



24V & 48V ESSENTIAL Li[®] QUICK START GUIDE

Part# US48VGC2, US24VGC2, US48V105



WARNING! Lithium-ion batteries can be dangerous if mishandled and/or abused. This Quick Start Guide will provide basic info. on functionality of the battery but to ensure maximum safety, please review the U.S. Battery Lithium-Ion User Manual in full prior to installation and use.



WARNING! Replacing lead-acid batteries with lithium-ion batteries results in a reduction in weight that can impact vehicle/machine dynamics. Counterweights may be required to reduce rollover risk. Consult the machine manufacturer or an installation professional.

TURNING ON

To turn on battery, press and hold the button for 5 seconds. LEDs should light up indicating the state of charge (SOC) of the battery. Note that if multiple batteries are connected in parallel, turning on the first battery will turn on all batteries in string.



When the battery is on and there are no faults/errors, the battery is in “Active” mode. This mode is identified by the green button LED flashing every 5 seconds. In this mode, the battery is ready to be used and voltage is present at the terminals. While in this mode, you can press the button once to reveal the state of charge. Note that this will display for 5 seconds. When power is drawn from the batteries, the button will blink green rapidly.

TURNING OFF

To turn off, press once and then press and hold the button for approximately 6 seconds. LED 2 & 3 will light up first, wait to release the button until LED 2 & 4 light up. When the battery is shutting down, the light will alternate red/green. Once off, the button LED should no longer be flashing. Note that if multiple batteries are connected in parallel, with CAN cables properly installed (see “CAN Bus” section), turning off the first battery will turn off all batteries.

CHARGING

It is important to only use chargers programmed and set for lithium iron phosphate chemistry batteries! Use of improper chargers can result in loss of warranty. Contact the charger manufacturer for information on available battery chemistry profiles.

When the battery is charging, the LEDs will pulse to indicate SOC progress. For example, if the battery is at 31%, the first LED will be solid (0-20%) and the second will be pulsing (20-40%).

FAULTS

When faults (condition outside of BMS safety parameters) are active, the button LED will flash red every 5 seconds. To determine the specific fault(s) that

is active press the button once. The Button LED will stay solid red for 5 seconds and the LEDs will indicate the specific fault. If multiple faults are active, tap the button to cycle through the faults. Once all faults have been displayed, the SOC will be displayed, which is indicated by the button LED changing from red to green.

****See User Manual for specific faults and solutions.****

CABLING AND HARDWARE INSTALLATION

Cable size has a direct influence on the voltage drop across the system. A trained professional should verify that your system’s cables are correctly sized and installed. Exceeding rated capacities of cables and/or connections can cause unsafe operating conditions.

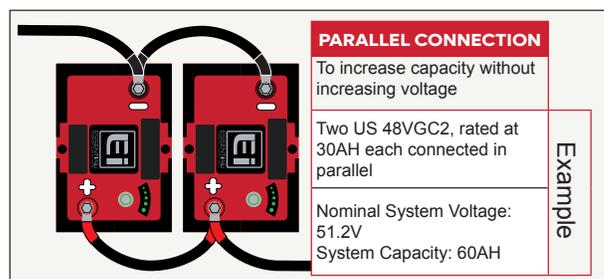
During installation and handling, ensure that terminals are covered with supplied terminal protectors and only remove when ready to attach cables. It is recommended that cables be installed while the battery is turned off.

PARALLEL CONNECTIONS

Lithium-Ion batteries should never be installed in series connection, only in parallel connections. Never install multiple batteries in parallel without first checking the state of charge on the display. The best way to ensure batteries are matched is by fully charging each battery prior to installation in parallel. Another way would be to check each battery voltage prior to installation. Always install the batteries in the “Off” state and verify all connections prior to turning “On”.

****Do not connect more than ten(10) GC2 batteries in parallel**

****Do not connect more than four(4) 105 batteries in parallel**





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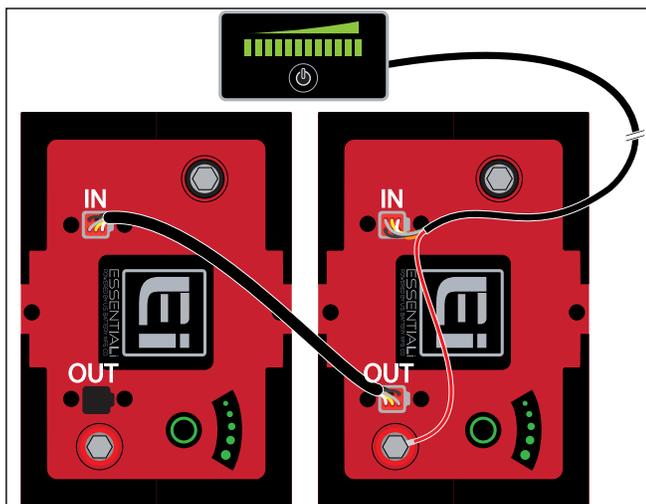
Part# US48VGC2,US24VGC2,US48V105

ACCESSORIES

Never connect accessories directly to the batteries (except for the U.S. Battery compatible remote display). 12V accessories should use a DC-DC power converter/reducer that is tied into the key switch of the vehicle. Accessories should be installed in a way that they do not drain the batteries while not in use. Please consult your U.S. Battery dealer when installing accessories on vehicles using lithium-ion batteries.

CAN Bus

Each 24V & 48V battery is supplied with a CAN jumper cable that should be installed between parallel batteries to allow for communication. This jumper should connect from the “OUT” port of one battery to the “IN” port of the next battery. For installations not using a remote display, the last battery in the string should use a CAN termination plug in the final “OUT” port. Contact your U.S. Battery dealer for CAN termination plugs.



Example of CAN Bus Connections with Remote Display

SLEEP AND PULSE

After 72 hours, if no charge/discharge is detected the battery will go into a sleep state to conserve power to ~1mA. The battery can be awakened by following the same instructions to turn it on.

When in sleep or low SOC protection mode, the battery will “pulse” so that it can be awakened with charging.

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This pulsing frequency decreases as time goes on. If a charger is connected while battery is in sleep mode, it will awaken with charging.

REMOTE DISPLAY(OPTIONAL)

Estimating the state of charge (SOC) using voltage is unreliable. Many electric vehicles designed for lead-acid batteries have SOC displays that rely on voltage and as such these displays will no longer be accurate when used with lithium-ion batteries. The only way to determine SOC is by viewing the LEDs on the battery or with the optional U.S. Battery Remote SOC Display.

WARRANTY

U.S. Battery offers a limited liability, 8 year warranty for Essential Lithium-Ion batteries. Please visit the link below to register your products and review the warranty specifics.

For additional information please visit the U.S. Battery Essential Li[®] landing page at the website listed below or scan the QR code with your mobile device.

<https://www.usbattery.com/essentialli-owner/>



SCAN ME