

# Optimate 2

## Duo 12V2A

MODEL: TM550, TM551, TM552, TM557, TM558

~ AC: 100 – 240VAC ~ 50-60Hz  
0.54A @ 100V ~ / 0.31A @ 240V ~  
== DC: 12V / 12.8V == 2A

# Optimate 2

## Duo 12V2A x2 DUAL BANK

MODEL: TM570, TM571, TM572

~ AC: 100 – 240VAC ~ 50-60Hz  
1.08A @ 100V ~ / 0.62A @ 240V ~  
== DC: 12V / 12.8V == 2A x 2

# Optimate 2

## Duo 12V2A x4 QUAD BANK

MODEL: TM574, TM575, TM576, TM577, TM578

~ AC: 100 – 240VAC ~ 50-60Hz  
2.16A @ 100V ~ / 1.24A @ 240V ~  
== DC: 12V / 12.8V == 2A x 4



12V / 12.8V  
STD / AGM / GEL / LiFePO<sub>4</sub>  
6 - 96Ah

Automatic charger for 12V lead-acid & 12.8V LiFePO<sub>4</sub> batteries

**INSTRUCTIONS FOR USE**  
IMPORTANT: Read completely  
before charging

EN

# Optimate 2

**Duo 12V2A**



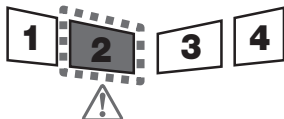
**Optimate 2 x2**  
**Duo 12V2A** DUAL BANK

**Optimate 2 x4**  
**Duo 12V2A** QUAD BANK



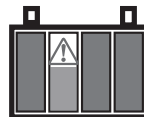
PbSO4	%	0	10	25	50	75	90
<b>AGM</b>	V	10.5V	12.0V	12.20V	12.40V	12.60V	12.8V +
<b>STD</b>	V	10.5V	11.8V	12.00V	12.20V	12.40V	12.6V +

V < 12.20V



LiFePO4	%	0	10	30	50	70	90
<b>LFP/LiFe</b>	V	8V	12.8V	13.00V	13.10V	13.20V	13.3V +

V < 12.20V



# Optimate 2

## Duo 12V2A

## IMPORTANT SAFETY INSTRUCTIONS

EN

**SAVE THESE INSTRUCTIONS. IT IS OF THE UTMOST IMPORTANCE THAT EACH TIME, BEFORE USING THE BATTERY CHARGER, YOU COMPLETELY FAMILIARIZE YOURSELF WITH THESE SAFETY INSTRUCTIONS.**

**AUTOMATIC BATTERY CHARGER FOR 12V LEAD-ACID & 12.8V LiFePO<sub>4</sub> BATTERIES. DO NOT USE FOR NiCd, NiMH, or any other types of Li-Ion OR NON-RECHARGEABLE BATTERIES.**

### 1. GENERAL BATTERY CHARGER PRECAUTIONS.

**CAUTION : DO NOT CONNECT TO GROUND.** Do not expose charger to rain or snow. 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. To reduce risk of damage to electric plug and cord/cable, pull by plug rather than cord/cable when disconnecting charger. Do not operate charger with damaged cord or plug - If the cable is damaged, it is essential to have it replaced without delay by the manufacturer, an authorised service agent or a qualified workshop, to avoid danger. Do not operate charger if it has received a sharp blow, been dropped, or has been otherwise damaged in any way; take it to a qualified Service Technician. 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. Before attempting any maintenance or cleaning, to reduce risk of electric shock, unplug the charger from the AC outlet and the battery. Clean only with slightly moist, not wet, cloth. Do not use solvents.

### 2. AC EXTENSION CORDS/CABLES.

An extension cord/cable 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

### 3. WARNING - RISK OF EXPLOSIVE GASES.

IMPORTANT SAFETY INSTRUCTIONS

a) Working in the vicinity of a battery is dangerous. Lead-acid batteries generate explosive gasses 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.

4. 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. 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 the battery or other electrical part that may cause explosion. g) Remove personal metal items such as rings, bracelets, necklaces, and watches when working with any battery. A lead-acid or lithium battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn. h) NEVER charge a frozen battery.

5. CHARGER LOCATION: a) Do not operate charger in a closed-in area or restrict ventilation in any way. b) Locate charger as far away from battery as DC cables permit. c) Never place charger directly above battery being charged; gases from battery can corrode and damage the charger. d) Never allow battery acid to drip on charger when reading gravity or filling battery. e) 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.

6. DC CONNECTION PRECAUTIONS: a) Connect and disconnect DC output clips only after removing AC cord from electric outlet. Never allow clips to touch each other. b) Attach clips to battery and chassis as indicated in 8(e), 8(f), and 9(a) through 9(d).

**NOTE** : This battery charger has an automatic safety feature that will prevent it from operating if the battery has been inversely connected. Remove AC cord from electrical outlet, disconnect the battery clips, then reconnect correctly according to the instructions below.

7. PREPARING THE BATTERY: a) 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.

b) If it is necessary to remove battery from vehicle to charge, make sure all accessories in the vehicle are off, so as not to cause an arc. First remove grounded terminal (normally marked NEGATIVE (NEG, N,-) from battery first, then the terminal marked POSITIVE (POS, P, +).

**c) Place the battery in a well ventilated area.**

d) 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.

e) Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.

f) For lead-acid batteries with removable filler caps, 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.

g) For a battery without cell caps, such as valve regulated lead-acid (VRLA), absorbed glass mat (AGM) lead-acid or Lithium (LiFePO4) batteries, carefully follow manufacturer's recharging instructions.

h) Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

i) 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 battery charger.

**8. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE AND YOU CHOOSE TO USE BATTERY CLIPS TO CHARGE THE BATTERY. 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 the vehicle itself or moving engine parts. b) Stay clear of fan blades, belts, chains, sprockets, pulleys, and other vehicle parts that can cause injury to persons or damage to the charger and its cords/cables.

c) Check polarity of battery posts. On automotive batteries 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 modern 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 carburettor, 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.

## 9. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE OF THE VEHICLE OR HAS BEEN REMOVED FROM THE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

a) Check polarity of battery posts. The POSITIVE (POS, P, + ) and NEGATIVE (NEG, N, - ) battery posts will be clearly marked. b) Connect the POSITIVE (RED) charger clip to POSITIVE (POS, P, + ) post of battery. c) Then connect the NEGATIVE (BLACK) charger clip to the NEGATIVE (NEG, N, - ) post of the battery. d) When disconnecting charger, always do so in reverse sequence of connecting procedure & break first connection while as far away from battery as practical.

10. SAFE USE BY MINORS OR PERSONS WITH REDUCED CAPABILITIES: a) This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge only if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

b) Choking Hazard. Accessories may present a choking hazard to children. Do not leave children unattended with product or any accessory. The product is not a toy.

11. RADIO FREQUENCY INTERFERENCE: The OptiMate DUO complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

12. PROPOSITION 65, STATE OF CALIFORNIA: Battery posts / terminals, and related accessories may contain chemicals, including lead or sulphuric acid. These materials are known to the State of California to cause cancer and birth defects and other reproductive harm.

## OPTIMATE 2 DUO: CONNECTION ACCESSORIES

Two interchangeable connection sets are supplied with the battery charger:

1) A battery lead with metal eyelet lugs for permanent fitment to the battery posts, and re-sealable weatherproof cap on the on the connector that connects to the charger output cable. 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.

**IMPORTANT:** This battery lead is protected by a 15A fuse. If under any circumstance the fuse blows, do not try and replace the fuse without first identifying and correcting the issue that caused the fuse to blow. Only replace the fuse with a 15A rated ATO fuse.

2) A set of battery clips for charging the battery on or off-vehicle. Read **IMPORTANT SAFETY INSTRUCTIONS** points 8 or 9 before connecting to the battery.

**OPTIONAL BATTERY CONNECTION:** On some vehicles it is possible to charge the battery through the fitted auxiliary 12V DIN/ISO 4165 power socket. The battery can only be charged and maintained if the 12V socket remains powered up after the ignition has been turned off and the vehicle has been parked. Find a suitable accessory at [www.optimate1.com](http://www.optimate1.com).

## USING THE OPTIMATE 2 DUO: PROCEEDING TO CHARGE

**For safety reasons, the OptiMate output will only activate if a battery retaining at least 4V is connected.**

### LED PANEL:



**NOTE: Charge stations / banks on OptiMate2 DUOx2 / OptiMate2 DUOx4 operate independently.**

**LED #1 - Power on. Confirms AC power supply to the charger.**

**LED #2 : ERROR - requires user interaction.**

**REVERSE POLARITY PROTECTION** - Lights when the battery connections are incorrect. The charger is electronically protected so no damage will result, and the output will remain disabled until the connections are corrected.

**FAULTY BATTERY** - Blinks / flashes if battery could not hold a basic charge, possible due to

permanent damage within one or more cells.

*WARNING: Do not attempt to charge again. Have the battery professionally assessed. This is especially important for LiFePO4 lithium batteries where continued charging of a damaged battery could cause it to overheat.*

### **LED #3 - Low Volt Save, Charge and Charge verification**

**STEP1:** LOW VOLT SAVE (4V - 13V): LED #3 blinks (on-off-on-off) to confirm the battery is deep discharged. For Lithium (LiFePO4) batteries current is limited to 0.3A so that the battery may gently recover to a safe voltage level of 8.8 Volts, after which current increases to 1A. Charge progress is carefully monitored. For lead-acid / AGM batteries charge may be delivered in pulses to prepare the battery to accept normal charge. Charge time: Minimum 15 minutes, maximum 4 hours.

**VERY FLAT NEGLECTED BATTERIES: Pay particularly close attention to the following which is especially important for relatively small batteries such as those used on motorcycles, lawn tractors, jet-ski's, snowmobiles and similar:** A battery left deep-discharged for an extended period may develop permanent damage in one or more cells. Such batteries may heat up excessively during high current charging.

Monitor the battery temperature during the first hour, then hourly there-after. Check for unusual signs, such as bubbling or leaking electrolyte, heightened activity in one cell compared to others, or hissing sounds. If at any time the battery is uncomfortably hot to touch or you notice any unusual signs, DISCONNECT THE CHARGER IMMEDIATELY.

**STEP 2: HEALTH TEST:** A test is performed to determine if the battery can continue receiving charge. If the battery is deemed healthy, charging continues to STEP 3. If a fault has been detected, charging is immediately suspended and LED #2 will blink. See FAULTY BATTERY above.

**STEP 3 : CHARGE (LED #3 yellow):** The BULK CHARGE stage delivers a constant current of about 2 Amps maximum into the battery, up to a voltage of 14.2 - 14.4V.

**STEP 4 : VERIFICATION:** Battery charge level is verified. Variable current pulses are delivered to bring all cells to equal and full charge.

NOTE: For safety reasons there is an overall charge time limit of 48 hours, after which the program automatically advances to STEP 5. See expected Charging time below.

**LED# 4 (green) - 24-7 BATTERY MAINTENANCE.** STEP 5 (Test) and STEP 6 (Float Charge) alternate half-hourly until the battery is disconnected.

**STEP 5:** Test (30 min) - NO CHARGE CURRENT is delivered and the battery voltage is monitored.

First test following progression from STEP 4: For a battery able to hold a nominal charge, the program will progress to STEP 6, otherwise LED #2 will blink indicating a faulty battery (see above). Subsequent tests: the need for hourly maintenance charge is determined, influenced by the connected battery type and its state of health and continuous draw from stored vehicle's circuitry. Charge is delivered if voltage has reduced below 13.3V. A healthy lithium battery may occasionally



receive charge, but a sealed AGM or standard lead-acid battery is expected to receive charge during every hour of maintenance. See page 2 for % State Of Charge by battery type.

**STEP 6:** Float charge (30 min) at a safe voltage limit of 13.6V and current up to 2A is available.

NOTE: If a sudden high loss of charge is detected (e.g. vehicle ignition turned on, or engine starting up whilst the OptiMate remains connected) the program may revert to STEP 3 to bring the battery back to full charge before continuing with 24-7 battery maintenance.

**Maintaining a battery for extended periods:** The OptiMate will maintain a battery whose basic condition is good, for months at a time. At least once every two weeks, check that the connections between the charger and battery are secure, and, in the case of lead-acid 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 described under the section IMPORTANT SAFETY INSTRUCTIONS.

**Charging time:** The time required for the OptiMate 2 DUO to complete a charge on a flat but otherwise undamaged battery is roughly equal to 0.5x the battery's Ah rating, so a 42Ah battery should take no more than about 21 hours to progress to Step 4. Deep-discharged batteries may take significantly longer.

**ECO POWER SAVING MODE WHEN THE CHARGER IS CONNECTED TO AC SUPPLY:** The power converter switches to ECO mode when the charger is not connected to a battery resulting in a very low power draw of less than 0.5W, equivalent to power consumption of 0.012 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.