Datasheet Thor 5000 LFP Battery

General Data	
Model Number	GP-Thor-5000
Battery cell technology (REPT CB79)	Lithium Iron Phosphate / LFP / LiFePO4
Dimensions (H x W x D)	135mm x 442mm x 450mm (488mm)
Weight	41kg
Case material	Mild Steel (optional: Stainless Steel 201)
Protection class	IP20
Applications	OFF-GRID / ON-GRID / Backup
Ambient operating temperature range	0 ~ 40°C (Recommended: 15 ~ 25°C)
Relative humidity range	0 ~ 95%
Electrical Parameters	
Nominal Capacity (0.2C @ 25°C)	5.1kWh
Nominal Voltage (16S x 3.2V)	51.2V
Recommended End of Charge Voltage	55.2 ~ 56.0V
Recommended Discharge cutoff Voltage	50.0 ~ 48.0V
Maximum Discharge Current @ 0-45°C	100A (for continuous use: < 50A)
Maximum Charge Current @ 25-45°C	80A (for continuous use: < 50A)
Maximum Charge Current in cold climate	5A@0°C, 10A@5°C, 25A@10°C, 70A@20°C
DC-rated circuit breaker	100A (20kA breaking capacity; 250VDC)
Max. parallel batteries without ext. fuse	3 Batteries without external protection
Nr. of Cycles @ 80% DoD (0.2C, 20°C)	> 6000 until 80% SoH
Nr. of Cycles @ 100% DoD (0.5C, 25°C)	> 3000 until 80% SoH
Calendar aging lifetime 80% SoH @ 20°C	20 years @ 53.6 ~ 54.0V Float voltage

BMS (Battery Management System)	
Type / Name	JK-Inverter BMS 100A JK_PB1A16S10P V19
Communication with Inverter	CAN-Bus / RS485 (Master: DIP Address 0)
Communication with parallel batteries Set DIP Address (see binary chart)	16 batteries via RS485 I and RS485 II ports (32 batteries with FW V19.31B or higher)
Firmware-upgrade PC: JK-BMS-Monitor	RS485 to USB adapter via RS485 I or II port
Password (modify settings at own risk)	App: 0000, Settings: 000000
Bluetooth can be turned ON or OFF	Double press ON / OFF - button (BMS B-)
Programmable Relay (Normally Open) for high & low SoC, voltage, current, temp.	Less than 1A and below 60VDC / 250VAC Do not switch capacitive loads directly
Active Cell balancing current	1A (highest to lowest cell)
Do not connect Battery packs in Series	For wiring examples -> Quick Start Guide
Remote monitoring over Inverter	Example: Victron Energy via VRM-Portal

Abbreviations: DoD (Depth of Discharge), SoH (State of Health), SoC (State of Charge)

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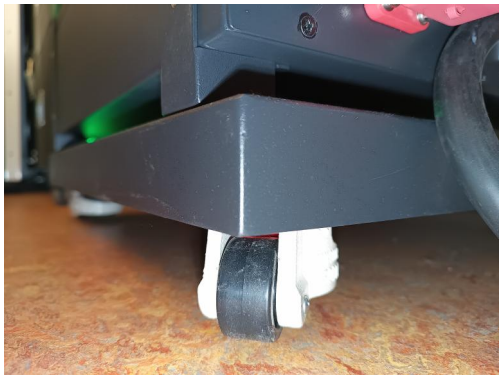
Included Accessories

2 x 100mm² M8 flexible copper busbars to parallel up to 4 stacked battery packs
4 x M8 Stainless steel bolts
4 x Terminal covers (2 x red + 2 x black)
2 x Server rack brackets (1 x left side, 1 x right side)
4 x Stacking brackets (2 x left side, 2 x right side)
1 x RJ45 Ethernet cable 30cm long
1 x Green pug for BMS relays output
1 x RJ45 to USB converter cable to access the BMS via a computer

Optional Accessories

1 x Wheelbase (metal structure + 4 x heavy load wheels)
2 x 35mm² 1m fine strained silicon Battery cable (1x red + 1x black) with M8 cable luggs

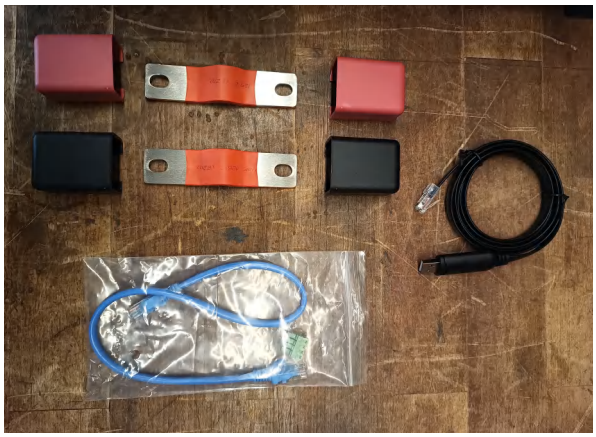


Advantages

- Weights only 41kg -> easy installation
- Big 300A M8 front terminals with large terminal covers -> 95mm² ring-lugs fit perfectly
- Up to 4 Battery packs in parallel with 100mm² busbars -> only one pair of 95mm² wires
- Built in low resistance 100A DC rated circuit breaker with 20kA breaking capacity
  -> Magnetic trigger mechanism trips even faster than the BMS in case of a short
- Battery pack is designed for low electrical resistance -> less heat losses
- Busbars are designed with a expansion bend/bulge to reduce stress on cell terminals
- High build quality -> no loose connections during transport and use
- Stainless Steel 201 -> corrosion resistance and stronger -> no rust, no dents during shipping, does not loose structural integrity easily during excessive heat or fire
- Grounding screws are available on the left and right side of the front panel
- Compact, practical industrial design -> Battery handles, circuit breaker and communication board are not in the way of the busbars and cables
- Brand new grade A cells -> full capacity available and well matched cells
- 100A JK-Inverter BMS with 1A active balancer and carefully chosen BMS-settings
- Inverter communication for up to 32 parallel battery packs 163.2kWh total capacity
- Batteries also works without any RJ45 or CAN-communication

Cost saving

- Batteries are stackable -> no extra shelf or server-rack needed
- Batteries can be connected in parallel, even without external fuses
- Instead of running one pair of 35mm² or 50mm² wires from each battery pack to a Lynx Distributor, you can get away with only one pair of 95mm² wire for a stack of 4 parallel battery packs (20.4kWh total), using the 100mm² flexible copper busbars. For small systems, you won't even need a Lynx Distributor at all.
- For large systems with 16 battery packs, you would only need one Lynx Distributor. Each stack of 4 batteries connects via one pair of 95mm² cable to the Lynx Distributor
- Quick installation -> Stack up to 8 Battery packs on top of each other without a rack
- You can start with a small system and easily add further 16S LFP battery packs in future



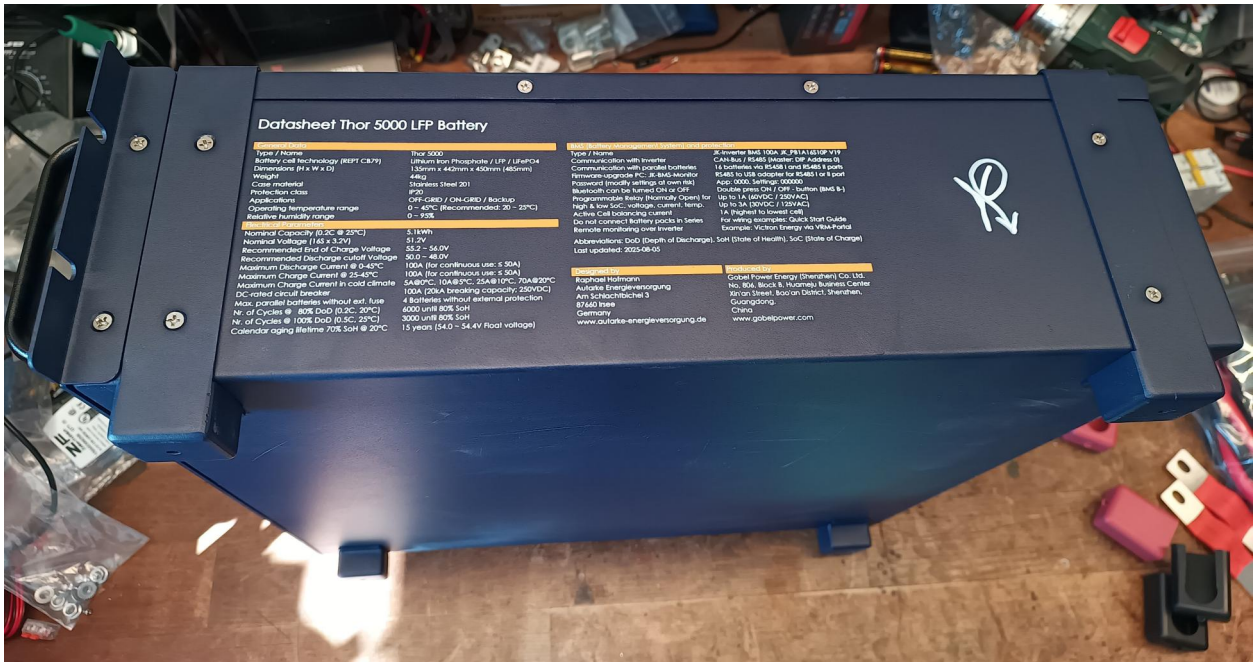
Wiring:
Only 95mm² cables (or 2 x 50mm² cables) connect the battery stack to the system

Available in custom colours (If you order 6pcs or more)

Inside the Battery pack:

- Short flexible copper busbars for high efficiency -> reduced resistance and heat loss
- Welded Aluminium Busbars for low resistance + no screws get loose during transport
- Optional available with flexible copper busbars -> cells could be swapped in future
- Neat cable management -> cables are not rubbing on the battery case

Datasheet is printed on the side of the battery case



Quick start guide Thor 5000 LFP Battery

Instructions

Startup sequence:
1. Connect the Battery to the System (Inverter, MPPTs, DC-Loads, other Batteries, ...)
2. Check for correct polarity
3. Press BMS B- Button. The BMS (Battery Management System) will switch ON
4. Switch Circuit breaker B+ to the ON-Position

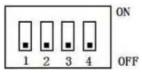
BMS Communication with Inverter

Establishing communication to your system is not necessary for the Battery to function.
If you want to use the benefits of communication, follow those steps:
The default setting for CAN communication is Victron Energy. You need a Victron Type A cable (you can also manufacture it yourself with a standard RJ45 Patch cable).
Connect the Type A cable in the correct orientation to the Battery and the GX-Device.
The Default RS485 communication protocol is set to Growatt.
For further information, have a look at the JK-Inverter-BMS Manual.
With the JK-BMS-MONITOR PC-software or the JK-BMS App you can change all settings to your liking. Change settings at your own risk. Password App: 0000, Settings: 000000
Latest JK-BMS-APP:
https://www.pgyer.com/Cfq3

Further useful documentation and latest firmware (PC-Software and RS485-USB converter necessary) is available at the Website:
https://www.autarke-energieversorgung.de/english-international-customers/batteries/

BMS Parallel Battery Communication

The Batteries can be connected in parallel without communication.
If you use communication, daisy chain the batteries with standard Cat5e RJ45 Patch cable. Use the RS485 I and RS485 II ports to connect multiple batteries in parallel.
Both ports (RS485 I and RS485 II) have the same function.
The Master Battery has Address 0 and is connected to the Inverter via the CAN or RS485 port. Set the DIP-switches according to the following chart:

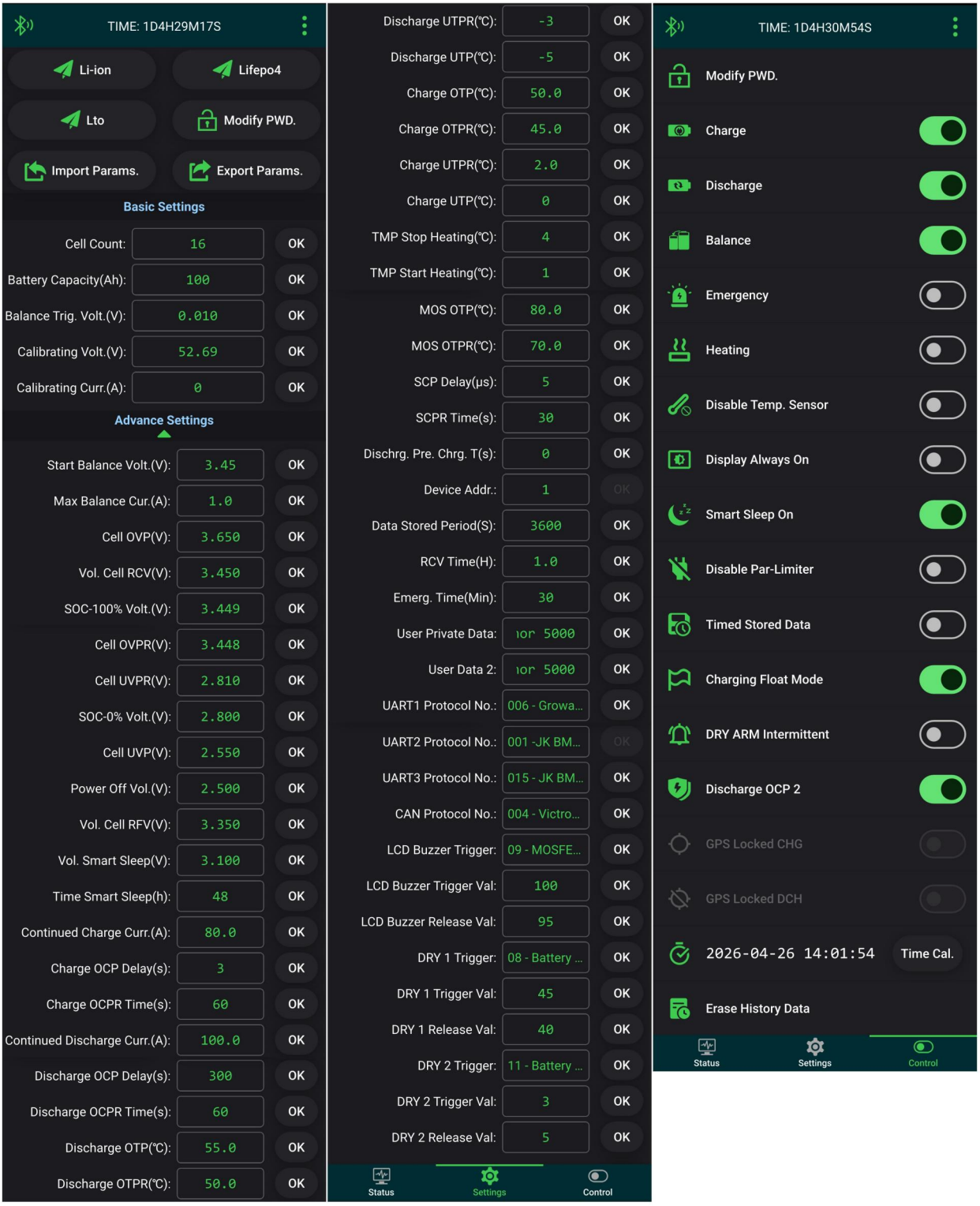


Address	Dial switch position			
	1	2	3	4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

If you want to establish communication to **more than 16 Batteries**, you have to install a special firmware with the ending B on the V19 BMS. That will disable the physical DIP-Switches on the communication board. Every BMS with V19.31**B** (or higher) has to be given a Address manually via the Bluetooth App.
The Master BMS (DIP Address 0) has to be hardware V19.
The Batteries / BMS with Addresses 1 to 15 can also have older V14 and V15 hardware.
All following Addresses have to be given with hardware V19 BMS on firmware version B.
You need the force updating code, when going from V19.31 to V19.31B:
https://mirofromdiro.github.io/JK-firmware-code/

BMS Settings for Thor 5000 LFP Battery

Those are the recommended BMS settings (Firmware V19.31 or newer):

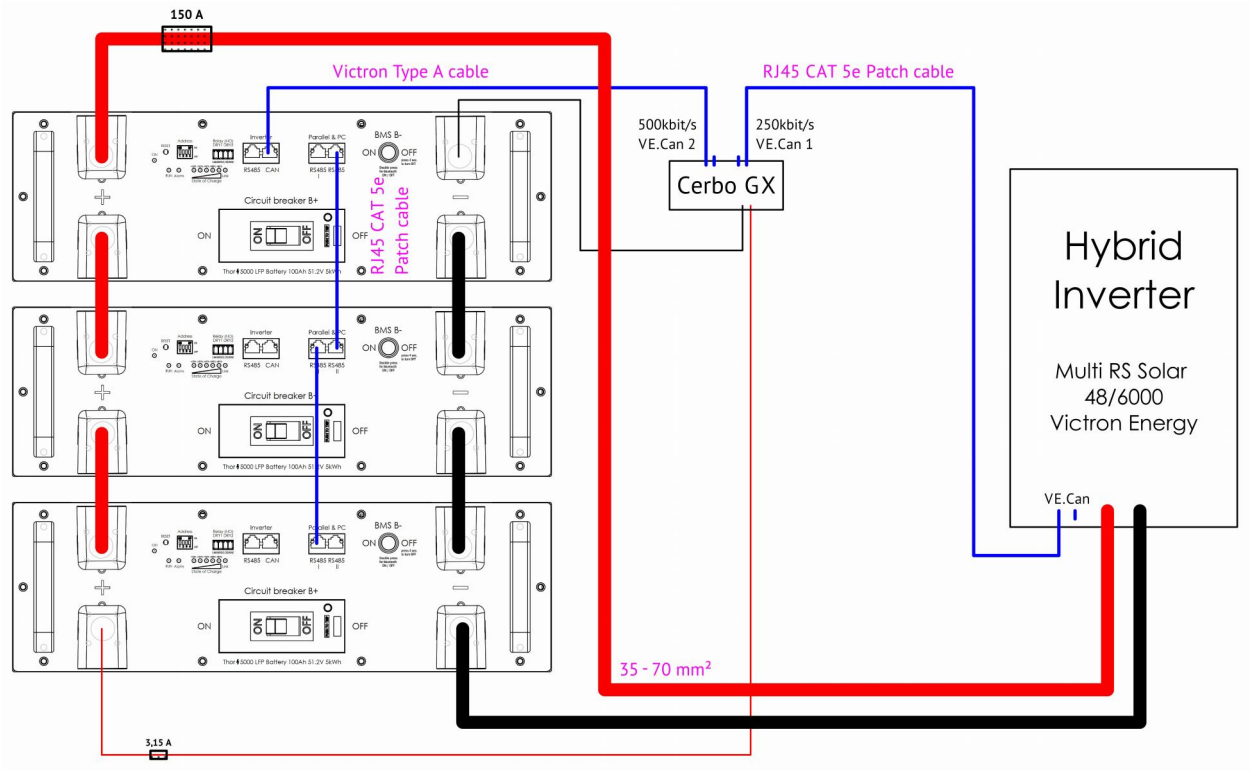


You can ask your distributor for the latest settings and firmware file:
Settings file: JK-PB1A16S10P-19.31.jkcfg
Firmware file: 069-JK-PB1A16S10P-V19.31.jkbms

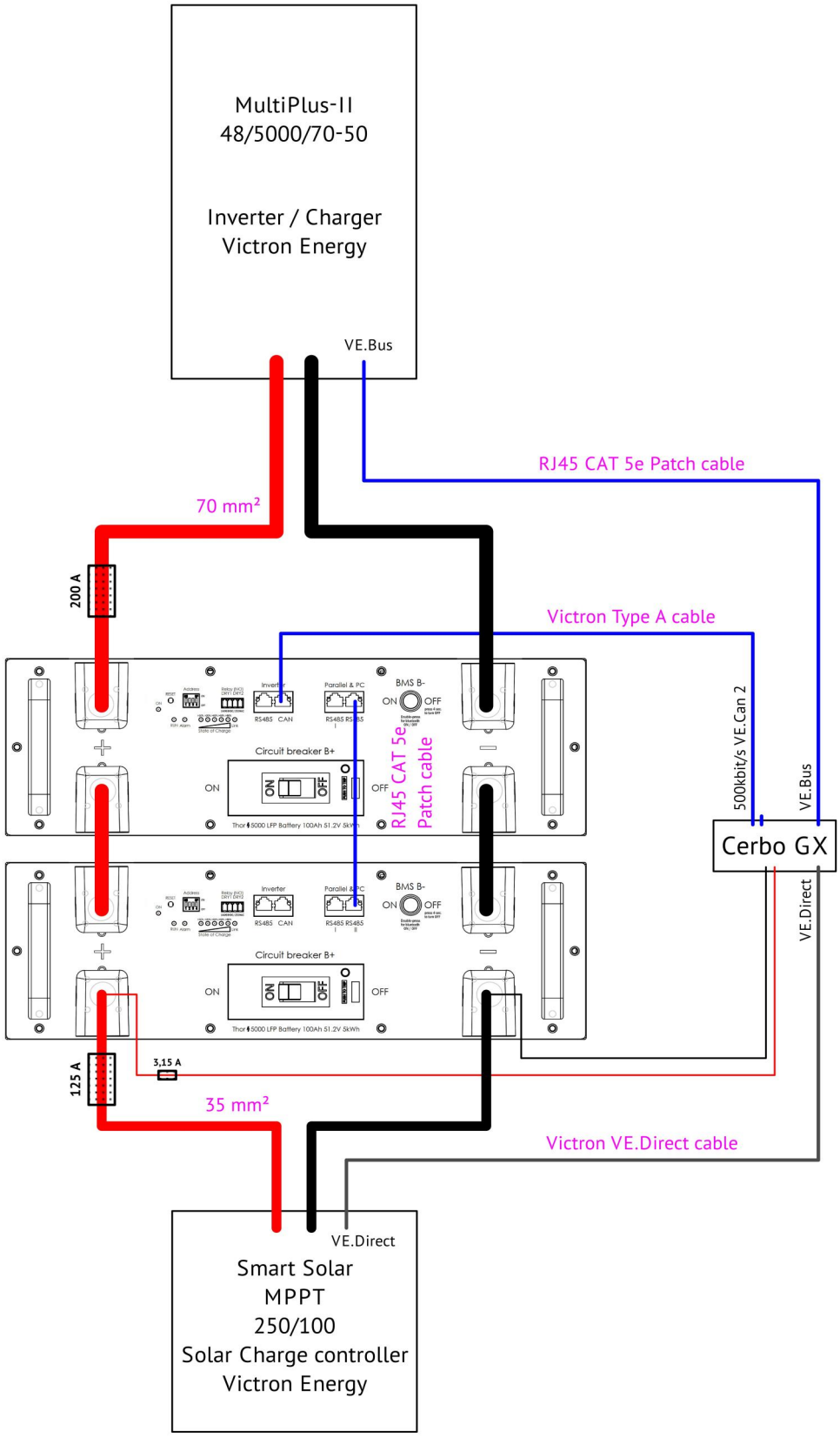
Wiring examples

The Battery Terminals are designed to handle up to 300A of current.
Therefore you can reduce the amount of cables in your system and instead use Busbars to connect a stack of up to 4 Battery packs in parallel.
In the wiring examples, you find only 51.2V DC-cables and communication wires. AC-wiring, external meters and solar cables are not displayed to keep diagrams simple. All wiring examples are done with Victron Energy components. A GX-Device (like the Cerbo GX) is the communication link between Inverters, Chargers and Batteries.

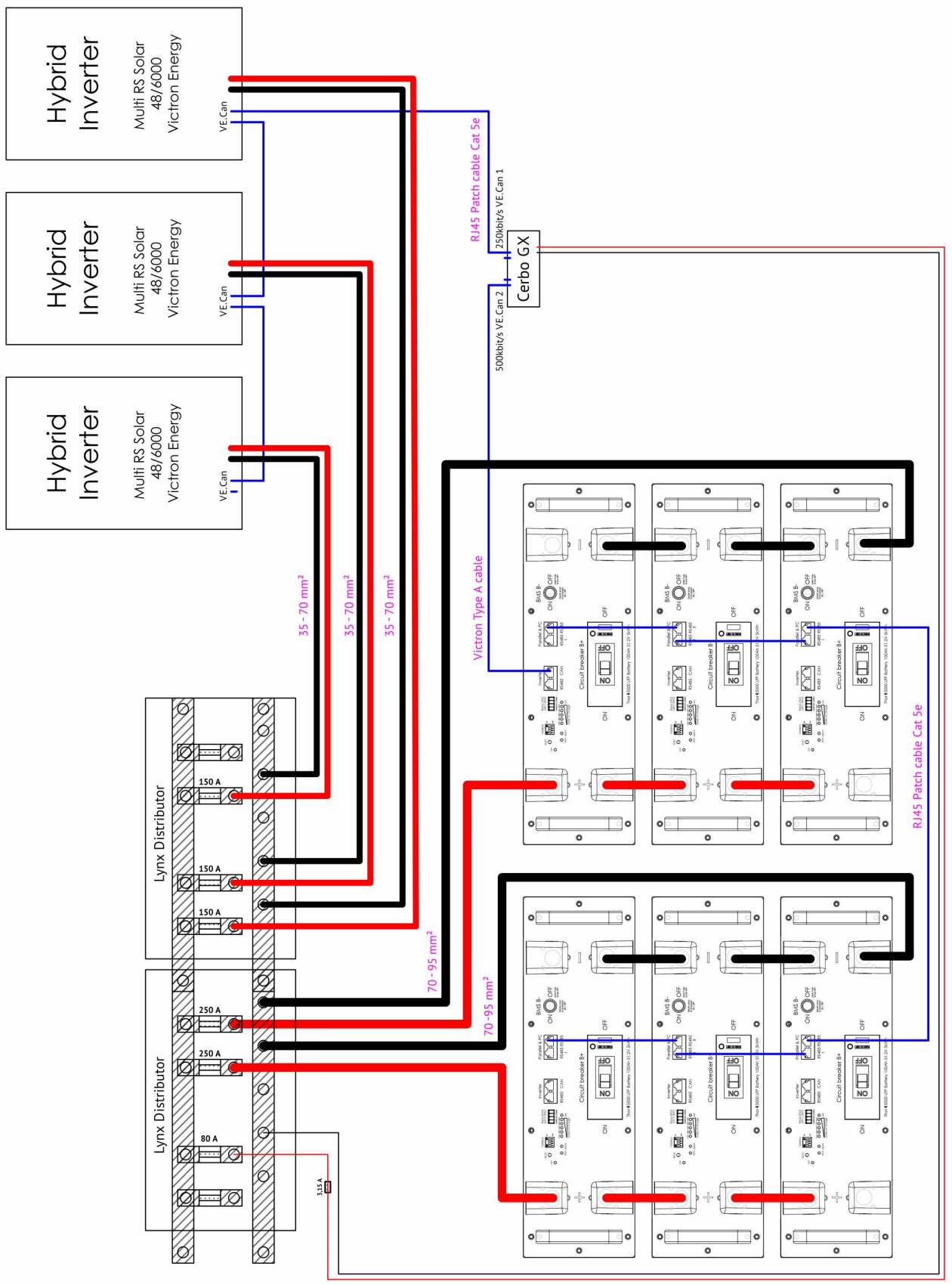
Example 1: 15kWh Battery, 6kW Hybrid Inverter (1-phase), 6kW Solar (2 x MPPT inputs)
Connect 3 battery packs in parallel at a time and use 35 mm², 50 mm² or 70 mm² cables (depending on cable length) to connect to your hybrid inverter.
100mm² M8 busbars can be ordered separately to connect the 3 battery packs in parallel.



Example 2: 10kWh Battery, 5kVA Inverter (1-phase), 5kW Solar (1 x MPPT)
Two parallel battery packs with a 5kVA (4.2kW) Inverter/Charger and a 5kW Solar charge controller. The external 200A fuse for the MultiPlus-II is optional, but recommended.

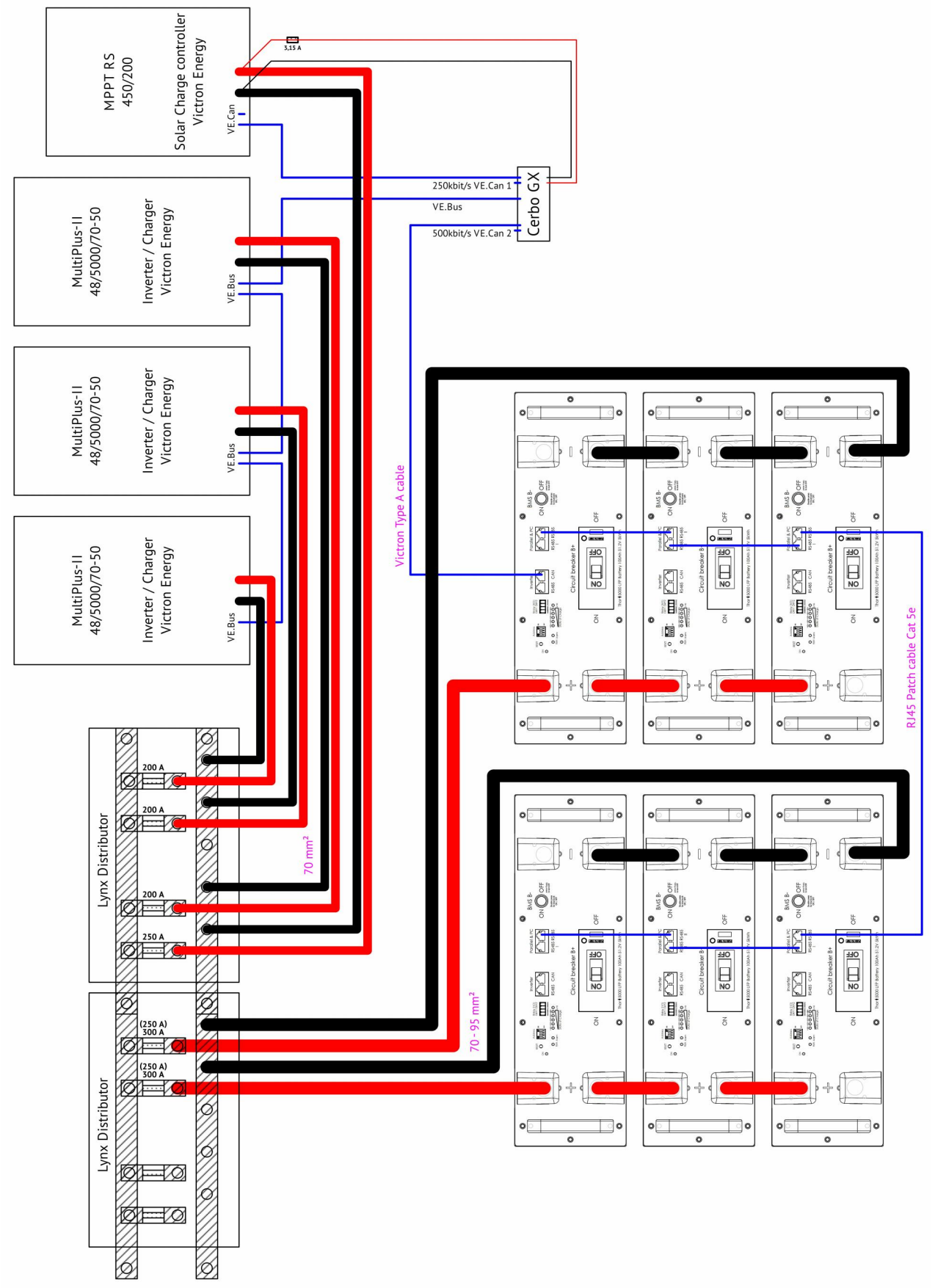


Example 3: 30kWh Battery, 18kW Hybrid Inverter (3-phase), 18kW Solar (6 x MPPT)
6 x 5kWh Battery packs in parallel. Use 70mm² cables and 250A fuses (or 95mm² cables and 300A fuses) to connect to the Lynx Distributor (DC-Busbar and fuse holder).

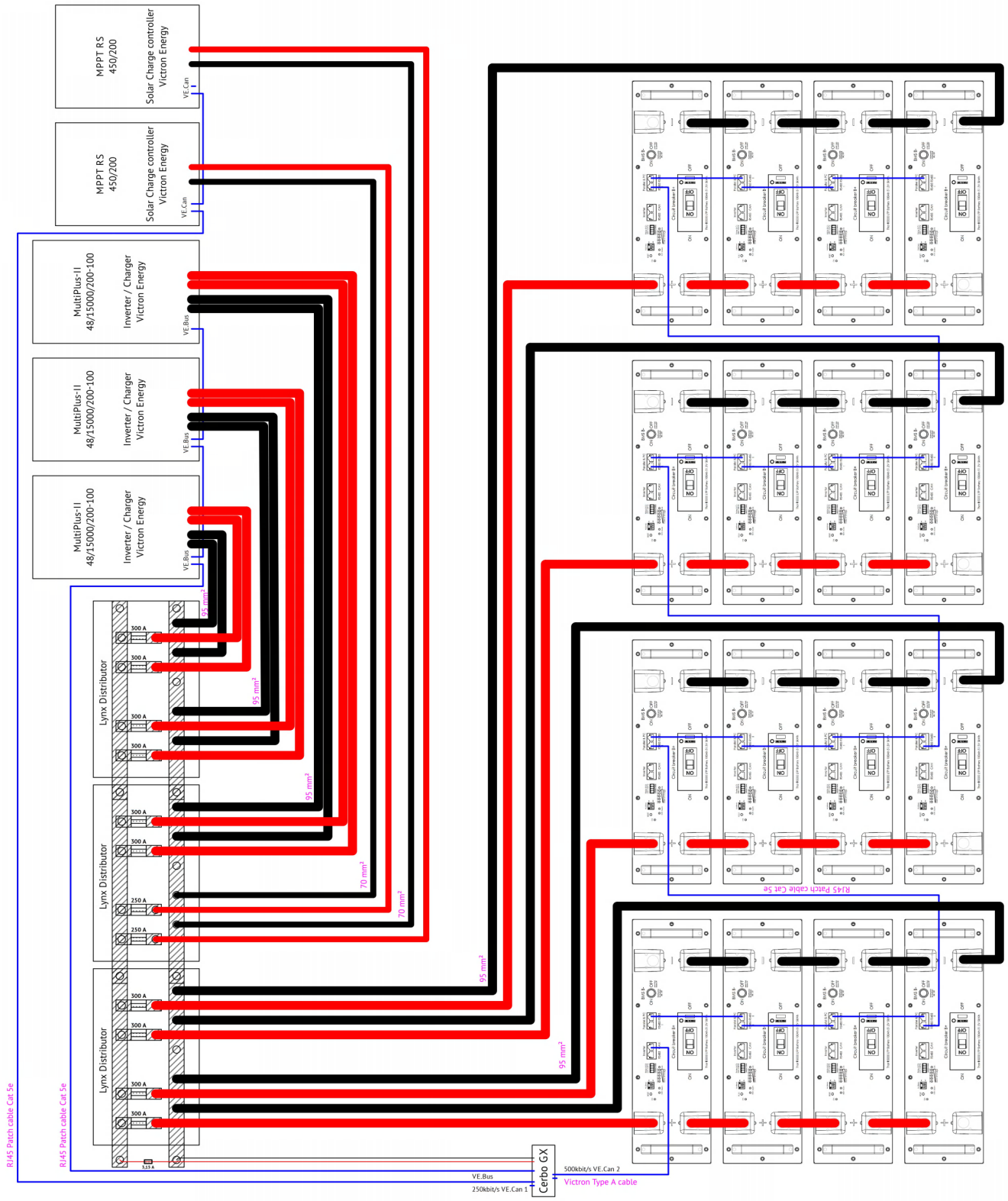


Example 4: 30kWh Battery, 15kVA Inverter (3-phase), 10kW Solar (4 x MPPT)

6 x 5kWh Battery packs in parallel. Use 95mm² cables to connect to the Lynx Distributor. You can also have additional AC-Solar-Inverters. Excess solar power is then charged into the Batteries by the MuliPlus-II Inverter/Chargers.



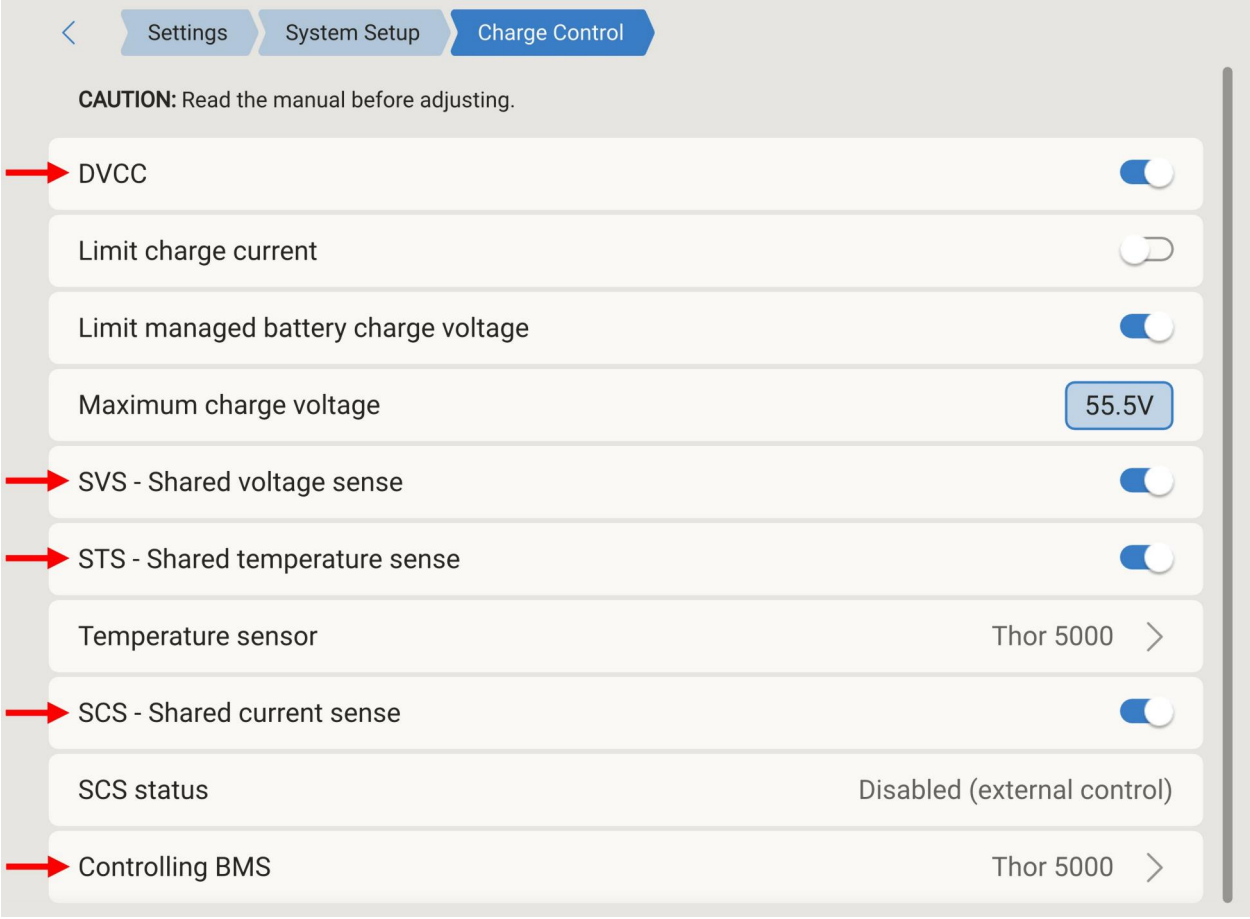
Example 5: 80kWh Battery, 45kVA Inverter (3-phase), 20kW Solar (8 x MPPT)
16 x 5kWh Battery packs in parallel. Use 95mm² cables to connect to the Lynx Distributor. If more than 3 battery packs are directly connected in parallel with busbars or short cables, use a 300A fuses in the Lynx Distributor to protect the battery terminals.
You can also have additional AC-Solar-Inverters. Excess solar power is then charged into the Batteries by the MuliPlus-II Inverter/Chargers.



Victron Energy System Settings

Turn on **DVCC** in the Cerbo GX and make sure, that **SVS – Shared voltage sense**, **STS – Shared temperature sense** and **SCS – Shared current sense** is turned on.
As **Controlling BMS** you can choose **Automatic selection**
or directly select the **Thor 5000** Battery:

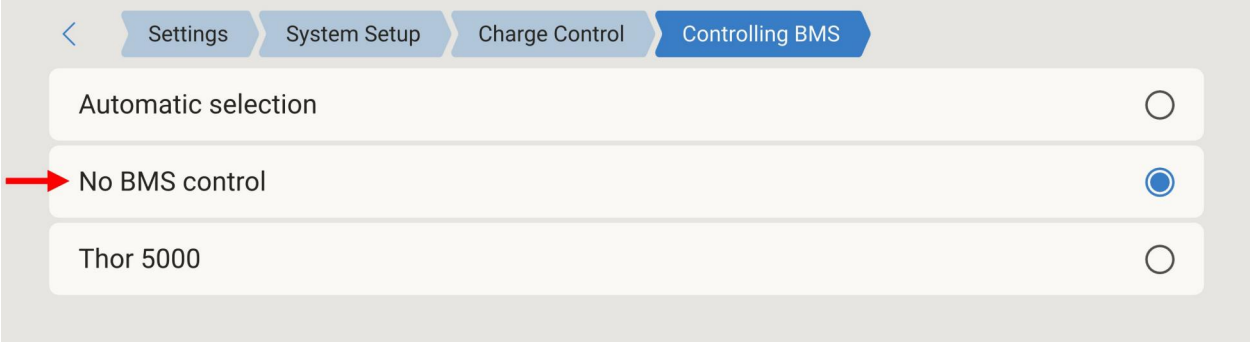
Settings -> System Setup -> Charge Control ->
DVCC -> ON
SVS – Shared voltage sense -> ON
STS – Shared temperature sense -> ON
SCS – Shared current sense -> ON
Controlling BMS -> Thor 5000



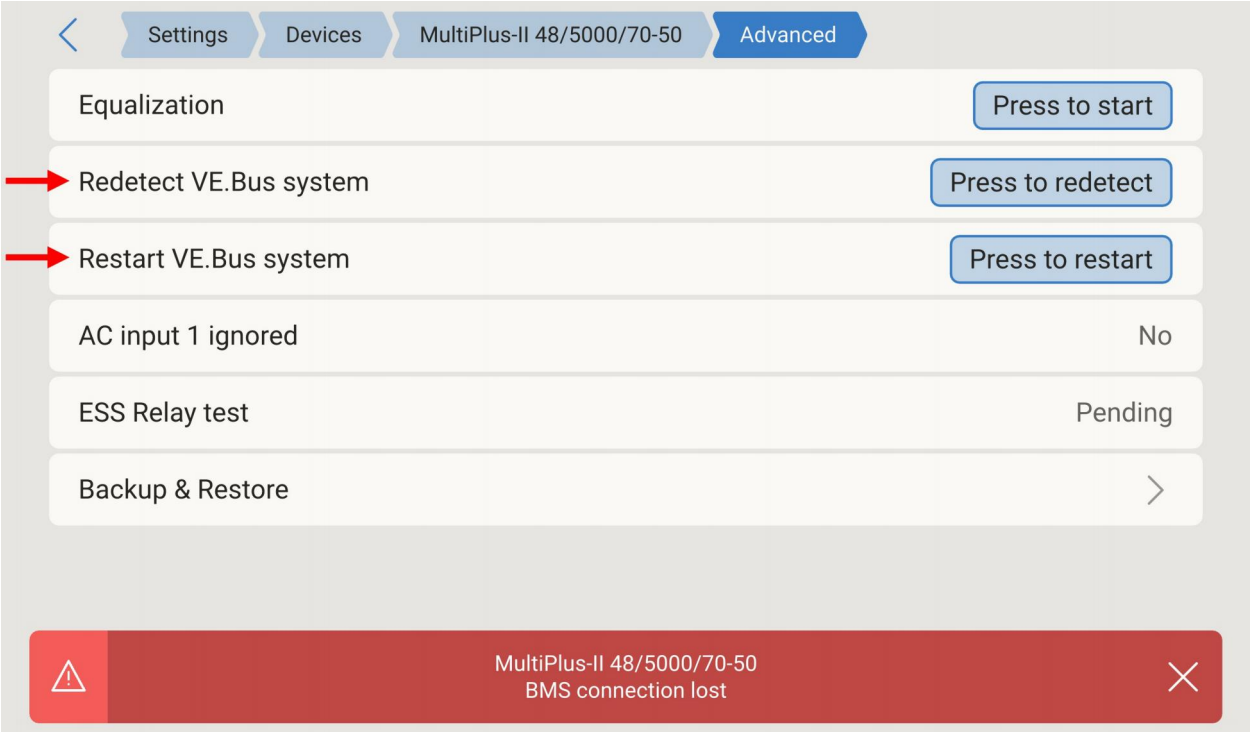
Using the batteries without BMS control is for advanced users only:

If you switch off BMS Control, the BMS will have no influence on charge voltage and charge current. The charge voltage setting of the Inverter/Charger (e.g. MultiPlus-II) or solar charge controller will be used in this case.
This setting can be used, if you wand to build a more redundant system that does not depend on any communication cable to be plugged into your battery bank.
You might also want to switch off BMS control, if parallel Batteries with different brand BMS are used. In this case you also need an external SmartShunt or LynxShunt for accurate current and SoC readings.

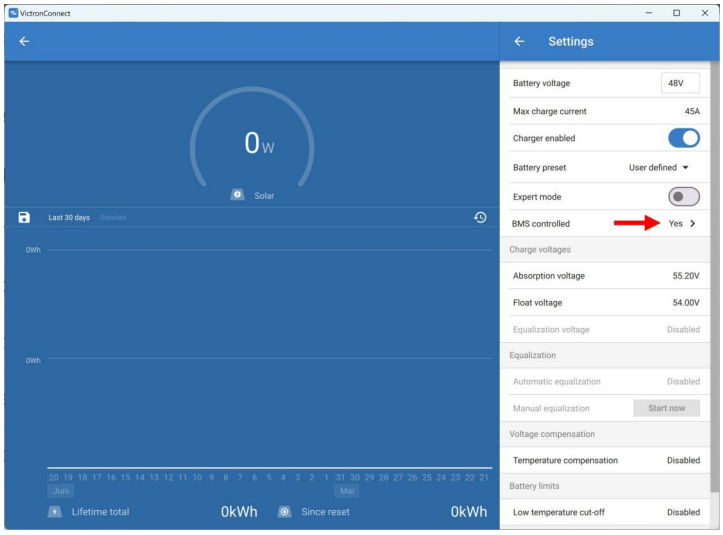
If you select **No BMS control**,
Settings -> System Setup -> Charge Control -> Controlling BMS -> No BMS control

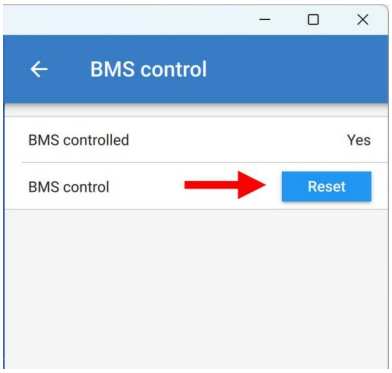


make sure to Redetect and Restart the VE.Bus System
Settings -> Devices -> (your Inverter/Charger) -> Advanced -> Redetect VE.Bus system -> Press to redetect & Restart VE.Bus system -> Press to restart



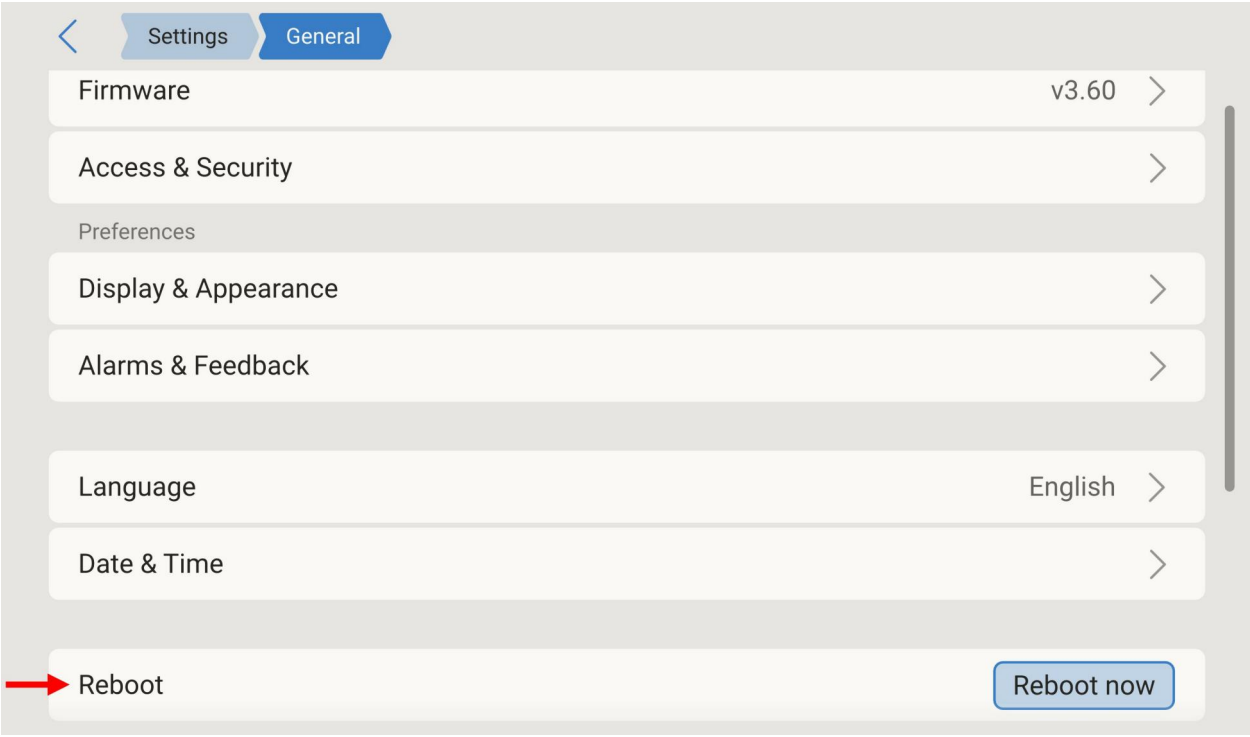
Reset BMS control in the MPPT Charge controllers with the Victron Connect App:
Settings -> Battery -> BMS controlled -> BMS control -> Reset





You can also reset your MPPTs BMS-control on the GX-Device:
Settings -> Devices -> (Name of MPPT) -> Networked operation -> BMS control -> Reset

The last step is to reboot the GX-Device:
Settings -> General -> Reboot -> Reboot now



Now your BMS will not control the Victron system any more and the Victron system acts, as if no BMS communication is enabled. But you can still track all the BMS information in the VRM-Portal or even build custom warnings or alarms via Node-Red (after enabling it on Venus OS large image.)

The Battery can be purchased on the GobelPower Website
https://www.gobelpower.com/germany-designed-quality-gobel-power-thor-5000-51kwh-512v-100ah-lifepo4-battery_p282.html#3

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