



POWERED BY SCHUMACHER

# PROSERIES™

MODEL

## DSR127

### Automatic Battery Charging Station

OWNERS MANUAL



**PLEASE SAVE THIS OWNERS MANUAL AND READ BEFORE EACH USE.**

This manual will explain how to use the battery charger safely and effectively. Please read and follow these instructions and precautions carefully.


## 1. IMPORTANT SAFETY INSTRUCTIONS

### SAVE THESE INSTRUCTIONS.

- 1.1 **SAVE THESE INSTRUCTIONS –**  
This manual contains important safety and operating instructions.
- 1.2 Keep out of reach of children.
- 1.3 Do not expose the charger to rain or snow.
- 1.4 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.
- 1.5 To reduce the risk of damage to electric plug and cord, pull by the plug rather than the cord when disconnecting charger.
- 1.6 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 an extension cord must be used, make sure:
  - The pins on plug of extension cord are the same number, size and shape as those of plug on charger.
  - The extension cord is properly wired and in good electrical condition.
  - The wire size is large enough for AC ampere rating of charger as specified in section 8.
- 1.7 Do not operate charger with damaged cord or plug – replace the cord or plug immediately.
- 1.8 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.
- 1.9 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.
- 1.10 To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
- 1.11 **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 battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary markings on these products and on engine.

## 2. PERSONAL SAFETY PRECAUTIONS

- 2.1 Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- 2.2 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- 2.3 Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- 2.4 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.
- 2.5 NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- 2.6 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.
- 2.7 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.
- 2.8 Use this charger for charging only 6V and 12V LEAD-ACID (STD, AGM or GEL) and 12V Lithium Ion (LiFePO<sub>4</sub>) rechargeable batteries with recommended rated capacities of 24Ah (6V) and 44-75Ah (12V). It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.  
**WARNING:** Do not use this charger for charging Lithium Ion batteries other than the Lithium Iron Phosphate (LiFePO<sub>4</sub>) type. Other Lithium Ion battery types may not be sufficiently charged or may be overcharged with this charger. Overcharging may ignite or burst a battery and cause injury to persons and damage to property.

**NOTE:** 12V LiFePO<sub>4</sub> batteries can only be charged; the  Recovery setting (“REC”) does not apply for this battery type. If the “LITH” battery type is chosen, the rate of

charge automatically defaults to 12V, the only rate allowed. For Battery Type and Battery Voltage settings, see Section 10.

**2.9** NEVER charge a frozen battery.

### 3. PREPARING TO CHARGE

- 3.1** 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.
- 3.2** Be sure area around battery is well ventilated while battery is being charged.
- 3.3** Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- 3.4** Add distilled water in 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.

- 3.5** Study all battery manufacturer’s specific precautions while charging and recommended rates of charge.
- 3.6** Determine voltage of battery by referring to car owner’s manual and make sure that output voltage selector switch is set at correct voltage. If charger has adjustable charge rate, charge battery initially at lowest rate.

### 4. CHARGER LOCATION

- 4.1** Locate charger as far away from battery as DC cables permit.
- 4.2** Never place charger directly above battery being charged; gases from battery will corrode and damage charger.

**4.3** Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.

- 4.4** Do not operate charger in a closed-in area or restrict ventilation in any way.
- 4.5** Do not set a battery on top of charger.

### 5. DC CONNECTION PRECAUTIONS

- 5.1** Connect and disconnect DC output clips only after setting any charger switches to “off” position and removing AC cord from electric outlet. Never allow clips to touch each other.

**5.2** Attach clips to battery and chassis, as indicated in sections 6 and 7.

### 6. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE

**WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE RISK OF A SPARK NEAR THE BATTERY:**

- 6.1** Position AC and DC cords to reduce risk of damage by hood, door, or moving engine part.
- 6.2** Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- 6.3** Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- 6.4** Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (6.5). If positive post is grounded to the chassis, see (6.6).
- 6.5** 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 gauge metal part of the frame or engine block.

- 6.6** 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 gauge metal part of the frame or engine block.
- 6.7** When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
- 6.8** See *Battery Percent and Charge Time* for length of charge information.

## 7. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE

**WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE RISK OF A SPARK NEAR THE BATTERY:**

- 7.1 Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- 7.2 Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- 7.3 Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- 7.4 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.

- 7.5 Do not face battery when making final connection.
- 7.6 When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
- 7.7 A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

## 8. GROUNDING AND AC POWER CORD CONNECTIONS

- 8.1 This battery charger is for use on a nominal 120 volt circuit and requires a dedicated 15A circuit. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. The plug pins must fit the receptacle (outlet). Do not use with an ungrounded system.
- 8.2 **DANGER:** Never alter the AC cord or plug provided – if it does not fit the outlet, have a proper grounded outlet installed by a qualified electrician. An improper connection can result in a risk of an electric shock or electrocution.

**NOTE:** Pursuant to Canadian Regulations, use of an adapter plug is not allowed in Canada. Use of an

adapter plug in the United States is not recommended and should not be used.

### 8.3 USING AN EXTENSION CORD

The use of an extension cord is not recommended. If you must use an extension cord, follow these guidelines:

- Pins on plug of extension cord must be the same number, size, and shape as those of plug on charger.
- Ensure that the extension cord is properly wired and in good electrical condition.
- Wire size must be large enough for the AC ampere rating of charger, as specified:

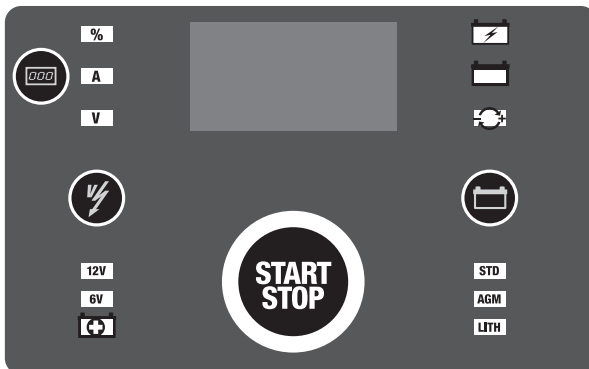
Length of cord (feet)	25	50	100	150
AWG* size of cord	16	12	10	8

\*AWG-American Wire Gauge

## 9. ASSEMBLY INSTRUCTIONS

- 9.1 Remove all cord wraps and uncoil the cables prior to using the battery charger.

## 10. CONTROL PANEL



### **DISPLAY MODE BUTTON**

Use this button to set the function of the digital display to one of the following:

**% (Battery %)** – The digital display shows an estimated charge percentage of the battery connected to the charger's battery clamps.

**A (Amperage)** – The digital display shows the charging current, in DC amps.

**V (Voltage)** – The digital display shows the voltage at the charger battery clamps, in DC volts.

**NOTE:** Pressing the display button when the Voltage function is active turns the display off. Pressing the button again will turn the display back on to Battery %.


### **BATTERY VOLTAGE BUTTON**

Use this button to select one of the following:

**12V** – The battery is a 12V type and charges at the corresponding rate.

**CAUTION:** Do not use the 12V setting for a 6V battery. Overcharging will occur. The battery may burst and cause injury to persons and damage to property.

**6V** – The battery is a 6V type and charges at the corresponding rate. **6V setting is not available for lithium ion batteries.** If a 12V battery is detected (battery voltage above 8V), the button setting will automatically change to 12V, with the voltage of the battery displayed; the 6V setting will not be allowed.

 **(Recovery) – For 12V non-lithium ion batteries only.** This rate uses a unique recovery algorithm to recover a sulfated battery. The display will show "REC" for the entire recovery/charge/maintain cycle until this option is deselected by the user. The battery %, amperage and voltage will not be shown.

**CAUTION:** Use the Recovery setting only for 12V batteries. The Recovery setting cannot be used with 6V batteries. The 12V setting is automatically applied when Recovery is selected. Selecting Recovery for a 6V battery will cause overcharging. The battery may burst and cause injury to persons and damage to property.

### **BATTERY TYPE BUTTON**

Use this button to select the type of battery.

**NOTE:** Batteries should be marked with their type. If charging a battery that is not marked, check the manual of the item that uses the battery.

**NOTE:** When the "LITH" battery type is selected, only the "12V" voltage setting is available.

**STD (Standard)** – Used in cars, trucks and motorcycles, these batteries have vent caps and are often marked "low maintenance" or "maintenance-free". This type of battery is designed to deliver quick bursts of energy (such as starting engines) and has a greater plate count. The plates are thinner and have somewhat different material composition. Standard batteries should not be used for deep-cycle applications.

**Deep-Cycle** – Set button to **AGM**. Deep-cycle batteries are usually marked as "Deep-Cycle" or "Marine". Deep-cycle batteries are usually larger than the other types. This type of battery has less instant energy but somewhat greater long-term energy delivery than regular batteries. Deep-cycle batteries have thicker plates and can survive a number of discharge cycles.

**AGM** – The Absorbed Glass Mat construction allows the electrolyte to be suspended in close proximity with the plate's active material. In theory, this enhances both the discharge and recharge efficiency. The AGM batteries are a variant of Sealed VRLA (valve regulated lead-acid) batteries. Popular uses include high-performance engine starting, power sports, deep-cycle, solar and storage batteries. AGM batteries are typically good deep cycle batteries and they deliver best life performance if recharged before the battery drops below the 50 percent discharge rate. If these AGM batteries are completely discharged, the cycle life will be 300 plus cycles and this is true of most AGM batteries rated as deep-cycle batteries.

**Gel** – Set button to **AGM**. The Gel Cell is similar to the AGM style because the electrolyte is suspended, but different because the AGM battery is still considered to be a wet cell. The electrolyte in a GEL cell has a silica additive that causes it to set up or stiffen. The recharge voltages on this type of cell are lower than the other styles of lead-acid battery. This is probably the most sensitive cell in terms of adverse reactions to over-voltage charging. Gel batteries are best used in VERY DEEP cycle applications and may last a bit longer in hot weather applications. If the incorrect battery charger is used on a Gel Cell battery, poor performance and premature failure is certain.

**LITH (Lithium Ion, LiFePO<sub>4</sub> only)** – The LiFePO<sub>4</sub> (Lithium Iron Phosphate) battery is lithium-ion based and offers good safety characteristics. The LiFePO<sub>4</sub> cell has a very constant discharge voltage. This allows the cell to deliver virtually full

power until it is discharged. Because of the nominal 3.2 VDC output, four cells can be placed in series for a nominal voltage of 12.8 V. This comes close to the nominal voltage of six-cell lead-acid batteries. This makes the LiFePO<sub>4</sub> a good replacement for lead-acid batteries in applications such as automotive and solar. Like a gel cell, the LiFePO<sub>4</sub> cell is sensitive to overcharging. Its cells are balanced before they are assembled, and an internal protection system is implemented, preventing too deep a discharge.


### START/STOP BUTTON


Use this button to start or stop the charging process, after the battery is properly connected and battery voltage and type have been selected. If the battery voltage is greater than 0.2 V, the display will briefly show "ON" when the START/STOP button

is pressed. After charging has started, pressing the START/STOP button will cause the display to briefly show "OFF". If the battery voltage is 0.2 V or less and the START/STOP button is pressed, the display will show "OFF". This indicates that charging has not started, due to low battery voltage.

### CHARGING LED INDICATORS

 **Charging (yellow/orange) lit** – The charger is charging the battery.



 **Charged/Maintaining (green) lit** – The battery is fully charged and the charger is in maintain mode.

 **Reversed Clamps (red) flashing** – The connections are reversed.

**NOTE:** See *Operating Instructions* for a complete description of the charger modes.

## 11. OPERATING INSTRUCTIONS


### OVERVIEW

Connect AC power and set the front panel ON/OFF switch to the ON position. Then select an unused charging outlet from the eight available. Connect the battery, following the precautions listed under sections 6 and 7. Select the appropriate  Battery Voltage and  Battery Type and press START. If the battery voltage is greater than 0.2 V, charging will begin. If charging begins, the Battery Voltage, Type and Display settings are saved. Then, whenever the unit has been off and AC power is reapplied for 10 minutes and no buttons are pressed, charging of the battery will resume with the saved settings from the last charging cycle.


### DISPLAY

Following power-up, the display turns off after 1 minute or 1 minute from the last key press or connection to a battery. With the display off, any button press (other than a display button press) will turn the display on for one minute or one minute from any subsequent key press or clamp connection. Also, with the display off, connecting the station cable clamps to a battery will show the battery voltage and keep the display on for one minute or one minute from any subsequent key press. However, with the display off, if the display button turns the display on, the display will remain on until power-down. If the display button turns the display off (see *Display Mode Button*, in Section 10), then the above scenario, with the display off, once again applies.

### CHARGING

When charging begins, the yellow/orange  Charging LED will be lit.

### COMPLETION OF CHARGING

Charge completion is indicated by the green  Charged/Maintaining LED. When lit, the charger has stopped charging and has switched to Maintain Mode of operation.

### ABORTED CHARGE


If charging cannot be completed normally, charging will abort. When charging is aborted, the charger's output is shut off. The display will show "BAD BAT" and an error code. See section 15, *Troubleshooting and Error Codes*. To reset after an aborted charge, press the START/STOP button to turn the charger off.

### RECOVERY MODE

#### (Non-lithium ion batteries only)



If a battery is left discharged for an extended period of time, it could become sulfated and not accept a normal charge. The charger will detect this and automatically enter Recovery mode. When this mode is activated, the display will read "BAD BATT REC". The display will revert to normal operation when normal charging begins after the battery is recovered. Recovery Mode could take up to 10 hours. If it fails, charging will abort and the display will read "BAD BAT F02". For more information, see section 15, *Troubleshooting and Error Codes*.

### MAINTAIN MODE

When the green  Charged/Maintaining LED is lit, the charger has started Maintain Mode. This mode of operation is known as Float Mode Monitoring. In this mode, the charger keeps the battery fully charged by delivering a small current, when necessary. The voltage is maintained at a level determined by the battery type selected.



## GENERAL CHARGING NOTES

- The large chassis-mounted main fan runs, based on temperatures of the individual charging boards within the unit and the total power being supplied by the unit. The board-mounted fans run, based on the corresponding board temperature.
- If the charge mode is changed after charging has started (by pressing the  Battery Voltage or  Battery Type button), the charging process stops and begins again automatically at the new selection.
- The voltage displayed during charging is the charging voltage and usually will be higher than the battery's resting voltage.

## POWER CONTROL

To keep the unit from exceeding its input current level specification of 15 A, all charging stations are connected by an I<sup>2</sup>C (pronounced "i squared c") communication bus, and power data is accumulated by one station communicating with all other stations. If the power is greater than 850 W (this corresponds to an input AC current of about 15 A), the max current of all stations is reduced from 12 A to 7 A. After 2 minutes, if the total power is still above the 850 W, the max current of all stations is reduced to 4 A. Then, after two more minutes, if the power persists above 850 W, all stations are turned off. After any of these power reductions, excluding shut down, if the total power drops below 600 W for 1 hour, the max current in all stations is then increased back to 12 A.

## 12. USING THE VOLTMETER TO TEST BATTERY STATE OF CHARGE

### OVERVIEW


The charger has a built in voltmeter to test your battery's state of charge. The charger does not have a built in load tester. As such, a recently charged battery could have a temporarily high voltage due to what is known as "surface charge". The voltage of such a battery will eventually drop during the period immediately after the charging system is disengaged. Consequently, the tester could display inconsistent values for such a battery. For a more accurate reading, the surface charge should be removed by temporarily creating a load on the battery by turning on the lights or other accessories.

The battery tester is only designed to test 6V and 12V batteries. Testing a device with a rapidly changing voltage could yield unexpected or inaccurate results.

### TESTING SEQUENCE

There are three basic steps required to test the battery state of charge:

1. Connect the battery charger's clips to the battery. Be sure to follow all of the precautions listed under sections 6 and 7.

2. Connect the charger's power cord to a 120 VAC outlet. Again, be sure to follow all of the precautions listed under sections 6 and 7.
3. Read the voltage on the digital meter or press the  Display Mode button to set the tester to % (Battery %) and read the battery percentage.

### TESTER AND CHARGER

When first turned on, the charger operates only as a tester, not as a charger. To continue to use it as only a tester, avoid pressing the START/STOP button. The charger is always in tester mode until the START/STOP button is pressed. Pressing the START/STOP button activates the charger and deactivates the tester.

### TESTING AFTER CHARGING

After the unit has been changed from tester to charger (by pressing the START/STOP button), it remains a charger as long as it's connected to a battery. Press the START/STOP button again to change back to tester mode.

## 13. BATTERY PERCENT AND CHARGE TIME

This charger adjusts the charging time in order to charge the battery completely, efficiently and safely.

**The duration of the charging process depends on three factors:**

### Battery State

If a battery has only been slightly discharged, it can be charged in less than a few hours. The same battery could take up to 10 hours if very weak. The battery

state can be estimated by using the built-in tester. The lower the reading, the longer charging will take.

### Battery Rating

A higher rated battery will take longer to charge than a lower rated battery under the same conditions. A battery is rated in Ampere-Hours (AH), Reserve Capacity (RC) and Cold Cranking Amps (CCA). The lower the rating, the faster the battery will charge.

### Battery Size

The charger automatically selects a charge rate up to 12 amps. The charger charges at the selected charge rate and eventually reduces the charge rate in a controlled manner. After the charging process has started, the digital display can be used to determine the charging progress by selecting the % (Battery %) mode.

### Important facts to keep in mind when charging a battery:

- When the display indicates 77% charged, the battery has been charged enough to start most vehicles.
- The battery % shown in tester mode is an estimate based on the battery voltage and a scale set by the Battery Council International. The battery % shown in charger mode is an estimate of the relative charge in the battery compared to the charge it should have if the charging process is allowed to complete.
- The battery % shown in tester mode can be used to estimate the relative charge time. The lower the % shown, the longer the charge time for a given battery.
- The battery % shown in charger mode is an indication of the relative progress of the charging process. The higher the battery % displayed, the less charge time remains.
- The more a battery is discharged, the faster it absorbs a charge from the charger. That means that the battery % increases faster at the beginning of the charging process than at the end. In other words, it takes longer for a battery to accept the last few percent of the charge than the first several percent.

## 14. MAINTENANCE AND CARE

A minimal amount of care can keep your battery charger working properly for years.

- Clean the clamps each time you are finished charging. Wipe off any battery fluid that may have come in contact with the clamps to prevent corrosion.
- Occasionally cleaning the case of the charger with a soft cloth will keep the finish shiny and help prevent corrosion.
- Coil the input and output cords neatly when storing the charger. This will help prevent accidental damage to the cords and charger.
- Store the charger unplugged from the AC power outlet in an upright position.
- Store inside, in a cool, dry place. Do not store the clamps on the handle, clipped together, on or around metal, or clipped to the cables.

## 15. TROUBLESHOOTING AND ERROR CODES

### Error Codes

CODE	DESCRIPTION	REASON/SOLUTION
F01	The battery voltage is still under 10V (for a 12V battery) or 5V (for a 6V battery) after 2 hours of charging.	The battery could be bad. Have it checked or replaced.
F02	The charger cannot desulfate the battery.	The battery could not be desulfated; have it checked or replaced.
F03	The battery was unable to reach the "full charge" voltage.	Have the battery checked or replaced.
F04	The connections to the battery are reversed or are made incorrectly.	The battery is connected backwards. Or for multiple batteries being charged, the connections are not proper. Unplug the charger and reverse or correct the connections to the battery(s).
F05	The charger was unable to keep the battery fully charged in maintain mode.	The battery won't hold a charge. May be caused by a drain on the battery or the battery could be bad. Make sure there are no loads on the battery. If there are remove them. If there are none, have the battery checked or replaced.
F06	The charger detected that the battery may be getting too hot (thermal runaway).	The charger automatically shuts the current off if it detects the battery may be getting too hot. Have the battery checked or replaced.



CODE	DESCRIPTION	REASON/SOLUTION
F07	The charger shut off because its internal temperature exceeds limit.	Make sure the charger does not have the side ventilation holes blocked. Move the charger out of the sun and into the shade.
F08	The battery voltage dropped too low during the maintain mode.	May be caused by a drain on the battery or the battery could be bad. Make sure there are no loads on the battery. If there are remove them. If there are none, have the battery checked or replaced.
F09	The Lithium Ion (LiFePO <sub>4</sub> ) battery continues to read 0 V and is therefore unable to be charged.	The Lithium Ion (LiFePO <sub>4</sub> ) battery could be bad. Have it checked or replaced.
F10	The voltage on the Lithium Ion (LiFePO <sub>4</sub> ) battery exceeds the safe limit.	The charger automatically shuts off if it senses that the Lithium Ion (LiFePO <sub>4</sub> ) battery voltage exceeds the safe limit. The battery could be bad. Have it checked or replaced.

If you get an error code, check the connections and settings and/or replace the battery.

### Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
The battery is connected and the charger is on, but is not charging.	The charger is not in charger mode.	Press START/STOP button for the battery that is connected to the charger.
The indicator lights are lit in an erratic manner, not explained in the <i>Operating Instructions</i> section.	A button may have been pressed when the charger was plugged in.	Make sure nothing is touching the control panel, then unplug the unit and plug it in again.
The display shows "BAD BAT" and an error code.	The charger was unable to complete the charging of the battery and is in abort mode. See <i>Error Codes</i> for more information.	Press the corresponding START/STOP button, to turn off and reset the charger.
The charger is making an audible clicking sound.	The charger has a relay that turns the current to the battery on and off.	No problem, this is a normal condition.
The measured current is much lower than expected.	The charger reached the maximum voltage and is reducing the current.  The charger detected an over-temperature condition and has reduced the current to allow the unit to cool.	No problem, this is a normal condition.  Make sure the charger does not have the side or rear ventilation holes blocked. Move the charger out of the sun and into the shade.
While charging the battery, the battery stays at a certain % (ex. <65%).	The % display may not change at a steady rate.	DO NOT UNPLUG OR CHANGE THE SETTING. Be patient and let the charger finish. This is normal.
When the charger is unplugged or the settings are changed, the number increases or jumps to 100%.	The battery voltage is still high from a partial charge.	Wait for the voltage to settle before resuming the charge. Turn on the lights to remove the surface charge.

## 16. SPECIFICATIONS

Input..... 120V AC 60Hz, 12A @ 12V, 4A

Output..... 12V DC, 12A/120 sec., 12V DC, 4A/120 sec.

12V DC, 7A cont.