



La MARCHÉ

La Marche Manufacturing Company

www.lamarchemfg.com

SGC

SCR Stationary Battery Charger



Installation and Operation Manual

Important Safety Instructions

Before using this equipment read all manuals and other documents related to this charger and other equipment connected to this charger. Always have a copy of a charger's manual on file nearby, in a safe place; if a replacement copy of a manual is needed, it can be found at www.lamarchemfg.com.

Electrical Safety



WARNING: Hazardous Voltages are present at the input of power systems. The output from chargers and from batteries may be low in voltage, but can have a very high current capacity that may cause severe or even fatal injury.

When working with any live battery or power system, follow these precautions:

- Never work alone on any live power systems, someone should always be close enough to come to your aid.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Wear complete eye protection (with side shields) and clothing protection.
- Always wear gloves and use insulated hand tools.



WARNING: Lethal Voltages are present within the power system. Parts inside the charger may still be energized even when the unit has been disconnected from the AC input power. Check with a meter before proceeding. Do not touch any uninsulated parts.

- A licensed electrician should be used in the installation of any charger.
- Always disconnect the charger from the supply, batteries, and loads before performing maintenance, replacing parts, or cleaning.
- Always assume that an electrical connection is live and check the connection relative to ground.
- Be sure that neither liquids nor any wet material come in contact with any internal components.
- Do not operate this charger outside the input and output ratings listed on the charger nameplate.
- Do not use this charger for any purpose not described in the operation manual.

Mechanical Safety

- This charger or parts of the charger may get very hot during normal operation, use care when working nearby.
- Do not expose equipment to rain or snow. Always install in a clean, dry location.
- Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way.
- Do not disassemble this charger. Incorrect re-assembly may result in a risk of electric shock or fire.
- If modifications to the enclosure are necessary, such as drilling for conduit fitting, ensure the interior is protected from metal shavings and debris. Additional precautions should be taken to remove any remaining debris from interior of charger prior to energizing.

Battery Safety



WARNING: Follow all of the battery manufacturer's safety recommendations when working with or around battery systems. DO NOT smoke or introduce a spark or open flame in the vicinity of a battery. Some batteries generate explosive gases during normal battery operation.

- To reduce risk of arc, connect and disconnect the battery only when the charger is off.
- If it is necessary to remove battery connections, always remove the grounded terminal from the battery first.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Always wear rubber gloves, safety glasses, and a rubber lined vest/apron when working near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- If the battery electrolyte contacts skin or clothing, wash immediately with soap and water.
- If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and seek medical attention immediately.
- Do not drop or place any materials on a battery. A spark or short-circuit could cause an explosion.

Charger Location

- Allow at least 3 inches of free air on all vented surfaces (and external heatsinks) for proper cooling.
- Allow sufficient clearance to open the front panel for servicing.
- Do not operate this charger in a closed-in area or restrict ventilation in any way.
- Do not set any battery on top of this charger.
- Never allow battery electrolyte to drip on this charger when reading the specific gravity or filling the battery.
- Never place this charger directly above a standard flooded battery. Gases from the battery will corrode and damage equipment.

Check for Damages

Prior to unpacking the product, note any damage to the shipping container and take pictures. Unpack the product and inspect the exterior and interior of product for damage. If any damage is observed, take pictures and contact the carrier immediately to file a damage claim. Contact La Marche for a Return Material Authorization number to have the charger sent back for evaluation and repair.



CAUTION: Failure to properly file a claim for shipping damages, or provide a copy of the claim to La Marche, may void warranty service for any physical damages reported for repair.

Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is damaged/unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. *La Marche is not responsible for damage caused by improper packaging of returned products.*

Inspection Checklist

- Enclosure exterior and interior is not marred or dented.
- There are no visibly damaged components.
- All internal components are secure.
- Printed circuit boards are firmly seated.
- All hardware and connections are tight.
- All wire terminations are secure.
- All items on packing list have been included.

Handling

Equipment can be very heavy with uneven distribution of weight. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent equipment from being accidentally tipped over or dropped.

Table of Contents

Important Safety Instructions	ii
Model Scope/General Description	1
Understanding the Model Number	1
Optional Accessories Included in the Charger	1
1 Equipment Handling	2
1.1 Storing the SGC	2
1.2 Moving the SGC	2
2 Installing the SGC	2
2.1 Mounting the SGC	2
2.1.1 Wall Mounting the SGC	2
2.1.2 Floor Mounting the SGC	3
2.1.3 Rack Mounting (4 Enclosure Only)	4
2.2 Changing Transformer Taps.....	4
2.3 AC Input Connections	5
2.4 Output Connections.....	6
2.5 Alarm Connections	7
2.5.1 Standard Alarms	7
2.5.2 Alarm Description	7
2.6 External Temperature Compensation Connections (Option 11W/11Y)	9
2.7 Ground Detection Connection	10
3 Operation	11
3.1 Starting the SGC	11
3.1.1 Checking the Installation	11
3.1.2 Starting/Stopping the SGC	11
3.1.3 Start-Up Sequence	11
3.2 Front Panel Display	12
3.2.1 Controls	12
4 Configuration Mode	13
5 Service	16
5.1 Performing Routine Maintenance	16
5.2 Troubleshooting Procedure	17
5.3 Troubleshooting Chart	18
Appendix A: SGC Configuration Menu Structure	19
Appendix B: SGC Specifications.....	20
Appendix C: Manufacturer's Warranty	21
Appendix D: Document Control and Revision History	22

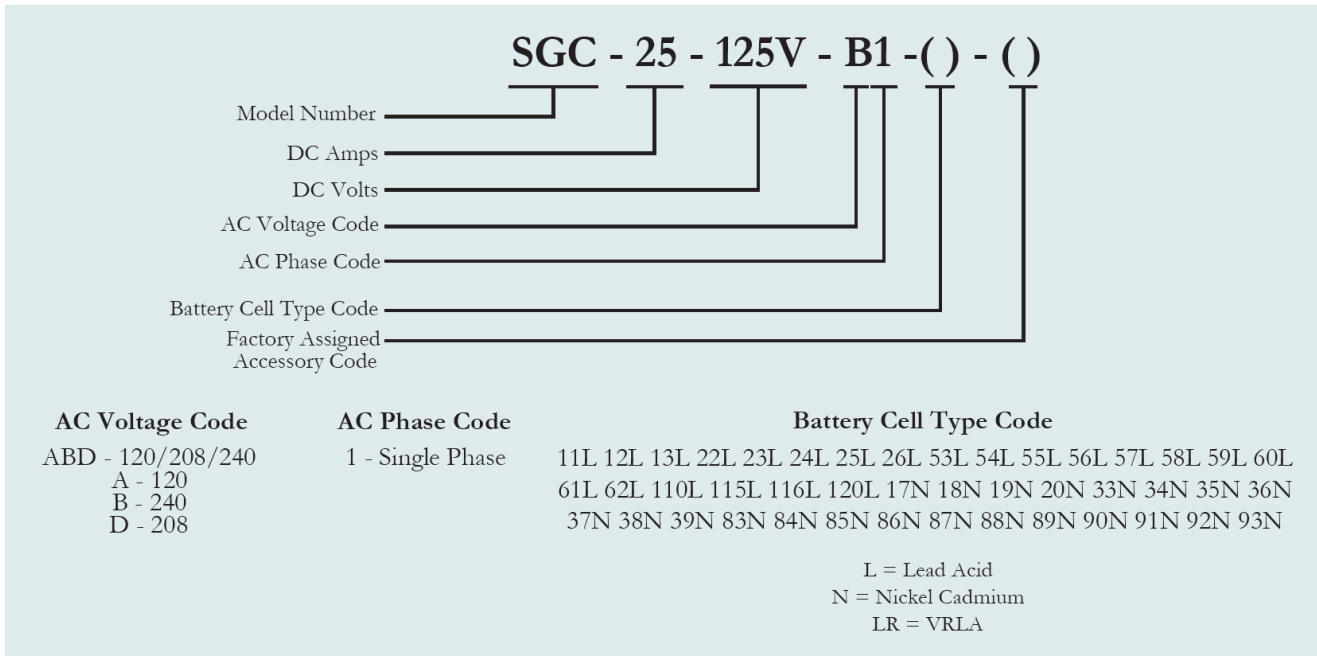
Model Scope/General Description

The La Marche model SGC industrial battery charger product line utilizes microprocessor-controlled SCR Charging Technology. The PWM control provides the highest reliability that is required for maintaining and recharging batteries. The SGC features adjustable Float and Equalize voltages, soft start, equalize timer, and is configurable for Flooded Lead Acid, NiCad or VRLA batteries. The SGC offers both AC and DC breakers as standard equipment.

The SGC is equipped with a two-line LCD display which shows output voltage and current, along with an alarm status text description. Individual LED indicators provide local supervision and Form "C" Alarm Contacts provide remote annunciation.

Understanding the Model Number

The SGC model number is coded to describe the features that are included. Find the model number on the nomenclature nameplate of the charger. Follow the chart below to determine the configuration of the battery charger.



Optional Accessories Included in the Charger

This charger may have been outfitted with a number of optional accessories or option packages. To determine the options included (if any) refer to the cover page of the manual package. If the manual package that is included with the charger is no longer available, contact La Marche and provide the model or serial number of the charger to receive a list of the included accessories.

1 Equipment Handling

1.1 Storing the SGC

If the SGC is to be stored for more than a few days after delivery, it should be stored within its shipping container. The location chosen for storage should be within an ambient temperature of -40 to 185°F (-40 to 85°C) with a non-condensing relative humidity of 5 to 95%. Storage should not exceed 2 years due to the limited shelf life of the DC filter capacitors when they are not in service.

1.2 Moving the SGC

After careful inspection and upon verification that the SGC is undamaged, identify the enclosure style and weight of the SGC charger (refer to table below).

2 Installing the SGC

2.1 Mounting the SGC

When mounting the SGC in any configuration, consider the size and weight of the charger. The wall, rack, and/or floor must be able to support the weight of the charger, as well as an additional safety factor. Verify the weight of the SGC charger and the method of mounting using the table below. The location chosen for the charger should be within an ambient temperature range of -4 to 158°F (-20 to 70°C) with a non-condensing relative humidity no higher than 95%. The SGC should be mounted in an area free of flammable & explosive materials and away from drips and splatter. To be mounted on non-combustible surface. The SGC utilizes convection cooling, so a clearance of at least 6in of free air must be maintained on the top, bottom, and both sides for cooling air. Maintain 36in or more of clearance at the front of the charger in order to allow for operation and maintenance.

Model Number	DC Amps	DC Protection DC Breaker/ Rating	Single Phase AC Input Current Draw Amps @ 100% Load (Recommended Feeder AC Supply Breaker)				Case No.	Overall Dimensions W x D x H	Shipping Weight	
			(A) 120	(D) 208	(B) 240	Rating			lbs	kg
SGC-25-24V	25	40/10 KAIC	10 (20)	7 (10)	6 (10)	10 KAIC	3	15.38 x 11.0 x 23.75" 391 x 279 x 603mm	130	59
SGC-50-24V	50	70/10 KAIC	24 (40)	14 (20)	12 (20)	10 KAIC	3	15.38 x 11.0 x 23.75" 391 x 279 x 603mm	140	63.5
SGC-25-48V	25	40/10 KAIC	24 (35)	14 (25)	12 (20)	10 KAIC	3	15.38 x 11.0 x 23.75"* 391 x 279 x 603mm	169	77
SGC-50-48V	50	70/10 KAIC	24 (40)	14 (20)	12 (20)	10 KAIC	4	19.0 x 15.7 x 23.75"* 483 x 399 x 602mm	190	86
SGC-16-125V	16	25/10 KAIC	39 (60)	23 (40)	20 (30)	10 KAIC	4	19.0 x 15.7 x 23.75"* 483 x 399 x 602mm	155	70
SGC-25-125V	25	40/10 KAIC	61 (90)	35 (50)	31 (50)	10 KAIC	4	19.0 x 15.7 x 23.75"* 483 x 399 x 602mm	185	84

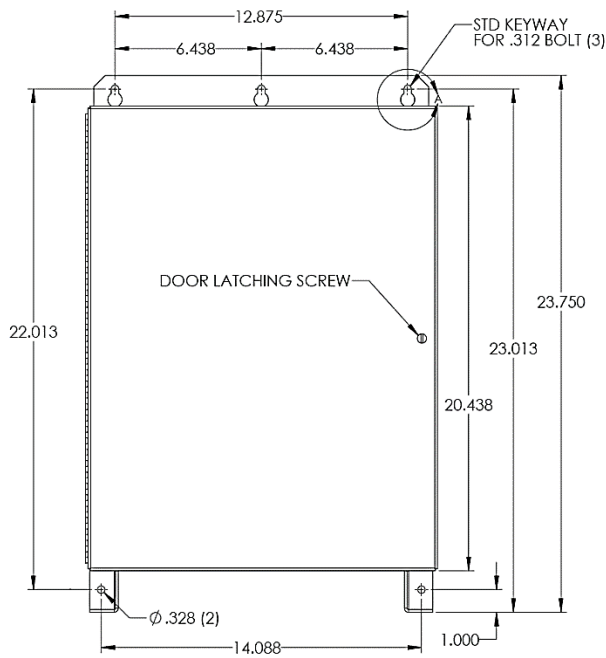
*Floor mounting brackets add 2" (51mm) to overall height. Case sizes may differ depending on optional accessories. Consult factory when dimensions are critical. Detailed dimensional drawings are available for mounting purposes.

Table 1 – Case Type, Weight, and Dimensions

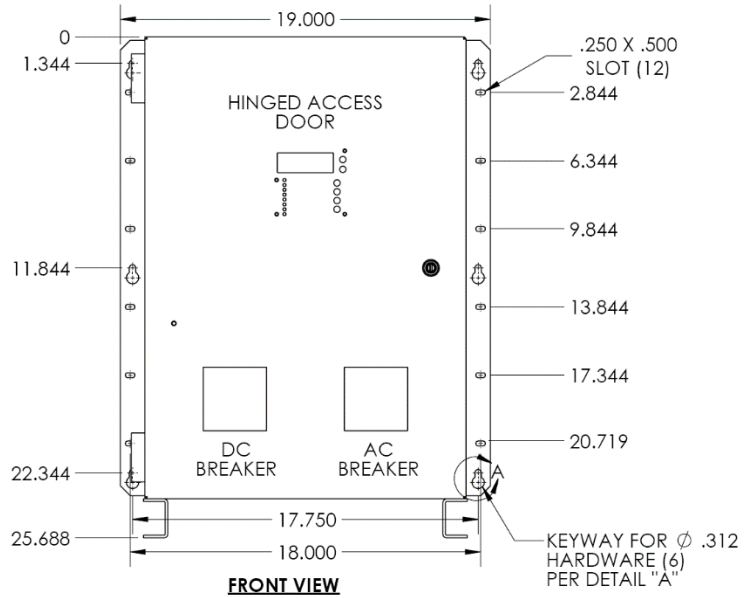
2.1.1 Wall Mounting the SGC

To wall-mount the SGC, install bolts on the wall rated to support the charger's weight plus a safety factor of at least four times. Refer to the table above for charger weight specifications. Secure the charger on bolts, add appropriate mounting hardware, and tighten securely. Refer to the figures on the next page for mounting dimensions.

NOTE: All dimensions are in inches. For further SGC enclosure information, see the outline drawings online at <http://www.lamarchemfg.com/info/enclosure-drawings.html>



**Figure 1 – 3 Enclosure
Wall Mounting Dimensions**



**Figure 2 – 4 Enclosure
Wall Mounting Dimensions**

2.1.2 Floor Mounting the SGC

To floor-mount the SGC, install four anchor bolts into the floor. Place the charger on the anchor bolts, add appropriate mounting hardware onto the floor-mounting anchor bolts, and tighten securely. Refer to Figure 3 for hardware specifications and floor-mounting dimensions. All dimensions are given in inches.

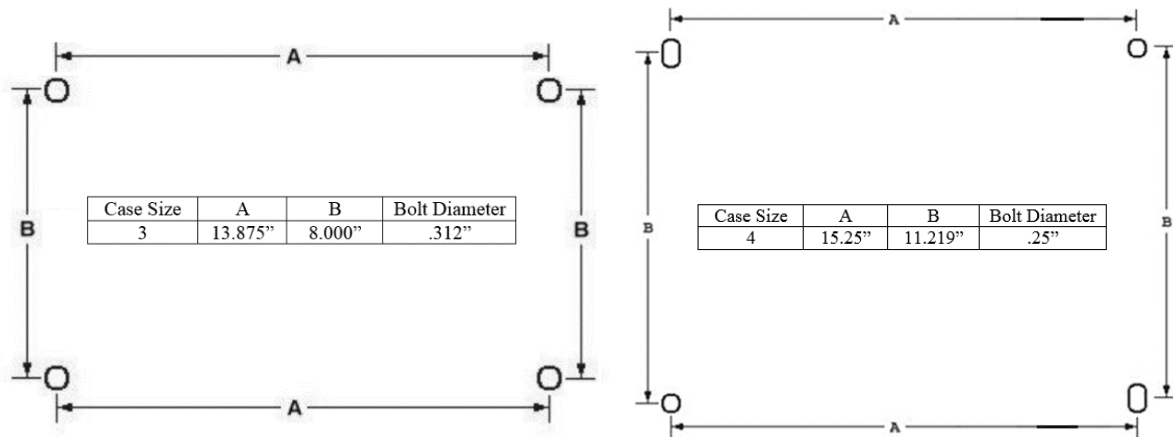


Figure 3 – Floor Mounting Dimensions

2.1.3 Rack Mounting (4 Enclosure Only)

The SGC can be installed in most relay racks with standard EIA hole spacing. If a relay rack is needed, they are available for purchase from La Marche. The 4 enclosures are shipped from the factory with the necessary brackets installed for rear mounting on a 19" relay rack (The same bracket is used for wall mounting and cannot be removed). If center mounting is desired, a rack-mounting kit is available for the 4 enclosure. Before installing the charger on the rack, locate the placement of the conduit entrances and assure the knockouts on the sides or bottom of the charger are accessible after the charger is rack-mounted. The table and figure below show the rack-mounting options for SGC.

Rack Mounting Procedure

To rack mount the SGC, first mount the charger onto the rack-mounting brackets using the hardware supplied. Second, install the brackets onto the rack. Provide at minimum 6in (152mm) of air space above and below to allow for cooling.

Enclosure Number	Rear Mounting	Center Mounting
4	Yes (19" Rack Only)	Yes (with Optional Hardware)

Table 2 – Available Rack Mount Configurations

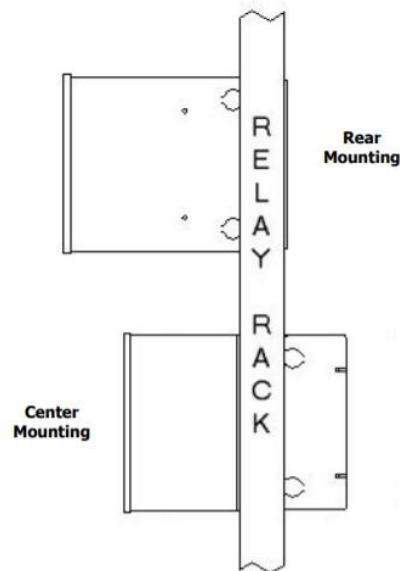


Figure 4 – Rack-Mounting Configurations

2.2 Changing Transformer Taps

NOTE: This procedure refers **only** to SGC battery chargers that are multi-tap (**ABD1**). All other SGC battery chargers do not include transformer taps.

The multi-tap SGC accepts standard input voltages of 120, 208, or 240 VAC by changing the connections to the input terminals. Before changing the AC input taps, assure that AC supply and DC loads to the SGC are turned off and locked out. Verify that no voltage is present by using a voltmeter at all input and output terminals. Turning off the AC and DC circuit breakers on the SGC does NOT eliminate live voltages inside the enclosure. Additionally, de-energize any external wiring to the alarm relay contacts. Change the connections to the input terminals as shown in the table and figure below.

Note: Input mains voltage must also be changed in the configuration menu.

Changing Transformer Taps Procedure

Before beginning any work inside the charger enclosure, ensure that all incoming AC supply and DC load wires are de-energized. Verify that no voltage is present inside the case by using a voltmeter at all input and output terminals.

Charger AC-Input Voltage Tap Settings		AC-Input Wiring at TB1		AC-Input Tap Settings at TB3			
				Wire-"A"	Wire-"B"	Wire-"C"	Wire-"D"
AC-Input Voltage	120	TB1-1 (Line)	TB1-3 (Neutral)	TB3-8	TB3-10	TB3-6	TB3-10
	208	TB1-1 (Line-1)	TB1-2 (Line-2)	TB3-9	TB3-8	TB3-5	TB3-9
	240			TB3-10			TB3-10

Table 3 – Input Terminal Connections

For 120 VAC Input Voltage:

1. Connect wire marked **A** to terminal **TB3-8**
2. Connect wire marked **B** to terminal **TB3-10**
3. Connect wire marked **C** to terminal **TB3-6**
4. Connect wire marked **D** to terminal **TB3-10**

AC input 1 connects to terminal **TB1-1 (Line)**

AC input 2 connects to terminal **TB1-3 (Neutral)**

For 208 VAC Input Voltage:

1. Connect wire marked **A** to terminal **TB3-9**
2. Connect wire marked **B** to terminal **TB3-8**
3. Connect wire marked **C** to terminal **TB3-5**
4. Connect wire marked **D** to terminal **TB3-9**

AC input 1 connects to terminal **TB1-1 (Line 1)**

AC input 2 connects to terminal **TB1-2 (Line 2)**

For 240 VAC Input Voltage:

1. Connect wire marked **A** to terminal **TB3-10**
2. Connect wire marked **B** to terminal **TB3-8**
3. Connect wire marked **C** to terminal **TB3-5**
4. Connect wire marked **D** to terminal **TB3-10**

AC input 1 connects to terminal **TB1-1 (Line 1)**

AC input 2 connects to terminal **TB1-2 (Line 2)**

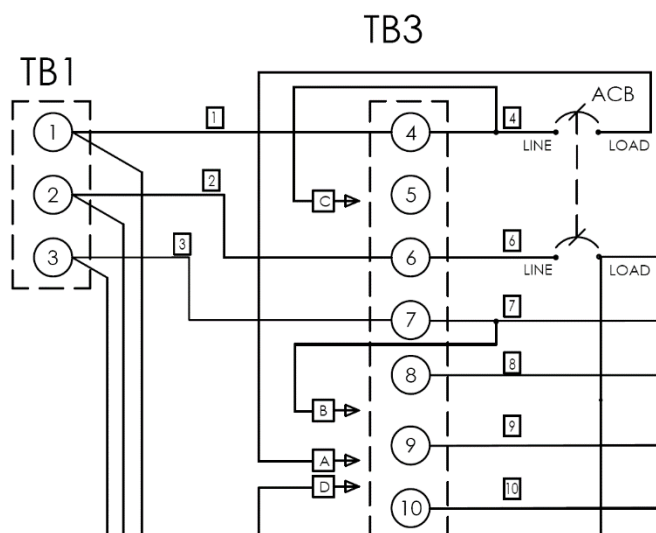


Figure 5 – Input Terminals Connection Schematic

2.3 AC Input Connections

Before beginning any work inside the charger, ensure that all incoming AC supply is de-energized. Verify that no voltage is present inside the case by using a voltmeter at all input and output terminals. Check that the source voltage and frequency match the charger front nameplate specifications. Also, confirm if charger is multi or single input by referring to charger nameplate. If charger is confirmed to be a multi-input charger, refer to corresponding charger schematic or AC input wiring chart inside charger for transformer tap settings. Select wire size using the table below. This is based on an overload **current of 110%** of the input current listed on the charger nameplate.

NOTE: Feeder breaker should be sized to match the size of the AC protection used in charger. If multi-tap charger is set for 120VAC input configuration, feeder breaker should be double the size of the AC protection. 120VAC configured multi-tap chargers use both breaker poles in parallel.

Breaker Size – Amps	AWG Minimum Wire Size Requirement for Customer Connection	AWG Minimum Wire Size for Equipment Grounding
3	#14	#14
5	#14	#14
10	#14	#14
15	#14	#14
20	#12	#12
25	#10	#12
30	#10	#10
40	#8	#10
50	#8	#10
60	#6	#10

**Table 2 – AC/DC & Ground Wire Size Minimum Requirements
(All wires specified in the table are rated at 90 °C or 194 °F)**

NOTE: These are recommended sizes per La Marche Standards. The National Electrical Code (NEC) and Local Wiring Codes must be followed.

2.4 Output Connections

Select proper size for the DC wiring from the wire size table on the previous page. If the distance between the charger's DC output and the DC load exceeds 10 feet, use the Power Cabling Guide on the next page to minimize the voltage drop across the wire distance.

Power Cabling Guide

Use the following formulas and table to determine proper wire size for minimal voltage drop. At distances exceeding 10 feet, the DC wire size should be chosen to keep the voltage difference between the charger's DC output terminals and the battery at less than 1/2 volt when the charger is fully loaded.

Table of Conventions:

<i>CMA</i>	= Cross section of wire in circular MIL area
<i>A</i>	= Ultimate drain in amperes
<i>LF</i>	= Conductor loop feet
<i>MaxAmp</i>	= Maximum allowable amperes for given voltage drop
<i>AVD</i>	= Allowable voltage drop
<i>K</i>	= 11.1 for commercial (TW) copper wire = 17.4 for aluminum

Calculating Wire Size Requirements:

$$CMA = \frac{A \times LF \times K}{AVD}$$

Size (AWG)	Area CIR.MILS	Size (MCM)	Area CIR.MILS
18	1620	250	250000
16	2580	300	300000
14	4110	350	350000
12	6530	400	400000
10	10380	500	500000
8	16510	600	600000
6	26240	700	700000
4	41740	750	750000
3	52620	800	800000
2	66360	900	900000
1	83690	1000	1000000
0	105600	1250	1250000
00	133100	1500	1500000
000	167800	1750	1750000
0000	211600	2000	2000000

Table 5 – Wire Size/Area Table

Calculating Current Carrying Capacity of Wire:

$$MaxAmp = \frac{CMA \times AVD}{LF \times K}$$

EXAMPLE: If the charger being used has a max ampere output of 33 Amps and 30 loop feet of copper wire cable is required with an allowable voltage drop of 0.5 Volts, the wire size calculation will be:

$$CMA = \frac{A \times LF \times K}{AVD}$$

$$A = 33$$

$$LF = 30$$

$$K = 11.1$$

$$AVD = 0.5$$

$$CMA = \frac{33 \times 30 \times 11.1}{0.5} = 21978 \text{ or } \#6\text{AWG wire}$$

2.5 Alarm Connections

2.5.1 Standard Alarms

Four alarm relays (and 6 alarm LEDs) are included as a standard feature of the SGC. The included alarm relays are High DC Voltage, Low DC Voltage, Summary, and AC Failure. Each alarm includes a form "C" contact, enabling the user to connect remote annunciators. The Alarm contacts are rated for 2A at 30VDC / 0.5A @ 125VAC.

Alarm LEDs are provided for the following alarms: Summary, Low DC Current, Current Limit, High DC Voltage, High Voltage Shutdown, Low DC Voltage, End of Discharge, Positive Ground, and Negative Ground.

If an alarm condition occurs for a default time of longer than 5 seconds, the summary alarm relay will activate. The AC Fail and HVSD alarms are default set to trigger after 20 seconds.

When an alarm activates, the specific indicator on the front panel will light, any connected remote annunciators will activate, and the display will cycle through all active alarms.

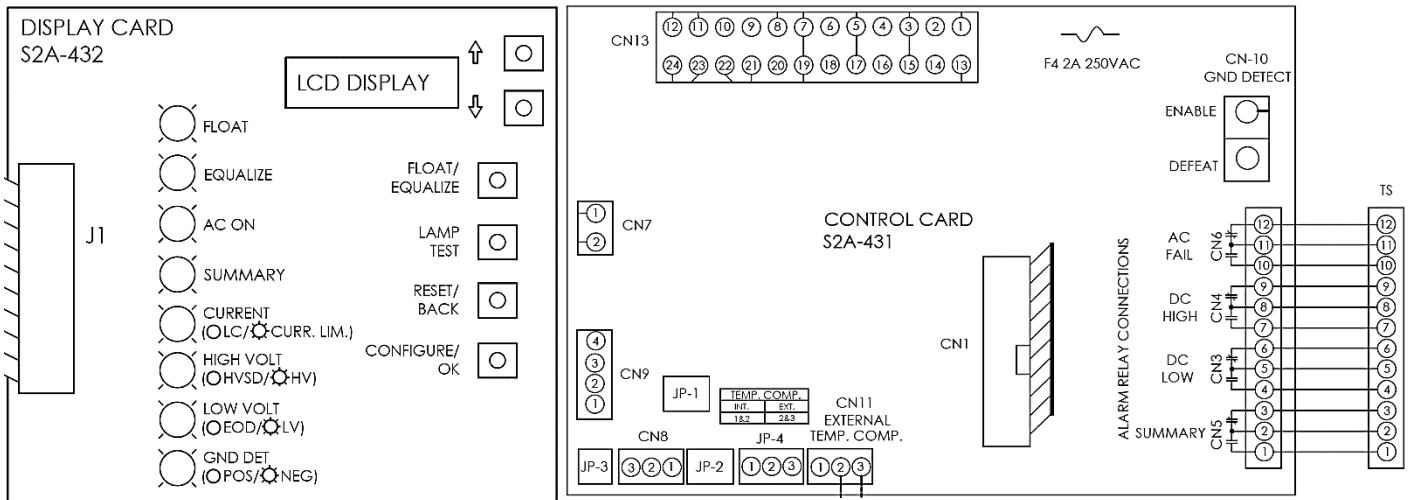


Figure 6 – Display & Control/Alarm Board

2.5.2 Alarm Description

CHARGER FAILURE ALARM occurs if the charger is unable to regulate the output voltage. This alarm stays latched in until the SGC charger is reset.

AC MAINS FAIL ALARM will trigger, the green "AC ON" LED will turn off if the AC power to the charger is lost. The alarm will automatically reset when AC power is restored to the charger. When AC power is lost, the front panel display and indicators will remain powered by the connected batteries.

AC MAINS LOW/HIGH ALARM will trigger, the green "AC ON" LED will blink if the AC power to the charger is outside the AC fail voltage thresholds. The alarm will automatically reset when AC power is within the accepted range.

SUMMARY ALARM is triggered when any of the following alarms are activated:

- | | | | |
|-------------------|-------------------------|-------------------------|----------------|
| • Low DC Voltage | • Positive Ground Fault | • High Voltage Shutdown | • AC Failure |
| • High DC Voltage | • Negative Ground Fault | • Battery Fault | • Charger Fail |
| • Low DC Current | • End of Discharge | | |

NOTE: Each alarm can be configured to be or not to be included in Summary.

LOW DC CURRENT ALARM will trigger and the amber "DC CURRENT" LED will turn on solid if the output DC current of the charger falls below the alarm threshold for longer than 5 seconds.

NOTE: The Low DC Current alarm can be disabled if considered a nuisance. Refer to Section 4 for instructions.

CURRENT LIMIT ALARM will trigger and the "DC CURRENT" alarm LED will blink when the charger is in current limit, i.e. regulating the load in a constant current mode.

HIGH DC VOLTAGE ALARM will trigger and the red "HIGH DC VOLTAGE" LED will blink if the output DC voltage rises above the specified voltage threshold of the alarm for longer than 5 seconds. The alarm will clear once the high DC voltage condition is no longer present.

HVSD ALARM will trigger and the red "HIGH DC VOLTAGE" LED will turn on solid if the output DC voltage of the charger rises above the alarm threshold. If the High DC Voltage Shut Down alarm activates, the DC output of the charger shuts off to prevent irreversible damage to the battery. This alarm will stay latched until the charger is reset by isolating from all power sources or by pressing and holding the Back button to reset.

LOW DC VOLTAGE ALARM will trigger and the red "LOW DC VOLTAGE" LED will blink if the DC voltage falls below the specified voltage threshold of the alarm for longer than 5 seconds. The alarm will clear once the low DC voltage condition is no longer present.

END OF DISCHARGE ALARM will trigger and the red "LOW DC VOLTAGE" LED will turn on solid if the DC voltage falls below the specified percentage or voltage threshold of the alarm for longer than 5 seconds. The alarm will clear once the low DC voltage condition is no longer present.

POSITIVE GROUND ALARM will trigger and the red "GND DET" LED will turn on if 1.2mA or greater current is measured between the positive terminal of the battery and earth ground. The alarm will clear once the positive ground condition is no longer present. If the charger has Ground Detection disabled, this alarm will not function.

NEGATIVE GROUND ALARM will trigger and the red "GND DET" LED will turn on if 1.2mA or greater current is measured between the negative terminal of the battery and earth ground. The alarm will clear once the negative ground condition is no longer present. If the charger has Ground Detection disabled, this alarm will not function.

Most alarms have adjustable time delays to energize; ranging from 1 through 255 seconds. Refer to Table 7 for the factory setting of each alarm.

All alarms contacts for the SGC are designed to be fail-safe. In other words, if both the AC and DC power are removed, each alarm will be indicating in its correct state. All relay contacts are shown in the de-energized state on schematics. Customer alarm connections should be made accordingly. Refer to the table below.

2.5.3 Alarm Connection Procedure

Before making any connections to the SGC, ensure that the AC power is off at the main breaker box and that both of the charger's breakers are off. Verify that no voltage is present by using a voltmeter at all input and output terminals.

If it is desired that the annunciator be active until the alarm triggers, connect the annunciator leads to the **NC** and **C** contacts of the desired alarm (located on the Control Card *S24-431*). If it is desired that the annunciator be activated when an alarm triggers, connect the annunciator leads to the **NO** and **C** contacts of the desired alarm.

SGC Relay Information	
Relay Function	Logic
AC Fail	De-Energize on Fail
High DC Voltage	Energize on Fail
Low DC Voltage	De-Energize on Fail
Summary	De-Energize on Fail

Table 6 – Relay Functionality

2.6 External Temperature Compensation Connections (Option 11W/11Y)

The natural voltage of a battery changes as a function of temperature change. As the battery temperature rises, the effective voltage of the battery decreases. Without Temperature Compensation, the battery charger will always produce a set constant output voltage. As the battery temperature increases, this constant voltage will then induce a higher output current from the charger. This higher current can result in overcharging the battery, which in turn can result in damage to the batteries.

Temperature Compensation combats this overcharging by adjusting the charger's output voltage based on the temperature read by the temperature probe. In order to increase the accuracy of the temperature compensation, the external probe can be used to measure the temperature of the battery.

Option 11W includes the compensation circuit and a 24-foot long temperature probe. Option 11Y includes the compensation circuit and a 100-foot long temperature probe. With either option, approximately two feet of the probe is taken inside the charger enclosure.

External Probe Connection Procedure

Before making any connections to the SGC, ensure that the AC Power is off at the main breaker box and that both of the charger's breakers are off. Verify that no voltage is present by using a voltmeter at all input and output terminals.

To connect the external probe, the JP4 jumper must be moved to pins 2 and 3 on the control board (Refer to the figure below). Moving this jumper will disable the charger's internal temperature compensation.

On the charger side, simply plug the probe's 3-pin connector in the CN11 connection on the Control/Alarm Board. Install the remaining lug of the probe to the battery. As battery setups vary between users and battery manufacturers, it is recommended that the battery manufacturer be consulted for placement of the probe. The lug of the probe is completely isolated from the compensation circuitry, so the battery voltage will not affect the compensation.

With the probe connected, enter the Configuration Mode and make sure that Temperature Compensation has been enabled (For more details, see *Temperature Compensation* under Section 4).

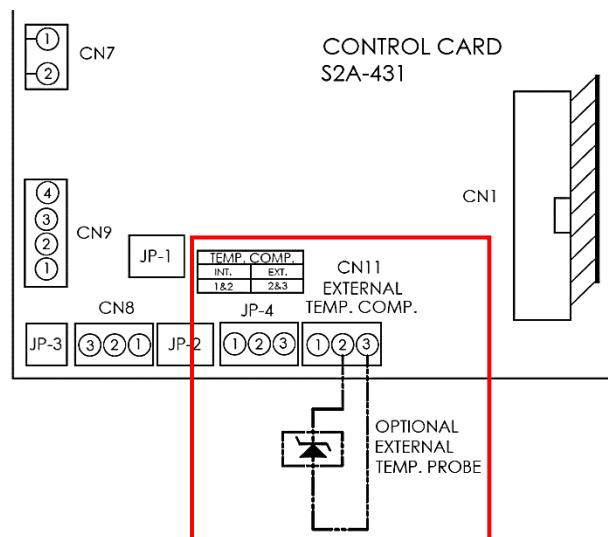


Figure 7 – External Temperature Probe Connection (Option 11W/11Y)

2.7 Ground Detection Connection

Ground Detection is available on all SGC chargers. The purpose of Ground Detection is to determine if the battery or loads have become grounded. If the battery or loads are set up as Floating, it is recommended that Ground Detection be enabled. When Ground Detection is enabled, a positive or negative ground fault indicator will energize upon detection of the specified ground. The Ground Detection circuitry monitors the amount of ground current, whether it is positive or negative, and will alarm when the threshold of 1.2mA is reached (or exceeded).

SGC chargers are shipped from the factory with Ground Detection enabled by default. It is recommended that Ground Detection be disabled if the battery or loads are either positively or negatively grounded. Additionally, the charger will show a ground fault at all times if the system is known to be grounded and the Ground Detection is enabled.

For SGC chargers which are set up to load share, only one charger should have Ground Detection enabled. All other chargers must have Ground Detection disabled (See procedure below for steps). If an external Ground Detection system is used, the SGC Ground Detection must be disabled.



WARNING: With Ground Detection enabled, the SGC charger will contribute approximately 5mA from either the positive or negative to ground on a dead short condition.

2.7.1 Ground Detection Connection Procedure

Before making any connections to the SGC, ensure that the AC Power is off at the main breaker box and that both of the chargers' breakers are off. To disable Ground Detection, move the green Ground Detection wire to the **GND DETECT-DEFEAT** terminal of the CN10 connector on the S2A-431 board. To enable Ground Detection, move the green Ground Detection wire back to the **GND DETECT-ENABLE** terminal of the CN10 connector on the S2A-431 board. Refer to the figure below.

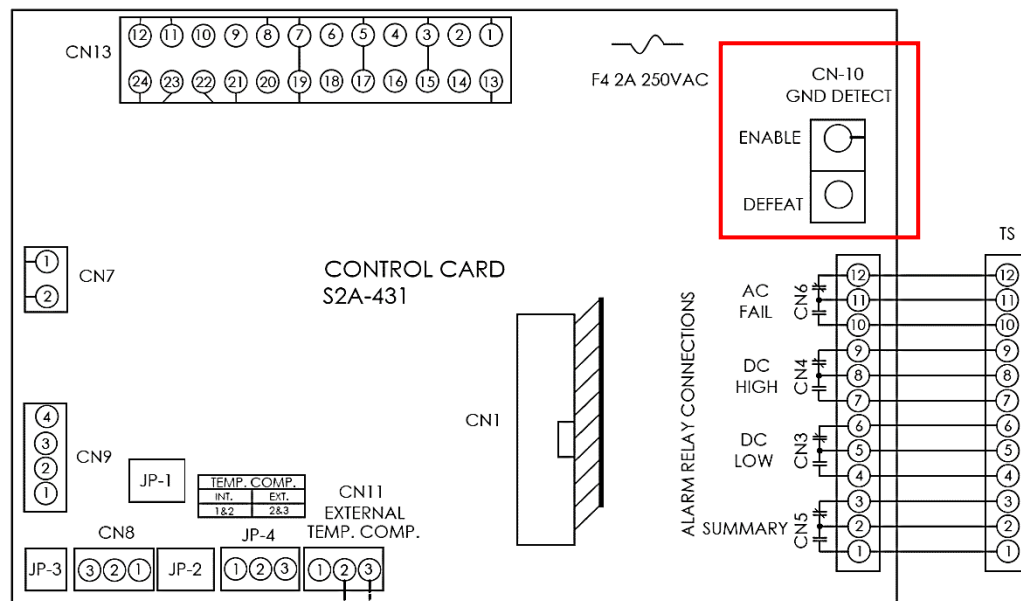


Figure 8 – Ground Detection Connection

3 Operation

3.1 Starting the SGC



All equipment is shipped from the factory fully checked and adjusted based on the factory settings listed below. Before connecting the battery, check with the battery manufacturer for the correct voltage settings and adjust the configuration accordingly (refer to Section 4 for configuration). Failure to match the charger settings with the connected battery may damage or shorten the life of the battery.

Factory Settings

The factory settings of the SGC are based on the customer order, unless otherwise specified. All chargers are set at the factory with the following default settings.

Parameter	Lead Acid	Nickel Cadmium	Delay (sec.)
Float Voltage	2.17 V/C	1.44 V/C	
Equalize Voltage	2.33 V/C	1.55 V/C	
Low DC Voltage	1.98 V/C	1.20 V/C	5
Low DC Current	0.5 Amps		5
Current Limit	110% of nominal output current		5
High DC Voltage	2.45 V/C	1.61 V/C	5
High Voltage Shutdown	2.50 V/C	1.65 V/C	5
End of Discharge	1.75 V/C	1.10 V/C	5
Equalize Timer Mode	Manual		
Equalize Time	8 Hours		

NOTE: V/C – Volts/Cell.

3.1.1 Checking the Installation

Before starting up the SGC, check and verify that all connections are correct. Check that all terminations and contacts are tightened securely. Check that the transformer is set for the correct input voltage. Check that the input frequency matches the nameplate of the charger. Check that the battery voltage matches the DC output voltage on the nameplate of the charger.

3.1.2 Starting/Stopping the SGC

Once proper connections are established, energize the charger by turning on the charger's AC breaker (the DC breaker should be off). This will charge the capacitors inside the charger and eliminate heavy arcing when the batteries are connected. After about 30 seconds, turn on the DC breaker. When shutting down the SGC, switch off the AC breaker first and then switch off the DC breaker.

3.1.3 Start-Up Sequence

Upon powering up the SGC, the LCD will display "La Marche SGC". During the startup sequence, the Low DC Voltage alarm will be temporarily activated. The display will show "FLOAT MODE" and the output voltage and current of the charger will slowly ramp up. After reaching the output voltage, the Low DC Voltage alarm will deactivate.

3.2 Front Panel Display

After the SGC has completed start up, the "AC ON" indicator on the front panel and either the "Float" or "Equalize" indicator on the front panel will be lit. The LCD will display the system DC output voltage and DC output current on line one. Line two of the LCD displays the status of SGC.

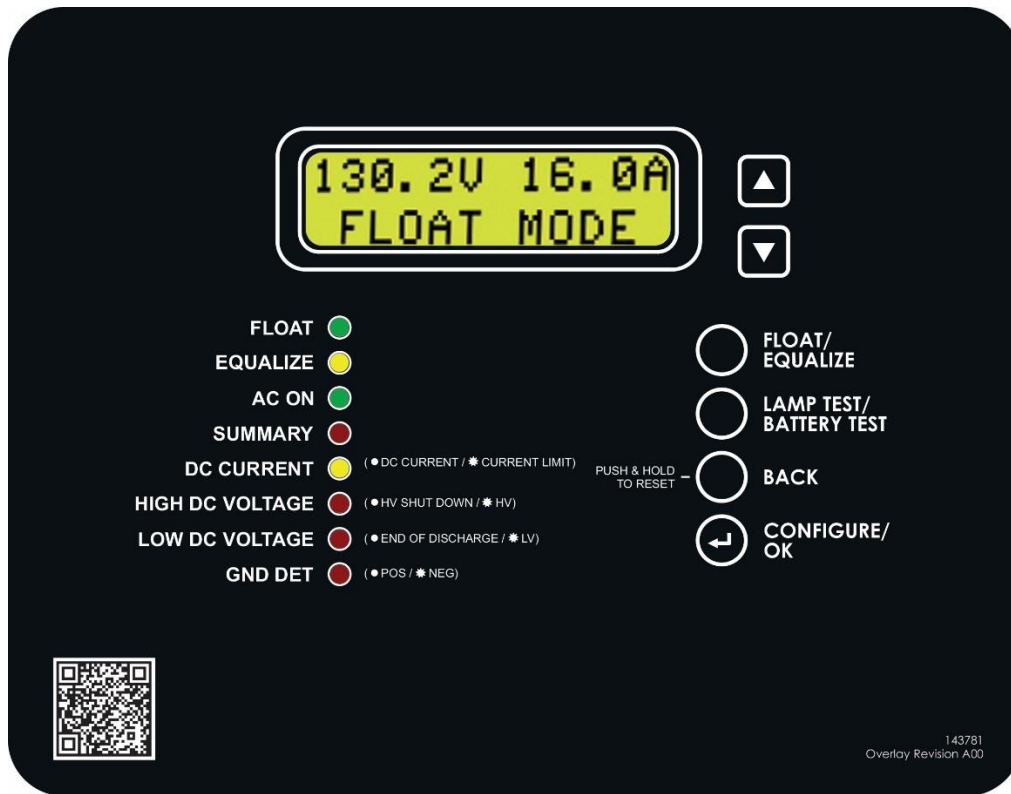


Figure 9 – Front Panel Display

3.2.1 Controls

Up/Down Arrows – The Up and Down arrows offer no function outside of Configuration Mode. When in Configuration Mode, the up and down arrows allow the user to navigate menus and increase or decrease values.

Float/Equalize Button – The Float/Equalize button allows the user to manually switch between Float Mode and Equalize Mode. Float charging mode is used for all normal battery charging needs. Equalize mode is used when it is necessary to Equalize (or balance) the level of charge across all cells present in the battery. Refer to battery manufacturer for recommended Equalize scheduling and parameters. When the SGC is in Equalize Mode, line two of the display will alternate between "EQUALIZE MODE" and the time remaining.

Lamp Test/Battery Test Button – The Lamp Test/Battery Test button allows the user to check the function of all of the front panel LEDs without affecting the operation of the charger, as well as perform a battery test. While the lamp test is running, all of the LEDs flash and a sequence of numbers is written to the display.

Upon pressing and holding the "Lamp Test/Battery Test" button for 2 seconds, the charger will run the Battery test and "PERFORMING BATTERY TEST" will be displayed. The charger will lower the output voltage to check the battery voltage connected to the charger and generate a "BATTERY TEST PASSED" or "BATTERY FAILED" along with "PRSS ↵/OK TO CLR" status after the test. The Summary LED will illuminate once "BATTERY FAILED" is declared, if Battery Fault alarm is assigned to the Summary alarm. Quickly pressing the RESET/BACK or CONFIGURE/OK button will clear the alarm. If the "BATTERY TEST PASSED" is displayed, the charger returns to default display (showing output voltage and current).

NOTE: A battery test cannot be performed if the charger has an active alarm or is in Equalize mode.

Reset/Back Button – The back button allows the user to navigate to a previous screen or out of the configuration. Holding the back button will reset the charger. Upon restarting, the SGC will once again go through the start-up sequence described in Section 3.1.3.

Configure/OK Button – The Configure/OK button brings the SGC into Configuration Mode. This allows the user to set charger parameters in Basic Settings as well as Float Voltage, Equalize Voltage, Equalize Timer, Current Limit, Temperature Compensation and Alarm settings. Once in Configuration Mode, this button becomes the OK button which is used to make selections with in the menus.

4 Configuration Mode

Pressing the Configure/OK button enters Configuration Mode. Each of the adjustable settings of the SGC is accessible using Configuration Mode. Once in Configuration Mode, the user can navigate using the Up and Down arrows to the right of the display, the Reset/Back button, and the Configure/OK button.

The following features are available to be configured:

Number of Cells – Allows output configuration selection (voltage/current) and the number of cells.

- Select No. of Cells
 - Select Battery Type
 - Select number of battery cells

Float Voltage – Allows the selection of voltage per cell for Float operation.

- Select FLOAT VOLTAGE from Configuration Menu
 - Set to the voltage recommended by battery manufacturer

Equalize Voltage – Allows the selection of voltage per cell for Equalize operation.

- Select EQUALIZE VOLTAGE from Configuration Menu
 - Set to the voltage recommended by battery manufacturer

Equalize Timer – Allows selection for the length of the Equalize cycle (in hours) as well as when an Equalize cycle is initiated (manual/automatic).

- Select EQUALIZE TIMER from Configuration Menu
 - Select EQUALIZE HOURS
 - Set the hours that the charger will be in the EQUALIZE mode.
 - Select EQUALIZE MODE
 - set for MANUAL or one of the automatic modes:

<i>Manual:</i>	Equalize cycle is started manually
<i>7 Days:</i>	Equalize cycle is started automatically every 7 days
<i>14 Days:</i>	Equalize cycle is started automatically every 14 days
<i>30 Days:</i>	Equalize cycle is started automatically every 30 days

In any Equalize Mode, the SGC will return to Float Mode at the end of the Equalize cycle.

Current Limit – Allows adjustment of the current limit from 50% to 110% of rated output.

- Select CURRENT LIMIT from Configuration Menu
 - Select current limit as a percentage of the rated output current of the charger.

Temperature Compensation – Allows enable or disable of the Temperature Compensation feature.

- Select TEMP. COMP. from Configuration Menu
 - Select DISABLE or ENABLE

NOTE: For internal compensation, enable the setting and place JP4 jumper across pins 1 and 2. For external compensation, disable the setting and place jumper across 2 and 3 (refer to Figure 10 and 11).

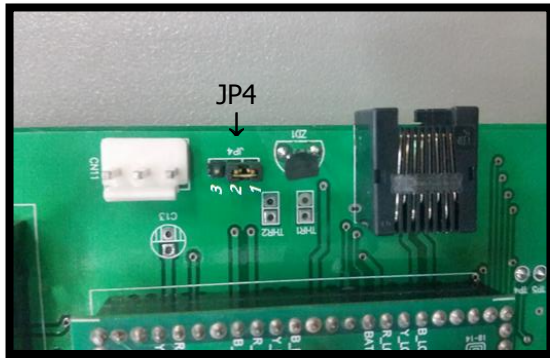


Figure 10 –
Internal Temperature
Compensation Setup

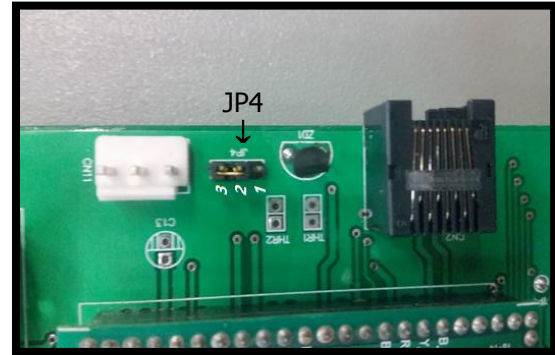


Figure 11 –
External Temperature
Compensation Setup

Battery Test – Allows the user to select whether the battery test is performed automatically or manually. The automatic battery test can be performed every day, every 7, 14, 21, 30, or every 60 days.

- Select BATTERY TEST from configuration menu
 - Select MAN. BAT. TEST or AUTO BAT. TEST with the following selections available:

<i>Everyday:</i>	Battery Test is started automatically everyday
<i>7 Days:</i>	Battery Test is started automatically every 7 days
<i>14 Days:</i>	Battery Test is started automatically every 14 days
<i>21 Days:</i>	Battery Test is started automatically every 21 days
<i>30 Days:</i>	Battery Test is started automatically every 30 days
<i>60 Days:</i>	Battery Test is started automatically every 60 days

Alarm Settings – Allows setting the alarm thresholds for the provided alarms and the alarm time delay

- Select ALARM SETTING from the Configuration Menu.
 - ALARM DELAY
 - Select the alarm delay in seconds. Delay can be set from 1 second to 255 seconds
 - GROUND DETECTION DELAY
 - Select the ground detection alarm delay in seconds. Delay can be set from 1 to 255 seconds
 - DC LOW VOLTAGE
 - Select the desired low voltage alarm point in V/C (volts per cell)
 - DC HIGH VOLTAGE
 - Select the desired high voltage alarm point in V/C (volts per cell)
 - LOW DC CURRENT
 - Select the desired low DC current alarm point in amps

NOTE: The Low DC Current alarm can be disabled if considered a nuisance. To disable the alarm, continuously press the DOWN button until OFF is displayed.

- AC FAIL VOLTAGE
 - Select AC Mains Low
 - Alarm will activate when AC voltage is the percentage selected below the nominal voltage.
 - Select AC Mains High
 - Alarm will activate when AC voltage is the percentage selected above the nominal voltage.

End of Discharge – Allows adjustment of the End of Discharge alarm triggering threshold.

- Select END OF DISCHARGE from Configuration Menu
 - Select the desired end of discharge alarm in V/C (volts per cell)

High DC Shutdown – Allows adjustment of the High DC Voltage Shutdown alarm triggering threshold.

- Select HIGH DC SHUTDOWN from Configuration Menu
 - Select the desired high DC voltage shutdown alarm in V/C (volts per cell)

Summary Alarm – Allows the user to select which alarms trigger the Summary alarm when activated. More than one alarm may be associated with the Summary alarm.

- Select SUMMARY ALARM from Configuration Menu
 - Select from the following alarms available:

▪ DC Low	▪ Pos. Gnd Fault	▪ Charger Fail	▪ Low Current
▪ DC High	▪ End of Discharge	▪ Neg. Gnd Fault	▪ High DC Shutdown
▪ AC Fail	▪ Battery Fault		

Change Serial Number – Allows the user to change the serial number associated with the S2A-431 control board. This serial number is the serial number of the SGC charger and is set at the factory for new chargers. If a user receives a replacement S2A-431 board, the serial number may have to be set via calibration.

- Select CHANGE SERIAL NUMBER from Configuration Menu
 - Input the serial number of the battery charger as shown on its nameplate

Default Settings – Allows the user to reset all settings to how they were programmed from the factory. To reset the SGC settings to the original default settings, scroll to DEFAULT SETTINGS in the Configuration menu. Select DEFAULT SETTINGS. Press the Configure/OK button to confirm.

Input Mains – This feature will read the AC voltage present at input terminals, as well as allow the user to select the input voltage configuration the charger is setup for.

- Select INPUT MAINS from the Configuration Menu.
 - MAINS MODE
 - Select the input AC voltage. The available settings are 120VAC, 208VAC, and 240VAC
 - INPUT VOLTAGE
 - Allows the user to view the input AC voltage reading

5 Service

All work inside the SGC should be performed by a qualified electrician. La Marche is not responsible for any damages caused by an unqualified technician.



Before working inside the SGC, ensure that the AC Power is off at the main breaker box and that both of the charger's breakers are off. Verify that no voltage is present by using a voltmeter at all input and output terminals.

5.1 Performing Routine Maintenance

Although minimal maintenance is required with La Marche chargers, routine checks and adjustments are recommended to ensure optimum system performance.

Yearly

1. Confirm air vents are open. Remove dust and debris from interior of unit.
2. Verify all connections are tight.
3. Perform a visual inspection on all internal components.
4. Check front panel meters for accuracy and LED operation.
5. Check capacitors for electrolyte leakage (and replace, if necessary).

7th Year

1. If the charger is consistently operated in higher temperature environments, all capacitors are recommended to be replaced.

10th Year

1. Check magnetics, components and wiring for signs of excessive heat.
2. It is recommended to replace all capacitors if not done so at the 7 year interval.

5.2 Troubleshooting Procedure

Troubleshooting should be performed only by trained service personnel or experienced electricians. Before setting up any complicated testing or making conclusions, inspect the charger using the guide below.

Check the following:

1. Check DC output cables, connections, battery type, and number of cells against the charger's rating.
2. Check charger specifications against customer order.
3. Check input connections, input voltage and feeder breaker/fuse.
4. Check any internal wiring, fuses, and breakers.
5. Check for shipping damage, loose connections, broken wires, etc.
6. Certain failures can be caused by defective batteries and customer loads; make sure batteries are free from defects.

NOTE: *If the problem is found to be located in the printed circuit boards, the board should be replaced. No attempt should be made to repair circuit boards in the field.*

La Marche Service Technicians are available to help with troubleshooting or with scheduling charger service. When calling in for a service inquiry or for troubleshooting assistance, be sure to have all of the following information on hand:

1. Equipment model number and serial number.
2. The actual AC input voltage.
3. The DC output voltage with and without the battery.
4. Result of the check of the AC and DC breakers.
5. The actual DC output current and voltage, measured with battery and load connected to charger.

NOTE: *When ordering replacement parts, drawings, or schematics, provide the model number, serial number, and description of problem, if available.*

La Marche Phone Number: (847) 299-1188

24-hour **Emergency** Number: (847) 296-8939

5.3 Troubleshooting Chart



Isolate from all power sources prior to performing any interior verifications or part replacements.

Symptom	Possible Cause
AC Breaker Trips (High Input Current)	Wrong AC Input Voltage Frequency out of Range Internal Wiring Failure Defective Component on Heatsink Assembly
AC Mains Fail Alarm	No AC Power Connected Incorrect Input AC Voltage Tap Setting
DC Breaker Trips (High Output Current)	Internal Wiring Failure Incorrect Battery Connected Shorted Output Cables Shorted Battery Cells or Customer Equipment Defective Component on Heatsink Assembly
No Display and No LEDs	Internal Wiring Failure Defective Display Driver Board (S2A-348) Defective Control Board (S2A-431)
Failed LED Test	Defective LEDs Defective Display Driver Board (S2A-348)
Meter Reading Incorrect Voltage or Current	Internal Wiring Failure Defective Shunt Defective/ Incorrect Settings on Control Board (S2A-431) Pot Misadjustment
Charger Running Hot	Inadequate Ventilation Ambient is Too Hot
Battery Temperature Too High	Battery Power Demand Too Great Ambient is Too Hot Shorted Battery Cell(s) Float/Equalize Voltage Set Too High Battery needs to be Equalized
Low Output Voltage or Current	Float/Equalize Voltage Incorrectly Set Charger is in Current Limit Tripped/Defective DC Breaker Defective Control Board (S2A-431) Defective Component on Heatsink Assembly
High Output Voltage or Current	Float/Equalize Voltage Incorrectly Set Defective Control Board (S2A-431) Defective Component on Heatsink Assembly
Erratic Operation	Defective Control Board Internal Wiring Failure Defective Component on Heatsink Assembly Lack of Maintenance High Ambient Temperature

Appendix A: SGC Configuration Menu Structure

Configure/OK	→	Number of Cells	→	Lead Acid Type	→	5-6 (12V) / 10-12 (24V) / 20-26 (48V) / 53-62 (130V)
			→	Nickel Cadmium Type	→	9-10 (12V) / 18-20 (24V) / 36-40 (48V) / 85-98 (130V)
		Float Voltage	→	x.xx Volts per Cell		
		Equalize Voltage	→	x.xx Volts per Cell		
		Equalize Timer	→	Equalize Hours	→	1-145 Hours
			→	Equalize Cycle	→	Manual 7 Days 14 Days 30 Days
		Current Limit	→	50-110%		
		Temperature Compensation	→	Enable Disable		
		Battery Test	→	Auto Battery Test	→	Everyday 7 Days 14 Days 21 Days 30 Days 60 Days
			→	Manual Battery Test		
		Alarm Settings	→	Alarm Delay	→	1-255 Seconds
			→	Ground Detection Delay	→	1-255 Seconds
			→	DC Low Voltage	→	x.xx Volts per Cell
			→	DC High Voltage	→	x.xx Volts per Cell
			→	Low DC Current	→	OFF – xx.x Amps
			→	AC Fail Voltage	→	AC Mains Low → 1-12%
					→	AC Mains High → 1-12%
		End of Discharge	→	x.xx Volts per Cell		
		High DC Shutdown	→	x.xx Volts per Cell		
		Summary Alarm	→	DC Low DC High AC Fail Charger Fail Neg. Gnd Fault Pos. Gnd Fault End of Discharge Battery Fault Low Current High DC Shutdown		
		Change Serial Number	→	xxxxxx-xx		
		Default Settings	→	Load Default Settings		
		Input Mains	→	Mains Mode	→	120 208 240
			→	Input Voltage xxxV		

Appendix B: SGC Specifications

<i>ELECTRICAL</i>	
AC Input	Voltage Range $\pm 10\%$ Frequency Range 50/60Hz
DC Output	16 or 25 ADC @ 125 VDC
Output Filtering	Less than 500mV RMS, with connected battery
Regulation	$\pm 0.5\%$ from no load to full load over the specified input voltage, frequency and ambient temperature range.
Meters	LCD Digital Display DC Ammeter & DC Voltmeter $\pm 1\%$ Accuracy
<i>PROTECTION</i>	
Current Walk-In	The output current will gradually increase after the charger is turned on, eliminating surges and overshoot
Current Limit	50 - 110% of the rated DC output current.
AC Breaker	AC breaker is standard.
DC Breaker	DC breaker is standard.
<i>ENVIRONMENTAL</i>	
Operating Temperature	-40 to 70°C (-40 to 122°F), derated above 50°C
	-20 to 60°C (-4 to 140°F), derated to 67°C (for ZF1 units)
Storage Temperature	-40 to 85° C (-40 to 185° F)
Relative Humidity	5% to 95% (non-condensing)
Cooling	Convection cooled
Shock	The battery charger in its shipping container withstands shock developed when one edge of the container is dropped six inches while the opposite edge is resting on the ground, or it is dropped two inches without any physical damage or degradation of the electrical performance.
Vibration	The battery charger in its shipping contained, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.
Altitude	This battery charger is capable of operation at altitudes up to 10,000 feet at an ambient temperature of up to +40° C.
Ventilation	The unit should be mounted so that ventilating openings are not blocked and air entering the cabinet does not exceed 50°C (122° F).

Appendix C: Manufacturer's Warranty

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory and is warranted to be free from any defect in workmanship and material that may develop within two (2) years from date of purchase.

Any part or parts of the equipment (except fuses, DC connectors and other wear-related items) that prove defective within a two (2) year period shall be replaced without charge providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation.

Should a piece of equipment require repair during the warranty period, the equipment can be returned to the La Marche factory to have the inspection, parts replacements and testing performed by factory personnel. Should it be necessary to return a piece of equipment or parts to the factory, the customer or sales representative must obtain authorization from the factory. If upon inspection at the factory, the defect was due to faulty material or workmanship, all repairs will be made at no cost to the customer during the first two years. Transportation charges or duties shall be borne by purchaser.

In accepting delivery of the equipment, the purchaser assumes full responsibility for proper installation, installation adjustments and service arrangements. Should minor adjustments be required, the local La Marche sales representative should be contacted to provide this service only.

All sales are final. Only standard La Marche units will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special units are not returnable.

In no event shall La Marche Manufacturing Co. have any liability for consequential damages, or loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause. In addition, any alterations of equipment made by anyone other than La Marche Manufacturing Co. renders this warranty null and void.

La Marche Manufacturing Co. reserves the right to make revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.

The failure of La Marche Manufacturing Co. to object to provisions contained in customers' purchase orders or other communications shall not be deemed a waiver of the terms or conditions hereof, nor acceptance of such provisions.

The above warranty is exclusive, supersedes and is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer, nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an official of the manufacturer.