

InCharger™
Industrial Battery Charger

**INSTALLATION INSTRUCTION
& OWNER'S MANUAL**

**Model 93-INCHGR06-A
93-INCHGR10-A
93-INCHGR20-A
93-RMTEMP01-A
93-RMDISP01-A**



INTRODUCTION AND APPLICATION 3

 Manual Purpose 4

IMPORTANT SAFETY INSTRUCTIONS 4

 Environmental Precaution 4

 Location Precautions 4

 Application Precaution 4

 Damaged Unit Precaution 5

 Disassembly Precaution 5

 Maintenance/Cleaning Precaution 5

 Personal Safety Precautions 5

 Preparing to Charge Precautions 5

 Grounding Precautions 6

MOUNTING 6

WIRING 7

 Wire Recommendations 7

 Connection Points 7

INCHARGER OPERATION 10

 Battery Charger Terminology 10

 Soft Touch Button Setting 10

 Turning the InCharger™ ON/OFF 10

 Setup Mode 10

 Setup Types 11

 Procedure for Setup Mode 11

 Important Notes 12

 Configuration Storage 12

 Display Screens 15

 Remote Display Operation 16

 Analyzing and Synchronization to the Battery 16

 Lamp Test Mode 16

 Cooling and Blower Operation 16

ALARMS 17

 Alarm Silence 17

 AC Input Power not Present 18

 Deeply Discharged Battery Recovery 18

 Battery Temperature Compensation During Charging 18

 Connection 19

 Operation 19

STARTER CUTOFF 20

 Connection 20

 Operation 20

MAINTAINING THE INCHARGER 21

 Fuse Replacement 21

INCHARGER FAILURE AND REPLACEMENT 22

WARRANTY AND SERVICE 22

 Warranty 22

 Service Center and Repair Correspondence 22

SPECIFICATIONS 23

FACTORY DEFAULT SETTINGS 24

INTRODUCTION AND APPLICATION

Thank you for purchasing the InCharger™. We hope you will be satisfied with this charger and it provides many years of exceptional service.

The InCharger™ is a heavy duty, state of the art, microprocessor controller, single bank Industrial Battery Charger that allows easy custom user configuration and setup.

This charger has the following features that make it configurable to fit most applications.

- Bright Vacuum Florescent Display (VFD) to indicate information such as output amps, battery voltage, temperature (Celsius or Fahrenheit) and alarms
- 12 or 24 VDC output (user selectable)
- Pre-configured for Gel, Flooded Lead Acid, AGM or NiCAD batteries. (or adjust and modify the preset configuration to meet your needs).
- Universal AC input 95–140 VAC & 190–265 VAC (60 Hz) automatic voltage selection
- 6, 10, & 20 amp sizes
- Easy Wiring Connectors for fast wiring.
- Memory button that stores all settings and can be transferred to other chargers in case of failure or upgrade.
- Audio Alarm (user selectable: On/Off)
- Soft Touch Capacitive User Interface that is resistant to dust and dirt contamination.
- Starter Cutoff Input – turn off the InCharger’s output during engine starting
- The ability to alert other systems through eight heavy-duty dry Form C relay contacts.
- Equalization (Flooded Lead Acid and NiCAD only)
- Ground Fault Detection (user selectable: On/Off)
- Deeply Discharged Battery Recovery system to safely recharge a deeply discharged battery.
- Battery Fault indication (indicator and relay)
- DC High and DC Low Alarms (indicators and relays)
- “Cranking Detect...Low Cranking Voltage” (indicator and relay)
- “Battery Reversed (automatic shutoff)... no fuse blowing.” (indicator and relay)
- Cool touch, Rugged Anodized Aluminum case with retained screws on the covers
- –40 to +65 C (–40 to 149 F) ambient operating temperature with no derating
- Over Temperature detection and shutdown (prevents damage due to overheating)
- Optional fully functional Remote display with keypad and Audible alert
- Optional easy to install Battery Temperature Sensor.

Manual Purpose

With your personal safety in mind, this manual lists important safety precautions first, then covers installation, operation, maintenance, troubleshooting, warranty, and service information.

Warranty/Registration

Before proceeding, complete and mail back your Warranty Registration card.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important safety and operating instructions for the InCharger™. Read the entire manual before usage.



This device is not ignition protected. Avoid serious injury or death from fire or explosion. Do not install in compartment containing gasoline fueled engines or gasoline tanks, or in areas where ignition protected equipment is required.



To avoid serious injury or death from high voltage electrical shock disconnect AC shore power before opening panel.

WARNING

RISK OF EXPLOSIVE GASES! WORKING IN THE VICINITY OF A LEAD ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. THEREFORE IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR InCharger™ YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

To reduce risk of battery explosion, follow these instructions, those of the battery manufacturer, and the manufacturer of any equipment you use in the vicinity of the battery. Review cautionary markings on these products and on the engine.

Environmental Precaution

The InCharger™ is intended for installation in an area protected from rain and/or snow.

Location Precautions

When choosing a location for the InCharger™ the following precautions must be adhered to:

1. Locate the InCharger™ as far away from the battery as DC cables will permit.
2. Never place the InCharger™ directly above the battery being charged; gases from the battery will corrode and damage the InCharger™.
3. Never allow battery acid to drip on the InCharger™ when reading gravity or filling the battery.
4. Do not operate the InCharger™ in an enclosed area or restrict ventilation in any way.
5. Do not set a battery on top of the InCharger™.

Application Precaution

These units are intended for hard-wired, permanent, installation. Use of attachments not recommended or sold by the Charles Marine & Industrial Group may result in risk of fire, electrical shock or personal injury.

Damaged Unit Precaution

Do not operate the InCharger™ if it has received a sharp blow, been dropped, immersed in water or otherwise damaged. See the section in this manual on *Warranty and Customer Service* for repair and replacement information.

Disassembly Precaution

Do not disassemble the InCharger™. See the sections in this manual on *Maintaining the InCharger™*, *Troubleshooting*, and *Warranty and Service*.

Maintenance/Cleaning Precaution

To reduce risk of electrical shock, disconnect the InCharger™ from AC power and batteries before attempting any maintenance or cleaning.

Personal Safety Precautions:

Adhere to the following personal safety precautions when installing or working with an InCharger™ :

1. Someone should be within voice range or close enough to come to your aid when you work near a lead acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
4. If battery acid contacts skin or clothing, wash them immediately with soap and water. If acid enters the eye, flood the eye with cold, running water for at least ten minutes and get medical attention immediately.
5. Never smoke or allow a spark or flame in the vicinity of the battery or engine.
6. Do not drop a metal tool onto the battery. It may spark or short circuit the battery or other electrical parts that can cause an explosion.
7. Remove all personal metal items such as rings, bracelets, necklaces and watches when working near a lead acid battery. A battery can produce short circuit currents high enough to weld a ring or the like to metal, causing a severe burn.
8. Do not use the InCharger™ for charging dry cell batteries that are commonly used with home appliances. These batteries may burst and cause personal injury and property damage.
9. **NEVER** charge a frozen battery.

Preparing to Charge Precautions

CAUTION

To reduce risk of injury, charge only lead acid, gel, NiCAD or AGM batteries. Other types of batteries may burst, causing personal injury and damage.

Before charging a battery with the InCharger™, read the following precautions:

1. If it becomes necessary to remove the battery from the boat to charge, first remove the grounded terminal from the battery. Make sure all accessories in the vehicle are off, so as not to cause an arc.
2. Be sure the area around the battery is well ventilated while the battery is being charged. Gas can be forcefully blown away using a piece of cardboard or other non-metallic material as a "hand fan".
3. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.

4. Add distilled water in each cell until battery acid reaches levels specified by the battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow the manufacturer's recharging instructions.
5. Study all battery manufacturer's precautions, such as removing or not removing cell caps while charging and recommended rates of charge.
6. Determine the voltage of the battery by referring to the owner's manual. Make sure that the output voltage selector switch is set at the correct voltage. If the charger has an adjustable charge rate, charge the battery initially at the lowest rate.

Grounding Precautions

When the InCharger™ is permanently mounted, it must have a grounding conductor.

1. The InCharger™ should be connected to a metal, grounded, permanent wiring system. An equipment-grounding conductor should be run with the circuit wiring and connected through the InCharger™ housing grommets to the equipment grounding (GRN) terminal on the InCharger™.
2. Connections to the InCharger™ should comply with all local codes and ordinances.

MOUNTING

The InCharger™ charger is designed to be mounted vertically, as on a wall or mounting rails. Horizontal mounting is acceptable provided that the free air clearance is doubled from that listed below. Sufficient mounting hardware should be used (not provided) to support the weight of the InCharger™. It is recommended that six (6) 1/4-20 screws, a minimum of 1 1/2 inches long be used to mount the InCharger™.

While the InCharger™ is designed to maintain a cool touch exterior, sufficient clearance must be allowed for heat dissipation and cooling. It is strongly recommended that the InCharger™ be mounted in such a way that there is at least 3 inches of free air clearance on the sides, front, top and bottom. The back on the InCharger™ may be mounted flush against a wall provided the wall is of a solid material that will not block the rear airflow. Do not mount against a wall made of a material that may hinder airflow on the rear of the unit. Do not block the top and bottom of the rear of the unit.

WARNING

The InCharger™ blower exhausts the heat the InCharger™ generates during operation through the vent holes on the rear of the case. In addition, this exhausted air helps cool the case. Blocking the airflow on the rear of the case will result in charger overheating and shutdown. It is very important to verify the airflow channel across the rear of the case is not blocked by any material.

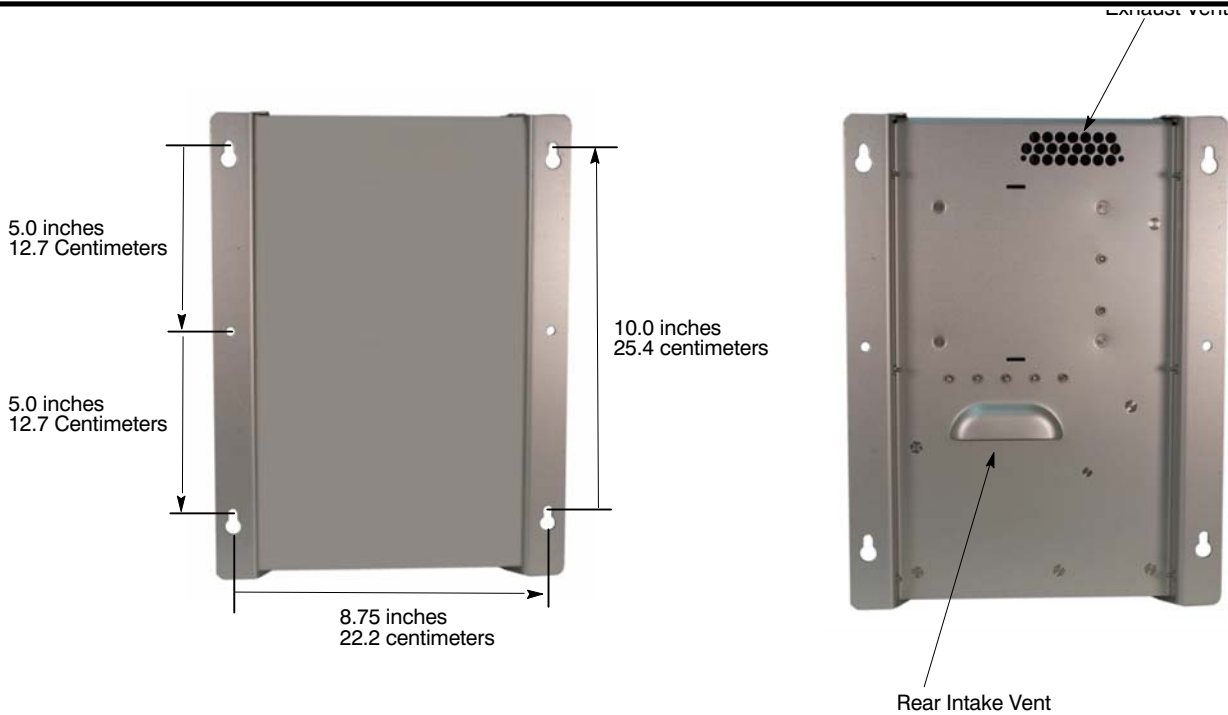


Figure 1. Mounting Dimensions and Rear Ventilation

WIRING



To maintain protection from fire, only use conductors recommended in this manual.

Wire Recommendations

The wire gauges in Table 1 are the minimum requirement for making wire connections.

Note: Use only copper or copper-clad wire. Do not use steel or aluminum wire.

Table 1. Minimum Wire Gauge Requirements

Type of Connection	Wire Gauge
Input	14 AWG
Output	10 AWG
Alarm Contacts	26 AWG
Starter Cutoff	26 AWG

Connection Points

The wiring is housed in the Main Wiring Compartment. Access this compartment by loosening the retained screws as shown and pulling down slightly on the Wiring Compartment Cover. Remove the AC cover in the same manner to access the AC fuse and input connections. Replace all covers and tighten screws after installation is complete.

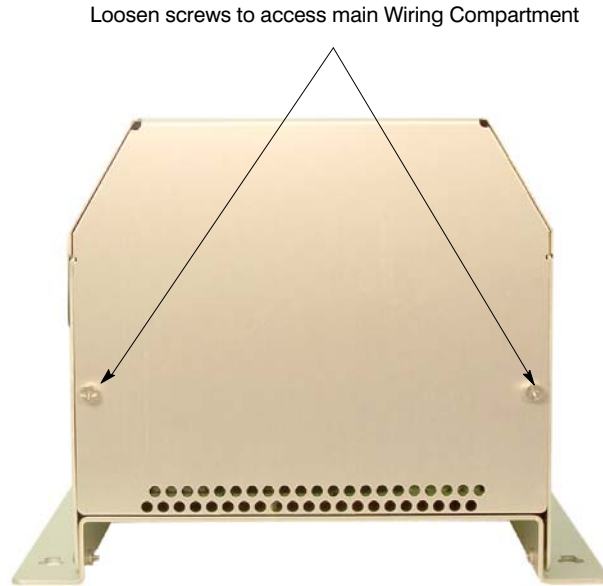


Figure 2. Main Wiring Compartment Access

All Easy Change Connector blocks may be removed for convenient wiring. Loosen the set screws and gently pull the plug away from the header. Insert wire into connection blocks and tighten as appropriate. After wiring the Easy Change Connector block, insert into mating header and tighten the outer set screws to avoid disconnection from vibration.

Knock-outs for 1/2" conduit are provided on either side for easy wiring. AC connections must be routed through a knock-out. DC connections, alarm contacts, starter cutoff, and optional equipment may be routed through the center of the rubber grommet (cut center as necessary). All connections through the rubber grommet must be secured to the Wiring Retaining Strap. Non-conductive wire ties (not provided) are recommended. Allow sufficient extra wire in wiring compartment for expansion and contraction of wiring harness.

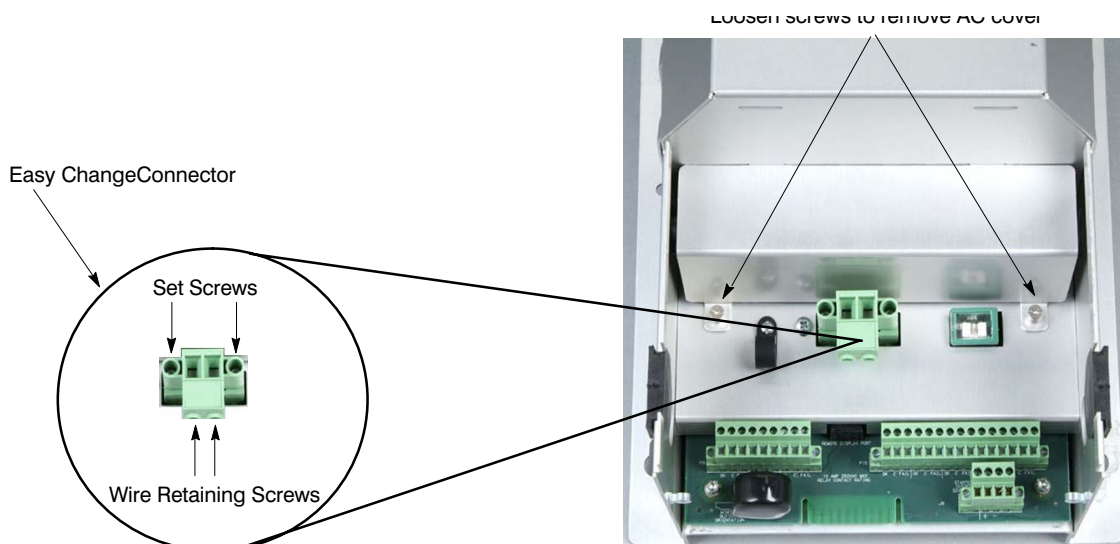


Figure 3. AC Cover Location

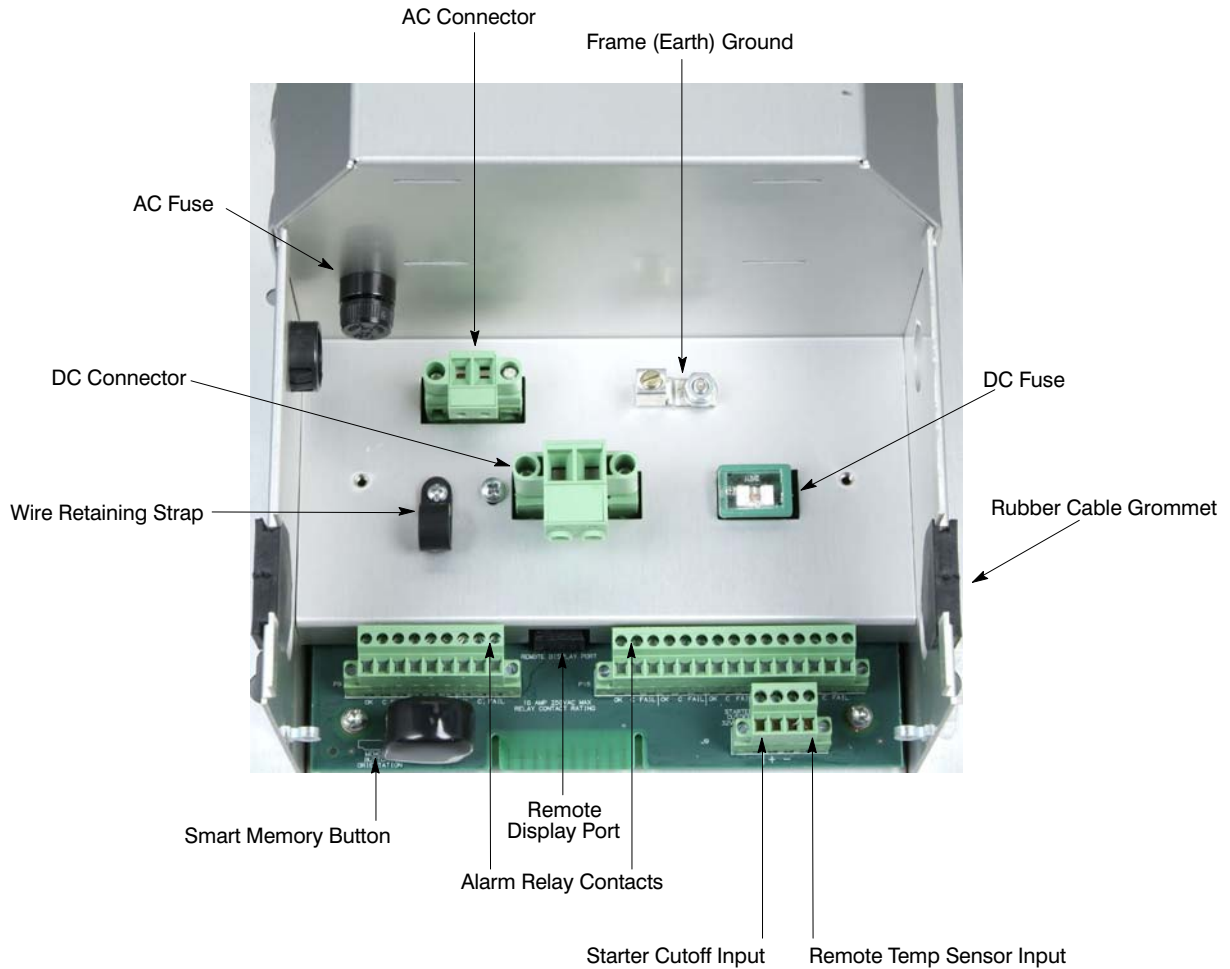


Figure 4. Covers Removed from InCharger

Table 2. Wiring Connection List

Type of Connection	Description
Input	95–140 VAC, 190–265 VAC system auto select
Frame Ground	Connect to Earth Ground
Output	12 VDC or 24 VDC set through <i>Setup</i> menu
Alarm Connections	Optional: Each alarm has a Common (C), Pass (closed when no alarm), and Fail (closed when in alarm) connection
Starter Cutoff	Optional: Connect across a switched 9–32 VDC line. Non-polarized. When energized, will indicate to the charger that a starter motor is active. Charge will respond by turning off output power. (see <i>Starter Cutoff</i> section)
Remote Temp. Sensor (93-RMTEMP01-A)	Optional: Connect to Remote Temp. Sensor (if purchased separately). Observe polarity. Place non-conductive ring lug over any battery terminal to measure battery temperature.
Remote Display (93-RMDISP01-A)	Optional: Remove dirt cap and plug in remote display to unit. Use a standard “straight” Cat-5E Ethernet cable (max 500 feet). Do not use a Cat-5E “cross-over” cable. Remote display mirrors charger display including touch buttons. Note: This port is not an Ethernet port. Do not connect to Ethernet type equipment.

INCHARGER OPERATION

The InCharger™ is a completely automatic battery charging system. However, there are still a few parameters that need to be configured by the user prior to use. If this is the first time using the system, the system will initially default into SETUP mode.

If the system has been previously setup, all the settings are recalled and the InCharger™ is automatically configured to the previous settings.

Upon Power up (or the return of AC power, if missing), the InCharger™ will enter Bulk Mode (Lead Acid, Gel, or AGM) or Equalize Mode (NiCAD), and stay in that mode for the duration set by Bulk Duration (Lead Acid, Gel, or AGM) or Equalize Duration (NiCAD).

After the Bulk or Equalize Duration completes, the InCharger™ will enter Float Mode to maintain the batteries. The InCharger™ will stay in Float Mode until the AC is removed or the battery voltage drops approximately 1.0 volts [12 Volt mode] or 2.0 volts [24 Volt mode] below Float voltage for approximately five minutes. After the time delay, the InCharger™ will reenter the Bulk [Equalize] Mode for the duration set.

Battery Charger Terminology

This explanation of terms will assist in understanding battery charger operation.

Term	Definition
3-Stage Charging/ Single Stage Charging	By setting the Bulk Mode and Float Mode to different values, the InCharger™ will effectively do 3-stage charging. If Single Stage Charging is desired, set the Bulk and Float Mode settings to the same voltage level.
Bulk Duration	The time the system is in Bulk Mode. With NiCAD batteries this is called Equalize Duration.
Bulk Mode	The higher output voltage setting for rapidly charging discharged batteries. This is also called the Equalize Mode when using NiCAD batteries.
Equalize Cycle (Lead Acid & NiCAD batteries only)	When set, this is the number of days between Equalization. Lead Acid and NiCAD have two different operations. When using Lead Acid batteries, the voltage is raised to 15.5 VDC [12 Volt mode] or 31.0 [24 Volt mode] for 1 hour to equalize the batteries. When using NiCAD batteries, the InCharger™ will set the output voltage to the setting of the Equalize Mode [Bulk Mode] for the duration specified by the Equalize Duration [Bulk Duration].
Float Mode	The lower output voltage setting for maintaining batteries once the battery is charged.

Soft Touch Button Setting

Simply lightly touch the button with your finger. The charger will sense your finger. Pressing hard on the button is not desirable. Remove finger from button completely before pressing next button. Avoid laying your finger from the button to the metal housing as this may cause the button not to sense your finger properly.

Turning the InCharger™ ON/OFF

Press and hold the ON or OFF button for approximately 3 seconds to turn on/off the InCharger™.

Note: If the charger was left in the "ON" state, the charger will restart to the "ON" state when AC Input Power is applied. The same holds true for the "OFF" state. If the charger was left in the "OFF" state, it will restart in the "OFF" state when AC Input Power is applied.

Setup Mode



Setup mode allows the user to select and customize as necessary the parameters of the InCharger™. All setup mode operations are available using the following buttons:

Keypad Button	Description
ENTER ↵	Press to enter <i>Setup Mode</i> or advance to next setup category.
UP arrow ↑	Select the desired operation.
DOWN arrow ↓	Hold button to repeat.

Setup Types

There are two basic types of setup selections as described below.

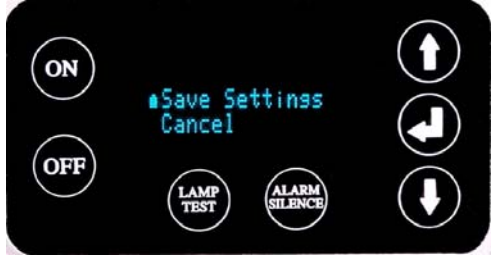
Table 3. Setup Types

Setup Type	Display Output
<p><u>Type 1 – Selectable Selection Setup:</u> This type of setup allows the user to select a specific option. Example would be <u>12</u> or <u>24</u> VDC output. Use the UP/DOWN arrow keys to move the small battery icon to the desired selection. Use the ENTER (↵) button to move to the next set-up category.</p>	 <p>Selected Value: 24V</p>
<p><u>Type 2 – Variable Selection Setup:</u> This type of setup allows the user to select a desired operation from a large range. Example would be maximum output amperage. Use the UP/DOWN arrow keys to select the desired value from the range shown. The current value is shown on the right and an analog range percentage bar is shown on the bottom. Hold the UP/DOWN arrows for repeat action. Use the ENTER (↵) button to move to the next setup category. OFF and NOW are available on some categories. If available on certain categories, the OFF can be reached by pressing the DOWN button until “OFF” appears on the right side. Similarly, NOW can be reached by pressing the UP button until “NOW” appears on the right side.</p>	 <p>Range: 2.0 to 20.0 amps Current Value: 15.0 amps</p>

Procedure for Setup Mode

- Setup the system by pressing ENTER (↵). This will turn the charger’s output to OFF while the system is in Setup mode. Once Setup Mode is complete, the charger’s output will automatically restart.
- The first menu displays the 12/24 VDC battery output selection menu. Using the Up/Down arrow keys as explained in a Type 1 selection above, select the desired output voltage. Press ENTER (↵) to advance to the next menu.
- The second menu displays the Battery Type selection menu. There are 4 battery types, with only 2 types shown at a time. Use the Up/Down arrow keys to select the desired battery type. Note the small arrow on the display indicates the direction of the other two hidden battery types. Press ENTER (↵) to advance to the next menu.
- The third menu displays *Factory* or *Custom* settings. Select *Factory* to use the pre-programmed settings. Select *Custom* to adjust the settings to the application.
 1. Selecting *Factory* settings will jump to the Save Setting Menu.

2. Selecting Custom settings will allow changing all the parameters as explained in the table below. Change settings using Type 1 or Type 2 selection modes as described above.

Step	Action	Result
1.	At the end of setup, there is an option to Save or Cancel the changes just made. Cancel returns to the previously unchanged values. Save stores the values in the memory button.	

Important Notes

- The Charger output is turned off during Setup and will automatically restart after Setup mode is completed.
- Keypad Timeout: If no keys are pressed for approximately 5 minutes, the system will return to normal operation, which is equivalent to pressing the *Cancel* key.
- The system must be Setup before the 1st operation. *Cancel* is replaced with *Restart*. Keypad Timeout is disabled.
- The Smart Memory Button must be in-place for Setup to operate properly.
- Factory default will set all parameters to Factory Settings except the following which must be selected prior to startup:
 1. 12 or 24 VDC output to batteries
 2. Battery Type Selection

Configuration Storage

All the configuration and settings are stored in the *Smart Memory Button*. This non-volatile memory can be moved from charger to charger if necessary.

During system startup and operation, the *Smart Memory Button* is referenced for setting and configuration necessary to operation the charger. For this reason, the *Smart Memory Button* must be present at all times during charger operation.

Table 4. Setup Menu Options

Menu Option	Type	Description
Battery Voltage	Selectable	Set to the nominal voltage of the battery connected.
Battery Type	Selectable	Set to the type of battery connected. <i>Note: A small arrow in the lower corner of the display screen indicates that additional battery selections are available.</i>
Factory Default or Custom Settings	Selectable	Depending on requirements, the InCharger™ may operate with Factory Default settings or Custom Settings may be selected. <i>Note: If Factory Default is selected, the next menu selection will be the Save Setting/Cancel menu. The following options will be available if Custom Settings is selected.</i>




Menu Option	Type	Description
The following selections are available from the Custom Settings Menu.		
Bulk (Boost) or Equalize Voltage	Variable	This value is displayed in VDC and increases in 0.1 volt steps. If lead acid, AGM or gel was selected as the battery type, Bulk (Boost) Voltage will be displayed. If NiCAD was selected as the battery type, Equalize Voltage will be displayed. Select the Bulk (Boost)/Equalize Voltage for the battery. <i>Note: Using the Remote Temperature Gauge will reduce or increase the charger's maximum output voltage depending on the temperature.</i>
Float Voltage	Variable	The voltage at which the battery is maintained once the Bulk (Boost) (lead acid, gel or AGM battery types) or Equalize (NiCAD battery type) charge is complete. <i>Note: For single stage charging, set Bulk (Boost)/Equalize Voltage and Float Voltage to the same value.</i>
Bulk Duration (lead acid, gel or AGM battery types) Equalize (NiCAD battery type)	Variable	The time the InCharger™ will stay in Bulk (Boost)/Equalize Voltage mode. This value is in days and increases in 0.1 day steps.
Equalize Cycle (lead acid and Ni- CAD battery types only)	Variable	<u>Lead Acid Battery Type:</u> Number of days between 1 hr Equalization cycles. During the equalization cycle, the voltage will be raised to 15.5 VDC (12 volt system) or 31.0 VDC (24 volt system) to help reform the batteries. As an example, setting the value to 25.0 days will run equalization for 1 hour every 25 days. Equalization will start at a random time. The High Voltage alarm is disabled during equalization. <u>NiCAD Battery Type:</u> For NiCAD batteries the equalize cycle is equivalent to the settings for equalize voltage and equalize duration set previously. This value is in days and increases in 1.0 day steps. This option can be turned OFF (lowest setting). This option can also be turned on NOW for immediate Equalization (highest setting). After the 1 hr equalization is complete, the Equalization will return to the OFF mode. Entering Setup during equalization automatically cancels the equalization operation. This option only available for Lead–Acid and NiCAD battery types.



Menu Option	Type	Description
Maximum Amps	Variable	<p>Upper limit of the maximum output amperage to the battery. Use a smaller value for small batteries. Consult your battery manual for maximum charge rate in amperage.</p> <p>This value is in amps and increases in 1 amp steps.</p> <p>The charger may lower its output below the maximum amperage if the charger detects the batteries are sufficiently charged or to complete a charge in a more consistent manner.</p> <p><i>Note: There are short intervals that the charger may output more than the maximum amperage. During this time, the charger will slowly lower its output to the maximum level set point above.</i></p> <p><i>Note: If the charger detects a deeply discharged battery, the maximum output amperage will be significantly reduced. See selection about Deeply Discharged Battery Recovery.</i></p>
Starter Delay	Variable	<p>Sets the delay before the InCharger™ will again attempt to analyze and restart charging after the voltage on the Starter Cutoff has been removed.</p> <p>This value is in seconds and increases in 0.5 second steps.</p> <p>See <i>Starter Cutoff</i> for more information.</p>
Low Volt Alarm	Variable	<p>Sets the minimum voltage the battery can reach before alarming.</p> <p>This value is in VDC and increases in 0.1 volt steps.</p> <p>This option can be turned OFF (lowest setting).</p>
High Volt Alarm	Variable	<p>Sets the maximum voltage the battery can reach before alarming</p> <p>This value is in VDC and increases in 0.1 volt steps.</p> <p>This option can be turned OFF (lowest setting).</p>
Crank Volt Alarm	Variable	<p>Sets the minimum voltage the battery can reach before alarming when Starter Cutoff is active.</p> <p>This value is in VDC and increases in 0.1 volt steps.</p> <p>This option can be turned OFF (lowest setting).</p>
Ground Fault Alarm	Selectable	<p>Selects whether the Ground Fault is on/off.</p> <p><i>Note: If either the positive or negative lead of the DC Output is connected to Frame Ground, Ground Fault must be set to off.</i></p>
Display Temperature	Selectable	<p>Selects Fahrenheit or Celsius units on the Temperature display screen</p>
Audio Beep and Alarm	Selectable	<p>Turns the Audio beep and the audio alarm on/off.</p>

Menu Option	Type	Description
Password Enabled	Selectable	<p>Provides the ability to password protect the Setup menu. If this option is enabled a three-digit password will be required to change settings. Password protection is not a default setting and therefore needs to be enabled.</p> <p>If enabled:</p> <ul style="list-style-type: none"> – Use the UP/DOWN keys to change a digit and then press the ENTER (↵) key to move to the next digit. – Once a password is entered, a second entry is required for verification. If both password entries do not match, the message “Password Mismatch” will appear and the password will not be changed. – When both password entries match, Save Settings must be selected in order for this feature to be activated. The next time the Setup Menu is accessed, a password entry will be required. – Selecting the Factory Default setting does not disable password protection or change the password. <p><i>Note: A password of “000” disables the password protection feature.</i></p>
Save Settings Cancel	Selectable	<p>Saves the current settings to the memory button...or...</p> <p>Cancels the current setting changes and reverts back to settings previously stored in the memory button.</p>

Display Screens

Each of the display screens will appear in sequence. Automatically change after an brief display cycle. The software Version Screen only appears at initial power up.

Description of Screen	Display Screen
<p><u>Software Version Screen</u></p> <p>Upon initial power up, the software version screen is displayed for a few seconds. This information will be required when calling for Technical Support.</p>	
<p><u>Logo Screen</u></p> <p>The logo screen will periodically appear.</p>	
<p><u>Temperature Screen</u></p> <p>This screen displays the internal temperature of the charger on the top line. The external battery temperature (if connected) will be displayed on the bottom line. If the external battery temperature sensor is not connected or connected incorrectly, the bottom line will show dashes for the Battery temperature. Select Fahrenheit or Celsius in the setup menu.</p>	

Description of Screen	Display Screen
<p><u>Battery Voltage Screen</u></p> <p>This screen displays the current battery voltage (as read by the charger) and the current amperage the charger is supplying to the battery. These values are updated periodically. If the AC source has failed, the amperage section of the display will change to “AC Failure”.</p>	
<p><u>Error Screen</u></p> <p>These screens indicate an error condition exists. Refer to the <i>Alarms</i> section for more information.</p>	

Remote Display Operation

The Remote Display is identical in operation and displays the same information as on the charger. Use either the buttons on the charger or the remote display to control the charger.

The remote display may be plugged in at any time. Should the logo screen be missing or some small blocks appear on the display, they will be corrected within 2 minutes of normal operation of the main screens (Logo Screen, Temperature Screen, Battery Voltage Screen).

Analyzing and Synchronization to the Battery

The InCharger™ is designed to analyze and synchronize to the battery. This is done to optimize the battery charging configuration.

There will be a short period of time when the InCharger™ is analyzing the battery. During this time period, the output will be off. Once the battery is analyzed, the InCharger™ will automatically start charging the battery. If for some reason the InCharger™ determines that battery condition has changed, it may momentarily turn off the output, reanalyze the battery and restart the charging.

Lamp Test Mode

Press and hold the LAMP TEST button to verify the operation of the following:

- Display will flash
- Alarm will sound
- All relays will change to FAIL state. Use this mode to help verify wiring
- Blower will turn on.

Release the LAMP TEST button to cease testing.

During the Lamp Test, the DC output to the batteries is not affected.

Note: Lamp Test is not available in Setup Mode.

Note: AC input power must be present for the blower and relays to operate during Lamp Test Mode.

Cooling and Blower Operation

The InCharger™ requires sufficient airflow for cooling to maintain operation. This is especially important on the air vents, located on the back and sides of the charger. Failure to allow sufficient airflow will cause the charger to overheat and shutdown.

The internal cooling blower is temperature controlled and will turn on and off as needed. The blower does not function when the charger is only powered by the DC battery (AC Failure alarm condition).

ALARMS

Alarm Silence

If the audio alarm is sounding, it may be silenced by pressing the “*Alarm Silence Button*”. This will silence the audio alarm for any current alarms. Any new alarms will again restart the audio alarm. Regardless of the state of the audio alarm, all alarms will still be displayed on the screen.

Note: The audio alarm is only available if the audio beep is enabled (see Setup Menu).

Table 5. Alarms

Alarm	Description	Alarm Relays Activated	Possible reason
AC Missing	<p>The AC source is missing. Charging is suspended until the AC source is reapplied.</p> <p>Once the AC source is reapplied, the system will restart and resume charging.</p> <p>Warning: The charger will operate the display and alarms using battery power. This will slowly drain the batteries.</p>	AC Failure Charger Failure	AC source missing or off AC Fuse blown.
Reverse Polarity Alarm	If the DC is connected to the InCharger™ with reversed polarity, the system will immediately declare an alarm, flash the display, and indicate reverse polarity has been detected. Remove both DC connections to clear the alarm.	Battery Failure Charger Failure	DC connection connected with reverse polarity.
Battery Low Alarm	If enabled in the <i>Setup Menu</i> , the alarm will activate when the battery voltage is less than the alarm set value.	DC Low Charger Failure	Battery voltage too low. Check Batteries and charger output. DC Fuse blown.
Battery High Alarm	If enabled in the <i>Setup Menu</i> , the alarm will activate when the battery voltage is greater than the alarm set value	DC High Charger Failure	Battery voltage too high. Check Batteries and charger output.
Low Cranking Voltage Alarm	During cranking, Battery voltage has dropped below the alarm set value.	Low Cranking Voltage Charger Failure	This alarm will only activate during Starter cutoff. See <i>Starter Cutoff</i> for more information.
Battery Failure	If the InCharger™ detects an incorrect or defective battery, the Battery Failure alarm will activate.	Battery Failure DC Low (if enabled) Charger Failure	Battery not connected, dead battery or battery voltage too high. DC Fuse blown.

Alarm	Description	Alarm Relays Activated	Possible reason
Ground Fault	If enabled, the Ground Fault Alarm will activate. The InCharger™ must be properly grounded to earth ground for Ground Fault to operate properly. Do not enable if either the DC positive or negative output leads will be connected to earth ground. Warning: Excessively high DC voltages may cause unintentional ground faults.	Ground Fault Charger Failure	Ground leakage current from DC+ or DC- to earth ground due to a possible compromise in wire insulation integrity of the DC wires.
Over Temperature	Should the internal temperature of the InCharger™ rise to 75C, the InCharger's™ output will temporary shut down until the unit cools to below 70C	Over Temp Charger Failure	Insufficient cooling of the charger. Allow sufficient air clearance for ventilation. Clean charger air vents.
Smart Memory Button Missing	Smart Memory button is missing or has been placed backwards in the holder.	Charger Failure	InCharger™ needs the memory button to operate. Replace missing button or correctly insert memory button into holder.
Equalizing	Unit is performing an Equalization for 1 hour on the batteries	No Alarms	(see <i>Setup Menu</i> for more information)
Reduced Output	The charger has detected a battery that is very drained and has reduced the maximum current output to a safe level.	No Alarms	(see <i>Deeply Discharged Battery Recovery</i> for more information)

AC Input Power Not Present

The InCharger™ is designed to draw a minimal amount of power from the batteries to maintain the display and the audio alarm when the AC input power is not present. This power draw will over time, run down the batteries. If the AC input power is not present for long periods of time, the InCharger™ must be disconnected from the batteries.

When the AC input power returns, the InCharger™ will institute a restart as if the charger was started from a cold boot.

Note: The relays and the blower will not operate when AC input power is not present.

Deeply Discharged Battery Recovery

Connecting a deeply discharged battery to the InCharger™ will cause the InCharger™ to enter battery recovery mode. The InCharger™ will slowly charge the deeply discharged battery, limiting the output current until the battery can take full charge. During this time, you will see the charger displaying “Reduced Output” to the prevent battery from over-heating. The recovery may take several hours, depending on the size and response of the battery.

During battery recovery, the InCharger™ alarms may activate and then reset. This is due to the deeply discharged battery’s operation with high internal resistance. Over time, if the battery recovers, the alarms will not be activated. It is strongly recommended to turn off the alarms during battery recovery.

The InCharger™ will not recover a damaged battery. A damaged battery must be replaced.

Note: Regarding battery life span – A deeply discharged battery has a significantly shortened operational life span. It is strongly recommended to keep your batteries charged at all times.

Battery Temperature Compensation During Charging

Requires optional Battery Temp Sensor.

Connection

Connect the Battery Temp Sensor to the InCharger's™ connector in the Connection compartment observing the correct polarity. The lead with the red band is positive.

Place the temperature sensing ring lug over the battery terminal screw. The temperature ring lug should be the lug closest to the head of the screw or nut. Since the ring lug is electrically isolated, it may be placed on either the positive or negative lead of the battery that will be connected to the InCharger™.

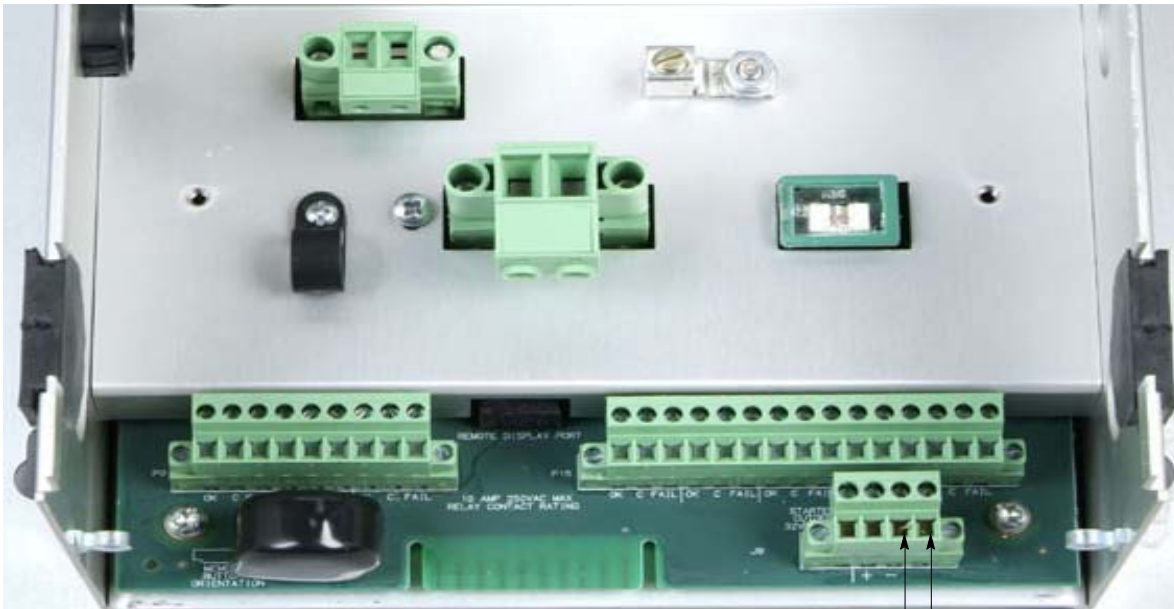
Operation

Once connected, the InCharger™ will automatically detect the Battery Temp Sensor within one minute and adjust the output accordingly to optimize the battery charging. It will take at least one complete cycle of the display to show the battery temperature.

The Battery temperature will be shown on the temperature display screen. If the temperature is not displayed within 1 minute (only dashes appear), the Battery Temp Sensor is not connected properly.

The Battery Temp Sensor will adjust the output voltage to the battery based on the temperature measured. The output voltage may be slightly greater or less than the Max Output Voltage. As the battery temperature changes, the InCharger™ will optimize the charge automatically.

With regard to Max Output Voltage, at higher temperatures, the output voltage is slightly reduced. At lower temperatures, the output voltage is slightly increased.



Battery Temp Sensor Connections

Figure 5. Battery Temp Sensor Connections in the InCharger™

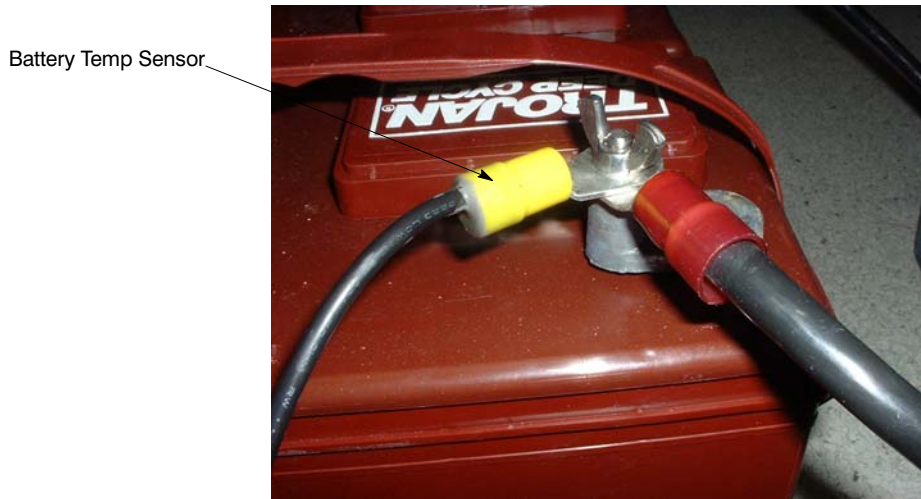


Figure 6. External Battery Temp Sensor

STARTER CUTOFF

The InCharger™ can be configured to instantly stop charging when an engine start condition is detected. Using this feature guarantees that the charger will not unnecessarily load down the AC source which could result in damage to the charger, and allow the starter to get all the necessary power from the batteries.

Connection

Connect 2 wires from across the engine starter's solenoid positive and negative terminals to the InCharger's™ connector in the Connection compartment. Polarity is not important. The engine starter's solenoid voltage must be in the range of 9–32VDC.

Operation

When the InCharger™ Starter Cutoff is wired across an engine starter motor solenoid, the InCharger™ will monitor the engine starter motor for voltage. When the engine starter motor solenoid is energized (to start the engine), the InCharger™ will detect the voltage and immediately turn off the DC output from the InCharger™. The display will indicate that the Starter Cutoff is active. After the voltage is removed, the InCharger™ will continue to remain off for the time specified in the *Starter Delay Setup*. Once the delay has expired, the InCharger™ will resume charging.

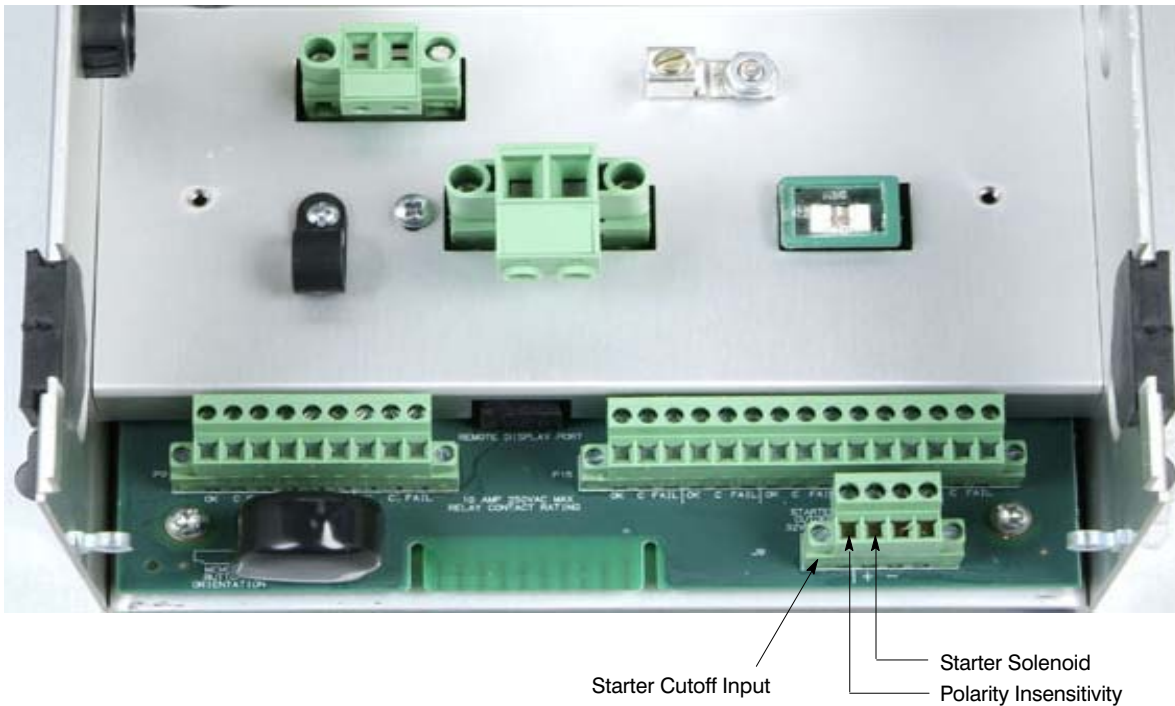


Figure 7. Starter Cutoff Wiring

MAINTAINING THE INCHARGER

The InCharger™ is designed to operate with minimum maintenance.

- Periodically verify the air vents are open and clear of obstructions. Clean if necessary.
- Wipe the case off with a soft cloth.

Fuse Replacement

The AC fuse is located in Main Wiring Compartment under the AC cover.

The DC fuse is located in the Main Wiring Compartment.

Both fuses may be purchased at your local hardware or automotive parts store. Please do not call Charles Marine & Industrial Group for replacement fuses.

WARNING

For safety and to prevent damage to the InCharger™, only use a fuse that matches the specifications below.

Table 6. Fuse Specifications

Fuse Type	Description
AC Fuse Specifications	20A, 250VAC Slow Blow fuse (Littelfuse™ #0326020 or equivalent)
DC Fuse Specifications	JCASE, 40A, 32VDC Automotive Fuse (Littelfuse™ #0495040 or equivalent)

INCHARGER FAILURE AND REPLACEMENT

At Charles, we take pride in designing and building high quality, tough products. As such, it is rare that a charger will fail.

However, sometimes a charger does fail. In this case, you can quickly restore operation using the replacement InCharger™ as follows:

1. Transfer the current settings by removing the Smart Memory Button from the failed charger and installing it into the new charger. The Smart Memory Button is located under the protective cap in the Main Wiring Compartment. Once transferred, the new charger will assume the same configuration as was on the failed charger prior to the failure.
2. Power down both systems. Remove the protective cap on both systems and transfer the Smart Memory Button from the failed charger to the new charger. Replace the protective cap.
3. Disconnect the Easy Change Connectors. Depending on how the system is wired, changing may be as simple as removed the plug by unscrewing the set-screws and moving the plug to the new charger.
4. For assistance and before returning the InCharger™ for repair, call the technical support line listed at the end of this manual.

WARRANTY AND SERVICE

Warranty

The CHARLES Marine & Industrial Group warrants the unit will be free from defects in materials and workmanship that cause mechanical failure for three (3) years, as set forth in the Limited Warranty. Notice of any alleged defect in material or workmanship must be provided within thirty (30) days of discovering the problem, and within the warranty period. Follow the procedure outlined below to obtain warranty service.

Service Center and Repair Correspondence

Note: Do not attempt to service the unit. Contact the Service Center.

To contact the Service Center via telephone directly:

800-830-6523 (Toll Free)

217-932-2317 (Voice)

217-932-2473 (FAX)

Call to obtain a Returned Materials Authorization (RMA) number prior to returning any unit to Charles Industries.

Return the unit for repairs to the Service & Repair Center address below:

Charles Industries, Ltd.
Marine & Industrial Group
503 NE 15th Street
Casey, IL 62420-2054
USA

Correspondence can be sent to Corporate Headquarters via the address below:

Note: Do not return the unit to this address.

Charles Industries, Ltd.
Marine & Industrial Group
5600 Apollo Drive

Rolling Meadows, IL 60008-4049
 USA
 847-806-6300
 www.charlesindustries.com

SPECIFICATIONS

The InCharger™ meets the following regulatory specifications:

- **FCC Class A:** This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: 1.) This device may not cause harmful interference, and 2.) this device must accept any interference received, including interference that may cause undesired operation.

Assembly location: United States of America

The operating specifications of the InCharger™ are listed in Table 7.

Table 7. Specifications

Feature	Specification
Input Voltage	95–140 VAC, 190–265 VAC 60 Hz
Input Voltage Selection	Auto
Input Amperage Maximum (93-INCHGR20-A)	20 amps (95–140VAC range), 9 amps (190–265 VAC range)
Input Amperage Maximum (93-INCHGR10-A)	13 amps (95–140VAC range), 6 amps (190–265 VAC range)
Input Amperage Maximum (93-INCHGR06-A)	12 amps (95–140VAC range), 5 amps (190–265 VAC range)
DC Output Voltage	12/24VDC User Select
DC Output Amperage (93-INCHGR20-A)	2–20 amps User configurable
DC Output Amperage (93-INCHGR10-A)	2–10 amps User configurable
DC Output Amperage (93-INCHGR06-A)	2–6 amps User configurable
DC current draw during AC failure	0.3 amps (12 or 24 VDC mode)
Connectors	Easy Change Connector blocks
Wiring compartments	Separate AC & DC compartments with ½-inch standard conduit knock-outs and rubber grommets (DC compartment only)
Battery types	Lead Acid (flooded), NiCAD, Gel, AGM
Equalization	Lead Acid (flooded) and NiCAD only
Maximum Output voltage	Default or User Selectable
Starter Cutoff allowable input voltage	9–32 VDC (non-polarized input)
Parameter and Setting Storage	Non-volatile Smart Memory Button
Dimensions (centimeters)	20.3 depth x 33.0 high x 24.1 wide
Dimensions (inches)	8.0 depth x 13.0 high x 9.5 wide
Weight	13 kg (28 lbs)
Case Material	Anodized Aluminum

Feature	Specification
Operating Temperature Range	-40 to +65 C (-40 to 149 F) – no derating
Alarm Relays	Charger Failure, AC Failure, DC Low Alarm, DC High Alarm, Low Cranking Voltage, Over Temperature, Battery Failure, Ground Fault
Alarm Relay Contact Rating	10 Amps (max 265 VAC or 32 VDC)

FACTORY DEFAULT SETTINGS

Table 8 shows the factory default settings using a 12V battery. Table 9 shows the factory default settings using a 24V battery.

Table 8. Factory Default Settings with a 12V Battery

Variable Settings	Default	Units
Gel (Bulk Mode)	14.2	Volts
Gel (Float Mode)	13.6	Volts
NiCAD (Equalize Mode)	14.5	Volts
NiCAD (Float Mode)	14.0	Volts
AGM (Bulk Mode)	14.2	Volts
AGM (Float Mode)	13.4	Volts
Lead Acid (Bulk Mode)	14.5	Volts
Lead Acid (Float Mode)	13.1	Volts
Bulk/Equalize Duration	0.2	Days
Equalize Cycle	30.0	Days
Max Amps	6.0, 10.0, 10.0	Amps
Starter Cutoff Delay	5.5	Seconds
Low Voltage Alarm	10.0	Volts
High Voltage Alarm	15.0	Volts
Low Cranking Voltage	10.0	Volts
Equalize Voltage * † (Lead Acid)	15.5	Volts
Equalize Time * †	1.0	Hours
Ground Fault	On	
Temperature	Fahrenheit	Degrees
Audio Alarm	On	
Password	Disabled	
* Not a changeable parameter		
† Lead Acid and NiCAD batteries only		

Table 9. Factory Default Settings with a 24V Battery

Variable Settings	Default	Units
Gel (Bulk Mode)	28.4	Volts
Gel (Float Mode)	27.2	Volts

NiCAD (Equalize Mode)	29.0	Volts
NiCAD (Float Mode)	28.0	Volts
AGM (Bulk Mode)	28.4	Volts
AGM (Float Mode)	26.8	Volts
Lead Acid (Bulk Mode)	29.0	Volts
Lead Acid (Float Mode)	26.2	Volts
Bulk/Equalize Duration	0.2	Days
Equalize Cycle	30.0	Days
Max Amps	6.0, 10.0, 10.0	Amps
Starter Cutoff Delay	5.5	Seconds
Low Voltage Alarm	20.0	Volts
High Voltage Alarm	30.0	Volts
Low Cranking Voltage	20.0	Volts
Equalize Voltage * † (Lead Acid)	31.0	Volts
Equalize Time * †	1.0	Hours
Ground Fault	On	
Temperature	Fahrenheit	Degrees
Audio Alarm	On	
Password	Disabled	
* <i>Not a changeable parameter</i>		
† <i>Lead Acid and NiCAD batteries only</i>		

