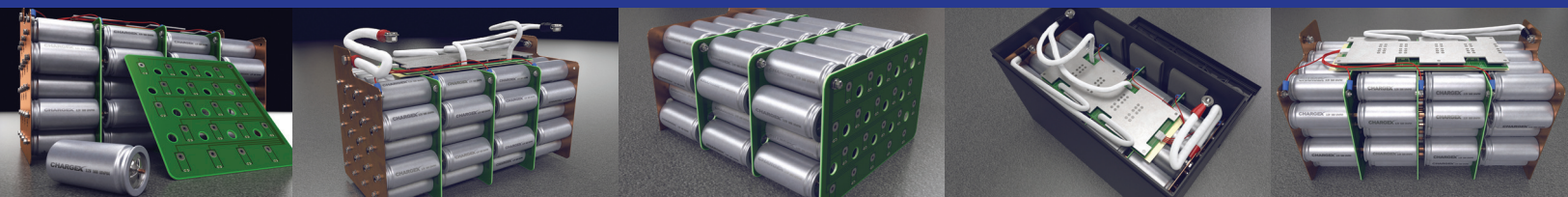


TECHNICAL SPECIFICATIONS



48V 400AH LITHIUM ION BATTERY

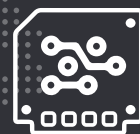


SAFE



LiFePO₄
TECHNOLOGY

BUILT IN BMS
Internal Battery Management System



HIGH OUTPUT

1000 Cold Cranking Amps and 400 Usable Amp Hours



DROP-IN REPLACEMENT

Plug and Play for any application currently using a Lead Acid, AGM or Gel Battery



Model: **CX48400**

48V 400 AH Lithium Ion Battery (LiFePO₄)

GROUP SIZE NA

DEEP CYCLE + STARTING

BMS

COMMERCIAL | MARINE | RV | GOLF | AUTOMOTIVE | UPS | OFF-GRID

The Charge[®]x CX48400 - 48V 400AH Lithium Ion Battery features the latest and most advanced Lithium Iron Phosphate - LiFePO₄ Battery Technology and is designed for Deep Cycle applications. The CX48400 is engineered with our - High Output 3.2V Stainless Steel LiFePO₄ Cells that are bolted together for Rigid Strength and Current Conductivity vs. the tab welded method. The CX48400 is Plug and Play for any application that currently uses lead acid, gel or agm batteries.

ADVANTAGE*

POWER | ENERGY

Nominal Voltage	51.2V
Charge Voltage	57.6V - 58.4V
Peak Discharge (5 Sec)	1000A
Continuous Charge / Discharge Rate	200A
Capacity (amp hours)	400AH
Capacity (watts)	20480WH
Chemistry	Lithium Iron Phosphate (LiFePO ₄)

ADVANTAGE*

TECHNOLOGY

Usable Capacity (AH)	400AH
Depth of Discharge	>100% DOD
Reserve Minutes @ 20A	1200 min
Reserve Minutes @ 50A	480 min
Self Discharge	<3% per mo
Chemistry	Lithium Iron Phosphate (LiFePO ₄)
Cell Type	Cylindrical
Modular	Series or Parallel Connection

ADVANTAGE*

DIMENSIONS | WEIGHT

Group Size	N/A
Weight	200Kg / 440.9 Lbs
Length	927mm / 36.5"
Width	460mm / 18.11"
Height	392mm / 15.43"

ADVANTAGE*

TEMP PERFORMANCE

CELSIUS	FAHRENHEIT	USABLE CAPACITY
60°	140°	103%
50°	122°	102%
40°	104°	100%
30°	86°	100%
20°	68°	98%
10°	50°	92%
0	32	83%
-10	14	80%
-20	-4	70%
-30	-22	60%
-40	-40	10%
-50	-58	0%

ADVANTAGE*

SAFETY | PROTECTION

Automatic Low Voltage Disconnect	40V
Automatic Short Circuit Protection	Instant
Automatic Over Voltage Protection	62.4V
Automatic Reverse Polarity Protection	Instant
Internal Cell Thermal Safety Fuse	Yes
Flame Retardant Electrolyte	Yes
Length Way Circuit Boards	Yes
Automatic Internal Cell Balancing	Yes
Automatic Fault Recovery	Yes
Explosion Proof Stainless Steel Cells	Yes



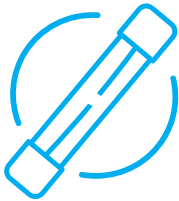
CELL SAFETY FEATURES AND DESIGN 1.1

The main issue with all lithium batteries is cell overheating and rupturing due to over-charging. CHARGEEX® Lithium battery systems have several layers of safety redundancy at the cell level. Notably, an internal thermal fuse between the anode and cathode which shuts down the cell before overheating occurs, to prevent pressure build-up. In the unlikely event this thermal fuse fails, pressure releases through a 1.5MPa safety vent to the cell's electrolyte composition that includes a highly effective flame-retardant additive. These conditions would likely only occur if a charger or controller failed spiking current into the battery. The BPS is designed to protect the cells from this anomaly by opening at 15.8V and would have to fail in the closed state allowing excess current into the cells. **The 48V 400AH is built with cylindrical 3.2V 6.5AH (32650) cells combined in parallel and then in series. All cells are matched by measuring 10 consistencies during several charge / discharge cycles at the end of production.**



Retardant

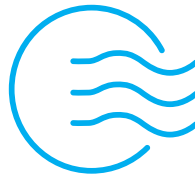
FLAME RETARDANT ELECTROLYTE:
Chargex® cells are safeguarded with flame retardant additive in the electrolyte for best safety.



Thermal Fuse

INTERNAL CELL SAFETY FUSE:

Our latest cell technology has a built-in thermal safety fuse between the anode and cathode that breaks in the unlikely event a cell begins to overheat.



Safety Vent

HIGH PRESSURE SAFETY VENT:
A high pressure safety vent will flip open to release energy and prevent explosion if exposed to extreme heat.



Explosion Proof

STAINLESS STEEL CELL:

Every Cell is manufactured in an explosion proof stainless steel cylindrical case.



CELL SAFETY FEATURES AND DESIGN 1.2

Cell Balancing

The BMS balances the cells by sending more current through the *Lengthway Circuit Boards* and into the cells with a lower voltage. The BMS will also discharge any cell that exceeds 3.65V during charging.



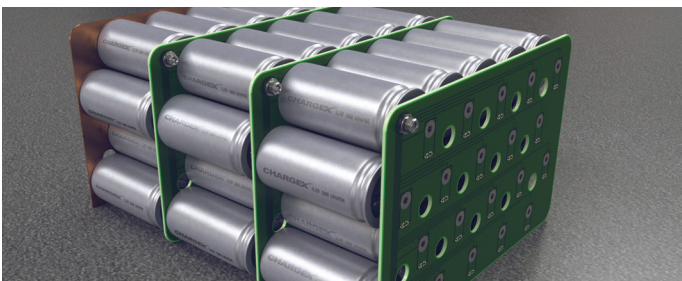
Bolted Cells

Most of our cells positive and negative terminals are bolted vs the more common tab welded method. This creates a superior connection for higher amperage loads and better current conductivity.



Lengthway Board

The *Lengthway Circuit Boards* have a unique function of over-current and cross-protection. The cells' bolt-through *Lengthway Circuit Board* provides balancing, even current flow, short circuit protection and add rigid strength to the battery pack.



Cell Matching Processes

1. Consistency of Self Discharge
2. Consistency of Voltage
3. Consistency of Inner Impedance
4. Consistency of Capacity
5. Consistency of Cycle Life
6. Consistency of Platform
7. Consistency of Constant Current Rate
8. Consistency of Cell Power Control
9. Consistency of Parallel Module Control
10. Consistency of Finished Battery Module

Circuit Protection

If a cell overheats or if the battery is penetrated by a metal object the *Lengthway Circuit Board* will disconnect the impacted cells allowing the rest of the battery to continue to function normally.



PHYSICAL SPECIFICATIONS 1.3

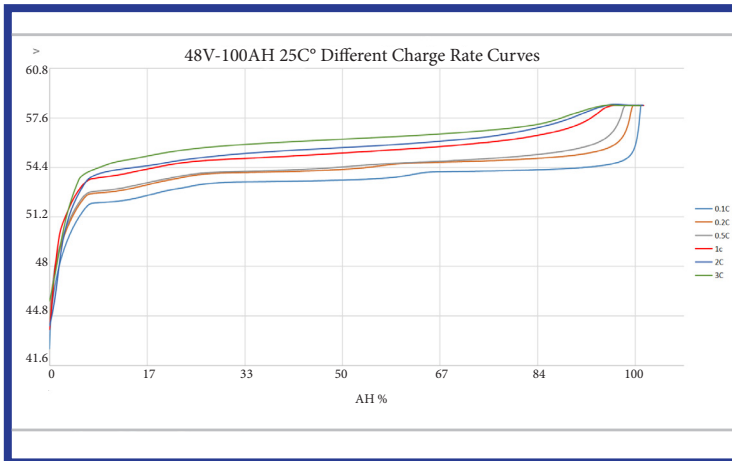


M10 Terminal →



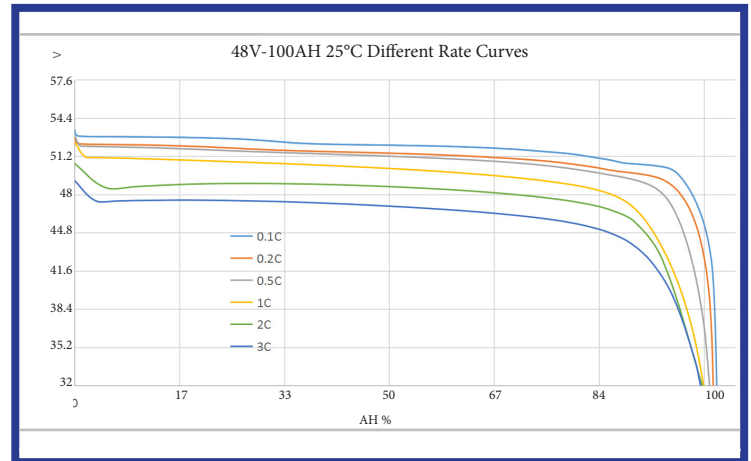
CHARGE AND DISCHARGE CHARTS 1.4

Chart 1



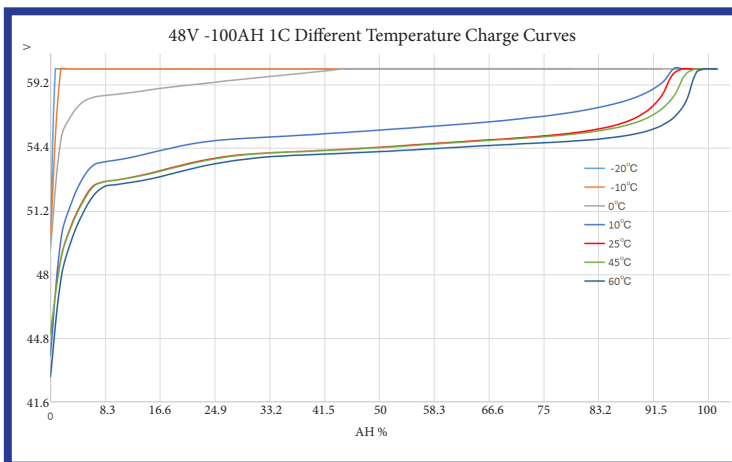
Charging rate at different amps.

Chart 2



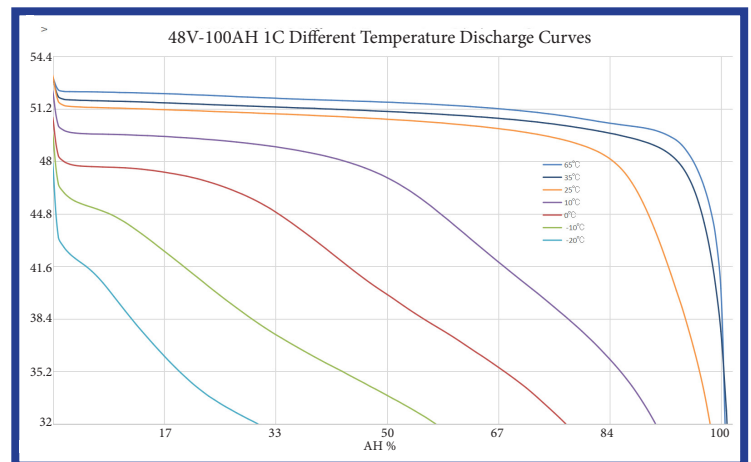
Discharge rates at nominal temperatures.

Chart 3



Charging rates at different temperatures.

Chart 4



Various discharge rates at different temperatures.

These models are based on the 48V 100AH Battery. All cells in each different size battery will charge and discharge at the same rate. Apply the number in AH on these charts as a percentage to a 48V battery with a higher or lower capacity.

CHARGING 1.5

Charging:

Our Lithium Ion Batteries have a built in battery protection system that allows them to be charged with a standard charger. In some cases if your battery charger does not reach 57.6V - 58.4V during charging it may not fully top off the Lithium Ion Battery. In this case we would recommend you purchase a Lithium Charger.



[CXC4825 48V25A](#) Lithium Charger

Alternator:

Most alternators charge around 14.4 - 14.8V. This will sufficiently charge a CHARGE^{EX} Battery under normal circumstances.

Inverter Charger / Solar Controller:

Most inverter chargers have a remote that can program the charging system to either lead acid, gel or agm batteries. These devices will typically have a custom setting as well. Simply set the custom 3 stage charging as follows: (If you do not have a custom setting choose the profile as close to this as possible without going over 15V).

Charger Configuration:

Bulk: 57.6V
Absorb: 58.4V
Float: 54.4V

Zero Memory Charging:

CHARGE^{EX} Batteries are 99.1% efficient and have no memory. This allows you to drain the battery and recharge at any depth of discharge (DOD).

MAINTENANCE 1.6-1

Precautions:

- **Do not** immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if on standby.
- **Do not** use or leave the battery at high temperature, near fire or a heat source. It may overheat, ignite or its performance will degenerate and its service life will decrease.
- **Do not** reverse the positive and negative terminals.
- **Do not** reverse polarity charging.
- **Do not** connect the battery electrodes to an electrical outlet.
- **Do not** short circuit since it will cause serious damage to the battery.
- **Do not** transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- **Do not** strike, trample, throw or drop the battery.
- **Do not** directly solder the battery and pierce the battery with a nail or other sharp objects.
- **Do not** use the battery in a location where static electricity and magnetic fields are great since the safety devices may be damaged, causing hidden safety problems.
- Please use a Lithium compatible charger for charging.
- Recommended to charge the battery within 12 hours after use.
- Charging current should be less than maximum charge current specified in the Product Specification. Charging current bigger than recommended current may damage the battery.
- Discharging current should be less than maximum discharge current specified in the Product Specification. Discharging current bigger than recommended current may damage the battery.
- It should be noted that it is possible for the cell to be at an over-discharged state due to self-discharge characteristics in case the cell is not used for a long time. In order to prevent over-discharging, the cell should be charged periodically to maintain a certain voltage (15.6~16V), 2 months one cycle. Over-discharging may cause loss of cell performance characteristics, or battery functions. But for battery packs with communication function, please maintain it once a month.
- If the battery leaks and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention.
- If the battery gives off a strange odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or in storage, immediately stop charging or using, and remove it from the device.
- In case the battery terminals are dirty or oxidized, clean the terminals with a dry cloth before use. Otherwise, poor performance may occur due to the poor connection with the instrument.
- Tape the discarded battery terminals to insulate them.

MAINTENANCE 1.6-2

BATTERY INSTALLATION GUIDE:

1. Battery Check:

- After receiving the battery, you should first carefully check the packaging. During the process, please ensure that the battery has no faults.
- If there is any damage or leakage, please check the battery box and accessories, and if so, please contact us immediately.
- Please check whether the output connector is correct and measure the positive and negative voltages to see if they are within the normal standard range.

2. Precautions:

- Avoid heat or fire during the installation process to eliminate the chance of a short circuit of the battery to prevent equipment damage or personal injury.
- The battery should be installed in a well-ventilated and sunless place. Do not place it where flooding is likely.
- When fixing the battery terminals, do not use excessive force, otherwise the terminals may be damaged.
- Use a dry cloth to clean the battery components. Do not use oil or other volatile organic solvents to clean the battery compartment, otherwise the battery compartment may be damaged.
- Please make sure that the positive (+) and negative (-) polarity of the connection is correct, otherwise it may cause fire or damage the battery or equipment.

3. Battery installation:

- Clean the battery installation location to ensure that there is no dust or metal objects.
- Put the battery in the correct place.
- Connect the terminal between the device and the battery well.
- After connection, please check whether the connection is good with both the positive and negative poles and that there is no dust or debris close to the battery.

MAINTENANCE 1.6-3

BATTERY CARE & MAINTENANCE:

- When the battery voltage is low, please charge it in time. This can ensure a longer life cycle. If the battery cannot be charged in time and is in a state of low power, it may affect the life cycle.
- The battery should be installed in a dry, clean environment with air circulation. Avoid using flammable materials during charging/discharging.
- Use temperature: -20°C~+60°C. Humidity: RH≤85%. When the temperature exceeds 45°C, please pay attention to ventilation. When the ambient humidity is higher than 85%, please pay attention to protection. Charging temperature: 0°C~+45°C. Humidity: RH≤85%, when the ambient humidity is higher than 85%, please pay attention to protection; storage temperature: 0°C~45°C (optimum temperature 15°C~25°C in dry environment). The battery is affected by temperature that can be determined by the capacity change, which is normal.
- Do not use organic solvents to clean the battery compartment. In the event of a battery fire, use a dry powder fire extinguisher or sand.

MAINTENANCE 1.6-4

BATTERY FAULTS & SOLUTIONS:

- I. The battery voltage is too low after being fully charged.
 - The battery has not been used for a long period, has been in storage or does not meet the maintenance regulations.
 - Solution: Charge the battery.
 - The battery is in a violent collision, the battery casing is damaged or the electrolyte smells.
 - Solution: Generally not within the scope of maintenance. If maintenance is required, we need to confirm whether there is a problem with the output cable or the battery itself. First, open the battery compartment and check the battery P + / C + and P / C wires or connectors for damage. If it is damaged, it needs to be replaced. Then, investigate the smell/odor to determine the health of the battery, if there is an irritating electrolyte odor, it indicates that the battery
 - has leaked. You need to test the voltage of each series. If the voltage of a series is very different from the much lower voltage, the series needs to be replaced.
 - Insufficient capacity.
 - Solution: It usually takes 3-5 cycles to charge and discharge the battery.

MAINTENANCE 1.6-4 CONT'D

- II. After the battery is fully charged, the battery voltage is zero or low (the charger shows that it is full).
- Disconnect battery.
 - **Solution:** Remove the battery, check whether the circuit is damaged, whether the solder joint is off, whether the nickel band is broken, and then repair it according to the damage.
 - BPS not working.
 - **Solution:** First, make sure that the cable is in good contact with the protective plate, and then observe whether the solder is closed. If the above conditions are normal, please test the voltage between B + B- and P + P- voltage, if the voltage difference is large, the circuit board will fail. Then please conduct a detailed test on the protection board. If it fails, please replace it with a new BMS.
- III. Unstable battery voltage.
- Welding error.
 - **Solution:** Use an internal resistance tester to test the resistance, and confirm whether the internal resistance of the battery exceeds a predetermined value. Otherwise, the welding state of the battery will be wrong, and the battery needs to be disassembled and welded again.
 - Abnormal protection board.
 - **Solution:** Replace the protection board.
 - Poor connector or terminal contact
 - **Solution:** replace the terminal or connector.
- IV. The battery works normally during charging, but it cannot discharge.
- **Solution:** The BPS is damaged; you need to replace the protection board.

QUALITY CONTROL 1.7

- **Cell Match**
Strict cell matching standard, the difference of Internal resistance is 1mΩ and voltage is 5mV.
- **Automatic Cells Welding**
Cells are assembled by automatic welding equipment to ensure the quality, reliability and consistency.
- **100% Cycle Test**
All battery packs are 100% cycle tested (Fully Discharged-Fully Charged-Fully Discharged - 60% Charged) before packaging and all test reports are stored.
- **Unique Tracking Number**
All battery pack cells are lasered with a unique number on the case side for quality tracking.

CERTIFICATIONS 1.8

- **UL 1642 (Cell)**
CAS Number 1335-31-5
- **CE (Pack)**
Access to European Union Markets
- **UN3480**
Lithium Ion Batteries (shipped by themselves)
- **UN38.3 (Cell / Pack)**
UN Transportation testing
- **IEC62619 (Cell)**
Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for large format secondary lithium cells and batteries for stationary and motive applications.
- **IEC62133 (Cell)**
Standard for Exporting Lithium Ion Batteries
- **ROHS (Cell)**
Restriction of Hazardous Substances in Electrical and Electronic Equipment

WARRANTY, REPAIR AND REPLACEMENT 1.7

Manufacturer's Limited Warranty: We Guarantee every battery sold by us or any of our authorized dealers or distributors worldwide, to be free of defects from the date of sale. Subject to the issues listed below, we will repair or replace the battery and/or parts of the battery if the components in question are defective in materials or workmanship. Our batteries are designed to replace lead-acid batteries and should be used as drop-in replacement for lead-acid applications.

Battery Protection System: Our lithium batteries have a built in battery protection system designed to prevent damage to the cells from an external occurrence. The battery protection will internally disconnect to prevent damage to the cells if it senses any of the following conditions, short circuit, reverse polarity, overcharge and over discharge voltage protection. If your battery has disconnected, it will be necessary to charge the battery before using it again. In some cases, your charger may not turn the battery on. Please contact us through the form below and we will guide you through the steps necessary to wake it up.

Warranty Procedure: In the unlikely event your battery cannot be woken up, shipping can be arranged to our headquarters once an RMA number has been created. If the battery is repairable, it will be repaired at no cost and returned to you. If it is not repairable and the issue was caused by a manufacturer defect, we will replace the battery at no cost within the first 5 years. After 5 years, we will repair your battery at no cost to you if the battery is repairable. In the unlikely event it is not repairable, we will pro-rate the cost of a new replacement battery for you at 50% off the cost of a new one. Warranties are non-transferable and stay with the original purchaser of our products. In some cases, your warranty claim may require special order parts and it can take > 3mo. for us to get the necessary parts and components. In some cases, we may require your battery to be shipped back to the factory to be assessed and/or repaired. In this case, it can take > 6 mo. to get the battery returned once the repairs have been made. CHARGEEX® is an approved hazmat shipper which is required to ship lithium ion batteries. All of our products are delivered in packaging that meets or exceeds federal and international standards for shipping lithium ion batteries.

Not Covered by This Warranty: Manufacturer is not obligated to warrant the battery in question, if defects are related to damages caused by abuse/neglect, or from the following: - Damage from shipping, loose terminal bolts or corroded hardware - Manufacturer codes tampering or removal - Failure to properly install the battery, in addition to keeping the battery properly charged and maintained - Breakage from collision, fire or freezing—which includes damage from extreme heat or cold, improper storage, water damage, CHARGEEX® warranty does not cover spent or worn out batteries or tampering. All bolts must be firmly tightened with a torque wrench and NOT by hand to avoid overheating caused by a loose connection.

Other Warranties: Our authorized dealers and distributors may offer an additional warranty to the Manufacturer's Limited Warranty. Manufacturer is not responsible for dealer or distributor created warranties or any claims that may arise from said warranties.

Warranty Disclaimer: Customers should adhere to all documentation and guidelines. Manufacturer will not be responsible for any expenses related to installation/removal, electrical system tests, battery charging, loss of time or other expenses which should be considered incidental damages, including all shipping charges after the first 30 days of warranty.

Back Orders: From time to time we encounter gaps in inventory. Below is information about how we handle items that are on backorder.

Some items may not be readily available and must be ordered from our factory. Within 48 hours after you place your order we will notify you by email if the item is on back order and provide you with the expected ship date. If the products have not yet shipped you can cancel your order anytime. Production delays do happen, We apologize in advance and will do everything to help you get your products as soon as possible. After your order has shipped there are no returns or exchanges accepted. Our zero return policy is effective at the time of purchase. As always, our commitment to excellent customer service is our top priority. Please contact us if you have further questions about our warranty and return policy.

PLEASE NOTE - Customers are responsible for all shipping fees following the first 30 days of purchases.