

# **Battery Charger**

## with Wireless Communications

## **Owner's Manual**

## LIFEPLUS MOD3

## Models: LPM3 (Standard and Flex) LPM3C (CEC)

For local parts, sales and service, call toll-free 1-800-251-6560.

BC

AM-HLPM3-OM Rev AB September 2019

 Model:
 S/N:
 AC Input Voltage

 Installed by
 Date

IMPORTANT Read and understand your user's manual before installing, operating, or servicing this product. DO NOT DESTROY THIS BOOK

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## **IMPORTANT SAFETY INSTRUCTIONS**

#### WARNING: THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION.

- 1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, **CAUTIONs** and **WARNINGs** on the battery charger, the battery and the product using the battery.
- 2. This battery charger is designed to charge flooded and sealed lead-acid batteries. Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
- 3. **Do not** touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
- 4. During charge, batteries produce hydrogen gas which can explode if ignited. Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
- 5. **Do not** connect or disconnect the battery plug while the battery is charging. Doing so will cause arcing and burning of the connector resulting in charger damage or battery explosion.
- Lead-acid batteries contain sulfuric acid which causes burns. Do not get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.
- 7. Only factory qualified personnel can service this equipment. De-energize all AC and DC power connections before servicing the charger.
- 8. The charger is **not** for outdoor use.
- 9. Do not expose the charger to moisture. Operating **conditions** should be 32° to 113° F (0° to 45° C); 0 to 70% relative humidity.
- 10. Do not operate the charger if it has been dropped, received a sharp hit, or otherwise damaged in any way.
- 11. For continued protection and to reduce the risk of fire, install chargers on a floor of non-combustible material such as stone, brick, or grounded metal.

## **INSTRUCTIONS DE SÉCURITÉ IMPORTANTES**

- 1. Ce manuel contient des informations et des consignes importantes pour l'emploi et l'utilisation du chargeur de batteries industrielles. Avant tout emploi, il est fortement conseillé de lire l'ensemble des instructions, recommandations, et avertissements concernant le chargeur et la batterie.
- 2. Ce chargeur a été conçu pour la charge des batteries industrielles type plomb-acide dite « ouverte ». (Il ne peut pas être adapté pour les batteries étanches.)
- 3. Lisez toutes les condisnes d'installation et d'utilisation avant d'employer le chargeur de batterie pour empêcher des dommages à la batterie et / ou au chargeur.
- 4. **Ne pas être en contact avec** les pièces sous-tension non-isolées tels que la prise de charge ou des éléments de connexion de la batterie pour empêcher le choc électrique.
- Pendant la charge, le dégagement d'hydrogène rend l'emploi de feu strictement interdit «risque d'explosion ». Ne jamais fumer, employer une flamme nue, ou créez les étincelles à proximité de la batterie. Ventiler suffisamment pour éviter toute condensation de gaz dans un espace restreint.
- 6. **Ne brancher ou débrancher la batterie que si le chargeur est à l'arrêt.** Faire ainsi risque d'endommager la prise de charge pouvant avoir pour conséquence des dommages du chargeur ou l'explosion de la batterie.
- 7. Les batteries d'acide au plomb contiennent l'acide sulfurique, qui cause des brûlures. Eviter le contact avec les yeux, la peau, ou sur l'habillement. Dans le cas de contact avec les yeux, et faut nettoyer immédiatement avec de l'eau propre pendant 15 minutes et consulter un médecin immédiatement.
- 8. Seul le personnel qualifié par l'usine peut entretenir cet équipement. Pour le service, veuillez contacter la société EnerSys ou l'un de ces représentant (1-800-251-6560)
- 9. Avant toute intervention d'entretien ou de réparation il faut s'assurer que le chargeur est hors tension et la batterie est déconnectée.
- 10. Le chargeur **n'est** pas pour un usage extérieur.
- 11. Ne pas exposer le chargeur à l'humidité. Les conditions de fonctionnement devraient être 0° à 45°c; humidité relative de 0 à de 70%.
- 12. Ne pas mettre en fonctionnement le chargeur s'il a reçu un choc mécanique ou tout autre dommage di quel que façon.
- 13. Pour une protection permanente et pour réduire le risque du feu, installez les chargeurs sur un plancher ou un matériel non-combustible tel qu'un mur plein en béton, en brique, ou l'acier.

## **TECHNICAL INFORMATION**

There are two nameplates located on the outside of the charger and should be used to check this application before installation. The "Main" nameplate includes the UL Model number and the ratings of the cabinet at its full capacity, while the "Configured Ratings" nameplate includes the Part number and the ratings of the cabinet as configured. The Configured Ratings nameplate label must be replaced when adding or removing modules permanently in the field.

### Part Number and UL Model Number

The UL Model Number specifies the characteristics of a full cabinet charger, while the Part Number specifies the characteristics of the cabinet as configured, plus all options. The Part Number is required in any discussion or correspondence regarding this unit.



## **Cabinet Size/Gauge Letter Codes**

The following table describes the letter codes to be used in charger part numbers to indicate the number of slots and size of DC cables.

Letter Code	Module Positions	Standard Cable Gauge	Comments
С	3	2/0	Three slot, 3.5kW cabinet
F	6	3/0	Six slot, 3.5kW cabinet
L	12	3/0	12 slot, 3.5kW cabinet

## AC Line Voltage Letter Codes

The following table describes the letter codes used in the charger part number to indicate the nominal AC line voltage(s) and frequency at which the charger is designed to operate.

Letter Code	Voltage(s) (volts rms)	Line Frequency (Hertz)	Comments
С	600	50/60	600 VAC only
G	208/220/240	50/60	208/220/240 VAC
Н	440	50/60	440 VAC only
Y	480	50/60	480 VAC only

## SPECIALTY CHARGER OPTIONS LIST

Suffix	Description	
1	15 Ft of DC cable.	
2	20 Ft of DC cable.	
3	25 Ft of DC cable.	
4	30 Ft of DC cable.	
E	LAN (Ethernet Compatible)	
F	Red/Green Next Battery Capable – used in conjunction with BSI and BSS	
R	Remote control capable (order remote control separately)	
V	PLC capable	

## <u>Serial No.</u>

This is the serial number that indicates complete information about the charger. It must be supplied with the part number on any correspondence or discussion regarding this charger.

## Battery Type

The chemical content of the battery this charger is designed to charge: L-A = Lead Acid.

## <u>Max AH</u>

This number indicates the maximum Amperes-Hours (AH) capacity of this charger. Charging batteries of AH capacities not specified here will cause the charger to deviate from the specifications.

## <u>No. Cells</u>

This is the number of cells this charger is designed to charge.

## Max Modules

This is the maximum number of power modules that can be installed into the charger cabinet.

## Config Modules

This is the actual number of power modules installed in the charger cabinet.

## <u>Hertz</u>

This is the frequency in cycles per second of the AC input voltage this charger is designed to operate on. Do not operate charger at a different frequency or from a generator with unstable frequency.

## <u>Phase</u>

Number "1" indicates a Single Phase Charger and number "3" indicates a Three Phase Charger.

## AC Volts

This is the input voltage accommodated by this charger.

Failure to use the correct voltage will result in damage to the charger and/or the battery.

## IMPORTANT: THE CHARGER WILL OPERATE ONLY ON NOMINAL AC LINE VOLTAGES INDICATED ON THE NAMEPLATE.

## Config AC Amps

This is the AC current that this charger will draw with the number of power modules shown in Config Modules on the nameplate.

## Max AC Amps

This is the Maximum AC current this charger will draw from AC power. This charger must be connected to a branch circuit protection in accordance with the National Electrical Code NFPA70 and local codes. (AC breaker/fuse values can be found on a decal outside the charger.)

## Max DC Amps

This is the maximum DC current that this charger cabinet will deliver to a discharged battery when fully populated with power modules.

## DC Volts

This is the rated DC output voltage of the charger.

## Config DC Amps

This is the DC current that this charger will deliver to a discharged battery with the originallyfurnished (Config Modules) number of power modules.

## <u>CEC</u>

This logo is applied to chargers that are certified with the California Energy Commission in compliance with Appliance Efficiency Regulations:



#### <u>cULus</u>

This logo is applied to chargers that have been tested to applicable standards and requirements by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA):



## INSTALLATION

## WARNING: THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION

### Location

For maximum trouble-free service, choose a location which is free of excess moisture, dust and corrosive fumes. Also, avoid locations where temperatures are high or where liquids will drip on the charger. Follow charger warning label when mounting on or over a combustible surface. Do not obstruct the ventilating openings.

#### Wall/Floor Mount Cabinet Chargers

The charger must be permanently mounted in a vertical position. The lower part of the charger must be at least 12 inches from the charger below if installed above another charger, and the upper part 12 inches from the ceiling. The distance between two chargers must be no less than 12 inches. Use the mounting kit supplied with the charger. See the Mounting Dimensions section at the end of this manual for proper Wall and Floor mounting.

#### **NOTE:** Ambient temperature cannot exceed 113° F (45° C).

#### **Electrical Connections**

To prevent failure of the charger, be sure it is connected to the correct line voltage.

## WARNING: MAKE SURE THE POWER TO THE CHARGER IS OFF AND THE BATTERY IS DISCONNECTED BEFORE CONNECTING THE INPUT POWER TO THE TERMINALS OF THE CHARGER.

#### **Connecting Input Power**

Connect the input power to the appropriate terminals, *including ground*. For screw type terminals, torque to 15 in.lbs. Follow your local and National Electric Code in making these connections.

## AC Circuit Protection

The user must provide suitable branch circuit protection and a disconnect method from the AC power supply to the charger to allow for safe servicing.

## Breaker/Fuse Chart

AC Amps (A)	Breaker/Fuse size (A)
1 - 12	15
12.1 - 16	20
16.1 - 20	25

20.1 - 24	30
24.1 -28	35
28.1 - 32	40
32.1 - 36	45
36.1 - 40	50
40.1 - 48	60
48.1 - 56	70
56.1 - 64	80
64.1 - 72	90
72.1 - 80	100
80.1 - 88	110
88.1 - 100	125

## DC Plug Polarity

The charging cables are connected to the DC output of the charger with the red cable to the positive bus bar, and the black cable to the negative bus bar. The red cable is terminated into the "+" side of the battery connector, and the black cable is terminated into the "-"side of the connector. The output polarity of the charger must be observed when connecting to the battery (read warning above). Improper connection will open the DC fuses in the power modules.

DANGER: FAILURE TO GROUND THE CHARGER COULD LEAD TO FATAL ELECTRIC SHOCK. Follow local and National Electric Code for ground wire sizing.

## Grounding the Charger

Connect incoming grounding conductor to the ground lug provided on the charger support panel. Torque the Ground wire to 15 in.lbs.This lug is marked as shown:

GND

## DESCRIPTION OF OPERATION

## <u>General</u>

The LIFE**PLUS** MOD3 series of chargers are compatible with batteries at 24, 36, 48 volts or 72, 80 volts, depending on model.

The LIFE**PLUS** MOD3 chargers are microprocessor-controlled. The processor calculates the battery's capacity so that the charging profile can be automatically adapted to the battery's actual state over a wide range of capacities. The charging coefficient is maintained absolutely on all types of batteries. LIFE**PLUS** MOD3 chargers adapt to the battery's capacity and its discharge level.

LIFE**PLUS** MOD3 chargers can easily be set to charge flooded batteries used in cold or freezer storage applications, ionic or opportunity profiles. This battery charger is also designed to charge flooded and sealed lead-acid storage batteries within the range of the cell and amp-hour rating as marked on the nameplate.

## Auto Start Charge

When a battery is connected to the charger, the control board senses the voltage and after a 20 second delay, the charger starts charging the battery automatically.

## **Charging Current**

Charging current is determined by the charger based on battery voltage and its state of charge. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical LCD display will output various charge parameters including the charging current.

## AC Power Fail

If the AC power fails with a battery connected to the charger during a charge cycle, the charger will reset and start a new charge cycle when power is restored. All charger settings as well as the time and date are preserved.

## Series Charging

In series charging, the voltages of both batteries add up and must match charger's nameplate rating. The charger's amp-hour rating must be equal to each of the batteries' amp-hour rating. Charge cycle will not start unless both batteries are connected.

## <u>GLOSSARY</u>

## Battery Boss WC (BBWC™)

This is a compact wireless electronic device that is installed on the battery to provide real-time battery diagnostics. The device monitors the battery parameters such as capacity, temperature, voltage and state of charge, allowing the user to maximize battery performance and life.

## Block Out Time

This function prevents the charger from charging the battery during the block out time window. If a charge cycle has started before the block out window it is inhibited during the block out window and will automatically restart the charge cycle at the end of the block out window.

## Charging Profile

The charging profile defines the rate of current charge over time. The charger adapts to the battery's condition and level of discharge.

## Thin Plate Pure Lead (TPPL)

This is an advanced lead acid battery design used in FLEX batteries. TPPL technology provides longer service life, higher power density, longer shelf life and fast recharge capabilities.

## Flex Bloc Profile

This charging profile allows charging of Flex bloc batteries at rates up to 0.7C.

## Flex Standard Profile

This charging profile allows charging of FLEX 2v cell batteries at rates up to 0.25C.

## Flex Fast Profile

This charging profile allows charging of FLEX 2v cell batteries at rates up to 0.4C.

## Cold Storage

This is a charging profile that allows the configuration of the charger for use with batteries in cold storage application. The profile is an IEI (constant current, constant voltage, constant current) type with a number of user configurable parameters.

## Equalization Charging

Equalization charging is performed after normal charging. It balances the electrolyte densities in the battery's cells.

## Gel Profile

This charging profile is designed to charge Valve Regulated Lead-Acid (VRLA) or Gel batteries.

## Float Charge

A float charge at the end of standard charge is intended to compensate for consumption by the truck electronics that are left on when truck is not being operated.

## Ionic Profile

Also called "ionic mixing", this type of charging profile consists of sending short pulses of current to stimulate gas formation in the active material, causing sulfuric acid to be distributed outside the plates. This system of mixing the electrolyte enables more rapid charging of flooded cell batteries subject to very high demands and balances out differences in density, homogenizing the electrolyte across the surface of the plates.

## **Opportunity Profile**

The OPPOR charge profile is used when opportunity charging is desired. It has a start rate of 25% of the batteries rated amp hour capacity, requires one complete recharge in every 24 hours of service and must have an equalize charge done once a week which is programmed to run automatically.

## **Operation:**

During opportunity charging the user can plug the battery in and charge it during breaks, lunch or any work stoppage time. One time per day the battery must receive a full standard lonic recharge. The charger real time clock must be adjusted and set for this switch in charging profile to occur automatically at a predetermined time. Sufficient time should be scheduled after the full charge to allow the battery to completely cool to ambient temperatures before use.

Note: The user must configure the charger for the time of day that the full recharge is to take place, they must also configure the day of the week that the equalize charge will take place.

### Refresh Charging

Refresh or maintenance charging enables the battery to be maintained at maximum charge all the time that it is connected to the charger. Refresh charge is applied at a predetermined intervals after charge is complete and battery remains connected to charger.

## **ABBREVIATIONS AND ACRONYMS**

AH	Amp-Hour
AWG	American Wire Gauge
AVAIL	Available
BBWC™	Battery Boss Wireless Connection
CEC	California Energy Commission
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt
L-A	Lead Acid
RFI	Radio Frequency Interface

LCD Liquid Crystal Display

LED Light Emitting Diode

TFT Thin Film Transistor

USB Universal Serial Bus

## **OPERATING INSTRUCTIONS**

The LIFE**PLUS** MOD3 series of chargers are compatible with batteries at 24, 36, 48 and 72 or 80 volts (depending on the version supplied).

Battery recognition (voltage, capacity and state of charge) is accomplished automatically by the microprocessor. Several charging profiles are available (Ionic, Gel, Opportunity) based on the configuration chosen by the operator. If the charger is loaded with the Flex firmware then the selectable profiles are Flex Fast and Flex Bloc. Furthermore, equalization and compensation charges are integrated.

The LIFE**PLUS** MOD3 includes an adapter to communicate to a BBWC<sup>™</sup>. The BBWC<sup>™</sup> is an advanced battery module that measures, tracks and stores important battery parameters such as temperature, electrolyte level, voltage and AH throughput. This data is wirelessly transmitted to the LIFE**PLUS** MOD3 to optimize charging, alerts the operator to battery issues and safeguards the battery from being permanently damaged.

## **CONTROL PANEL**

	LIFEPLUS	
5	Main Menu System Setup Enter Password	
	2	

Ref	Function	Description
1.	Graphical TFT LCD Display	Displays charger operation info and Menus
2.	Navigation buttons	Each navigation button corresponds with the rectangle located directly above it
3.	STOP and START button	Stop and restart battery charge
4.	LED indicator	Solid RED, fault indicator
		Blinking RED, charge stopped
		Solid YELLOW, charging
		Solid GREEN, charger idle
		Blinking GREEN, charge complete
5.	USB port	Logs charge data, updates firmware and saves setup parameters

Menu Access

## Idle Screen



When the charger is idle, select Setup, the Main Menu is then displayed. The main menu is automatically exited after 120 seconds of inactivity or can be exited voluntarily by pressing the Close button.

#### Main Menu Display



#### <u>Main Menu</u>

All menus are accessed from Main Menu. The menus that require a password are not displayed until the correct password has been entered.

- 1. Select a menu option using the Up/Down navigation buttons.
- 2. Display the highlighted menu screen by pressing the Select navigation button.
- 3. Return to the main menu by pressing the Close button.
  - System Setup
  - Enter Password

System Setup

#### <u>Date</u>

Sets the date of the charger (MM/DD/YY).

## <u>Time</u>

Sets the time of the charger (24 Hr Clock).

#### **Daylight Savings Time**

Enables or disables automatic clock adjustment for daylight savings time. When enabled, time will move ahead one hour at 02:00 on the second Sunday in March and will move back one hour at 02:00 on the first Sunday of November. The charger must be powered up at the time of the change for it to take effect.

#### <u>Language</u>

Selects the language displayed in the menus.

#### **Displayed Units**

Selects metric (EU) or imperial (US) units for temperature, length and size of DC cables.

#### Energy Saver

Enables or disables energy saver mode. When enabled, if the charger is left in idle mode for 5 minutes, the display backlight and power modules will shut off to save energy.

#### **Display Brightness**

Adjusts the brightness of the display screen.

#### <u>Network</u>

This can only be accessed by entering a password. If you don't know the password then a service technician will need to set this up.

<u>Type: Wired, Wireless:</u> Select network type <u>Charger IP Address:</u> Enter address <u>Subnet Mask:</u> Enter Subnet Mask <u>Gateway Address:</u> Enter Gateway Address <u>Wireless Settings:</u> Set SSID, Security, and Passphrase <u>Modbus:</u> Enable or Disable Modbus <u>Transceiver Address:</u> Enter address

#### Reset History

This can only be accessed by entering a password. If you don't know the password then a service technician will need to clear history.

Select Yes to delete all history or No to exit without deleting history

#### Enter Password

This is where the password is entered to gain access to service level menus by an authorized Hawker service personnel only. Some of the items are accessible by all service personnel,

others are only accessible through a higher level password controlled by the individual dealer's service manager.

- 1. Use the Up/Down buttons to select the correct alphanumeric character.
- 2. Use the Left/Right buttons to move the cursor either left or right.
- 3. Once the correct password is entered press the Select button.

If the correct password is entered, the display will automatically jump to the main menu with the service level menu displayed.

- System Setup
- Enter Password
- Change Password
- USB
- Charge Profile Configuration
- Constant Current Configuration
- Equalize Configuration
- Start Charge Configuration
- Post Charge Configuration
- Charger Configuration

#### Change Password

This can only be accessed by entering the admin password. If you don't know the admin password then you will not be able to change any passwords.

<u>Change Tech Password</u> Use this to change the main password <u>Change Admin Password</u> Use this to change the admin password

#### USB

#### History Data

Enables the storage of charge History Data to a USB data storage device (aka memory stick, thumb drive). To save charge history data:

- 1. Insert the data storage device in the USB port on the front of the charger.
- 2. Go to Setup->USB->History Data.
- 3. Select Filter History Data and set the number of days (30, 60, 90, 180, 360, All) Defaults to all if no filter is selected.
- 4. Select Save Memo History Data to create a file to save History Memo Data. Default filename is the charger serial number. Use the Up/Down buttons to change the alphanumeric character and the Right/Left buttons to move the cursor. When you have entered the desired file name press save.
- 5. Remove data storage device from USB port. The file, in CSV format will be stored in the data storage device.

#### Save Setup Parameters

Enables the storage of the charger Setup Parameters to a USB data storage device (aka memory stick, thumb drive).

#### Load Setup Parameters

Enables the uploading of the charger Setup Parameters from a USB data storage device (aka memory stick, thumb drive).

#### Load Control Firmware

Enables the updating of the charger's internal firmware. Firmware updates will be provided by Hawker.

#### Load Module Firmware

Enables the updating of the power modules' internal firmware. Firmware updates will be provided by Hawker.

#### Charge Profile Configuration

#### Battery Capacity

*Without BBWC:* this adjusts the battery AH capacity used by the charger to determine start and finish rates, and should match the AH capacity of the battery being charged.

With BBWC: the battery AH capacity will be automatically transmitted from the BBWC.

*When running in ionic:* In ionic with Auto Capacity is enabled, the value is not used and it automatically calculates the Ah capacity of the battery. If using ionic and Auto Capacity is disabled the charger will use this for the Ah capacity of the battery.

#### Auto Capacity

Select either Disable or Enable. Only used for ionic. All other profiles are manual all the time and will either use the battery Ah programmed into Battery Capacity or the value the charger reads from the BBWC. When enabled in ionic the charger will automatically adjust to battery Ah sizes within the range it covers. (depending on number of modules installed)

#### **Battery Temperature**

This parameter adjusts the regulation voltages on the charging profile (values between 5° and 149° F (–15° and 65° C).

*Without BBWC:* defines the average operating battery temperature before the charge. It is recommended the average electrolyte temperature be entered, especially in cold areas.

*With BBWC:* the battery operating temperature will be automatically transmitted from the BBWC. The battery temperature will be analyzed during the charge; if it increases too much, the charger will stop to prevent any possible damage.

#### **High Battery Temperature**

Defines a battery temperature safety limit.

#### Without BBWC: not used.

*With BBWC:* If the battery temperature, during the charge, reaches the programmed limit, the charger will stop the charge cycle and wait until the temperature decreases.

#### Restart Temperature

#### Without BBWC: not used.

*With BBWC:* Defines the temperature at which the charge will restart, if the programmed limit is reached, and the charge stops.

## **Charge Profile**

To set the correct profile the charger will need to have the appropriate firmware loaded. If a Flex battery you will need to have firmware FXPLUS-VX.XX or if it's a flooded battery or a Gel you need to have LPM3-VX.XX in the charger. (make sure X.XX is the latest available version if you are updating the charger)

To install firmware follow all steps below. If you have the appropriate firmware installed already skip to step 8.

- 1. Insert flash drive in USB port with appropriate firmware installed.
- 2. Enter password and go to USB menu.
- 3. Select Load Control Firmware.
- 4. Using the down arrow button, select firmware file from the list on screen and hit Select button.
- 5. Firmware will automatically load at this point. Wait until it finishes and splashes the Hawker startup screen before removing the flash drive.
- 6. Reenter password.
- 7. Scroll down to Charge Profile Menu again and select Charge Profile.
- 8. Select Ionic, Opportunity, or Gel. Or if the charger is loaded with the Flex firmware the selectable profiles are Flex Bloc and Flex Fast.

## **Ionic Charge Coefficient**

This is only accessible through high level password If you do have access to this setting make sure you understand what you are doing. If adjusted incorrectly it could eventually damage a battery if not corrected.

This is the amount of overcharge built into the Ionic charge profile to compensate for losses in the battery during recharge. (factory set to 15%, means total of 115%)

## AGV offset

For AGV applications, enter amount of Amps onboard electronics draw during charging. Allowed range is 0 to 20A. Entering 0 disables

#### Constant Current Configuration

Caution: This mode is for use by trained service technicians only. For instructions on use see charger service manual.

#### Equalize Configuration

#### Equalize Davs

Select day or days of the week to equalize the battery. You may select none, or as many days as you need.

#### Equalize Time

Equalize Time of Day: Sets the time of day the Equalize charge will start (24hr clock).

Equalize Delay: Sets the delay between the normal charge and the equalization charge from 0 to 24 hrs.

## Equalize Duration

Sets the equalization time from 00:01 to 23:59. (hh:mm)

Start Charge Configuration

## Charge Delay

Charge Delay Type:

- OFF (no delay)
- Charge Delay Time of Day
- Time After Battery Connect

**Charge Delay On Days:** Selects day or days of the week to delay charge. One or more days may be selected, or none.

**Charge Delay Time of Day:** Charge will not start until the time of day stored in VALUE (24 Hour format) is reached.

**Delay Time After Battery Connection:** Start of charge is delayed by the amount of time stored in VALUE (0 to 24 Hours).

#### Charge Blockout

**Block out Days:** Selects day or days of the week to block out charge. One or more days may be selected, or none.

**Block Out Start Time:** Sets block out start time. **Block Out End Time:** Sets block out end time.

## **Conditional Charge %**

Set conditional charge %. The charger will only charge if the battery has reached the limit of *depth of discharge (DoD)* of more than x%. For example if the user wants to charge the battery only if it is discharged more than 30%, the parameter 30 has to be entered in the conditional charge. The 0 value disables the function.

## **Opportunity Daily Charge**

Start Daily Charge Time: Sets daily charge start time.

End Daily Charge Time: Sets daily charge end time.

#### Post Charge Configuration

## Cool Down ON/OFF

Turns the cool down ON or OFF.

## Cool Down Time

Sets the period of cool down time.

## Float On/Off

Turns Float ON or OFF.

## Float Current

Used for AGV's that have a continuous amp draw for the onboard electronics. Use this feature to avoid a battery being discharged after main charge is completed (values allowed from 3A to 20A).

## Refresh ON/OFF

Sets refresh mode to ON or OFF.

Once charging is complete, as long as the battery remains connected, refresh charging is automatically initiated to retain the battery's charge.

#### Charger Configuration

#### Cabinet Bay Size

This can only be accessed by entering higher level password. Select 3 Bay, 6 Bay, or 12 Bay to match actual cabinet size.

#### Number of Modules

This can only be accessed by entering higher level password. Enter number of modules installed in charger. Limited by the cabinet selected in Cabinet Bay Size.

#### Module Type

This can only be accessed by entering higher level password. Select module type installed in charger. Either 24-36-48 or 72-80.

## 72/80 V Module Battery Voltage

**Charger Out of Service:** Leave this option selected if charging a 24/36/48 V battery. Select 72 V or 80 V if charging a 72 V or 80 V battery.

## DC Cable Setup

**DC Cable Length:** Selects the length of DC cables from the charger to the battery terminals. UL listed chargers require 6 ft minimum.

DC Cable Section: Sets the DC cable gauge. Selections 4, 2, 1/0, 2/0, 3/0, 4/0 AWG.

## Charger Options

Options Selection: Choose Remote Switch/PLC or Battery Status Indicator.

If using one of these charger options, that option must be enabled. Remote Switch and PLC options can't be enabled at the same time.

**I/O Test Inputs:** Push button on remote and circle will turn yellow if operating correctly.

**I/O Test Outputs:** Used to test the functionality of each option. Use the up and down buttons to highlight the correct I/O test. Press the ON button to start the test and the OFF to stop the test.

## **BBWC Communications**

This can only be accessed by entering higher level password.

Select Disable or Enable. When disabled there are no BBWC communications even if the battery has a BBWC.

### **Electrovalve**

Electrovalve Enable/Disable: Enables or disables Electrovalve option.

Electrovalve Duration: Sets the duration the Electrovalve output will be on (0 to 480 seconds) after charge is complete.

## Enter Charger Serial Number

If replacing a HMI/display assembly the charger serial number will need to be added. Used when saving memos for keeping track of data.

## Customer Asset Number

Enter customer asset number. Used when saving memos for keeping track of data.

#### Notice Regarding Cold Profile:

There is not a selectable profile for Cold. This is because the LifePlus MOD3 charger will switch to the Cold profile automatically when using a Battery Boss WC on the battery if the temperature is below 60°F. When not using a Battery Boss WC, the user should program the actual battery temperature in the charger and it will run a Cold profile for the temperature programmed. Regulation voltage is temperature compensated so ideally cold storage applications would use a Battery Boss WC.

## **CHARGING THE BATTERY**

Once the charger is set up by a qualified service person, charging begins when a battery of the proper type, capacity and voltage is connected to the charger. While the charger is in idle mode (No battery connected), the display will show the following information:

## **Charger Idle Display**



Ref	Description
1	Charger Type
2	Firmware Version
3	System Time and Date
4	Connect Battery

## Starting a Charge Cycle

The charger will start automatically when a battery is connected, or by pushing the Stop/Start button if the battery is already connected.

## **Delayed Start**

If the charger was programmed for delayed start, charging will begin following that delay. When the battery is plugged in to the charger, the display shows the time remaining before the programmed charging starts.

## Count Down

## Without a BBWC™

If the BBWC<sup>™</sup> adapter is not enabled or no BBWC<sup>™</sup> are in range, effective charging starts after a 20 second countdown. The charger uses Profile, Capacity and Temperature settings programmed in the Configuration menu.

## With a BBWC™

If a BBWC<sup>™</sup> adapter is present and one or more BBWC<sup>™</sup> is in range, the charger will turn ON and apply current to the battery. The display will show "SCAN" followed by "LINK". This routine determines which BBWC<sup>™</sup> in range is on the battery the charger is connected to. Once the charger makes the determination it downloads data from BBWC<sup>™</sup>, displays the battery S/N, updates the profile, capacity and temperature for charging and starts the main charge.

## How it connects to a *BBWC*<sup>™</sup>

**Scanning** – Scanning for BBWC's. This state is collecting addresses of any BBWC's within the adapter's range. If any addresses are successfully collected, the next state is Syncing (see below). If none were found, the charger will display **"No BBWC's found"** and go straight to a charge cycle without a BBWC present.

**Syncing** – Setting of three specific current values and measuring all BBWC's and running a match algorithm. These steps will be displayed as "**Measure BBWC's - Iteration:** *x*" (*where x is 1, 2, and 3*) signifying each measurement step.

**Enumerating** – If the Syncing state was successful and a match was found, the BBWC will go to the enumerating state where the Battery's Serial Number, Capacity, programmed charge profile, etc. will be loaded on to the charger and the charge cycle will then begin using this data. This information is also displayed on the bottom of the charger display as well. If the syncing state failed, the charger will display "**No matching BBWC's**" and go straight to a charge cycle without a BBWC present.

## CHARGING DISPLAY

A few moments into the effective charge, the display will begin displaying the following charging information:



REF	Description											
4	Charge DC Voltage of battery, alternating with											
I	charge Time, AH, and V/C											
2	Charge DC Current into battery											
3	Battery S/N reported by BBWC™											
4	Battery temperature											
5	Charge time bar graph											
6	Percent of charge bar graph											
7	Programmed battery size in AH											
8	BBWC <sup>™</sup> link indicator											
9	Charge profile											
10	RFI transceiver is communicating with BBWC <sup>™</sup>											

## End of Charge Display

The display background turns green at the end of a normal charge cycle and shows "Charge Complete" at the top, followed by number of Amperes-Hours returned to battery (1) and total charge time (2):



## **Equalization**

An Equalize charge can be added manually or automatically.

## Manual Equalize:

At the end of a normal charge, or during a charge cycle, press the Equalize button. An equalize charge will start after a normal charge cycle is complete. The start of an equalize charge is indicated by the message **Equalize Charge**. During the equalize charge, the charger displays the output current, and alternates between the battery voltage, volt per cell and remaining time of the equalize charge. Once equalize charge is complete, the display background turns green and the displays shows Charge Complete, indicating the battery is available for use. If the battery remains plugged in and Refresh Charge has been enabled, refresh charges will occur to maintain a full charge.

## Automatic Equalize:

If an equalize charge has been programmed in charger Equalize Configuration, an equalize charge will start automatically on the programmed day of the week after normal charge cycle is complete.

Once equalize charge is complete, the display background turns green and the displays shows Charge Complete, indicating the battery is available for use. If the battery remains plugged in and Refresh Charge has been enabled, refresh charges will occur to maintain a full charge.

## CHARGER INFORMATION

Pressing the "Charger" button in idle mode (Connect Battery screen) will display Charger Information as well as reported faults.

#### Charger Serial No.

This number indicates complete information about the specific charger and will match the charger nameplate. It must be supplied with the part number on any correspondence or discussion regarding this charger.

#### Asset No.

Assigned by the customer and programmed at the factory or by an authorized service personnel.

#### **Connects**

Total number of times the charger has been connected to a battery.

#### Complete Equalizes

Total number of equalizes normally terminated.

#### **Complete Charges**

Total number of charges normally terminated.

#### AH Returned

Total number of Amperes-Hours returned by the charger.

## FAULTS

In case of a fault, one of the corresponding fault codes listed below will appear on the display. If it is a critical fault, charging will stop and the red fault LED will be illuminated.

Fault	Cause	Solution
Battery Disconnects While Charging	Occurs when a charging battery is disconnected from the charger without first stopping the charge cycle.	Press the STOP button before disconnecting the battery. Can be reset by connecting a battery to the charger.
Low Battery Voltage	Occurs when the battery is first connected and the voltage is between 1.0 and 1.8 volts/cell.	Can be reset if battery voltage is between 1.8 and 2.4 volts/cell.
High Battery Voltage	Occurs when the battery is first connected and the voltage is above 2.4 volts/cell.	Can be reset if battery voltage is between 1.8 and 2.4 volts/cell.
Charger Cell Size Exceeded	Occurs when the battery cell size does not match the charger nameplate.	Check that the number of battery cells matches the charger nameplate.
Check Battery	Occurs when the battery is overheating.	Allow the battery to cool. Battery may need service. Can be reset by disconnecting the battery from the charger.
Thermal	Occurs when the charger is overheating.	Check that fans are working. Check ambient temperature (between 32° and 113° F (0° and 45° C). Inspect to see if charger ventilation is obstructed or impaired.
Time Limit Before Gassing Exceeded	Occurs when the overall charge cycle time limit in start rate mode is exceeded.	Can be reset by disconnecting the battery from the charger.
Time Limit After Gassing Exceeded	Occurs when the time limit after gassing is exceeded.	Can be reset by disconnecting the battery from the charger.

## Module Status Display

This displays the status of each module installed in the charger. From main menu, press Charger button, then press Modules button. If OK is displayed under the module (shown as Module 1 below), this indicates the module is operating properly. If FAIL is displayed under the module, this indicates a fault. Contact your servicing agent.

wodule Status	1		3	4	5	6
Faults						
Comm Fail	OK	OK				
voitage (v) Current (A)	0.040	0.030			The state	
Output Over Load	OK I	ok l				
Output Over Voltage	OK.	OK I				
Output Fuse	OK					
input Fuseronder v						
DC/DC Fail	OK	ok				
Load Share Imbalance	OK	ok –				
Overtemperature	OK I	ŎŔ				
EEPROM Fail	ОК	OK				
Low Voltage Reading	oK	QK.				
						01
Info						Close

## <u>Info</u>

Displays details about each module installed.

#### Module LED Status

The modules have LED indicators on the front. These can be observed to determine the status of that particular module:

Flashing Green: Module in Standby Solid Green: Module in Use Red: Module Fault No LEDs: Module Fault (assuming not in energy saver mode)

## **MOUNTING DIMENSIONS**

## **<u>3 Bay Mounting Dimensions</u>**









## **6 Bay Wall Mounting Dimensions**





## MAINTENANCE AND SERVICE

## **CAUTION:** THERE ARE DANGEROUS VOLTAGES WITHIN THE BATTERY CHARGER CABINET. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO ADJUST OR SERVICE THIS BATTERY CHARGER.

The charger requires a minimum of maintenance. Connections and terminals should be kept clean and tight. Follow recommended installation and make sure ventilation openings are not blocked.



MODULE FRONT





## Inside View of 3-Bay Cabinet



## Technical Specifications for 208/220/240V:

		AC Input			DC	0	utput	8 hour	Opportunity Capacity Range	Dimensions	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	H x W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	40	100-250	100-160				
LPM3-48C-40G	208/220/240	7.4/7.0/6.4	22.2	3	1/3	18	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	С	54
						24	40	100-250	100-160				
						12	80	100-500	100-320				
LPM3-48C-80G	208/220/240	14.8/14/12.8	22.2	3	2/3	18	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	С	62
						24	80	100-500	100-320				
						12	120	100-750	100-480				
LPM3-48C-120G	208/220/240	22.2/21/19.2	22.2	3	3/3	18	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	С	70
						24	120	100-750	100-480				
						12	40	100-250	100-160				
LPM3C48C-40G	208/220/240	7.4/7.0/6.4	22.2	3	1/3	18	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	С	54
						24	40	100-250	100-160				
						12	80	100-500	100-320				
LPM3C48C-80G	208/220/240	14.8/14/12.8	22.2	3	2/3	18	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	С	62
						24	80	100-500	100-320				
						12	120	100-750	100-480				
LPM3C48C-120G	208/220/240	22.2/21/19.2	22.2	3	3/3	18	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	С	70
						24	120	100-750	100-480				
LPM3-80C-25G	208/220/240	7 7/7 3/6 7	23.1	3	1/3	36	25	100-157	100-100	23.1 x 12.7 x	2/0	C	54
2. 100 000 200	200,220,240	1.111.0/0.1	20.1	5	1/0	40	25	100-157	100-100	14.1	210	Ŭ	
LPM3-80C-50G	208/220/240	15.4/14.6/13.4	23.1	3	2/3	36	50	100-313	100-200	23.1 x 12.7 x	2/0	с	62
				-		40	50	100-313	100-200	14.1		-	

		AC Input			DC	01	utput	8 hour	Opportunity Capacity Range	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (Ibs.)
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)				
L BM3 80C 75C	208/220/240	22 1/21 0/20 1	22.1	2	2/2	36	75	100-469	100-300	23.1 x 12.7 x	2/0	C	70
LF MI3-80C-73G	200/220/240	23.1/21.9/20.1	23.1	5	3/3	40	75	100-469	100-300	14.1	2/0	C	70
LPM3C80C-25G	208/220/240	7.7/7.3/6.7	23.1	3	1/3	36	25	100-157	100-100	23.1 x 12.7 x	2/0	С	54
						40	25	100-157	100-100	14.1			
LPM3C80C-50G	208/220/240	15.4/14.6/13.4	23.1	3	2/3	36	50	100-313	100-200	23.1 x 12.7 x	2/0	с	62
						40	50	100-313	100-200	14.1			-
LPM3C80C-75G	208/220/240	23.1/21.9/20.1	23.1	3	3/3	36	75	100-469	100-300	23.1 x 12.7 x	2/0	С	70
						40	75	100-469	100-300	14.1			
						12	120	100-750	100-480	00.17 y 01 y			
LPM3-48F-120G	208/220/240	22.2/21/19.2	44.4	3	3/6	18	120	100-750	100-480	23.17 X 21 X 13.77	3/0	F	86
						24	120	100-750	100-480				
						12	160	100-1000	100-640				
LPM3-48F-160G	208/220/240	29.6/28/25.6	44.4	3	4/6	18	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						24	160	100-1000	100-640				
						12	200	100-1250	100-800				
LPM3-48F-200G	208/220/240	37/35/32	44.4	3	5/6	18	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						24	200	100-1250	100-800				
						12	240	100-1500	100-960				
LPM3-48F-240G	208/220/240	44.4/42/38.4	44.4	3	6/6	18	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						24	240	100-1500	100-960				
						12	120	100-750	100-480				
LPM3C48F-120G	208/220/240	22.2/21/19.2	44.4	3	3/6	18	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						24	120	100-750	100-480				

		AC Input			DC	O	utput	8 hour	Opportunity Capacity Range	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (Ibs.)
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)				
						12	160	100-1000	100-640				
LPM3C48F-160G	208/220/240	29.6/28/25.6	44.4	3	4/6	18	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						24	160	100-1000	100-640				
						12	200	100-1250	100-800				
LPM3C48F-200G	208/220/240	37/35/32	44.4	3	5/6	18	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						24	200	100-1250	100-800				
						12	240	100-1500	100-960				
LPM3C48F-240G	208/220/240	44.4/42/38.4	44.4	3	6/6	18	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						24	240	100-1500	100-960				
	208/220/240	22 1/21 0/20 1	46.2	2	3/6	36	75	100-469	100-300	23.17 x 21 x	2/0	E	86
LF MI3-801 -736	200/220/240	23.1/21.9/20.1	40.2	5	5/0	40	75	100-469	100-300	13.77	3/0	F	80
L PM3-80E-100G	208/220/240	30 8/20 2/26 8	46.2	3	4/6	36	100	100-625	100-400	23.17 x 21 x	3/0	F	94
EI 100-001 - 1000	200/220/240	50.0/29.2/20.0	40.2	5	4/0	40	100	100-625	100-400	13.77	3/0	1	54
LPM3-80F-125G	208/220/240	38 5/36 5/33 5	46.2	3	5/6	36	125	100-782	100-500	23.17 x 21 x	3/0	F	102
	200/220/240	00.0/00.0/00.0	40.2	5	3/0	40	125	100-782	100-500	13.77	3/0		102
LPM3-80F-150G	208/220/240	46 2/43 8/40 2	46.2	3	6/6	36	150	100-938	100-600	23.17 x 21 x	3/0	F	110
	200/220/240	40.2/40.0/40.2	40.2	Ŭ	6,6	40	150	100-938	100-600	13.77	0,0		110
L PM3C80E-75G	208/220/240	23 1/21 9/20 1	46.2	3	3/6	36	75	100-469	100-300	23.17 x 21 x	3/0	F	86
	200/220/210	20.112110/2011	10.2	Ŭ	0,0	40	75	100-469	100-300	13.77	0,0		00
LPM3C80F-100G	208/220/240	30.8/29.2/26.8	46.2	3	4/6	36	100	100-625	100-400	23.17 x 21 x	3/0	F	94
		2010, 2012, 2010		Ŭ		40	100	100-625	100-400	13.77	0,0		÷.
LPM3C80F-125G	208/220/240	38.5/36.5/33.5	46.2	3	5/6	36	125	100-782	100-500	23.17 x 21 x	3/0	F	102
1.1.100001 1200	200,220,240	22.0,00.0,00.0	10.2	Ŭ	5,5	40	125	100-782	100-500	13.77	0,0	•	102

Madal Number		AC Input			DC	O	utput	8 hour	Opportunity Capacity Range	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (Ibs.)
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)				
	208/220/240	46 2/42 8/40 2	46.0	2	6/6	36	150	100-938	100-600	23.17 x 21 x	2/0	Г	110
LFIVISCOUF-150G	200/220/240	40.2/43.0/40.2	40.2	3	0/0	40	150	100-938	100-600	13.77	3/0	r	110

## Technical Specifications for 440V:

		AC Ir	nput		DC	Οι	utput	8 hour	Opportunity Capacity Range	Dimensions	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	H x W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	70	100-438	100-280				
LPM3-48C-60H	440	5.3	15.9	3	1/3	18	65	100-407	100-260	23.1 x 12.7 x 14.1	2/0	С	54
						24	60	100-375	100-240				
						12	140	100-875	100-560				
LPM3-48C-120H	440	10.6	15.9	3	2/3	18	130	100-813	100-520	23.1 x 12.7 x 14.1	2/0	С	62
						24	120	100-750	100-480				
						12	210	100-1313	100-840				
LPM3-48C-180H	440	15.9	15.9	3	3/3	18	195	100-1219	100-780	23.1 x 12.7 x 14.1	2/0	С	70
						24	180	100-1125	100-720				
						12	70	100-438	100-280				
LPM3C48C-60H	440	5.3	15.9	3	1/3	18	65	100-407	100-260	23.1 x 12.7 x 14.1	2/0	С	54
						24	60	100-375	100-240				

		AC Ir	nput		DC	Οι	ıtput	8 hour	Opportunity Capacity Range	Dimensions	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	H x W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	140	100-875	100-560				
LPM3C48C-120H	440	10.6	15.9	3	2/3	18	130	100-813	100-520	23.1 x 12.7 x 14.1	2/0	С	62
						24	120	100-750	100-480				
						12	210	100-1313	100-840				
LPM3C48C-180H	440	15.9	15.9	3	3/3	18	195	100-1219	100-780	23.1 x 12.7 x 14.1	2/0	С	70
						24	180	100-1125	100-720				
	440	5.0	45.0	2	4/2	36	40	100-250	100-160	23.17 x 21 x	2/0	0	54
LPM3-80C-36H	440	5.3	15.9	3	1/3	40	36	100-225	100-144	13.77	2/0	C	54
	440	10.6	15.0	2	2/2	36	80	100-500	100-320	23.17 x 21 x	2/0	C	62
LFM3-60C-72H	440	10.0	15.9	3	2/3	40	72	100-450	100-288	13.77	2/0	C	02
LPM3-80C-108H	440	15.9	15.9	3	3/3	36	120	100-750	100-480	23.17 x 21 x	2/0	C	70
	0	10.0	10.0	Ű	0/0	40	108	100-675	100-432	13.77	2/0	Ũ	10
LPM3C80C-36H	440	5.3	15.9	3	1/3	36	40	100-250	100-160	23.17 x 21 x	2/0	С	54
				Ŭ		40	36	100-225	100-144	13.77	_, .	-	
LPM3C80C-72H	440	10.6	15.9	3	2/3	36	80	100-500	100-320	23.17 x 21 x	2/0	с	62
						40	72	100-450	100-288	13.77			
LPM3C80C-108H	440	15.9	15.9	3	3/3	36	120	100-750	100-480	23.17 x 21 x	2/0	с	70
						40	108	100-675	100-432	13.77			
						12	210	100-1313	100-840	23 17 v 21 v			
LPM3-48F-180H	440	15.9	31.8	3	3/6	18	195	100-1219	100-780	13.77	3/0	F	86
						24	180	100-1125	100-720				
						12	280	100-1750	100-1120	23 17 x 21 x			
LPM3-48F-240H	440	21.2	31.8	3	4/6	18	260	100-1625	100-1040	13.77	3/0	F	94
						24	240	100-1500	100-960				

		AC II	nput		DC	Οι	ıtput	8 hour	Opportunity Capacity Range	Dimensions	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	H x W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	320	100-2000	100-1280				
LPM3-48F-300H	440	26.5	31.8	3	5/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						24	300	100-1875	100-1200				
						12	320	100-2000	100-1280				
LPM3-48F-320H	440	31.8	31.8	3	6/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						24	320	100-2000	100-1280				
						12	210	100-1313	100-840				
LPM3C48F-180H	440	15.9	31.8	3	3/6	18	195	100-1219	100-780	23.17 x 21 x 13.77	3/0	F	86
						24	180	100-1125	100-720				
						12	280	100-1750	100-1120				
LPM3C48F-240H	440	21.2	31.8	3	4/6	18	260	100-1625	100-1040	23.17 x 21 x 13.77	3/0	F	94
						24	240	100-1500	100-960				
						12	320	100-2000	100-1280				
LPM3C48F-300H	440	26.5	31.8	3	5/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						24	300	100-1875	100-1200				
						12	320	100-2000	100-1280				
LPM3C48F-320H	440	31.8	31.8	3	6/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						24	320	100-2000	100-1280				
	140	45.0	24.0	0	2/6	36	120	100-750	100-480	23.17 x 21 x	2/0	F	00
LPM3-80F-108H	440	15.9	31.8	3	3/6	40	108	100-675	100-432	13.77	3/0	F	80
	140	04.0	24.0		4/6	36	160	100-1000	100-640	23.17 x 21 x	2/0	F	04
	440	21.2	31.8	3	4/0	40	144	100-900	100-576	13.77	3/0	F	94
	440	20 5	24.0	2	E/C	36	200	100-1250	100-800	23.17 x 21 x	2/0	F	100
	440	20.5	31.8	3	0/6	40	180	100-1125	100-720	13.77	3/0	Г	102

		AC Ir	nput		DC Output			8 hour	Opportunity Capacity Range	Dimensions	Charger	Cabinet	Weight	
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	H x W x D (inch)	Cable (AWG)	Туре	(lbs.)	
	110	24.0	24.0	2	6/6	36	240	100-1500	100-960	23.17 x 21 x	2/0	F	110	
LP1013-60F-216H	440	31.0	31.0	3	0/0	40	216	100-1350	100-864	13.77	3/0	Г	110	
	110	15.0	24.0	3	2/6	36	120	100-750	100-480	23.17 x 21 x	2/0	F	96	
	440	15.9	31.0	3	3/6	40	108	100-675	100-432	13.77	3/0	Г	00	
	440	04.0	24.0	0	4/6	36	160	100-1000	100-640	23.17 x 21 x	2/0	F	04	
LPM3C80F-144H	440	21.2	31.8	3	4/6	40	144	100-900	100-576	13.77	3/0	F	94	
	440	00 F	24.0	2	5/0	36	200	100-1250	100-800	23.17 x 21 x	2/0	F	400	
LPM3C80F-180H	440	20.5	31.8	3	5/6	40	180	100-1125	100-720	13.77	3/0	F	102	
		2	0/0	36	240	100-1500	100-960	23.17 x 21 x	2/0	F	110			
LPINI3C80F-216H	440	31.8	31.8	3	6/6	6/6	40	216	100-1350	100-864	13.77	3/0	F	110

## **Technical Specifications for 480V:**

		AC Ir	nput		DC Output			8 hour	Opportunity Capacity Range	Dimensions H x	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	80	100-500	100-320				
LPM3-48C-60Y	480	4.8	14.4	3	1/3	18	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	С	54
						24	60	100-375	100-240				
						12	160	100-1000	100-640				
LPM3-48C-120Y	480	9.6	14.4	3	2/3	18	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	С	62
						24	120	100-750	100-480				
						12	240	100-1500	100-960				
LPM3-48C-180Y 4	480	14.4	14.4	3	3/3	18	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	С	70
						24	180	100-1125	100-720				
						12	80	100-500	100-320				
LPM3C48C-60Y	480	4.8	14.4	3	1/3	18	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	С	54
						24	60	100-375	100-240				
						12	160	100-1000	100-640				
LPM3C48C-120Y	480	9.6	14.4	3	2/3	18	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	С	62
						24	120	100-750	100-480				
			+ +			12	240	100-1500	100-960				
LPM3C48C-180Y	480	14.4	14.4	3	3/3	18	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	С	70
						24	180	100-1125	100-720				
L PM3-80C-36V	480	4.8	14.4	3	1/3	36	40	100-250	100-160	23.17 x 21 x	2/0	C	54
	400	4.0	14.4	5	1/5	40	36	100-225	100-144	13.77	2/0	C	- 54

		AC Ir	nput		DC	DC Output			Opportunity Capacity Range	Dimensions H x	Charger	Cabinet	Weight
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(lbs.)
	490	0.6	14.4	2	2/2	36	80	100-500	100-320	23.17 x 21 x	2/0	C	62
EI 103-000-721	400	9.0	14.4	5	2/5	40	72	100-450	100-288	13.77	2/0	0	
LPM3-80C-108Y	480	14.4	14.4	3	3/3	36	120	100-750	100-480	23.17 x 21 x	2/0	C	70
EI 103-00C-1001	400	14.4	14.4	5	3/3	40	108	100-675	100-432	13.77	2/0	C	70
	480	4.8	14.4	3	1/3	36	40	100-250	100-160	23.17 x 21 x	2/0	C	54
EI 1030000-301	400	4.0	14.4	5	1/3	40	36	100-225	100-144	13.77	2/0	0	
	480	9.6	14.4	3	2/3	36	80	100-500	100-320	23.17 x 21 x 13.77	2/0	C	62
EI 1030000-721	400	9.0	14.4	5	2/5	40	72	100-450	100-288		2/0	Ű	02
	490	14.4	14.4	2	2/2	36	120	100-750	100-480	23.17 x 21 x 13.77	2/0	C	70
EF103C80C-1081	400	14.4	14.4	5	3/3	40	108	100-675	100-432			0	70
						12	240	100-1500	100-960				
LPM3-48F-180Y	480	14.4	28.8	3	3/6	18	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
						24	180	100-1125	100-720				
						12	320	100-2000	100-1280				
LPM3-48F-240Y	480	19.2	28.8	3	4/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94
						24	240	100-1500	100-960				
						12	320	100-2000	100-1280				
LPM3-48F-300Y	480	24	28.8	3	5/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						24	300	100-1875	100-1200				
						12	320	100-2000	100-1280				
LPM3-48F-320Y	480	28.8	28.8	3	6/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						24	320	100-2000	100-1280				

		AC Ir	nput		DC	DC Output			Opportunity Capacity Range Dimensions H x		Charger	Cabinet	Weight			
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(lbs.)			
						12	240	100-1500	100-960							
LPM3C48F-180Y	480	14.4	28.8	3	3/6	18	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86			
						24	180	100-1125	100-720							
						12	320	100-2000	100-1280							
LPM3C48F-240Y	480	19.2	28.8	3	4/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94			
						24	240	100-1500	100-960							
						12	320	100-2000	100-1280	23.17 x 21 x 13.77						
LPM3C48F-300Y	LPM3C48F-300Y 480	24	28.8	3	5/6	18	320	100-2000	100-1280		3/0	F	102			
						24	300	100-1875	100-1200							
						12	320	100-2000	100-1280							
LPM3C48F-320Y	480	28.8 28.8	3	6/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110				
						24	320	100-2000	100-1280							
LDM2 90E 109V	490	14.4	20.0	2	2/6	36	120	100-750	100-480	23.17 x 21 x	2/0	F	96			
LFIM3-00F-1001	400	14.4	20.0	3	3/0	40	108	100-675	100-432	13.77	3/0	Г	ØØ			
	480	10.2	28.8	2	1/6	36	160	100-1000	100-640	23.17 x 21 x	3/0	-	04			
LF 1013-001 - 144 1	400	19.2	20.0	5	4/0	40	144	100-900	100-576	13.77	5/0	ſ	54			
1 DM2 90E 190V	490	24	20.0	2	E/G	36	200	100-1250	100-800	23.17 x 21 x	2/0	F	102			
EF 103-001 - 1001	400	24	20.0	5	5/0	40	180	100-1125	100-720	13.77	5/0	ſ	102			
LPM3-80E-216V	480	28.8	28.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x	3/0	F	110			
EI 1013-001 -2101	400	20.0	20.0	5	0/0	40	216	100-1350	100-864	13.77	3/0	1	110			
	480	14.4	28.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x	3/0	F	86			
	400	14.4	20.0	5	5/0	40	108	100-675	100-432	13.77	3/0		00			
	480	10.2	28.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x	3/0	F	94			
	-00	10.2	20.0	J	0,1	40	144	100-900	100-576	13.77	5,6		57			

AC Input		DC	DC Output			Opportunity Capacity Range	portunity apacity Range Dimensions H x	Charger	Cabinet	Weight			
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(Ibs.)
	490	24	20.0	2	5/0	36	200	100-1250	100-800	23.17 x 21 x	2/0	F	102
	400	24	20.0	3	5/6	40	180	100-1125	100-720	13.77	3/0	Г	102
	400	20.0	20.0	2	6/6	36	240	100-1500	100-960	23.17 x 21 x	2/0	F	110
	400	20.0	20.0	3	0/0	40	216	100-1350	100-864	13.77	3/0	1.	110

## **Technical Specifications for 600V:**

AC Input		DC Output			8 hour	Opportunity Capacity Range	y Dimensions H x	Charger	Cabinet	Weight			
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	80	100-500	100-320				
LPM3-48C-60C	600	3.8	11.4	3	1/3	18	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	С	54
						24	60	100-375	100-240				
						12	160	100-1000	100-640				
LPM3-48C-120C	600	7.6	11.4	3	2/3	18	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	С	62
						24	120	100-750	100-480				
						12	240	100-1500	100-960				
LPM3-48C-180C	600	11.4	11.4	3	3/3	18	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	С	70
						24	180	100-1125	100-720				
						12	240	100-1500	100-960				
LPM3-48F-180C	600	11.4	22.8	3	3/6	18	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
						24	180	100-1125	100-720				

		AC In	put		DC Output		8 hour	Opportunity Capacity Range	Dimensions H x	Charger	Cabinet	Weight	
Model Number	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	Capacity Range (Ah)	(AH)	W x D (inch)	Cable (AWG)	Туре	(lbs.)
						12	320	100-2000	100-1280				
LPM3-48F-240C	600	15.2	22.8	3	4/6	18	320	100-2000	100-1280	23.17 x 21 x 13 77	3/0	F	94
						24	240	100-1500	100-960				
						12	320	100-2000	100-1280				
LPM3-48F-300C	600	19	22.8	3	5/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						24	300	100-1875	100-1200				
						12	320	100-2000	100-1280				
LPM3-48F-320C 600	600	22.8	22.8	3	6/6	18	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						24	320	100-2000	100-1280				
LDM2 80C 108C	600	2.0	11.4	2	1/2	36	40	100-250	100-160	23.17 x 21 x 13.77	2/0	0	E 4
LP1013-60C-106C	600	3.0	11.4	3	1/3	40	36	100-225	100-144			C	54
LDM2 80C 144C	600	7.6	11.4	2	2/2	36	80	100-500	100-320	23.17 x 21 x	2/0	0	60
LPIM3-80C-144C	600	7.0	11.4	3	2/3	40	72	100-450	100-288	13.77	2/0	J	02
L DM2 80C 180C	600	11 4	11 /	2	2/2	36	120	100-750	100-480	23.17 x 21 x	2/0	C	70
LFINI3-00C-100C	000	11.4	11.4	5	3/3	40	108	100-675	100-432	13.77	2/0	0	70
L DM3 80E 108C	600	11 /	22.8	2	3/6	36	120	100-750	100-480	23.17 x 21 x	2/0	F	86
LFIM3-60F-106C	000	11.4	22.0	5	3/0	40	108	100-675	100-432	13.77	3/0	Г	00
LDM2 80E 144C	600	15.0	22.0	2	1/6	36	160	100-1000	100-640	23.17 x 21 x	2/0	F	04
LPIM3-60F-144C	600	15.2	22.0	3	4/0	40	144	100-900	100-576	13.77	3/0	F	94
	600	10	22.6	2	5/6	36	200	100-1250	100-800	23.17 x 21 x	3/0	F	102
	000	19	22.0	3	5/0	40	180	100-1125	100-720	13.77	3/0	1-	
LPM3-80F-216C	600	22.8	22.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x	3/0	F	110
LI WI3-001-2100	000	600 22.8	22.8	5	0/0	40	216	100-1350	100-864	13.77	3/0	F	110

## MAINTENANCE LOG

1. Modifications to Factory Settings

Date	Variable	Change	Service Technician

#### 2. Service

Date	Description	Service Technician



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