

Instructions for Use of 12V/24V LiFePO4 Battery

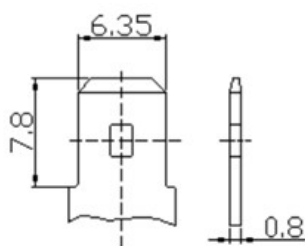
1. Overview

This manual is meant for the installer and the user of the Li-ion battery. Only qualified, certified personnel may install and perform maintenance on the Li-ion battery.

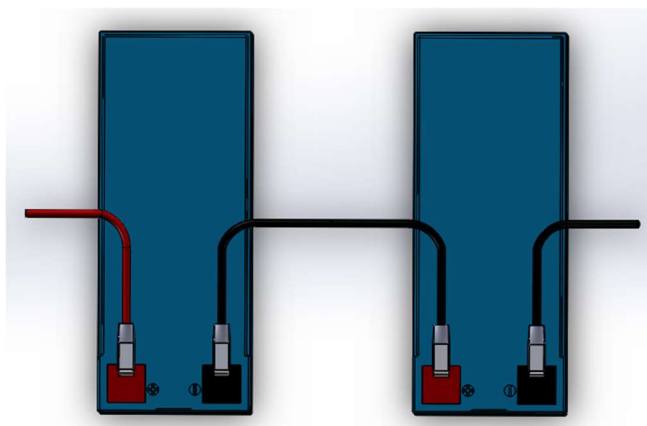
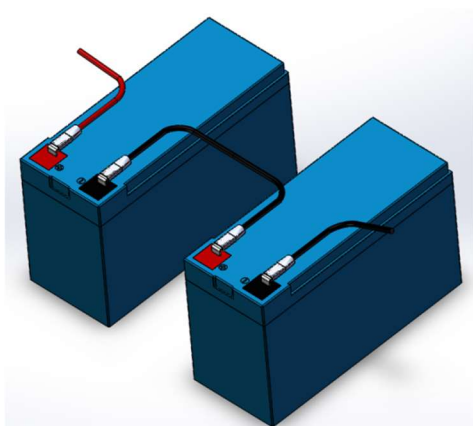
This manual contains instructions of Vision's 12V/24V lithium iron phosphate battery connection methods, precautions for use and storage, troubleshooting, and general guidelines for the convenience of customers.

2. 12V battery F2 (0.250) terminal products

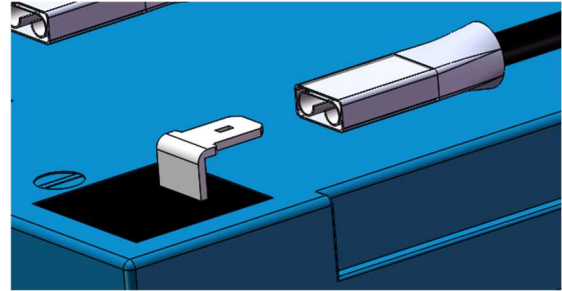
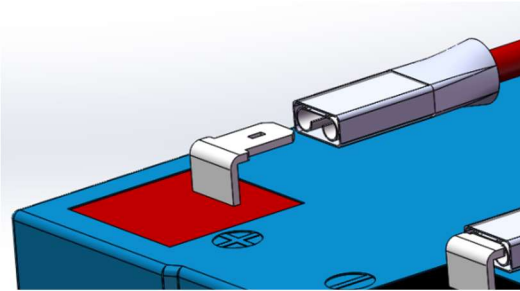
Terminal diagram



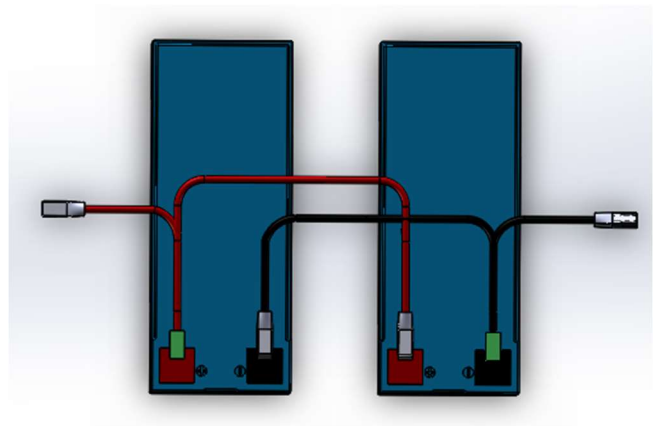
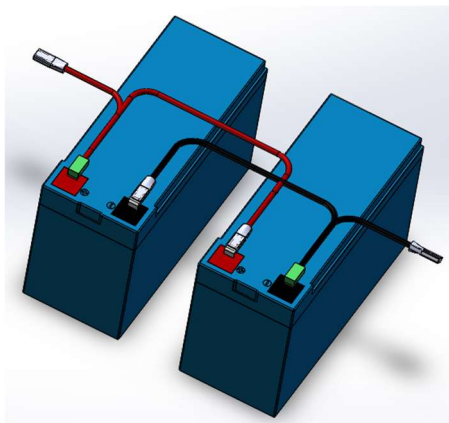
① Wiring diagram for series connection



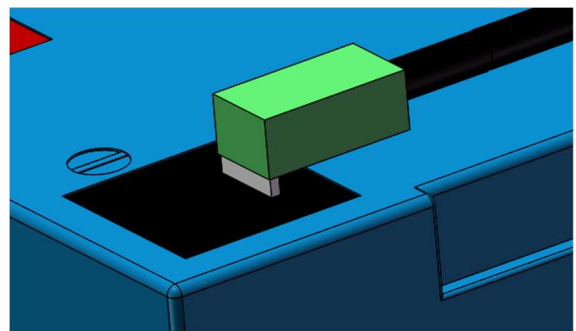
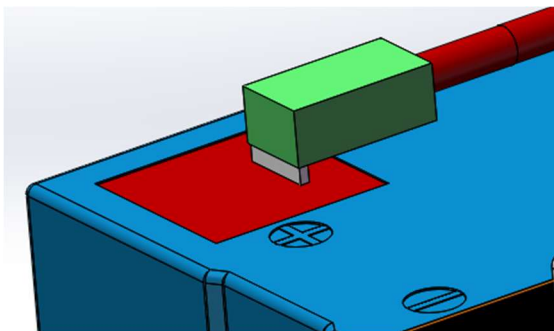
When battery is fixed in series, it is recommended to use the plug-in method for the connection. If the vibration is relatively large during use, it is recommended to use welding to connect.



② Wiring diagram for parallel use

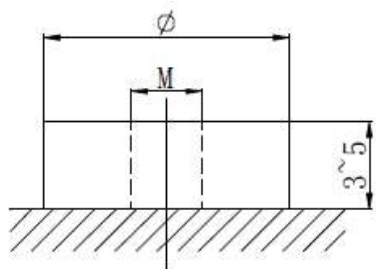


In parallel, it is recommended to use welding to connect.

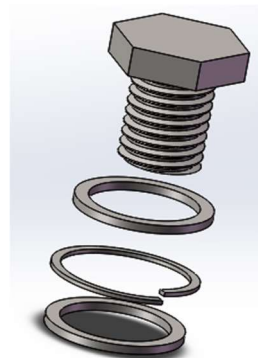


3. 12V and 24V battery M5/M6/M8 terminal products

Terminal diagram

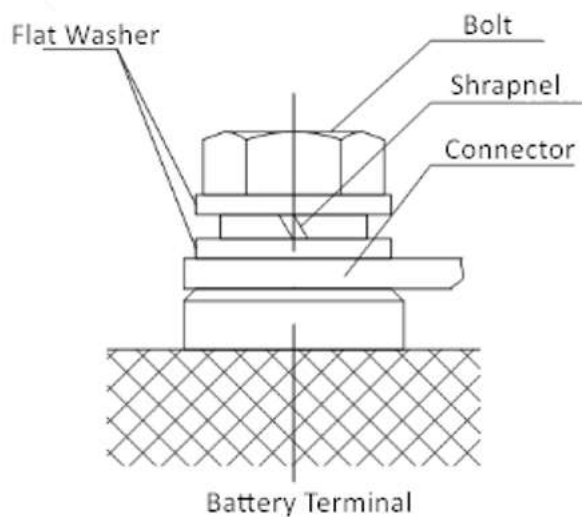


Locking bolt assembly: 1 screw + 2 flat washers + 1 shrapnel



| TYPE | F11 | F12 | F13 |
|-------------------|------|-------|------|
| M | 6 | 8 | 5 |
| ϕ | 14 | 16 | 12 |
| Tightening torque | 8N•m | 10N•m | 6N•m |

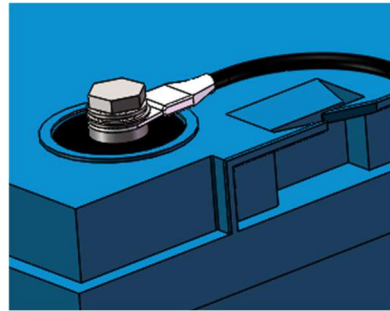
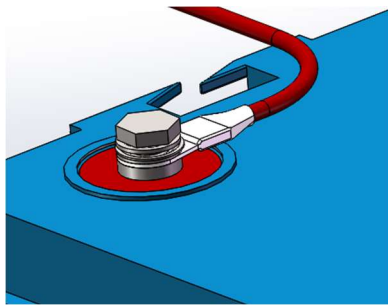
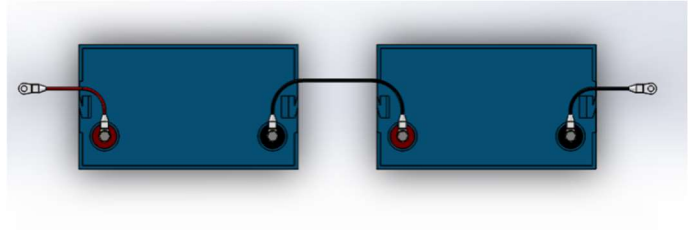
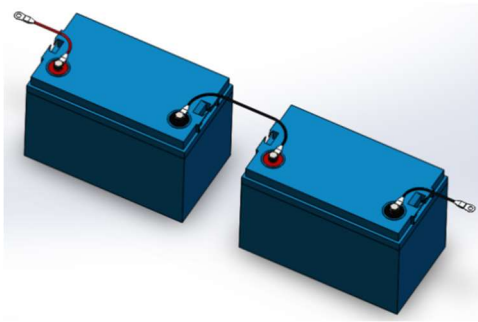
Schematic diagram of the bolt-locking-connector, the flat washer and the shrapnel cannot be placed between the connector and the battery terminal.



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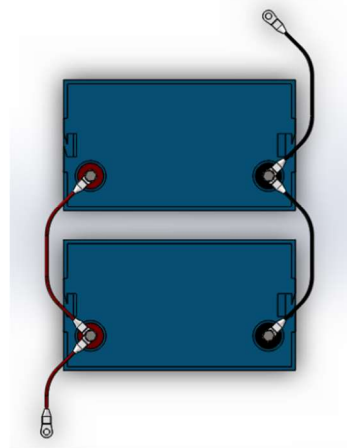
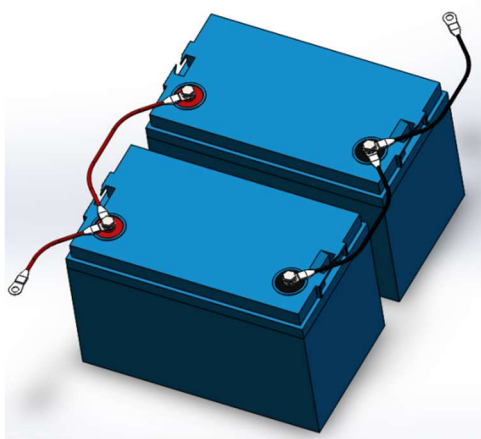
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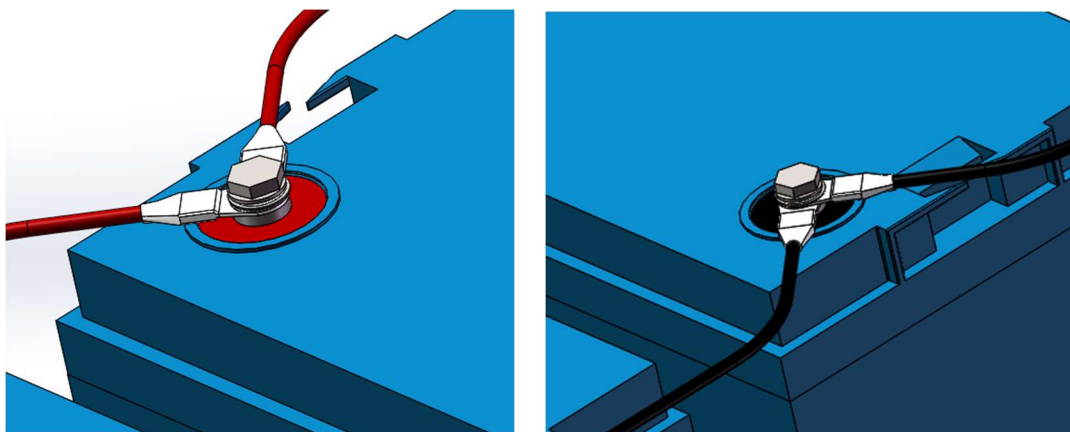
① Wiring diagram for series connection



IMPORTANT: Maximum serial connection Voltage CANNOT exceed 40V. So two 24V batteries cannot be connected in Serial.

② Wiring diagram for parallel use





4. Cautions

- 1) The battery is in half-charged state when leaving the factory, please fully charge it before use.
- 2) When battery is stored for a long time, ensure that it is half-charged. In order to ensure the best performance of the battery, it should be charged and discharged every three months.
- 3) Before the batteries are used in series or in parallel, they need to be fully charged separately with a special charger for lithium iron phosphate batteries, and the voltage difference should not exceed 0.1V. The recommended charging voltage is 14.4V~14.6V for 12V batteries, 28.8V~29.2V for 24V batteries, and the recommended charging current is 0.2C~0.5C.
- 4) Do not mix batteries made by different manufacturers, different types of batteries, and mix new and old batteries.
- 5) When installing, it is best to ensure a certain heat dissipation gap between the batteries, and the recommended gap is $\geq 20\text{mm}$.
- 6) It is strictly forbidden to immerse the battery in water. When not in use, it should be stored in a cool and dry environment.
- 7) It is strictly forbidden to throw the battery into the fire to avoid explosion or other dangers.
- 8) It is strictly forbidden to use the battery with the positive and negative poles reversed. It is strictly forbidden to connect the battery directly to the power socket, and it is forbidden to short-circuit the positive and negative poles of the battery.
- 9) Do not charge or discharge the battery with heat, swelling, deformation or leakage.
- 10) It is forbidden to pierce the battery with nails or other sharp objects, and it is forbidden to throw, step on, knock, hit the battery, etc.

Appendix

Common Issue and Solution During Use of LiFePO4 Battery

| Issue | Reason | Solution |
|--------------------------------------|--|--|
| The battery cannot be charged | The charger is connected reversely. | Connect the charger correctly. |
| | Charger has low voltage disable function. | a. Connect a fully charged lead-acid battery or lithium iron phosphate battery with the same rated voltage in parallel for boost charging. Switch to another lithium iron phosphate battery charger without low voltage disable function. |
| | Battery is in high voltage. | Charging over-voltage protection: disconnect the circuit and wait, when cell voltage is ≤ 3.50 and the battery voltage drops to 13.8~14.0V, the protection will be automatically released or release the protection by 5A discharge. |
| | High temperature inside the battery. | High temperature charging protection: the protection will be released when battery inside temperature drops to 50~60°C. |
| | Low temperature inside the battery. | Low temperature charging protection: the protection will be released when battery inside temperature rises to above 5°C. |
| | The charging current is too high. | Charging over-current protection: disconnect the circuit, wait for about 1 minute for self-recovery or release the protection by 5A discharge. |
| | Long-term storage after the battery is discharged will cause the BMS to fail to activate under low-voltage conditions. | The battery must be charged within 6 days after fully discharged, otherwise the battery needs to be returned to the factory for dismantling and repair. |
| | BMS failure. | The battery needs to be returned to the factory for dismantling and repair. |

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| | | |
|---|---|--|
| The battery cannot be discharged | Battery is in low voltage. | Discharge low voltage protection: disconnect the circuit and wait, when the cell voltage rises to 2.60V~3.00V and the battery voltage rises to 10.8~12V, the protection will be automatically released or release the protection by 5A charge. |
| | High temperature inside the battery. | High temperature discharging protection: the protection will be released when battery inside temperature drops to 50~60°C. |
| | Low temperature inside the battery. | Low temperature discharging protection: the protection will be released when battery inside temperature rises to above -15°C. |
| | The discharging current is too high. | Discharging over-current protection: disconnect the circuit, wait for about 1 minute for self-recovery or release the protection by 5A charge. |
| | The external load is short-circuited. | Automatically recover about 1 minute after the load is removed |
| | BMS failure. | The battery needs to be returned to the factory for dismantling and repair. |
| Battery discharge time is short | The cells in the battery pack are short-circuited slightly, resulting in large self-discharge. | The battery needs to be returned to the factory for disassembly, and the bad battery cell needs to be replaced with new one. |
| | There are big differences in cells consistency, and BMS detects the low voltage of the backward cells and terminates discharge early. | The battery needs to be returned to the factory for disassembly, and the backward cell needs to be replaced with new one. |
| The battery can't be fully charged | There are big differences in cells consistency, and BMS detects the high-voltage of individual cells, and terminates charge early. | The battery needs to be returned to the factory for disassembly, and the backward cell needs to be replaced with new one. |
| Low voltage after the battery is stored for a short time | The cells in the battery pack are short-circuited slightly, resulting in large self-discharge. | The battery needs to be returned to the factory for disassembly, and the backward cell needs to be replaced with new one. |
| Charging voltage range | / | 12V: 14.4-14.6V 24V: 28.8-29.2V |
| Discharge cut-off voltage | / | 12V: ≥10.8V 24V: ≥21.6V |