

Quick User Guide

Lynx Ion + Shunt 350/600
24V/180Ah Lithium Ion Batteries

Quick user guide - Victron Lynx Ion + Shunt

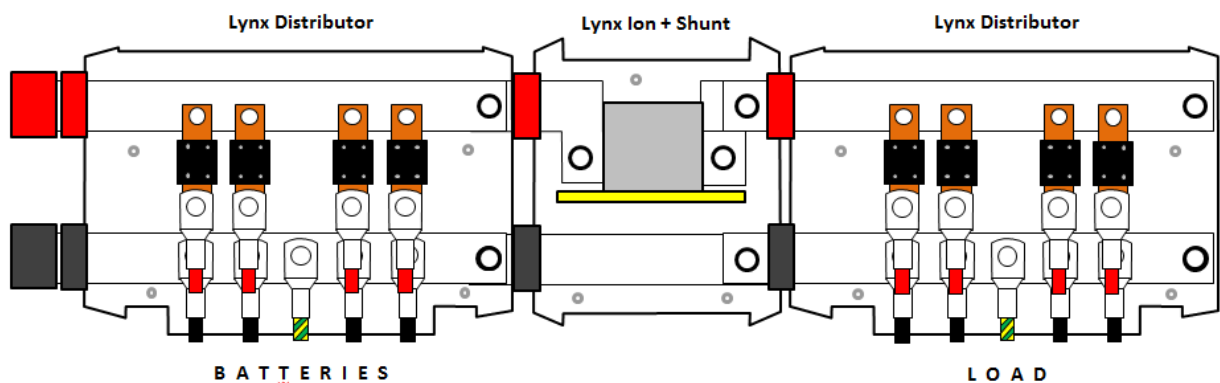
This quick user guide describes the main procedures for setting up the Victron Lithium-Ion battery system with the Lynx Ion + Shunt. A detailed description can be found in the manual.

Installation

Connect the Lynx Distributor (optional), Lynx Ion + Shunt and Lynx Distributor (optional) together like in the picture below.



The Lynx Distributer is used at the battery side (left side) instead of a Lynx Power In. This is because in this way fuses can also be installed at the battery side.



- Connect all the batteries to the left side of the Lynx Ion + Shunt.
- Connect all chargers and loads to the right side of the Lynx Ion + Shunt.



WARNING: Never connect loads and chargers directly to the batteries. This can damage the batteries.

Installing Fuses

Fuses must be installed on both the battery side and load/charger side of the Lynx Ion + Shunt.



The total value of the fuses in the Lynx Distributor on the load/charger side (right side) may not exceed the maximum current of the safety contactor. For the Lynx Ion + Shunt 350 this is 350A and for the Lynx Ion + Shunt 600 this is 600A.

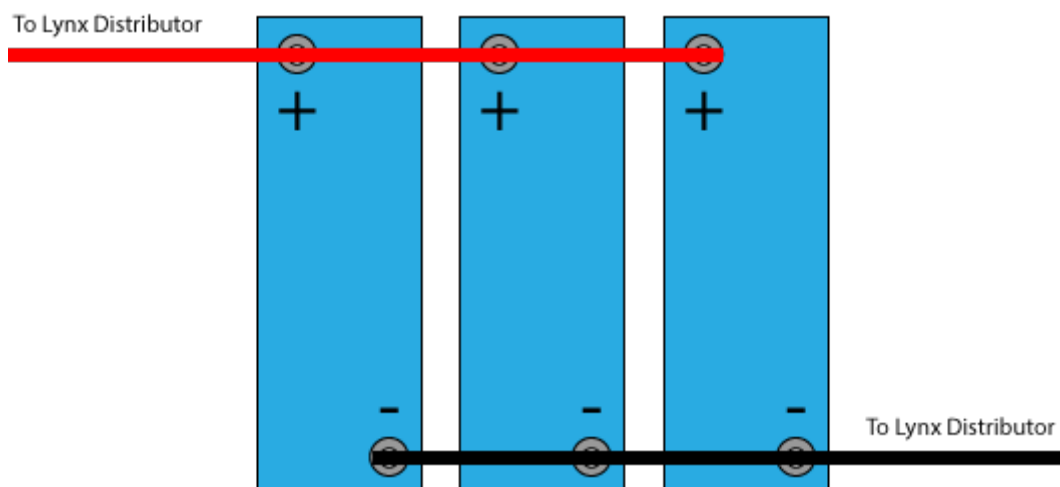
On the battery side (left), the fuses are functional as short-circuit protection. It is recommended that this value is between 300A and 500A on each connection depending on how many batteries are connected.

Parallel connection of batteries

- Be sure that the battery state-of-charge is equal for each battery. If the batteries are new then they have an equal state-of-charge.
- Keep wire lengths exactly the same. Otherwise imbalance occurs.

Batteries can be connected to the Lynx Distributor or as a parallel battery string like in the figure below.

Example of parallel connection of batteries with the same cable lengths:

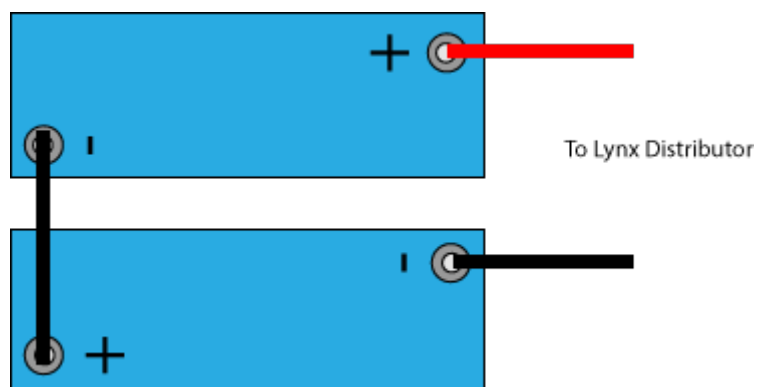


Series connection of batteries

The maximum battery in series is 2. This is because the maximum voltage on the Lynx Ion + Shunt is 60V.

- Be sure that the battery state-of-charge is equal for each battery. If the batteries are new then they have an equal state-of-charge.

Example of series connection of two batteries:

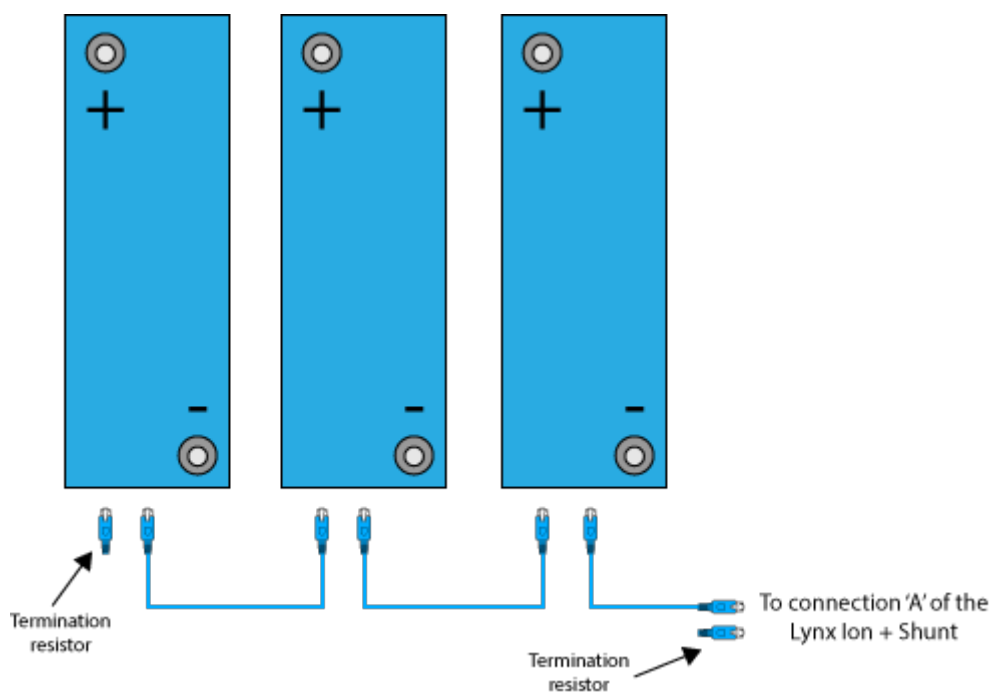


Connections

Connecting the BMS CAN-Bus network

Use connection A of the Lynx Ion + Shunt, top left pair of RJ45 connectors, to connect the BMS CAN-Bus network to.

Connect the network as following:



Do not forget the termination resistors at the ends of the CAN-Bus network.

Connecting to VE.CAN network

Use connection D of the Lynx Ion, the pair of RJ-45 sockets at lower left to connect devices like the Color Control GX or a BlueSolar MPPT.

Connecting Allow-to-charge and Allow-to-discharge



The Allow-to-charge and Allow-to-discharge are very important. They control the chargers and loads in the system.

There are 2 important functionalities in the Victron Lithium-Ion battery system.

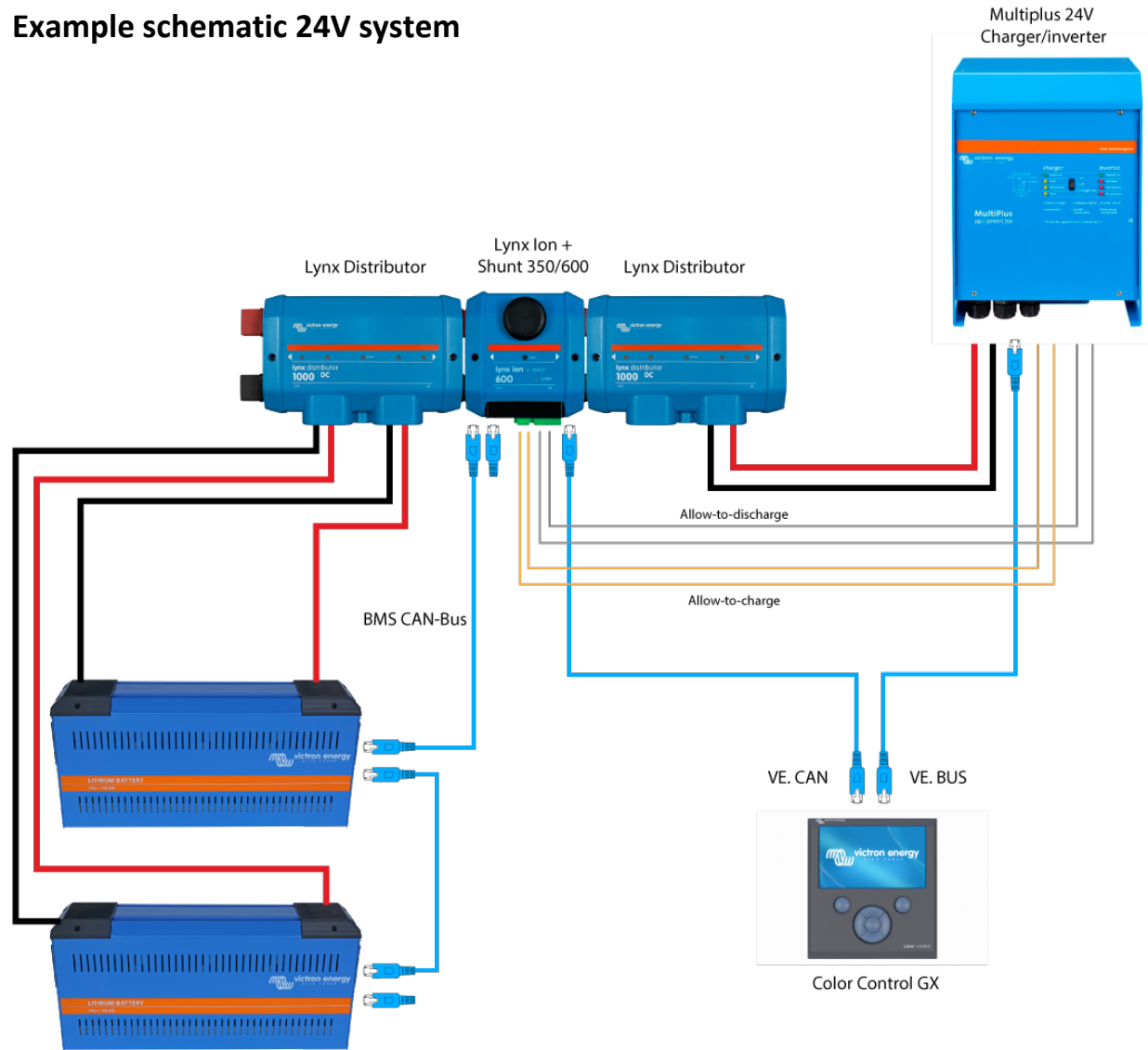
1. All chargers need to stop charging if the batteries are fully charged.
2. All loads need to stop discharging if the batteries are empty.

This kind of functionality of the system can be achieved to use the allow-to-charge and allow-to-discharge of the Lynx Ion + Shunt.

- When the battery is fully charged the allow-to-charge contact is opened and charging has to stop.
- When the battery is fully discharged the allow-to-discharge contact is opened and discharging has to stop.

If charging or discharging is not stopped the safety contactor will be opened to make sure the batteries are not damaged.

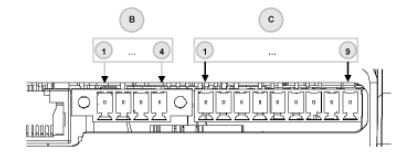
Example schematic 24V system



Allow-to-discharge
Connect the allow-to-discharge to the **Temp. sense input** of the Multi.

Allow-to-charge
Connect the allow-to-charge to the **AUX input** of the Multi.

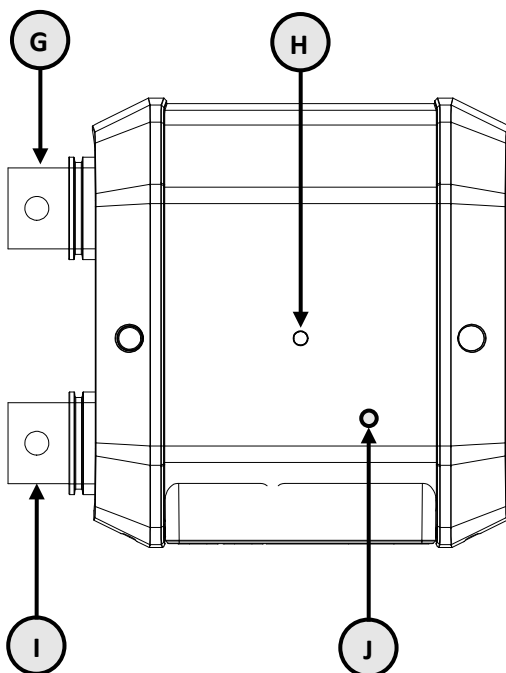
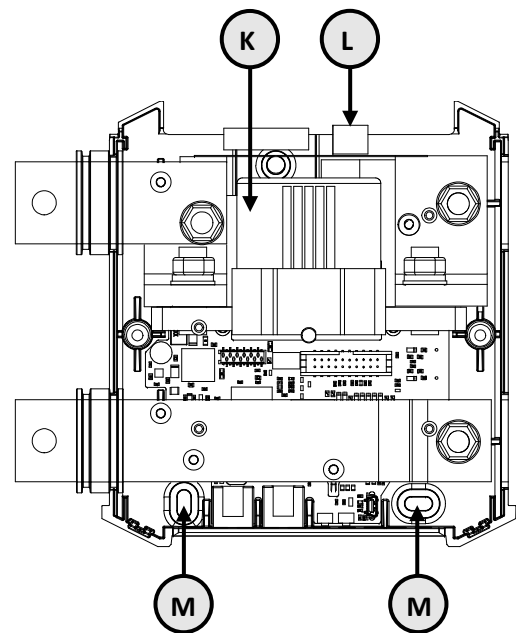
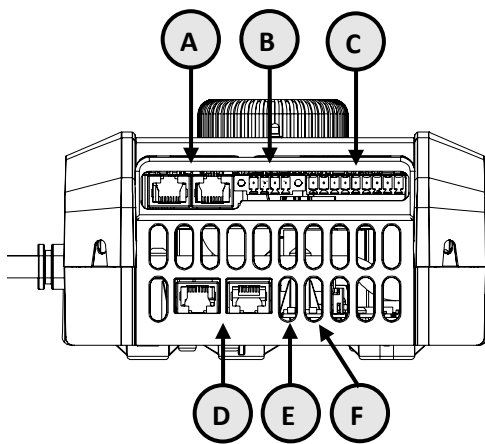
Lynx Ion + Shunt connection overview:



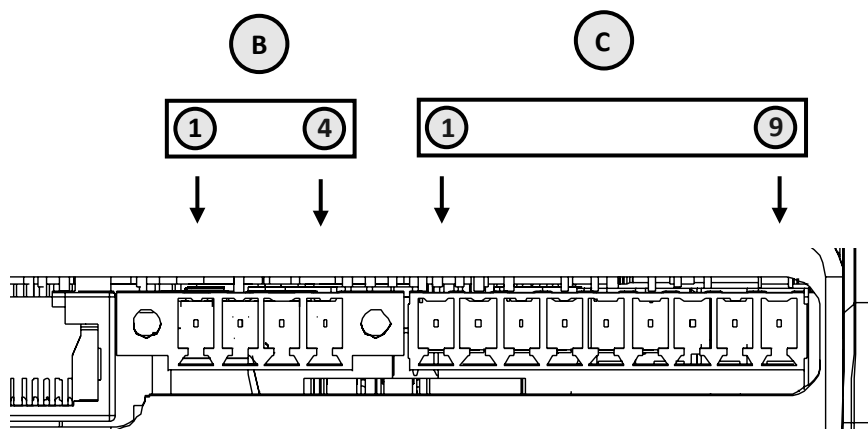
Connector pins and specifications					
Conn.	Pin	I/O	Voltage Max	Current Max	Purpose
B	1	Out	+ V System	5 A	External status output
	2	Out	GND		
	3	Out	+ V System	5 A	External safety contactor
	4	Out	GND		
C	1		60 V	1.0 A @ 60 V	Allow-to-charge
	2		60 V	1.0 A @ 60 V	Allow-to-discharge
	3		60 V	1.0 A @ 60 V	Future use
	4		60 V	1.0 A @ 60 V	Future use
	5		60 V	1.0 A @ 60 V	Future use
	6				
	7	In			External START-button
	8	Out	12 V	140 mA	External status signal
	9				GND used for status signal and/or START-button

Overview

Part descriptions	
A	BMS CAN-Bus connections. CAN-In, CAN-out.
B	Power out connections. Used for External status and external safety contactor.
C	Signal I/O's
D	VE.Can CAN-Bus connections. CAN-In, CAN-out.
E	Hard-reset button.
F	Reserved button.
G	'+' connection for battery.
H	Status LED.
I	'-' connection for battery.
J	START-button.
K	Safety contactor. 350A or 600A continuous.
L	Pre-Charge fuse 10A.
M	Mounting holes.



Connector B and C zoomed view



Connector pins and specifications					
Conn.	Pin	I/O	Voltage Max.	Current Max.	Purpose
B	1	Out	+ V System	5 A	External status output
	2		GND		
	3	Out	+ V System	5 A	External safety contactor
	4		GND		
C	1		60 V	1,0 A @ 60 V	Allow-to-charge
	2				
	3		60 V	1,0 A @ 60 V	Allow-to-discharge
	4				
	5		60 V	1,0 A @ 60 V	Future use
	6				
	7	In			External START-button
	8	Out	12 V	140 mA	External status signal
9				GND used for status signal and/or START-button	

Power up the system

Other than below procedure, no configuration is needed. The battery configuration is automatically recognized.

Power up procedure

1. Make sure that all energy consumers are switched off before starting up the system.
2. The Lynx Ion + Shunt will pre-charge the system before closing the safety contactor.
3. Press the START-button on the front of the Lynx Ion + Shunt to start the system.
4. Now the system is being pre-charged. The safety contactor is closed as soon as the voltage rises above 80% of the battery voltage.
5. If the status LED is continuously on, then the system is running and ready for use.



The Lynx Ion + Shunt will not start if there is more than 10A drawn by the system during pre-charging.

Power down/reset procedure

Lynx Ion + Shunt to standby mode:

1. Press and hold the START-button until the Lynx Ion goes into standby mode (status LED off).
2. Now the safety contactor is open and the batteries are disconnected from the system.

Reset Lynx Ion + Shunt from error state:

1. Press the START-button for 1 second.
2. The system will now restart.

Automatic power-up

The Lynx Ion + Shunt will automatically power-up from standby if a charge voltage on the output is supplied for more than 10 seconds.

Troubleshooting

Firmware version 1.22 and higher.

Status LED state	Description	Solution in case of error
Off	System is in standby mode. Press START button to start up the system.	
Blinking fast	Initializing.	
On	Running.	
Blinking	Balancing active.	
Flashing/beeping 1 time	Battery initialization error.	Solution: Check the BMS CAN-Bus network: - Are all batteries connected properly to the network? - Is the CAN-Bus terminated with termination resistors? - Are only the same type of batteries connected?
Flashing/beeping 2 times	No batteries connected	Solution: Check the BMS CAN-Bus network: - Are all batteries connected properly to the network? - Is the CAN-Bus terminated with termination resistors? - Are only the same type of batteries connected?
Flashing/beeping 3 times	Unknown battery connected / battery connected to a running system.	Solution: Check the BMS CAN-Bus network: - Are all batteries connected properly to the network? - Is the CAN-Bus terminated with termination resistors? - Are only the same type of batteries connected?
Flashing/beeping 4 times	Different types of batteries connected	Check if only the same type of batteries are connected.

Flashing/beeping 5 times	Number of connected batteries incorrect	<p>??? This error occurs when the bus voltage is not equal to the number of batteries in series. For example, an 48V system cannot have 1 battery.</p> <p>Check the BMS CAN-Bus network:</p> <ul style="list-style-type: none"> - Are all batteries connected properly to the network? - Is the CAN-Bus terminated with termination resistors?
Flashing/beeping 6 times	Cannot find Lynx Shunt VE.CAN	???
Flashing/beeping 7 times	Battery measure error occurred	???
Flashing/beeping 8 times	Internal calculation error	???
Flashing/beeping 9 times	Number of batteries in series incorrect	<p>Cause:</p> <p>The bus voltage is not equal to the number of batteries in series. For example, an 48V system cannot have 1 battery.</p> <p>Solution:</p> <p>Check the BMS CAN-Bus network:</p> <ul style="list-style-type: none"> - Are all batteries connected properly to the network? - Is the CAN-Bus terminated with termination resistors?
Flashing/beeping 10 times	Number of batteries incorrect (only used when using static number of battery configuration)	???
Flashing/beeping 11 times	Hardware failure	Internal hardware error. Please contact you supplier.
Flashing/beeping 12 times	Not used	

Flashing/beeping 13 times	Over voltage	<p>Cause:</p> <ul style="list-style-type: none"> - An over voltage occurs when one of the battery cells in the system is above the 3,62V for more than 20 seconds. <p>Solution:</p> <ul style="list-style-type: none"> - Make sure that all the chargers are stop charging by using the allow-to-charge contact. Check the wiring of the allow-to-charge contact and test if the functionality works for every charger separately.
Flashing/beeping 14 times	Under voltage	<p>Cause:</p> <ul style="list-style-type: none"> - an under voltage occurs when one of the cell voltages in the system is below 2,60V for 20 sec. <p>Solution:</p> <ul style="list-style-type: none"> - Make sure that all loads are stop with discharging by using the allow-to-discharge contact. Check the wiring of the allow-to-discharge contact and test if the functionality works for every load separately.
Flashing/beeping 15 times	Over temperature	<p>Cause:</p> <ul style="list-style-type: none"> - an over temperature occurs when one of the battery temperatures in the system is higher than 65°C. <p>Solution:</p> <ul style="list-style-type: none"> - Make sure that the battery temperature stays below 65°C degrees. <p>NOTE: The allowed-to-charge and Allowed-to-discharge are switched at different temperatures. See manual for exact switching values.</p>

Flashing/beeping 16 times	Under temperature	<p>Cause:</p> <ul style="list-style-type: none"> - an under temperature occurs when one of the battery temperatures in the system is lower than -10°C when charging and -25°C when discharging. <p>Solution:</p> <ul style="list-style-type: none"> - Make sure the battery temperature is above -10°C when charging and above -25°C when discharging. <p>NOTE: The allowed-to-charge and Allowed-to-discharge are switched at different temperatures. See manual for exact switching values.</p>
Flashing/beeping 17 times	ADC data error	
Blinking/beeping fast	Battery BMS error (slave)	
Flashing 3 times (no beeping)	Battery BMS warning (slave)	
Flashing/beeping 18 times	Pre-Charge error	<p>The system cannot pre-charge the DC-bus.</p> <p>Cause:</p> <ul style="list-style-type: none"> - The current drawn from the system when pre-charging is higher than 10A. <p>Solution:</p> <ul style="list-style-type: none"> - Make sure that all loads are not drawing more than 10A when pre-charging. - Check the pre-charge fuse in the Lynx Ion.
Flashing/beeping 19 times	Safety contactor error	<p>Cause:</p> <ul style="list-style-type: none"> - The voltage across the safety contactor is too high. <p>Solution:</p> <ul style="list-style-type: none"> - Check the voltage over the safety contactor when the system is started and there is current drawn from the batteries. If this above 2V then the safety contactor needs to be replaced.

Flashing 2 times (no beeping)	Over current error on External status or external safety contactor output (appendix A connector B)	<p>Cause:</p> <ul style="list-style-type: none">- There is too much current drawn or a short circuit on one of the two outputs. <p>Solution:</p> <ul style="list-style-type: none">- Remove the short circuit or lower the load current then the outputs will recover automatically.
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