STRYTEN ENERGY

M-SERIES

X-7

X-7 STANDARD, OPPORTUNITY, AND FAST CHARGERS FOR INDUSTRIAL BATTERIES

INSTALLATION AND OPERATING INSTRUCTIONS

DUAL (5 - 15KW) AND **QUAD (5 - 30KW)** MODULE CABINET CONFIGURATIONS

CAUTION - READ THE ENTIRE INSTALLATION AND OPERATING INSTRUCTIONS BEFORE PLACING BATTERIES IN SERVICE

Previously Fury X-7.

NOTE

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all systems.

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X-7 FEATURES AND BENEFITS

The X-7 charger is a multi-voltage modular design for industrial battery fleet applications and is offered in 2 bay (Dual) and 4 bay (Quad) cabinet sizes. It uses Silicon Carbide MOSFET (Metal Oxide Semiconductor Field-Effect Transistor) power technology to provide efficient high frequency power conversion to minimize infrastructure costs, reduce your carbon footprint and provide multishift standard, opportunity and fast charging capabilities.

FEATURES*	BENEFITS
Charging capabilities	Capable of Opportunity and Fast charging (user programmable) in extended temperature industrial environments with auto finish and equalization.
Modular design	Advanced 24/36/48V Multi-Voltage Modular design allows the charger to grow with your fleet. If more power is needed, more modules can be added. If one module fails, the others continue operation. Shelf, stand, and wall mounting options available.
Intelligent charging technology	Intelligent charging technology analyzes battery historical performance and charge data to provide a rapid and efficient recharge while maximizing battery life. The charger's diagnostic intelligence evaluates battery state and condition throughout the charging cycle.
Silicon Carbide MOSFET power	Ultra high-frequency silicon carbide (SiC) MOSFET power conversion to minimize charger size and weight, while maximizing efficiency and power factor.
Anti-Arc Technology	Proprietary active arc reduction technology that allows up to a 30% start rate without aux pins.
Fully programmable	Programmable via Wi-Fi or Bluetooth® to allow wireless client configuration. Large LCD graphics display allows for clear reading of battery and charger status
PLC Communications	Battery data communications over DC power cables allow operation without auxiliary pins in connector
Intelligent battery module	Recognizes all battery voltages automatically with or without battery module. Entire battery history and data accessible with a PowerLogger battery module
Wireless communications	Wireless communication via Wi-Fi or Bluetooth allows both on-site and remote client configuration, programming and data downloads using Stryten eConnect.
Battery types	Lead Acid (Flooded, VRLA, AGM, Gel), Li-Ion

*X-7 chargers are field upgradeable to all capabilities as they are developed.

X-7 TECHNICAL SPECIFICATIONS

X-7 MODULAR MULTI-VOLTAGE INDUSTRIAL BATTERY CHARGERS							
CABINET SIZE		2 BAY		4 BAY			
480VAC Model #	X7MV48-480-	0207	0215	0407	0415	0422	0430
Multi-Voltage Output Module (24V-36V-48V)	24V	150	300	150	300	450	600
	36V	150	300	150	300	450	600
	48V	130	260	130	260	390	520
Recom. Min. DC Output Wire Size*		1/0	4/0	1/0	4/0	3/0 x 2	4/0 x 2
Max Output Power		7.5kW	15kW	7.5kW	15kW	22.5kW	30kW
Max Input Amps at 480VAC (A)**		10.4	20.8	10.4	20.8	31.2	41.6
230VAC Model #	X7MV48-230-	0205	0210	0405	0410	0415	0420
Multi-Voltage Output Module (24V-36V-48V)	24V	88	176	88	176	264	352
	36V	88	176	88	176	264	352
	48V	86	172	86	172	258	344
Recom. Min. DC Output Wire Size*		1/0	1/0	1/0	1/0	4/0	1/0 x 2
Max Output Power		5kW	10kW	5kW	10kW	15kW	20kW
Max Input Amps at 230VAC (A)**		16	32	16	32	48	64
Number of Power Modules		1	2	1	2	3	4
Weight: 2 Bay (41lbs), 4 Bay (65lbs) Cabinet, + 17lbs per Module		58lbs	75lbs	82lbs	99lbs	116lbs	133lbs
Dimensions (HxWxD)		24”Hx12”Wx19”D		24”Hx21”Wx19”D			
Input Voltage**		480 or 230VAC (Model Dependent) +/-10%, 3PH, 50/60Hz					
Efficiency & Power Factor		Efficiency=0.94 / Power Factor=0.95 max.					
Control		Manual & fully automatic control of charge, finish & equalization					
Environmental		0° to 45°C (32° to 113° F), NEMA 1					
Display		4.3” Backlit Color Graphic LCD					
Power Device		Silicon Carbide MOSFET					
Certifications		UL1564, CEC***					
IoT Data Capability		Wireless config,comm&control capabilities via BT®, Wi-Fi, PLC, USB Port					
Field Repair		Module Replacement					
Warranty		3 Year Limited Warranty					
Installation		Wall, stand, or shelf mounting options					

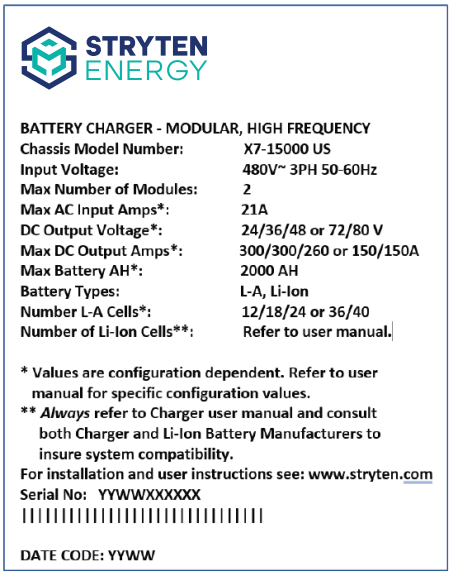
* Stated output currents will require connectors and electrical cables of adequate capacity. Consult your factory representative.
**Always use professional electricians for Stryten charger and associated electrical service installations. Follow all required electrical codes.
X7MV48-230-xxxx Model covers 208-240VAC Input Voltages
***CEC Certification has been achieved on 36V and 48V output voltages for the 230V AC model and all output voltages for the 480V AC model.

CHASSIS MODEL NUMBERS

Each charger has a chassis model number located on the charger's data sticker. The data sticker can be found on the left side of the charger and includes the CEC (California Energy Commission) compliance trademark, when applicable.

Examples for each type of cabinet size are shown below:

X7-15000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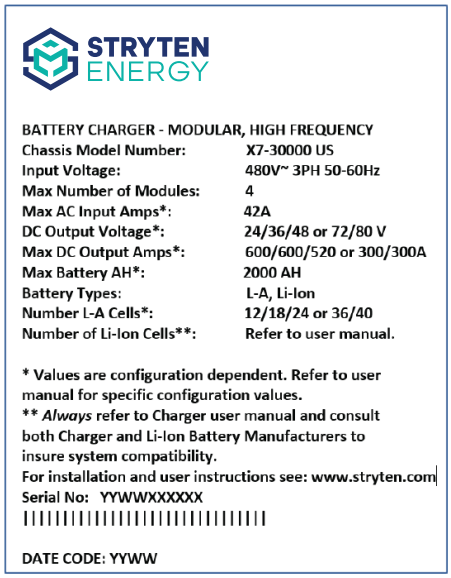
BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-15000 US
Input Voltage:	480V~ 3PH 50-60Hz
Max Number of Modules:	2
Max AC Input Amps*:	21A
DC Output Voltage*:	24/36/48 or 72/80 V
Max DC Output Amps*:	300/300/260 or 150/150A
Max Battery AH*:	2000 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24 or 36/40
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXXX

DATE CODE: YYWW

X7-30000


STRYTEN ENERGY

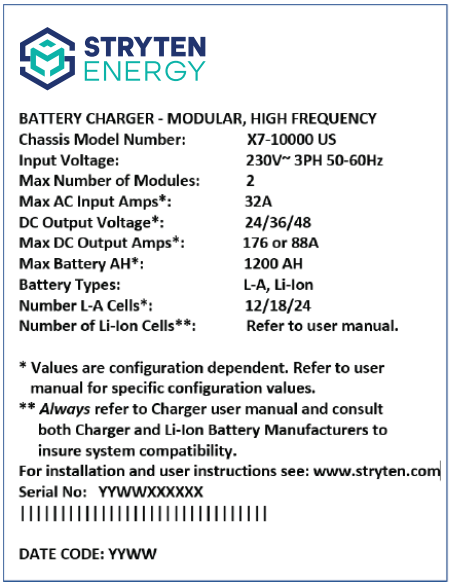
BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-30000 US
Input Voltage:	480V~ 3PH 50-60Hz
Max Number of Modules:	4
Max AC Input Amps*:	42A
DC Output Voltage*:	24/36/48 or 72/80 V
Max DC Output Amps*:	600/600/520 or 300/300A
Max Battery AH*:	2000 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24 or 36/40
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXXX

DATE CODE: YYWW

X7-10000


STRYTEN ENERGY

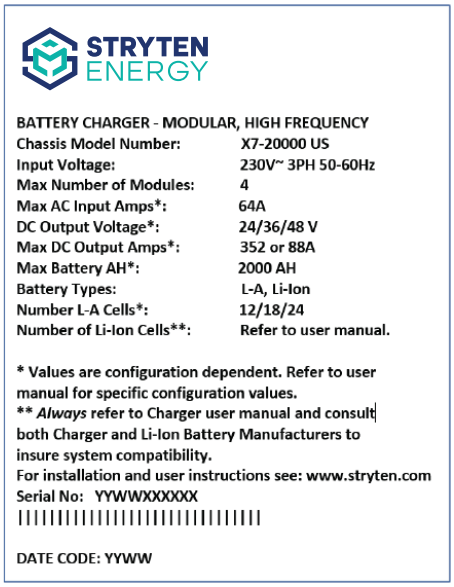
BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-10000 US
Input Voltage:	230V~ 3PH 50-60Hz
Max Number of Modules:	2
Max AC Input Amps*:	32A
DC Output Voltage*:	24/36/48
Max DC Output Amps*:	176 or 88A
Max Battery AH*:	1200 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXXX

DATE CODE: YYWW

X7-20000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BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-20000 US
Input Voltage:	230V~ 3PH 50-60Hz
Max Number of Modules:	4
Max AC Input Amps*:	64A
DC Output Voltage*:	24/36/48 V
Max DC Output Amps*:	352 or 88A
Max Battery AH*:	2000 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXXX

DATE CODE: YYWW

CHARGER CHASSIS AND POWER MODULE COMPATIBILITY CHART

Charger Model Number	Power Module Model Number	Chassis Model Number
X7MV48-480-02XX	PM752-48-480	X7-15000
X7MV48-480-04XX	PM752-48-480	X7-30000
X7MV48-230-02XX	PM502-48-230	X7-10000
X7MV48-230-04XX	PM502-48-230	X7-20000

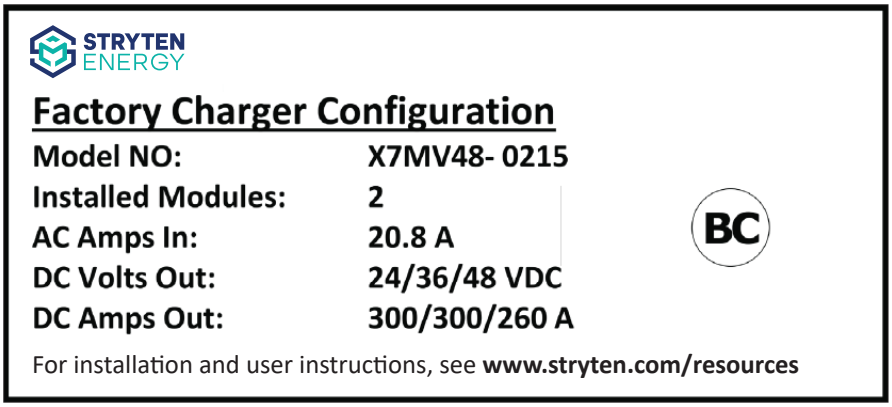
NOTE:

Ensure power module model number is compatible with the charger model number and chassis model number.

Do not mix power module numbers with the wrong charger model number and chassis model number!

CHARGER CONFIGURATION LABEL

Each charger has a configuration label located on the backside of the charger. The label contains the configuration model number, which is defined by the model numbering scheme in the X-7 Technical Specification table.



SAFETY PRECAUTIONS

SAVE THESE INSTRUCTIONS. This manual contains important safety and operating instructions.

This danger symbol indicates that personnel must practice safety procedures to prevent equipment damage, bodily injury, or death.

CAUTION! BATTERIES CAN BE DANGEROUS.

Batteries generate explosive gases during normal charging and usage. Do not smoke, use open flame or cause sparking near the battery. To reduce risk of battery explosion always follow charging instructions and those of the battery manufacturer.

WARNING! DO NOT ATTEMPT TO CHARGE NON-RECHARGEABLE BATTERIES.

Fast chargers are designated to be used only for charging rechargeable batteries. Attempting to charge a non-rechargeable battery could lead to possible injury or death from exploding batteries.

WARNING! RISK OF ELECTRICAL SHOCK THAT CAN CAUSE SERIOUS INJURY OR DEATH.

Do not touch un-insulated battery terminals, connectors or other live electrical parts. Always make sure the charger is OFF before disconnecting it from the battery. Disconnect the charger from input power and battery before servicing. Only qualified personnel should install, use, or service the charger.

CAUTION! NEVER PLACE THE CHARGER DIRECTLY ABOVE OR BELOW THE BATTERY BEING CHARGED.

Never place the charger directly above or below the battery being charged; gases or fluids from the battery will corrode and damage the charger. Locate the charger as far away from the battery as DC cables permit.

PRÉCAUTIONS DE SÉCURITÉ

SCONSERVER CES INSTRUCTIONS. Ce manuel comporte des consignes importantes de sécurité et d'utilisation.:

Ce symbol de danger indique que le personnel doit suivre les procédures de sécurité de façon à prévenir une dégradation de l'équipement, les dommages corporels ou la mort.

ATTENTION! LES BATTERIES PEUVENT ÊTRE DANGEREUSES.

Les batteries génèrent des gaz explosifs lors de leur chargement et leur utilisation habituels. Ne pas fumer, utiliser de flamme nue ou provoquer d'étincelles à proximité de la batterie. Afin de réduire le risque d'explosion de la batterie, toujours suivre les instructions lors de la mise en charge et celles du fabricant de la batterie.

WARNING! NE PAS ESSAYER DE CHARGER DES BATTERIES NON-RECHARGEABLES.

Les chargeurs rapides Express sont conçus pour être utilisés uniquement pour charger des batteries plomb-acide noyées rechargeables. Essayer de charger une batterie nonrechargeable peut mener à l'explosion des batteries et donc à des blessures ou la mort.

WARNING! RISQUE DE CHOC ÉLECTRIQUE QUI PEUT CAUSER DE GRAVES BLESSURES OU LA MORT.

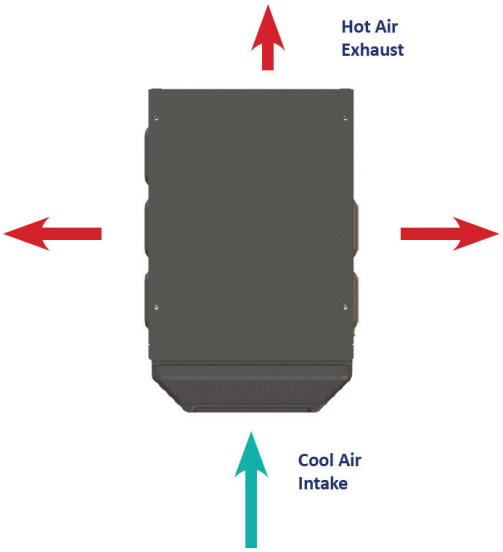
Ne pas toucher les bornes non-isolées des batteries, les connecteurs ou d'autres composants électriques sous tension. Toujours s'assurer que le chargeur est éteint avant de le déconnecter de la batterie. Déconnecter le chargeur de la prise et de la batterie avant d'en assurer la maintenance. Seul du personnel qualifié doit installer, utiliser ou d'assurer la maintenance du chargeur.

ATTENTION! NE JAMAIS PLACER LE CHARGEUR DIRECTEMENT AU-DESSUS OU AU-DESSOUS DE LA BATTERIE EN CHARGE.

Ne jamais placer le chargeur directement au-dessus ou au-dessous de la batterie en charge; les gaz et les fluides de la batterie corroderaient et endommageraient le chargeur. Placer le chargeur aussi loin de la batterie que le permettent les câbles CC.

CHARGER INSTALLATION

With the front to back airflow design of the X-7 charger, spacing between chargers is not critical for proper operation. The following diagram shows a top-down view of the X-7's airflow.



STANDARD SIDE-TO-SIDE

The recommended minimum side-to-side spacing of chargers is 18 inches (46cm) for standard installations to allow output cable and AC input service clearance.

INSTALLATION

- Installation must only be carried out by suitably qualified personnel and in accordance with current local and national wiring regulations.
- Battery leads should not be altered without prior consultation with service personnel.
- The charger should be sited in a cool, dry, well-ventilated location away from corrosive fumes and humid atmospheres. Ambient temperature range must be maintained between 32°F-104°F.
- The charger is for indoor use only.
- Before installation, check that the charger has not sustained any damages during transit. Make sure the rating is suitable for the intended input supply and batteries to be charged and that the connector polarity is correct and matches the polarity of the battery connector.
- CAUTION – To reduce the risk of fire, use only on circuits provided with branch circuit protection consistent with the current indicated on the Factory Charger Configuration label and in accordance with the National Electrical Code, ANSI/NFPA 70 or equivalent.
- The circuit breakers rating should be based on the charger's maximum input current, as stated on the Factory Charger Configuration label.
- (See the Technical Specifications pages for more details)

WALL MOUNT INSTALLATION

Wall mounting hangers with a pogo are available for installation. Figure 1 illustrates the various parts for a typical wall mount charger installation:

Fig. 1 Dual/Quad Bay Wall Mounting Parts and Quad Bay Charger with Wall Mounting

STEP 1. BOLT THE WALL MOUNT HANGER TO THE WALL

Secure the wall mount hanger to the concrete wall through the pre-drilled holes in the hanger. Ensure the two fins are facing up. Mount to a solid concrete wall through wall hanger holes using bolts paired with wall anchors – check with professional installation personnel to determine proper mounting techniques for all wall types.

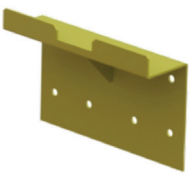


Fig. 2 Wall Mount Hanger (Proper Orientation)

STEP 2. HANG THE CHARGER ON THE WALL MOUNT

Hang the charger on the wall mount hanger so that the slot on the back of the charger lines up with the two fins of the hanger.

Fig. 3 Hang charger on wall mount hanger using the slot located on the back of charger

STEP 3. MOUNT THE BOTTOM BRACE TO THE CHARGER AND WALL

Position the bottom brace so that it sits flush against the wall and aligns with the pre-drilled hole located on the bottom of the charger. First, attach the brace to the charger using the provided bolt and then secure the brace to the concrete wall using bolts paired with wall anchors – check with professional installation personnel to determine proper mounting techniques for all wall types.

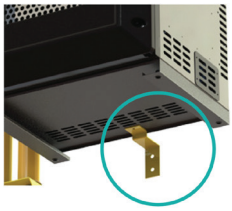


Fig. 4 Bottom Brace for Wall Installation

STEP 4. MOUNT THE POGO WALL BRACKET TO THE WALL AND ATTACH THE POGO

Secure the pogo wall bracket to the concrete wall using bolts paired with wall anchors – check with professional installation personnel to determine proper mounting techniques for all wall types. Attach the pogo to the wall bracket using the nut provided with the pogo.

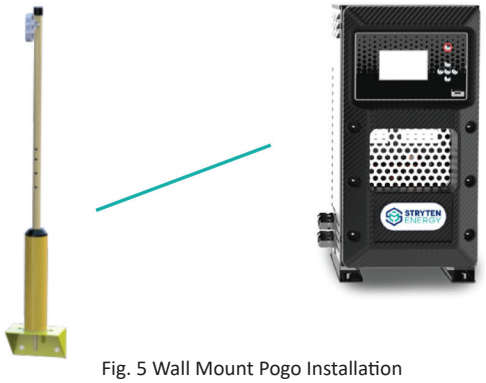


Fig. 5 Wall Mount Pogo Installation

FLOOR STAND INSTALLATION

Floor stands with a pogo are also available for installation.

Fig. 6 Floor Stand with Charger

STEP 1. BOLT STAND TO THE FLOOR

Secure the stand to the concrete floor through the pre-drilled holes in the stand base. Use ½ inch diameter anchor bolts as a minimum.

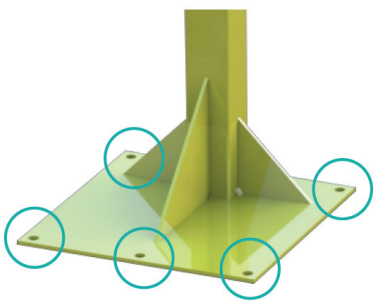


Fig. 7 Pre-drilled holes for bolting base to floor

STEP 2. ATTACH POGO TO THE POGO BRACKET

Attach the pogo to the pogo bracket with the bolts provided.

Fig. 8 Pogo mounted on stand

STEP 3. HANG THE CHARGER ON THE STAND

Hang the charger on the stand's hanger so that the slot on the back of the charger lines up with the two fins at the top of the stand.

Fig. 9 Hang charger on floor stand hanger using the slot located on the back of the charger

STEP 4. MOUNT THE BOTTOM BRACE TO THE CHARGER AND STAND

Position the bottom brace so that it sits flush against the stand and aligns with the pre-drilled hole located on the bottom of the charger. First, attach the brace to the charger and then secure the brace to the stand using the provided bolts.

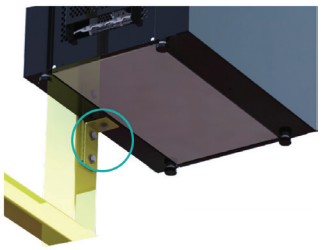
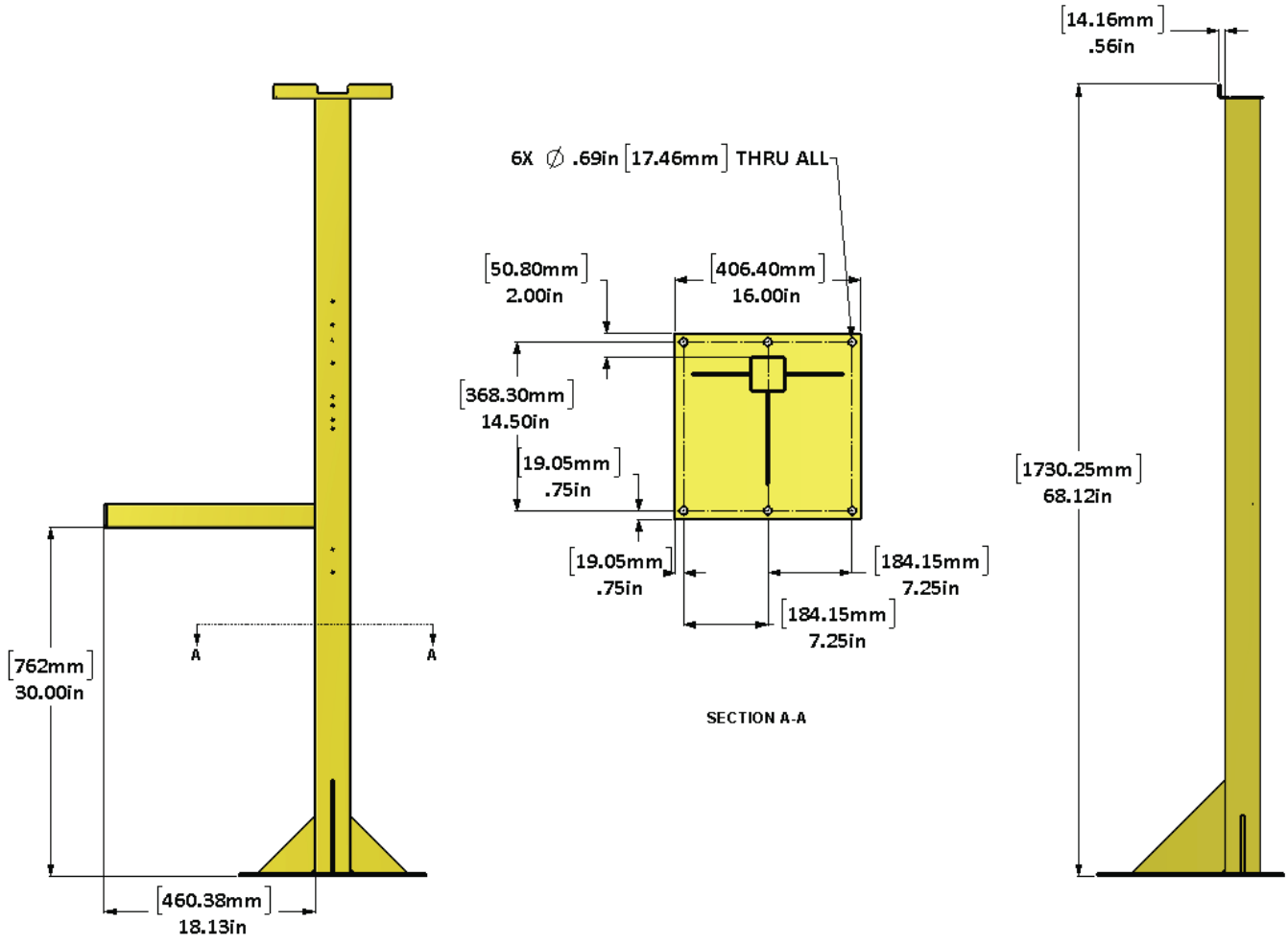


Fig. 10 Bottom Brace for Stand Installation

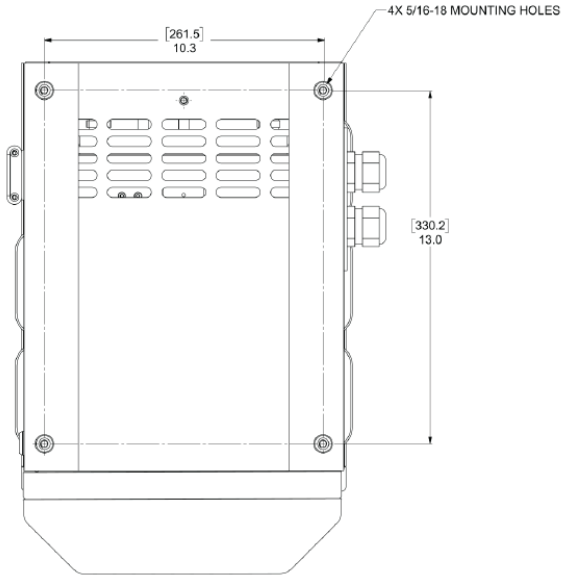
FLOOR STAND DIMENSIONS

Attach the pogo to the pogo bracket with the bolts provided.

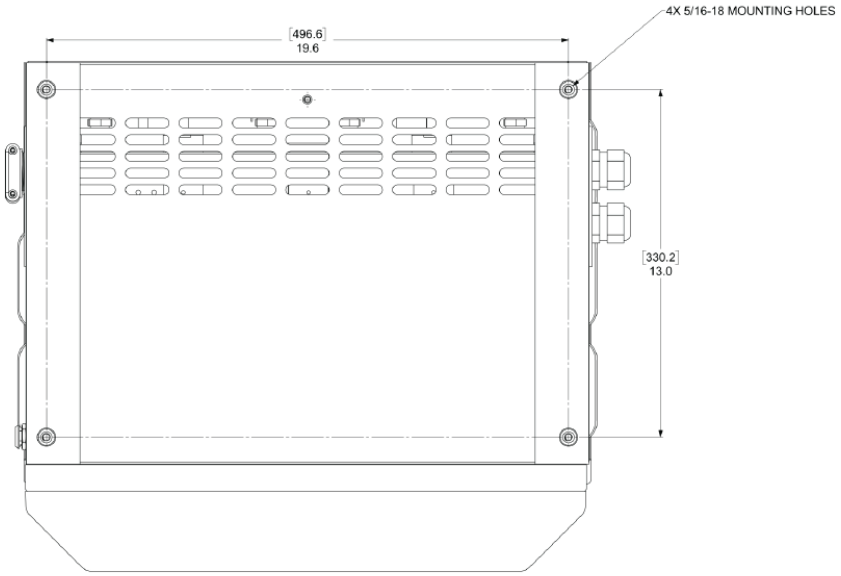


SHELF MOUNT INSTALLATION

Chargers can be mounted to a shelf using 5⁄16 - 5⁄18 bolts. Please refer to the diagrams for appropriate hole spacing for each model.



BOTTOM VIEW
FURY X7 DUAL



BOTTOM VIEW
FURY X7 QUAD

CONNECTION TO MAIN POWER

CAUTION!

Electrical connections are to be made by a qualified electrician only! Make sure that the service AC input voltage is OFF before wiring charger.

Risk of Fire! Use on circuits provided with the following branch circuit protection in accordance with your regional electric code. (National Electrical Code, NFPA 70 or IEC)

VAC Input	VAC Input
230VAC ONLY	480VAC ONLY

**Ensure the AC wiring and AC plugs used meet regional requirements. Refer to the technical specification section of this manual to view AC input information.

STEP 1. REMOVE TOP PANEL OF CHARGER

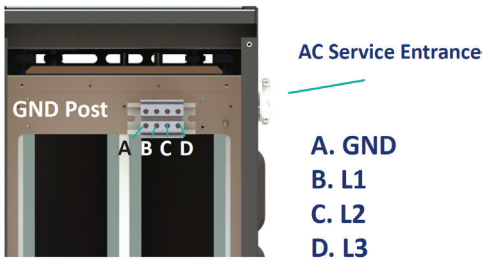
Remove the top panel of the charger by removing the attachment screws shown:

STEP 2. ATTACH SHIELDED INPUT CABLE OR CONDUIT TO CHARGER (TOP DOWN VIEW)

Use a professional electrician for charger AC service installation. Use an NEC or IEC approved conduit or AC input cable (such as type SOOW) to connect to the charger. Use an appropriate minimum wire size or larger to match the configured maximum amperage draw of charger. The hole located in the top right corner of the right side of the charger must be used for the AC service entrance. Use an appropriate cable or conduit clamp in this AC service entrance hole.

STEP 3. CONNECT 3-PHASE AC INPUT POWER CABLES

Ensure ground and power cables have been properly stripped (approximately a half inch of insulation from the ends). Loosen the securing screws in the AC input terminal block and insert the stripped ends of the ground and power cables. Re-tighten the screws. The 3-phase input is not phase specific, so AC line input positions are interchangeable. Ensure the cable or conduit clamp has been properly tightened.

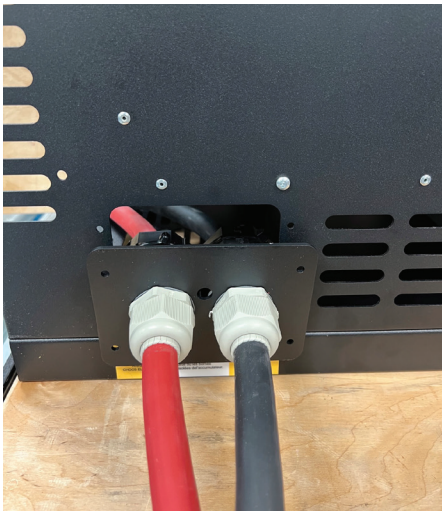


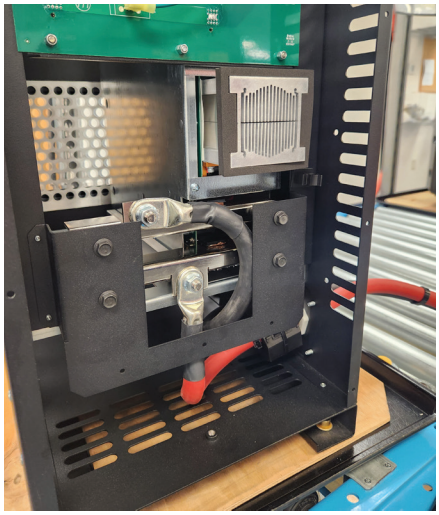
STEP 4. CONNECT DC OUTPUT POWER CABLES

Use an NEC, UL or IEC approved DC output cable (if not already equipped from the factory) such as type UL 3311, UL 3279, or CSA CL 905 – battery cable, with a polarized connector appropriate for battery charging (such as REMA 160, 320, REMA DIN 640, or Anderson Power Products Euro, SBX, or SB connectors).

Use appropriate minimum wire size or larger for maximum kilowatt rating and amperage output of charger – See Cable & Connector Technical Recommendations Table (Page 6) for sizing the output connector and cable to the maximum charger output amperage.

The panel located at the bottom left of the charger must be used for the DC power output cables. There are threaded studs for the attachment of cable terminals inside the unit on the appropriate DC output bus bars. The positive (red) cable is attached to the positive bus bar and the negative (black) cable is attached to the negative bus bar.





CABLE AND CONNECTOR TECHNICAL RECOMMENDATIONS

All connector and cable combinations must be made with UL approved connectors and cables. The selected cable size and connector combinations must meet UL approval for maximum temperature rise with the maximum charger output amperage as configured. Also, we recommend following standard ASTM C1055 for maximum allowed temperatures.

MAXIMUM CURRENT CARRYING CAPACITIES FOR CABLE AND CONNECTOR COMBINATIONS

Absolute Max Current Capacities for Selected Cable and Connector Types				
Connectors	Cable Sizes			
	1/0 Current Limits	3/0 Current Limits	4/0 Current Limits	250mcm Current Limits
SB175	210A	N/A	N/A	N/A
SB350	N/A	280A	350	380
Euro320	N/A	280A	350	N/A
SBX350	N/A	280A	350	380
REMA640	N/A	280A	350	380
REMA320	N/A	280A	N/A	N/A

SAFETY NOTE: Stryten Energy Recommends that Standard ASTM C1055 (the Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries) should be applied for charger connectors and cabling. It recommends that surface temperatures remain at or below 140°F (60°C). The reason for this is that the average person can touch a 140°F (60°C) surface for up to five seconds without sustaining irreversible burn damage. It is the customer's responsibility to ensure your installations continue to meet this standard as charger output connections age with normal wear and tear.

CONNECTOR/BATTERY MODULE COMPATIBILITY TABLE

	Conventional Charging		Opportunity/Fast Charging		Li-ion Charging
	No Accessory	X-Loop	PL3 Module	PLC Module	CAN bus
Euro/REMA Connectors	NOT RECOMMENDED	●	●	✕	●
SB Connectors	●	✕	✕	●	✕
SBX Connectors	●	●	●	●	✕

WARNING: Using Euro/REMA connectors without disconnect sensing contacts may result in premature connector failure. Stryten Energy strongly recommends using auxiliary contacts (X-Loop or PL3) in the Euro/REMA connectors to sense battery/charger disconnects and prevent arcing that causes premature connector failure. The factory will provide auxiliary contacts at no charge for all Euro/REMA installations.

LITHIUM ION BATTERY CHARGING

Note: The X-7 charger is not UL1564 certified to charge Lithium Ion Batteries. However, non UL1564 certified charging with the X-7 of only Stryten Energy Li-Ion batteries exclusively may be permitted. Consult an authorized Stryten Energy representative for further information.

BATTERY COMMUNICATIONS

The Stryten Energy X-7 charger supports several communication interfaces for opportunity and fast charging of almost any motive power battery including lithium ion. The following shows information on the different communication options:

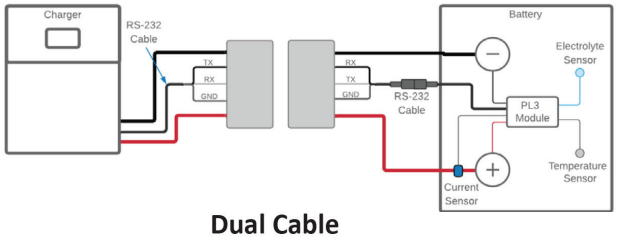
Note: Lead acid batteries may be charged without a battery module or X-Loop up to 20% of the battery's nameplate capacity, however, battery data is not available without a module.

PL3 BATTERY MODULE (RS-232)

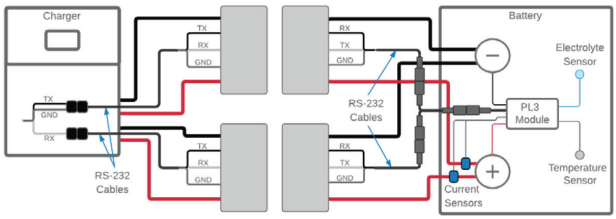
A PL3 battery module collects temperature, electrolyte level, and state of charge data from the battery and sends it to the charger. Temperature data allows for fast charging, thus reducing the time for a battery to reach full charge. This is the recommended setup for charging lead acid batteries.

Battery Type	Lead Acid
Recommended Connector Type(s)	Anderson SBX /Euro or REMA 320/640
Charge Rate	Up to 40% of battery's nameplate capacity
Battery Data	Yes
Anti-Arc Protection	Yes, both connector separation and integral module anti-arc sensing

Single Cable



Dual Cable

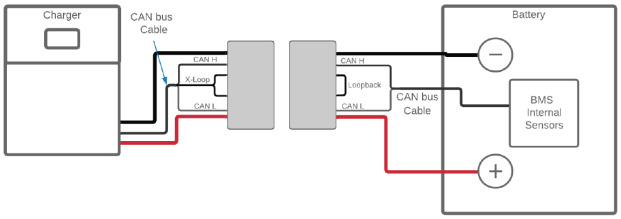


CAN BUS

NOTE: THE X-7 CHARGER IS NOT UL1564 CERTIFIED TO CHARGE LITHIUM ION BATTERIES.

However, non UL1564 certified charging with the X-7 of Stryten Energy Li-Ion batteries may be permitted. Consult an authorized Stryten Energy representative for further information. The Stryten Energy battery to be charged will require a Stryten Energy approved Battery Management System (BMS) to communicate with the charger, CAN communications, X-Loop disconnect sensing, and a recognized charging protocol. The charger will also recognize connector separation using X-Loop disconnect sensing.

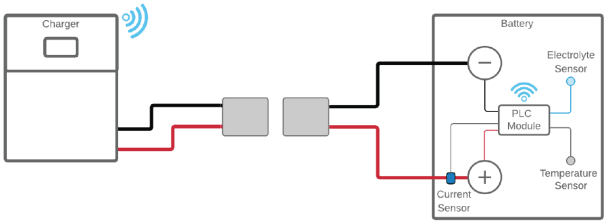
Battery Type	Various
Recommended Connector Type(s)	Anderson Euro or REMA 320/640
Charge Rate	As directed by Stryten Energy
Battery Data	Yes
Anti-Arc Protection	Yes, both connector separation and integral module anti-arc sensing



PLC BATTERY MODULE (POWER LINE COMMUNICATION)

A PLC battery module communicates over main power cables to establish a wireless Bluetooth connection allowing charger/battery communications without auxiliary wiring. Battery temperature, electrolyte level, and state of charge are transmitted to the charger allowing for higher charge rates than standard rate (no module) charging.

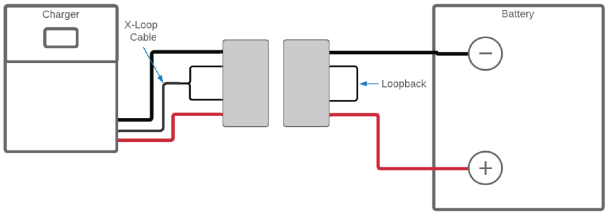
Battery Type	Lead Acid
Recommended Connector Type(s)	Anderson SB Series
Charge Rate	Up to 30% of battery's nameplate capacity
Battery Data	Yes
Anti-Arc Protection	Integral module anti-arc sensing only



X-LOOP

X-Loop disconnect sensing uses a current sense loopback auxiliary contact wiring for sensing battery disconnect. X-Loop provides anti-arc protection for hot disconnects while charging. Since battery temperature data is not available with X-loop, charging will be limited to standard rate.

Battery Type	Lead Acid
Recommended Connector Type(s)	Anderson SB Series
Charge Rate	Up to 30% of battery's nameplate capacity
Battery Data	Yes
Anti-Arc Protection	Integral module anti-arc sensing only



OPERATING INSTRUCTIONS

CONTROL PANEL FEATURES

1. 4.3” Backlit Color Graphic Display
2. USB Port for Updates and Data Transfer
3. Navigation Buttons
4. Start/Stop Button

CHARGER OPERATION

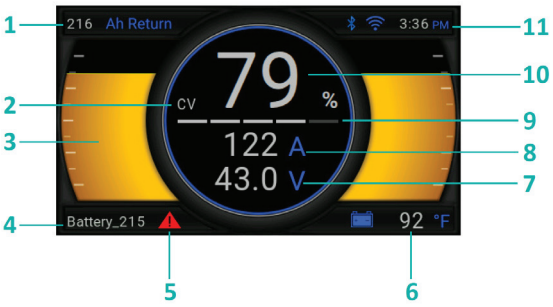
CONNECT BATTERY:

If a battery is not connected, the Connect Battery Screen is displayed. To start a charge cycle, attach charger cables to the battery. The charger will initialize the battery and be ready to start charging.

START CHARGING:

If a battery is connected, the Press Start Screen is displayed. Press the START/STOP button to begin charging. If Auto-Start is enabled, the charger will begin charging automatically after a 10 second countdown when a battery is connected to the unit.

VIEWING CHARGING INFORMATION:



AFTER A CHARGE HAS BEEN STARTED, THE CHARGER WILL DISPLAY THE FOLLOWING INFORMATION:

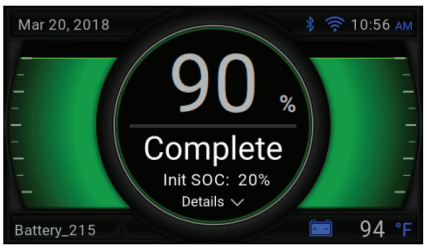
1. Amp-hours Returned to Battery
2. Charge Mode (CC, CV, FN, EQ, TK)
3. SOC Progress Bar
4. Battery ID (if equipped)
5. Error Warning (When Flashing)
6. Battery Temperature (if battery module equipped)
7. Charge Voltage
8. Charge Current
9. Active Power Drawers Indicator
10. State of Charge
11. Time, Wi-Fi, and Bluetooth

STOP CHARGING:

To stop charging, press the START/STOP button during a charge. If a charge cycle is stopped by pressing the START/STOP button, the User Stopped Screen is displayed. Note: While charging, always press the stop button before disconnecting battery to prevent damage to the charger and battery. If the battery is disconnected during a charge cycle, the charger will stop automatically.

CHARGE COMPLETE (LEAD ACID ONLY):

When the charger completes a charge cycle, the Charge Complete Screen is displayed. The complete screen displays the battery's state of charge along with its initial state of charge. There is also the option to view charge details by pressing the down arrow. The details screen provides the same information as the record detail screen. If the battery is left connected to the charger for a consecutive 5 days after completing a charge, the charger will perform a refresh charge to ensure the battery remains at its maximum capable capacity.



CHARGE MODES

LEAD-ACID CHARGE MODES

Constant Current (CC)
The charger operates in constant current mode until the target voltage is reached. In CC mode, the current is equal to the user specified start rate which typically ranges from 10-40% of the battery's capacity.

Constant Voltage (CV)
The charger will switch over from constant current mode to constant voltage mode once the battery's target voltage has been reached. In CV mode, the charging voltage will remain constant as the current slowly decreases. Once the current decreases to a certain percentage of the battery capacity, the charger will transition to one of the following modes in order of priority: Finish mode, Mix mode, or Charge Complete.

Finish (FN)
Finish mode charges the battery at a low, constant rate of charge to achieve the battery's maximum state of charge. Finish mode can only occur after constant voltage mode has completed. A finish charge is typically performed no more than once per week to prevent excessive overcharging.

Equalize (EQ)
Equalize mode charges a battery at low charge rate with a high float voltage to balance or equalize the battery's cell voltages. An equalization charge can only be performed after completing a finish charge.

Mix (MX)
Mix mode is essentially a short finish. Mixing can only occur after constant voltage mode has completed and is typically performed daily.

Trickle (TK)
Trickle mode is used to charge a battery with a lower than normal voltage. When the charger detects a battery with a voltage below an expected threshold, the charger will attempt to charge the battery at a low current until the battery's voltage is suitable for constant current mode.

LITHIUM-ION CHARGE MODES

Main Charge Constant Current (CC)
The charger puts out a constant current determined by the battery's Battery Module System (BMS). Once a target voltage has been reached the BMS will transition to Equalize mode.

Equalize
Lithium Equalize mode equalizes the cell voltages until the target SOC and cell voltages are achieved across all cells.

Voltage Hold
Once a lithium battery reaches 100% SOC, the BMS will enter Voltage Hold mode. This mode maintains the battery voltage above a certain threshold to compensate for self-discharge while continuing to equalize cell voltages until reaching a "well balanced" state.

VIEWING CHARGER AND CHARGING INFORMATION

MAIN MENU

Press the center or right arrow to access the Main Menu from the idle or charging screen. All other menus are accessed from the Main Menu. Use the arrow keys to navigate and the center key to select options. Main Menu options include:

EQ – Manually select equalization to occur
(Note: If this feature is enabled, it is only accessible when a battery is connected)

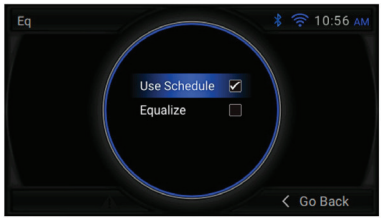
Actuals – View Actuals Menu

Records – Browse charge records stored on the charger

Settings – View the Settings Menu

Info – View system information

EQ



If this menu is enabled, it allows a user to manually run equalization on the connected battery. The selected option is indicated by a checkmark. Only one option can be selected at a time. By default, the charger will follow the user defined schedule for finish and equalize. To manually begin an equalize cycle, navigate to the Main Menu and select the EQ Menu. Select the Equalize option. A check next to Equalize indicates a finish and equalize cycle will occur after the regular charge cycle.

Use Schedule – The charger will follow its programmed schedule for equalization and mixing.

Equalize – The charger will finish and equalize the currently connected battery once it's fully charged.

ACTUALS

This menu has options to view data for each of the power modules and battery information for a connected battery.

Controller – Displays information about the management controller.

Modules – Displays status information for each power module in the charger.

Battery – Displays information about the currently connected battery.

RECORDS

This menu holds records of the 100 most recent charges always starting with the most recent. Select a record by using the Up and Down arrow keys. To view a selected record details, press the center key. Use the left arrow key to go back to the previous screen.

RECORD DETAIL

DETAIL	INFORMATION
Timestamp	Date and time of charge event
Duration	Length in hh:mm:ss of the charge event
Battery ID	Battery name
Battery Serial	Battery serial number
Module Serial	Module or power logger serial number
Battery Info	Voltage and capacity of battery
SOC	Start and end SOC
Voltage	Start, end, and max battery voltages
Temperature	Start, end, and max battery temperatures
Amp Hours Returned	Amp hours returned to the battery
Charge Profile	Charge profile used during charge
OS/App Version	Operating system and application version numbers
Termination	Reason for event termination

SETTINGS

Settings Menu: This menu allows a user to browse current user settings for the charger.

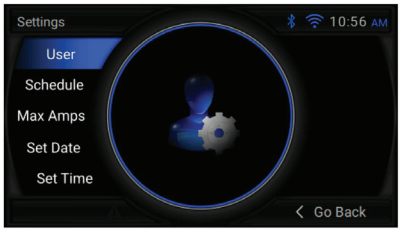
User Settings: Displays the currently configured user settings.

Schedule: Displays the Finish/EQ, Mix, and Finish Makeup schedules.

Max Amps: Displays the max ampere settings for various battery sizes.

Set Date: Allows a user to set the date on the display.

Set Time: Allows a user to set the time on the display.



SET DATE AND TIME

From the Settings Menu, select Set Date or Set Time. Use the left and right arrows to highlight a property and the up and down arrows to change that property. Note: the Set Time menu uses a 24-hour clock. When setting the date or time backwards, the charger will reboot after 10 seconds.

INFO (SYSTEM INFORMATION)

This screen displays the following information about the charger:

Type | Serial number | Application version | Drawer quantity | Kilowatt rating | Max output current | Cable configuration | Voltage setting

USB

DOWNLOAD CHARGE RECORDS

A charger can transfer its charge records to a USB drive. For instructions on transferring data, contact your local sales representative.

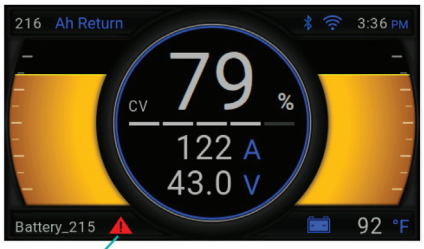
UPDATE SOFTWARE

A USB stick can be used to update the charger's software. If you need assistance with updating charger software, please contact your local sales representative.

SERVICE AND TROUBLESHOOTING

WARNING INDICATOR

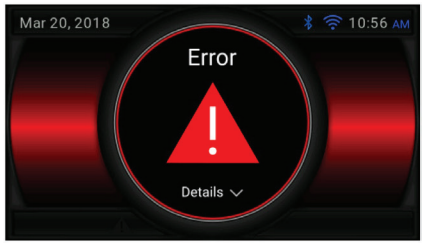
If an error occurs and the charger can keep charging, the red warning symbol will flash in the bottom-left of the screen. To find out more details about the warning, press the center or right navigation button to view the Warning Details screen. You can still access the main menu by pressing the center or right navigation button again.



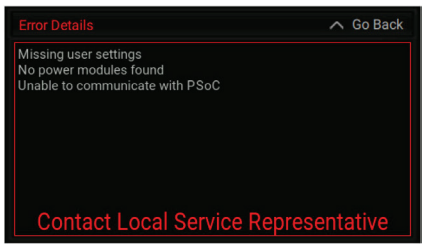
Warning Indicator

SYSTEM ERROR

If an error occurs that restricts the charger from running properly, the following screen will be displayed:



To find more information on the error, press the down arrow on the navigator to access the Error Details screen.

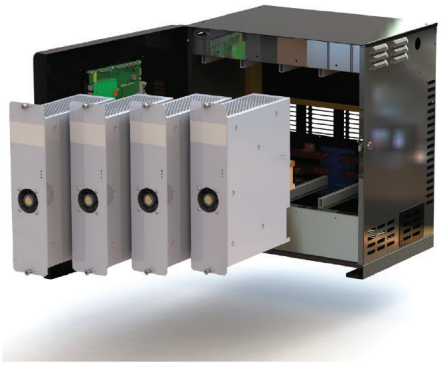


For service, please contact your local sales representative.

X-7 CHARGER UPGRADES

WARNING! Make sure all AC service power is disconnected, the charger is powered off, and no battery is connected before opening the charger's door. Charger upgrades should only be performed by qualified personnel.

Additional power modules may be added to a charger with empty bays. Consult your local Stryten Energy sales representative to determine an appropriate upgrade package. This will require an on-site visit from an Stryten Energy authorized technician to assess your power and upgrade requirements.



Upgrading the X-7 with a different number of power modules requires:

1. Consultation with a Stryten Energy authorized representative to determine your new power and configuration requirements

2. Ordering and receiving the authorized upgrade package service from Stryten Energy

3. Upgrading of the electrical AC service to the charger (if required) by a professional electrician

4. Having a Stryten Energy factory authorized technician install the upgrade package consisting of:

- **a.** Power Module(s)
- **b.** New DC output cables & connector (if required)
- **c.** New charger configuration sticker (calls out new electrical requirements)
- **d.** Updating of the charger's control panel factory settings

WARNING: Only Stryten Energy factory trained and authorized technicians should upgrade your X-7 charger. Stryten Energy is not responsible for unauthorized X-7 charger changes or upgrades.

WARNING: The number of power modules in the charger must match the module quantity on the charger's Info screen. Do not add power modules to a charger without the help of an authorized Stryten Energy factory representative.

WARNING: Adding additional power modules to your X-7 charger may require upgrading your AC service wiring and DC output cables. Your Stryten Energy factory authorized technician will refer to the X-7 Technical specifications page to determine if AC breaker size, AC wiring, DC output cables, and DC connectors will meet the specified requirements when installing additional power module(s).

WARNING: Electrical AC service wiring upgrades should only be performed by a licensed electrician.

POWER MODULE REPLACEMENT

IMPORTANT! Make sure all AC service power is disconnected, the charger is powered off, and no battery is connected before opening the charger's door. Power module replacement should only be performed by qualified personnel.

STEP 1

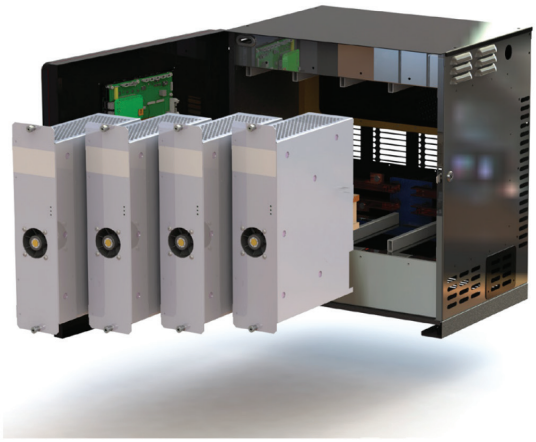
Disconnect battery from charger if one is connected.

STEP 2

Disconnect and lock out AC power source from charger.

STEP 3

Unlock and open charger door.



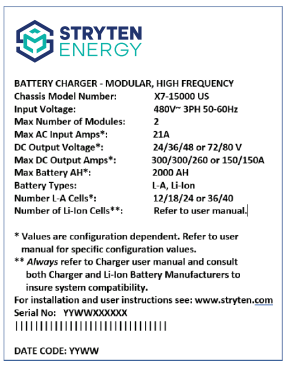
STEP 4

Loosen the top and bottom mounting screws and pull defective module out of charger.

STEP 5

Insert the replacement module into charger while ensuring correct orientation. Push into cabinet until rear connectors mate correctly with bus bars and backplane assembly.

Note: Ensure the proper input voltage module is used. Reference back to page 4 to see all labels that can support with this.

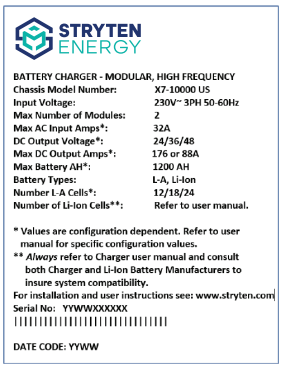

STRYTEN ENERGY

BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-15000 US
Input Voltage:	480V~ 3PH 50-60Hz
Max Number of Modules:	2
Max AC Input Amps*:	21A
DC Output Voltage*:	24/36/48 or 72/80 V
Max DC Output Amps*:	300/300/260 or 150/150A
Max Battery AH*:	2000 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24 or 36/40
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXX

DATE CODE: YYWW


STRYTEN ENERGY

BATTERY CHARGER - MODULAR, HIGH FREQUENCY

Chassis Model Number:	X7-10000 US
Input Voltage:	230V~ 3PH 50-60Hz
Max Number of Modules:	2
Max AC Input Amps*:	32A
DC Output Voltage*:	24/36/48
Max DC Output Amps*:	176 or 88A
Max Battery AH*:	1200 AH
Battery Types:	L-A, Li-Ion
Number L-A Cells*:	12/18/24
Number of Li-Ion Cells**:	Refer to user manual.

* Values are configuration dependent. Refer to user manual for specific configuration values.
** *Always* refer to Charger user manual and consult both Charger and Li-Ion Battery Manufacturers to insure system compatibility.
For installation and user instructions see: www.stryten.com
Serial No: YYWWXXXXX

DATE CODE: YYWW

STEP 6

Tighten top and bottom mounting screws to secure module in charger frame. Front panel of module should be flush with charger cabinet frame.

STEP 7

Close and lock charger door.

STEP 8

Restore AC power to charger and ensure charger is functioning properly.

INDEX

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