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SC3

1-2-3 Cell Battery Charger



Installation and Operation Manual

This manual is subject to change without notice. You may obtain the newest version of the manual at www.lamarchemfg.com

Important Safety Instructions

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

Electrical Safety



WARNING: Hazardous Voltages are present at the input of power systems. The output from rectifiers 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 system, 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 unit 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 unit.

Always disconnect the unit from the supply, batteries and loads before performing maintenance 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 unit outside the input and output ratings listed on the unit nameplate.

Do not use this unit for any purpose not described in the operation manual.

Mechanical Safety

This unit or parts of the unit 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 unit. Incorrect re-assembly may result in a risk of electric shock or fire.

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 unit is off.

If it is necessary to remove the 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 metal on a battery. A spark or short-circuit could occur and could cause an explosion.

Charger Location

Do not operate this unit in a closed-in area or restrict ventilation in any way.

Do not set any battery on top of this unit.

Never allow battery electrolyte to drip on this unit when reading the specific gravity or filling the battery.

Never place this unit directly above a standard flooded battery. Gases from the battery will corrode and damage equipment.

A sealed maintenance free or valve regulated lead acid battery may be placed below this equipment.

Check for Damages

Prior to unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior of product for damage. If any damage is observed, contact the carrier immediately. Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact La Marche for advice on the risk due to any damage before installing the product. Verify that you have all the necessary parts per your order for proper assembly.



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

Use proper equipment for handling. Care must be taken to prevent the equipment from being accidentally tipped over.

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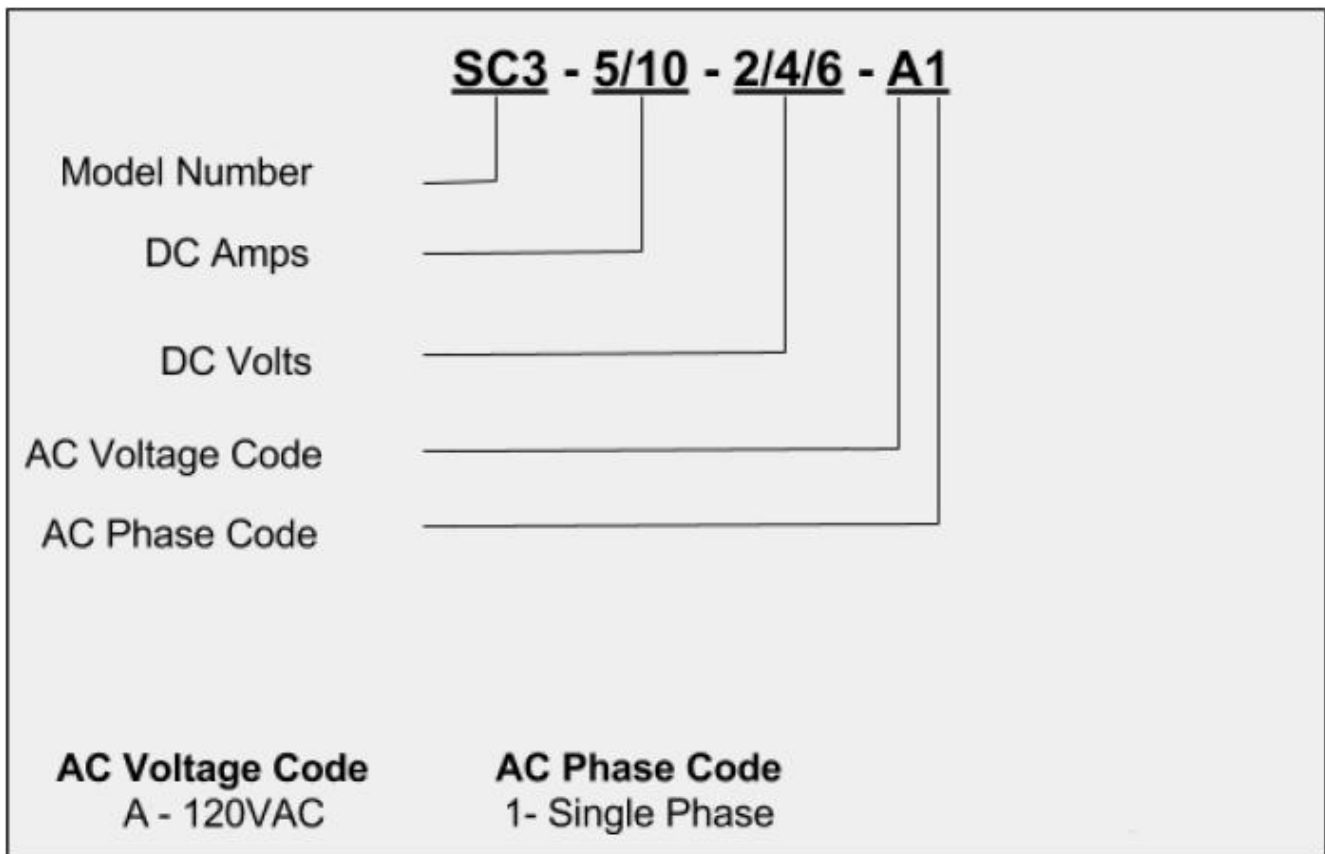
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SC3 General Description

The La Marche model SC3 series uses proven high frequency charging with microprocessor controlled SCR technology and is developed specifically to maintain factory charger on batteries applications. The PWM control provides the highest reliability that is required for maintaining and recharging batteries. This filtered unit is designed and built to charge flooded Lead Acid batteries. The SC3 is the perfect solution for maintenance or conditioning of a single cell within a battery.

Understanding the Model Number

The SC3 model number is coded to describe charger and options that are included. Find the model number on the nomenclature sticker of the charger. Then follow the chart to determine configuration of your battery charger.



1 Equipment Handling

1.1 Storing the SC3

If SC3 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 0 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 SC3

After careful inspection and upon verification that the SC3 is undamaged, identify the enclosure style and weight of the SC3 unit. Refer to the table below.

Output Voltage	Ampere Rating	AC Input Voltage	AC Input Draw (100% load)	Dimensions (W x D x H)	Weight	
					lbs	Kgs
2.20/4.50/6.75 VDC	5/10 ADC	120 VAC	1 A	7.185" x 5.20" x 12.563"	12	5.5

Table 1 – SC3 Weights and Dimensions

2 Installation

2.1 Mounting

The SC3 can be wall mounted using four #4 bolts. Install the SC3 using appropriate hardware on the wall.

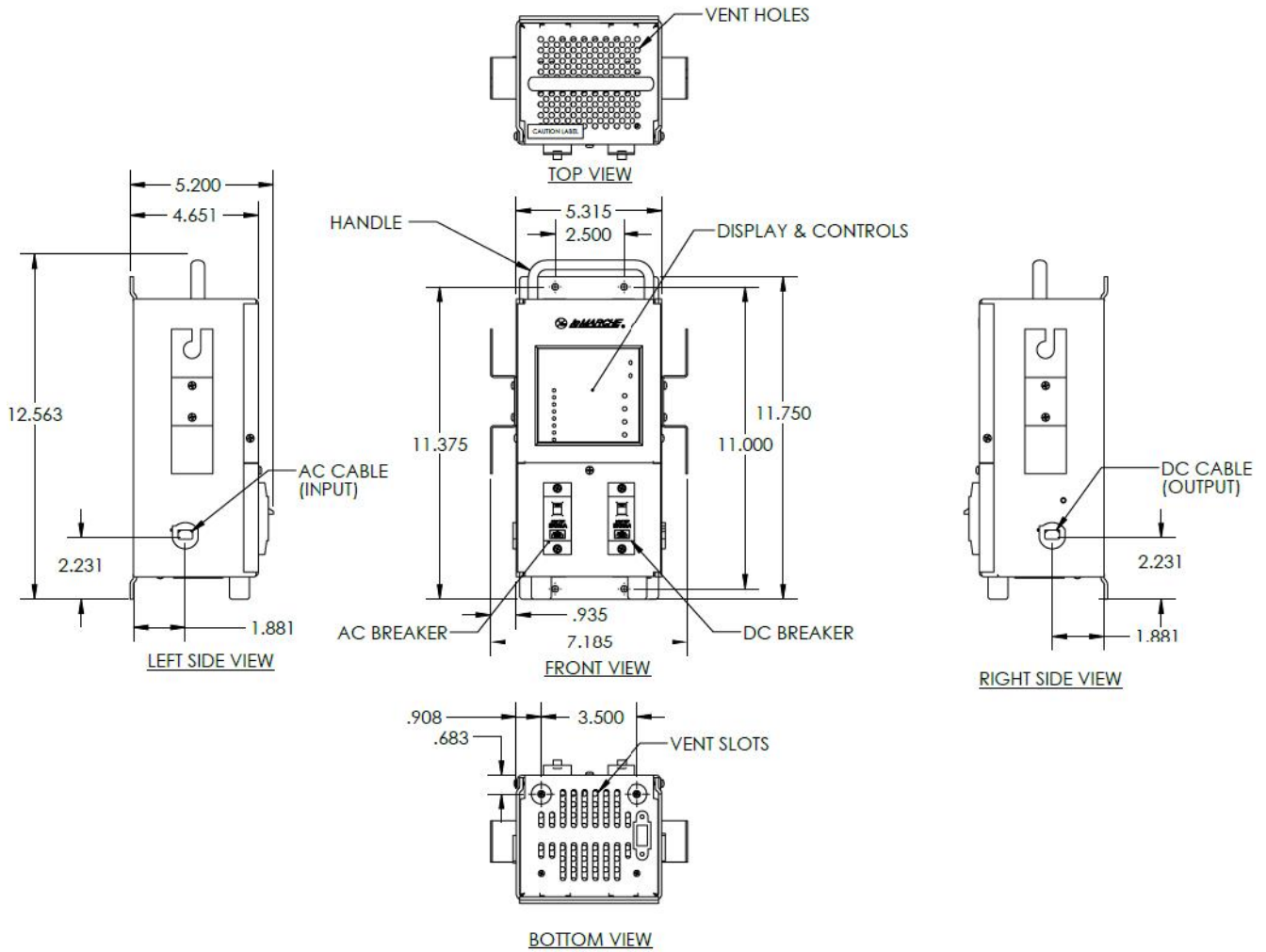


Figure 1 - SC3 Mounting Dimensions

2.2 Electrical Connections

2.2.1 Input Connections

Before beginning any work ensure that all incoming AC supply and DC load wires are de-energized. Verify that no voltage is present by using a voltmeter at all input and output terminals. Check that the source voltage and frequency match the charger nameplate specifications. Before connecting the Battery and/or DC loads, it is recommended to apply AC power and set the configuration for the correct output. Connect the AC power cord to the nearest outlet. See section 3.3 for the configuration instructions. Once the configuration is set remove AC cord of the charger.

2.2.2 Output Connections

The SC3 is equipped with Alligator clip-type terminals for the output connections. The positive cable from each battery should be connected to a separate positive DC output terminal. See figure 2. If the distance between the charger's DC output and the battery/load exceeds 6 feet, use the Power Cable Guide in Appendix C to minimize the voltage drop across the wire distance.



Figure 2 – SC3 Input and Output Terminals



CAUTION: When connecting the DC cables to the battery, be certain the positive terminal of the charger is connected to the positive battery terminal and the negative terminal is connected to the negative battery terminal.

3 Operation



All equipment is shipped from the factory fully checked and adjusted to factory default settings. Before connecting the battery check with the battery manufacturer for the correct voltage settings and adjust the configuration accordingly (refer to section 3.3). Failure to match the charger settings with the connected battery may damage or shorten the life of the battery.

3.1 Initial Setup

Before starting up the SC3, check and verify that all connections are correct and are tightened securely. Check that the input voltage and frequency of the power source match the rating of the charger. Plug in AC Power Cord of the SC3 in order to start up the charger.

3.2 Front Display and Indicators

Close the AC breaker to power on the charger. Upon powering up the SC3, the “AC ON” indicator on the front panel will illuminate, the LCD will display the Output Voltage & Current as zero with display message “CONNECT BATTERY”. After the unit has completed the Start-up procedure, the LCD will show the DC output voltage and DC output current readings with message “CHARGING”.

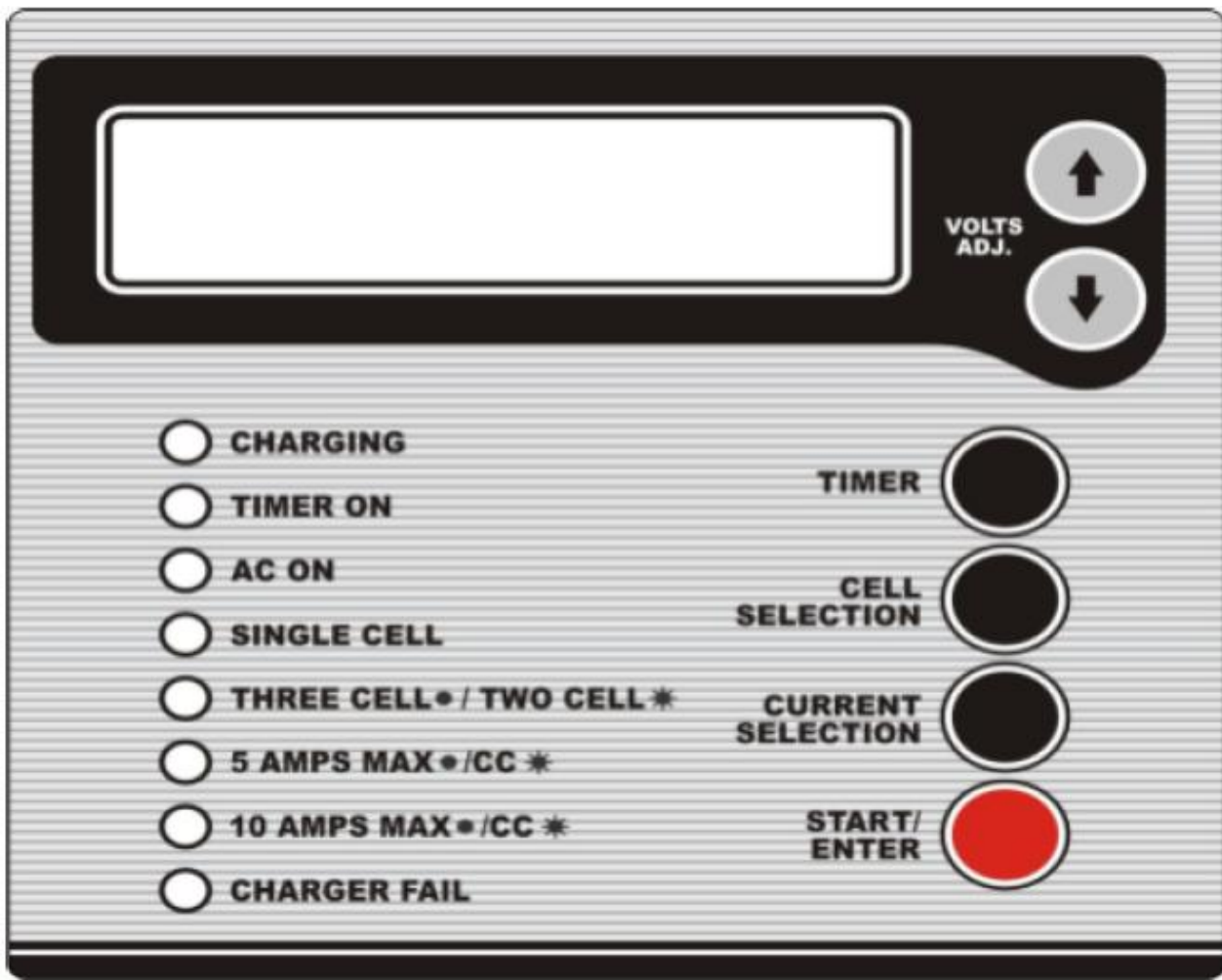


Figure 3 – Front Panel Display

3.2.1 Controls

Up/Down (VOLTS ADJ.) Arrows – The Up and Down arrows is used for increasing or decreasing voltage setting values / Timer selection / Cell Selection / Current Selection.

TIMER Button – the “TIMER” button is used to “SET/RUN” the timer (1 Hr. -24Hrs #8Hr.) also pressed & hold for 10 second to switch off the timer.

CELL SELECTION Button – Used to select the number of cells (Single / Two / Three).

CURRENT SELECTION Button – Used to select the current mode (5 AMPS CC / 10 AMPS CC / 5 AMPS MAX / 10 AMPS MAX).

START/ENTER Arrows – Used to run the charger.

3.2.2 LED Indicators

LCD Display – The LCD display shows the output DC voltage and output DC amperage of the SC3 charger at all times. Chargers modes and different alarm conditions will be displayed if they should occur.

Charging (Green) – The charging LED will illuminate and blink during battery charging.

Timer (Yellow) – The timer LED will illuminate whenever timer is on.

AC On (Green) – The AC ON LED will illuminate whenever AC voltage is present at the single cell charger.

Single Cell (Red) – The Single cell LED will illuminate whenever single cell option is selected.

Two/Three Cell (Red) – The Two/Three Cell LED will illuminate and blink when Two Cell is selected and solid glow when three cells is selected.

5 AMPS MAX/CC (Red) – The 5 AMPS MAX/CC LED will illuminate blink when CC mode is selected and solid glow when MAX mode is selected.

10 AMPS MAX/CC (Red) – The 10 AMPS MAX/CC LED will illuminate blink when CC mode is selected and solid glow when MAX mode is selected.

Charger Fail (Red) – The Charger Fail LED will illuminate and remain solid when the charger is not able to regulate the output voltage. If charger AC input voltage goes above 155 VAC the Charger Fail LED will illuminate, “AC MAINS FAIL” and “CHARGER FAIL” will display on the LCD.

5 / 10A MAX. mode: - During this mode the charger follows a constant voltage charge curve with adjustable output voltage ranges below:

- a. SINGLE CELL mode – 2.20V to 2.55V
- b.
- c. TWO CELL mode- 4.40V to 5.10V
- d. THREE CELL mode- 6.60V to 7.65V

5 / 10A C.C. mode- During this mode the charger follows a constant charge curve with maximum of 5 amps or 10 amps.

Caution- Battery voltage should be monitored frequently as voltage from charger could rise to the following fixed voltages:

- a. SINGLE CELL mode- 3.0 Volts
- b. TWO CELL mode- 5.50 Volts
- c. THREE CELL mode- 8.0 Volts

3.3 Flow Chart

For configuration, follow the SC3 flow chart. Use the Up and Down buttons to cycle through the available options and the Start button to run the charger. See the chart below for the adjustable settings in the calibration mode. Except timer hours the controller settings will remain stored even in the event of total power failure.

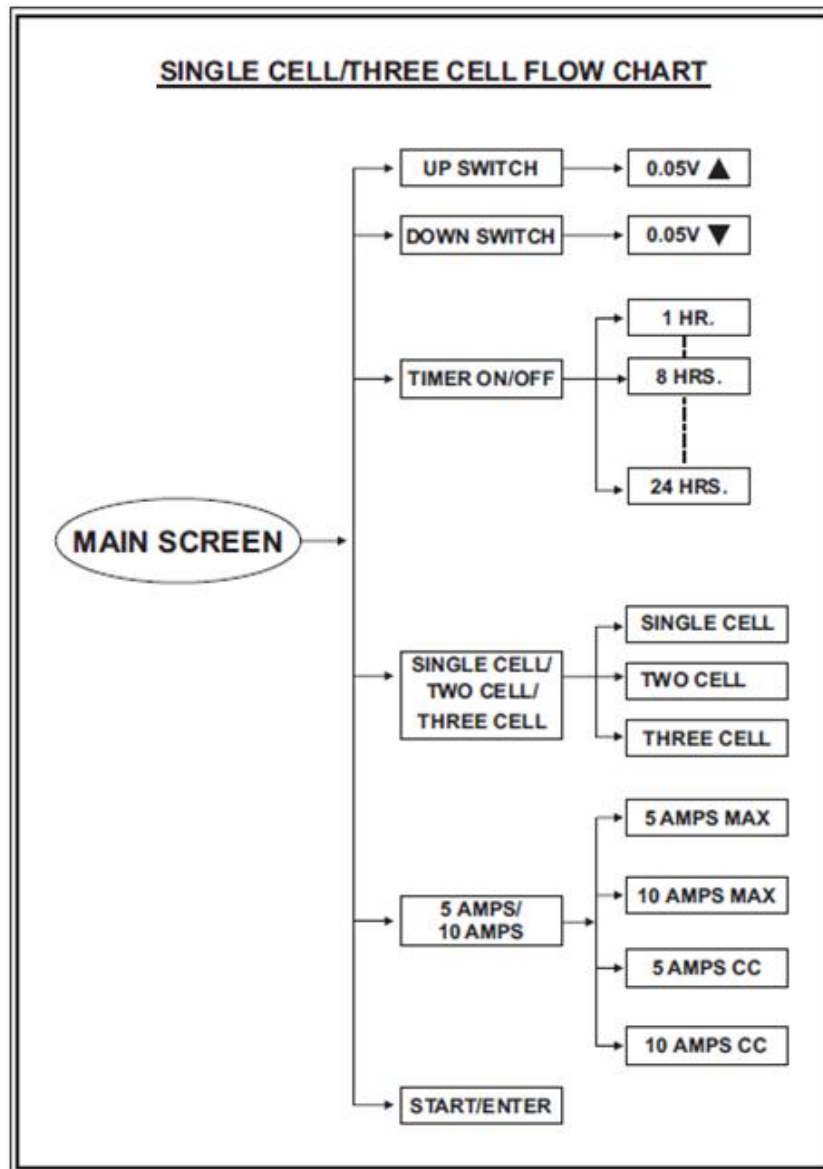


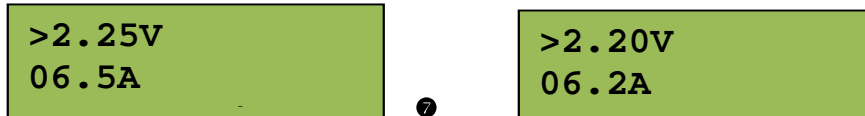
Figure 6 - SC3 FLOW CHART

3.3.1 Setting Output Mode

Press UP Button with increasing SET VOLT values.



Press DOWN Button with decreasing SET VOLT values.



3.3.2 Setting Timer

Press Timer button to run timer.



Timer start from 1-24 Hours and default value is 8 hours using UP/DOWN switch.

3.3.3 Cell Selection

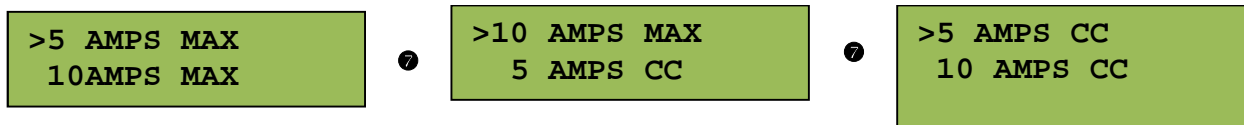
Press cell selection Button for selecting No. of cells (Single/Two/Three) using UP/DOWN switch.



Pressing the DOWN switch will scroll from SINGLE CELL to THREE CELLS.

3.3.4 Current Selection

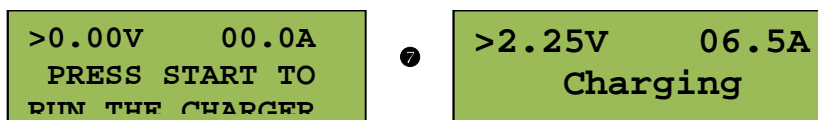
Press Current selection button for selecting current mode using UP/DOWN switch.



Pressing the DOWN switch will Scroll from 5 AMPS MAX to 10 AMPS CC.

3.3.5 Start/Enter

Press start to run the charger and can also be used for selection.



4 Service



All work inside the SC3 should be performed by a qualified electrician. La Marche is not responsible for any damages caused by an unqualified technician.

Before workings on SC3 charger ensure that the main breaker is at “OFF” position and the AC power is off. Disconnect the battery from the charger via the battery disconnect breaker at “OFF” position or manually disconnecting the battery cables. Verify that no voltage is present by using a voltmeter at all input and output terminals.

4.1 Performing Routine Maintenance

In order for the SC3 to continue to operate properly it must undergo routine maintenance. The recommended maintenance schedule is listed below:

Yearly

1. Make sure all connections are tight. (make sure the unit is de-energized)
2. Perform a visual check on all internal components.
3. Check front panel meters and LEDs for accuracy.

4.2 Troubleshooting Procedure

Troubleshooting should be performed only by trained service personnel or experienced electricians. Before setting up any complicated testing, give the unit a general inspection.

Check the following:

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

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 the battery.
4. Result of the check of the AC breaker and DC fuses/ breakers.
5. The actual DC output current and voltage, measured with battery and load connected to charger.

Appendix A: SC3 Specifications

<i>ELECTRICAL</i>	
AC Input	Voltage range: 100– 150Vac Frequency Range: 45-65Hz
DC Output	5A/10A @ 2.25Vdc 5A/10A @ 4.50Vdc 5A/10A @ 6.75Vdc
Output Filtering Regulation	Suitable for Valve-Regulated batteries ± 0.5% from no load to full load over the specified input voltage, frequency and ambient temperature range.
LCD Display	Digital DC Ammeter & DC Voltmeter ± 1% Accuracy
<i>PROTECTION</i>	
Current Walk-In	The output current will gradually increase after the charger is turned on, eliminating surges and overshoot
Environmental	Thermal Protection
Emergency Restoration	The battery charger may be connected to a battery which is heavily discharged and recharge it without clearing any protective devices.
<i>ENVIRONMENTAL</i>	
Audible Noise	Less than 65dBA at any point 5 feet from any vertical surface
Operating Temperature	-4 to 122°F (-20 to 50°C)
Storage Temperature	-40 to 185° F (-40 to 85°C)
Relative Humidity	0 to 95% (non-condensing)
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 container 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 3,000 feet at an ambient temperature of up to +40 degrees C.
Ventilation	The unit should be mounted so that ventilating openings are not blocked and air entering the cabinet does not exceed 50 degrees C (122 degrees F).

Appendix B: SC3 Current draw, Heat loss, and Case size

No. Cell	Operation Mode	Input Voltage	AC Current
Single Cell	5 A CC	120V	0.5
	10 A CC	120V	1
	5A C.V. Mode	120V	0.5
	10A C.V. Mode	120V	1
Two Cell	5 A CC	120V	0.5
	10 A CC	120V	1
	5A C.V. Mode	120V	0.5
	10A C.V. Mode	120V	1
Three Cell	5 A CC	120V	1
	10 A CC	120V	1.5
	5A C.V. Mode	120V	1
	10A C.V. Mode	120V	1.5

Appendix C: Power Cabling Guide

Use the following formulas and table to determine proper wire size for minimal voltage drop.

At distances exceeding 6 feet, the DC wire size should be chosen to keep the voltage difference between the units DC output terminals and the battery at less than 1/2 volt when unit is fully loaded.

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 of Conventions

CMA = Cross section of wire in circular MIL area

A = Ultimate drain in amperes

LF = Conductor loop feet

Max. Amp = Max. Allowable amperes for given voltage drop

AVD = Allowable voltage drop

K = 11.1 for commercial (TW) copper wire

= 7.4 for aluminum

Calculating Wire Size Requirements

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

Calculating Current Carrying Capacity of Wire

Table 4 - Wire Size/Area Table

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

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

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

A= 33, LF= 30, K= 11.1, AV= 0.5

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

Appendix D: 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 one year from date of purchase. In addition to the standard one (1) year warranty, La Marche warrants its magnetics and power diodes on a parts replacement basis only for one (1) additional year under normal use.

Any part or parts of the equipment (except fuses, DC connectors and other wear-related items) that prove defective within a one (1) 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. Magnetics and power diodes are warranted for two (2) years after date of purchase. During the last one (1) year of this two (2) year warranty period, the warranty covers parts replacement only, and no labor or other services are provided by La Marche, nor is La Marche obligated to reimburse the owner or any other person for work performed.

Should a piece of equipment require major component replacement or repair during the first year of the warranty period, these can be handled in one of two ways:

1. The equipment can be returned to the La Marche factory to have the inspections, 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 year. Transportation charges or duties shall be borne by purchaser.
2. If the purchaser elects not to return the equipment to the factory and wishes a factory service representative to make adjustments and/or repairs at the equipment location, La Marche's field service labor rates will apply. A purchase order to cover the labor and transportation cost is required prior to the deployment of the service representative.

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 LaMarche 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 customer's 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.

Appendix E: Document Control and Revision History

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Instruction Number: P25-LSC3-1
Issue ECN: 21497

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