



Battery Charger

Owner's Manual

PTO™ MOD3

Models: PTOM1 / PTOM3 / PTOM3C (Standard and Flex)



For parts sales, call toll-free **1-800-409-8895** and for charger technical support, troubleshooting, and service call **1-800-251-6560**.

AM-HPTOM3-OM
Rev AB February 2020

Model:	S/N:	AC Input Voltage
Installed by		Date

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

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IMPORTANT SAFETY INSTRUCTIONS**WARNING: THE SHIPPING PALLET MUST BE REMOVED FOR PROPER AND SAFE OPERATION.**

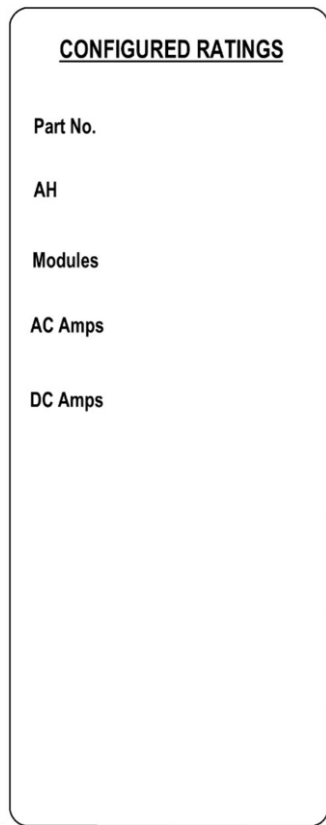
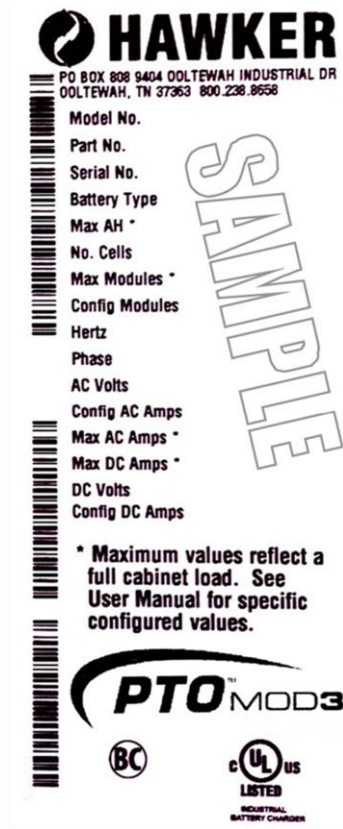
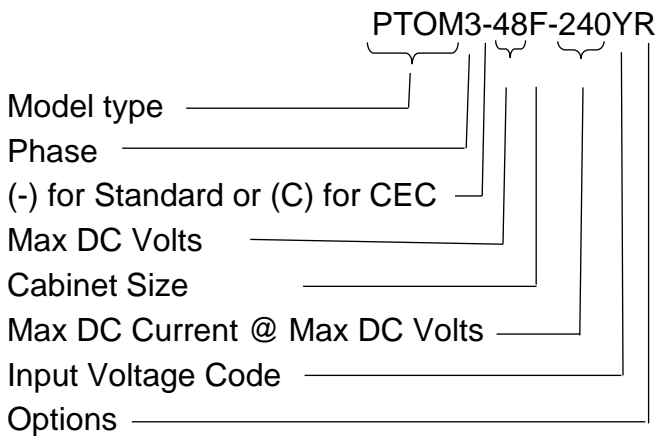
1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, **CAUTIONs** and **WARNINGs** on the battery charger, the battery and the product using the battery.
 2. This battery charger is designed to charge flooded and sealed lead-acid batteries. Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
 3. **Do not** touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
 4. During charge, batteries produce hydrogen gas which can explode if ignited. Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
 5. **Do not** connect or disconnect the battery plug while the battery is charging. Doing so will cause arcing and burning of the connector resulting in charger damage or battery explosion.
 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.
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TECHNICAL INFORMATION

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

Part Number and UL Model Number

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



Cabinet Size/Gauge Letter Codes

The following table describes the letter codes to be used in charger part numbers to indicate the DC output voltage(s) of the charger.

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

AC Line Voltage Letter Codes

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

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

Serial No.

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

Battery Type

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

Max AH

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

No. Cells

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

Max Modules

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

Config Modules

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

Hertz

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

Phase

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

AC Volts

This is the input voltage accommodated by this charger.

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

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

Config AC Amps

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

Max AC Amps

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

Max DC Amps

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

DC Volts

This is the rated DC output voltage of the charger.

Config DC Amps

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

CEC

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

**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):



INSTALLATION

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

Location

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

Wall/Floor Mount Cabinet Chargers

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

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

Electrical Connections

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

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

Connecting Input Power

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

AC Circuit Protection

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

Breaker/Fuse Chart

AC Amps (A)	Breaker/Fuse size (A)
1 – 12	15
12.1 – 16	20
16.1 – 20	25
20.1 – 24	30

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

DC Plug Polarity

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

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

Grounding the Charger

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



DESCRIPTION OF OPERATION

General

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

PTO™ 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. PTO™ MOD3 chargers adapt to the battery's capacity and its discharge level.

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

Auto Start Charge

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

Charging Current

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

AC Power Fail

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

Series Charging

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

GLOSSARY

Charge Blockout

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

Charging Profile

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

Cold 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.

Thin Plate Pure Lead (TPPL)

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

Flex Bloc Profile

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

Flex Standard Profile

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

Equalization Charging

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

Opportunity Profile

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

Operation:

During opportunity charging the user can plug the battery in and charge it during breaks, lunch or any work stoppage time. One time per day the battery must receive a full standard recharge. The complete charge must be programmed for a delay that's long enough so that the complete charge will not occur during normal operation. 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 day of the week that the equalize charge will take place.

Standard Flooded

The profile is an IEI (constant current, constant voltage, constant current) type with a number of user configurable parameters.

Refresh Charging

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

ABBREVIATIONS AND ACRONYMS

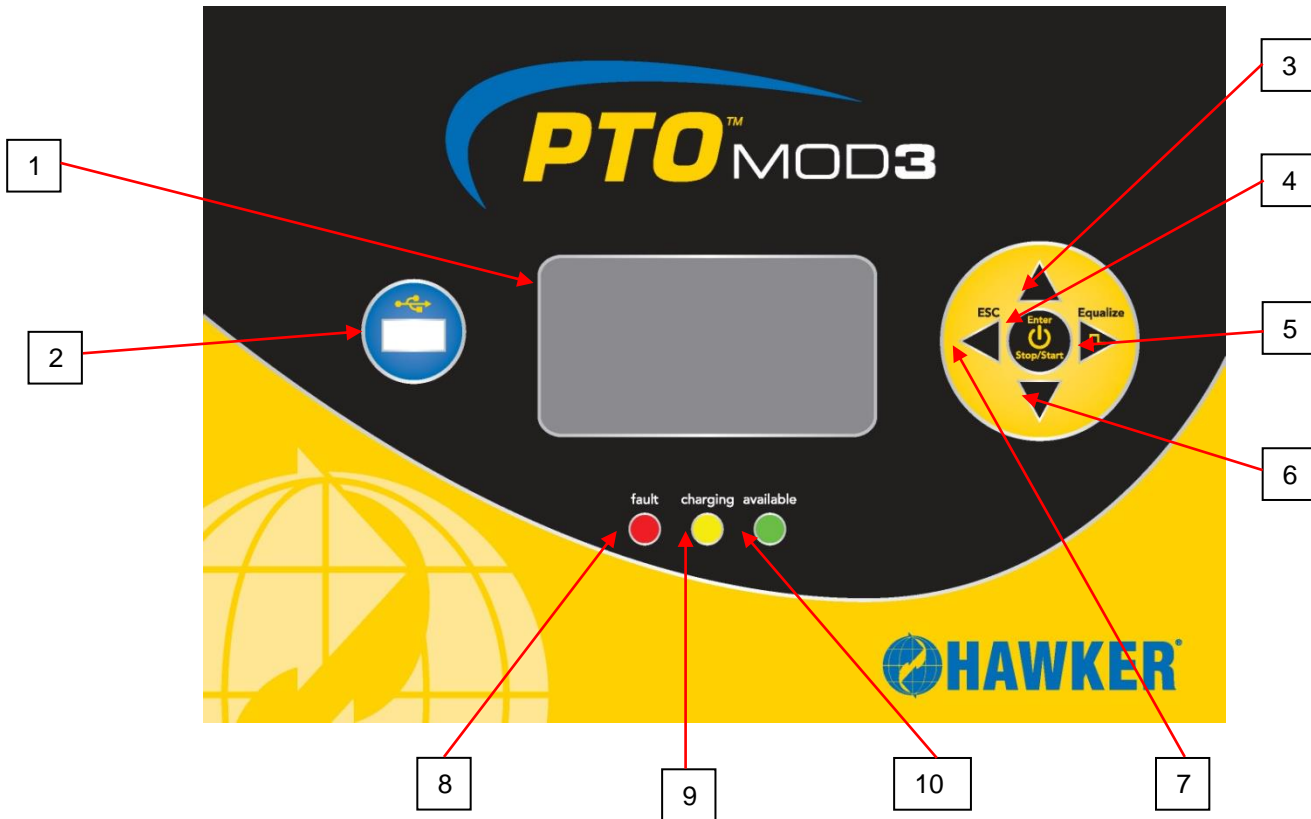
AH	Amperes-Hours
AWG	American Wire Gauge
AVAIL	Available
BBWC™	Battery Boss Wireless Communication
CEC	California Energy Commission
DoD	Depth of Discharge
GND	Ground
kW	Kilowatt
L-A	Lead Acid
LCD	Liquid Crystal Display
LED	Light Emitting Diode
TFT	Thin Film Transistor
USB	Universal Serial Bus

OPERATING INSTRUCTIONS

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

Battery voltage and Amp-hour size must be programmed into the charger for it to charge properly. Several charging profiles are available (Standard Flooded, Opportunity, Cold) based on the configuration chosen by the operator. If the charger is loaded with the Flex firmware then the selectable profiles (Flex Standard and Flex Bloc) are available. Furthermore, Equalization and Refresh charges are integrated.

Charger Control Panel



Ref	Function	Description
1.	Graphical LCD Display	Display charger operation info/Menus
2.	USB Port	Log charge data, and update firmware
3.	Navigate UP button	Navigate menus/Change values
4.	ENTER/STOP and START button	Select menu items/Enter values/Stop and restart battery charge
5.	Navigate RIGHT/EQUALIZE button	Scroll right/Start equalize or desulfation
6.	Navigation DOWN button	Navigate menus/Change values
7.	Navigation LEFT/ESC button	Enter Main Menu/Scroll left/Exit menus
8.	RED fault indicator	OFF = no fault FLASHING = fault detected
9.	YELLOW charging indicator	OFF = charge paused FLASHING = countdown ON = charging in progress
10.	GREEN charge complete indicator	OFF = charger OFF or battery not available FLASHING = charge complete ON = charger in idle mode

SETTING UP CHARGER

Idle Screen Display



Start Menu Display



Start Menu

When the charger is idle, the display shows "CONNECT BATTERY". To enter the Start Menu, press and hold <ESC>, the Start Menu is then displayed. The current menu is automatically exited after two minutes of inactivity or can be exited voluntarily by pressing the <ESC> button.

1. Select a menu option using the Up/Down buttons. The selected menu will be highlighted.
2. Display the highlighted menu screen by pressing the Enter button.
3. Return to the main menu by pressing the Esc button.

Main Menu

Navigate to the main menu by selecting Setup under the Start Menu.

SYSTEM SETUP

Date

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

Time

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

DST (Daylight Saving Time)

Enable or disable automatic clock adjustment for daylight saving 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.

Units

Selects Metric or English units for temperature, length and cable gauge.

Display Contrast

Adjusts the brightness of the LCD display.

ENTER PASSWORD

This is where the password is entered to gain access to service level menus by authorized Hawker service personnel.

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.

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

MAIN MENU**System Setup**

- Enter Password
- Change Password
- USB
- Charge Prof. Config
- Constant Current
- Equalize
- Start Charge
- Post Charge
- Charger Config

CHANGE PASSWORD

Enter the current password used to get the above menu. If the password is entered correctly the display will ask to enter a new password. After a new password is entered press the Enter button. Don't forget the new password or you will not be able to get into the charger settings anymore.

USB

Memo Data

Enables the storage of charge Memorizations to a USB data storage device (aka memory stick, thumb drive). To record memos:

1. Insert the data storage device in the USB port on the front of the charger.
2. Go to Start Menu->Enter Password->USB->Record Memo. Select "ON".
3. Display will show "Memo File: .csv"
4. The default file name is the charger serial number. Name the file and press the Enter button to save.
5. Remove data storage device from USB port. The file, in CSV format (useable with Memo Report or Excel), will be stored in the data storage device under the name "MDDHMM.CSV" where:
 - M: is for Memorization data file
 - DDD: Day of the year
 - HH: Hour of file creation
 - MM: Minute of file creation

Save Setup Params

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

Load Setup Paramrs

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

Load Control FW

Enables the updating of the chargers internal firmware. Firmware updates will be provided by Hawker.

Load Module FW

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

CHARGE PROF. CONFIG

Battery Cells

This allows the charger to be adjusted for the number of cells in the battery being charged. Allowable cell settings: 12, 18, 24, 36, 40. Scroll to find correct battery and hit Enter to select.
This is critical it be set to match the battery and match the module types in the charger.

Battery Capacity

This adjusts the battery Ah capacity used by the charger to determine start and finish rates, and must match the Ah capacity of the battery being charged. Allowable Ah sizes: 100Ah to 2500Ah.
This must match the battery Ah size because this charger does not read a BBWC nor is it automatic like the LifePlus series chargers.

Battery Temperature

Defines the average operating battery temperature before the charge. It is recommended the average electrolyte temperature be entered, especially in cold areas and when Opportunity charging. If not in Cold profile ranges allowed from 60°F to 149°F. If in Cold range is 5°F to 50°F.

Profile

For selecting the right charging profile for the application. 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 FLEX-VX.XX or if it's a flooded battery you need to have PTOM3-VX.XX in the charger. (verify 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 FW.
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 Charger Prof. Config and select Profile.
8. Select Standard, Opportunity, or Cold. Or if the charger is loaded with the Flex firmware the selectable profiles are Flex Bloc and Flex Standard.

Charge Coefficient

Change setting for California Energy Commission compliant chargers. Allowable range 1% to 9%. Should normally be at 9%.

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. Any combination of one or more days may be selected or none may be selected. Hit Enter next to day to be selected.

Delay Time Aft Chg

Sets the delay between the normal charge and the equalization charge from 0 to 24 Hrs.

Duration

Sets the equalization time from 00:05 to 23:59 (hh:mm).

NOTE:

If duration is set below 5 minutes the charge will default back to the factory setting for that profile. If not using this charger to equalize the battery, select no days of the week for equalize.

START CHARGE CONFIGURATION**Charge Delay**

- Charge Delay Type: OFF or Time After Connect
- Time After Connect: Charge is delayed for the amount of time entered

Charge Blockout

ON/OFF: sets charge block out ON or OFF.

Block out Days: Select day or days of the week to block out charge. Any combination of one or more days may be selected or none may be selected.

Block out Start – Sets block out start time. Block out End – Sets block out end time.

Cond 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. Allowed range 0 to 70%.

Daily Chg Countdown

Set time delay in minutes for charger to perform complete charge when running Opportunity profile. This setting is not used with other profiles. Allowed range 0 to 480 minutes.

POST CHARGE CONFIGURATION**Cool Down**

- Cool Down On/Off: Sets this function On or Off. If enabled the charger will not show available after a charge until the time set has expired allowing batteries to cool.
- Cool Down Time: Sets time for Cool Down.

Refresh ON/OFF

Sets refresh mode 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 CONFIG

Cabinet Bay Size

This can only be accessed by entering the higher level password. Select cabinet size to match the actual cabinet size.

Number of Modules

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

DC Cable Setup

- Cable Length: Select the length of DC cables from the charger to the battery terminals. One foot increments from 2 to 200 Ft (0.6 to 60.9 m).
- Cable Size: Sets the DC cable gauge. Selections #2, #1, 1/0, 2/0, 3/0, 4/0 AWG.

Charger Options

- Select Options: choices are Remote, BSI or Electrovalve. If using one of these charger options, that option must be enabled.
- I/O Test is used to test the functionality of each option. Use the up and down buttons to highlight the correct I/O test. **Particular Option Must be enabled first.**
 - Test Inputs: Push the appropriate button on the external device and observe state of the test box in the menu.
 - Test Outputs: Push the Up button to start the test and the Down button to stop the test.

Serial Number

The charger Serial Number can be changed. This number must match the number on the charger nameplate attached to the side of the cabinet.

Asset Number

Each charger may be assigned a unique asset number using any combination of Alpha/Numeric Characters.

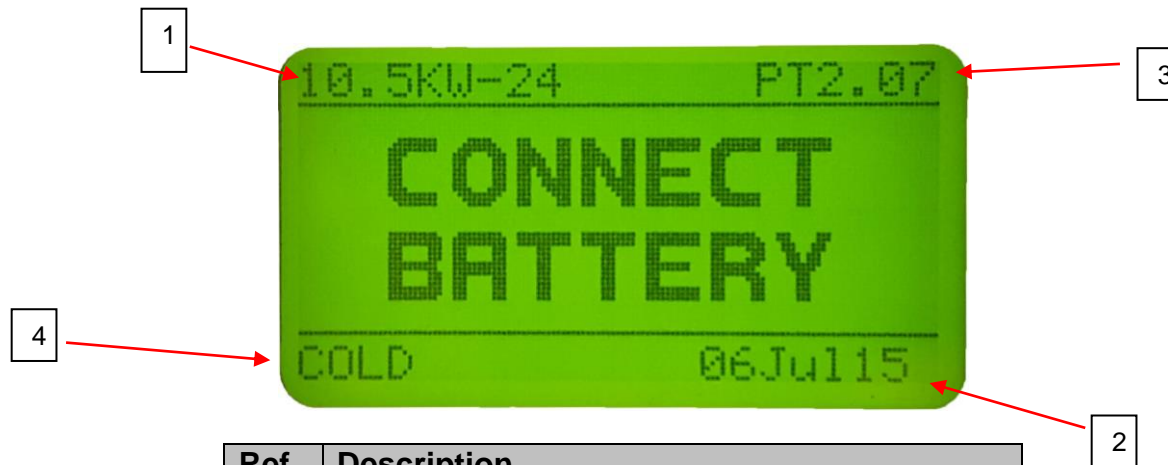
Reset Memos

Resets and clears all memorizations and status history.

WARNING: ONCE THE MEMORIZATIONS AND STATUS HAVE BEEN CLEARED THEY CANNOT BE RECOVERED.

CHARGING THE BATTERY

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

Charger Idle Display

Ref	Description
1	Charger Type
2	Firmware Version
3	System Time and Date
4	Charge Profile

Starting a Charge Cycle

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

Delayed Start

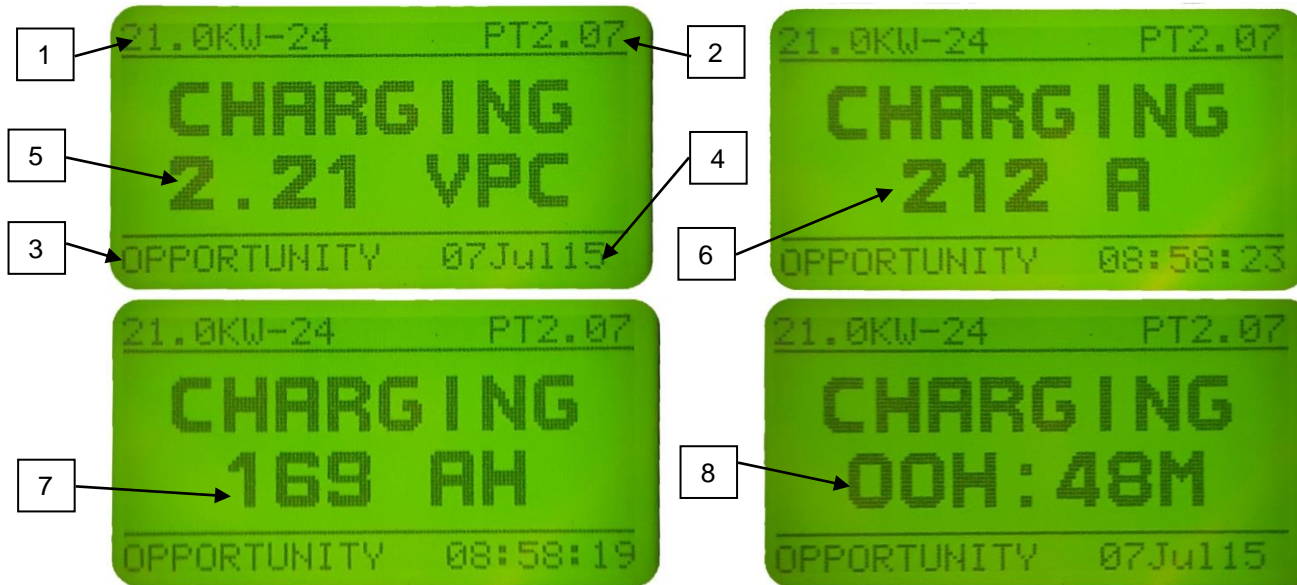
If the charger is programmed for delayed start, charging will begin following that delay. When the battery is plugged into the charger, the display shows the time remaining before the programmed charging starts.

Count Down

Effective charging starts after a 20 second countdown. The charger uses Profile, Capacity and Temperature settings programmed in the Configuration menu.

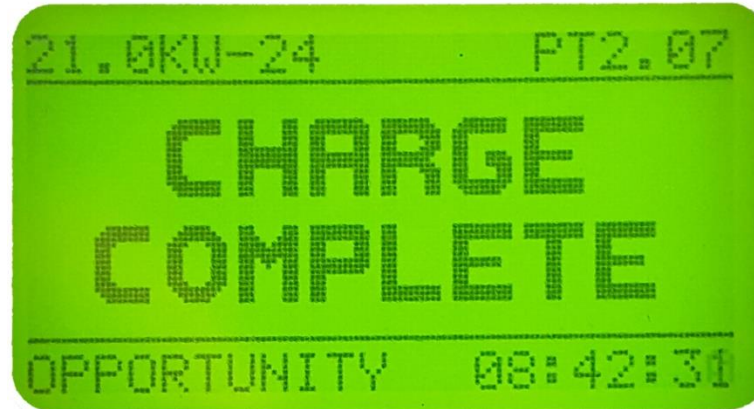
Charge Display

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



Ref	Description
1	Charger Type
2	Firmware Version
3	Charge Profile
4	System Time and Date
5	Volts Per Cell
6	DC Amps
7	AH Returned to Battery
8	Charge Time

End of Charge Display



End of Charge without Equalization

The green available LED comes on after proper end of charge. The green available LED is on and the display shows CHARGE COMPLETE. The display shows:

1. Total charging time.
2. Amp-hours restored to the battery.

If the battery remains plugged in and 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 Start

1. At the end of charge, press the Equalize navigation button. The equalize button can also be pressed any time during the charge and an equalize charge will be started after charging is complete.
2. The start of the equalization charge is indicated by the message **Equalize Charge**. During the equalization charge, the charger displays the output current and alternates to battery voltage, voltage per cell and 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 Refresh charge has been enabled, refreshes will occur to maintain an optimal charge.

Automatic 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.

The battery will be available when the green LED comes back on and the display shows Charge Complete. The battery is now ready for use. If the battery remains plugged in and Refresh charge has been enabled, refreshes will occur to maintain an optimal charge.

CHARGER INFORMATION

To access Charger Information, select “Charger” under the Start Menu:

Version

Shows the controller version that is normally displayed in upper right corner of display.

Serial Number

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 Number

Enables the customer to assign a Charger Asset Number.

Status

Status	Description
Connects	Total number of times a battery was connected during the life of the charger.
Comp Chg	Total number of charges normally completed.
Part Chg	Total number of charges terminated before completion.
Comp EQ	Total number of equalizes normally completed.
Part EQ	Total number of equalizes terminated before completion.
kAh Return	Total number of amp hours returned over the life of the charger.
Batt Disconn	Total number of times a battery was disconnected during the life of charger.
DF1 etc.	Number of faults recorded over the life of the charger. (see fault codes)

Modules

The module status is listed in ascending order from 1 to 3 or 1 to 6, numbered from left to right.

<OK> the module is inserted and functioning properly.

<Fault> if a module is inserted in this slot, contact a servicing agent.

<Unavailable> there is no module inserted in this slot.

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)

Memos

Memorization Access

On the main Start Menu, select Memos and press <Enter>.

Memorizations Display Screen

The display lists memos in ascending order, one being the most recent charge cycle. Memos are stored for one year from the date recorded.



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

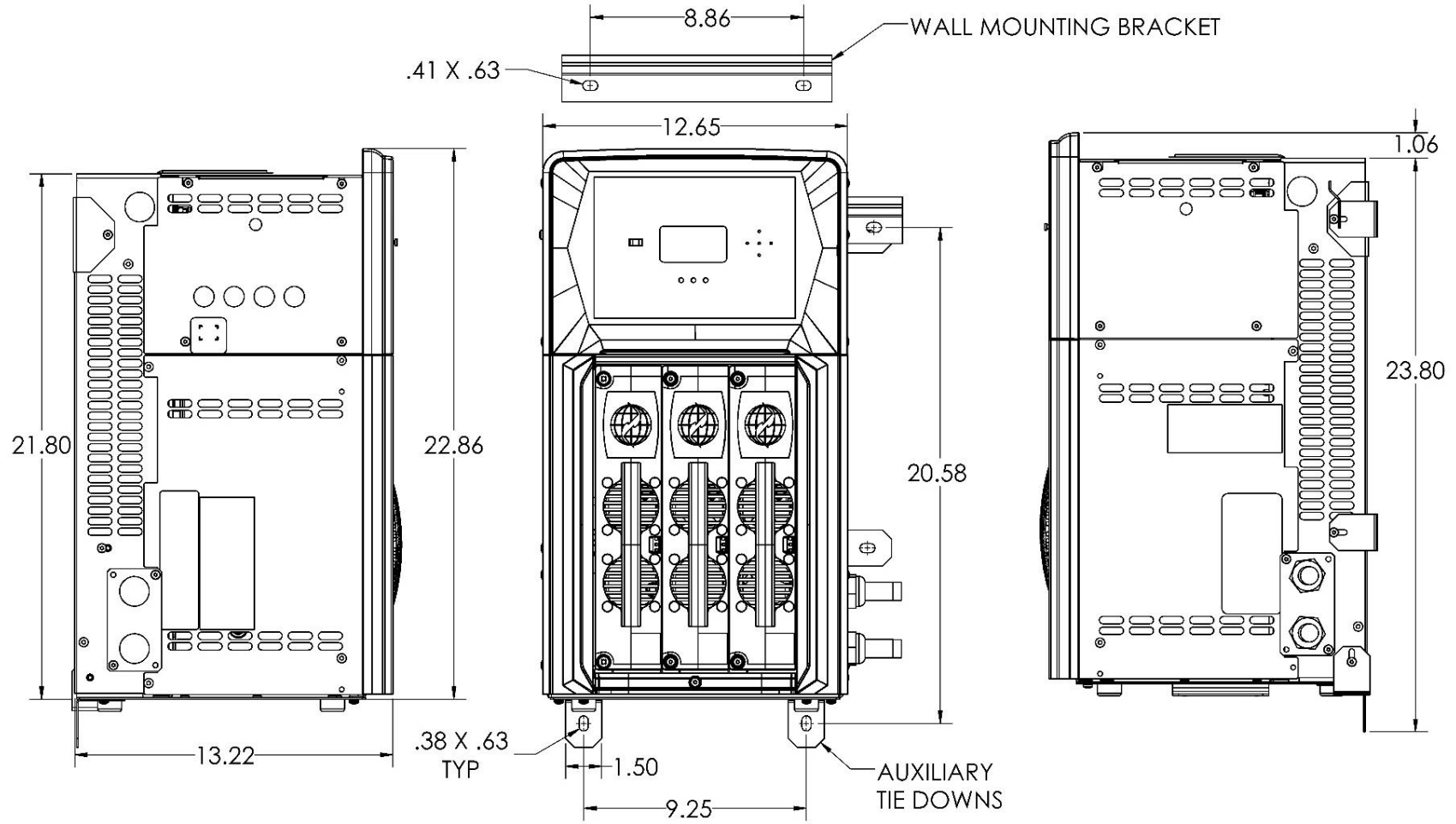
When the charge history is displayed, use the ▲/▼ to scroll through the parameters.

FAULT CODES

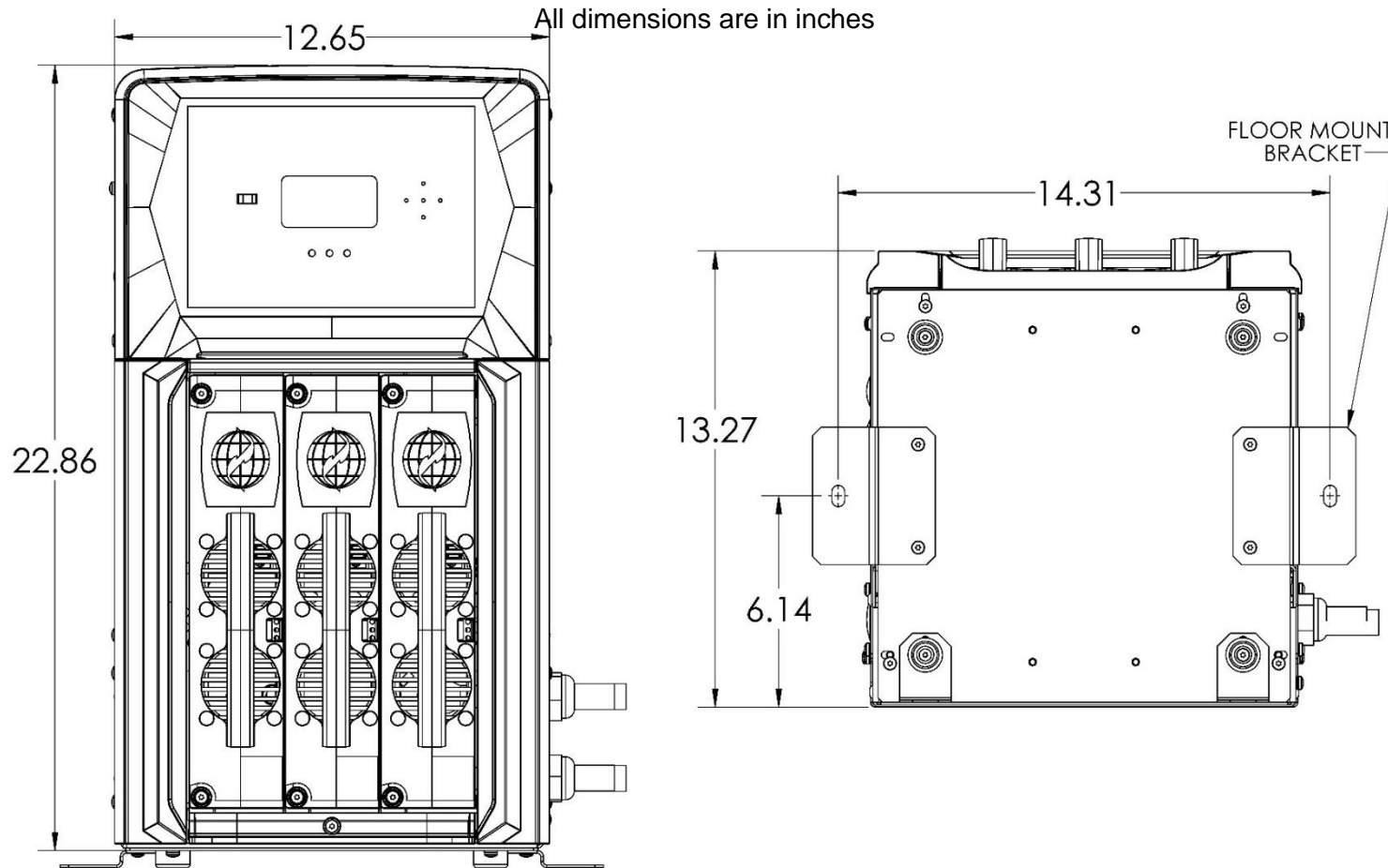
In case of a fault, one of the corresponding fault codes listed below will appear on the display. If it is a critical fault, charging will stop and the red Fault LED will be illuminated.

Fault	Cause	Solution
DF1	Low output current	Check input voltage and fuses. Call for service.
DF2	Output fault	Check for proper battery connection (reversed polarity). Check output fuse. Call for service.
DF3	Improper battery	Battery voltage too high (>2.4 Vpc) or too low (<1.8 Vpc). Use proper charger for battery. Check Batt Cells in Setup.
DF4	The battery has been discharged more than 80% of its capacity	Prevent battery over discharging. Battery charge gauges and lift interrupts may need calibration.
DF5	Start time with full start rate current applied or charge cycle taper and finish time is exceeded.	Check the battery temperature. Check the configuration in the menu (charge cable parameters). Check that the battery is the correct cell size for the charger.
DF6	Occurs when the overall charge cycle time limit is exceeded (14 Hrs).	Check the battery temperature. Check the configuration in the menu (charge cable parameters). Check that the battery is the correct cell size for the charger.
DF7	CHK BATT	Check battery (temperature, gravity, etc). Check the battery operation. Check cable parameters in Charger Config menu.
DFMx	One or more module in fault – the charge process continues – the fault module(s) is (are) displayed + red led flashing.	Check power modules. If all modules in DF1 fault, a DF1 error will follow. Call for service.

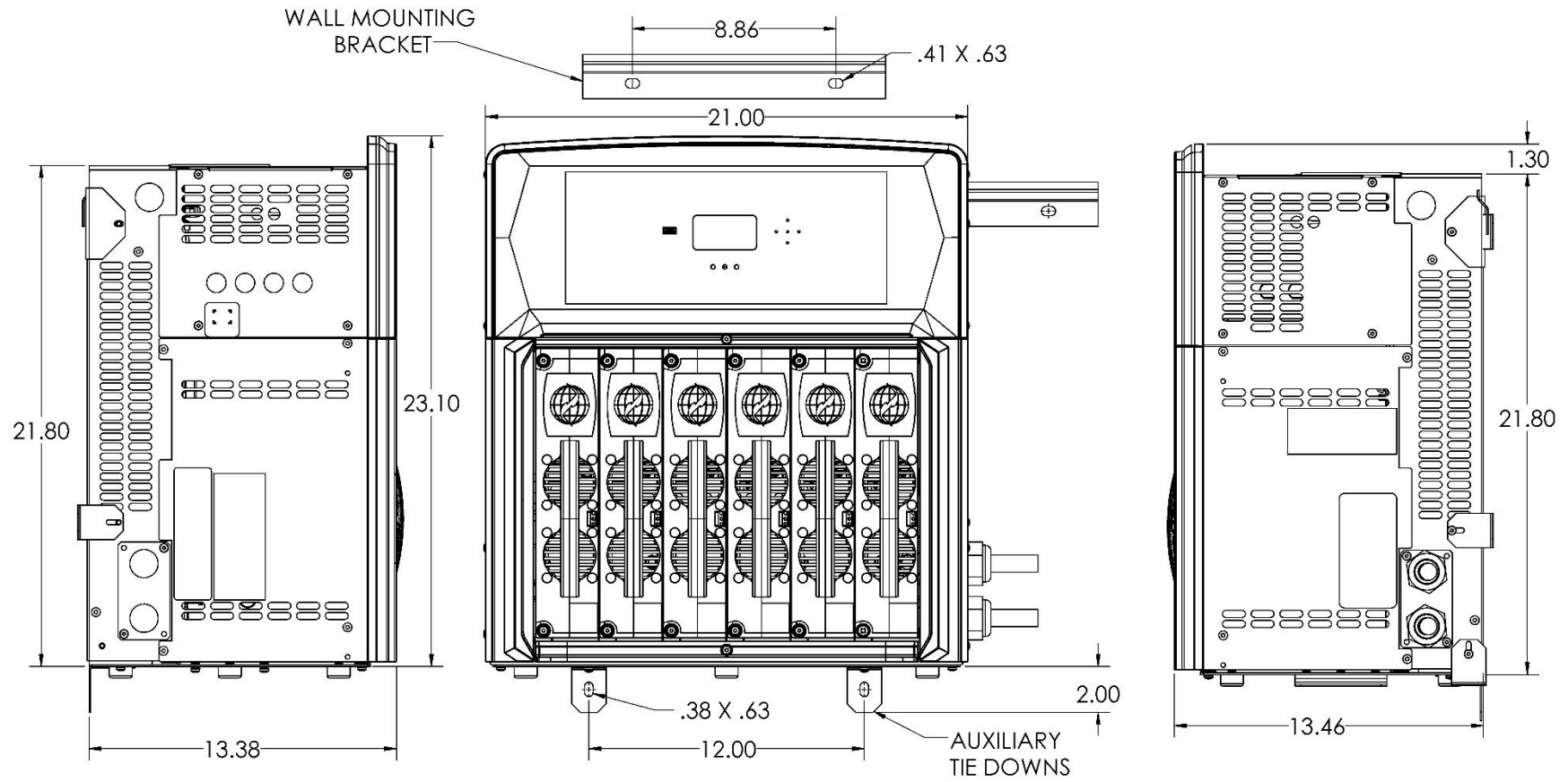
3 Bay Mounting Dimensions



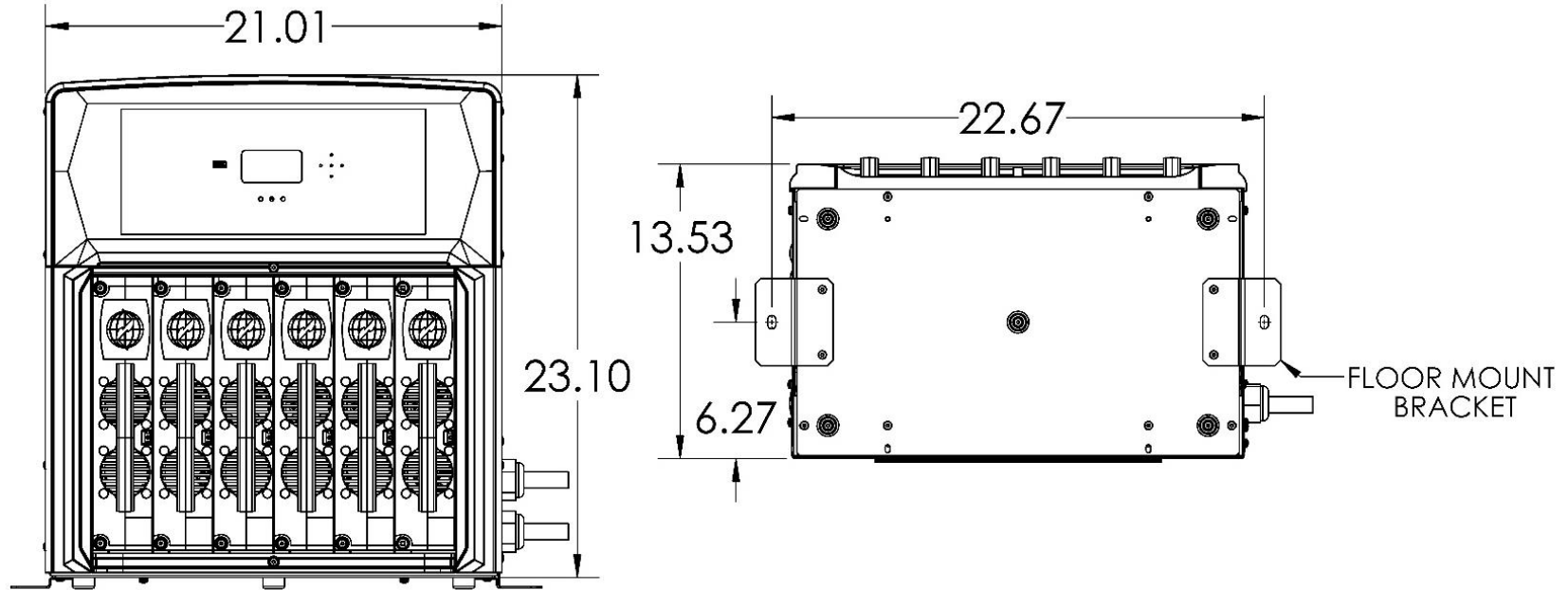
All dimensions are in inches



6 Bay Mounting Dimensions



All dimensions are in inches

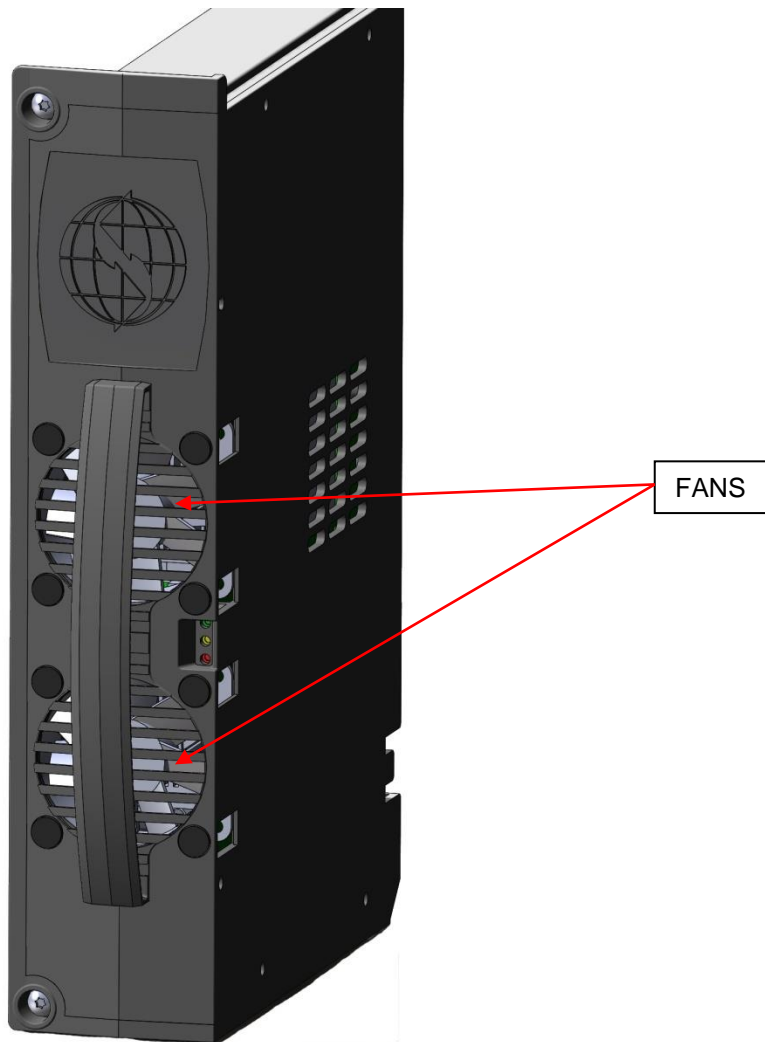


All dimensions are in inches

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.

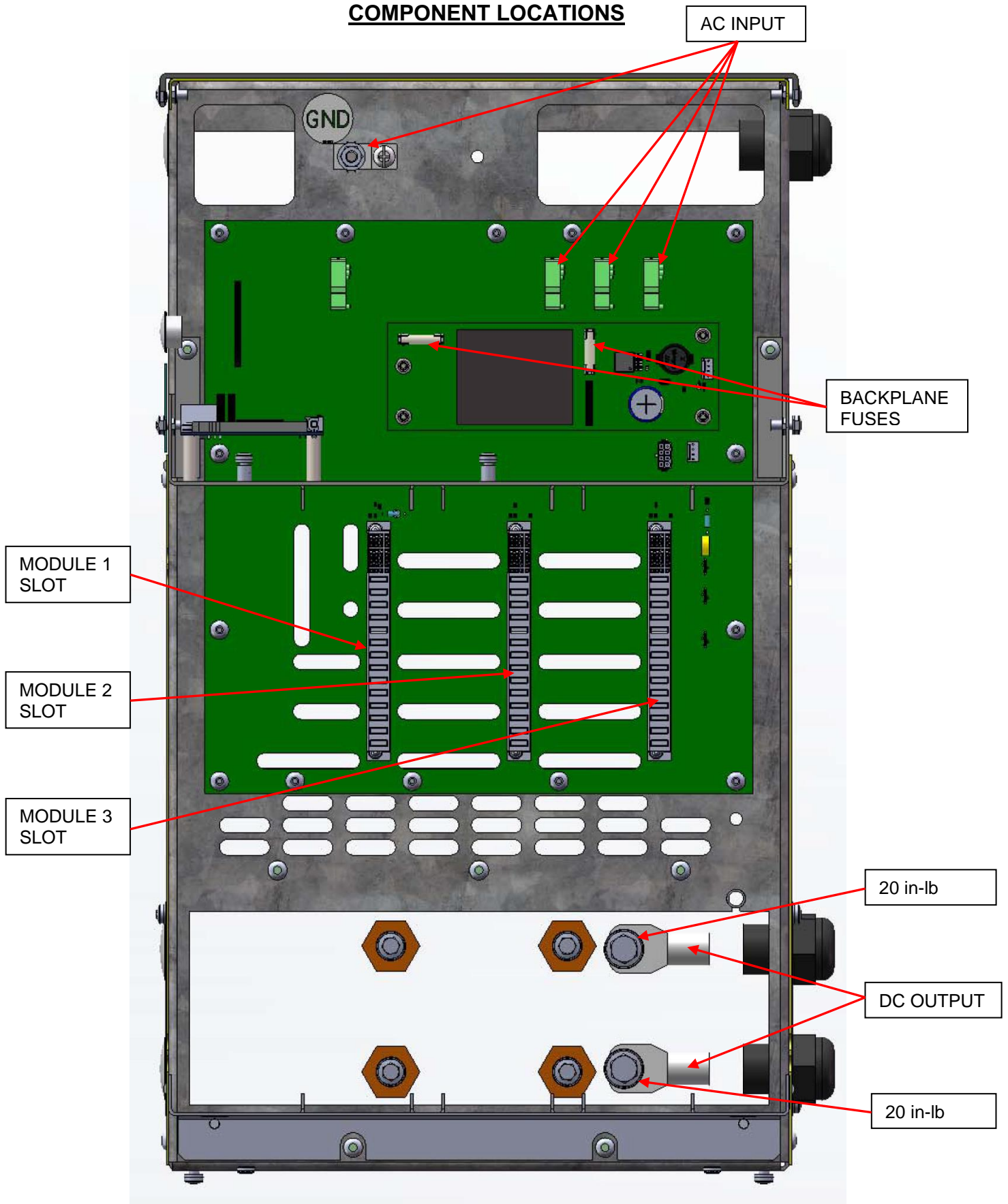
The charger requires a minimum of maintenance. Connections and terminals should be kept clean and tight. Follow recommended installation and make sure ventilation openings are not blocked.



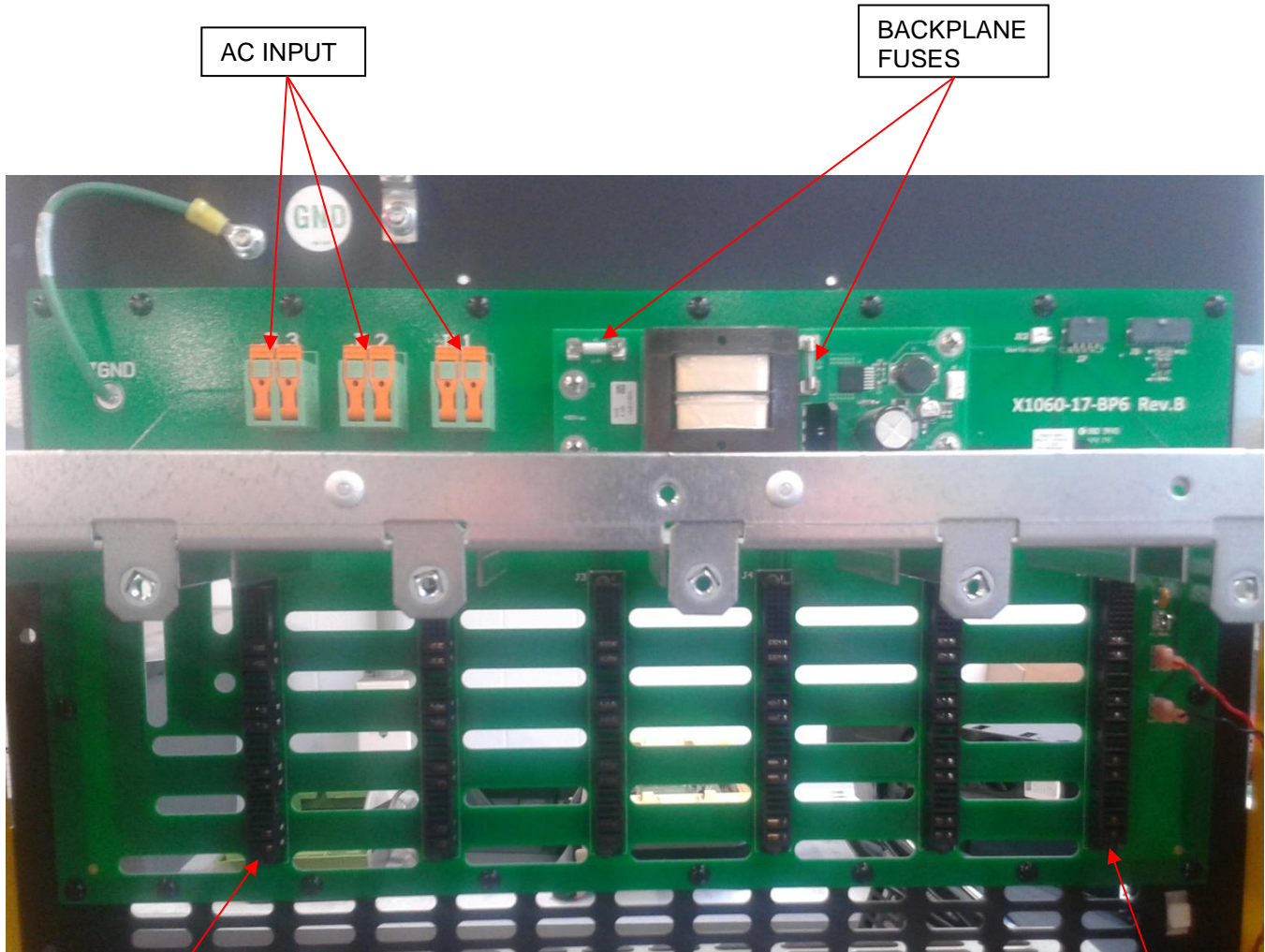
MODULE FRONT

Note: Module shown is the first generation. If you have V2+ modules they no longer have the yellow LED on the front.

COMPONENT LOCATIONS



Inside View of Cabinet



AC INPUT

BACKPLANE
FUSES

MODULE 1
SLOT

Inside View of a 6-Bay Cabinet

MODULE 6
SLOT

TECHNICAL SPECIFICATIONS**Technical Specifications for 480V, 1 phase:**

Model Number	AC Input				DC Output			8 hour Capacity Range (AH)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw (A)	Max Rated Cabinet Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM1-24C-80Y	480	5.8	17.4	1	1/3	12	80	100-500	100-320	23.1 x 12.7 x 14.1	2/0	C	54
PTOM1-48C-50Y	480	7.1	21.3	1	1/3	18	50	100-313	100-200				
						24	50	100-313	100-200				
PTOM1-24C-160Y	480	11.6	17.4	1	2/3	12	160	100-1000	100-640	23.1 x 12.7 x 14.1	2/0	C	62
PTOM1-48C-100Y	480	14.2	21.3	1	2/3	18	100	100-625	100-400				
						24	100	100-625	100-400				
PTOM1-24C-240Y	480	17.4	17.4	1	3/3	12	240	100-1500	100-960	23.1 x 12.7 x 14.1	2/0	C	70
PTOM1-48C-150Y	480	21.3	21.3	1	3/3	18	150	100-938	100-600				
						24	150	100-938	100-600				
PTOM1-24F-80Y	480	5.8	34.8	1	1/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	70
PTOM1-48F-50Y	480	7.1	42.6	1	1/6	18	50	100-313	100-200				
						24	50	100-313	100-200				
PTOM1-24F-160Y	480	11.6	34.8	1	2/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	78
PTOM1-48F-100Y	480	14.2	42.6	1	2/6	18	100	100-625	100-400				
						24	100	100-625	100-400				
PTOM1-24F-240Y	480	17.4	34.8	1	3/6	12	240	100-1500	100-960	23.17 x 21 x 13.77	3/0	F	86
PTOM1-48F-150Y	480	21.3	42.6	1	3/6	18	150	100-938	100-600				
						24	150	100-938	100-600				

Model Number	AC Input				DC Output			8 hour Capacity Range (AH)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw (A)	Max Rated Cabinet Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM1-24F-320Y	480	23.2	34.8	1	4/6	12	320	100-2000	100-1280	23.17 x 21 x 13.77	3/0	F	94
PTOM1-48F-200Y	480	28.4	42.6	1	4/6	18 24	200 200	100-1250 100-1250	100-800 100-800				
PTOM1-48F-250Y	480	35.5	42.6	1	5/6	18 24	250 250	100-1563 100-1563	100-1000 100-1000	23.17 x 21 x 13.77	3/0	F	102
PTOM1-48F-300Y	480	42.6	42.6	1	6/6	18 24	300 300	100-1875 100-1875	100-1200 100-1200	23.17 x 21 x 13.77	3/0	F	110

Technical Specifications for 208/220/240V, 3 phase:

Model Number	AC Input				DC Output			8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM3-48C-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					
PTOM3-48C-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					

Model Number	AC Input				# Modules / # Bays	DC Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48C-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				
PTOM3C48C-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				
PTOM3C48C-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				
PTOM3C48C-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				
PTOM3-80C-25G	208/220/240	7.7/7.3/6.7	23.1	3	1/3	36	25	100-155	100-100	23.1 x 12.7 x 14.1	2/0	C	54
						40	25	100-155	100-100				
PTOM3-80C-50G	208/220/240	15.4/14.6/13.4	23.1	3	2/3	36	50	100-315	100-200	23.1 x 12.7 x 14.1	2/0	C	62
						40	50	100-315	100-200				
PTOM3-80C-75G	208/220/240	23.1/21.9/20.1	23.1	3	3/3	36	75	100-470	100-300	23.1 x 12.7 x 14.1	2/0	C	70
						40	75	100-470	100-300				
PTOM3C80C-25G	208/220/240	7.7/7.3/6.7	23.1	3	1/3	36	25	100-155	100-100	23.1 x 12.7 x 14.1	2/0	C	54
						40	25	100-155	100-100				
PTOM3C80C-50G	208/220/240	15.4/14.6/13.4	23.1	3	2/3	36	50	100-315	100-200	23.1 x 12.7 x 14.1	2/0	C	62
						40	50	100-315	100-200				
PTOM3C80C-75G	208/220/240	23.1/21.9/20.1	23.1	3	3/3	36	75	100-470	100-300	23.1 x 12.7 x 14.1	2/0	C	70
						40	75	100-470	100-300				

Model Number	AC Input				DC # Modules/ # Bays	Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48F-40G	208/220/240	7.4/7.0/6.4	44.4	3	1/6	12	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						18	40	100-250	100-160				
						24	40	100-250	100-160				
PTOM3-48F-80G	208/220/240	14.8/14/12.8	44.4	3	2/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						18	80	100-500	100-320				
						24	80	100-500	100-320				
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3C48F-40G	208/220/240	7.4/7.0/6.4	44.4	3	1/6	12	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						18	40	100-250	100-160				
						24	40	100-250	100-160				

Model Number	AC Input				DC Output			8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM3C48F-80G	208/220/240	14.8/14/12.8	44.4	3	2/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						18	80	100-500	100-320				
						24	80	100-500	100-320				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3-80F-25G	208/220/240	7.7/7.3/6.7	46.2	3	1/6	36	25	100-155	100-100	23.17 x 21 x 13.77	3/0	F	70
						40	25	100-155	100-100				
PTOM3-80F-50G	208/220/240	15.4/14.6/13.4	46.2	3	2/6	36	50	100-315	100-200	23.17 x 21 x 13.77	3/0	F	78
						40	50	100-315	100-200				
PTOM3-80F-75G	208/220/240	23.1/21.9/20.1	46.2	3	3/6	36	75	100-470	100-300	23.17 x 21 x 13.77	3/0	F	86
						40	75	100-470	100-300				

Model Number	AC Input				DC Output			8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM3-80F-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				
PTOM3-80F-125G	208/220/240	38.5/36.5/33.5	46.2	3	5/6	36	125	100-780	100-500	23.17 x 21 x 13.77	3/0	F	102
						40	125	100-780	100-500				
PTOM3-80F-150G	208/220/240	46.2/43.8/40.2	46.2	3	6/6	36	150	100-940	100-600	23.17 x 21 x 13.77	3/0	F	110
						40	150	100-940	100-600				
PTOM3C80F-25G	208/220/240	7.7/7.3/6.7	46.2	3	1/6	36	25	100-155	100-100	23.17 x 21 x 13.77	3/0	F	70
						40	25	100-155	100-100				
PTOM3C80F-50G	208/220/240	15.4/14.6/13.4	46.2	3	2/6	36	50	100-315	100-200	23.17 x 21 x 13.77	3/0	F	78
						40	50	100-315	100-200				
PTOM3C80F-75G	208/220/240	23.1/21.9/20.1	46.2	3	3/6	36	75	100-470	100-300	23.17 x 21 x 13.77	3/0	F	86
						40	75	100-470	100-300				
PTOM3C80F-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				
PTOM3C80F-125G	208/220/240	38.5/36.5/33.5	46.2	3	5/6	36	125	100-780	100-500	23.17 x 21 x 13.77	3/0	F	102
						40	125	100-780	100-500				
PTOM3C80F-150G	208/220/240	46.2/43.8/40.2	46.2	3	6/6	36	150	100-940	100-600	23.17 x 21 x 13.77	3/0	F	110
						40	150	100-940	100-600				

Technical Specifications for 440V, 3 phase:

Model Number	AC Input				DC # Modules/ # Bays	Output		8 hour Capacity Range (Ah)	Opportu nity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48C-60H	440	5.3	15.9	3	1/3	12	70	100-440	100-280	23.1 x 12.7 x 14.1	2/0	C	54
						18	65	100-405	100-260				
						24	60	100-375	100-240				
PTOM3-48C-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	100-815	100-520				
						24	120	100-750	100-480				
PTOM3-48C-180H	440	15.9	15.9	3	3/3	12	210	100-1315	100-840	23.1 x 12.7 x 14.1	2/0	C	70
						18	195	100-1220	100-780				
						24	180	100-1125	100-720				
PTOM3C48C-60H	440	5.3	15.9	3	1/3	12	70	100-440	100-280	23.1 x 12.7 x 14.1	2/0	C	54
						18	65	100-405	100-260				
						24	60	100-375	100-240				
PTOM3C48C-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	100-815	100-520				
						24	120	100-750	100-480				
PTOM3C48C-180H	440	15.9	15.9	3	3/3	12	210	100-1315	100-840	23.1 x 12.7 x 14.1	2/0	C	70
						18	195	100-1220	100-780				
						24	180	100-1125	100-720				
PTOM3-80C-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				

Model Number	AC Input				# Modules/ # Bays	DC Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-80C-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				
PTOM3-80C-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				
PTOM3C80C-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				
PTOM3C80C-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				
PTOM3C80C-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				
PTOM3-48F-60H	440	5.3	31.8	3	1/6	12	70	100-440	100-280	23.17 x 21 x 13.77	3/0	F	70
						18	65	100-405	100-260				
						24	60	100-375	100-240				
PTOM3-48F-120H	440	10.6	31.8	3	2/6	12	140	100-875	100-560	23.17 x 21 x 13.77	3/0	F	78
						18	130	100-815	100-520				
						24	120	100-750	100-480				
PTOM3-48F-180H	440	15.9	31.8	3	3/6	12	210	100-1315	100-840	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-1220	100-780				
						24	180	100-1125	100-720				
PTOM3-48F-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				

Model Number	AC Input				DC # Modules/ # Bays	Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3C48F-60H	440	5.3	31.8	3	1/6	12	70	100-440	100-280	23.17 x 21 x 13.77	3/0	F	70
						18	65	100-405	100-260				
						24	60	100-375	100-240				
PTOM3C48F-120H	440	10.6	31.8	3	2/6	12	140	100-875	100-560	23.17 x 21 x 13.77	3/0	F	78
						18	130	100-815	100-520				
						24	120	100-750	100-480				
PTOM3C48F-180H	440	15.9	31.8	3	3/6	12	210	100-1315	100-840	23.17 x 21 x 13.77	3/0	F	86
						18	195	100-1220	100-780				
						24	180	100-1125	100-720				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3C48F-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				

Model Number	AC Input				DC # Modules/ # Bays	Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-80F-36H	440	5.3	31.8	3	1/6	36	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						40	36	100-225	100-144				
PTOM3-80F-72H	440	10.6	31.8	3	2/6	36	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						40	72	100-450	100-288				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3C80F-36H	440	5.3	31.8	3	1/6	36	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						40	36	100-225	100-144				
PTOM3C80F-72H	440	10.6	31.8	3	2/6	36	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						40	72	100-450	100-288				
PTOM3C80F-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				
PTOM3C80F-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				
PTOM3C80F-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				
PTOM3C80F-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				

Technical Specifications for 480V, 3 phase:

Model Number	AC Input				DC Output			8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM3-48C-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				
PTOM3-48C-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				
PTOM3-48C-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				
PTOM3C48C-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				
PTOM3C48C-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				
PTOM3C48C-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				
PTOM3-80C-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				
PTOM3-80C-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				

Model Number	AC Input				# Modules/ # Bays	DC Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-80C-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				
PTOM3C80C-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				
PTOM3C80C-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				
PTOM3C80C-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				
PTOM3-48F-60Y	480	4.8	28.8	3	1/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	70
						18	80	100-500	100-320				
						24	60	100-375	100-240				
PTOM3-48F-120Y	480	9.6	28.8	3	2/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	78
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3-48F-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				

Model Number	AC Input				# Modules/ # Bays	DC Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (Ah)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48F-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				
PTOM3C48F-60Y	480	4.8	28.8	3	1/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	70
						18	80	100-500	100-320				
						24	60	100-375	100-240				
PTOM3C48F-120Y	480	9.6	28.8	3	2/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	78
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3C48F-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				
PTOM3-80F-36Y	480	4.8	28.8	3	1/6	36	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						40	36	100-225	100-144				

Model Number	AC Input				# Modules/ # Bays	DC Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-80F-72Y	480	9.6	28.8	3	2/6	36	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						40	72	100-450	100-288				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3C80F-36Y	480	4.8	28.8	3	1/6	36	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						40	36	100-225	100-144				
PTOM3C80F-72Y	480	9.6	28.8	3	2/6	36	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						40	72	100-450	100-288				
PTOM3C80F-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				
PTOM3C80F-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				
PTOM3C80F-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				
PTOM3C80F-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 for 600V, 3 phase:

Model Number	AC Input				DC Output			8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase	# Modules/ # Bays	Cells	Max Current (A)						
PTOM3-48C-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				
PTOM3-48C-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				
PTOM3-48C-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				
PTOM3-48F-60C	600	3.8	22.8	3	1/6	12	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	70
						18	80	100-500	100-320				
						24	60	100-375	100-240				
PTOM3-48F-120C	600	7.6	22.8	3	2/6	12	160	100-1000	100-640	23.17 x 21 x 13.77	3/0	F	78
						18	160	100-1000	100-640				
						24	120	100-750	100-480				
PTOM3-48F-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				
PTOM3-48F-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				

Model Number	AC Input				DC # Modules/ # Bays	Output		8 hour Capacity Range (Ah)	Opportunity Capacity Range (AH)	Dimensions H x W x D (inch)	Charger Cable (AWG)	Cabinet Type	Weight (lbs)
	Voltage	Nominal Amp Draw	Max Amps	Phase		Cells	Max Current (A)						
PTOM3-48F-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				
PTOM3-48F-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				
PTOM3-80C-36C	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				
PTOM3-80C-72C	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				
PTOM3-80C-108C	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				
PTOM3-80F-36C	600	3.8	22.8	3	1/6	36	40	100-250	100-160	23.17 x 21 x 13.77	3/0	F	70
						40	36	100-225	100-144				
PTOM3-80F-72C	600	7.6	22.8	3	2/6	36	80	100-500	100-320	23.17 x 21 x 13.77	3/0	F	78
						40	72	100-450	100-288				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				
PTOM3-80F-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				

MAINTENANCE LOG

1. Modifications to Factory Settings

Date	Variable	Change	Service Technician

2. Service

Date	Description	Service Technician



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