

OptIMATE

DC → DC

12V
↓
12V 2A

MODEL: TM500

INPUT --- DC: 12V-16VDC 2.7A max.

OUTPUT --- DC: 2A --- 12V

DC IN / Courant d'entrée directe /
Gelijkstroom-ingang / entrada de corriente
directa / ingresso diretto di corrente /
entrada decorrente direta / Likström ingång /
Gleichstrom-Eingang

 12V - 16V
STD / AGM-MF / GEL /
AGM CYCLIC CELL / LITHIUM

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

 1 x 12V
STD / AGM-MF / GEL / CYCLIC CELL
6 - 96Ah

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

**12V SOURCE BATTERY
/ DC SUPPLY**

12-16V == 12V 2.7A max

DC IN / Courant d'entrée directe /
Gelijkstroom-ingang / entrada de
corriente directa / ingresso diretto di
corrente /entrada decorrente direta /
Likström ingång / Gleichstrom-Eingang



Model: TM500



OUTPUT/SORTIE/SALIDA/LEISTUNG/
USCITA/UITGANG/UTSPÄNNING/
SAIDA: **12V == 2A**

OptiMATE **12V**
DC → DC **12V 2A**

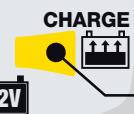
**DESULPHATING
CHARGER + TESTER
MICROPROCESSOR**

12V AGM GEL STD

LED #1
SOURCE
BATTERY
LOW

LED #2
REVERSE
POLARITY

LED #3
SAVE
1V→12.4V



LED #5
LED #6
TEST &
MAINTAIN

LED #4
CHARGE
12.4V→14.4V

**12V BATTERY FOR
CHARGING & MAINTENANCE**



IMPORTANT SAFETY INSTRUCTIONS FOR CANADA & USA

THIS PORTION OF THE MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS FOR THE OPTIMATE DC-DC 12V 2A 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.

EN

SAFETY

AUTOMATIC CHARGER FOR 12V LEAD-ACID BATTERIES

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

1. CAUTION : 12V DC APPLIANCE. DO NOT CONNECT TO AC POWER .
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 DC ampere rating of the charger as specified in the table below.

DC 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) 50 (15.2) 100 (30.5)
		18 16 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 supply 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 DC cord from supply. 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 DC cord from the DC supply, 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 not allow charge current unless a voltage of at least 1V 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.



AUTOMATIC MAINTENANCE CHARGER FOR 12V LEAD-ACID BATTERIES FROM 6Ah TO 96Ah, AS FOUND IN:

EN

SAFETY



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

Input: 12 - 16VDC 2.7A max. (12V BATTERY OR 15V 3A DC SUPPLY)

Charge rate: approximately 2 Ah / hour, will recharge a 96Ah battery in 48 hours.

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. Disconnect DC input 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: INPUT: A set of fused battery clips is supplied. OUTPUT: 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 SOURCE BATTERY before making or breaking DC / battery connections of battery under charge.
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. **CHARGING:** For safety reasons, the OptiMate output will only activate if a battery retaining at least 1V is connected. 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.
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 DC-DC FOR LEAD-ACID: PROCEEDING TO CHARGE

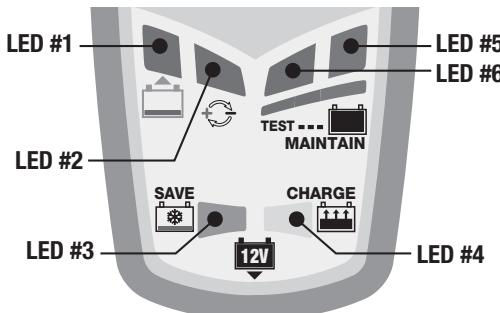
CONNECTING THE CHARGER TO A DC SUPPLY (DC adapter rated at minimum 15V 3A or a fully charged 12V battery): When the OptiMate DC-DC 12V 2A is connected to a SOURCE BATTERY or DC supply measuring at least 12V (range: 12-16V) LED #3 and #4 will flash twice and then continue to slowly flash for one minute to indicate it is ready for a battery requiring charge & maintenance to be connected. If a battery is not connected the charger shuts off completely. To restart the charger, disconnect and then reconnect once again to the SOURCE BATTERY or DC supply.

SOURCE BATTERY: Source battery capacity (in Ah) should ideally be 1.5 times higher than the battery to be charged. E.G. to recharge a flat 10Ah battery, you need a 15Ah source battery. The 12V SOURCE BATTERY should ideally be rated for deep cycle use.

POWER CONSUMPTION FROM SOURCE BATTERY WHEN MAINTAINING A VEHICLE BATTERY: The power consumption depends on the current demand of vehicle / electronic circuitry from the battery to be maintained. As an easy reference: For every 10mA of drain current by vehicle / connected circuitry, assume a drain of 0.30Ah per day (24 hours) from the source battery. E.G. Source battery min. capacity for a 90 day period if current drain from vehicle battery is 10mA : $0.3\text{Ah} \times 90 = 27\text{Ah}$.

CHARGING TIME: The time required for the OptiMate DC-DC 12V 2A to complete a charge on a flat but otherwise undamaged battery is roughly equal to 1/2 the battery's Ah rating, so a 10Ah battery should take no more than about 5 hours to progress to Step 4. Deep-discharged batteries may take significantly longer.

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 - Lights to warn the SOURCE BATTERY voltage has reduced below 12V (low charge level). Recharge and reconnect for further maintenance. Once the SOURCE BATTERY voltage reduces below 10V OptiMate DC-DC 12V 2A will shut off to avoid deep discharging the SOURCE BATTERY.

2. LED #2 indicates inverse polarity - wrong output connections. Swap around to activate output.

3. LED #3 SAVE lights If the battery is extremely flat (deep-discharged or sulphated), Time: 2 hours.

3.1 STANDARD recovery for neglected batteries - LED #3 steady on : Up to 16V is applied with current limited to 0.2A. If the battery is unable to accept a charge TURBO recovery will engage after 5 seconds. Batteries able to accept 0.2A of charge current will advance to PULSE recovery.

3.2 TURBO recovery for very badly neglected batteries removed from the vehicle - Output voltage increases to a maximum of 20V with current limited to 0.2A. *The charger's special recovery mode cannot engage if it senses that the battery is still connected to a vehicle wiring circuit which effectively offers a lower electrical resistance than the battery on its own. However, if the deep-discharged battery is not removed for recovery, neither battery nor vehicle electronics will be damaged.*

3.3 PULSE recovery - LED #3 steady on: Current up to 2A is delivered in pulses to prepare the battery to accept normal charge. *This mode is particularly effective for recovery of factory activated / "hi-performance" pure lead or cyclic cell AGM batteries.*

4. LED #4 Charge and charge verification

4.1 CHARGE: The BULK CHARGE stage delivers a constant current of about 2 Amps into the battery, up to a voltage of 14.2 -14.5V.

4.2 VERIFICATION: 2 hours maximum: The circuit verifies battery 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 48 hours.

5. VOLTAGE RETENTION TEST: LED #5 flashing

Delivery of current to the battery is interrupted for 30 minutes to allow the program to determine the battery's ability to retain charge. For batteries with a good state of health LED #5 (green) should continue to flash for the full 30 minute period. Read the section NOTES ON TEST RESULTS on reasons for poor test results or how to test a battery that returns a good result but cannot deliver sufficient power once it is returned to service.

6. MAINTENANCE CHARGE: LED #5 / 6

LED #5 or 6 indicates depending on the outcome of the voltage retention test.

The maintenance charge mode is designed to preserve the DC source battery whilst maintaining the battery connected for maintenance at full charge. A charge period intermittently alternates with a monitor period. Length of charge and/or monitor period depends on the drain of connected circuitry from the MAINTAINED battery.

A charge period is activated when voltage of the maintained battery reduces below 12.9V and continues until the voltage reaches 13.6V. LED #5 or 6 indicates continuously during the charge period.

During a monitoring period no charge is delivered. Current draw from the SOURCE battery is limited to what the charger requires to monitor the MAINTAINED battery. During battery monitoring mode LED #5 or 6 will flash every 10 seconds to indicate battery status (as determined during the previous voltage retention test).

The charge and monitor cycles will repeat until either the SOURCE battery (or DC supply) or MAINTAINED battery is disconnected or the SOURCE battery is completely discharged.

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 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.

Notes on TEST results:

1. If the red LED #6 lights a significant problem exists. The red LED means that after being charged the battery's voltage is not being sustained above 12.4V (roughly equal to 50% charge in a sealed AGM battery) or that despite recovery attempts the battery was irrecoverable. This may be due to a defect in the battery itself, such as a short-circuited cell or total sulphation, or, in the case of a battery still connected to the electrical system it supports, the red LED #6 may be signalling a loss of current through deteriorated wiring or a degraded switch or contact, or in-circuit current-consuming accessories. A sudden load such as vehicle headlights being switched on while the charger is connected can also cause the battery voltage to dip significantly.

2. GOOD TEST RESULT, but the battery cannot deliver sufficient power: Permanent damage within the battery may be causing excessive self discharge (caused by the battery itself, even a partly damaged battery may initially retain sufficient power, but lose power faster than normal thereafter). Disconnect the battery from the OptiMate. After at least 12 hours reconnect and observe if SAVE LED #3 lights, indicating the battery was unable to hold charge. If CHARGE LED #4 lights the battery retained at least 12.4V.

MOUNTING NOTICE

NOTICE DE MONTAGE

NOTA PARA EL MONTAJE

NOTA DA MONTAGEM

WANDMONTIERUNG

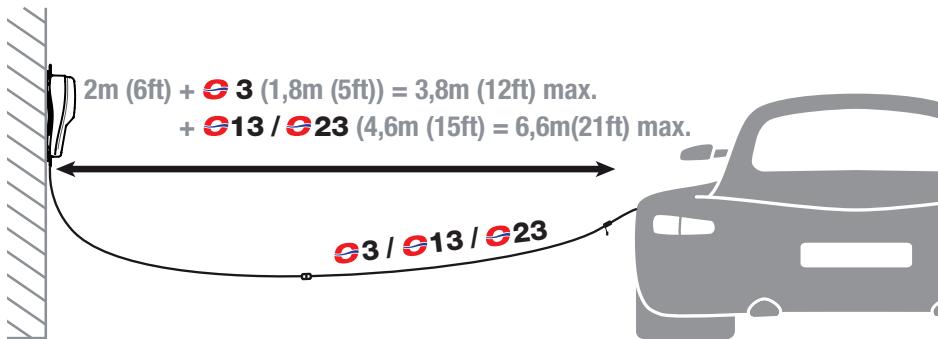
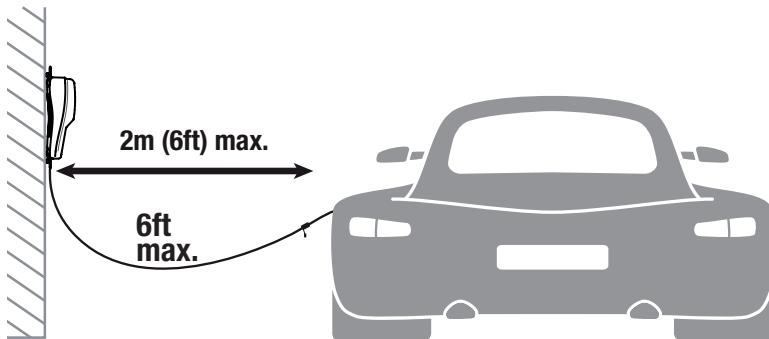
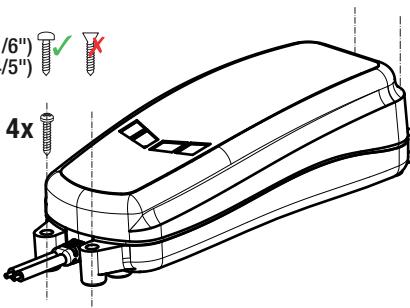
MUURBEVESTIGING

NOTA DEL MONTAGGIO

VÄGGMONTERING

ИНСТРУКЦИЯ ПО МОНТАЖУ

$\varnothing 4.5\text{mm}$ (1/6") ✓
L +20mm (+4/5") ✗





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