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LMES Pro

Battery Charger

Installation and Operation Manual

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CPN 144074

Instruction Drawing Number: P25-LLMESP-01
Revision A00 Rev. Date: 12/20 ECN:22774

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 unit's 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.

This manual offers important information and suggestions with respect to installation, use etc. Please take the time to read this operator's manual and become familiar with the LMES Pro Battery Charger. This will help you to make full use of the charger.
This manual contains important safety, installation and operating instructions. The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instruction.

***WARNING*:** Indicates a potentially dangerous condition extreme caution when performing this task.

***CAUTION*:** Indicates a critical procedure for safe and proper operation of the controller.

NOTE: Indicates a procedure or function that is important for safe and proper operation of the controller.

CAUTION:
The handling, installation & maintenance of the battery associated with this equipment must be done in accordance with the instructions & safety precautions given by the battery manufacturer.

CAUTION:
Installation, maintenance & repair of the equipment should be undertaken by trained, experienced and authorized service personnel or electrical personnel.

Electrical Safety

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 and batteries 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 comes 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 lead to an explosion.

Unit Location

- Allow at least 6 inches of free air on all vented surfaces for proper cooling
- 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. Take care 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 (VRLA) 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 as 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 hardware is tight.

Handling

Use caution handling the unit to prevent damage

Precautions

- Do not operate this system in direct sunlight, in contact with fluids, or where there is excessive dust or humidity.
- Allow adequate space for proper ventilation.
- Connect the charger AC Mains power cable directly to the distribution panel. Use cables according to the size of the upstream AC protection panel device.
- This charger is not equipped with output reverse polarity protection. Please connect wire polarity correct or use an external 15 Amp fuse when installing.

Table of Contents

1. LMES Pro Charger Description

1.1 General Description

The La Marche LMES Pro battery charger is an advanced battery charger, which utilizes high frequency technology. It is specially designed to meet the requirements of charging the batteries used in engine starting applications. This system is intended for indoor use only.

The charger is compact in form so it takes less space to install. Many functions are user selectable so that user can choose according to their need. Although the charger is very simple to use, please take time to read this user manual and become familiar with your charger.

Front View

Bottom View

1.2 Product Overview

The LMES Pro battery charger is designed with 4 stage battery charging algorithms to prevent overheating and extended battery life. The charger provides protection against battery reverse connection, high DC voltage, input voltage variation and surges etc.

1.3 Four Stage Charge Curve

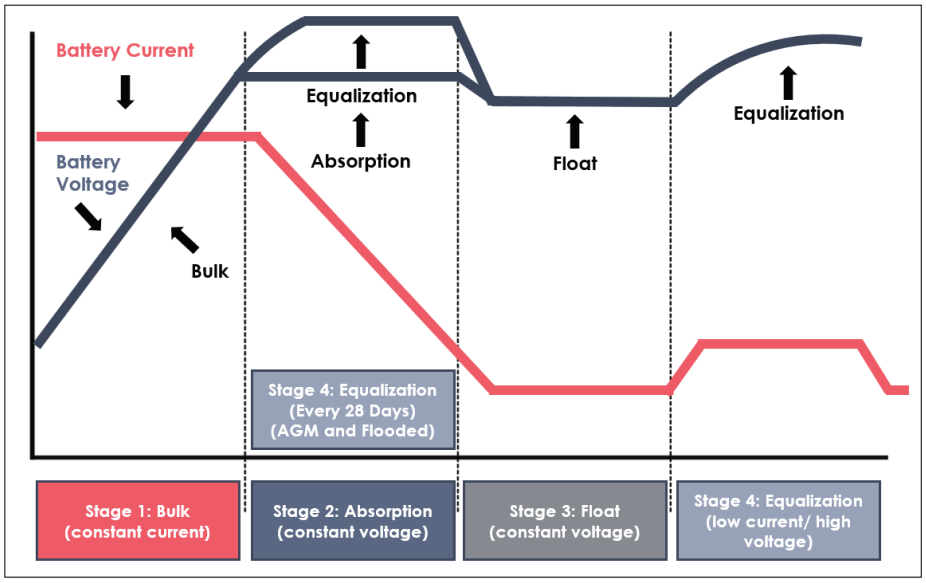
Four Stage Battery charging Algorithm: Bulk/Absorption/Float/Equalize charging stages that slowly lower the amount of power applied to the batteries as the batteries get closer to gets fully charged. This charger allows the batteries to be fully charged with less stress on the battery, preventing battery overheating, over gassing and reaching maximum battery life. It can also keep batteries in a fully charged state (called "float") indefinitely.

Bulk Charge: In this stage, the battery voltage has not yet reached up to absorption voltage and 100% of rated current is used to recharge the battery. Charger initiates this mode when the battery voltage is less than 2.1 Volts per cell for more than 90secs. Provides full current until the battery reaches 102% of its absorption voltage reference.

Absorption: When the battery has recharged to the Absorption voltage level, constant-voltage regulation is used to prevent heating and excessive battery gassing. Charger hold absorption voltage until output current is less than 0.5Amps, or battery is determined to be fully charged (Absorption voltage reference) max. of 4 hours at this mode and go to Float.

Float: After the battery is fully charged the Charge Controller reduces the battery voltage to a float charge which is sometimes called a trickle charge.

Equalize (NiCad and Flooded battery type only): The Charge Controller will equalize the battery for three hours. Equalize charging raises the battery voltage above the standard absorption voltage. This process prevents electrolyte stratification and equalizes the individual cell voltages within the battery.



Four Stage Charge Curve

1.4 Features

- ➢ High Frequency-Based Charger.
- ➢ Single Phase AC Input 105 Vac-264 Vac, 50/60Hz
- ➢ Complete Galvanic Isolation from AC to DC
- ➢ Soft Start, Short Circuit Protection, Over Voltage and Over Temperature Protection.
- ➢ Four Stage Battery Charging Algorithm
- ➢ Automatic High Battery Cutout in High DC Protection.
- ➢ Low Noise & High Reliability.
- ➢ Lightweight with Sleek Aesthetic Looks.
- ➢ Generates Low EMI
- ➢ Temperature Compensation

1.5 Remote Temperature Sensor

Battery charging voltage is temperature compensated when the temperature probe is connected to the RTS terminal with the correct polarity.

Temp. compensation is not applicable for NiCad and Sealed type of batteries.

Default Temp. Compensation Coefficient (25'C Reference Temp.) = -3mV/cell/'C rise in Temp.

Default Temp. Compensation Range = 0'C to +50'C.

1.6 Protections

- ➢ **Transient Surge Protection**

- ➢ **Temperature Compensation**

  In temperature compensation, the protection output is derated according to the temperature (3mV/deg C/ Cell). It also detects open and shorted probe. When the temperature probe is not connected/open, temperature compensation is disabled.

- ➢ **High Dc Protection**

  If 24V DC battery is connected to the charger when 12V mode is selected, charger will shut down in high DC protection. No damage occurs in the charger.

- **Output Short Circuit Protection**

  In output short circuit condition, 6V voltage dip occurs at output voltage during running system and battery volt comes below 6V in 12V mode/12V in 24V mode, charger goes OFF. Charger turn ON again after 2 mins in soft start to charge the battery.

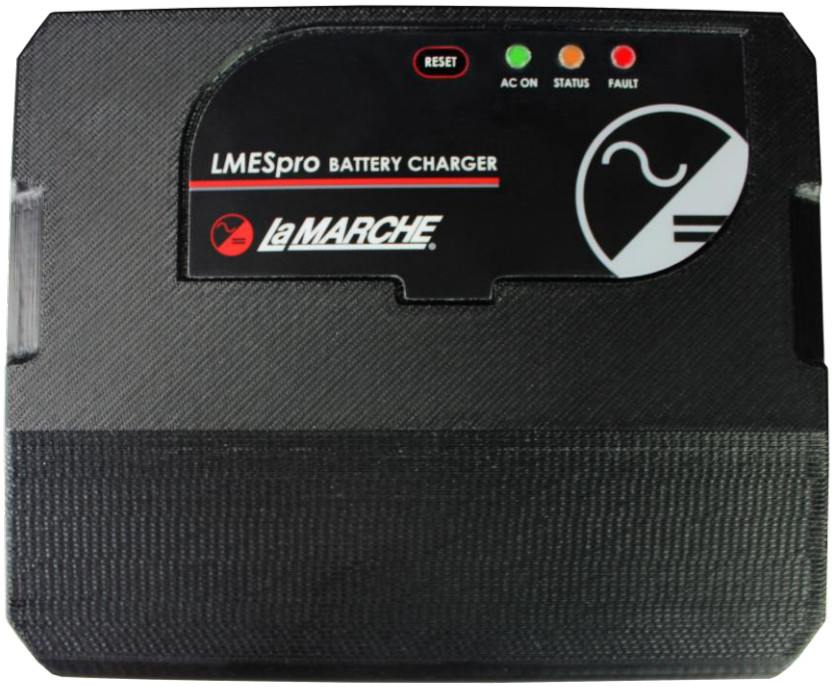
- **Output Overload Protection**

  When output current exceeds the 105% of rated current, charger limits the current and output DC voltage foldbacks to compensate the output overload condition.

- **Thermal Protection**

  Charger is also protected from over-temperature, i.e., at 70’C output current is derated by 30% and recovery of derated output is at 60’C. Thermal shutdown of charger is at 85’C and recovery is at 60’C.

2. Indication Details



Front View

	LED STATUS	INDICATION
AC ON (Green) AC Status	ON	AC ON
	OFF	AC out of range
CHG. STATUS (Orange) Charging Status	Blink with 5 sec delay	Bulk Charging
	Blink with 20 sec delay	Absorption Charging
	Solid Glow	Float Charging
CHARGER FAILURE (Red) Charger Status	ON	Charger Failure

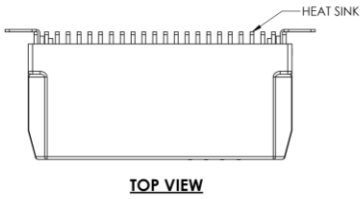
3. Installation

3.1 Where to Install

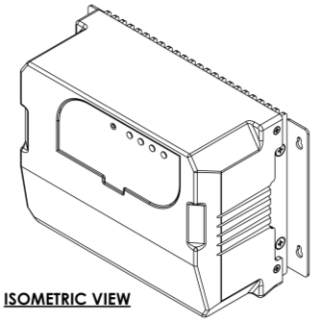
The charger should be installed in a location that meets the following requirements:

1. Never install the equipment near liquids or in an excessively damp environment.
2. The charger must be installed in a room with proper ventilation.
3. Avoid using equipment in location with corrosive gases (for example: Over Flooded Lead Acid batteries) and dust.

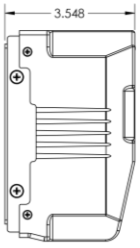
3.2 Dimensions



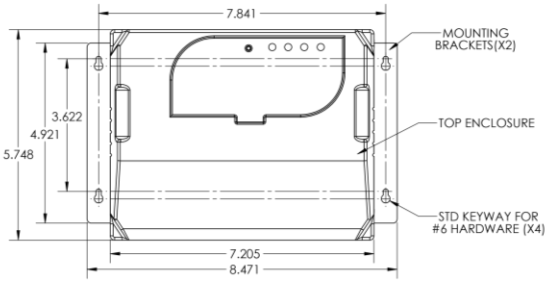
TOP VIEW



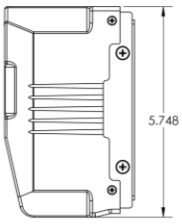
ISOMETRIC VIEW



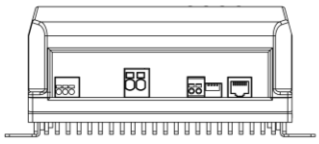
LEFT VIEW



FRONT VIEW



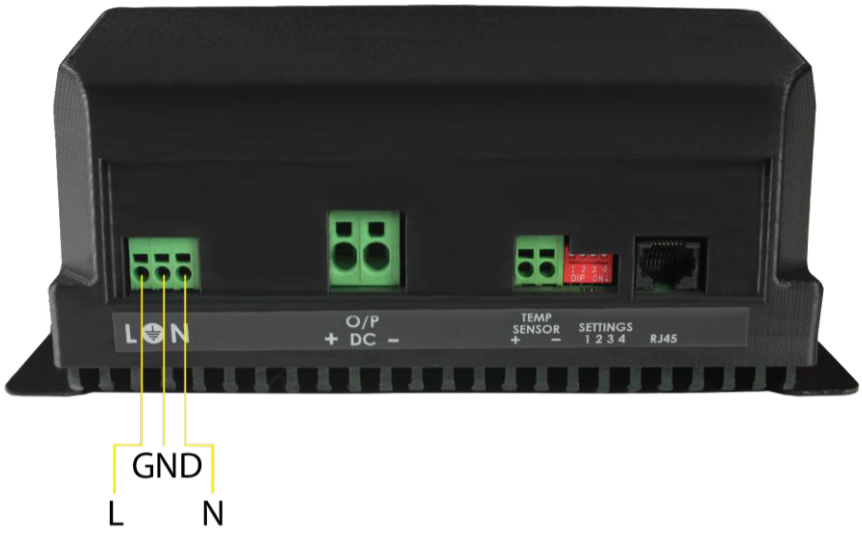
RIGHT VIEW



BOTTOM VIEW

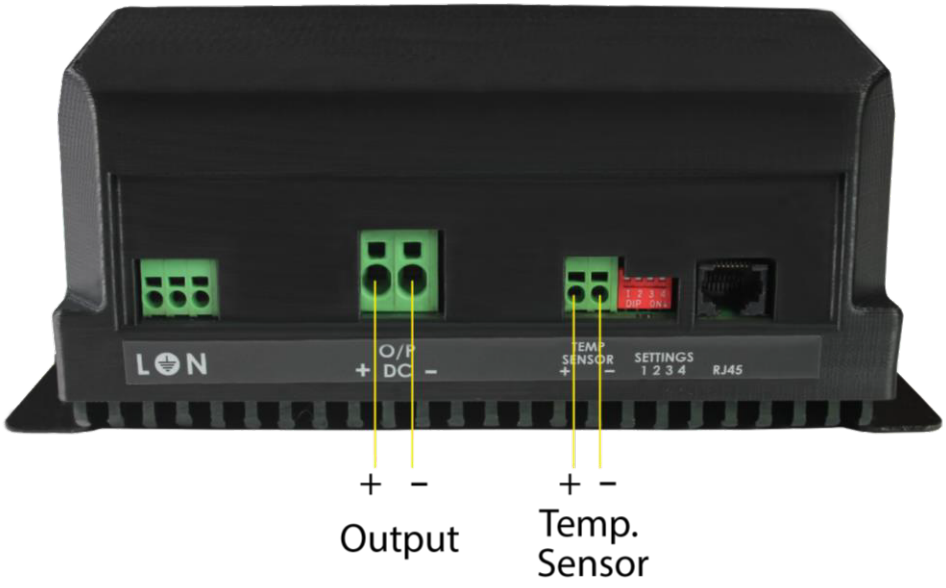
3.3 Input AC Connection

Connect AC wiring to the equipment as per the image shown below. Refer to section for recommended wire sizes.



3.4 Output DC Connection

Connect battery wires and remote temperature probe to the equipment with the correct polarity connection as shown in below image. Connect the remote temperature sensor (RTS) probe thimble to the negative terminal of the Battery. Refer to section for recommended wire sizes.



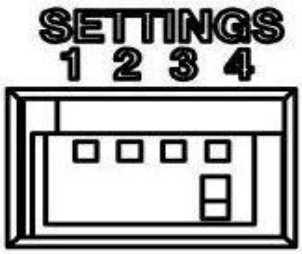
Configure the unit as per your requirement Battery Mode - 12V/24V and Battery Type - NiCad/Sealed/Flooded.

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.

CAUTION: Do not touch the charger while it is in operation or just after the turn off of the system as the Solar Charge Controller heat-sink can become very hot during operation.

4. User Configuration

4.1 System Configuration Using Dip-Switch



4.2 System Mode Selection

SWITCH 1	System Mode
0	12V Mode
1	24V Mode

4.3 Battery Cell Selection

SWITCH 3	Battery Type (No. of Cells)
0	19NC Cell for NiCad Battery
1	20NC Cell for NiCad Battery

4.4 Battery Type Selection

SWITCH 4	Battery Type
0	Flooded Battery
1	NiCad Battery

5. Service

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

CAUTION: Before working inside the LMES Pro Charger ensure that the AC power is off. Disconnect the battery from the charger. Verify that no voltage is present by using a voltmeter at all input and output terminals.

5.1 Performing Routine Maintenance

Although very little maintenance is required with the LMES Pro Charger, routine checks are recommended to ensure optimum system performance.

Yearly

1. Confirm that the LMES Pro charger is located in a well-ventilated area. The charger should always be kept free of dust and debris. Remove any that may be present.
2. Make sure all connections are tight. Make sure the unit is not too hot.
3. Make sure charger is mounted indoors only.

5.2 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 input-output cables, connections, battery type, and number of batteries/cells against the unit's rating.
2. Check unit specifications against customer order.
3. Check AC input connection and input voltage connected.
4. Measure AC voltage if power outage occurred. If the charger is in 105VAC-119VAC range, press reset button to restart. The charger restart automatically at 120VAC after power outage.
5. Check for shipping damage, loose connections, broken wires, etc.
6. 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 and without the battery.
4. The actual DC output current and voltage, measured with battery connected to charger.

NOTE: When ordering replacement parts, drawings, or schematics, always give model number and serial number

5.3 Fault Indications and Alarms

Output High DC

If 24V DC battery is connected to the LMES pro charger when 12V mode is selected, Charger shutdown in high DC protection. No damage occurs in the Charger.

Charger Mode Selected	High DC Shutdown Voltage	High DC Recovery Voltage
12V	15.3V	14V
24V	30.6V	28V

Output Low Dc

When 6V voltage dip occurs at output voltage during running system and battery volt comes below 6V in 12V mode or 12V in 24V mode, charger goes OFF. Charger turn ON again after 2 mins in soft start to charge the battery.

Output Short Circuit

When output short circuit occurs or output current reaches greater than 15A. Remove short circuit and reset the AC power to resume normal operation.

Thermal Derating

Charger is also protected from over-temperature, i.e., at 70'C, output current derated by 30% and recovery of derated output is at 60'C.

Thermal Shutdown

When enclosure temperature of the charger reaches 85'C, charger shutdown in thermal protection. when temperature reduces to 60'C, charger normal operation resume.

AC Failure

When AC input goes out of the range 105 Vac - 264Vac considered AC failure.

Appendix A - LMES Pro Technical Specifications

	LMES PRO SPECIFICATION	
S. NO.	**PARAMETERS**	
1	**Model**	**LMESpro10 Amp**
2	**Input Amps Rms (Max)**	3.3 Amps
3	**Input Voltage Range:**	105V-264 AC 50/60Hz
4	**AC I/P Low Cut**	100V
5	**AC I/P Low Cut Recovery**	120V
6	**AC I/P High Cut**	265V
7	**AC I/P High Cut Recovery**	258V
8	**Battery Banks**	1,2
9	**Output Volts**	12/24-Volt, Field Selectable
10	**Charging Current**	10 Amp
11	**Electronic Current Limit**	105%
12	**Charging Modes**	4 stages (Soft-Start, Bulk, Absorption, Float, Equalize)
13	**Rechargeable Battery Type**	VRLA(Sealed) and NiCad
14	**Battery Temperature Compensation Range**	0*C to +50*C
15	**Battery Temperature Compensation Coefficient**	3mV/deg C/ Cell: (with Probe Connected)
16	**Enclosure Protection Type**	IP32
17	**Led Indication**	1. AC ON (Green) 2. Charger Failure (Red) 3. Charge Status (Flashing Green for Bulk, Solid Green for Float)

18	**User Programmable Settings**	1. Field Selectable 12/24-Volt Output 2. Flooded/NiCad Battery Selection		
19	**Ambient Operating Temp**	-40 °C to +50 °C		
20	**Storage Temp Range**	-40 °C to +70 °C		
21	**Protections**	-Output Overcurrent -Output Short Circuit -Output Reverse Polarity -AC Fuse (Internal) -DC Fuse (Internal) -Thermal Protection		
22	**Features**	1. Cranking Function 2. System Derating		
23	**Battery Set Points @ 25'C**	**NiCad Battery 12V - 10cell / 24V - 20cell**	**Sealed Battery 12V/24V**	**Flooded Battery 12V/24V**
24	**Bulk Voltage (102% Of Absorption Voltage)**	1.45V/Cell CC Mode	14.38V/28.76V	14.68V/29.37V
25	**Absorption Voltage**	1.44V/Cell	14.1V/28.2V	14.4V/28.8V
26	**Absorption Duration**	4 Hrs / Until Charge Current Reduced to 0.5A	4 Hrs / Until Charge Current Reduced to 0.5A	4 Hrs / Until Charge Current Reduced to 0.5A
27	**Float Voltage**	1.44V/Cell	13.7V/27.4V	13.7V/27.4V
28	**Equalize Voltage**	1.55V/Cell	N/A	14.9V/29.8V
29	**Equalize Calendar**	28 Days	N/A	28 Days
30	**Equalize Duration**	3 Hrs.	N/A	3 Hrs.

Appendix B - 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.

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.

Should a piece of equipment require major component replacement or repair during the first year of the warranty period, this 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 travel and 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 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 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.