CHARGING SOLUTIONS

LIFEPLUS® MOD3

HAWKER LIFEPLUS® MOD3 LP3 BATTERY CHARGER

OWNER'S MANUAL

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

Skip to page 33 For Models: LPM3 (Standard and HAWKER FLEX® Charger), LPM3C (CEC), and LPL3

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INTRODUCTION

The information contained in this document is critical for safe handling and proper use of the HAWKER LIFEPLUS® MOD3 chargers. It contains a global system specification as well as related safety measures, codes of behavior, a guideline for commissioning, and recommended maintenance. This document must be retained and available for users working with and responsible for the charger. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the charger before operating the charger and the equipment into which it is installed.

It is the owner's responsibility to ensure the use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the industrial truck or HAWKER LIFEPLUS® MOD3 chargers that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the charger system.

Refer to the abbreviations and terms at the end of this document.

For service, contact your sales representative or call:
1-877-7HAWKER (USA and Canada)
www.hawkerpowersource.com

Your Safety and the Safety of others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow instructions.

FEATURES & INFORMATION

Features

- Microprocessor-controlled
- Able to auto-identify battery's capacity
- Able to adapt to State of Charge (SoC) in IONIC™ charge profile
- Compatible with battery voltages of 24, 36, 48, 60, 64, 72 and 80
- Wireless integration with HAWKER® BBWC battery monitoring devices
- Individual battery pack recognition and automatic pairing with the charger
- Unique profile for charging Thin Plate Pure Lead (TPPL)
- Unique IONIC™ charge profile for flooded (patented)
- Unique profiles for HAWKER® battery charge applications
- Remote access via HAWKER® MOD-ifi™ smart device app to change settings, monitor charger and share data
- Controller Area Network (CAN) communication capable
- Fully programmable to unique fleet requirements
- Battery chemistry agnostic: lithium-ion (Li-ion), TPPL, Flooded Lead-Acid

Technical Information

Main Nameplates (UL model number) vs. Configured Ratings (Part number) labels

There are two nameplates located on the outside of the charger. 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.**

The part number is required in any discussion or correspondence regarding this unit.

Figures 1 & 2: Nameplate labels

Figure 1

Figure 2

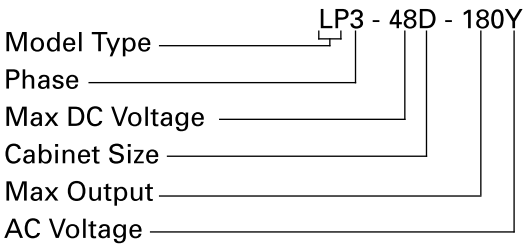
Technical Information (cont.)

Nameplate Label Definitions

Item	Description
UL Model Number	UL-recognized number that indicates the ratings of the cabinet at its full capacity
Serial Number	Provides date code
Battery Type	L-A: Lead-Acid; Li-ion: lithium-ion
Max Ah	Maximum amp-hours capacity of this cabinet
No. Cells	Number of battery cells this unit will charge. **Any battery connected to the charger output should have the same number of cells**
Max Modules	Maximum number of modules the cabinet can hold
Hertz	AC input voltage frequency. **Under no conditions operate the charger at a different frequency or from a generator with unstable frequency**
Phase	Number "3" indicates a three-phase charger and number "1" indicates a single-phase charger
AC Volts	Nominal voltage for which this charger is rated to operate
Max AC Amps	Maximum AC amps for which this cabinet is rated
Max DC Amps	Maximum output DC amps for which this charger is rated
DC Volts	Nominal DC output voltage of the charger
Part Number	Indicates the complete information about the charger
Ah	Largest Ampere-hour (Ah) capacity of the battery this charger is designed to charge efficiently as configured
Modules	Actual number of power modules installed in the charger cabinet
AC Amps	AC current drawn by the charger with the number of power modules shown in Configured Ratings nameplate
DC Amps	DC current that this charger will deliver to a discharged battery with the number of power modules installed
CEC	Logo is applied to chargers that are certified with the California Energy Commission in compliance with Appliance Efficiency Regulations
cULus	Logo is applied to chargers that have been tested to applicable standards and requirements by Underwriter Laboratories (UL) and the Canadian Standards Association (CSA)

Part Number Decoder

Single Display Cabinet



Technical Information (cont.)

Cabinet Size (number of modules available) and DC Cable Size

Letter Code	Module Positions	Standard Cable Gauge	Comments
B	2	1/0	Two slot, 3.5 kW cabinet
D	4	3/0	Four slot, 3.5 kW cabinet
F	6	3/0	Six slot, 3.5 kW cabinet
H	8	3/0	Eight slot, 3.5 kW cabinet

AC Line Voltage

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

Suffix	Description
R	Remote control capable (order remote control separately)
F	Red/Green Next Battery Capable – USED in conjunction with BSI and BSS
V	PLC capable
E	LAN (Ethernet Compatible)

CABLES
Extra length charging leads (10’ standard w/charger)

Suffix	Cable Length
1	15 ft. charging lead
2	20 ft. charging lead
3	25 ft. charging lead
4	30 ft. charging lead

NOTES:
- AC input voltage + 10%
- Frequency Hz 50/60
- Battery Cable Length: 10 ft standard – optional 15, 20, 25, 30 ft.
- IP Protection IP20
- Operating Temperature 32 to 113°F
- Display – TFT LCD

Technical Information (cont.)

Charger Profile

Charger Profile	Description
Cold	IEI (constant current, constant voltage, constant current) type with several user-configurable parameters specifically designed for cold storage applications.
Gel	IEI (constant current, constant voltage, constant current) charging profile designed for gelled electrolyte type sealed lead-acid batteries.
IONIC™	The IONIC™ charge profile diagnoses the battery status throughout the recharge phase and adjusts its parameters to optimize the charge of flooded battery technology. Short current pulses injected during charge stimulate gas formation in the active material, allowing for a better density distribution of sulfuric acid (homogenization) across the surface of the plates. Being performed during the regular charge, this sophisticated form of equalization improves charge efficiency in terms of charge time reduction and heat generation.
Flex Li3	When a HAWKER FLEX® Li3 battery is connected, the CAN communication between the battery and charger is established and the message "BMS CONNECTED" will be displayed on the screen. The battery BMS will control the charge current and voltage through the CAN.
OPP	Designed for opportunity charging operations. It includes a start rate of up to 25% C6 and an equalize charge performed once a week. The weekly equalize charge can be programmed to run automatically.
FXBLOC	Designed for HAWKER FLEX® TPPL bloc batteries at 0.2 to 0.7 C6 charging rates.
FXSTND	Designed for HAWKER FLEX® 2V batteries at 0.2 to 0.25 C6 charging rates.
FXFAST	Designed for HAWKER FLEX® 2V batteries at 0.26 to 0.40 C6 charging rates.
FLEX® Elite	This charging profile allows charging of HAWKER FLEX® Elite bloc batteries at rates of 0.2 to 0.7 C6.

(*) Opportunity Profile Options
Operation: In Opportunity charging mode, the user can charge the battery during breaks, lunch, or any available time during the work schedule. The Opportunity charge profile allows the battery to be safely charged while it is kept in a partial state of charge between 20% and 80% of C6 throughout the work week. Sufficient time should be scheduled after the weekly equalize charge to allow battery cooling and to perform periodical electrolyte level checks.

Daily Charge: This option can be set to add additional daily charging time if the work schedule allows. Recommended to be used any time OPP profile is selected.

Equalization Charging
Equalization charging for traditional flooded lead-acid batteries, performed after normal charging, balances the electrolyte densities in the battery's cells.

Block-out Time
This function inhibits 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.

Refresh Charging
Refresh or maintenance charging enables the charger to maintain the battery at a maximum state of charge as long as it is attached to the charger.

Technical Information (cont.)

Specialty Charger Option List

Suffix	Description
C6	6 ft of AC cord
C10	10 Ft of AC cord
C12	12 Ft of AC cord
C18	18 Ft of AC cord
L10*	10 Ft of DC cable
L13	13 Ft of DC cable
L15*	15 Ft of DC cable
L18	18 Ft of DC cable
L20*	20 Ft of DC cable
L25	25 Ft of DC cable
L30	30 Ft of DC cable
PLC	Programmable Logic Controller
R	Remote ready
IR	Remote Installed
LM2	Late Break/Early Make
CAN	Controller Area Network
Ethernet	Network Connection

*L10, L15 and L20 cable lengths are the only available options for lithium chargers as well as standard.

Serial Number
This number indicates complete information about the specific charger. It must be supplied with the part number in any correspondence or discussion regarding this charger.

Battery Type
The chemical content construction of the battery this unit is designed to charge is given in this part of the nameplate. (L-A = Lead-Acid)

Max Ah
This is the maximum amp-hour capacity of this cabinet.

No. Cells
This is the number of battery cells this unit will charge. **This number must match exactly with any battery connected to the charger output.**

Max Modules
This is the maximum number of modules the cabinet can hold.

⚠ WARNING THE NUMBER OF MODULES MUST MATCH THE NUMBER OF "CONFIG MODULES" ON THE NAMEPLATE. DO NOT ADD MORE MODULES IN THE FIELD. CONSULT THE MANUFACTURER IF MORE MODULES ARE NEEDED.

Config Modules
This is the number of modules for which this cabinet is configured.

Hertz
This gives the frequency in cycles per second of the AC input voltage. Under no conditions operate the charger at a different frequency or from a generator with unstable frequency.

Technical Information (cont.)

Phase
Number “3” indicates a three-phase charger and “1” indicates a single-phase charger.

AC Volts
This is the nominal voltage for which this charger is rated. The charger will only operate on this voltage.

Config AC Amps
This is the AC amps for which this charger is configured.

Max AC Amps
This is the maximum AC amps for which this cabinet is rated.

Max DC Amps
This is the maximum output DC amps for which this charger is rated.

DC Volts
This gives the nominal DC output voltage of the charger.

Config DC Amps
This is the output DC amps this charger is configured to deliver to a battery that is over 20% discharged.

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

BC

cULus
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):

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SAFETY & INSTALLATION

Safety

Important Safety Instructions

- **⚠ WARNING** The shipping pallet must be removed for proper and safe operations.
- 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.
- Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
- Do not touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
- During charge, lead-acid 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.
- Unless the charger is equipped with LM2 (Late Break/Early Make) feature, **do no**t connect or disconnect the battery plug while the charger is on. 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.
- Only factory-qualified personnel should install, set up, and service this equipment. De-energize all AC and DC power connections before servicing the charger.
- The charger is not for outdoor use.
- **Do not** expose the charger to moisture. Operating conditions should be 32°F (0°C) to 113°F (45°C); 0 to 70% relative humidity.
- **Do not** operate the charger if it has been dropped, received a sharp impact, or otherwise damaged in any way.
- For continued protection and to reduce the risk of fire, install chargers on a non-combustible surface.
- For HAWKER FLEX® Li3 batteries, use only HAWKER® battery packs that include the battery management system and all necessary protection for the battery pack integral to the pack.
- The DC cables of the charger emit low-power magnetic fields in their surroundings (<5cm). People with medical implant devices should avoid being near chargers while charging.

Installation

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

Location

For maximum safe operation, choose a location that is free of excess moisture, dust, combustible material, and corrosive fumes. Avoid locations where temperatures are high or where liquids will drip on the charger. Do not obstruct the ventilation openings or the space under the charger. Follow the charger warning label when mounting on or over a combustible surface.

Cabinet Mounting

The charger must be mounted on a wall, stand, shelf, or floor in a vertical position. The minimum distance between two chargers must be 12 inches. The charger will be installed with four 5/16-inch bolts or with the bracket supplied. See the Mounting Dimensions section at the end of this manual for the proper bolt pattern. The charger should be permanently fastened in place.
For shelf mounting, part number 159-6LA22723 is required – two per charger.
NOTE: Ambient temperature at all levels cannot exceed 113° F (45° C).

Electrical Connections

To prevent failure of the charger, make sure it is connected to the correct line voltage.
Follow your local and National Electric Code (NEC) in making these connections.

⚠ 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.

Installation (cont.)

Connecting Input Power
Connect the input power to the appropriate terminals and apply the appropriate torque as follows:

Phase	Power (kW)	Cabinet (Bay)	Terminals			Torque (in-lbs)
3	2.5/3.5	4 and 6	L1	L2	L3	15
3	2.5/3.5	8	L1	L2	L3	25

Connecting Input Power (cont.)
- Three-phase chargers are not phase rotation sensitive and work with a grounded Delta or Wye electrical service configuration.

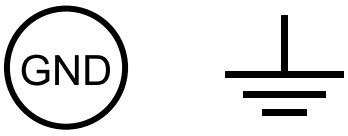
AC Circuit Protection
- The user must provide suitable branch circuit protection and a disconnect method from the AC power supply to the charger to allow for safe servicing.

⚠ CAUTION Risk of Fire. Use only on circuits provided with branch circuit protection in accordance with the Breaker/Fuse Chart table in this manual, and the National Electrical Code, NFPA 70.

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

AC Amps (A)	Breaker Fuse Size (A)
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

Grounding the Charger
- Connect the ground wire to the terminal marked with either of the two symbols below and apply same torque value per the table in section 4.4.1.



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

DC Connector Polarity
- DC plug polarity.
- The charging cables are connected to the DC output of the charger: The red charging cable (POS) is connected to the positive busbar of the charger, and the black charging cable (NEG) is connected to the negative busbar of the charger. The output polarity of the charger must be observed when connecting to the battery. An improper connection will open the DC fuses in the power modules.

Glossary

Battery Boss™ WC (BBWC) Device
This unit, permanently mounted on the battery, ensures that certain battery parameters can be sent to the charger for the purposes of optimizing the charge and monitoring the charging and discharging characteristics.

Block-Out Time
This function inhibits 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 charge current over time. The charger adapts to the battery's age and level of discharge. Controlling the overcharge coefficient, whatever the battery's discharge level, reduces the amount of electricity consumed.

Thin Plate Pure Lead (TPPL)
This is an advanced lead-acid battery design used in HAWKER® batteries. TPPL technology provides longer service life, higher power density, longer shelf life, and fast recharge capabilities.

FXBLOC Charging Profile
This charging profile allows the charging of HAWKER FLEX® bloc batteries.

FXSTD Charging Profile
This charging profile allows the charging of HAWKER FLEX® 2V batteries at rates of 0.20 to 0.25 C6.

FXFAST Charging Profile
This charging profile allows the charging of HAWKER FLEX® 2V batteries at rates of 0.26 to 0.40 C6.

Cold Storage Charging Profile
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.

HAWKER FLEX® Li3 Charging Profile
Designed for HAWKER FLEX® Li3 batteries. It uses CAN communication to allow the batteries onboard BMS to control the entire charging process.

HAWKER FLEX® Elite Charging Profile
Similar to the CAN communications in the lithium profile but designed to charge HAWKER FLEX® Elite TPPL batteries.

Equalization Charging
Equalization charging, performed after normal charging, balances the electrolyte densities in the battery's cells.

Gel Profile
This charging profile is an IEI (constant current, constant voltage, constant current) charging profile designed for gelled electrolyte type sealed lead-acid batteries.

IONIC™ Charging Profile
This charging profile sends 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. It is intended to be used with flooded lead acid batteries.

Opportunity Charging Profile
The OPP charging 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.

TERMS AND ABBREVIATIONS

Description of Operation

General
HAWKER LIFEPLUS® 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. HAWKER LIFEPLUS® MOD3 chargers adapt to the battery's capacity and its discharge level.
HAWKER LIFEPLUS® MOD3 chargers are set to charge batteries within the range of the cell and Ampere-hour rating marked on the nameplate.

Starting the Charge Cycle
When a battery is connected to the charger, the control board senses the voltage and after a short delay, the charger starts charging the battery.

Charging Current
The charging current is determined by the battery voltage and state of the charge condition. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical display will output various charge parameters including the percentage of battery capacity.

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 the charger's nameplate DC volt rating. The charger's amp-hour rating must be equal to each battery's Ampere-hour rating. The charge cycle will not start unless both batteries are connected.

Terms and Abbreviations

Term/ Abbreviation	Explanation/Description
AGM	Absorbed Glass Mat
AGV	Auto Guided Vehicle
Ah	Amp-Hour
AWG	American Wire Gauge
AVAIL	Available
CEC	California Energy Commission
dBm	Decibel-milliwatts
DF#	Fault Number
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt

Term/ Abbreviation	Explanation/Description
MAC	Media Access Control
MANU	Manual
mVpc	Millivolts Per Cell
NEMA	National Electronics Manufacturers Association
SoC	State of Charge
TH	Thermal Fault
TH-Amb	Thermal - Ambient Temperature Faults
TFT	Thin Film Transistor
TPPL	Thin Plate Pure Lead

Operating Instructions

The HAWKER LIFEPLUS® MOD3 charger series is compatible with batteries of 24, 36, 48, 60, 64, 72, and 80 volts (depending on the version supplied). Battery recognition (voltage, capacity, and state of charge) is accomplished automatically by the microprocessor. Charging profiles are Gel, IONIC™, OPP, Cold, FXSTND, FXFAST, FXBLOC, FLEX Li3, and FLEX® Elite. Furthermore, equalization charges are integrated.

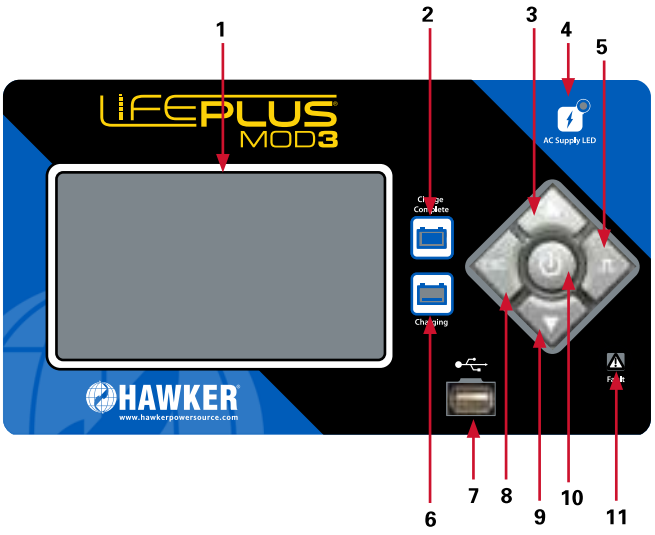
Ref	Function	Description
1	Graphical Thin Film Transistor (TFT) display	Display charger operation info/menus
2	GREEN charge complete indicator	OFF = charger off or battery not available Flashing = cooling phase ON = battery ready and available
3	Navigate UP button	Navigate menus/change values
4	BLUE AC supply indicator	OFF = AC missing ON = AC present
5	Navigate right/ equalize button	Scroll right/Start equalize or desulfation
6	YELLOW charging indicator	OFF = charger off or battery not available ON = charging in progress
7	USB port	Download memos/upload software
8	Navigate left/ESC button	Enter main menu/scroll left/ exit menus
9	Navigate DOWN button	Navigate menus/change values
10	Enter/stop and start button	Select menu items/enter values/stop and restart battery charge
11	RED fault indicator	OFF = no fault Flashing = ongoing fault detected ON = fault

Charge Operation

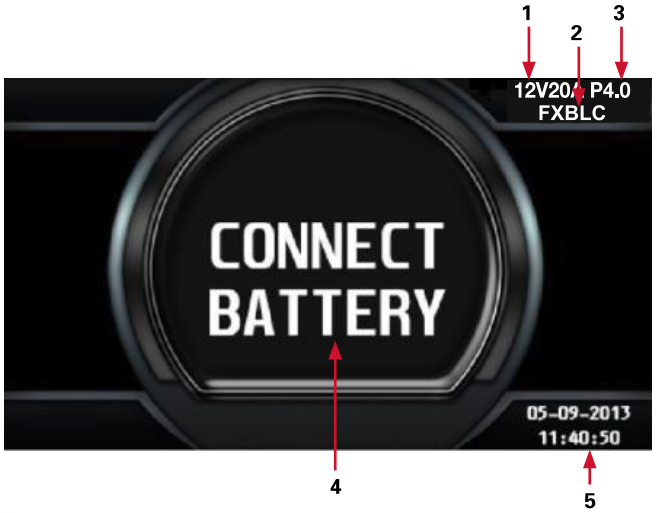
Charger idle display: With the charger in wait mode (no battery connected) and without pressing the enter/stop and start button, the display will show the following information:

Reference	Description
1	Charger DC Voltage
2	Selected Charge Profile
3	Firmware Version
4	Connect Battery
5	System Time and Date

The HAWKER LIFEPLUS® MOD3 charger includes an adapter to communicate with a BBWC device. The BBWC device is an advanced battery module that measures, tracks, and stores important battery parameters such as temperature, electrolyte level, voltage, and Ah. This data is wirelessly transmitted to the HAWKER LIFEPLUS® MOD3 charger to optimize charging, alert the operator to battery issues, and safeguard the battery from being permanently damaged.



Control Panel Features



Operating Instructions (cont.)

Charge Operation (cont.)

- **Connect battery:** Make sure the charger connector(s) match(es) the battery connector(s). Plug the charger connector(s) to the battery connector(s). For chargers with dual connectors, both connectors must be connected in order to start a charge.
- HAWKER FLEX® Li3 batteries come with a specific type of connector. The HAWKER LIFEPLUS® MOD3 charger comes with one or two connectors (Li-ion Connector) depending on the charger model. When the charger is equipped with two connectors, both connectors must be connected, otherwise the charge cycle will not start. Always connect connector 1 first. All HAWKER LIFEPLUS® MOD3 charger connectors are equipped with an arcless option called Late Make Early Break to prevent arcing if the battery is disconnected while charging.
- When CAN communication is established between the HAWKER FLEX® Li3 battery and HAWKER LIFEPLUS® MOD3 charger, "BMS CONNECTED" will appear on the display screen. If the text "BMS CONNECTED" is NOT shown, the charge cycle will not start. Check CAN wiring and battery.

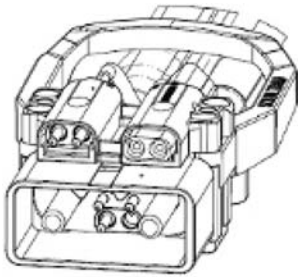


Figure 3

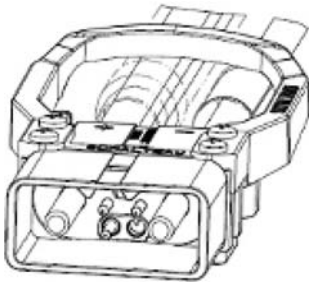


Figure 4

Figures 3 & 4: Connectors for HAWKER FLEX® Li3 Batteries

Start Charging

When a battery is connected to the charger, the control board senses the voltage and after a short delay, the charger starts charging the battery automatically if autostart is set to ON. Push the enter/stop and start button if the battery is already connected. When charging a HAWKER FLEX® Li3 battery, the CAN communication between the battery and charger is established and the message "BMS CONNECTED" will be displayed on the screen. After a few seconds, the battery will close the charge contactor to initiate the charge. The charger will start the countdown process and will start displaying the charge information.

Delayed Start: If the charger was programmed for a delayed start, charging will begin following that delay. When the battery is plugged into the charger, the display shows the time remaining before the programmed charging starts. **Figure 5.**

Figure 5

Without a BBWC Device: If the BBWC device adapter is not enabled or no BBWC devices are in range, effective charging starts after the programmed delay. The charger uses Profile, Capacity and Temperature settings programmed in the Configuration menu.

PAIRING with a BBWC Device: If one or more BBWC device adapters are in range, the charger will turn on and apply current to the battery. The display will show "SCAN" followed by "IQLINK". This routine determines which BBWC device in range is connected to the battery charger. Once the charger makes the determination, it downloads data from BBWC device, displays the battery S/N, updates the profile capacity, and temperature for charging, and starts the main charge.

Operating Instructions

Reference	Description
1	Charge time
2	Charge current
3	Percent of charge
4	BBWC device warnings
5	USB connection
6	Charge voltage (total V and V/c), alternates with Ah returned
7	Battery temperature, alternates with battery capacity
8	Battery S/N from BBWC battery monitoring device Li-ion only: Max current and voltage requested by BMS
9	BBWC device link

Charging current (2) is determined by the battery voltage and state of the charge condition. Charging current declines automatically as battery voltage rises during the charge. As the battery charges, the graphical display will output various charge parameters including the percentage of battery capacity (6).

When charging a HAWKER FLEX® Li3 battery, the battery BMS controls the charge current and voltage. During the charge cycle, the BMS through the CAN will send information to the charger to start, stop and output the desired current and voltage. If the CAN is lost during the charge cycle, the charger will stop the charge and show the off-charge display without the message "BMS CONNECTED".

Stop Charging
The charging can be paused and restarted where it left off at any time. Just hit the center power button (marked as number 10 in the Control Panel Features image on page 16) Remote is available for controlling at a distance.

Charge complete
Figure 6: End of charge display

End of charge without equalization
- The green complete LED comes on after the proper end of charge. The green complete LED is on and the display shows CHARGE COMPLETE. The display alternates between:
  - Total charging time
  - Amp-hours restored to the battery
- Any other lit LED indicates a problem during charging. Please refer to Troubleshooting section on pg 30 for more information.

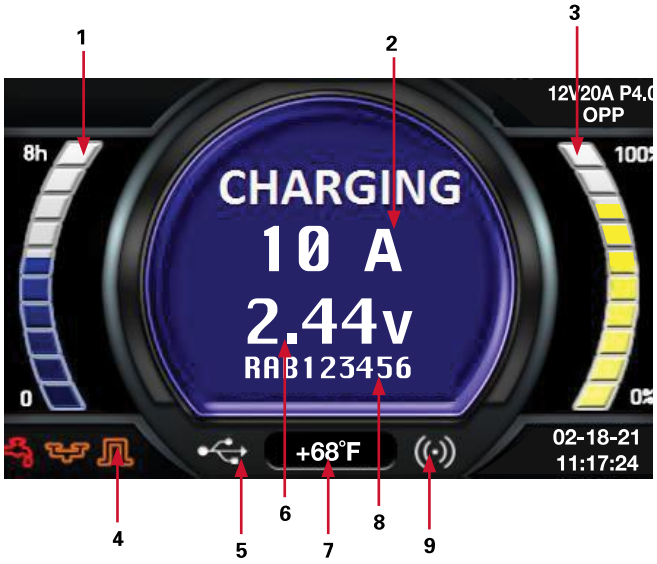


Figure 6

- If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge.
- The battery is now ready for use. Push the ON/OFF button before unplugging the battery.

End of charge with equalization
An Equalize charge can be started manually or automatically.

Manual equalization start
- At the end of the charge (green LED on or flashing), press the <EQUALIZE> button. The equalize button can also be pressed at any time during the charge, and an equalize charge will be started after charging is complete.
- The start of the equalization charge is indicated by the symbol. During the equalization charge, the charger displays the output current and alternates, the battery voltage and voltage per cell, and the remaining time.

NOTE: When an Equalize charge is manually started, the output will be set automatically.

Operating Instructions (cont.)

Automatic equalization start

- If an equalization day has been programmed in Charger configurations, the equalization charge will start automatically on the programmed day of the week after charging is complete.
- After the equalization, the battery will be available when the green LED comes back on and the display shows AVAIL. The battery is now ready for use. If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

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 the charger's nameplate DC Volts rating. The charger's amp-hour rating must be equal to each battery's Ampere-hour rating. The charge cycle will not start unless both batteries are connected.

Menu Access

Main Menu Display

When the charger is idle, press and hold the ESC button. The Main Menu is then displayed. The Main Menu is automatically exited after 60 seconds of inactivity or can be exited voluntarily by pressing the ESC button.

Main Menu

All menus are accessed from the Main Menu; a detailed description of each menu is included in the next sections of this manual. The menus that require a password are not displayed until the correct password has been entered.

The menus provide access to the following functions:

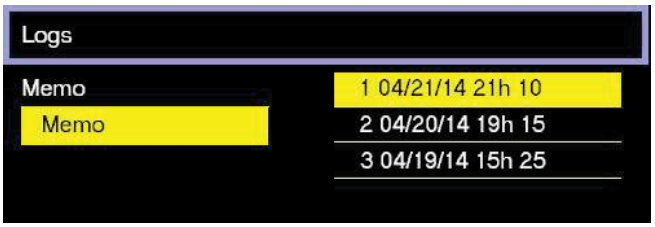
- View status and memorizations (Logs icon).
- Viewing of faults, alarms, etc. (Charger icon).
- USB functions (USB icon).
- Setting of date, language, and others (Settings icon).
- Management of password (Password icon).
- Exit main menu (Exit icon).

Logs

Memorization Display Screen
The charger can display the details of the last 300 charge cycles.
The display here shows 3 charges have been stored in memory. MEMO 1 is the latest charge memorized. After memorizing the three-hundredth charge, the oldest record is deleted and replaced by the next oldest.

Displaying a Charge Cycle
Proceed as follows:

1. Select a record (MEMO x) using the ▲/▼ buttons.
2. Display the first History screen by pressing Enter button.



3. Display the second History screen by pressing ▼.
4. Return to the Main Menu by pressing the ESC button.

The charge history is displayed; use ▲/▼ to scroll through the parameters.

Memorization Data

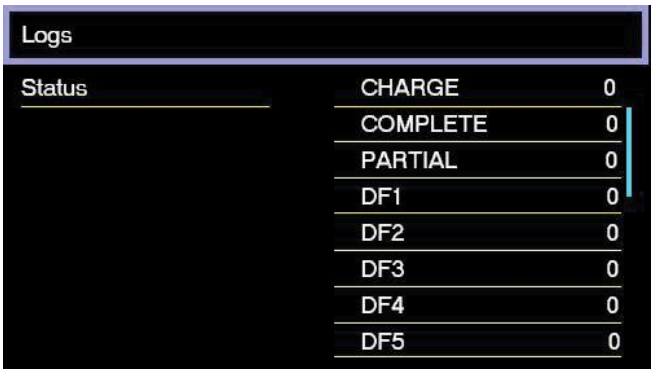
Memo	Description
S/N	BBWC device serial
Capacity	BBWC device serial Rated battery capacity (Ah)
U batt	Rated battery voltage (V)
Temp	Battery temperature at State of Charge (F)
Techno	Battery technology
Profile	Selected profile
% init	State of charge at State of Charge (%)
U start	Battery voltage at State of Charge (Vpc)
U end	Battery voltage at end of charge (Vpc)
Warning	BBWC device warnings

Memo	Description
I end	Current at end of charge
Temp end	Battery temperature at end of charge (F)
Chg Time	Time of the charge cycle (minutes)
Ah	Amp-hours returned during charge cycle
kWh	Kilowatt-hours returned during charge cycle
Status	Partial or Complete
Default	Fault codes
SoC	State of Charge date and time
DBa	Battery disconnect date and time
CFC	Termination code (for service tech)

Status

This menu displays the status of the charger's internal counters (number of normal and partial charges, fault code, etc.).

Status	Description
Charge	Total number of charges - corresponds to the total of normally terminated charges and charges terminated with or by faults.
Complete	Number of charges normally terminated.
Partial	Number of charges terminated abnormally.
DF1 etc.	Number of faults recorded by the charger (see Fault Codes).
TH	Number of charger temperature faults.
DFC	Number of DFC faults.



Status Screen

Status	Description
CNTAH	Cumulative Ah (odometer).
TH MOD	Individual MOD temp fault.

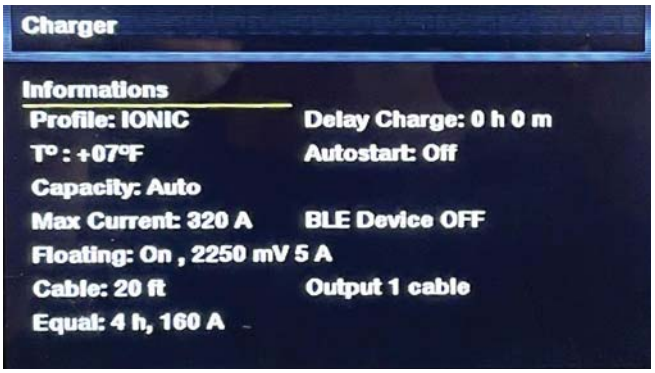
Charger

This menu displays information on the charger's configuration and output current of the charger and the power modules.

Information

This screen displays the following information on the charger's configuration.

Information	Description
Profile	Selected Charging Profile
Temperature	Programmed or BBWC device temperature
Capacity	Automatic or Manual
Max. Current	Maximum Current of Charger
Floating	ON/OFF
Cable	Length of DC Cable
Equal	Equalize Time and Current
Delay Charge	In Hours and Minutes
Auto Start	ON/OFF



Charger Information Display

Information	Description
BLE Device	ON/OFF
Output	1 Cable/2 Cable

Menu and Display Information

Parameter	Description
Date/Time	Sets date and time of the charger. The clock has a battery backup which will preserve the time when power to the charger is off.
Language	Selects the language displayed in the menus.
Region	Selects the format for date, metric (EU) or imperial (US) units for temperature, length and cable gauge in both metric and AWG.
Display	Set screen saver function and display themes.
Screen Saver	Enables or disables the screen saver function.
Delay Savings	Set the time the screen stays illuminated. The delay time is adjustable in minutes up to one hour and 59 minutes.
Themes	Themes A and B are two different ways that information is displayed throughout the charge cycle as seen in table below. Theme A is selected by default and will be used in this manual.
Daylight Savings	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.

USB

This menu provides access to the USB function to update software.
Software updates are provided by HAWKER®.

Update Software
Updates charger's internal software. The software is provided by HAWKER®.

Record Memo: Requires Password.
Save Settings: Requires Password.
Restore Settings: Requires Password.
Update Software: No Password Required.
Update Module: Requires Password.

Password

This is where the password is entered to gain access to service-level menus by authorized HAWKER® service representatives.

Settings

Parameters

Date/Hour
Sets the date and time of the charger. The clock has a battery backup which will preserve the time when power to the charger is off.

Serial Number
Password is required to access.

Language
Selects the language displayed in the menus.

Region
Selects the format for date, metric (EU), or imperial (US) units for temperature, length, and cable gauge.

Display
Set screen saver function and display themes.

Screen Saver
Enables or disables the screen saver function.

Delay
Set the time the screen stays illuminated. The delay time is adjustable in minutes up to one hour and 59 minutes.

Themes
Themes A and B are two different ways that information is displayed throughout the charge cycle as seen in the table below. Theme A is selected by default and will be used in this manual.

Function	Theme A	Theme B
IDLE Screen		
	Battery Disconnects while Charging. Alternates every two seconds with CONNECT BATTERY.	
	Charger paused while battery connected.	
CHARGING Screen		

Settings (cont.)

Function	Theme A	Theme B
AVAIL Screen		
EQUALIZATION Screen		

Daylight Saving
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.

Charge

Charge Profile
The charging profile defines the rate of charge current over time. Select the correct charging profile for your application such as; FXBLOC, GELBLC, FXSTND, FXFAST, and others.

Without BBWC device: The profile selected will be used. Values stored in the BATTERY menu, such as CAPACITY and TEMPERATURE, are used to determine key charging parameters. Make sure these values match the battery to be charged or the battery may be over or under-charged which will result in decreased battery life or performance.

With BBWC device: The appropriate profile for the battery technology will be selected at the State of Charge. Battery capacity and temperature will also be transmitted to the charger control.

Auto Start
To enable Auto Start select ON or to disable select OFF. When Auto Start is enabled the charger will start whenever a battery is plugged in and if it's off the user will have to press the start stop button to start a charge.

Charge Delay
Type – Sets OFF, DELAY, or TIME OF DAY.
Value hour delay – Sets the amount or time of day for the delay (00:00 to 24:00).

Delay: State of Charge is delayed for the amount of time stored in VALUE (0 to 24 hours).

Time of Day: Charge will not start until the time of day is stored in VALUE (24-hour format).

Daily Charge
ON/OFF – Sets daily charge ON or OFF.
Daily Chg Start – Sets daily charge start time.
Daily Chg End – Sets daily charge end time.

Block Out Charge
ON/OFF – Sets block out charge ON or OFF.
Block Out Start – Sets daily charge start time.
Block Out End – Sets daily charge end time.

Charge (cont.)

Floating Load
ON/OFF – Sets float mode ON or OFF.
Current – Sets float current.
Voltage – Sets float voltage.

This feature can be turned ON or OFF depending on the application. A float charge at the end of the standard charge is intended to compensate for consumption by the truck electronics that are left on when the truck is not used (typically AGV). The parameter VOLTAGE in mVpc (millivolts per cell) determines the maximum float voltage. The parameter CURRENT defines the current output during the float. The current will automatically decrease to keep the battery voltage at the maximum defined by the VOLTAGE parameter.

Conditional Charge
Sets conditional charge %.

The charger will only commence the 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.

Battery Rest
Set battery rest time in hours.

Cold Pulse
Sets cold pulses ON or OFF. Only can use with a high level password.

CF Flooded
Only can use with a high level password.

Refresh ON/OFF
Sets refresh mode ON or OFF.

Imax
Sets charger maximum output current.

Battery

NB Cells
Sets number of battery cells: Auto, 12, 18, 24, 30, 32, 36, and 40 Cell.

Cap Manu/Auto
Set in Auto for IONIC™ profile; all other profiles should be set in Manual.

Capacity
Without BBWC device: Charger uses programmed capacity for all profiles except IONIC™; in IONIC™, charger automatically calculates Ah capacity.
With BBWC device: Charger uses BBWC capacity for all charge profiles.

Battery Temperature
This parameter adjusts the regulation voltages on the charging profile – values from 5°F (-15°C) to 149°F (65°C).

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

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

High Temperature
Defines a battery temperature safety limit.

Without BBWC device: Not used.

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

CABLE AND EQUALIZATION

Cable

Length
Select the length of DC cables from the charger to the battery terminals in one-foot increments from three to 50 feet.

Section
Sets the DC cable gauge. Selections are 4, 1/0, 2/0, and 3/0 (AWG).

Equalization

Manu Current
This defines the equalization or desulphation current for a manual start.

Time
Sets the equalization time from one to 48 hours.

Delayed Start (Delay)
Sets the delay between the normal charge and the equalization charge from zero to 23 hours.

Frequency
Selects one or several periods for carrying out the equalization charge. The user can select one or several days per week.

Idle ON/OFF
Required for CEC Compliance (CA & OR).

Options

Options Test
Turns on Battery Status (Red/Green) and electrovalve output briefly to test operation.

Electrovalve Time
Sets time ON in seconds.

PLC Pulse ON/OFF
When interfacing a charger with a PLC controller, pulse charging can either be enabled or disabled. When enabled, the charge profile is similar to IONIC™ charge profile.

RFI IQ ON/OFF

Turns IQ communications ON or OFF.

RST Memo/Status
Always set to yes.

Network

Protocol
Sets a protocol to Jbus, LAN, or BFM.

Baud Rate
Sets baud rate.

JBUS-Address
Sets address.

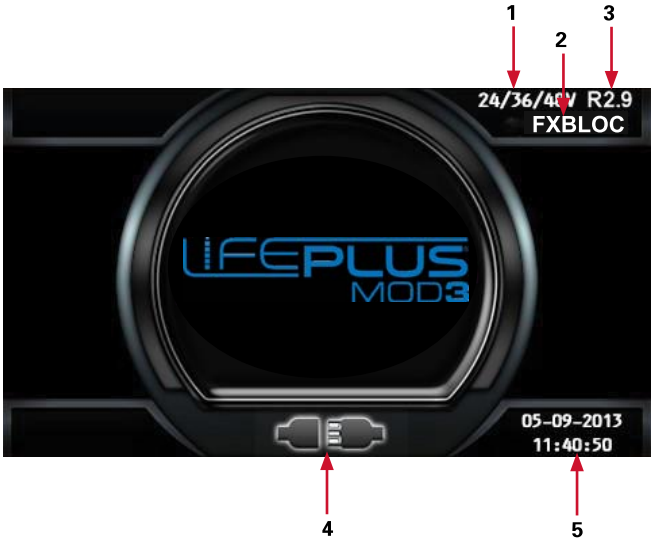
Ethernet
IP address, DNS, Gateway, and subnet mask.

WIFI
SSID1, SSID2, Security, Pass Phase 1, and Pass Phase 2.

Charging the Battery

At this point, the charger should have been set up by a qualified service technician. Charging can only begin when a battery of the proper type, capacity, and voltage is connected to the charger.
With the charger in wait mode (no battery connected) and without pressing the enter/stop and start button, the display will show the following information:

Ref	Description
1	Charger DC Voltage
2	Selected Charge Profile
3	Firmware Version
4	Connect Battery
5	System Time and Date



Charger Idle Display

Starting a Charge Cycle
The charger will start automatically when a battery is connected or push the enter/stop and start button if the battery is already connected.

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

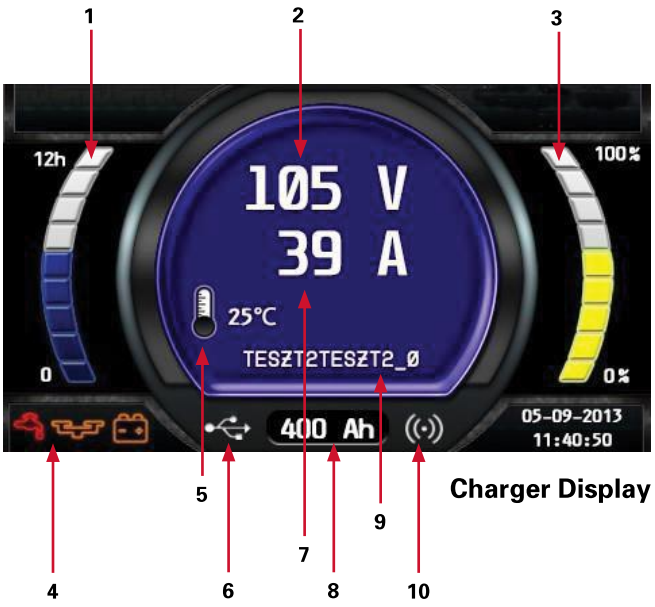
Countdown Display
Without a BBWC Device: If the BBWC device adapter is not enabled or no BBWC devices are in range, effective charging starts after the programmed delay. The charger uses Profile, Capacity, and Temperature settings programmed in the Configuration menu.
With a BBWC Device: If a BBWC device adapter is present and one or more BBWC device is in range, the charger will turn on and apply current to the battery. The display will show "SCAN" followed by "IQLINK". This routine determines which BBWC device in range the battery charger is connected to. Once the charger makes the determination, it downloads data from BBWC device, displays the battery S/N, updates the profile capacity and temperature for charging, and starts the main charge.

Countdown Display

Charging the Battery (cont.)

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

Ref	Description
1	Charge Time
2	Charge Voltage (total V and V/c)
3	Percent of Charge
4	BBWC Device Warnings
5	Battery Temperature, Alternates with Ah Returned
6	USB Connection
7	Charge Current
8	Battery Capacity
9	Battery S/N from BBWC Device
10	BBWC Device Link



Charger Display

End of Charge without Equalization
The green charge complete LED comes on after the proper end of charge. The green charge complete LED is on and the display shows AVAIL. The display alternates between:

- Total charging time
- Amp-hours restored to the battery

Any other lit LED indicates a problem during charging. Please refer to the Control Panel section for more information.

End of Charge Display

If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge.

The battery is now ready for use. Push the ON/OFF button before unplugging the battery.

End of Charge with Equalization
An equalize charge can be started manually or automatically.

Manual Equalization Start

1. At the end of the charge (green LED on or flashing), press the <EQUALIZE> button. The equalize button can also be pressed any time during the charge and an equalize charge will be started after charging is complete.
   NOTE: When an equalize charge is manually started, the output current will be set to the value saved in the charger configuration.
2. The start of the equalization charge is indicated by the symbol ⎍⎍⎍. During the equalization charge, the charger displays the output current and alternates, the battery voltage and voltage per cell, and the remaining time.
3. The battery will be available when the green LED comes back on and the display shows AVAIL.
4. The battery is now ready for use. If the battery remains plugged in and ra efresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

Automatic Equalization Start
If an equalization day has been programmed in Charger configurations the equalization charge will start automatically on the programmed day of the week after charging is complete.

Charging the Battery (cont.)

The battery will be available when the green LED comes back on and the display shows AVAIL. The battery is now ready for use. If the battery remains plugged in and a refresh charge has been enabled, refreshes will occur to maintain an optimal charge. Push the ON/OFF button before unplugging the battery.

Technical Specifications

3.5 kW Standard Technical Specifications

Model Number	Flex Fast Capacity Range (Ah)		DC Output			Battery Ah Rating Ranges							
	Nominal Amp Draw (A)	Max Amps	# Modules / # Bays	Cells	Max Current (A)	8 hour / Gel Capacity Range (Ah)	Opportunity / Flex Std. Capacity Range (Ah)	Flex Fast Capacity Range (Ah)	Flex Bloc Capacity Range (Ah)	Dimensions H x W x D (in)	Charger Cable* (AWG)	Weight (lbs)	Cabinet Type
LP3-48D-60Y	4.8	19.2	1 / 4	12	80	100 - 500	100 - 320	100 - 200	100 - 115	19.9 x 13.3 x 13.7	2/0	57	D
				18	80	100 - 500	100 - 320	100 - 200	100 - 115				
				24	60	100 - 375	100 - 240	100 - 150	86				
LP3-48D-120Y	9.6	19.2	2 / 4	12	160	100 - 1000	100 - 640	100 - 400	100 - 229	19.9 x 13.3 x 13.7	2/0	66	D
				18	160	100 - 1000	100 - 640	100 - 400	100 - 229				
				24	120	100 - 750	100 - 480	100 - 300	100 - 172				
LP3-48D-180Y	14.4	19.2	3 / 4	12	240	100 - 1500	100 - 960	100 - 600	100 - 343	19.9 x 13.3 x 13.7	2/0	75	D
				18	240	100 - 1500	100 - 960	100 - 600	100 - 343				
				24	180	100 - 1125	100 - 720	100 - 450	100 - 258				
LP3-48D-240Y	19.2	19.2	4 / 4	12	320	100 - 2000	100 - 1280	100 - 800	100 - 458	19.9 x 13.3 x 13.7	3/0	84	D
				18	320	100 - 2000	100 - 1280	100 - 800	100 - 458				
				24	240	100 - 1500	100 - 960	100 - 600	100 - 343				
LP3-48F-120Y	9.6	28.8	2 / 6	12	160	100 - 1000	100 - 640	100 - 400	100 - 229	20.0 x 19.2 x 13.8	3/0	66	F
				18	160	100 - 1000	100 - 640	100 - 400	100 - 229				
				24	120	100 - 750	100 - 480	100 - 300	100 - 172				
LP3-48F-180Y	14.4	28.8	3 / 6	12	240	100 - 1500	100 - 960	100 - 600	100 - 343	20.0 x 19.2 x 13.8	3/0	75	F
				18	240	100 - 1500	100 - 960	100 - 600	100 - 343				
				24	180	100 - 1125	100 - 720	100 - 450	100 - 258				
LP3-48F-240Y	19.2	28.8	4 / 6	12	320	100 - 2000	100 - 1280	100 - 800	100 - 458	20.0 x 19.2 x 13.8	3/0	84	F
				18	320	100 - 2000	100 - 1280	100 - 800	100 - 458				
				24	240	100 - 1500	100 - 960	100 - 600	100 - 343				
LP3-48F-300Y	24	28.8	5 / 6	12	320	100 - 2000	100 - 1280	100 - 800	100 - 458	20.0 x 19.2 x 13.8	3/0	97	F
				18	320	100 - 2000	100 - 1280	100 - 800	100 - 458				
				24	300	100 - 1875	100 - 1200	100 - 750	100 - 429				
LP3-48F-320Y	28.8	28.8	6 / 6	12	320	100 - 2000	100 - 1280	100 - 800	100 - 458	20.0 x 19.2 x 13.8	3/0	106	F
				18	320	100 - 2000	100 - 1280	100 - 800	100 - 458				
				24	320	100 - 2000	100 - 1280	100 - 800	100 - 458				

Technical Specifications (cont.)

Model Number	Flex Fast Capacity Range (Ah)		DC Output			Battery Ah Rating Ranges							
	Nominal Amp Draw (A)	Max Amps	# Modules / # Bays	Cells	Max Current (A)	8 hour / Gel Capacity Range (Ah)	Opportunity / Flex Std. Capacity Range (Ah)	Flex Fast Capacity Range (Ah)	Flex Bloc Capacity Range (Ah)	Dimensions H x W x D (in)	Charger Cable* (AWG)	Weight (lbs)	Cabinet Type
LP3-80D-36Y	4.8	19.2	1 / 4	36	40	100 - 250	100 - 160	100	58	19.9 x 13.3 x 13.7	2/0	57	D
				40	36	100 - 225	100 - 145	90	52				
LP3-80D-72Y	9.6	19.2	2 / 4	36	80	100 - 500	100 - 320	100 - 200	100 - 115	19.9 x 13.3 x 13.7	2/0	66	D
				40	72	100 - 450	100 - 290	90 - 180	100 - 103				
LP3-80D-108Y	14.4	19.2	3 / 4	36	120	100 - 750	100 - 480	100 - 300	100 - 172	19.9 x 13.3 x 13.7	2/0	75	D
				40	108	100 - 675	100 - 430	90 - 270	100 - 155				
LP3-80D-144Y	19.2	19.2	4 / 4	36	160	100 - 1000	100 - 640	100 - 400	100 - 229	19.9 x 13.3 x 13.7	3/0	84	D
				40	144	100 - 900	100 - 575	90 - 360	100 - 206				
LP3-80F-72Y	9.6	28.8	2 / 6	36	80	100 - 500	100 - 320	100 - 200	100 - 115	20.0 x 19.2 x 13.8	3/0	66	F
				40	72	100 - 450	100 - 290	90 - 180	100 - 103				
LP3-80F-108Y	14.4	28.8	3 / 6	36	120	100 - 750	100 - 480	100 - 300	100 - 172	20.0 x 19.2 x 13.8	3/0	75	F
				40	108	100 - 675	100 - 430	90 - 270	100 - 155				
LP3-80F-144Y	19.2	28.8	4 / 6	36	160	100 - 1000	100 - 640	100 - 400	100 - 229	20.0 x 19.2 x 13.8	3/0	84	F
				40	144	100 - 900	100 - 575	90 - 360	100 - 206				
LP3-80F-180Y	24	28.8	5 / 6	36	200	100 - 1250	100 - 800	100 - 500	100 - 286	20.0 x 19.2 x 13.8	3/0	97	F
				40	180	100 - 1125	100 - 720	90 - 450	100 - 258				
LP3-80F-216Y	28.8	28.8	6 / 6	36	240	100 - 1500	100 - 960	100 - 600	100 - 343	20.0 x 19.2 x 13.8	3/0	106	F
				40	216	100 - 1350	100 - 865	90 - 540	100 - 309				

Service and Troubleshooting

Fault Display

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.

Service and Troubleshooting (cont.)

Fault Codes

Fault	Critical	Cause	Solution
DF1	Yes	Low output current.	• Contact your HAWKER® service representative.
DF2	Yes	Output fault.	• Contact your HAWKER® service representative.
DF3	Yes	Incorrect battery.	• Contact your HAWKER® service representative.
DF4	No	The battery has been discharged more than 80% of its capacity.	• Contact your HAWKER® service representative.
DF5	No	Battery requires inspection.	• Contact your HAWKER® service representative.
DF7	No	Inspect battery.	• Contact your HAWKER® service representative.
TH or TH-Amb	Yes	Charger overheating.	• Contact your HAWKER® service representative.
BAT TEMP	Yes	Battery temperature reached maximum level.	• Allow the battery to cool down.
MOD TH	No	Alternating with charge parameters – one or more modules in thermal fault – the charging process continues – the fault module(s) is (are) displayed + Red Fault LED flashing.	• Contact your HAWKER® service representative.
DFMOD	No	Alternating with charge parameters – one or more modules in DF1 fault – the charging process continues – the fault module(s) is (are) displayed + Red Fault LED flashing.	• Contact your HAWKER® service representative.
DF ID	Yes	Blocking fault: one or more modules are not compatible with the charger configuration (for example 24 V charger with one 48 V module). This can happen if the user replaces one module with another one with a different voltage setting.	• Contact your HAWKER® service representative.
	No	Battery balance fault.	• Contact your HAWKER® service representative.

Service and Troubleshooting (cont.)

Maintenance and Service

⚠ WARNING THERE ARE DANGEROUS VOLTAGES WITHIN THE BATTERY CHARGER CABINET. ONLY A QUALIFIED PERSON SHOULD ATTEMPT TO ADJUST OR SERVICE THIS BATTERY CHARGER.

- The charger requires minimal maintenance. Connections and terminals should be kept clean and tight. The unit (especially the heatsink) should be periodically cleaned with low-pressure air to prevent any excessive dirt build up on components. Care should be taken not to bump or move any adjustments during cleaning. Make sure that both the AC lines and the battery are disconnected before cleaning. The frequency of this type of maintenance depends on the environment in which this unit is installed. For service, contact your local sales representative or call: 1-877-7HAWKER (USA & CANADA).
- Any data, descriptions, or specifications set forth herein are subject to change without notice. Before using the product(s), the user is advised and cautioned to make their own determination and assessment of the suitability of the product(s) for the specific use in question, and is further advised against relying on the information contained herein as it may relate to any general use or indistinct application. It is the ultimate responsibility of the user to ensure that the product is suited, and the information is applicable to the user's specific application. The product(s) featured herein will be used under conditions beyond the manufacturer's control and therefore all warranties, either express or implied, concerning the fitness or suitability of such product(s) for any particular use or in any specific application, are disclaimed. The user expressly assumes all risk and liability, whether based on contract, tort or otherwise, in connection with the use of the information contained herein or the product itself.

Notes

CHARGING SOLUTIONS

LIFEPLUS® MOD3

HAWKER LIFEPLUS® MOD3 BATTERY CHARGER WITH WIRELESS COMMUNICATIONS

Models: LPM3 (Standard and HAWKER FLEX® Charger), LPM3C (CEC), and LPL3

OWNER'S MANUAL

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

HAWKER®

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INTRODUCTION

The information contained in this document is critical for safe handling and proper use of the HAWKER LIFEPLUS® MOD3 chargers. It contains a global system specification as well as related safety measures, codes of behavior, a guideline for commissioning, and recommended maintenance. This document must be retained and available for users working with and responsible for the charger. All users are responsible for ensuring that all applications of the system are appropriate and safe, based on conditions anticipated or encountered during operation.

This owner's manual contains important safety instructions. Read and understand the sections on safety and operation of the charger before operating the charger and the equipment into which it is installed.

It is the owner's responsibility to ensure the use of the documentation and any activities related thereto, and to follow all legal requirements applicable to themselves and the applications in the respective countries.

This owner's manual is not intended to substitute for any training on handling and operating the industrial truck or HAWKER LIFEPLUS® MOD3 chargers that may be required by local laws and/or industry standards. Proper instruction and training of all users must be ensured prior to any contact with the charger system.

Refer to the abbreviations and terms at the end of this document.

For service, contact your sales representative or call:
1-877-7HAWKER (USA and Canada)
www.hawkerpowersource.com

Your Safety and the Safety of others is Very Important

⚠ WARNING You can be killed or seriously injured if you don't follow instructions.

SAFETY INSTRUCTIONS

Important Safety Instructions

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

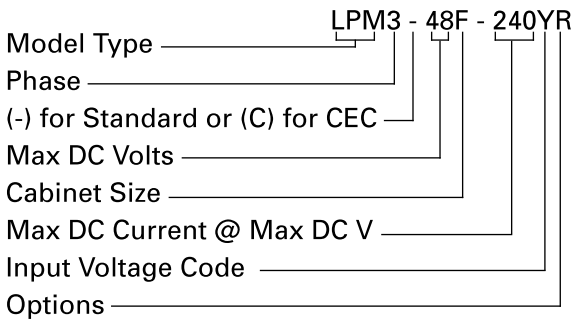
1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, cautions, and warnings on the battery charger, the battery, and the product using the battery.
2. This battery charger is designed to charge lithium-ion (if marked for lithium), 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.
6. 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.
12. For lithium batteries, use only Hawker battery packs that include the battery management system and all necessary protection for the battery pack integral to the pack.
13. The DC cables of the charger emit low power magnetic fields in their surroundings (<5cm). People with medical implant devices should avoid being near charger while charging.

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.

Technical Information (cont.)



Lithium Charger Label
Chargers that are capable of charging lithium-ion batteries are marked with a label identifying the charger as such.

Technical Information (cont.)

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
C	3	2/0	Three slot, 3.5 kW cabinet
F	6	3/0	Six slot, 3.5 kW cabinet
L	12	3/0	Twelve slot, 3.5 kW cabinet

AC Line Voltage Letter Codes
The following table describes the letter codes to be used in charger part numbers to indicate the AC line voltage(s) and AC line frequency at which the charger can be operated.

Letter Code	Voltage(s) (Volts rms)	Line Frequency (Hertz)	Comments
C	600	50/60	600 VAC only
G	208/220/240	50/60	208/220/240 VAC only
H	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
P	Parallel cables
R	Remote control capable (order remote control separately)
V	PLC capable

Technical Information (cont.)

Serial Number
This number indicates complete information about the specific charger. It must be supplied with the part number in any correspondence or discussion regarding this charger.

Battery Type
The chemical content construction of the battery this unit is designed to charge is given in this part of the nameplate. (L-A = Lead-Acid, LI = lithium-ion).

Max Ah
This number indicates the maximum Ampere-hour (Ah) capacity of this charger. Charging batteries to Ah capacities not specified here will cause the charger to deviate from the specifications.

No. Cells
This is the number of battery cells this unit will charge. **This number must match exactly with any battery connected to the charger output.**

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

⚠ WARNING THE NUMBER OF MODULES MUST MATCH THE NUMBER OF "CONFIG MODULES" ON THE NAMEPLATE. DO NOT ADD MORE MODULES IN THE FIELD. CONSULT THE MANUFACTURER IF MORE MODULES ARE NEEDED.

Config Modules
This is the number of modules for which this cabinet is configured.

Hertz
This gives the frequency in cycles per second of the AC input voltage. Under no conditions operate the charger at a different frequency or from a generator with unstable frequency.

Phase
Number "3" indicates a three-phase charger and "1" indicates a single-phase charger.

AC Volts
This is the nominal voltage for which this charger is rated. The charger will only operate on this voltage. 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 output DC amps for which this charger is rated.

DC Volts
This gives the nominal DC output voltage of the charger.

Config DC Amps
This is the output DC amps this charger is configured to deliver to a battery that is over 20% discharged.

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

BC

cULus
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):

C UL US
LISTED

Installation

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

Location

For maximum safe operation, choose a location that is free of excess moisture, dust, combustible material, and corrosive fumes. Avoid locations where temperatures are high or where liquids will drip on the charger. Do not obstruct the ventilation openings or the space under the charger. Follow the charger warning label when mounting on or over a combustible surface.

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 at all levels cannot exceed 113°F (45°C).

Electrical Connections

To prevent failure of the charger, make sure it is connected to the correct line voltage.
Follow your local and National Electric Code (NEC) in making these connections.

⚠ 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 A 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:

Description of Operation

General
HAWKER LIFEPLUS® MOD3 series chargers are compatible with batteries at 24, 36, 48 volts or 72, 80 volts, depending on model.
HAWKER LIFEPLUS® 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. HAWKER LIFEPLUS® MOD3 chargers adapt to the battery's capacity and its discharge level. When charging a lithium-ion battery, the battery BMS will control the charge current and voltage through the CAN. HAWKER LIFEPLUS® 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 lithium-ion (if marked for LI), 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. When a HAWKER® lithium-ion battery is connected, the battery's BMS controls the charger 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 the charger's nameplate DC volt rating. The charger's amp-hour rating must be equal to each battery's Ampere-hour rating. The charge cycle will not start unless both batteries are connected.

Glossary

Battery Boss™ WC (BBWC) Device
This unit, permanently mounted on the battery, ensures that certain battery parameters can be sent to the charger for the purposes of optimizing the charge and monitoring the charging and discharging characteristics.

Block-Out Time
This function inhibits 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 charge current over time. The charger adapts to the battery's age and level of discharge. Controlling the overcharge coefficient, whatever the battery's discharge level, reduces the amount of electricity consumed.

Thin Plate Pure Lead (TPPL)
This is an advanced lead-acid battery design used in HAWKER FLEX® TPPL batteries. TPPL technology provides longer service life, higher power density, longer shelf life, and fast recharge capabilities.

Glossary (cont.)

FLEX Bloc Charging Profile
This charging profile allows charging of HAWKER FLEX® Bloc batteries at rates up to 0.7C.

FLEX Standard Charging Profile
This charging profile allows charging of HAWKER FLEX® 2v cell batteries at rates up to 0.25C.

FLEX Fast Charging Profile
This charging profile allows charging of HAWKER FLEX® 2v cell batteries at rates up to 0.4C.

Cold Storage Charging Profile
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.

Lithium Charging Profile (LITH)
When a HAWKER® lithium-ion battery is connected, the CAN communication between the battery and charger is established, "Bat info" with Voltage, Ah and Temperature will be displayed, along with "Flex Li-3" as the charge profile. The battery BMS will control the charge current and voltage through the CAN.

Equalization Charging
Equalization charging, performed after normal charging, balances the electrolyte densities in the battery's cells.

Gel Charging 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™ Charging 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 Charging 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 IONIC™ 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.

Terms and Abbreviations

Term/Abbreviation	Explanation/Description
Ah	Amp-Hour
AWG	American Wire Gauge
AVAIL	Available, battery is fully charged
BBWC	Battery Boss Wireless Connection
BMS	Battery Management System
CAN	CANbus
CEC	California Energy Commission
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt
L-A	Lead-Acid
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LM/EB	Late Make/Early Break
RFI	Radio Frequency Interface
TFT	Thin Film Transistor
USB	Universal Serial Bus

Operating Instructions

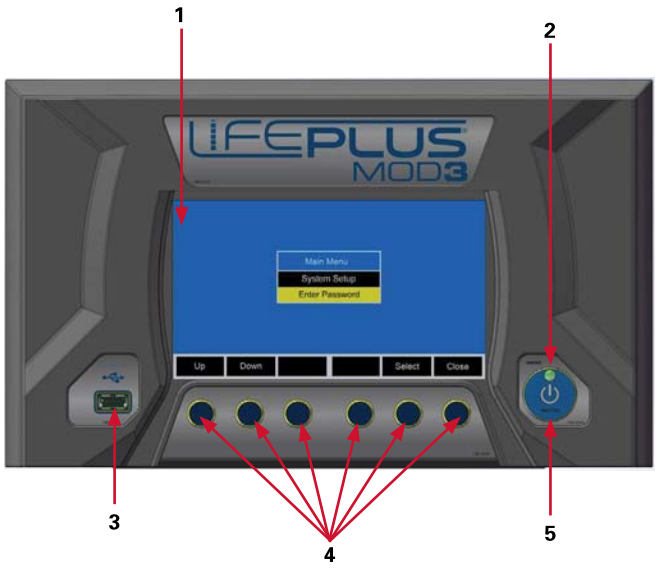
The HAWKER LIFEPLUS® MOD3 chargers series is compatible with batteries of 24, 36, 48, and 72 or 80 volts (depending on the version supplied). Battery recognition (voltage, capacity, and state of charge) is accomplished automatically by the microprocessor. Several charging profiles are available (IONIC™, Gel, Opportunity) based on the configuration chosen by the operator. If the charger is loaded with the HAWKER FLEX® Charger firmware then the selectable profiles are FLEX Fast, FLEX Bloc and , FLEX Li-3 (if marked for LI). Furthermore, equalization and compensation charges are integrated.

The HAWKER LIFEPLUS® MOD3 charger includes an adapter to communicate with a BBWC device. The BBWC device 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 HAWKER LIFEPLUS® MOD3 charger to optimize charging, alerts the operator to battery issues, and safeguards the battery from being permanently damaged.

When charging a HAWKER® lithium-ion battery, the charger uses a CAN adapter to communicate with the BMS (Battery Management System) of the lithium battery. The BMS of the lithium battery provides the charger with current, voltage and temperature information via the CANbus. This information is used to optimize charging, warns the operator of any battery issues, and protects the battery from being permanently damaged.

Control Panel

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



Menu Access

Idle Screen

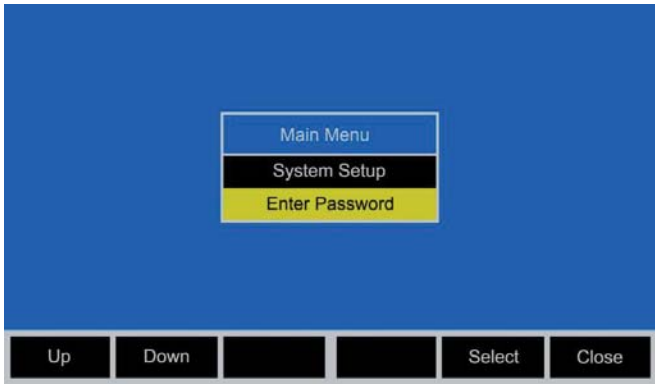
When the charger is idle, select Setup. The main menu is then displayed. The main menu is automatically exited after 120 seconds of inactivity or can be exited voluntarily by pressing the Close button.

Main Menu Display

Main Menu

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

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

Time
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.

Language
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.

Network
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.
Type: Wired, Wireless: Select network type
Charger IP Address: Enter address
Subnet Mask: Enter Subnet Mask
Gateway Address: Enter Gateway Address
Wireless Settings: Set SSID, Security, and Passphrase
Modbus: Enable or Disable Modbus
Transceiver Address: 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 representative 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

PASSWORD AND USB

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.

Change Tech Password
Use this to change the main password

Change Admin Password
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™: If using IONIC™ charge profile with Auto Capacity enabled, the value is not used and it automatically calculates the Ah capacity of the battery. If using IONIC™ charge profile 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™ charge profile setting. 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

Charge Profile Configuration (cont.)

using IONIC™ charging profile, the charger will automatically adjust to battery Ah sizes within the range it covers. (depending on number of modules installed). When charging a lithium-ion battery, the battery BMS will control the charge current, voltage and temperature information through the CANbus.

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 one of the following charge profiles: IONIC™, Opportunity, or Gel. Or if the charger is loaded with the Flex firmware the selectable profiles are Flex Bloc and Flex Fast. For lithium-ion, Flex Li-3 is automatically selected if CANbus communication is detected with battery BMS.

IONIC™ Charge Coefficient
This is only accessible through a 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 Days
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 (24-hour 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
Blockout Days: Selects day or days of the week to block out charge. One or more days may be selected, or none.
Blockout Start Time: Sets blockout start time.
Blockout End Time: Sets blockout 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. This feature does not apply to lithium-ion batteries.

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.

Post-Charge Configuration (cont.)

Float ON/OFF
Turns Float ON or OFF.

Float Current
Used for AGVs 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 a 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.

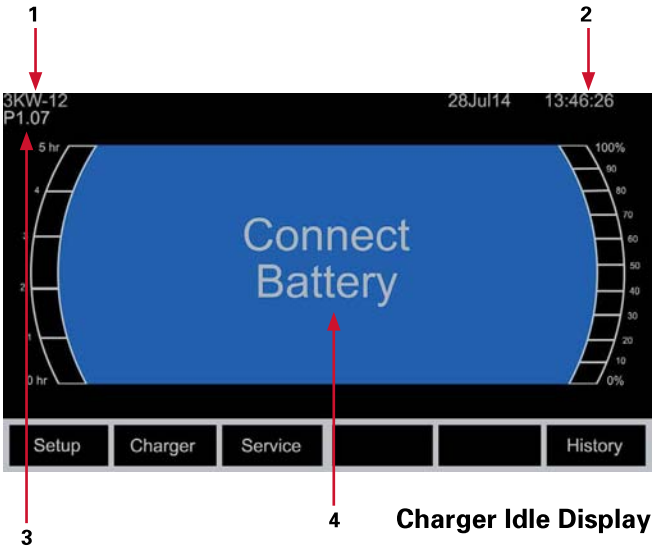
Customer Asset Number
Enter customer asset number. Used when saving memos for keeping track of data.

Notice Regarding Cold Profile:
There is not a selectable profile for Cold. This is because the HAWKER LIFEPLUS® MOD3 charger will switch to the Cold profile automatically when using a BBWC on the battery if the temperature is below 60°F. When not using a BBWC, 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 BBWC. For lithium-ion batteries, the battery BMS controls the charger and provides the charger with current, voltage and temperature information via the CANbus.

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:

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

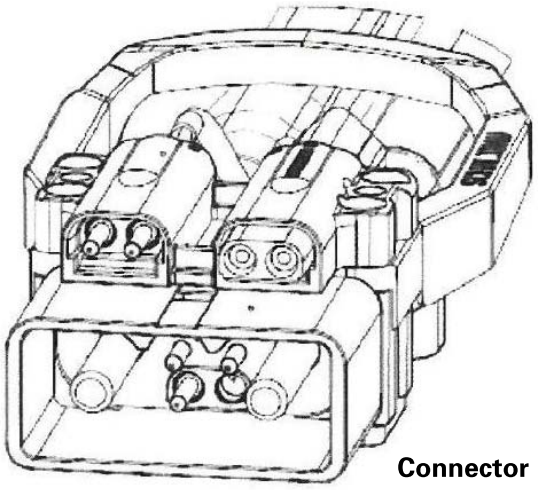


Charger Idle Display

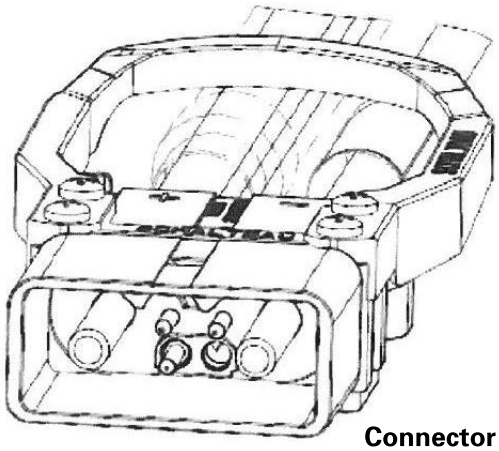
Connecting the Battery

HAWKER® lithium-ion batteries come with a specific type of connector(s). Make sure the charger connector matches the battery connector. Plug the charger connector to the battery connector. For chargers with dual connectors, always connect connector 1 (master connector) first. There is a countdown of 60 seconds to allow for connecting the second connector (slave connector) before the charger proceeds as a single cable charger.

HAWKER® lithium-ion batteries come with a specific type of connector(s). The charger comes with one or two connectors depending on the charger model. When the charger is equipped with two connectors, connector 1 must be connected first, and connector 2 must be connected within 60 seconds, otherwise the charger will only charge through connector 1. All lithium charger connectors are equipped with arcless option called Late Make Early Break to prevent arcing if battery is disconnected while charging.



Connector 1



Connector 2

Charging the Battery (cont.)

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.
When charging a lithium battery, the CAN communication between the battery and charger is established. Flex Li-3 and Bat Info will be displayed on the screen as shown at right. After a few seconds, the battery will close the charge contactor to initiate the charge. The charger will start the countdown process and will start displaying the charge information.

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.

Countdown Without a Battery Boss™ WC (BBWC)
If the BBWC adapter is not enabled or no BBWC is 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 adapter is present and one or more BBWC 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 in range is on the battery the charger is connected to. Once the charger makes the determination, it downloads data from BBWC, displays the battery S/N, updates the profile, capacity and temperature for charging, and starts the main charge.

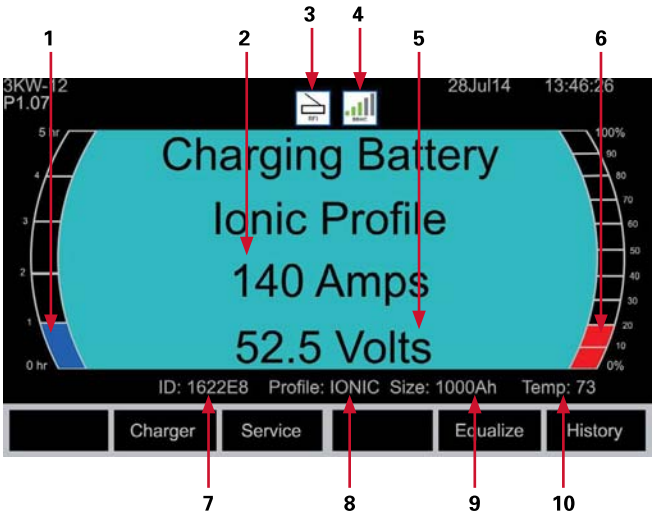
How it connects to a BBWC
Scanning – Scanning for BBWC devices. This state is collecting addresses of any BBWC devices within the adapter’s range. If any addresses are successfully collected, the next state is syncing (see below). If none were found, the charger will display “No BBWCs found” and go straight to a charge cycle without a BBWC present.
Syncing – Setting of three specific current values and measuring all BBWC devices and running a match algorithm. These steps will be displayed as “Measure BBWC devices - Iteration: x” (where x is 1, 2, or 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 devices” and go straight to a charge cycle without a BBWC present.

With Lithium-Ion Battery
The battery BMS controls the charge current and voltage. During the charge cycle, the BMS, through the CAN, will send information to the charger to start, stop and output the desired current and voltage. If the CAN is lost during charge cycle, the charger will stop.

Charging Display

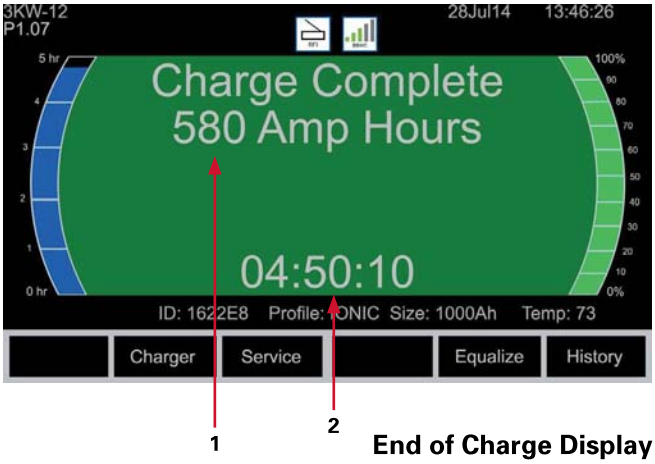
A few moments into the effective charge, the display will begin displaying the following charging information:

Ref	Description
1	Charge time bar graph
2	Charge DC current into battery
3	RFI transceiver is communicating with BBWC
4	BBWC link indicator
5	Charge DC Voltage of battery, alternating with charge time, Ah, and V/C
6	Percent of charge bar graph
7	Battery S/N reported by BBWC lithium only: battery information
8	Charge profile
9	Programmed battery size in Ah
10	Battery temperature



Charging Display

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 Ampere-hours returned to battery (1) and total charge time (2):



End of Charge Display

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 display 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 Ampere-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.

Info
Displays details about each module installed.

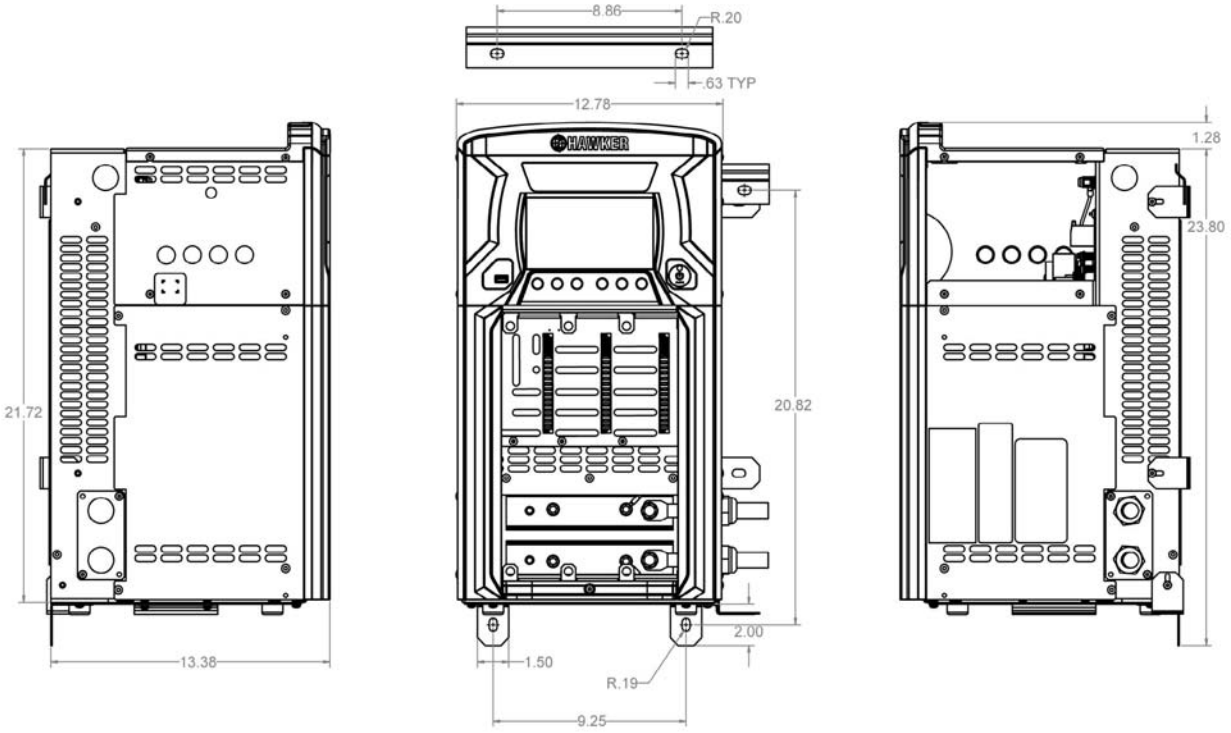
Module LED Status
The modules have LED indicators on the front. These can be observed to determine the status of that particular module:

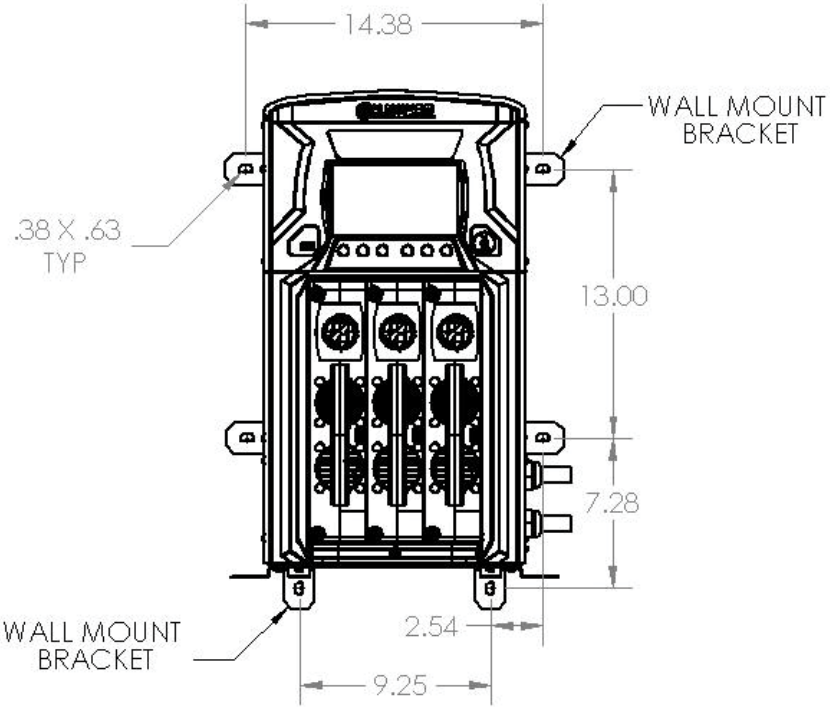
- **Flashing Green:** Module in Standby
- **Solid Green:** Module in Use
- **Red:** Module Fault
- **No LEDs:** Module Fault (assuming not in energy saver mode)

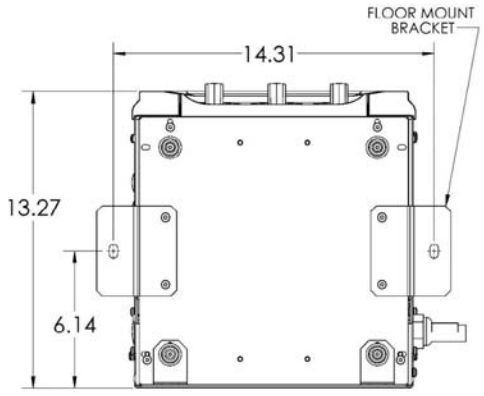
Mounting Dimensions

3-Bay Wall Mounting Dimensions

Dimensions shown are in inches.



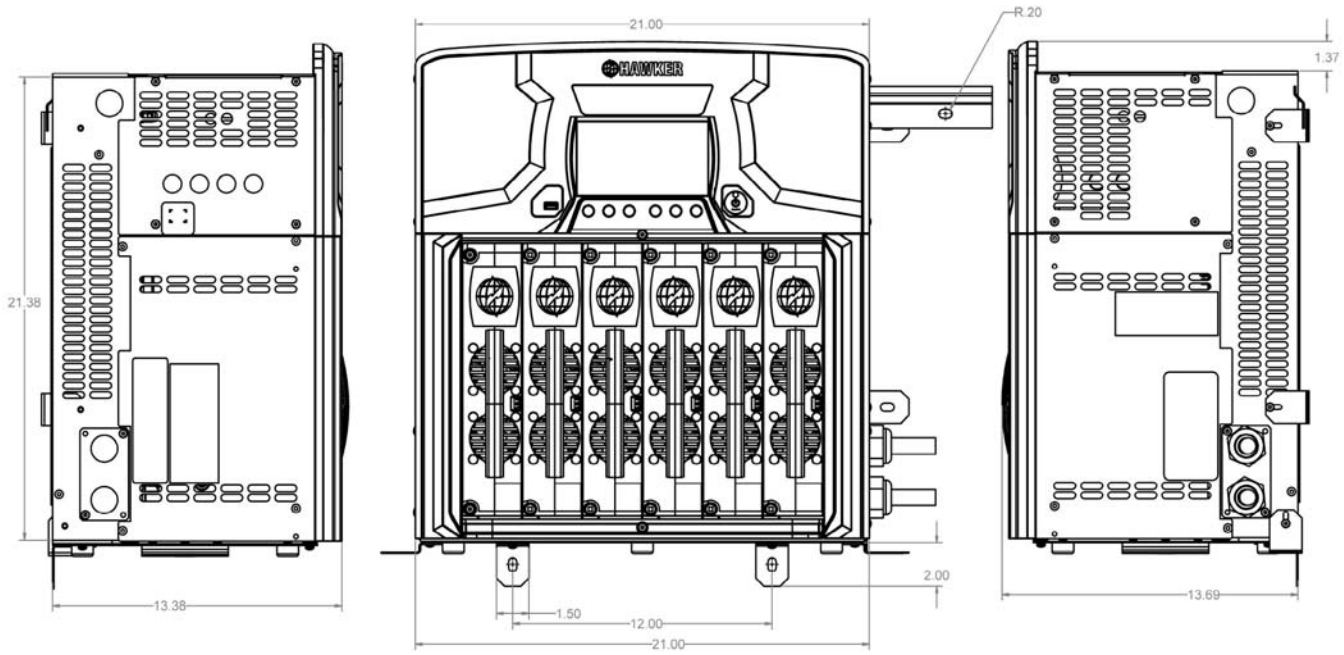


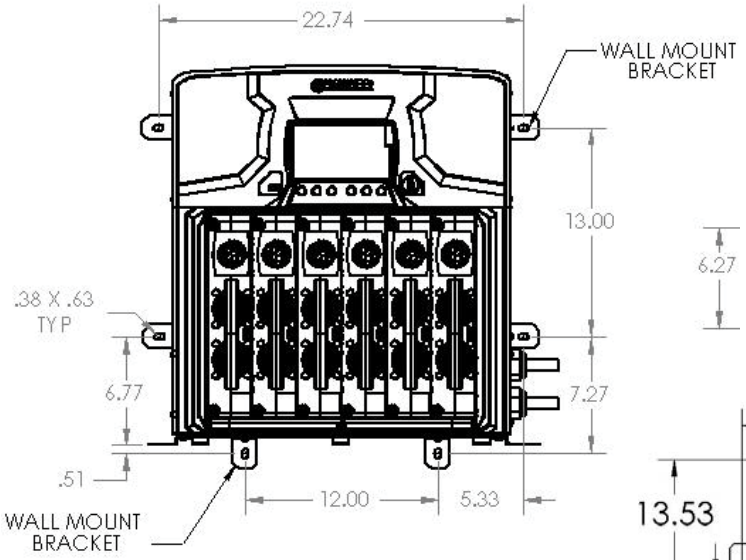


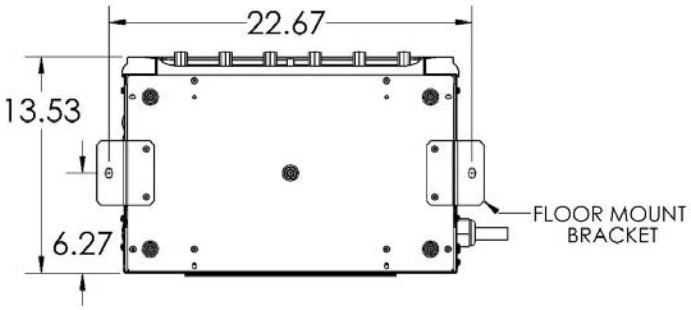
Mounting Dimensions (cont.)

6-Bay Wall Mounting Dimensions

Dimensions shown are in inches.



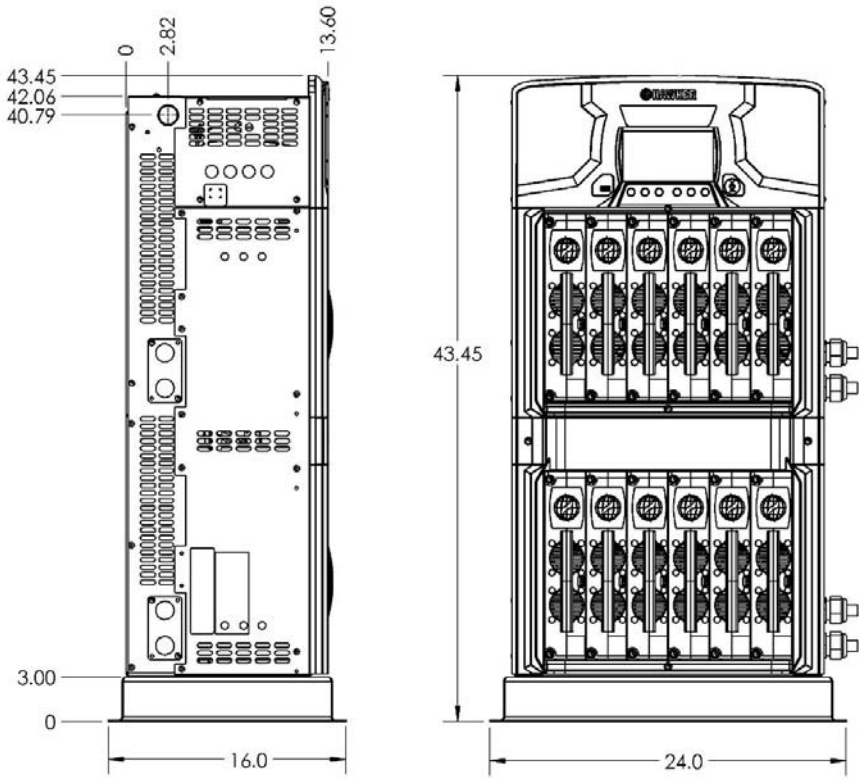


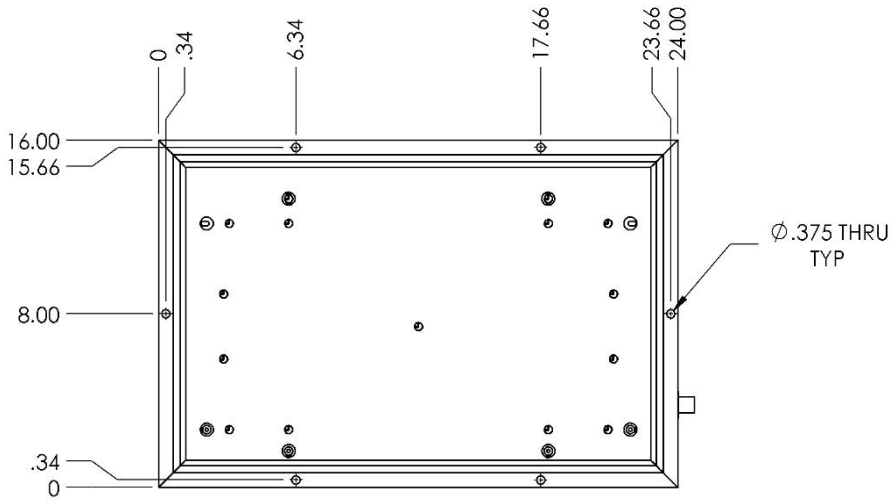


Mounting Dimensions (cont.)

12-Bay Floor Mounting Dimensions

Dimensions shown are in inches.





Maintenance and Service

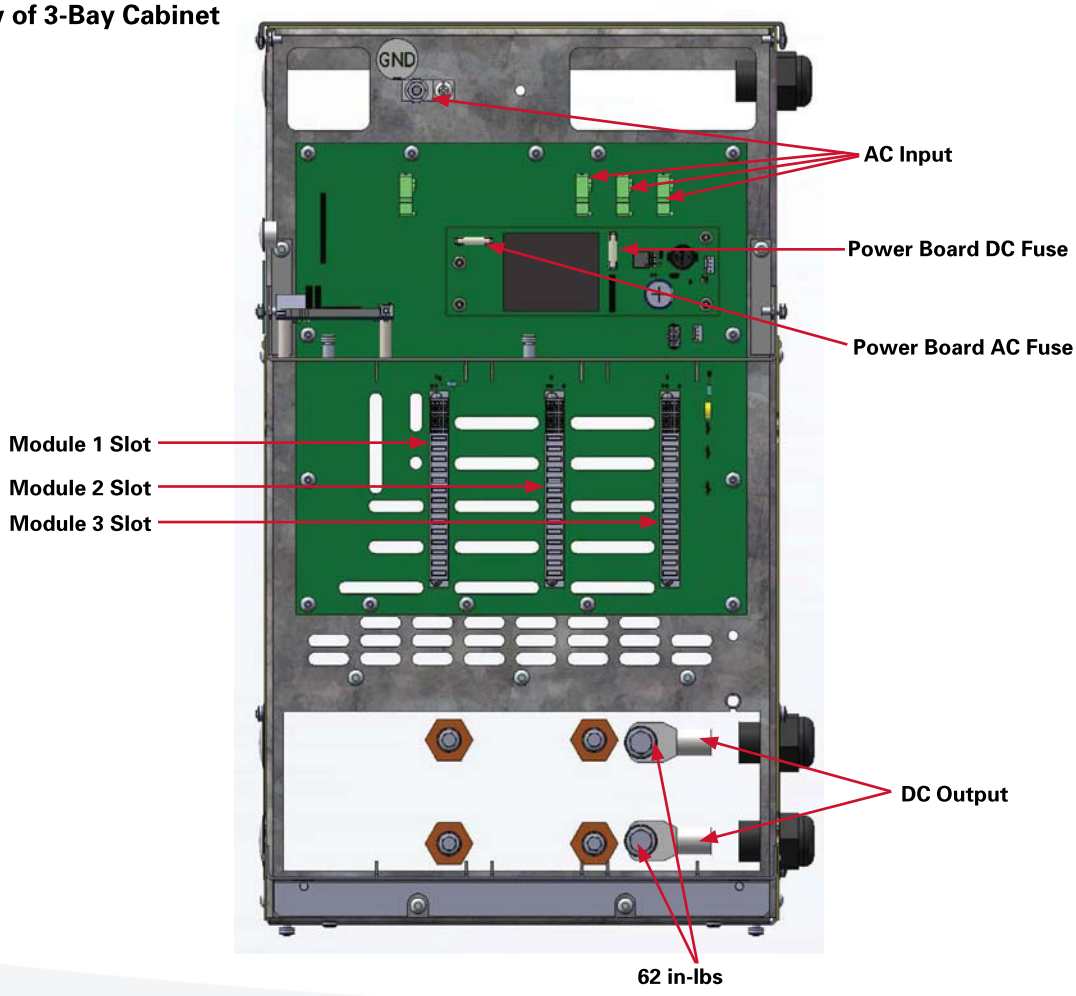
⚠ CAUTION THERE ARE DANGEROUS VOLTAGES WITHIN THE BATTERY CHARGER CABINET. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO ADJUST OR SERVICE THIS BATTERY CHARGER.

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

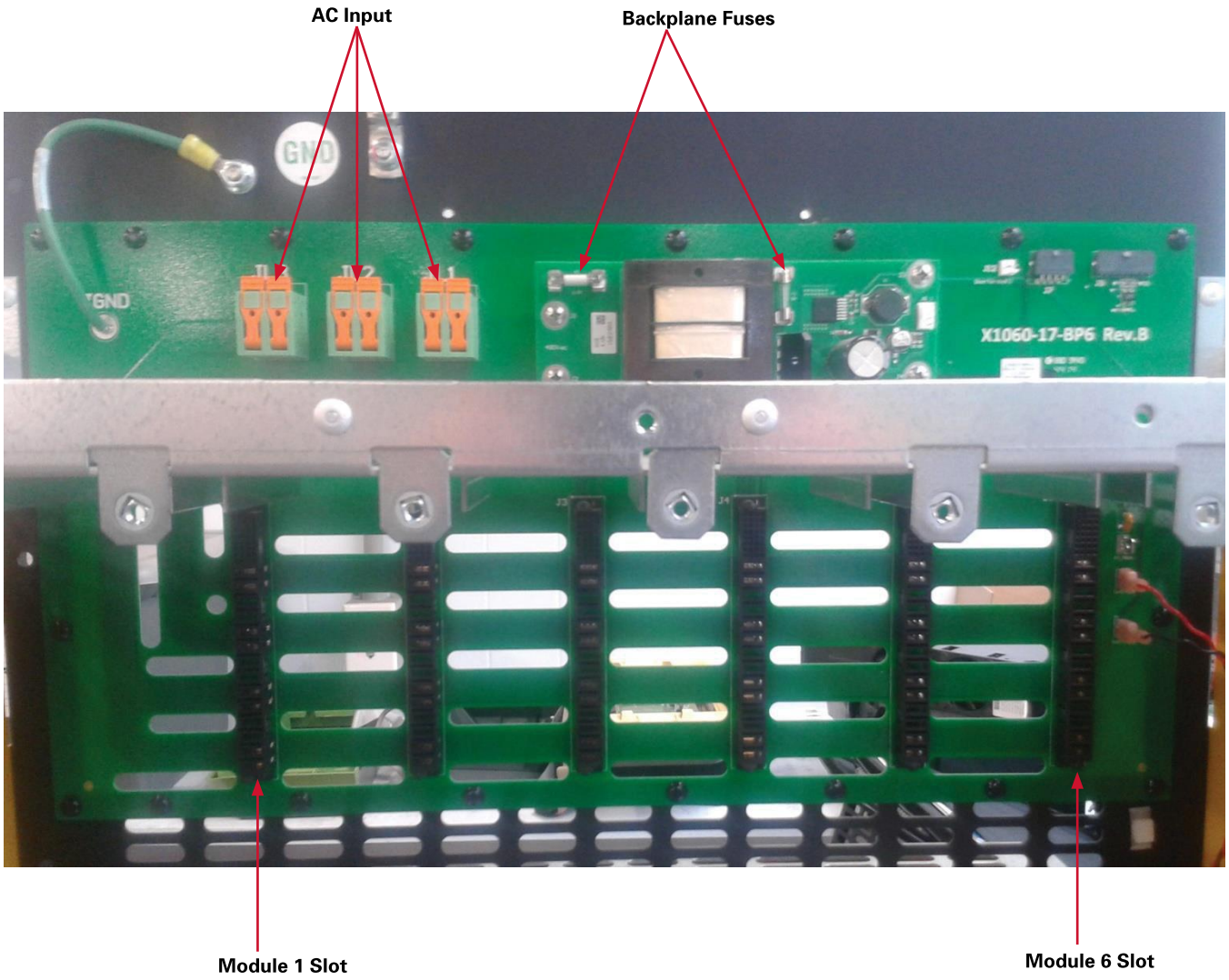
Component Locations

Inside View of 3-Bay Cabinet



Component Locations (cont.)

Inside View of a 6-Bay Cabinet



Technical Specifications

For LPM3 models, 208/220/240 V:

Model Number	AC Input				DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-48C-40G	208/220/240	7.4/7.0/6.4	22.2	3	1/3	12	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						18	40	100-250	100-160				
						24	40	100-250	100-160				
LPM3-48C-80G	208/220/240	14.8/14/12.8	22.2	3	2/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						18	80	100-500	100-320				
						24	80	100-500	100-320				
LPM3-48C-120G	208/220/240	22.2/21/19.2	22.2	3	3/3	12	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						18	120	100-750	100-480				
						24	120	100-750	100-480				
LPM3C48C-40G	208/220/240	7.4/7.0/6.4	22.2	3	1/3	12	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						18	40	100-250	100-160				
						24	40	100-250	100-160				
LPM3C48C-80G	208/220/240	14.8/14/12.8	22.2	3	2/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						18	80	100-500	100-320				
						24	80	100-500	100-320				
LPM3C48C-120G	208/220/240	22.2/21/19.2	22.2	3	3/3	12	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						18	120	100-750	100-480				
						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 14.1	2/0	C	54
						40	25	100-157	100-100				
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 14.1	2/0	C	62
						40	50	100-313	100-200				
LPM3-80C-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 14.1	2/0	C	70
						40	75	100-469	100-300				
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 14.1	2/0	C	54
						40	25	100-157	100-100				
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 14.1	2/0	C	62
						40	50	100-313	100-200				
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 14.1	2/0	C	70
						40	75	100-469	100-300				
LPM3-48F-120G	208/220/240	22.2/21/19.2	44.4	3	3/6	12	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						18	120	100-750	100-480				
						24	120	100-750	100-480				

Technical Specifications (cont.)

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-48F-160G	208/220/240	29.6/28/25.6	44.4	3	4/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						18	160	100-1000	100-640				
						24	160	100-1000	100-640				
LPM3-48F-200G	208/220/240	37/35/32	44.4	3	5/6	12	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						18	200	100-1250	100-800				
						24	200	100-1250	100-800				
LPM3-48F-240G	208/220/240	44.4/42/38.4	44.4	3	6/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	240	100-1500	100-960				
						24	240	100-1500	100-960				
LPM3C48F-120G	208/220/240	22.2/21/19.2	44.4	3	3/6	12	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						18	120	100-750	100-480				
						24	120	100-750	100-480				
LPM3C48F-160G	208/220/240	29.6/28/25.6	44.4	3	4/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						18	160	100-1000	100-640				
						24	160	100-1000	100-640				
LPM3C48F-200G	208/220/240	37/35/32	44.4	3	5/6	12	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						18	200	100-1250	100-800				
						24	200	100-1250	100-800				
LPM3C48F-240G	208/220/240	44.4/42/38.4	44.4	3	6/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						18	240	100-1500	100-960				
						24	240	100-1500	100-960				
LPM3-80F-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 13.77	3/0	F	86
						40	75	100-469	100-300				
LPM3-80F-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 13.77	3/0	F	94
						40	100	100-625	100-400				
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 13.77	3/0	F	102
						40	125	100-782	100-500				
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 13.77	3/0	F	110
						40	150	100-938	100-600				
LPM3C80F-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 13.77	3/0	F	86
						40	75	100-469	100-300				
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 13.77	3/0	F	94
						40	100	100-625	100-400				

Technical Specifications (cont.)

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
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 13.77	3/0	F	102
						40	125	100-782	100-500				
LPM3C80F-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 13.77	3/0	F	110
						40	150	100-938	100-600				

For LPM3 models, 440 V:

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-48C-60H	440	5.3	15.9	3	1/3	12	70	100-438	100-280	23.1 x 12.7 x 14.1	2/0	C	54
						18	65	100-407	100-260				
						24	60	100-375	100-240				
LPM3-48C-120H	440	10.6	15.9	3	2/3	12	140	100-875	100-560	23.1 x 12.7 x 14.1	2/0	C	62
						18	130	100-813	100-520				
						24	120	100-750	100-480				
LPM3-48C-180H	440	15.9	15.9	3	3/3	12	210	100-1313	100-840	23.1 x 12.7 x 14.1	2/0	C	70
						18	195	100-1219	100-780				
						24	180	100-1125	100-720				
LPM3C48C-60H	440	5.3	15.9	3	1/3	12	70	100-438	100-280	23.1 x 12.7 x 14.1	2/0	C	54
						18	65	100-407	100-260				
						24	60	100-375	100-240				
LPM3C48C-120H	440	10.6	15.9	3	2/3	12	140	100-875	100-560	23.1 x 12.7 x 14.1	2/0	C	62
						18	130	100-813	100-520				
						24	120	100-750	100-480				
LPM3C48C-180H	440	15.9	15.9	3	3/3	12	210	100-1313	100-840	23.1 x 12.7 x 14.1	2/0	C	70
						18	195	100-1219	100-780				
						24	180	100-1125	100-720				
LPM3-80C-36H	440	5.3	15.9	3	1/3	36	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						40	36	100-225	100-144				
LPM3-80C-72H	440	10.6	15.9	3	2/3	36	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						40	72	100-450	100-288				
LPM3-80C-108H	440	15.9	15.9	3	3/3	36	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						40	108	100-675	100-432				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LP-M3C80C-36H	440	5.3	15.9	3	1/3	36	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						40	36	100-225	100-144				
LP-M3C80C-72H	440	10.6	15.9	3	2/3	36	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						40	72	100-450	100-288				
LPM3C80C-108H	440	15.9	15.9	3	3/3	36	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						40	108	100-675	100-432				
LPM3-48F-180H	440	15.9	31.8	3	3/6	12	210	100-1313	100-840	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-1219	100-780				
						24	180	100-1125	100-720				
LPM3-48F-240H	440	21.2	31.8	3	4/6	12	280	100-1750	100-1120	23.17 x 21 x 13.77	3/0	F	94
						18	260	100-1625	100-1040				
						24	240	100-1500	100-960				
LPM3-48F-300H	440	26.5	31.8	3	5/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-2000	100-1280				
						24	300	100-1875	100-1200				
LPM3-48F-320H	440	31.8	31.8	3	6/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-2000	100-1280				
						24	320	100-2000	100-1280				
LPM3C48F-180H	440	15.9	31.8	3	3/6	12	210	100-1313	100-840	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-1219	100-780				
						24	180	100-1125	100-720				
LPM3C48F-240H	440	21.2	31.8	3	4/6	12	280	100-1750	100-1120	23.17 x 21 x 13.77	3/0	F	94
						18	260	100-1625	100-1040				
						24	240	100-1500	100-960				
LPM3C48F-300H	440	26.5	31.8	3	5/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-2000	100-1280				
						24	300	100-1875	100-1200				
LPM3C48F-320H	440	31.8	31.8	3	6/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-2000	100-1280				
						24	320	100-2000	100-1280				

Technical Specifications (cont.)

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-80F-108H	440	15.9	31.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						40	108	100-675	100-432				
LPM3-80F-144H	440	21.2	31.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						40	144	100-900	100-576				
LPM3-80F-180H	440	26.5	31.8	3	5/6	36	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						40	180	100-1125	100-720				
LPM3-80F-216H	440	31.8	31.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						40	216	100-1350	100-864				
LPM3C80F-108H	440	15.9	31.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						40	108	100-675	100-432				
LPM3C80F-144H	440	21.2	31.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						40	144	100-900	100-576				
LPM3C80F-180H	440	26.5	31.8	3	5/6	36	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						40	180	100-1125	100-720				
LPM3C80F-216H	440	31.8	31.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						40	216	100-1350	100-864				

For LPM3 models, 480 V:

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-48C-60Y	480	4.8	14.4	3	1/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	54
						18	80	100-500	100-320				
						24	60	100-375	100-240				
LPM3-48C-120Y	480	9.6	14.4	3	2/3	12	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	C	62
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
LPM3-48C-180Y	480	14.4	14.4	3	3/3	12	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	C	70
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				

Technical Specifications (cont.)

Model Number	AC Input			DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range			
LPM3C48C-60Y	480	4.8	14.4	3	1/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	54
						18	80	100-500	100-320				
						24	60	100-375	100-240				
LPM3C48C-120Y	480	9.6	14.4	3	2/3	12	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	C	62
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
LPM3C48C-180Y	480	14.4	14.4	3	3/3	12	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	C	70
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				
LPM3-80C-36Y	480	4.8	14.4	3	1/3	36	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						40	36	100-225	100-144				
LPM3-80C-72Y	480	9.6	14.4	3	2/3	36	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						40	72	100-450	100-288				
LPM3-80C-108Y	480	14.4	14.4	3	3/3	36	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						40	108	100-675	100-432				
LP-M3C80C-36Y	480	4.8	14.4	3	1/3	36	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						40	36	100-225	100-144				
LP-M3C80C-72Y	480	9.6	14.4	3	2/3	36	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						40	72	100-450	100-288				
LPM3C80C-108Y	480	14.4	14.4	3	3/3	36	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						40	108	100-675	100-432				
LPM3-48F-180Y	480	14.4	28.8	3	3/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				
LPM3-48F-240Y	480	19.2	28.8	3	4/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-2000	100-1280				
						24	240	100-1500	100-960				
LPM3-48F-300Y	480	24	28.8	3	5/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-2000	100-1280				
						24	300	100-1875	100-1200				
LPM3-48F-320Y	480	28.8	28.8	3	6/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-2000	100-1280				
						24	320	100-2000	100-1280				

Technical Specifications (cont.)

Model Number	AC Input				DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3C48F-180Y	480	14.4	28.8	3	3/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				
LPM3C48F-240Y	480	19.2	28.8	3	4/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-2000	100-1280				
						24	240	100-1500	100-960				
LPM3C48F-300Y	480	24	28.8	3	5/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-2000	100-1280				
						24	300	100-1875	100-1200				
LPM3C48F-320Y	480	28.8	28.8	3	6/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-2000	100-1280				
						24	320	100-2000	100-1280				
LPM3-80F-108Y	480	14.4	28.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						40	108	100-675	100-432				
LPM3-80F-144Y	480	19.2	28.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						40	144	100-900	100-576				
LPM3-80F-180Y	480	24	28.8	3	5/6	36	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						40	180	100-1125	100-720				
LPM3-80F-216Y	480	28.8	28.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						40	216	100-1350	100-864				
LPM3C80F-108Y	480	14.4	28.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						40	108	100-675	100-432				
LPM3C80F-144Y	480	19.2	28.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						40	144	100-900	100-576				
LPM3C80F-180Y	480	24	28.8	3	5/6	36	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						40	180	100-1125	100-720				
LPM3C80F-216Y	480	28.8	28.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						40	216	100-1350	100-864				

Technical Specifications (cont.)

For LPM3 models, 600 V:

Model Number	AC Input				DC Output			Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-48C-60C	600	3.8	11.4	3	1/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	54
						18	80	100-500	100-320				
						24	60	100-375	100-240				
LPM3-48C-120C	600	7.6	11.4	3	2/3	12	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	C	62
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
LPM3-48C-180C	600	11.4	11.4	3	3/3	12	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	C	70
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				
LPM3-48F-180C	600	11.4	22.8	3	3/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
						18	240	100-1500	100-960				
						24	180	100-1125	100-720				
LPM3-48F-240C	600	15.2	22.8	3	4/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94
						18	320	100-2000	100-1280				
						24	240	100-1500	100-960				
LPM3-48F-300C	600	19	22.8	3	5/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	102
						18	320	100-2000	100-1280				
						24	300	100-1875	100-1200				
LPM3-48F-320C	600	22.8	22.8	3	6/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	110
						18	320	100-2000	100-1280				
						24	320	100-2000	100-1280				
LPM3-80C-108C	600	3.8	11.4	3	1/3	36	40	100-250	100-160	23.1 x 12.7 x 14.1	2/0	C	54
						40	36	100-225	100-144				
LPM3-80C-144C	600	7.6	11.4	3	2/3	36	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	62
						40	72	100-450	100-288				
LPM3-80C-180C	600	11.4	11.4	3	3/3	36	120	100-750	100-480	23.1 x 12.7 x 14.1	2/0	C	70
						40	108	100-675	100-432				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				Battery Ah Rating Ranges		Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	8 hour Capacity Range	Opportunity Capacity Range				
LPM3-80F-108C	600	11.4	22.8	3	3/6	36	120	100-750	100-480	23.17 x 21 x 13.77	3/0	F	86
						40	108	100-675	100-432				
LPM3-80F-144C	600	15.2	22.8	3	4/6	36	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	94
						40	144	100-900	100-576				
LPM3-80F-180C	600	19	22.8	3	5/6	36	200	100-1250	100-800	23.17 x 21 x 13.77	3/0	F	102
						40	180	100-1125	100-720				
LPM3-80F-216C	600	22.8	22.8	3	6/6	36	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	110
						40	216	100-1350	100-864				

For LPL3 models, 208/220/240 V:

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-48F-40G	208/220/240	7.4/7/6.4	44.4	3	1/6	12 18 24	40	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	72
LPL3-48F-80G	208/220/240	14.8/14/12.8	44.4	3	2/6	12 18 24	80	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	80
LPL3-48F-120G	208/220/240	22.2/21/19.2	44.4	3	3/6	12 18 24	120	0-60	0-90	0-120	23.2 x 21 x 13.8	3/0	F	88
LPL3-48F-160G	208/220/240	29.6/28/25.6	44.4	3	4/6	12 18 24	160	0-80	0-150	0-160	23.2 x 21 x 13.8	3/0	F	96
LPL3-48F-200G	208/220/240	37/35/32	44.4	3	5/6	12 18 24	200	0-100	0-150	0-200	23.2 x 21 x 13.8	3/0	F	104
LPL3-48F-240G	208/220/240	44.2/42/38.4	44.4	3	6/6	12 18 24	240	0-120	0-180	0-240	23.2 x 21 x 13.8	3/0	F	112

Technical Specifications (cont.)

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-48L-200G	208/220/240	37/35/32	59.2	3	5/12	12 18 24	200	0-100	0-150	0-200	43.45 x 24 x 16	3/0	L	194
LPL3-48L-240G	208/220/240	44.4/42/38.4	59.2	3	6/12	24 36 48	240	0-120	0-180	0-240	43.45 x 24 x 16	3/0	L	202
LPL3-48L-280G	208/220/240	51.8/49/44.8	59.2	3	7/12	24 36 48	280	0-140	100-560	0-280	43.45 x 24 x 16	3/0	L	210
LPL3-48L-320G	208/220/240	59.2/56/51.2	59.2	3	8/12	24 36 48	320	0-160	0-240	0-320	43.45 x 24 x 16	3/0	L	218
LPL3-48L-360GP	208/220/240	66.6/63/57.6	88.8	3	9/12	24 36 48	360	0-180	0-270	0-360	43.45 x 24 x 16	Dual 3/0	L	226
LPL3-48L-400GP	208/220/240	74/70/64	88.8	3	10/12	24 36 48	400	0-200	0-300	0-400	43.45 x 24 x 16	Dual 3/0	L	234
LPL3-48L-440GP	208/220/240	81.4/77/70.4	88.8	3	11/12	24 36 48	440	0-220	0-330	0-440	43.45 x 24 x 16	Dual 3/0	L	242
LPL3-48L-480GP	208/220/240	88.8/84/76.8	88.8	3	12/12	24 18 24	480	0-240	0-360	0-480	43.45 x 24 x 16	Dual 3/0	L	250
LPL3-80L-175G	208/220/240	53.9/51.1/46.9	92.4	3	7/12	36 40	175	0 - 88	0 - 131	0 - 175	43.45 x 24 x 16	3/0	L	210
LPL3-80L-200G	208/220/240	61.6/58.4/53.6	92.4	3	8/12	36 40	200	0 - 100	0 - 150	0 - 200	43.45 x 24 x 16	3/0	L	218
LPL3-80L-225G	208/220/240	69.3/65.7/60.3	92.4	3	9/12	36 40	225	0 - 113	0 - 169	0 - 225	43.45 x 24 x 16	3/0	L	226
LPL3-80L-250G	208/220/240	77/73/67	92.4	3	10/12	36 40	250	0 - 125	0 - 188	0 - 250	43.45 x 24 x 16	3/0	L	234
LPL3-80L-275G	208/220/240	84.7/80.3/73.7	92.4	3	11/12	36 40	275	0 - 138	0 - 206	0 - 275	43.45 x 24 x 16	3/0	L	242
LPL3-80L-300G	208/220/240	92.4/87.6/80.4	92.4	3	12/12	36 40	300	0 - 150	0 - 225	0 - 300	43.45 x 24 x 16	3/0	L	250

Technical Specifications (cont.)

For LPL3 models, 440 V:

Model Number	AC Input				DC Output							Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)					
LPL3-48C-60H	440	5.3	15.9	3	1 / 3	12	70	N/A	N/A	N/A		23.5 x 12.8 x 14.1	2/0	C	54
						18	65	111 - 130	N/A	N/A					
						24	60	74 - 120	74 - 80	N/A					
LPL3-48C-120H	440	10.6	15.9	3	2 / 3	12	140	185 - 280	185 - 187	N/A		23.5 x 12.8 x 14.1	2/0	C	62
						18	130	111 - 260	111 - 176	111 - 130					
						24	120	74 - 240	74 - 160	74 - 120					
LPL3-48C-180H	440	15.9	15.9	3	3 / 3	12	210	185 - 320	185 - 280	185 - 210		23.5 x 12.8 x 14.1	2/0	C	70
						18	195	111 - 320	111 - 260	111 - 195					
						24	180	74 - 320	74 - 240	74 - 180					
LPL3-48F-60H	440	5.3	31.8	3	1 / 6	12	70	N/A	N/A	N/A		23.2 x 21 x 13.8	3/0	F	72
						18	65	111 - 130	N/A	N/A					
						24	60	74 - 120	74 - 80	N/A					
LPL3-48F-120H	440	10.6	31.8	3	2 / 6	12	140	185 - 280	185 - 187	N/A		23.2 x 21 x 13.8	3/0	F	80
						18	130	111 - 260	111 - 176	111 - 130					
						24	120	74 - 240	74 - 160	74 - 120					
LPL3-48F-180H	440	15.9	31.8	3	3 / 6	12	210	185 - 320	185 - 280	185 - 210		23.2 x 21 x 13.8	3/0	F	88
						18	195	111 - 320	111 - 260	111 - 195					
						24	180	74 - 320	74 - 240	74 - 180					
LPL3-48F-240H	440	21.2	31.8	3	4 / 6	12	280	185 - 560	185 - 373	185 - 280		23.2 x 21 x 13.8	3/0	F	96
						18	260	111 - 520	111 - 347	111 - 260					
						24	240	74 - 480	74 - 320	74 - 240					
LPL3-48F-300H	440	26.5	31.8	3	5 / 6	12	320	185 - 640	185 - 426	185 - 320		23.2 x 21 x 13.8	3/0	F	104
						18	320	111 - 640	111 - 426	111 - 320					
						24	300	74 - 600	74 - 400	74 - 300					
LPL3-48F-300HP	440	26.5	31.8	3	5 / 6	12	350	185 - 640	185 - 467	185 - 320		23.2 x 21 x 13.8	3/0	F	104
						18	325	111 - 640	111 - 433	111 - 320					
						24	300	74 - 600	74 - 400	74 - 300					
LPL3-48F-360HP	440	31.8	31.8	3	6 / 6	12	420	185 - 840	185 - 560	185 - 420		23.2 x 21 x 13.8	3/0	F	112
						18	390	111 - 580	111 - 520	111 - 390					
						24	360	74 - 720	74 - 480	74 - 360					

Technical Specifications (cont.)

Model Number	AC Input				DC Output			50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-48L-360HP	440	31.8	63.6	3	6 / 12	12	420	185 - 840	185 - 560	185 - 420	43.5 x 24 x 16	3/0	L	202
						18	390	111 - 580	111 - 520	111 - 390				
						24	360	74 - 720	74 - 480	74 - 360				
LPL3-48L-420HP	440	37.1	63.6	3	7/ 12	12	490	185 - 980	185 - 653	185 - 490	43.5 x 24 x 16	3/0	L	210
						18	455	111 - 910	111 - 606	111 - 455				
						24	420	74 - 840	74 - 560	74 - 420				
LPL3-48L-480HP	440	42.4	63.6	3	8/ 12	12	560	185 - 1120	185 - 746	185 - 560	43.5 x 24 x 16	3/0	L	218
						18	520	111 - 1040	111 - 693	111 - 520				
						24	480	74 - 960	74 - 640	74 - 480				
LPL3-48L-540HP	440	47.7	63.6	3	9/ 12	12	630	185 - 1260	185 - 840	185 - 630	43.5 x 24 x 16	3/0	L	226
						18	585	111 - 1170	111 - 780	111 - 585				
						24	540	74 - 1080	74 - 720	74- 540				
LPL3-48L-600HP	440	53	63.6	3	10/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	234
						18	640	111 - 1280	111 - 853	111 - 640				
						24	600	74 - 1200	74 - 800	74 - 600				
LPL3-48L-640HP	440	58.3	63.6	3	11/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	242
						18	640	111 - 1280	111 - 853	111 - 640				
						24	640	74 - 1280	74 - 853	74 - 640				
LPL3-80C-36Y	440	5.3	15.9	3	1 / 3	36	40	N/A	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	54
						40	36	N/A	N/A	N/A				
LPL3-80C-72Y	440	10.6	15.9	3	2 / 3	36	80	111 - 160	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	62
						40	72	111- 144	N/A	N/A				
LPL3-80C-108Y	440	15.9	15.9	3	3 / 3	36	120	111 - 240	111 - 160	111 - 120	23.5 x 12.8 x 14.1	2/0	C	70
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-36Y	440	5.3	31.8	3	1 / 6	36	40	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	72
						40	36	N/A	N/A	N/A				
LPL3-80F-72Y	440	10.6	31.8	3	2 / 6	36	80	111 - 160	N/A	N/A	23.2 x 21 x 13.8	3/0	F	80
						40	72	111- 144	N/A	N/A				
LPL3-80F-108Y	440	15.9	31.8	3	3 / 6	36	120	111 - 240	111 - 160	111 - 120	23.2 x 21 x 13.8	3/0	F	88
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-144Y	440	21.2	31.8	3	4 / 6	36	160	111 - 320	111 - 213	111 - 160	23.2 x 21 x 13.8	3/0	F	96
						40	144	111 - 288	111 - 192	111 - 144				
LPL3-80F-180Y	440	26.5	31.8	3	5 / 6	36	200	111 - 400	111 - 267	111 - 200	23.2 x 21 x 13.8	3/0	F	104
						40	180	111 - 360	111 - 240	111 - 180				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-80F-216Y	440	31.8	31.8	3	6 / 6	36	240	111 - 480	111 - 320	111 - 240	23.2 x 21 x 13.8	3/0	F	112
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-216H	440	31.8	63.6	3	6 / 12	36	240	111 - 480	111 - 320	111 - 240	43.5 x 24 x 16	3/0	L	202
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-252H	440	37.1	63.6	3	7/ 12	36	280	111 - 560	111 - 373	111 - 280	43.5 x 24 x 16	3/0	L	210
						40	252	111 - 504	111 - 336	111 - 252				
LPL3-80L-288H	440	42.4	63.6	3	8/ 12	36	320	111 - 640	111 - 427	111 - 320	43.5 x 24 x 16	3/0	L	218
						40	288	111- 576	111 - 384	111 - 288				
LPL3-80L-324H	440	47.7	63.6	3	9/ 12	36	320	111 - 640	11 - 427	111 - 320	43.5 x 24 x 16	3/0	L	226
						40	320	111 - 640	111 - 427	111 - 320				
LPL3-80L-324HP	440	47.7	63.6	3	9/ 12	36	360	111 - 720	111 - 480	111 - 360	43.5 x 24 x 16	3/0	L	226
						40	324	111 - 648	111 - 432	111 - 324				
LPL3-80L-360HP	440	53	63.6	3	10/ 12	36	400	111 - 800	111 - 533	111 - 400	43.5 x 24 x 16	3/0	L	234
						40	360	111 - 720	111 - 480	111 - 360				
LPL3-80L-396HP	440	58.3	63.6	3	11/ 12	36	440	111 - 880	111 - 587	111 - 440	43.5 x 24 x 16	3/0	L	242
						40	396	111 - 792	111 - 528	111 - 396				
LPL3-80L-396HP	440	63.6	63.6	3	12/ 12	36	480	111 - 960	111 - 640	111 - 480	43.5 x 24 x 16	3/0	L	250
						40	432	111 - 864	111 - 576	111 - 432				

For LPL3 models, 480 V:

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-48C-60Y	480	4.8	14.4	3	1/3	12	80	N/A	N/A	N/A	23.1 x 12.7 x 14.1	2/0	C	54
						18	80	111 - 160	N/A	N/A				
						24	60	74 - 120	74 - 80	N/A				
LPL3-48C-120Y	480	9.6	14.4	3	2/3	12	160	185 - 320	185 - 213	N/A	23.1 x 12.7 x 14.1	2/0	C	62
						18	160	111 - 320	111 - 213	111 - 160				
						24	120	74 - 240	74 - 160	74 - 120				
LPL3-48C-180Y	480	14.4	14.4	3	3/3	12	240	185 - 480	185 - 320	185 - 240	23.1 x 12.7 x 14.1	2/0	C	70
						18	240	111 - 480	111 - 320	111 - 240				
						24	180	74 - 360	74 - 240	74 - 180				

Technical Specifications (cont.)

Model Number	AC Input			DC Output							Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)				
LPL3-48F-180Y	480	14.4	28.8	3	3/6	12	240	185 - 480	185 - 320	185 - 240	23.17 x 21 x 13.77	3/0	F	86
						18	240	111 - 480	111 - 320	111 - 240				
						24	180	74 - 360	74 - 240	74 - 180				
LPL3-48F-240Y	480	19.2	28.8	3	4/6	12	320	185 - 640	185 - 427	185 - 320	23.17 x 21 x 13.77	3/0	F	94
						18	320	111 - 640	111 - 427	111 - 320				
						24	240	74 - 480	74 - 320	74 - 240				
LPL3-48F-300Y	480	24	28.8	3	5/6	12	320	185 - 640	185 - 427	185 - 320	23.17 x 21 x 13.77	3/0	F	102
						18	320	111 - 640	111 - 427	111 - 320				
						24	300	74 - 600	74 - 400	74 - 300				
LPL3-48F-300YP	480	24	28.8	3	5/6	12	320	185 - 640	185 - 427	185 - 320	23.17 x 21 x 13.77	3/0	F	102
						18	320	111 - 640	111 - 427	111 - 320				
						24	300	74 - 600	74 - 400	74 - 300				
LPL3-48F-360YP	480	28.8	28.8	3	6/6	12	480	185 - 960	185 - 640	185 - 480	23.17 x 21 x 13.77	3/0	F	110
						18	480	111 - 960	111 - 640	111 - 480				
						24	360	74 - 720	74 - 480	74 - 360				
LPL3-48L-360YP	480	28.8	28.8	3	6 / 12	12	480	185 - 960	185 - 640	185 - 480	43.5 x 24 x 16	3/0	L	202
						18	480	111 - 960	111 - 640	111 - 480				
						24	360	74 - 720	74 - 480	74 - 360				
LPL3-48L-420YP	480	33.6	57.6	3	7/ 12	12	560	185 - 1020	185 - 747	185 - 560	43.5 x 24 x 16	3/0	L	210
						18	560	111 - 1020	111 - 747	111 - 560				
						24	420	74 - 840	74 - 560	74 - 420				
LPL3-48L-480YP	480	38.4	57.6	3	8/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	218
						18	640	111 - 1280	111 - 853	111 - 640				
						24	480	74 - 960	74 - 640	74 - 480				
LPL3-48L-540YP	480	43.2	57.6	3	9/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	218
						18	640	111 - 1280	111 - 853	111 - 640				
						24	540	74 - 1080	74 - 720	74- 540				
LPL3-48L-600YP	480	48	57.6	3	10/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	234
						18	640	111 - 1280	111 - 853	111 - 640				
						24	600	74 - 1200	74 - 800	74 - 600				
LPL3-48L-640YP	480	52.8	57.6	3	11/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	242
						18	640	111 - 1280	111 - 853	111 - 640				
						24	640	74 - 1280	74 - 853	74 - 640				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-80C-36Y	480	4.8	14.4	3	1 / 3	36	40	N/A	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	54
						40	36	N/A	N/A	N/A				
LPL3-80C-72Y	480	9.6	14.4	3	2 / 3	36	80	111 - 160	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	62
						40	72	111- 144	N/A	N/A				
LPL3-80C-108Y	480	14.4	14.4	3	3 / 3	36	120	111 - 240	111 - 160	111 - 120	23.5 x 12.8 x 14.1	2/0	C	70
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-36Y	480	4.8	28.8	3	1 / 6	36	40	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	72
						40	36	N/A	N/A	N/A				
LPL3-80F-72Y	480	9.6	28.8	3	2 / 6	36	80	111 - 160	N/A	N/A	23.2 x 21 x 13.8	3/0	F	80
						40	72	111- 144	N/A	N/A				
LPL3-80F-108Y	480	14.4	28.8	3	3 / 6	36	120	111 - 240	111 - 160	111 - 120	23.2 x 21 x 13.8	3/0	F	88
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-144Y	480	19.2	28.8	3	4 / 6	36	160	111 - 320	111 - 213	111 - 160	23.2 x 21 x 13.8	3/0	F	96
						40	144	111 - 288	111 - 192	111 - 144				
LPL3-80F-180Y	480	24	28.8	3	5 / 6	36	200	111 - 400	111 - 267	111 - 200	23.2 x 21 x 13.8	3/0	F	104
						40	180	111 - 360	111 - 240	111 - 180				
LPL3-80F-216Y	480	28.8	28.8	3	6 / 6	36	240	111 - 480	111 - 320	111 - 240	23.2 x 21 x 13.8	3/0	F	112
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-216Y	480	28.8	57.6	3	6 / 12	36	240	111 - 480	111 - 320	111 - 240	43.5 x 24 x 16	3/0	L	202
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-252Y	480	33.6	57.6	3	7/ 12	36	280	111 - 560	111 - 373	111 - 280	43.5 x 24 x 16	3/0	L	210
						40	252	111 - 504	111 - 336	111 - 252				
LPL3-80L-288Y	480	38.4	57.6	3	8/ 12	36	320	111 - 640	111 - 427	111 - 320	43.5 x 24 x 16	3/0	L	218
						40	288	111- 576	111 - 384	111 - 288				
LPL3-80L-324Y	480	43.2	57.6	3	9/ 12	36	320	111 - 640	11 - 427	111 - 320	43.5 x 24 x 16	3/0	L	226
						40	320	111 - 640	111 - 427	111 - 320				
LPL3-80L-324YP	480	43.2	57.6	3	9/ 12	36	360	111 - 720	111 - 480	111 - 360	43.5 x 24 x 16	3/0	L	226
						40	324	111 - 648	111 - 432	111 - 324				
LPL3-80L-360YP	480	48	57.6	3	10/ 12	36	400	111 - 800	111 - 533	111 - 400	43.5 x 24 x 16	3/0	L	234
						40	360	111 - 720	111 - 480	111 - 360				
LPL3-80L-396YP	480	52.8	57.6	3	11/ 12	36	440	111 - 880	111 - 587	111 - 440	43.5 x 24 x 16	3/0	L	242
						40	396	111 - 792	111 - 528	111 - 396				
LPL3-80L-432YP	480	57.6	57.6	3	12/ 12	36	480	111 - 960	111 - 640	111 - 480	43.5 x 24 x 16	3/0	L	250
						40	432	111 - 864	111 - 576	111 - 432				

Technical Specifications (cont.)

For LPL3 models, 600 V:

Model Number	AC Input			DC Output									
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LPL3-48C-60C	600	3.8	11.4	3	1 / 3	12	80	N/A	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	54
						18	80	111 - 160	N/A	N/A				
						24	60	74 - 120	74 - 80	N/A				
LPL3-48C-120C	600	7.6	11.4	3	2 / 3	12	160	185 - 320	185 - 213	N/A	23.5 x 12.8 x 14.1	2/0	C	62
						18	160	111 - 320	111 - 213	111 - 160				
						24	120	74 - 240	74 - 160	74 - 120				
LPL3-48C-180C	600	11.4	11.4	3	3 / 3	12	240	185 - 480	185 - 320	185 - 240	23.5 x 12.8 x 14.1	2/0	C	70
						18	240	111 - 480	111 - 320	111 - 240				
						24	180	74 - 360	74 - 240	74 - 180				
LPL3-48F-60C	600	3.8	22.8	3	1 / 6	12	80	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	72
						18	80	111 - 160	N/A	N/A				
						24	60	74 - 120	74 - 80	N/A				
LPL3-48F-120C	600	7.6	22.8	3	2 / 6	12	160	185 - 320	185 - 213	N/A	23.2 x 21 x 13.8	3/0	F	80
						18	160	111 - 320	111 - 213	111 - 160				
						24	120	74 - 240	74 - 160	74 - 120				
LPL3-48F-180C	600	11.4	22.8	3	3 / 6	12	240	185 - 480	185 - 320	185 - 240	23.2 x 21 x 13.8	3/0	F	88
						18	240	111 - 480	111 - 320	111 - 240				
						24	180	74 - 360	74 - 240	74 - 180				
LPL3-48F-240C	600	15.2	22.8	3	4 / 6	12	320	185 - 640	185 - 427	185 - 320	23.2 x 21 x 13.8	3/0	F	96
						18	320	111 - 640	111 - 427	111 - 320				
						24	240	74 - 480	74 - 320	74 - 240				
LPL3-48F-300C	600	19	22.8	3	5 / 6	12	320	185 - 640	185 - 427	185 - 320	23.2 x 21 x 13.8	3/0	F	104
						18	320	111 - 640	111 - 427	111 - 320				
						24	300	74 - 600	74 - 400	74 - 300				
LPL3-48F-300CP	600	19	22.8	3	5 / 6	12	400	185 - 800	185 - 533	185 - 400	23.2 x 21 x 13.8	3/0	F	104
						18	400	111 - 800	111 - 533	111 - 400				
						24	300	74 - 600	74 - 400	74 - 300				
LPL3-48F-360CP	600	22.8	22.8	3	6 / 6	12	480	185 - 960	185 - 640	185 - 480	23.2 x 21 x 13.8	3/0	F	112
						18	480	111 - 960	111 - 640	111 - 480				
						24	360	74 - 720	74 - 480	74 - 360				
LPL3-48L-360CP	600	22.8	45.6	3	6 / 12	12	480	185 - 960	185 - 640	185 - 480	43.5 x 24 x 16	3/0	L	202
						18	480	111 - 960	111 - 640	111 - 480				
						24	360	74 - 720	74 - 480	74 - 360				

Technical Specifications (cont.)

Model Number	AC Input			DC Output										
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)	50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
LPL3-48L-420CP	600	26.6	45.6	3	7/ 12	12	560	185 - 1020	185 - 747	185 - 560	43.5 x 24 x 16	3/0	L	210
						18	560	111 - 1020	111 - 747	111 - 560				
						24	420	74 - 840	74 - 560	74 - 420				
LPL3-48L-480CP	600	30.4	45.6	3	8/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	218
						18	640	111 - 1280	111 - 853	111 - 640				
						24	480	74 - 960	74 - 640	74 - 480				
LPL3-48L-540CP	600	34.2	45.6	3	9/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	226
						18	640	111 - 1280	111 - 853	111 - 640				
						24	540	74 - 1080	74 - 720	74- 540				
LPL3-48L-600CP	600	38	45.6	3	10/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	234
						18	640	111 - 1280	111 - 853	111 - 640				
						24	600	74 - 1200	74 - 800	74 - 600				
LPL3-48L-640CP	600	41.8	45.6	3	11/ 12	12	640	185 - 1280	185 - 853	185 - 640	43.5 x 24 x 16	3/0	L	242
						18	640	111 - 1280	111 - 853	111 - 640				
						24	640	74 - 1280	74 - 853	74 - 640				
LPL3-80C-36C	600	3.8	11.4	3	1 / 3	36	40	N/A	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	54
						40	36	N/A	N/A	N/A				
LPL3-80C-72C	600	7.6	11.4	3	2 / 3	36	80	111 - 160	N/A	N/A	23.5 x 12.8 x 14.1	2/0	C	62
						40	72	111- 144	N/A	N/A				
LPL3-80C-108C	600	11.4	11.4	3	3 / 3	36	120	111 - 240	111 - 160	111 - 120	23.5 x 12.8 x 14.1	2/0	C	70
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-36C	600	3.8	22.8	3	1 / 6	36	40	N/A	N/A	N/A	23.2 x 21 x 13.8	3/0	F	72
						40	36	N/A	N/A	N/A				
LPL3-80F-72C	600	7.6	22.8	3	2 / 6	36	80	111 - 160	N/A	N/A	23.2 x 21 x 13.8	3/0	F	80
						40	72	111- 144	N/A	N/A				
LPL3-80F-108C	600	11.4	22.8	3	3 / 6	36	120	111 - 240	111 - 160	111 - 120	23.2 x 21 x 13.8	3/0	F	88
						40	108	111 - 216	111 - 144	N/A				
LPL3-80F-144C	600	15.2	22.8	3	4 / 6	36	160	111 - 320	111 - 213	111 - 160	23.2 x 21 x 13.8	3/0	F	96
						40	144	111 - 288	111 - 192	111 - 144				
LPL3-80F-180C	600	19	22.8	3	5 / 6	36	200	111 - 400	111 - 267	111 - 200	23.2 x 21 x 13.8	3/0	F	104
						40	180	111 - 360	111 - 240	111 - 180				

Technical Specifications (cont.)

Model Number	AC Input			DC Output				50% start rate (Ah)	75% start rate (Ah)	100% start rate (Ah)	Dimensions H x W x D (inches)	Charger Cable (AWG)	Cabinet Type	Weight (lbs.)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)							
LPL3-80F-216C	600	22.8	22.8	3	6 / 6	36	240	111 - 480	111 - 320	111 - 240	23.2 x 21 x 13.8	3/0	F	112
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-216C	600	22.8	45.6	3	6 / 12	36	240	111 - 480	111 - 320	111 - 240	43.5 x 24 x 16	3/0	L	202
						40	216	111 - 432	111 - 288	111 - 216				
LPL3-80L-252C	600	26.6	45.6	3	7/ 12	36	280	111 - 560	111 - 373	111 - 280	43.5 x 24 x 16	3/0	L	210
						40	252	111 - 504	111 - 336	111 - 252				
LPL3-80L-288C	600	30.4	45.6	3	8/ 12	36	320	111 - 640	111 - 427	111 - 320	43.5 x 24 x 16	3/0	L	218
						40	288	111- 576	111 - 384	111 - 288				
LPL3-80L-324C	600	34.2	45.6	3	9/ 12	36	320	111 - 640	11 - 427	111 - 320	43.5 x 24 x 16	3/0	L	226
						40	320	111 - 640	111 - 427	111 - 320				
LPL3-80L-324CP	600	34.2	45.6	3	9/ 12	36	360	111 - 720	111 - 480	111 - 360	43.5 x 24 x 16	3/0	L	226
						40	324	111 - 648	111 - 432	111 - 324				
LPL3-80L-360CP	600	38	45.6	3	10/ 12	36	400	111 - 800	111 - 533	111 - 400	43.5 x 24 x 16	3/0	L	234
						40	360	111 - 720	111 - 480	111 - 360				
LPL3-80L-396CP	600	41.8	45.6	3	11/ 12	36	440	111 - 880	111 - 587	111 - 440	43.5 x 24 x 16	3/0	L	242
						40	396	111 - 792	111 - 528	111 - 396				
LPL3-80L-396CP	600	45.6	45.6	3	12/ 12	36	480	111 - 960	111 - 640	111 - 480	43.5 x 24 x 16	3/0	L	250
						40	432	111 - 864	111 - 576	111 - 432				

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