



SUMMIT[®] II

SERIES

**1050W SWITCH MODE
INDUSTRIAL BATTERY CHARGER**

USER'S MANUAL

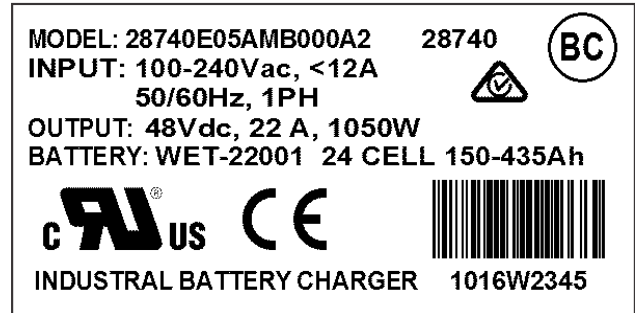
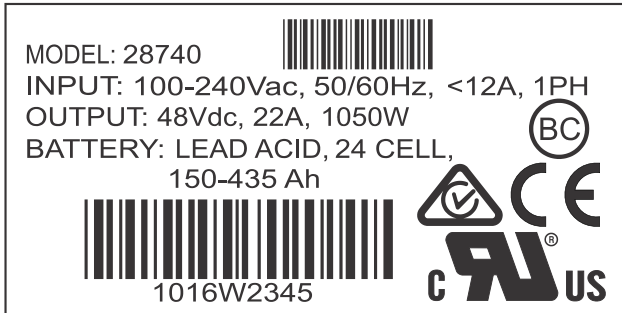
*Important Safety,
Installation,
Operation, and
Maintenance
Instructions*



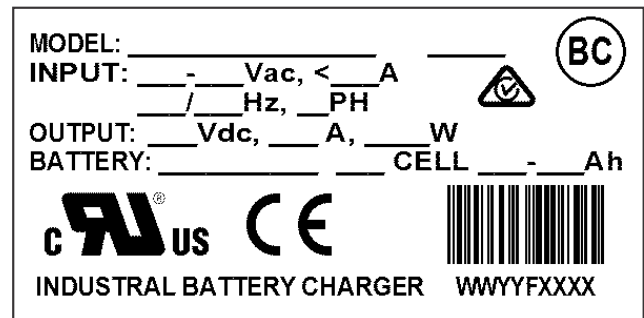
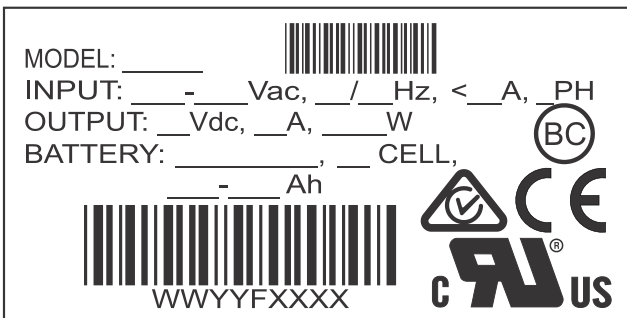
CHARGER RATINGS LABEL

The ratings label is located on the front of the charger. The label provides the model (MODEL), serial number (located below the barcode at the bottom of the label), AC input ratings (INPUT), and DC output ratings (OUTPUT) of the charger. The BATTERY field indicates the factory-configured active battery profile type. The BATTERY field amp-hour (Ah) rating indicates the full range of battery capacities that are recommended for use with this charger. A different active battery profile may be required to optimize the charging of specific battery capacities within this range. Before (1) using the charger for the first time or (2) using the charger with a battery pack of a different type or capacity, use the ChargerConnect™ app to verify that the proper active battery profile is selected (see Section 8).

One of two styles of ratings label will be attached to your charger. Examples of both styles are shown below.



Please fill in the applicable blank label below with the information from the ratings label on your charger for future reference.



⚠ CAUTION: PRIOR TO OPERATING THE CHARGER, VERIFY THAT THE ACTIVE BATTERY PROFILE MATCHES THE BATTERIES IN YOUR EQUIPMENT AND THAT THE SYSTEM SETTINGS MATCH YOUR APPLICATION BY USING A SMART PHONE OR TABLET AND THE CHARGERCONNECT APP AS DESCRIBED IN SECTION 8.

Document any configuration or settings changes that are made by marking the ratings label on your charger or on an additional label or tag attached to the charger.

SAVE THIS MANUAL: Keep it in a location where it is available to anyone who may operate the charger.

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IMPORTANT SAFETY INSTRUCTIONS

1. **SAVE THESE INSTRUCTIONS – This manual contains important safety and operating instructions.**
2. **Before using battery charger, read all instructions and cautionary markings on battery charger, battery, and product using battery.**



LOOK FOR THIS SYMBOL TO POINT OUT SAFETY PRECAUTIONS. IT MEANS: *BE ALERT—YOUR SAFETY IS INVOLVED.* IF YOU DO NOT FOLLOW THESE SAFETY INSTRUCTIONS, INJURY OR PROPERTY DAMAGE CAN OCCUR.

3. ** DANGER: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY READ AND FOLLOW THESE IMPORTANT SAFETY AND OPERATING INSTRUCTIONS BEFORE INSTALLING OR OPERATING THE CHARGER.**
4. ** INSTRUCTIONS IMPORTANTES CONCERNANT LA SECURITÉ.**
5. ** WARNING: TO REDUCE THE RISK OF FIRE, INSTALL THIS BATTERY CHARGER ON A SURFACE OF NON-COMBUSTIBLE MATERIAL SUCH AS BRICK, CONCRETE, OR METAL.**
6. ** DANGER: RISK OF ELECTRIC SHOCK. DISCONNECT CHARGER FROM BATTERY AND AC POWER BEFORE SERVICING. TURNING OFF THE CHARGER DOES NOT REDUCE THIS RISK.**
7. ** DANGER: RISK OF ELECTRIC SHOCK. DO NOT TOUCH UNINSULATED PORTION OF AC OR DC CONNECTORS OR UNINSULATED BATTERY TERMINAL.**
8. ** DANGER: RISQUE DE CHOCKS ÉLECTRIQUES. NE PAS TOUCHER LES PARTIES NON ISOLÉES DU CONNECTEUR DE SORTI OU LES BORNES NON ISOLÉES DE L'ACCUMULATEUR.**
9. ** CAUTION: CHARGE ONLY BATTERIES OF THE SAME TYPE, VOLTAGE, CELL NUMBER, AND AMP-HOUR CAPACITIES AS SHOWN ON THE LABEL. OTHER TYPES OF BATTERIES MAY BURST CAUSING PERSONAL INJURY AND DAMAGE. BEFORE CHARGING ANY OTHER TYPE OF RECHARGEABLE BATTERY, CHANGE THE CHARGER SETTINGS AS RECOMMENDED BY THAT BATTERY MANUFACTURER.**
10. ** ATTENTION: UTILISER POUR CHARGER UNIQUEMENT LES ACCUMULATEURS AU PLOMB À ELECTROLYTE LIQUIDE. D'AUTRES TYPES D'ACCUMULATEURS POURRAIENT ÉCLATER ET CAUSER DES.**
11. ** DANGER: TO PREVENT ELECTRICAL SHOCK, DO NOT TOUCH EITHER AC OR DC UNINSULATED PARTS. MAKE SURE ALL ELECTRICAL CONNECTORS ARE IN GOOD WORKING CONDITION. DO NOT USE CONNECTORS THAT ARE CRACKED, CORRODED OR DO NOT MAKE ADEQUATE ELECTRICAL CONTACT. USE OF A DAMAGED OR DEFECTIVE CONNECTOR MAY RESULT IN A RISK OF OVERHEATING OR ELECTRIC SHOCK.**
12. ** WARNING: HAZARD OF ELECTRIC SHOCK.**

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13. **⚠ WARNING: LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES. TO PREVENT ARCING OR BURNING NEAR BATTERIES, DO NOT DISCONNECT DC CHARGING CORD FROM BATTERIES WHEN THE CHARGER IS OPERATING. KEEP SPARKS, FLAME, AND SMOKING MATERIALS AWAY FROM BATTERIES.**
 14. **⚠ WARNING: ALWAYS SHIELD EYES WHEN WORKING NEAR BATTERIES. DO NOT PUT WRENCHES OR OTHER METAL OBJECTS ACROSS BATTERY TERMINAL OR BATTERY TOP. ARCING OR EXPLOSION OF THE BATTERY CAN RESULT.**
 15. **⚠ WARNING: BATTERIES PRODUCE HYDROGEN GAS, WHICH CAN EXPLODE IF IGNITED. NEVER SMOKE, USE AN OPEN FLAME, OR CREATE SPARKS NEAR THE BATTERY. VENTILATE THE AREA WHEN THE BATTERY IS CHARGING IN AN ENCLOSED PLACE.**
 16. **⚠ WARNING: LEAD-ACID BATTERIES CONTAIN SULFURIC ACID, WHICH MAY CAUSE BURNS. DO NOT GET ACID IN EYES, ON SKIN, OR CLOTHING. IF CONTACT WITH THE EYES OCCURS, FLUSH IMMEDIATELY WITH CLEAN WATER FOR 15 MINUTES AND OBTAIN MEDICAL ATTENTION.**
 17. **⚠ WARNING: ONLY A QUALIFIED SERVICE TECHNICIAN SHOULD PROGRAM OR SERVICE THIS EQUIPMENT.**
 18. **⚠ CAUTION: DO NOT OPERATE THE CHARGER IF IT HAS RECEIVED A SHARP BLOW, BEEN DROPPED, OR OTHERWISE DAMAGED. HAVE A QUALIFIED SERVICE TECHNICIAN EXAMINE AND REPAIR AS NEEDED.**
 19. **⚠ WARNING: DO NOT DISASSEMBLE THE CHARGER. HAVE THE CHARGER EXAMINED BY A QUALIFIED SERVICE TECHNICIAN. INCORRECT RE-ASSEMBLY OF THE CHARGER MAY RESULT IN AN EXPLOSION, ELECTRIC SHOCK, OR FIRE.**
 20. **⚠ CAUTION: MAKE SURE THE BATTERY SYSTEM HAS THE PROPERLY RATED VOLTAGE, AMP-HOURS, AND TYPE (“WET”, “AGM”, “GEL”, ETC.) FOR THIS CHARGING SYSTEM.**

SAVE THESE INSTRUCTIONS

1. INTRODUCTION

This switch mode (high frequency) industrial battery charger features advanced charge and termination algorithms designed to optimize both daily battery capacity and overall battery life. The charger is convection cooled with no moving parts, sealed, and designed to provide maximum reliability. The universal AC input enables the charger to be used with a wide range of AC voltages and frequencies, and the charger includes high efficiency and power factor.

The charger features Bluetooth® Smart wireless communication, which enables a smart phone or tablet running the ChargerConnect™ app to be used to:

- View the real-time charge cycle status
- Download charge cycle history records from the charger
- Upload charge cycle history records to the Cloud for access anywhere in the world
- Select the active charge profile
- Upload new charge profiles to the charger
- Download new charge profiles from the Cloud

The charger was factory-configured with the active battery profile that was requested as part of the original order from Lester Electrical. The charger was also factory-configured for mounting on-board a battery-powered vehicle/machine or for off-board use in a shelf or portable application per the original order from Lester Electrical. Before (1) using the charger for the first time or (2) using the charger with a battery pack of a different type or capacity, use the ChargerConnect app to verify that the proper active battery profile is selected and that the system settings match your application (see Section 8).

⚠ CAUTION: PRIOR TO OPERATING THE CHARGER, VERIFY THAT THE ACTIVE BATTERY PROFILE MATCHES THE BATTERIES IN YOUR EQUIPMENT AND THAT THE SYSTEM SETTINGS MATCH YOUR APPLICATION BY USING A SMART PHONE OR TABLET AND THE CHARGERCONNECT APP AS DESCRIBED IN SECTION 8.

2. RECEIVING AND INSTALLING THE CHARGER

⚠ WARNING: DO NOT INSTALL THE CHARGER ON OR NEAR FLAMMABLE MATERIALS. POSITION THE CHARGER ON A FOUNDATION OF STONE, BRICK, CONCRETE OR GROUNDED METAL.

⚠ WARNING: CHARGERS CAN IGNITE FLAMMABLE MATERIALS AND VAPORS. DO NOT USE NEAR FUELS, GRAIN DUST, SOLVENTS, THINNERS, OR OTHER FLAMMABLES.

⚠ WARNING: REPLACE WORN, DAMAGED, OR CUT ELECTRICAL CORDS AND PLUGS IMMEDIATELY.

Unpack the charger and examine it for shipping damage. In the event that shipping damage is found, report it as a claim with the freight company.

Do not operate the charger with a damaged AC or DC cable or connector. Do not operate the charger if it has received a sharp blow, was dropped, or was otherwise damaged in any way. Contact your dealer.

Proper installation is important to achieve optimum performance and life from the charger and batteries. Allow as much free air space around the charger as possible. Please refer to the Specifications section for specific storage and operating environmental specifications.

The most favorable mounting orientations of the charger are shown in Figure 2-1.

For on-board use, the most favorable way to mount the charger is with the charger base bolted to a 0.1 inch (2.5 mm) minimum thick metal plate. This provides both a strong structural mounting and good thermal conductive cooling (examples are shown in Figure 2-1). A poor thermal conductive mounting material such as plastic or wood would be less favorable for cooling.

The charger dimensions and mounting slot locations are shown in Figure 2-2. For off-board use, an optional handle is available for ease in carrying. The charger case also has routing and securing locations for the AC and DC cords when the cords need to be routed to the opposite end for your application as shown in Figure 2-3.

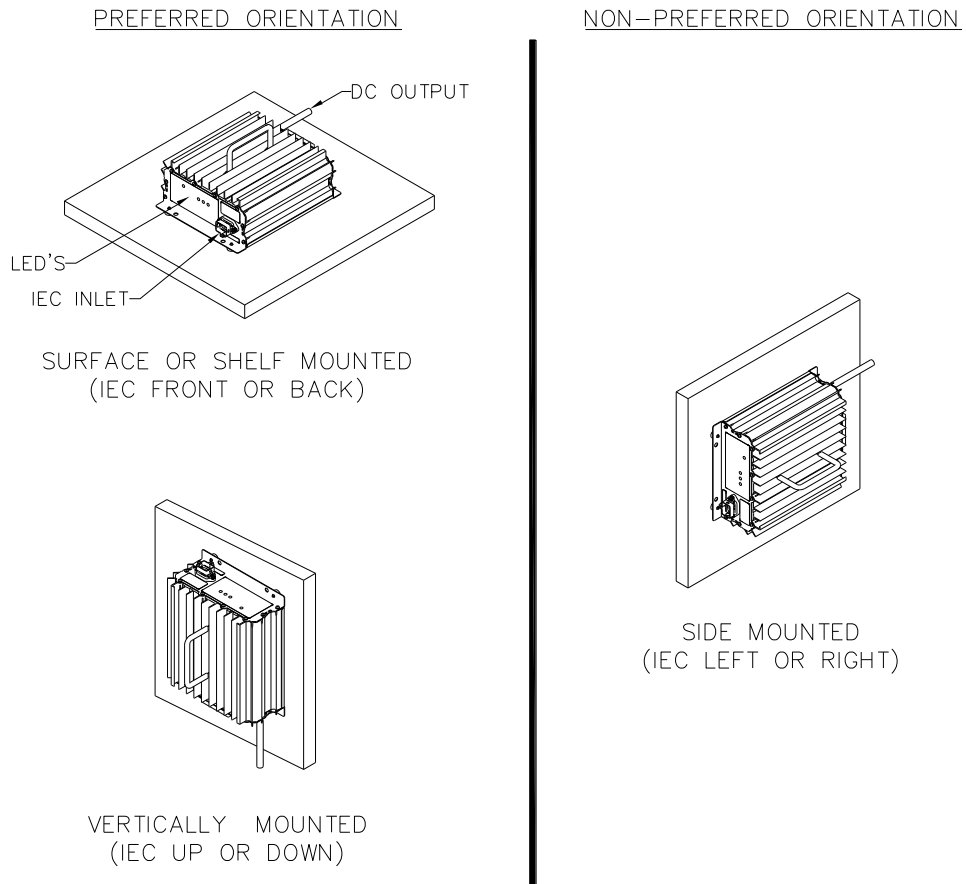


Figure 2-1: Charger Mounting Recommendations

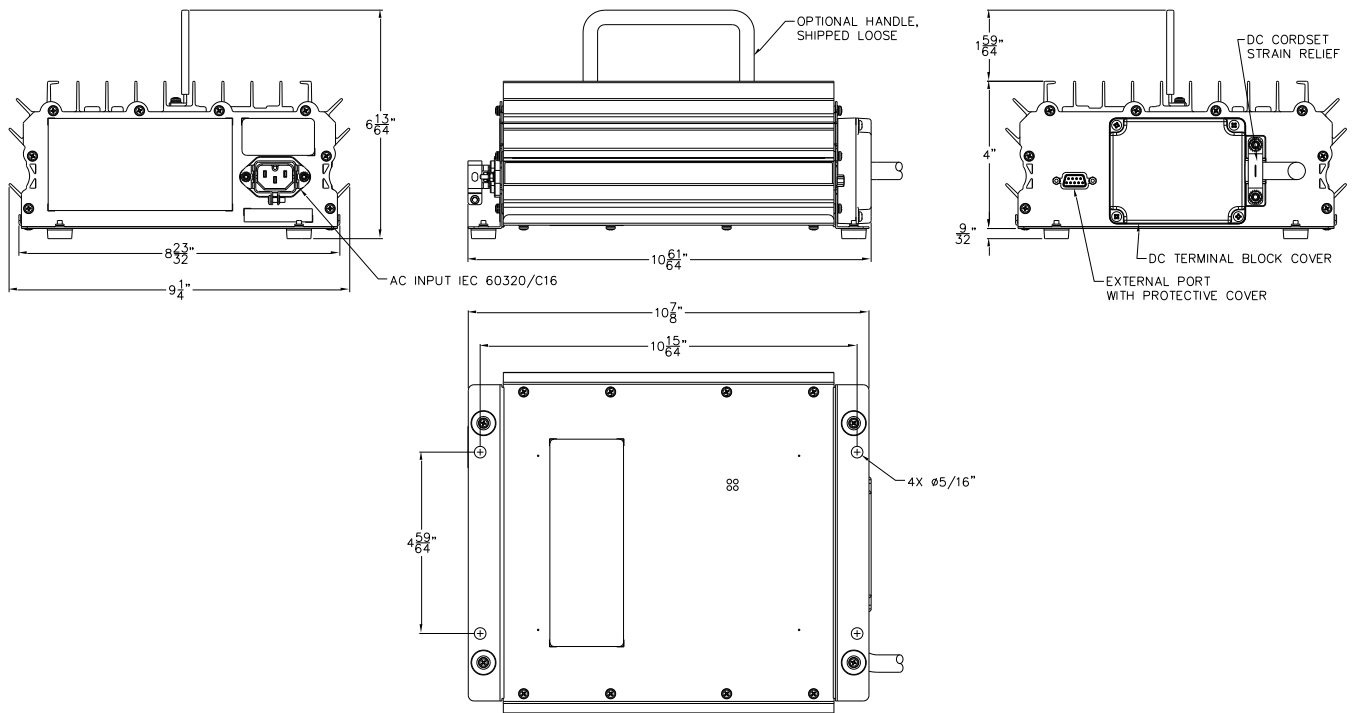


Figure 2-2: Charger Dimensions and Mounting Slot Locations

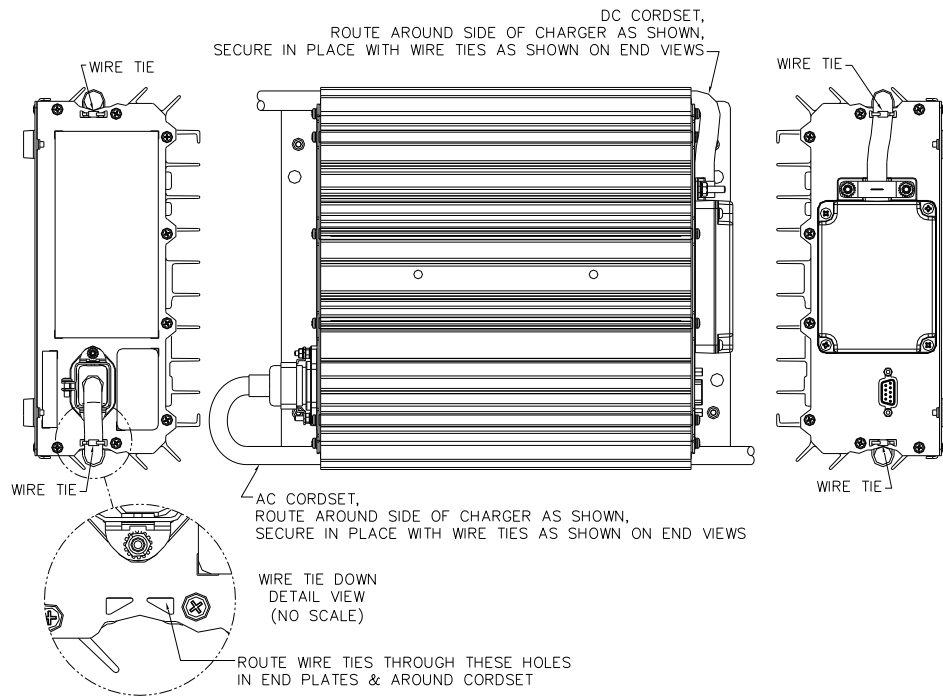


Figure 2-3: AC & DC Cordset Routing

3. BATTERY TYPE

This charger contains multiple battery profiles for different types (including wet/flooded, AGM, and gel) and capacities of batteries. The charger was factory-configured with the active battery profile that was requested as part of the original order from Lester Electrical. Before (1) using the charger for the first time or (2) using the charger with a battery pack of a different type or capacity, use the ChargerConnect app to verify that the proper active battery profile is selected. If the proper battery profile is not available on the charger, the ChargerConnect app can be used to download the appropriate battery profile from the Cloud. See Section 8 for additional details.

If the active battery profile is changed, mark the charger ratings label or add an additional label or tag.

⚠ CAUTION: THIS CHARGER IS FOR USE ONLY WITH BATTERY SYSTEMS OF THE SAME TYPE AS THE ACTIVE BATTERY PROFILE. BATTERIES IMPROPERLY MATCHED WITH THE CHARGER MAY BURST CAUSING PERSONAL INJURY AND DAMAGE TO THE BATTERIES OR CHARGER.

Battery manufacturers frequently use the same battery cases for different battery types. Wet/flooded batteries have removable cell caps. Water electrolyzed by discharging and charging the battery is replaced through these openings. Sealed (AGM and gel) batteries are generally distinguished by non-removable cell caps. The physical appearance of the battery case is frequently the same as a wet battery, though the cell caps are generally not removable. Refer to the battery manufacturer's information panel on the battery case to determine the type battery you have. If the information panel is missing or not legible, do not use the battery.

If you have questions regarding which battery profile to select for use with your particular battery pack, contact your dealer for assistance.

4. OFF-BOARD (SHELF) VERSUS ON-BOARD (BUILT-IN) CHARGERS

This section describes how the charger operates when the charger type is set to Off-board or On-board. Based on your application, this parameter may be changed, see section 8, under system profile.

The charger was factory-configured with the active battery profile that was requested as part of the original order from Lester Electrical. The charger was also factory-configured for mounting on-board a battery-powered vehicle/machine or for off-board use in a shelf or portable application per the original order from Lester Electrical. Before (1) using the charger for the first time or (2) using the charger with a battery pack of a different type or capacity, use the ChargerConnect app to verify that the proper active battery profile is selected and that the system settings match your application (see Section 8).

4.1 Off-Board Chargers

Off-board chargers are designed to be used in shelf or portable applications. If the AC input plug is connected to AC power, a new charge cycle automatically starts when the DC output is connected to a battery pack of the proper voltage. Disconnecting and reconnecting AC power while the DC output remains connected to a battery pack WILL NOT automatically start a new charge cycle. Disconnecting the DC output from the battery pack IS REQUIRED to automatically start a new charge cycle.

4.2 On-Board Chargers

On-board chargers are designed to be mounted on electric vehicles/equipment. If the DC output is connected to a battery pack of the proper voltage, a charge cycle automatically starts when the AC input plug is connected to AC power (unless a safety period of time has not passed since the successful completion of the previous charge cycle). Disconnecting the DC output from the battery pack IS NOT REQUIRED to automatically start a new charge cycle.

5. AC INPUT

The charger has an AC input rating of 100-240 volts, 50/60 hertz, single-phase. The charger has an AC operating range of 85-264 volts, 45/65 hertz. Below 108 volts, the charger may reduce output power.

The charger is equipped with an IEC inlet for the AC input power as shown. This allows the AC power cord to be selected with a proper plug to be compatible with the local wall outlets. AC cordset must be minimum of 16AWG for proper operation. An AC cord clamp is also attached to retain the AC power cord. Tighten the screw shown in this picture on the top of the clamp after inserting the AC plug.



The charger must be grounded to reduce the risk of electric shock and is equipped with an IEC inlet having an equipment-grounding conductor and a grounding socket. The installed AC power cord must be plugged into an outlet that is properly installed and grounded in accordance with all applicable electrical codes and ordinances.

If this charger includes the UL Listed symbol on its ratings label, it is provided with a cord set for connection to outlets operating at nominal 120 volts (or 240 volts as appropriate). If the input plug does not fit the power outlet, contact Lester Electrical or your dealer for the proper cord set terminating in an attachment plug of the proper configuration for the power outlet.

⚠ CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK OR FIRE, DISCONNECT AC POWER FROM THE CHARGER BEFORE INSTALLING OR REMOVING UNIT.

⚠ DANGER: NEVER ALTER THE AC POWER CORD OR PLUG PROVIDED. IF IT WILL NOT FIT AN OUTLET, OBTAIN THE CORRECT CHARGER IEC AC CORDSET FOR THE OUTLET, OR HAVE A PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN. IMPROPER CONNECTION CAN RESULT IN A RISK OF ELECTRIC SHOCK.

If an extension cord is necessary, it must be a 3-conductor, No. 12 AWG minimum, heavy-duty cord with ground. It must also be in good electrical condition and as short as possible, 25 ft (7.6m) maximum. Make sure that the pins on the plug of the extension cord are the same number, size, and shape as the AC power cord plug on the charger. The use of an improper extension cord could result in a risk of fire or electrical shock.

Locate all cords so that they will not be stepped on, tripped over, or otherwise subjected to damage, stress, or accidentally disconnected.

⚠ CAUTION: VERIFY THAT THE AC POWER CORD IS FULLY ENGAGED IN THE IEC INLET AND CANNOT BE PULLED LOOSE BEFORE USING THE CHARGER.

⚠ DANGER: RISK OF ELECTRIC SHOCK! CONNECT THE AC SUPPLY CORD DIRECTLY TO A GROUNDED, 3-WIRE OUTLET. DO NOT TOUCH UNINSULATED PORTION OF DC OUTPUT TERMINALS OR BATTERY TERMINALS. REPLACE DEFECTIVE CORDS, WIRES, OR CONNECTORS IMMEDIATELY.

6. DC OUTPUT

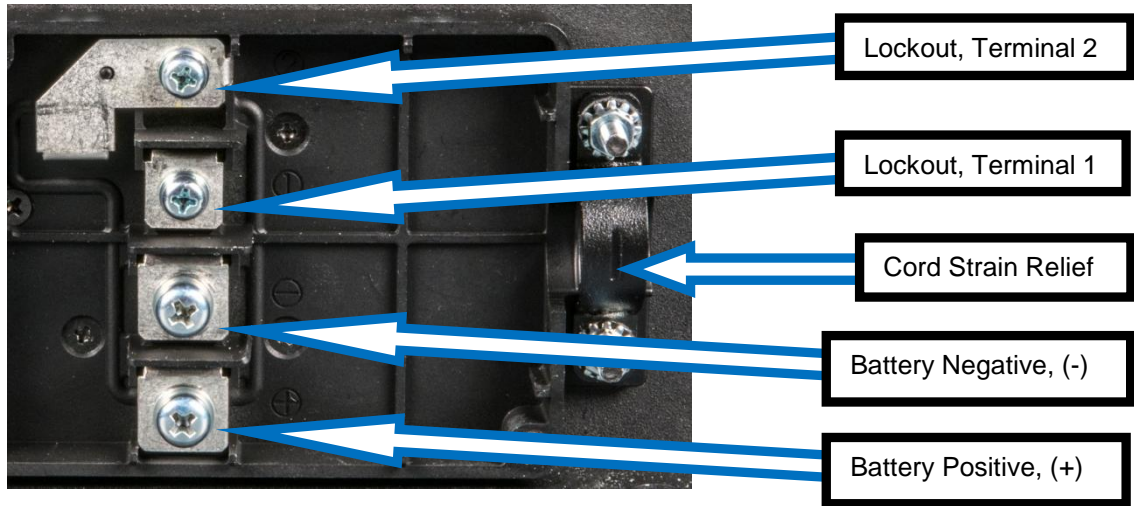
⚠ WARNING: LEAD-ACID BATTERIES GENERATE EXPLOSIVE GAS. CHARGE ONLY IN WELL VENTILATED AREAS. TO PREVENT ARCING OR BURNING NEAR BATTERIES, DO NOT DISCONNECT THE DC CHARGING CONNECTOR(S) FROM THE BATTERIES WHEN THE CHARGER IS OPERATING. IF THE CHARGE CYCLE MUST BE INTERRUPTED, UNPLUG THE AC POWER CORD BEFORE DISCONNECTING THE DC OUTPUT CONNECTOR(S) FROM THE BATTERIES. KEEP SPARKS, FLAME, AND SMOKING MATERIALS AWAY FROM BATTERIES. TO REDUCE THE RISK OF FIRE, DO NOT USE THE CHARGER NEAR FLAMMABLE MATERIALS OR VAPORS.

Only charge batteries of the same type, voltage, number of cells, and amp-hour capacities listed on the charger ratings label.

The DC output cordset includes a commonly-used connector/plug. The polarity of the charger DC connector/plug must be the same as the battery connector. The BLACK DC cable must be connected to the battery negative (-), and the WHITE or RED DC cable must be connected to the battery positive (+). The charger will not operate if the polarity is reversed.

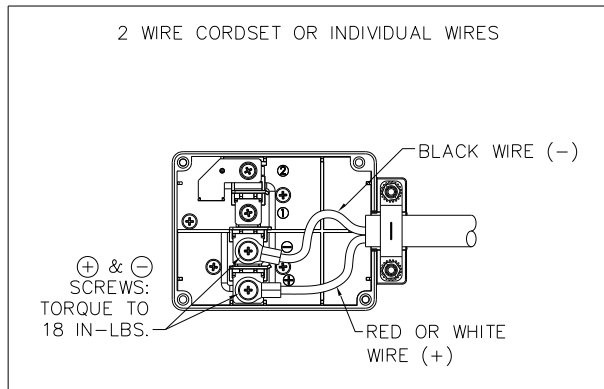
⚠ WARNING: CHARGER DC CORDSET MUST HAVE A MINIMUM OF 12AWG WIRE SIZE FOR PROPER HEAT DISSIPATION. TO PREVENT RISK OF FIRE, DO NOT USE SMALLER GAUGE WIRE.

The DC output cordset attaches to the charger's external terminal block. Remove the touch proof cover to expose the terminal block as shown below. Attach the wires as shown in the table and connection configurations below and torque the screws for the battery connections to 18 in-lbs (2.0 N-m) and the lockout connections to 12 in-lbs (1.35 N-m). Route the wire through the strain relief and torque the strain relief nuts to 12 in-lbs (1.35 N-m). Replace the cover and cover screws and torque the cover screws to 9 in-lbs (1 N-m).

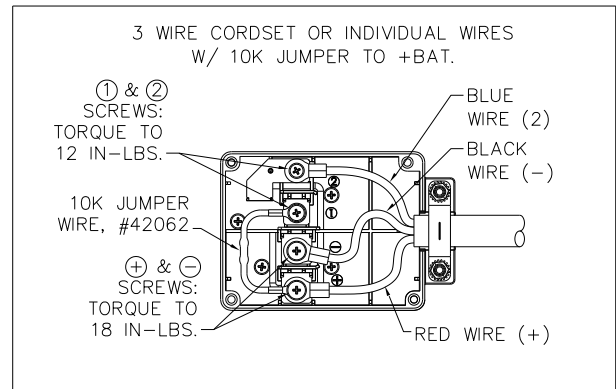


Number of Wires	Battery Connector	Configuration #
2	Anderson SB50	1
2	Anderson SB175	1
2	Lester 2-Blade	1
2	Yamaha 2-pin	1
2	E-Z-Go 36V Powerwise	1
3	Ring terminals	2, 3, or 4

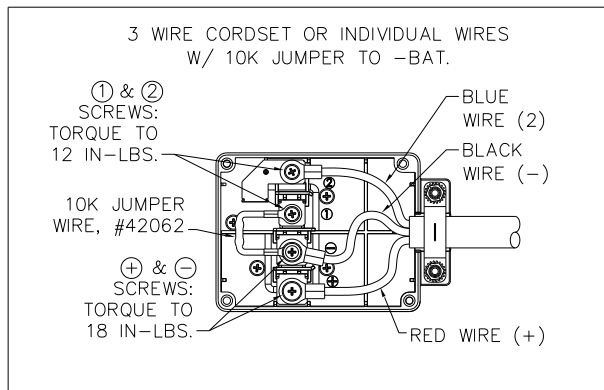
Configuration 1



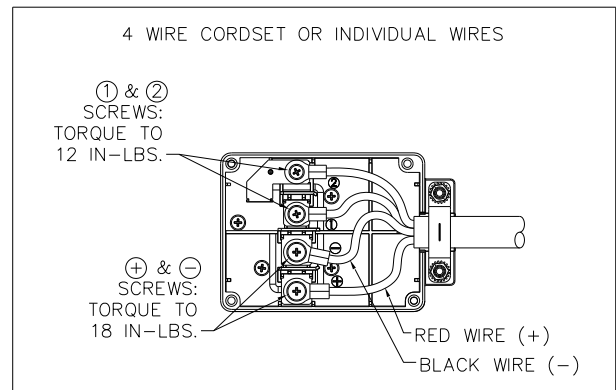
Configuration 2



Configuration 3



Configuration 4



7. VEHICLE LOCKOUT CONTROL

The charger's lockout/interlock control signal is an optional feature which can be wired to the vehicle/equipment to prevent movement of the vehicle while the charger is in use. If the charger was factory-configured for on-board use, the lockout control signal will be active while AC power is applied to the charger. If the charger was factory-configured for off-board use, the lockout control signal will be active while a valid battery is connected to the charger.

The lockout control wiring is connected to both sides of a normally closed relay contact and will open/break the circuit to prevent movement. This is usually connected to the vehicle motor speed controller or to the key switch circuit. The connection points are located on the terminal block as indicated in section 6. If both sides of the relay are needed to break an existing lockout circuit on your vehicle, use configuration 4. For a single wire lockout, the lockout signal can be pulled high to +Battery (Configuration 2) or low to -Battery (Configuration 3) through a 10K current limiting resistor or as required by your application. If you are uncertain of how to attach the lockout wiring, please contact your dealer.

8. BLUETOOTH SMART WIRELESS

The charger is equipped with a wireless Bluetooth module which can be accessed using either a Apple or Android smart phone, tablet, or similar device. Download the "Summit Charger" app for your phone by scanning the QR code on the charger or go to the App or Play Store and search for "Summit Charger".

To connect to your charger, open the app and select the charger from the list of available units seen by the app. The charger serial number is the identifier of the unit, unless the unit name has been changed by using the app. When connected, the green, yellow, and red LEDs on the charger will slow blink at the same time until the wireless communication is disconnected from the charger.

The following is a list of features the charger can perform using the wireless communications:

- Dashboard display showing charger status
 - Charger ID, Vehicle ID, Battery Profile
 - LED status, Charge status, AC present, Faults
 - Charge time remaining, Current, Ahrs. returned, Voltage
 - Manual start/stop charge cycle
 - Manual equalize charge cycle
- Diagnostics display of real time data
 - Ammeter, Voltmeter
 - SOC, Time remaining, Phase, Ahrs. returned, Faults, AC voltage, Battery Temperature
- System information
 - Serial number, Charger control version, Hardware version, Vehicle ID, Battery information
- System profile
 - Charger ID, Vehicle ID, On-board / off-board, DC cord length (feet) & gauge (AWG), Download options
- History of charge cycle data
 - Charger - total charge cycles, total Ahrs.
 - Device - total charge cycles, last charge cycle
 - Cloud - total charge cycles, last charge cycle
- Battery Profile
 - Presently selected, Alternate Choices, Download options, etc.

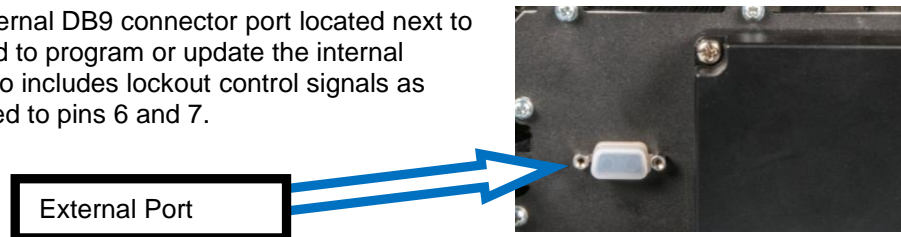
A "Help" screen is available in the app to answer questions about the wireless features and to link to this owner's manual.

 **CAUTION: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.**

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 and ICES-003 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9. EXTERNAL PORT

The battery charger has an external DB9 connector port located next to the terminal block which is used to program or update the internal firmware of the charger and also includes lockout control signals as described in section 7 connected to pins 6 and 7.



10. PROPER CARE OF DEEP-CYCLE LEAD-ACID MOTIVE POWER BATTERIES

Motive power battery packs are subjected to severe deep-cycle duty on a daily basis. Although these batteries are designed to withstand such duty, the following precautions must be observed to obtain good performance and maximum cycle life.

⚠ CAUTION: ALWAYS WEAR PROTECTIVE EYE SHIELDS AND CLOTHING WHEN WORKING WITH BATTERIES. BATTERIES CONTAIN ACIDS WHICH CAN CAUSE BODILY HARM. DO NOT PUT WRENCHES OR OTHER METAL OBJECTS ACROSS THE BATTERY TERMINAL OR BATTERY TOP. ARCING OR EXPLOSION OF THE BATTERY CAN RESULT.

1. When installing new batteries, be sure the polarity of each battery and the overall battery pack is correct. Otherwise, battery and/or charger damage can result.
2. New batteries should be given a full charge before their first use because it is difficult to know how long the batteries have been stored.
3. New batteries and older batteries that have been in storage are not capable of their rated output until they have been discharged and charged a number of times. Consult the manufacturer of your batteries for more information.
4. **DO NOT EXCESSIVELY DISCHARGE THE BATTERIES.** Excessive discharge can cause polarity reversal of individual cells resulting in complete failure shortly thereafter.
5. Maintain the proper electrolyte level of wet (flooded) batteries by adding water when necessary. Distilled or deionized water is best for battery life. Never allow the electrolyte level to fall below the top of the battery plates. Electrolyte levels lower during discharge and rise during charge. Therefore, to prevent the overflow of electrolyte when charging, it is mandatory that water be added to cells **AFTER** they have been fully charged – do not overfill. Old batteries require more frequent additions of water than new batteries.
6. Hard crystalline sulfates form when batteries in storage are not maintained in a charged active state. Internal self discharge can bring about the start of this condition in as little as three days in warm temperatures. Batteries not maintained and allowed to sit in storage will self discharge, sulfate and lose capacity. Repeated charging without using the batteries between charges can recover some of the lost power, range, and life, but some permanent loss should be expected.
7. Cold batteries require more time to fully charge. When the temperature falls below 65°F, the batteries should be placed on charge as soon after use as possible.
8. The tops of batteries and battery hold downs must be kept clean and dry at all times to prevent excessive self discharge and the flow of current between the battery posts and frame. Electrolyte spilled on batteries never dries or evaporates.

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9. All connections to batteries must be maintained clean and tight. Due to heating and discharge rates, bolted connections loosen over time. Re-tighten the connections twice yearly to the torques specified by the battery manufacturers.
 10. Follow all operating instructions, cautions, and warnings as specified in this manual, on the charger, in the battery manuals, and in the vehicle manuals.


10.1 Personal Safety Precautions

1. Have someone within the range of your voice and close enough to quickly come to your aid when you work near a lead-acid battery.
2. Ensure that ample fresh water and soap are nearby in case battery acid contacts your skin, clothing, or eyes.
3. Wear complete eye and clothing protection. Avoid touching your eyes while working near a battery.
4. If battery acid contacts your skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flush your eye with running cold water for at least 10 minutes, and get medical attention immediately.
5. NEVER smoke or allow a spark or flame to be in the vicinity of a battery.
6. Be extra cautious to reduce the risk of dropping a metal tool onto a battery. It could spark or short circuit the battery or other electrical components that could cause an explosion.
7. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery can produce a short-circuit current that is high enough to cause a severe burn.
8. NEVER charge a frozen battery.

11. CHARGER OPERATION


 **WARNING: TO REDUCE THE RISK OF AN ELECTRIC SHOCK, CONNECT ONLY TO A SINGLE-PHASE, PROPERLY GROUNDED (3-WIRE) OUTLET. REFER TO GROUNDING INSTRUCTIONS.**


 **CAUTION: MAKE SURE THE BATTERY IS A RECHARGEABLE DEEP-CYCLE BATTERY WITH THE PROPER RATED VOLTAGE FOR THIS CHARGER.**

 **DANGER: TO PREVENT ELECTRICAL SHOCK, DO NOT TOUCH UNINSULATED PARTS OF THE CHARGER DC OUTPUT CONNECTOR, BATTERY CONNECTOR, OR BATTERY TERMINALS. MAKE SURE ALL ELECTRICAL CONNECTORS ARE IN GOOD WORKING CONDITION. DO NOT USE CONNECTORS THAT ARE CRACKED, CORRODED, OR DO NOT MAKE ADEQUATE ELECTRICAL CONTACT. USE OF A DAMAGED OR DEFECTIVE CONNECTOR MAY RESULT IN A RISK OF OVERHEATING OR ELECTRIC SHOCK.**

 **WARNING: CHARGER IS NOT TO BE USED WHILE THE BATTERY POWERED EQUIPMENT IS OPERATING.**

 **ATTENTION: NE PAS UTILISER LE CHARGER PENDANT QUE L'EQUIPMENT EST EN MARCHÉ.**

 **WARNING: LEAD-ACID BATTERIES GENERATE GASES WHICH CAN BE EXPLOSIVE. TO PREVENT ARCING OR BURNING NEAR BATTERIES, DO NOT DISCONNECT THE CHARGER DC OUTPUT FROM THE BATTERIES WHEN THE CHARGER IS OPERATING. KEEP SPARKS, FLAME, AND SMOKING MATERIALS AWAY FROM BATTERIES.**

 **WARNING: ALWAYS SHIELD EYES WHEN WORKING NEAR BATTERIES. DO NOT PUT WRENCHES OR OTHER METAL OBJECTS ACROSS BATTERY TERMINALS OR THE BATTERY TOP. ARCING OR EXPLOSION OF THE BATTERY CAN RESULT!**

⚠ WARNING: DO NOT DISCONNECT THE CHARGER DC OUTPUT CONNECTOR FROM THE BATTERY CONNECTOR WHILE A CHARGE CYCLE IS IN PROGRESS. THE RESULTING ARCING AND BURNING OF THE CONNECTORS COULD CAUSE THE BATTERIES TO EXPLODE.

⚠ CAUTION: TO AVOID DAMAGE TO THE CHARGER DC CABLE AND CONNECTOR AND BATTERY CONNECTOR, DISCONNECT BY GRASPING THE CHARGER CONNECTOR HANDLE OR BODY AND PULLING IT STRAIGHT OUT OF THE BATTERY CONNECTOR. DO NOT PULL ON THE CHARGER CABLE. DO NOT TWIST, ROCK, OR PULL THE CONNECTOR SIDEWAYS.

The instructions printed on the charger are for daily reference.

11.1 Off-Board Charger Operation

If the charger was configured for off-board use, follow these operating instructions:

1. With the charger DC output connector/plug disconnected from the battery connector/receptacle, connect the charger AC power cord to an appropriate AC outlet (if not already connected) and the blue "AC PRESENT" LED will turn on.
2. Connect the charger DC output connector/plug to the battery connector/receptacle. The charger will start automatically, which is indicated by the yellow "CHARGE STATUS" LED beginning to blink slowly.
3. If the charger must be disconnected from the battery while a charge cycle is in progress, first disconnect the AC power cord from the AC outlet. Do not disconnect the charger DC output connector/plug from the battery while a charge cycle is in progress.
4. The charge cycle 80% point is indicated by the yellow LED beginning to blink quickly.
5. The Finish charge cycle phase is indicated by the solid illumination of the yellow LED. Not all charge profiles include a Finish phase.
6. An extended Balance/Equalize charge cycle phase is indicated by the green "CHARGE COMPLETE" LED beginning to blink quickly. Not all charge profiles include a Balance/Equalize phase.
7. The charger automatically terminates the charge cycle when a battery reaches full charge, which is indicated by [1] the solid illumination of the green LED or [2] the green LED beginning to blink slowly indicating a post-charge phase. The required charge time is affected by numerous factors, including battery amp-hour capacity, depth of discharge, battery temperature, and battery age/usage.
8. Before operating the machine/equipment, disconnect the charger DC output connector/plug from the battery connector/receptacle by firmly grasping both connectors and pulling them straight apart.

11.2 On-Board Charger Operation

If the charger was configured for on-board use, follow these operating instructions:

1. Ensure that the vehicle/equipment that the charger is mounted on is turned off.
2. With the charger AC power cord disconnected from the AC outlet, connect the charger DC output connector/plug to the battery connector/receptacle (most likely already connected or hard wired).
3. Connect the charger AC power cord to an appropriate live AC outlet which is indicated by the blue "AC PRESENT" LED turning on. The charger will start automatically as indicated by the yellow "CHARGE STATUS" LED beginning to blink slowly.
4. If the charger must be disconnected from the battery while a charge cycle is in progress, disconnect the AC power cord from the AC outlet. Do not disconnect the charger DC output connector/plug from the battery while a charge cycle is in progress.
5. The charge cycle 80% point is indicated by the yellow LED beginning to blink quickly.
6. The Finish charge cycle phase is indicated by the solid illumination of the yellow LED. Not all charge profiles include a Finish phase.
7. An extended Balance/Equalize charge cycle phase is indicated by the green "CHARGE COMPLETE" LED beginning to blink quickly. Not all charge profiles include a Balance/Equalize phase.

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8. The charger automatically terminates the charge cycle when a battery reaches full charge, which is indicated by [1] the solid illumination of the green LED or [2] the green LED beginning to blink slowly indicating a post-charge phase. The required charge time is affected by numerous factors, including battery amp-hour capacity, depth of discharge, battery temperature, and battery age/usage.
 9. Before operating the vehicle/equipment, disconnect the charger AC power cord from the outlet.

11.3 Storage Mode Operation

1. Storage Mode is designed to keep your battery maintained during storage periods that last a few weeks to several months at a time.
2. Depending on the battery type and battery profile selected, a storage charge can be a continuous float or a periodic charge mode.
3. Do NOT disconnect the charger from the battery or from the AC power until your machine is needed for use. Disconnecting and reconnecting the charger from the batteries or AC power may start a charge cycle, but disconnection disrupts the storage mode so optimum battery maintenance is not achieved.
4. After several months of storage your batteries should be serviced and the charger reset by disconnecting the DC for Off-Board or the AC for On-Board applications (disconnect AC for a minimum of 10 minutes) before continuing another storage season.

12. LED INDICATORS

The charger includes four (4) LEDs to indicate charger status and fault information. The functionality of the LEDs is outlined below and explained in the table below.

AC PRESENT (blue)

Indicates charger is connected to a live AC inlet.

CHARGE STATUS (yellow)

Indicates charge cycle status.

CHARGE COMPLETE (green)

Indicates when a charge cycle completes successfully, when an extended Balance/Equalize charge cycle phase is active, or when a post-charge phase is active.

FAULT (red)

Indicates when a charger or battery fault has occurred (see section 12.1 for more information).

FAULT (Red) LED	CHARGE STATUS (Yellow) LED	CHARGE COMPLETE (Green) LED	DESCRIPTION
Solid On	Solid On	Solid On	LED check for a few seconds during charger initialization
	Slow Blink	Off	Bulk/Start charge cycle phase (constant power or constant current).
	Fast Blink	Off	Absorption/Plateau charge cycle phase (constant voltage). Greater than 80% charged.
	Solid On	Off	Finish charge cycle phase (constant current). Not all charge profiles include a Finish phase.
	Off	Fast Blink	Balance/Equalize phase. An extended charge cycle is occurring because a trigger condition has been met (cycle count, etc). Not all charge profiles include a Balance/Equalize phase.
	Off	Solid On	Charge cycle complete.
	Off	Slow Blink	Charge cycle complete. Post Charge phase (constant voltage float, etc). Not all charge profiles include a Post Charge phase.
Slow Blink	Slow Blink	Slow Blink	Charger Bluetooth connected to a smart phone or device, LEDs blink at the same time

12.1 Faults

The charger will indicate when a fault occurs by using different patterns of the Fault (Red), Charge Status (Yellow), and Charge Complete (Green) LEDs as explained in the table below.


	FAULT (Red) LED	CHARGE STATUS (Yellow) LED	CHARGE COMPLETE (Green) LED	DESCRIPTION
Charger	Slow Blink	Solid On	Solid On	DC DISCONNECT – DC disconnect detected via the third-pin, but DC (battery) voltage is still present at the charger output. (Third-pin DC disconnect sensing is an optional feature available with supported DC plug/receptacle systems to minimize charger output inhibit time when a DC disconnect occurs during charging.)
	Slow Blink	Off	Solid On	OVER TEMP – Maximum temperature was met. Charge cycle was halted and will restart when the temperature decreases.
	Slow Blink	Fast Blink	Slow Blink	LOW TEMP – Temperature is too low to start a charge cycle (< -25°C). Charging will start when temperature increases.
	Slow Blink	Solid On	Off	LOW DC – DC (battery) voltage is too low to start charging (< 10V).
	Slow Blink	Off	Off	NO AC – AC power was lost during charging. Charge cycle was halted and will restart when AC power returns.
	Slow Blink	Solid On	Slow Blink	HARDWARE FAULT – Contact Lester Electrical.
	Slow Blink	Slow Blink	Off	HARDWARE FAULT – Contact Lester Electrical.
	Slow Blink	Slow Blink	Slow Blink	COMM FAULT – LEDs blink one at a time in a rotating pattern. Contact Lester Electrical. Unit is still able to charge.
	Slow Blink	Slow Blink	Solid On	HARDWARE FAULT – Contact Lester Electrical.
	Fast Blink	N/A	N/A	HARDWARE FAULT – Contact Lester Electrical. Unit is still able to charge.
Battery	Solid On	Off	Off	PHASE – A fault condition (most commonly maximum time) was met during a particular charge cycle phase (start/bulk, plateau/absorption, finish, etc).
	Solid On	Off	Slow Blink	MAX VOLTAGE – Maximum voltage was met.
	Solid On	Off	Solid On	MIN VOLTAGE – Minimum voltage was NOT met after a specified time from the start of the charge cycle.
	Solid On	Slow Blink	Off	MAX AMP-HOURS – Maximum amp-hours for the overall charge cycle was met.
	Solid On	Slow Blink	Slow Blink	MAX TIME – Maximum time for the overall charge cycle was met.

N/A = Not applicable, LED state does not matter

Disconnecting the charger from the battery always clears a fault. If the charger was factory-configured for on-board use, removing AC power from the charger also clears a fault. If a fault cannot be cleared after taking appropriate corrective action, contact your dealer for troubleshooting and/or service.

13. TROUBLESHOOTING

The charger was fully tested and calibrated before leaving the factory. It was delivered ready to charge. If properly installed, the charger should require very little attention. If improper charger operation occurs, it will require repair by a qualified service technician (see section 12.1 for information regarding the Fault LED).

 CAUTION: DO NOT OPERATE THE CHARGER IF IT IS DAMAGED OR APPEARS TO BE MALFUNCTIONING. PERSONAL INJURY OR DAMAGE TO THE CHARGER OR BATTERIES MAY RESULT. DO NOT DISASSEMBLE THE CHARGER. CONTACT YOUR DEALER. INCORRECT REASSEMBLY MAY RESULT IN RISK OF ELECTRIC SHOCK OR FIRE.

1. If the charger does not turn on, check for one of the following conditions.
 - a. The charger AC power cord is not plugged into a live and/or appropriate AC outlet.
 - b. The battery connections are incorrect – battery not connected, reverse polarity, or short circuit.
 - c. The battery voltage is too high.
 - d. The battery voltage is too low (below 10 volts).
2. If the charger turns off before a battery is fully charged, and a fault condition is not indicated by the Fault LED, this indicates one of the following conditions.
 - a. The AC power was interrupted during the charge cycle.
 - b. The charger DC output connector was disconnected from the battery during the charge cycle.
 - c. The battery has been allowed to sulfate. Charge the battery at least once every three (3) days when the equipment is lightly used. Once sulfation is allowed to take place, it may be partially reduced by returning, temporarily, to daily charging.
3. A decrease in vehicle/equipment range where the battery loses power faster indicates one of the following conditions.
 - a. The electrolyte level in a wet lead-acid battery was allowed to drop below the top of the battery plates. If so, add distilled water to just cover the top of the plates immediately upon discovery, and then fill to the proper level with distilled water at the completion of the very next charge cycle.
 - b. Use of the vehicle/equipment before the battery has been fully charged and the charger automatically terminates the charge cycle. This shortens battery life and accelerates the onset of reduced daily range.
 - c. The normal wear-out pattern for the battery.
4. A charge cycle running longer than anticipated before terminating indicates one of the following conditions.
 - a. An overly-discharged battery.
 - b. The charger output may have been reduced due to low AC input voltage, high ambient temperature, or obstructions to cooling airflow.
 - c. The amp-hour capacity of the battery is greater than the charger can fully charge in the anticipated amount of time.

14. SPECIFICATIONS

See the 1050W Summit Series II datasheet for specifications.

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