

# Optimate5

## voltmatic

**MODEL : TM222 / TM223**

~ **AC : 100-240VAC ~ 50-60Hz**

**0.90A @ 100Vac / 0.40A @ 240Vac**

== **DC : 2.8A == 12V 4A == 6V**



**1 x 12V**

**STD / AGM-MF / GEL / CYCLIC CELL  
7.5 - 120Ah (48 hour charge)**



**1 x 6V**

**STD / AGM-MF / GEL / CYCLIC CELL  
10 - 192Ah (48 hour charge)**

**Automatic charger for 6 & 12V lead/acid batteries • Chargeur automatique pour batteries 6 & 12V plomb-acide • Cargador automático para baterías 6 & 12V plomo-ácido • Carregador automático para baterias de 6 & 12V chumbo/ácido • Automatische Ladegerät für 6 & 12V Blei-Säure Batterien • Automatische lader voor 6 & 12V loodzuur accu's • Caricabatterie automatico per batterie 6 & 12V piombo-acido • Automatisk diagnostisk laddare för 6 & 12V blybatterier**

### INSTRUCTIONS FOR USE

**IMPORTANT:** Read completely before charging

**EN**

### MODE D'EMPLOI

**IMPORTANT:** à lire avant d'utiliser l'appareil

**FR**

### MODO DE EMPLEO

**IMPORTANTE:** a leer antes de utilizar el aparato

**ES**

### INSTRUÇÕES DE UTILIZAÇÃO

**IMPORTANTE:** Ler antes de utilizar.

**PT**

### ANWENDUNGSVORSCHRIFTEN

**WICHTIG:** Vollständig vor der Benutzung lesen

**DE**

### GEBRUIKSAANWIJZING

**BELANGRIJK:** Lees volledig voor gebruik

**NL**

### ISTRUZIONI PER L'USO

**IMPORTANTE:** da leggere prima di utilizzare l'apparecchio

**IT**

### INSTRUKTIONER

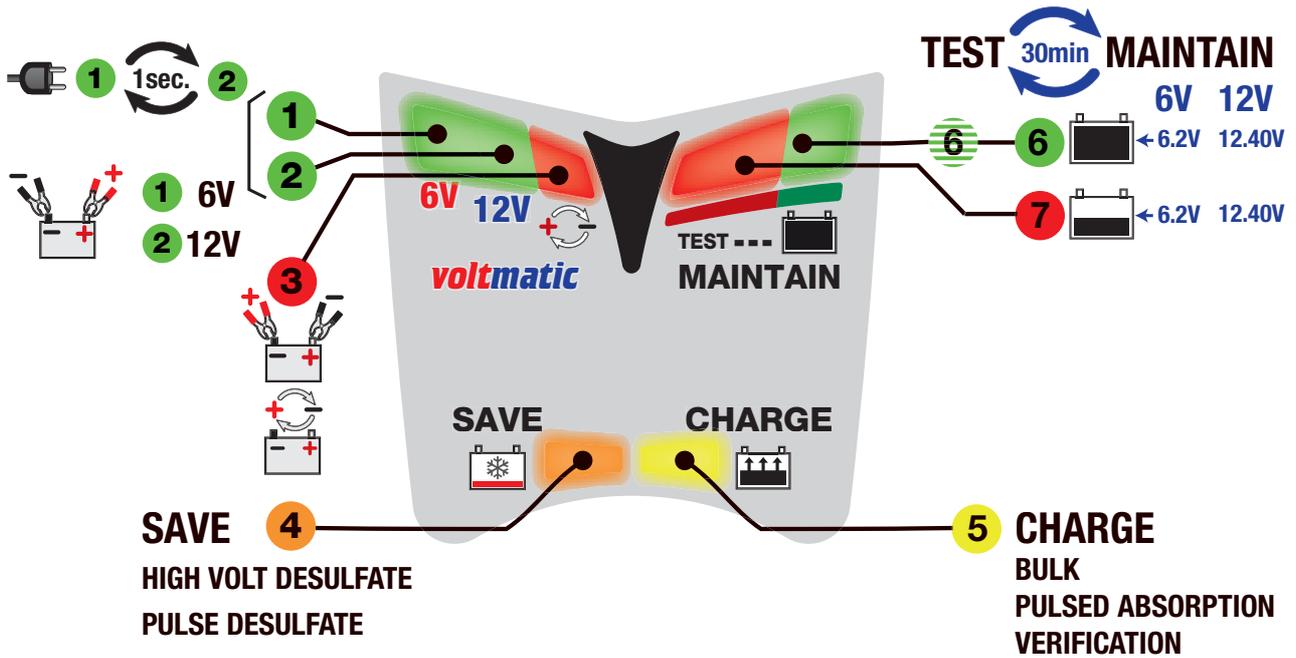
**VIKTIGT:** läs följande fullständiga instruktioner för användningen innan du använder laddaren

**SV**

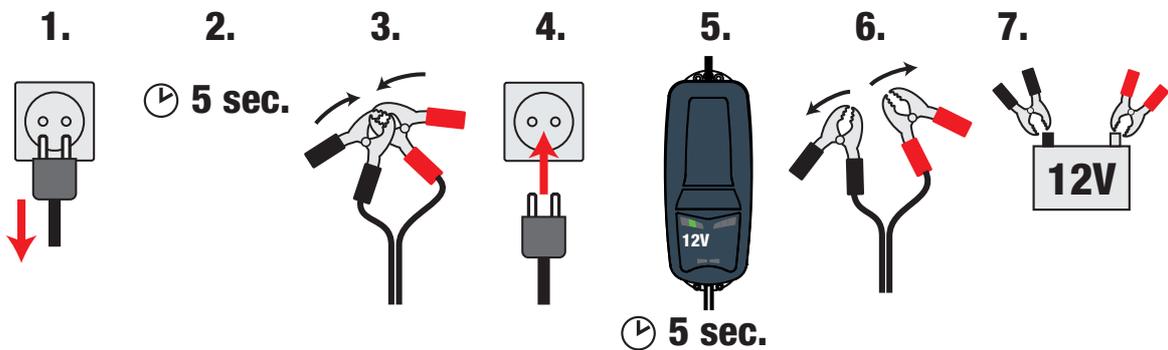
**tecMATE**

# Optimate5

## voltmatic



### PRE-SELECT 12V MODE: SAVE a low volt / FLAT 12V battery



**THIS PORTION OF THE MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS FOR THE OPTIMATE 5 BATTERY CHARGER. IT IS OF THE UTMOST IMPORTANCE THAT EACH TIME, BEFORE USING THE CHARGER, YOU READ AND EXACTLY FOLLOW THESE INSTRUCTIONS. SAVE THESE INSTRUCTIONS.**

### **AUTOMATIC CHARGER FOR 6 & 12V LEAD-ACID BATTERIES**

#### **DO NOT USE FOR NiCd, NiMH, Li-Ion OR NON-RECHARGEABLE BATTERIES.**

1. CAUTION : CLASS II APPLIANCE. DO NOT CONNECT TO GROUND.
2. For indoor use only. Do not expose charger to rain or snow.
3. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
5. An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used make sure that :
  - a) pins on plug of extension cord are the same number, size and shape as those of plug on charger.
  - b) the extension cord is properly wired and in good electrical condition, and
  - c) the conductor wire size is large enough for the AC ampere rating of the charger as specified in the table below.

AC INPUT RATING IN AMPERES		LENGTH OF CORD, FEET (m)	AWG SIZE OF CORD
Equal to or greater than	But less than		
2A	3A	25 (17.6)	18
		50 (15.2)	18
		100 (30.5)	14

6. Do not operate charger with damaged cord or plug - replace the cord or plug immediately.
7. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
8. Do not disassemble charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
9. To reduce risk of electric shock, unplug the charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk. Clean only with slightly moist, not wet, cloth. Do not use solvents.
10. WARNING - RISK OF EXPLOSIVE GASES.
  - a) WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU USE THE CHARGER.
  - b) To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in vicinity of the battery. Review cautionary marking on these products and on engine.

#### **11. PERSONAL PRECAUTIONS.**

- a) Someone should be within range of your voice OR close enough to come to your aid when you work near a lead-acid battery.
- b) Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- c) Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- d) If battery acid contacts or enters eye, flood eye with cold running water for at least 10 minutes and get medical attention immediately. If battery acid contacts skin or clothing, wash immediately with soap & water. If acid enters an eye, immediately flood eye with running cold water for at least 10 minutes & get medical attention immediately.
- e) NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- f) Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- g) Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- i) NEVER charge a frozen battery.

## 12. PREPARING TO CHARGE

- a) If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- b) Be sure area around battery is well ventilated while battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other non-metallic material as a fan.
- c) Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d) Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, such as valve regulated lead acid (VRLA) or absorbed glass mat (AGM) batteries, carefully follow manufacturer's recharging instructions.
- e) Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
- f) Determine voltage of battery by referring to vehicle or other user's manual and BEFORE MAKING THE BATTERY CONNECTIONS, MAKE SURE THAT THE VOLTAGE OF THE BATTERY YOU ARE GOING TO CHARGE MATCHES THE OUTPUT VOLTAGE OF THE CHARGER.

### 13. CHARGER LOCATION.

- a) Locate charger as far away from battery as DC cables permit.
- b) Never place charger directly above battery being charged; gases from battery will corrode and damage the charger. c) Never allow battery acid to drip on charger when reading gravity or filling battery. Do not operate charger in a closed-in area or restrict ventilation in any way.
- d) Do not set a battery on top of charger. IMPORTANT : Place charger on a hard flat surface or mount onto a vertical surface. Do not place on plastic, leather or textile surface.

## 14. DC CONNECTION PRECAUTIONS

- a) Connect and disconnect DC output clips only after setting any charger switches to off position and removing AC cord from electric outlet. Never allow clips to touch each other, however should this happen no damage will result to the charger circuit & the automatic charging programme will just reset to «start».
  - b) Attach clips to battery and chassis as indicated in 15(e), 15(f), and 16(b) through 16(d).
- NOTE : This battery charger has an automatic safety feature that will prevent it from operating if the battery has been inversely connected. Set charger switches to off position and/or remove AC cord from electrical outlet, disconnect the battery clips, then reconnect correctly according to the instructions below.

### 15. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR A BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY :

- a) Position AC and DC cords so as to reduce risk of damage by hood, door or moving engine part.
- b) Stay clear of fan -blades, belts, pulleys, and other parts that can cause injury to persons.
- c) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- d) Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (e). If positive post is grounded to the chassis, see (f).
- e) For negative-grounded vehicle, connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- f) For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- g) When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
- h) See operating instructions for length of charge information.

### 16. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY :

- a) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- b) This battery charger has an automatic safety feature that will prevent it from operating if the battery has been inversely connected. The charger does allow charge current unless a voltage of at least 2V is sensed.
- c) Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- d) Connect NEGATIVE (BLACK) charger clip to NEGATIVE (NEG, N, -) battery post of the battery.
- e) Do not face battery when making final connection.
- f) When disconnecting charger, always do so in reverse sequence of connecting procedure & break first connection while as far away from battery as practical.
- g) A marine (boat) battery must be removed & charged on shore. To charge it on board requires equipment specially designed for marine use.

# OptiMATE 5

## voltmatic

**AUTOMATIC DIAGNOSTIC CHARGER FOR 6V & 12V LEAD-ACID BATTERIES AS FOUND IN:**



EN

**DO NOT USE FOR NiCd, NiMH, Li-Ion OR NON-RECHARGEABLE BATTERIES.**

Input: 100-240V~ maximum 0.90A.

**IMPORTANT: READ THE FOLLOWING INSTRUCTIONS BEFORE USING THE CHARGER**

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.

**SAFETY WARNING AND NOTES: Batteries emit EXPLOSIVE GASES - prevent flame or sparks near batteries.**

Disconnect AC power supply before making or breaking DC/battery connections. Battery acid is highly corrosive. Wear protective clothing and eyewear and avoid contact. In case of accidental contact, wash immediately with soap and water. Check that the battery posts are not loose; if so, have the battery professionally assessed. If the battery posts are corroded, clean with a copper wire brush; if greasy or dirty clean with a rag damped in detergent. Use the charger only if the input and output leads and connectors are in good, undamaged condition. If the input cable is damaged, it is essential to have it replaced without delay by the manufacturer, his authorised service agent or a qualified workshop, to avoid danger. Protect your charger from acid and acid fumes and from damp and humid conditions both during use and in storage. Damage resulting from corrosion, oxidation or internal electrical short-circuiting is not covered by warranty. Distance the charger from the battery during charging to avoid contamination by or exposure to acid or acidic vapours. If using it in the horizontal orientation, place the charger on a hard, flat surface, but NOT on plastic, textile or leather. Use the fixing holes provided in the enclosure base to attach the charger to any convenient, sound vertical surface.

**EXPOSURE TO LIQUIDS:** This charger is designed to withstand exposure to liquids accidentally spilled or splashed onto the casing from above, or to light rainfall. Prolonged exposure to falling rain is inadvisable and longer service life will be obtained by minimizing such exposure. Failure of the charger due to oxidation resulting from the eventual penetration of liquid into the electronic components, connectors or plugs, is not covered by warranty.

**BATTERY CONNECTIONS:** 2 interchangeable connection sets are available, supplied with the charger is a set of battery clips for charging the battery off-vehicle, the other connection set comes with metal eyelet lugs for permanent connection to the battery posts, and re-sealable weatherproof cap on the connector that connects to the charger output cable. This connection set allows easy and sure connection of the charger to maintain the battery on-vehicle. The resealable weatherproof cap is designed to protect the connector from dirt and damp whenever the charger is not attached. Consult a professional service agent for assistance in attaching the metal eyelets to the battery posts. Secure the connector with weatherproof cap so that it cannot foul any moving part of the vehicle or the cable can be pinched or damaged by sharp edges. The in-line fuse in the eyelets connection set protects the battery against such accidental shorting across positive and negative conductors. Replace any burnt fuse only with a similar new fuse of 15A rating.

### CONNECTING THE CHARGER TO THE BATTERY

1. Disconnect AC power supply before making or breaking DC / battery connections.
2. If charging a battery in the vehicle with the battery clips, before making connections, first check that the battery clips can be safely and securely positioned clear from surrounding wiring, metal tubing or the chassis. Make connections in the following order: First connect to the battery terminal not connected to the chassis (normally positive), then connect the other battery clip (normally negative) to the chassis well away from the battery and fuel line. Always disconnect in reverse sequence.
3. When charging a battery out of the vehicle with the battery clips, place it in a well ventilated area. Connect the charger to the battery: RED clamp to POSITIVE (POS, P or +) terminal and BLACK clamp to NEGATIVE (NEG, N or -) terminal. Make sure the connections are firm and secure. Good contact is important.
4. **If the battery is deeply discharged (and possibly sulphated), remove from the vehicle and inspect the battery before connecting the charger for a recovery attempt.** Visually check the battery for mechanical defects such as a bulging or cracked casing, or signs of electrolyte leakage. If the battery has filler caps and the plates within the cells can be seen from the outside, examine the battery carefully to try to determine if any cells seem different to the others (for example, with white matter between the plates, plates touching). If mechanical defects are apparent do not attempt to charge the battery, have the battery professionally assessed.
5. **If the battery is new,** before connecting the charger read the battery manufacturer's safety and operational instructions carefully. If applicable, carefully and exactly follow acid filling instructions.

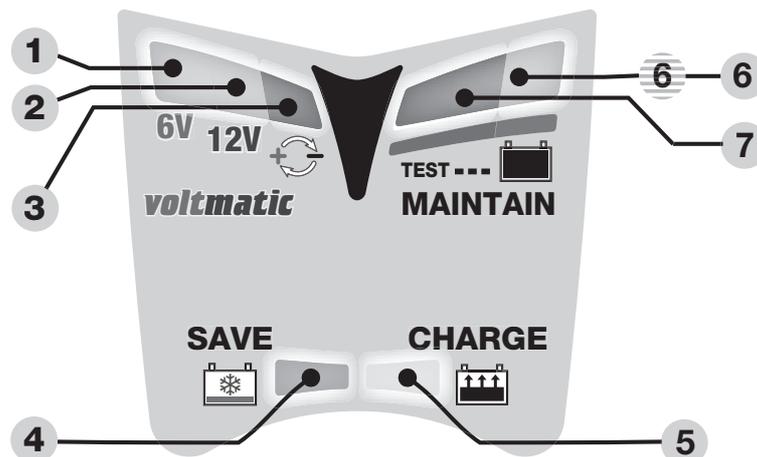
SAFETY

## USING THE OPTIMATE 5 *voltmatic*: PROCEEDING TO CHARGE

For safety reasons, the OptiMate output will only activate if a battery retaining at least 1V is connected, whereupon the circuit instantly diagnoses the battery condition and engages the appropriate charge mode and lights the corresponding charge status LED.

**ECO POWER SAVING MODE WHEN THE CHARGER IS CONNECTED TO AC SUPPLY:** To reduce long term power consumption OptiMate 5 employs two converter circuits, a power converter to charge the battery and an auxiliary converter to power the control circuitry and LED display. The power converter is switched off when the charger is not connected to a battery resulting in a very low power draw of less than 1,7W, equivalent to power consumption of 0.042 kWh per day. When a battery is connected to the charger power consumption depends on the current demand of the battery and its connected vehicle / electronic circuitry. After the battery has been charged and the charger is in long term maintenance charge mode (to keep the battery at 100% charge) the total power consumption is estimated to be 0.060 kWh or less per day.

The LED indicators referred to below, and the clauses dealing with them, are sequenced as they may come on through the course of the program.



**1. LED #1 (6V) & LED #2 (12V): Confirms AC Power supply to the charger.** LED #1 (6V) & LED #2 (12V) alternate until a battery is connected, where-after the *voltmatic* processor will select 6V or 12V charge mode according to battery voltage. Battery voltage lower than 8V: 6V charge mode is selected. Battery voltage higher than 8V: 12V charge mode is selected. **A very flat neglected 12V battery measuring less than 8V at the battery terminals will be selected as a 6V battery.**

**2. To save a low voltage 12V battery, 12V charging mode must be pre-selected as follows:**

STEP 1. Disconnect OptiMate 5 from AC power supply. STEP 2. Connect battery clips together. STEP 3. Reconnect OptiMate 5 to AC power supply. 12V LED flashes for 3 seconds and then turns on, confirming 12V mode is pre-selected. STEP 4. Connect OptiMate 5 to the 12V battery. Charging will proceed in 12V mode.

*NOTE: Once the 12V battery is disconnected after charging OptiMate 5 will return to **voltmatic** mode.*

**3. LED #3 indicates inverse polarity - wrong output connections. Swap around to activate output.**

**4. LED #4 SAVE / DESULPHATION MODE** Max. time: 2 hours

**4.1 SAVE mode for low voltage sulphated batteries unable to accept or hold a charge** - For a battery disconnected from vehicle wiring (*procedure described under point 4 of CONNECTING THE CHARGER TO THE BATTERY*) OptiMate 5 applies its *SAFE high voltage low current desulphation\** mode.

*\*The OptiMate SAFE low current, high voltage SAVE / DESULPHATION mode cannot engage if it senses that the battery is still connected to a vehicle wiring circuit. However, if the deep-discharged battery is not removed recovery will start with the low voltage PULSE desulphation mode. Desulphation is the electrochemical process of breaking up lead-sulfate crystals covering the surface of the battery's lead plates that prevents the battery from accepting and holding charge.*

**4.2 PULSE desulphation for low voltage batteries able to accept some charge** - Current is delivered in pulses and slowly increased to prepare the battery to accept full charge. *This mode is particularly effective for recovery of factory activated / "hi-performance" pure lead or cyclic cell AGM batteries.*

**5. LED #5: Charge, pulse absorption and cell equalization**

**5.1 BULK CHARGE:** Up to full current is delivered into the battery to increase the voltage up to 14.2 -14.5V for a 12V battery and 7.1 - 7.25V for a 6V battery.

**5.2 Pulsed absorption, cell equalization:** Current is delivered in pulses, varying between 0.4A and full current, within the voltage limit of 14.2 -14.5V for a 12V battery and 7.1 - 7.25V for a 6V battery.

**5.3 Verification:** After a 10 minute period of pulsed absorption the battery's charge progress is verified. If the battery requires further charging the program will revert to pulsed absorption. If the battery has accepted as much charge as its basic condition allows or the 2 hour pulsed absorption limit has been reached the voltage retention step follows.

**Charging time:** The time required for the OptiMate™5 to complete a charge on a flat but not severely discharged and otherwise undamaged battery is roughly equal to 1/3 the battery's Ah rating, so a 60Ah battery should take no more than about 20-25 hours to progress to the Maintenance charge cycle. Deep-discharged batteries may take significantly longer.

**For safety reasons there is an overall charge time limit of 72 hours for steps 4 and 5.**

## 6. LED #6 flashing: Voltage retention test

LED #6 flashes throughout the 30 minute test. NO CHARGE is delivered. A battery able to hold charge above 12.4V will proceed to the Maintenance charge cycle.

## 7. LED #6 on: Maintenance charge cycle

The maintenance charge cycle consists of 30 minute float charge periods alternating with a 30 minute 'rest' periods. During the 30 minute charge period current is offered to the battery within a safe voltage limit ("float charge" 6.8V for a 6V battery and 13.6V for a 12V battery), allowing it to draw whatever small current is necessary to maintain it at full charge and compensate for any small electrical loads imposed by vehicle accessories or on-board computer, or the natural gradual self-discharge of the battery itself.

During the 30 minute 'rest' cycle the charger automatically disconnects from the battery and no charge is delivered. The 30 minute charge, 30 minute rest "50% duty cycle" prevents loss of electrolyte in sealed batteries and minimizes gradual loss of water from the electrolyte in batteries with filler caps, and thereby contributes significantly to optimizing the service life of irregularly or seasonally used batteries.

**Maintaining a battery for extended periods:** The OptiMate will maintain a battery for months at a time, keeping the battery at 100% charge, but never overcharging. At least once every two weeks, check that the connections between the charger and battery are secure, and, in the case of batteries with filler caps on each cell, disconnect the battery from the charger, check the level of the electrolyte and if necessary, top up the cells (**with distilled water, NOT acid**), then reconnect. When handling batteries or in their vicinity, always take care to observe the SAFETY WARNINGS above.

## 8. LED #7 on: Failed Voltage retention test

If the battery voltage falls below 12.4V during the voltage retention test **LED #7 (red)\*\*** will come on and indicate steadily. A charge is delivered to the battery for a period of 30 minutes after which the Voltage retention test (point 6) is repeated. A repeated red light means that after being charged the battery's voltage is not being sustained or that despite recovery attempts the battery was irrecoverable. Always remove the battery from the vehicle, reconnect the OptiMate™ and allow it to proceed through its programme once more.

**9. LED #7 flashing:** a neglected / sulphated 12V battery may have been too low to trigger the 12V charge mode. Pre-select the 12V setting per point 2 and charge again.

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## LIMITED WARRANTY

TecMate (International) SA, Sint-Truidensesteenweg 252, B-3300 Tienen, Belgium, makes this limited warranty to the original purchaser at retail of this product. This limited warranty is not transferable. TecMate (International) warrants this battery charger for three years from date of purchase at retail against defective material or workmanship. If such should occur the unit will be repaired or replaced at the option of the manufacturer. It is the obligation of the purchaser to forward the unit together with proof of purchase (see NOTE), transportation or mailing costs prepaid, to the manufacturer or its authorized representative. This limited warranty is void if the product is misused, subjected to careless handling, or repaired by anyone other than the factory or its authorized representative. The manufacturer makes no warranty other than this limited warranty and expressly excludes any implied warranty including any warranty for consequential damages.

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NOTE: Details at [www.tecmate.com/warranty](http://www.tecmate.com/warranty).

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