



Instruction Disclaimer

Dennis Kirk provides instructions to help our customers better understand how to install the products we sell. The instructions are exact copies of what the manufacturer includes with the product being sold.

That means the quality and accuracy of the instructions is solely dependent on what the manufacturer produces. We do our best to make the text legible and the pictures viewable. However, the end result depends largely on the quality of instructions the manufacturer provides.

Therefore, you will find that some instructions are not of the highest quality. Sometimes text is hard to read and pictures are not easy to see. At times you will find the overall look of the instructions to be less than professional. However, we feel it is better to provide what we have rather than provide nothing at all.

To the best of our knowledge the instructions and application information contained in the instructions is accurate. However, Dennis Kirk assumes no liability related to any errors that may be contained in the copy of the manufacturer's instructions we provide. Buyers are solely responsible to insure that product use is consistent with their application.

If you have any questions please contact us at customerservice@denniskirk.com or 800-969-7501 so we can further assist you regarding additional product information or any other business related questions.

Thank you for doing business with Dennis Kirk.

Optimate 1 (DUO)

MODEL: TM413 (Canada/USA) / TM414 (EU)

~ AC: 100 - 240VAC ~ 50-60Hz
0.19A @ 100V ~ / 0.12A @ 240V ~

== DC: 12V == 0.6A 12.8V == 0.6A

1 x 12V / 12.8V
STD / AGM / GEL / LiFePO₄
2 - 20Ah



Automatic charger for 12V lead-acid & 12.8V LiFePO₄ batteries

Chargeur automatique pour batteries 12V plomb-acide & 12.8V LiFePO₄

Cargador automático para baterías 12V plomo-ácido & 12.8V LiFePO₄

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



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THIS PORTION OF THE MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS FOR THE OPTIMATE 1 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.

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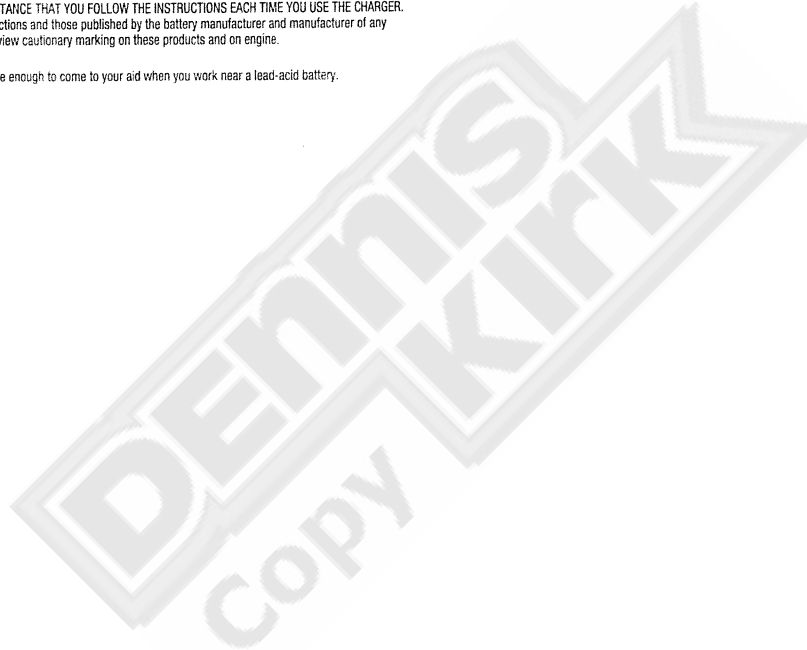
AUTOMATIC CHARGER FOR 12V LEAD-ACID & 12.8V LiFePO₄ BATTERIES

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 (7.6) | 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 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 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.
- h) 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).

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SAFETY



- 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 not allow charge current unless a voltage of at least 4V 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.

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Optimate 1

DUO

AUTOMATIC MAINTENANCE CHARGER FOR 12V LEAD-ACID / 12.8V LITHIUM (LiFePO₄) BATTERIES FROM 2Ah TO 20Ah, AS FOUND IN:



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

IMPORTANT: READ THE FOLLOWING INSTRUCTIONS BEFORE USING THE CHARGER

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 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.

SAFETY WARNING AND NOTES: Batteries emit EXPLOSIVE GASES - prevent flame or sparks near batteries. Charge the battery in a well ventilated area. 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 dampened in detergent. Use the charger only if the input and output leads and connectors are in good, undamaged condition. **If the 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: Failure of the charger due to oxidation resulting from the 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.

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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, 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.

USING THE OPTIMATE 1: PROCEEDING TO CHARGE

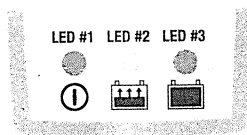
AC SUPPLY: GLOBAL 100-240Vac 50-60Hz.

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

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 thereafter. 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.

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.



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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.

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

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

No charging following connection to a battery -voltage below 4V or wrong output connections. Swap around to activate output.

LED #2 - Charge and charge verification

STEP1: LOW VOLT SAVE (from 4V) to 8.8V (LED #2 flashing) : Current is limited to 200mA so that the battery may gently recover to a safe voltage level of 8.8 Volts, after which current up to 0.6A is delivered in pulses to prepare the battery to accept normal charge. Charge time: Minimum 15 minutes, maximum 2 hours.

STEP2: CHARGE: The BULK CHARGE stage (LED #2) delivers a constant current of about 0.6 Amps maximum into the battery, up to a voltage of 14.2 -14.5V.

STEP3 : VERIFICATION: For 30 minutes the program verifies the charge level. If the battery requires further charging the programme reverts to BULK CHARGE for brief periods, delivering a variable current pulse to the battery. These reversions may occur as many times as is necessary to reduce the battery's current demand below 200mA at 13.6V (which is consistent with a battery that has accepted as much charge as its basic condition allows). See expected Charging time below.



NOTE: For safety reasons there is an overall charge time limit of 24 hours, after which the program advances to STEP4.

LED# 3 - STEP4 : Voltage retention tests alternating half-hourly with battery maintenance

Voltage retention test - NO CHARGE CURRENT is delivered for up to 30 minutes or until the voltage drops below 13.3V.

Maintenance - float charge at a safe voltage limit of 13.6V and up to 0.6A is available .

The battery can draw current as required to support small loads and counter self-discharge. Maintenance and voltage retention test periods continue alternating half-hourly until the battery is disconnected.

Battery problems / not charging :

1. LED #3 will not light or LED#2 and #3 alternate every 1-2 seconds: the battery may be unable to accept or hold sufficient charge, or, in the case of a battery still connected to the vehicle's wiring system, it may be signaling a loss of current through deteriorated wiring or a degraded switch or contact, or in-circuit current-consuming accessories. Disconnect OptiMate from AC supply and the battery, then :

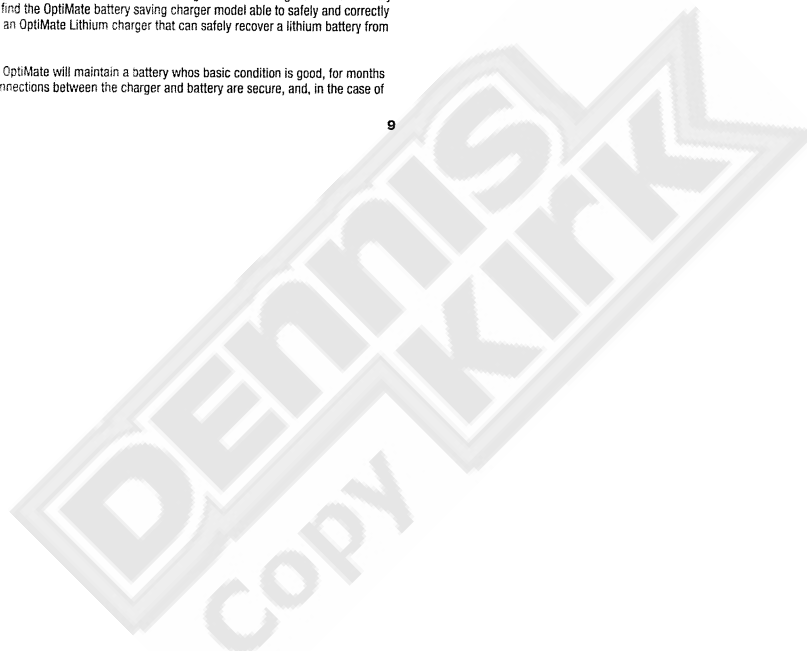
- a) if still connected to vehicle wiring, remove the battery from the vehicle. inspect and if the battery appears physically undamaged, then for 1 hour, allow for the voltage to recover.
- b) if the battery is in a very cold environment, move the battery where temperature is at least 15°C (60°F) and then for 1 hour (or up to 24 hours if the battery was stored below freezing) allow the battery to warm up naturally.

DO NOT ATTEMPT TO WARM THE BATTERY ARTIFICIALLY.

Then, reconnect OptiMate to the battery and then reconnect OptiMate to AC power. If the problem persists, read point 2 below.

2. This OptiMate charger's primary function is to charge and maintain batteries that are in good health or might have been mildly over discharged. Go to www.optimate1.com and find the OptiMate battery saving charger model able to safely and correctly recover a severely sulphated lead-acid battery or an OptiMate Lithium charger that can safely recover a lithium battery from a severely discharged state.

Maintaining a battery for extended periods: The OptiMate will maintain a battery whos 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



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.

Charging time: The time required for the OptiMate 1 DUO to complete a charge on a flat but otherwise undamaged battery is roughly equal to 1.5x the battery's Ah rating, so a 14Ah battery should take no more than about 21 hours to progress to Step 3. Deep-discharged batteries may take significantly longer.

