



Deltran Battery Tender®
12V/24V/36V/48V On-Board Chargers
Designed for 12V/24V/36V/48V
STANDARD/AGM/LITHIUM Batteries



Battery Tender®
 12V 26Amp On-Board Charger
 P/N 022-2011-DL-WH



Battery Tender®
 24V 20Amp On-Board Charger
 P/N 022-2012-DL-WH



Battery Tender®
 36V 18Amp On-Board Charger
 P/N 022-2013-DL-WH



Battery Tender®
 48V 15Amp On-Board Charger
 P/N 022-2014-DL-WH

IMPORTANT SAFETY INSTRUCTIONS

- 1) **SAVE THESE INSTRUCTIONS** – This manual contains important safety and operating instructions for battery charger models P/N's 022-2011, 022-2012, 022-2013, 022-2014.
 - 2) Do not expose the 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 the 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 necessary. Use of improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
 - a) The pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
 - b) That extension cord is properly wired and in good electrical condition; and
 - c) That wire size is large enough for ac ampere rating of the charger.
 - 6) Do not operate charger with damaged cord or plug – contact Deltran Battery Tender®.
 - 7) Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; contact Deltran Battery Tender®
 - 8) Do not disassemble the charger; contact Deltran Battery Tender® 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 charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
 - 10) **WARNING – RISK OF EXPLOSIVE GASES.**
 - a) **WORKING IN THE VICINITY OF A 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 battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary marking on these products and on engine.
- PERSONAL PRECAUTIONS**
- c) Consider having someone close enough by to come to your aid when you work near a battery.
 - d) Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
 - e) Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
 - f) If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
 - g) NEVER smoke or allow a spark or flame in vicinity of battery or engine.
 - h) Be extra cautious to reduce the risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
 - i) Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
 - j) Use charger for charging **STANDARD/AGM/Lithium Iron Phosphate** batteries only. It is not intended to supply power to a low voltage electrical system. Do not use battery charger for charging non-rechargeable batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
 - k) NEVER charge a frozen battery.

11) 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 the area around battery is well ventilated while battery is being charged.
- c) Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d) Add distilled water to each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- e) Study all battery manufacturers specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

12) 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 charger.
- c) Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- d) Do not operate charger in a closed-in area or restrict ventilation in any way.
- e) Do not set the battery on top of charger.

13) DC CONNECTION PRECAUTIONS

- a) Connect and disconnect dc output rings only after setting any charger switches to "off" position and removing ac cord from electric outlet. Never allow clips to touch each other.
- b) Attach rings to battery and chassis as indicated in 15(e), 15(f), and 16(b) through 16(d).
- c) Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- d) Do not operate charger in a closed-in area or restrict ventilation in any way.
- e) Do not set the battery on top of charger.

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

- a) Position ac and dc cords 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 people.
- 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) ring from battery charger to POSITIVE (POS, P, +) ungrounded post of battery first. Then connect NEGATIVE (BLACK) ring 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) ring from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery first. Then connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect rings 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 the charger, turn switches to off, disconnect AC cord, remove ring from vehicle chassis, and then remove ring from battery terminal.
- h) See operating instructions for length of charge information.

15) FOLLOW THESE STEPS WHEN THE 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) Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- c) Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- d) Position yourself and free end of cable as far away from battery as possible – then connect NEGATIVE (BLACK) charger clip to free end of cable.
- e) Do not face battery when making final connection.
- f) When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.

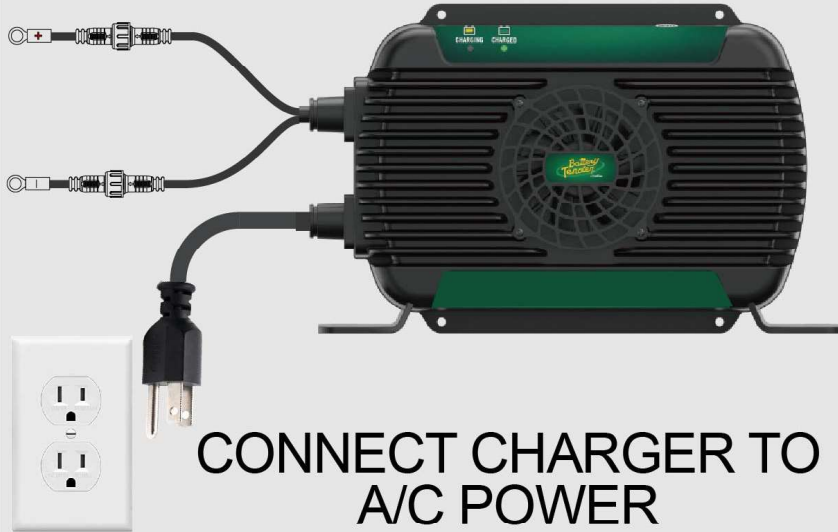
16) EXTERNAL CONNECTIONS TO THE CHARGER SHALL COMPLY WITH THE UNITED STATES COAST GUARD ELECTRICAL REGULATIONS (33CFR183 SUB PART I)



■ This symbol indicates separate collection for electrical and electronic equipment.

QUICK SETUP GUIDE

STEP 1



CONNECT CHARGER TO
A/C POWER

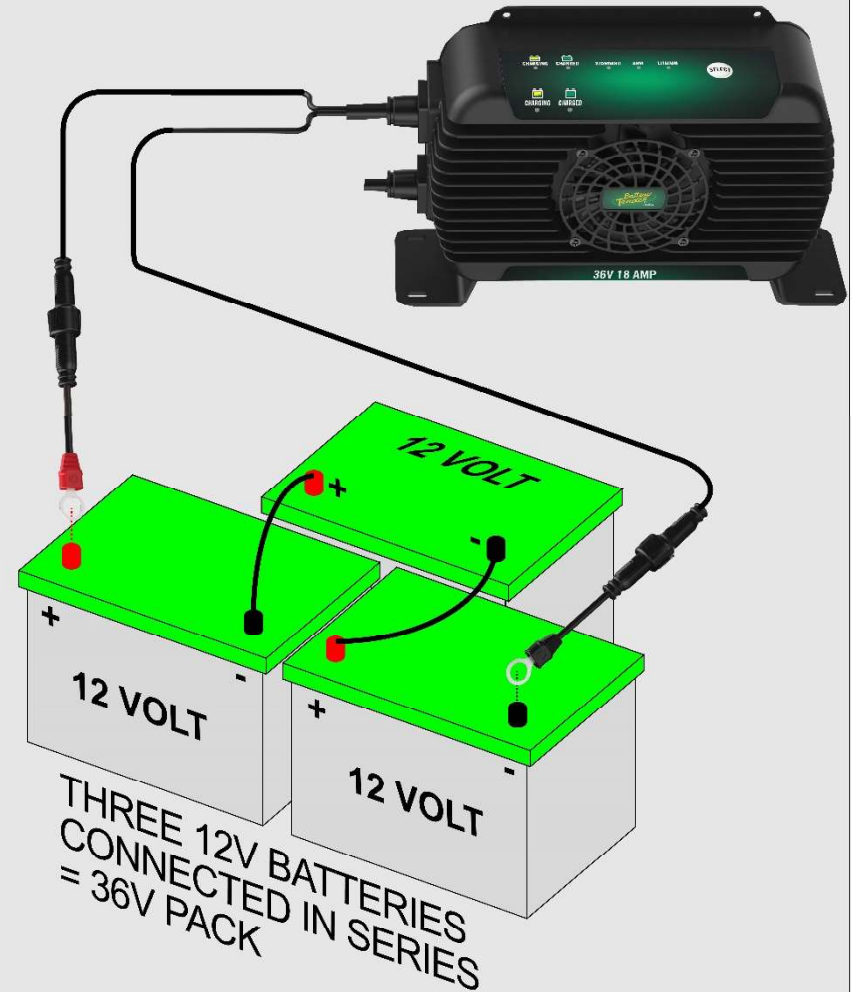
STEP 2



PRESS THE SELECT
BUTTON TO CHOOSE
CORRECT BATTERY TYPE
(STANDARD/AGM/LITHIUM)

STEP 3

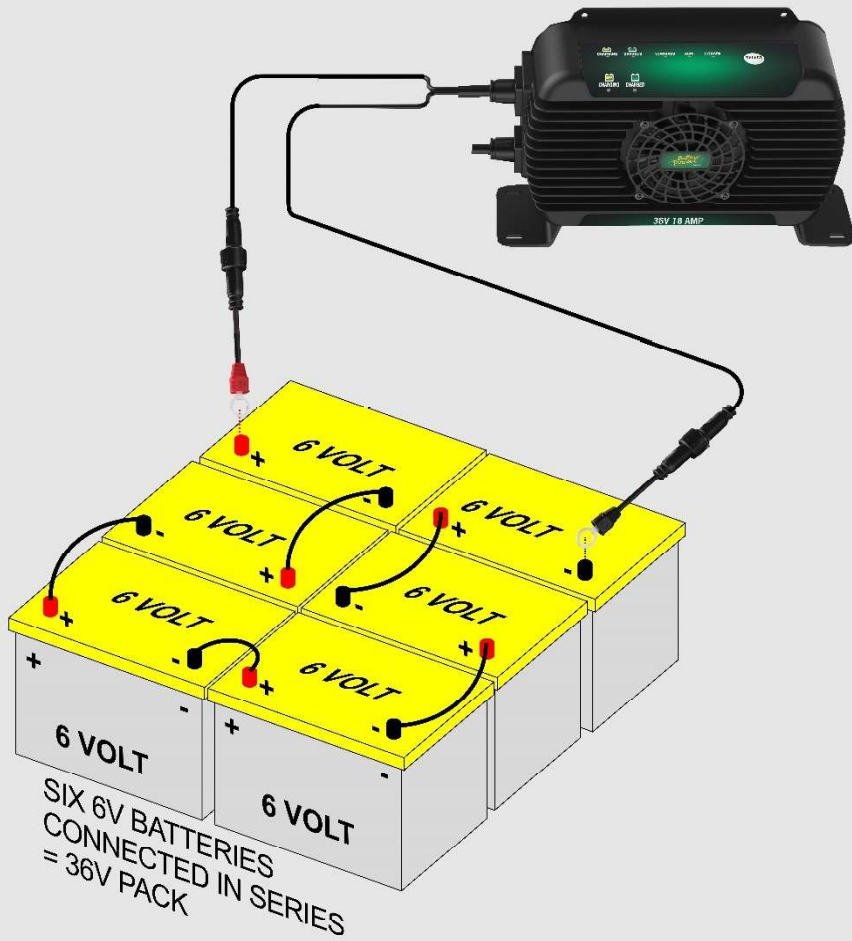
CONNECT THE RING TERMINALS TO
THE BATTERY POSTS (36V SET UP SHOWN)



THREE 12V BATTERIES
CONNECTED IN SERIES
= 36V PACK

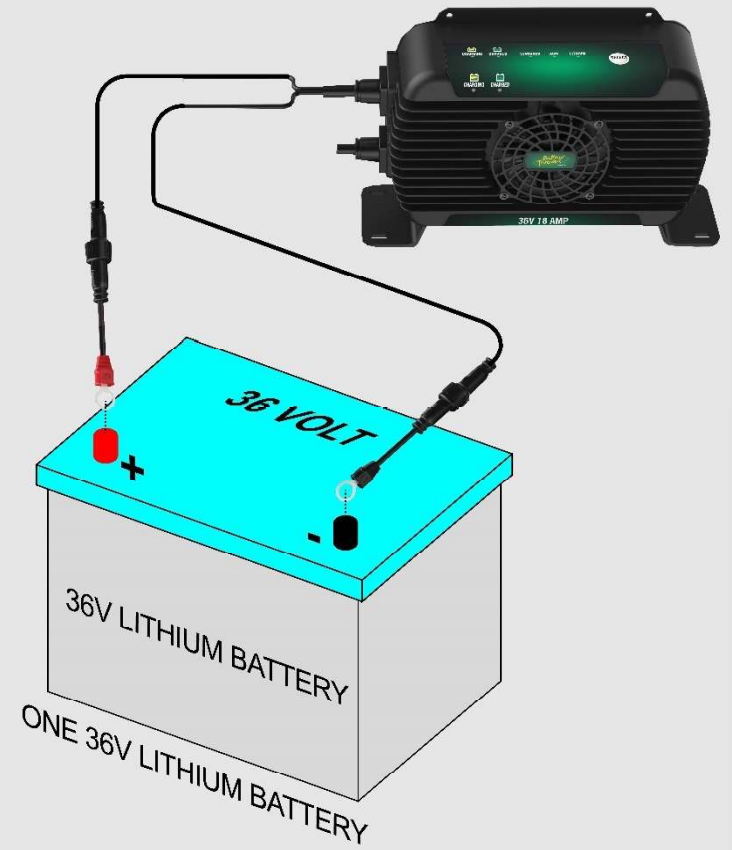
STEP 3A

CONNECT THE RING TERMINALS TO THE BATTERY POSTS (36V SET UP SHOWN)

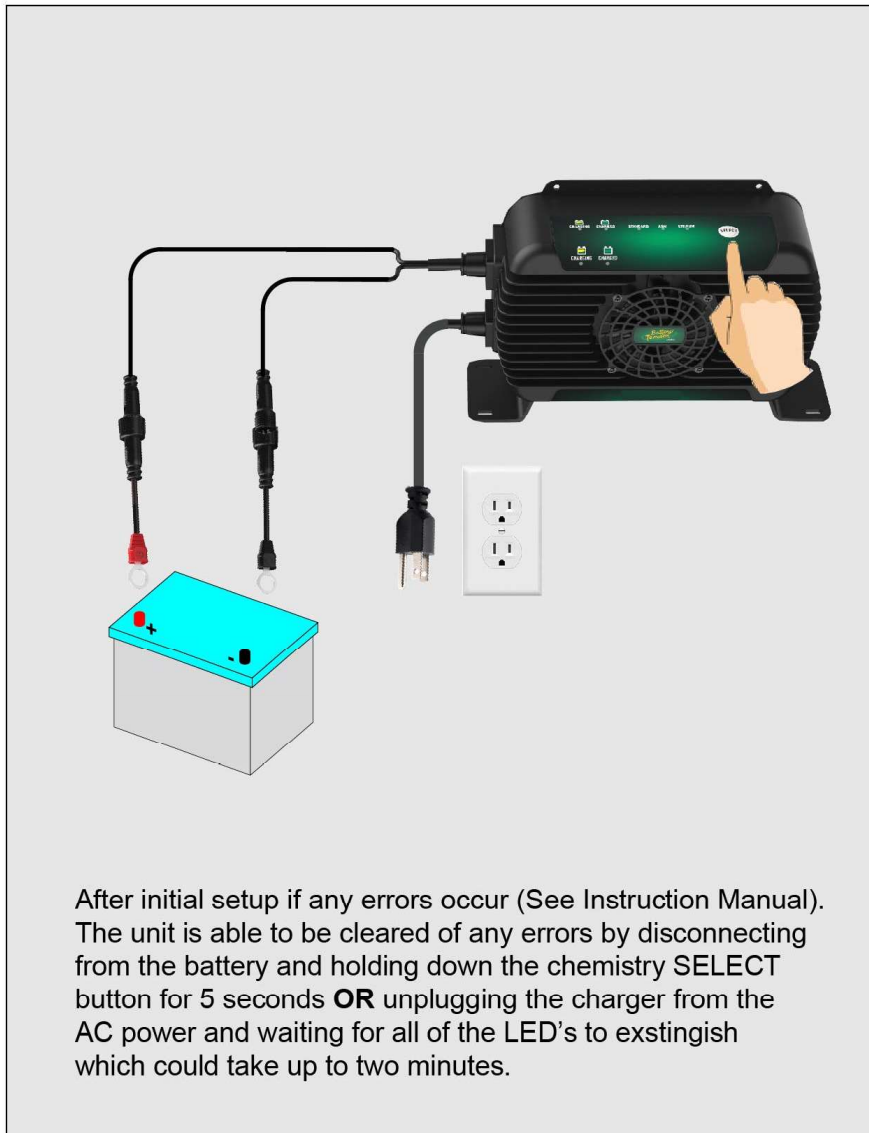


STEP 3C

CONNECT THE RING TERMINALS TO THE BATTERY POSTS (36V SET UP SHOWN)



QUICK GUIDE ERROR CLEARANCE



OPERATING INSTRUCTIONS

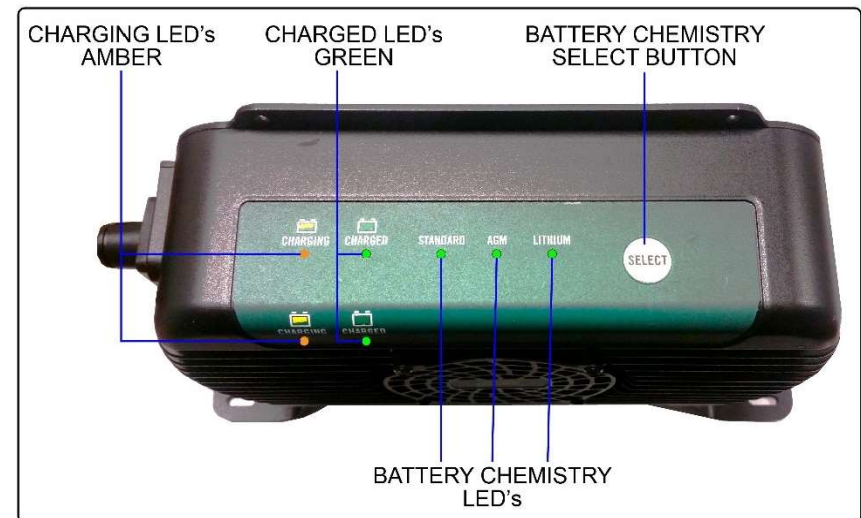
CHARGER OPERATION

The Battery Charger has a “SELECT” button that allows you to select the type/chemistry of battery you are about to charge.

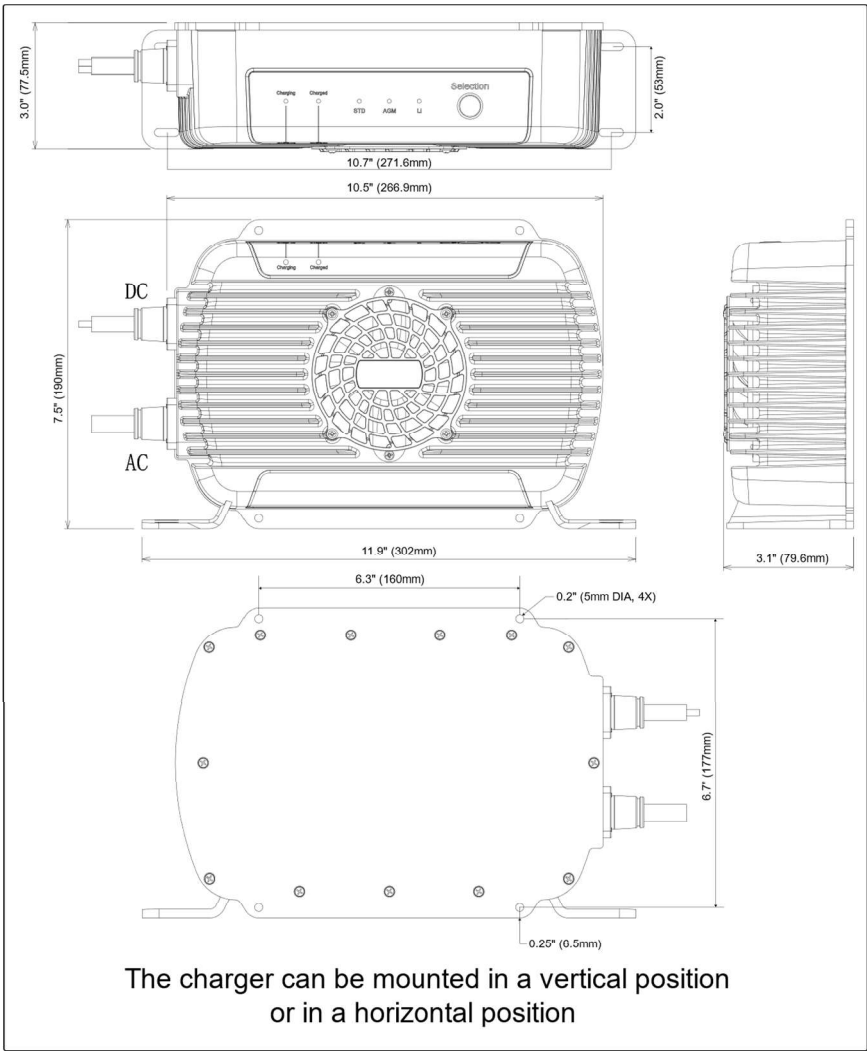
NOTE: This selection cannot be changed once the charger has been connected to a battery.

The “CHARGING” LED's which operate simultaneously and will be solid AMBER while charging.

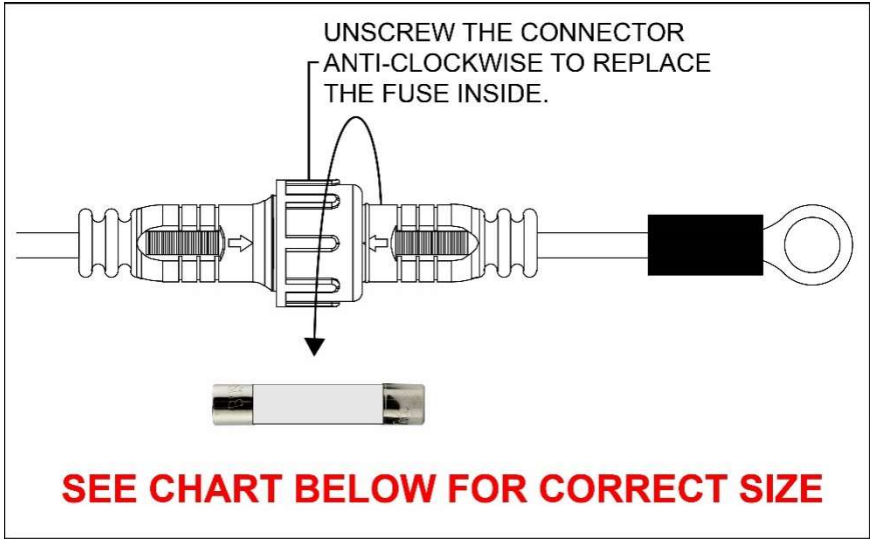
The “CHARGED” LED's which operate simultaneously and will FLASH GREEN once the battery reaches 80% charged, then turn solid GREEN once the battery is fully charged.



DIMENSIONS/MOUNTING SLOTS/HOLES



FUSE REPLACEMENT/TYPE



CHARGER PART NUMBER	CHARGER VOLTAGE/AMPERAGE	FUSE SIZE
022-2011	12VOLT/26AMP	40A 250V
022-2012	24VOLT/20AMP	30A 250V
022-2013	36VOLT/18AMP	30A 250V
022-2014	48VOLT/15AMP	30A 250V

Connecting to the AC and a Battery

- 1) When the charger is connected to the AC all the LED's will illuminate for about two seconds. Then the AMBER charging LED will flash, and one of the three battery chemistry GREEN LED's will be solid.
- 2) **Before connecting to a battery use the SELECT button to choose the correct battery chemistry that matches the battery you are about to charge. Once the charger is connected to a battery the battery chemistry cannot be changed unless it is disconnected from the battery.**
- 3) Then connect the positive (+) RED ring terminal first followed by the negative (-) BLACK ring terminal to the battery.
- 4) The AMBER charging LED should then turn solid, and the charge cycle has begun.
- 5) Once the battery reaches 80% the GREEN charge LED will start to flash. When the battery reaches 100% the GREEN charge LED will turn solid, and the Amber LED will turn off. If you have a large load or draw on the battery it may never reach 100%.

Battery Chemistry Selection Button

- 1) The Battery Tender® charger has a "SELECT" button for each channel which allows you to switch between charging a 12-volt Standard or 12-volt AGM battery or a 12-volt Lithium Iron Phosphate (LiFePO4) battery.
Note: For Lithium chemistry compatibility, this charger will only charge 12-volt rated Lithium Iron Phosphate (LiFePO4) batteries.
- 2) **Before connecting to a battery use the SELECT button to choose the correct battery chemistry that matches the battery you are about to charge. Once the charger is connected to a battery the battery chemistry cannot be changed unless it is disconnected from the battery.**
- 3) If the AC power is interrupted, the charger will resume charging with the last battery chemistry setting used once power is restored.

- 4) The unit is able to be cleared of any errors by disconnecting from the battery and holding down the chemistry SELECT button for 5 seconds **OR** unplugging from AC power and waiting for all of the LED's to extinguish which should take around two minutes.

LITHIUM Recovery Mode

If you try to charge a dead Lithium Iron Phosphate battery (LiFePO4) with a very low voltage, the charger will automatically switch into the Recovery Mode. When in this mode the Lithium GREEN LED will flash, and the CHARGING AMBER LED will be solid. If successful and once complete the charger will automatically switch back to the normal charge cycle.

There is a three (3) hour time limit for this recovery process. If not successful, the CHARGING AMBER LED and the Lithium GREEN LED will toggle back and forth. It will continue this sequence until the charger is disconnected from the AC source. If this happens there is a good chance that the battery has already been damaged due to the low voltage and cannot be recovered.

Battery Safety Timer

- 1) The charger has a safety timer fault that will activate if the battery does not reach its optimal voltage. If this occurs the battery may be defective; take the battery to the dealer to be tested. If not successful, the AMBER charging LED and the charged GREEN LED will toggle back and forth.
- 2) The unit is able to be cleared of any errors by disconnecting from the battery and holding down the chemistry SELECT button for 5 seconds **OR** unplugging from AC power and waiting for all of the LED's to extinguish which should take around two minutes.

Automatic Charging and Battery Status Monitoring

Battery Tender® chargers are completely automatic and may be left connected to both AC power and to the batteries being charged for long periods of time. The output power, voltage, and current of each channel depends on the condition of the battery it is charging. Battery Tender® chargers have several status LED indicators that provide a visual means to determine the operating mode of the charger and, hence, the condition of the battery connected to the charger.

- 1) **Qualification/Initialization mode-** The Monitor Circuit verifies appropriate battery voltage levels and good electrical continuity between the battery and the charger DC output.
- 2) **Bulk mode-** (full charge, constant current, battery is 0% to 80% charged)
- 3) **Absorption mode-** (high constant voltage, battery is 80% to 100% charged).
- 4) **Storage/float maintenance mode-** (low constant voltage, battery is 100% to 103% charged).

When the battery is fully charged, the charged GREEN LED will turn solid, and the charger will switch to a storage/float maintenance charge mode. The Battery Tender® charger will automatically monitor and maintain the battery at full charge.

Charger Cooling Fan Operation

The fan is electronically controlled and will turn on when the charger reaches a preset temperature or a preset amperage output level. The fan will continue to run and adjust its speed to keep the charger at the correct temperature. The fan will also turn off automatically once the correct temperature has been reached. Always leave an open space in front of the fan to allow the fan to pull air into and through the charger.

Attention: The Battery Tender® Charger Has Spark Free Circuitry

The Battery Tender® charger will not produce an output voltage until it senses at least 2 volts from a 12V STANDARD/AGM Lead acid battery or 4 volts from a 12V Lithium Iron Phosphate battery. It must also be connected to a battery with the correct polarity before it will start charging. Therefore, if the ring terminals incidentally comes in contact with one another, there will be no electrical spark.

NOTE:

THE OUTPUT CLIPS MUST BE CONNECTED TO A BATTERY BEFORE THE CHARGER CAN PRODUCE AN OUTPUT VOLTAGE.

Time Required to Charge a Battery

For example, the 36V 18AMP Battery Tender® charger charges at a rate of 18 Amps or 18 Amp-hours per hour. Therefore, a fully discharged 100 Amp-Hour battery will take approximately 45 hours to recharge to 80% capacity.

Working with a Dead Battery or a Battery with a Very Low Voltage

If you try to charge a dead battery having a voltage below 2 volts from a STANDARD/AGM Lead-acid battery or 4 volts from a Lithium Iron Phosphate battery, the Battery Tender® charger will not start. An internal safety circuit prevents the charger from generating any output voltage unless it senses at least 2 volts from a STANDARD/AGM Lead-acid battery or 4 volts from a Lithium Iron Phosphate battery at the charger output.

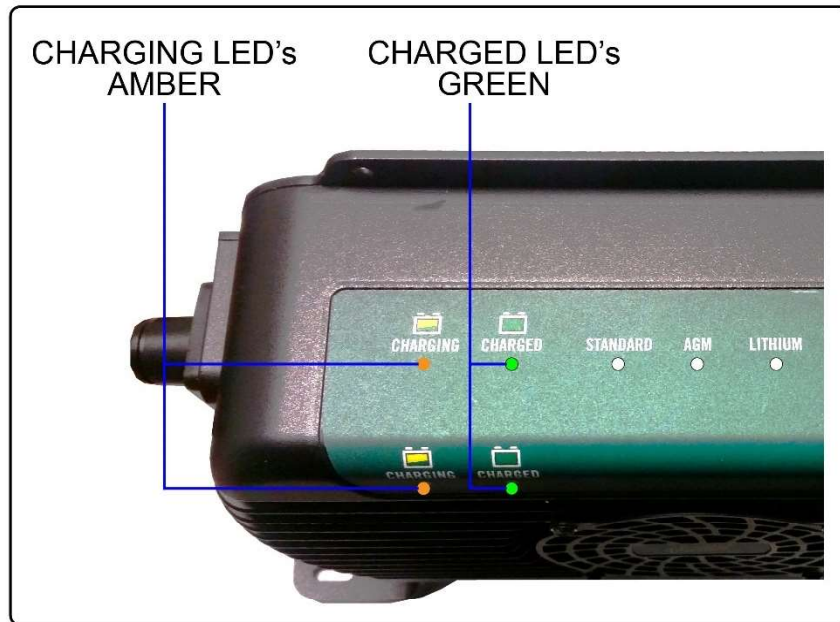
NOTE:

If a 12-Volt Lead-Acid battery has an output voltage of less than 9 volts when it is at rest, when it is neither being charged nor supplying electrical current to an external load, there is a good chance that the battery is defective. As a frame of reference, a fully charged 12-Volt, Lead-Acid battery will have a rest-state, no-load voltage of approximately 12.9 volts. A fully discharged 12-Volt, Lead-Acid battery will have a rest-state, no-load voltage of approximately 11.4 volts. That means that a voltage change of only 1.5 volts represents the full range of charge 0% to 100% on a 12-Volt, Lead-Acid battery. Depending on the manufacturer and the age of the battery, the specific voltages will vary by a few tenths of a volt, but the 1.5-volt range will still be a good indicator of the battery charge %.

LED Status Indicating Lights

ERROR INDICATION LED SEQUENCE

When any bank goes into an Error condition the charging **AMBER LED** and the charged **GREEN LED** will toggle back and forth



- 1) A reversed polarity connection to the battery.
- 2) Battery Lithium Recovery Mode time limit exceeded.
- 3) Battery Safety Timer limit exceeded.
- 4) **The unit is able to be cleared of any errors by disconnecting from the battery and holding down the chemistry SELECT button for 5 seconds OR unplugging from AC power and waiting for all of the LED's to extinguish which should take around two minutes.**

AVAILABLE BATTERY TENDER® ACCESSORIES

- 1) 5-foot extension cables.
- 2) 10-foot extension cables.
- 3) Cables and plugs that will fit your specific golfcart.

Check our website for more information.

Troubleshooting Guide

- 1) The charger does not turn on and none of the LED's illuminate.
 - a. Check to make sure the AC outlet is supplying power by plugging in a lamp, an appliance, or a voltage meter.
 - b. Check to see if the AC cord is damaged.
- 2) The charge **Green LED** comes on immediately when charging a discharged battery.
 - a. The battery is probably defective; take the battery to the dealer to be tested.
- 3) The charge **Green LED** never comes on when charging a battery.
 - a. The battery may be defective; take the battery to the dealer to be tested.
 - b. The battery has an excessive current draw; remove or disconnect the battery from the equipment.
 - c. The safety timer has been activated.
- 4) The charging **Amber LED** and the charged **Green LED** are toggling.
 - a. There is a reverse polarity connection to the battery.
 - b. The charger's safety timer has expired due to the battery not reaching its optimal voltage. The battery may be defective; take the battery to the dealer to be tested.
 - c. The Lithium Recovery Mode has timed out.
- 5) **The unit is able to be cleared of any errors by disconnecting from the battery and holding down the chemistry SELECT button for 5 seconds OR unplugging from AC power and waiting for all of the LED's to extinguish which should take around two minutes.**

WARRANTY

The Battery Tender® Charger comes with a twenty-four (24) month limited warranty against defects or failure (within two (2) years of purchase).

THIS LIMITED WARRANTY IS VOID under the following conditions:

- 1) The product is misused, subjected to careless handling, or operated under conditions of extreme temperature, shock, or vibration beyond our recommendations for safe and effective use.
- 2) The product is disassembled or repaired by anyone who is not an authorized service representative of Battery Tender®
- 3) The product was purchased from an unauthorized source. The warranty is not transferable from the original purchaser.
- 4) Any physical damage to any of components or any accessory after purchase.
- 5) Any modifications to any of the components.
- 6) Any corrosion including salt water.

Battery Charger Radio Frequency Warnings

FCC WARNING

Title 47 Subpart, 15.105(b)

Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio television reception, which can be determined by tuning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Canadian ICES-001: Industrial, Scientific, and Medical (ISM) Radio Frequency Generators

This product has been tested with the listed standards and found to be compliant with the Code of Industry Canada ES-001 and the measurement Procedure according to CISPR 11.

CAN ICES-001(B)/NMB-001(B)