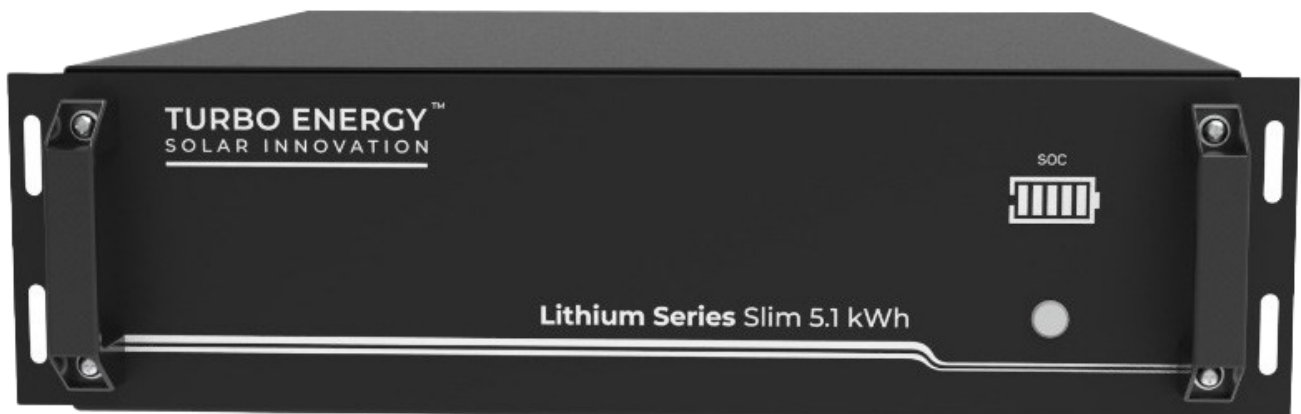


MANUAL
Lithium-Series
Slim48V 5.1kWh



LONG LIFE LITHIUM-ION BATTERIES MAXIMUM



CUSTOMER SATISFACTION



PLUG & PLAY

10
YEARS
WARRANTY

LITHIUM SERIES SLIM BATTERY 48V 5.1KWH



Please read this manual before installing the battery and follow the instructions carefully during the installation process.

Content

1. Scope	3
2. Specifications.....	3
3. battery dimensions	4
4. Characteristics	4
5. Operation	4
5.1. Frontalbattery	4
5.2. battery back.....	5
5.3. Connection	6
5.3.1. Configuration without communications.....	7
5.3.2. Configuration with communications	8
5.4. On and off	9
5.5. led display	10
5.6. codes ofprotection	10
5.7. error codes	11
6. Appendix	11
6.1. Security instructions	11
6.2. safety warnings.....	12
6.3. Warranty.....	12
6.4. Transport	12
6.5. Store	12
6.6. Contact information	12

1. Scope

This document describes the basic operation of the Turbo Energy™ Brand Lithium-Ion Rechargeable Battery (Lithium Series 48V 5.1 kWh Slim model). This manual includes all the necessary details for understanding the operation of the equipment and its correct operation.

2. Specifications

electrical	
Rated capacity	5.12 kWh
useful capacity	5 kWh
discharge depth	90%
Nominal voltage	51.2V
Voltage operating range	43.2 - 57.6V
Lifecycle	>=6000
physical	
Weight	44kg
Dimensions	440 x 460 x 133mm
protection class	IP20
Kind of battery	LifePO ⁴
Operation	
Maximum charge/discharge current	100A (1C)
charge/discharge current	50A(0.5C)
temperature operating range	0°C...50°C
Humidity	15% - 85%
operating altitude	< 3000m
BMS	
Consumption power (Idle state)	<100 µA
monitoring parameters	System voltage, current, cell voltage and temperature.
Communication	CAN and RS-485 compatible

3. Battery dimensions



4. Characteristics

Battery Lithium Series **48V 5.1 kWh Slim** presents the following characteristics:

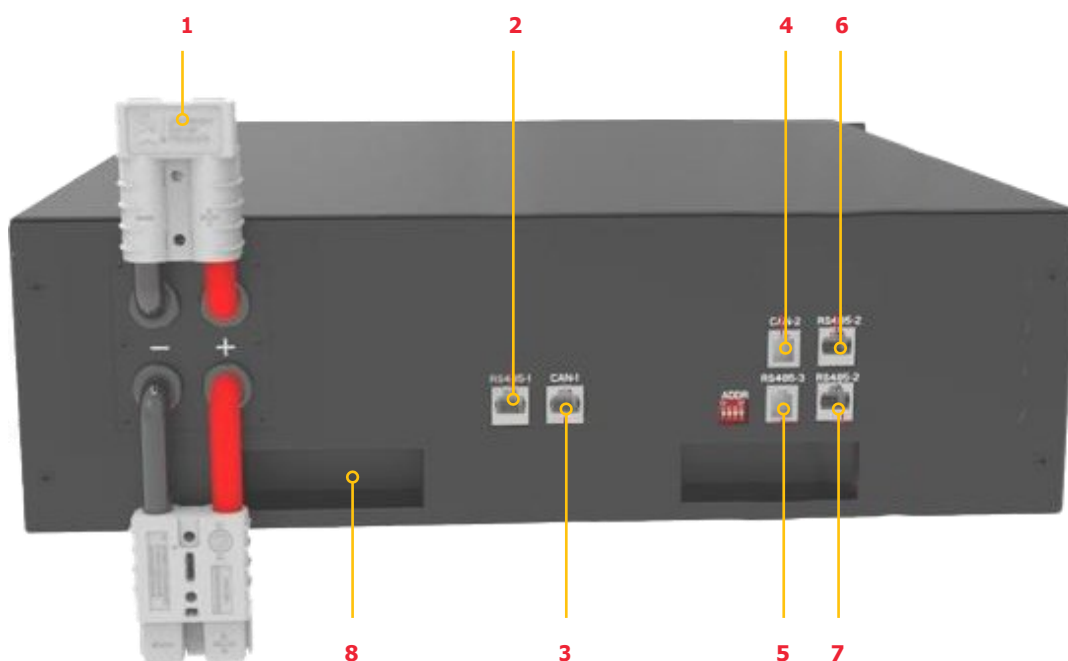
- Designed to be used in photovoltaic applications.
- Battery Management System (BMS): BMS system incorporated in the battery that monitors its operation and does not allow it to work outside the limits of the design regime (V, I).
- Expansion capacity: the storage capacity of the system can be expanded by incorporating more batteries.

5. Operation

5.1. BATTERY FRONT



5.2. BACK OF BATTERY



Article	Definition
1	C.connectorrquick Anderare 120A: Positive and negative connector – Connection with battery in parallel and power output
2	RS485-1 Portpnowconandxioncon pc either device EMS: monitoring of dataof the BMS
3	CAN-1 Connection with Turbo, Goodwe, Solis, Sermatec, Sofar, Ingeteam.
4	CAN-2 Connection with Victron
5	RS485-3 Connection with Growatt
6	RS485-2 Connection with Voltronic and port for communicationbetween batteries.
7	RS485-2 Connection with and port for communicationbetween batteries.
8	handles

List of items contained in the Lithium Series 48V 5.1 kWh Slim box:

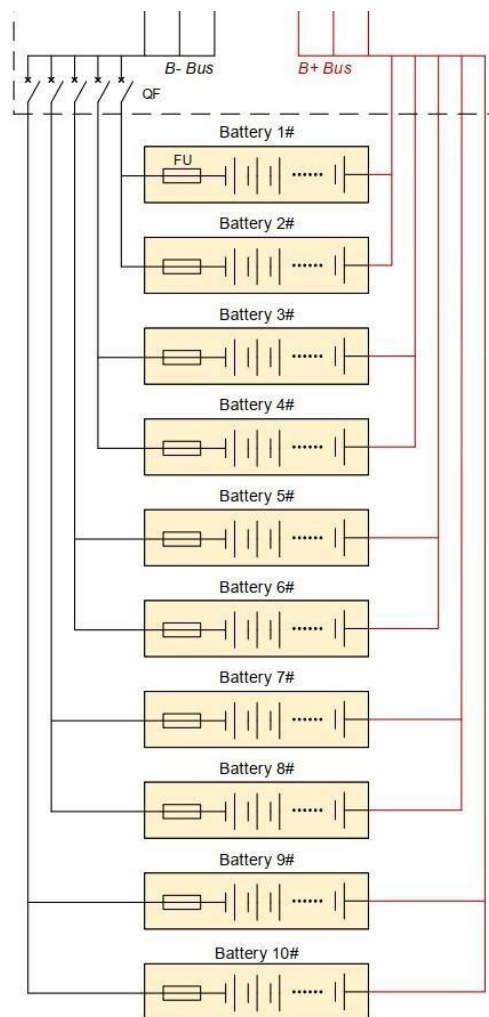
Item	Article	Description	You
1	Battery	lithiumSlim Series	1
2	RJ45 communication cables	RS485paralleling cable	1
3		CANBUS communication cable with Turbo Energy™ / 2m	1
4		CANBUS communication cable with Victron Energy / 2m	1
5		RS485 communication cable with Voltronic / 2m	1
6	cableland	Black/1.5m/10AWG	1

5.3. CONNECTION

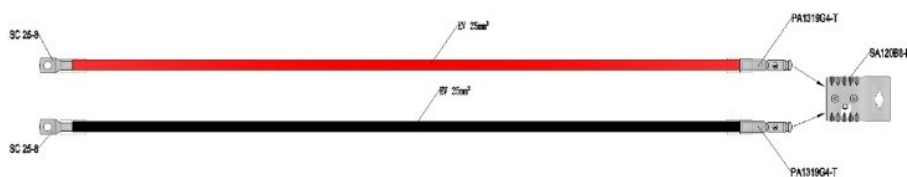
Batteries can be connected in parallel up to a maximum of 15.

Wiring between batteries:

- Up to 15 batteries can be connected with communication.
- Batteries connected in parallel need to have the same SOC level.
- The voltage difference of the batteries connected in parallel should be less than 0.5V.
- The sections of the power cables must be the same.
- The batteries must be connected two by two with the same cable to the busbar, following the following scheme.



Connection between batteries and inverter:



Inverter connection

Connection with battery

25 mm² section power cable

NOTE: Each power cable can carry a maximum of 120A, so for every two batteries a new cable would need to be connected to the inverter. However, if the inverter is 5 kW with a cable it would be enough to be in the limit of the maximum recommended current.

**Warning when doing a battery extension:**

It is very important that in the case of connecting batteries in parallel that are not new (for example, we add a new battery to an existing system), we previously perform a voltage balance (without load) between them to avoid overcurrents that could harm the system. As an alternative to voltage balancing, a balancing can be done by equalizing the SOC of the batteries. In addition, when connecting the new batteries, we must consider that the number of batteries at the time of connection must be similar to the number of batteries that are already connected to the system. For example, if we have five batteries installed and we want to connect a new one, we must first connect the new battery with two of the five that were already there so that they balance, and then connect these three with the other three remaining batteries in the system. Batteries should always be connected in groups of similar numbers so that a large group cannot damage a smaller group of batteries at the time of connection.

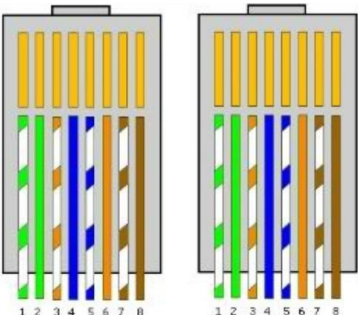
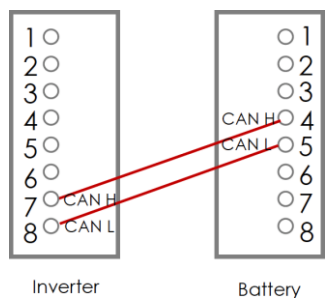
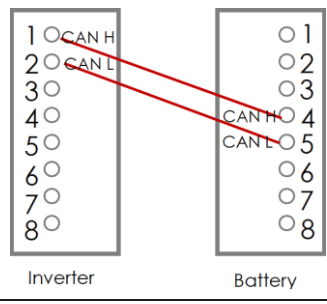
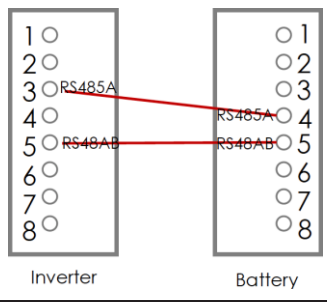
5.3.1. CONFIGURATION WITHOUT COMMUNICATIONS

For those cases where the battery is intended to work connected to an inverter without communications, it is not necessary to select a specific setting of the DIP switches and the batteries do not need to be connected to each other with the communication cable.

5.3.2. CONFIGURATION WITH COMMUNICATIONS

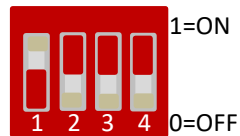
Communication cable:

It will be configured in one way or another depending on the inverter used.

<p>Cable configuration Turbo Energy™/Goodwe/Solis/Growatt hybrid inverter</p> <ul style="list-style-type: none"> · You can use the normal parallel ethernet cable · Connect the cable to the CAN-1 port · Growatt connects to the RS485-3 port 	
<p>Cable configuration Victron Energy inverter</p> <p>The cable connects to the CAN-2 port</p>	
<p>Sofar cable configuration</p> <p>The cable connects to the CAN-1 port</p>	
<p>Voltronic cable configuration</p> <p>The cable connects to the RS485-2 port</p>	

DIP switch

Each module has 4 DIP switches (Dual Inline Package) that will be configured differently depending on the number of batteries to be connected



They are configured following the binary code, starting with the master and continuing in descending order.

address	Dial switch position				explain
	#1	#2	#3	#4	
1	ON	OFF	OFF	OFF	Pack1/Master
2	OFF	ON	OFF	OFF	Pack2
3	ON	ON	OFF	OFF	Pack3
4	OFF	OFF	ON	OFF	Pack4
5	ON	OFF	ON	OFF	Pack5
6	OFF	ON	ON	OFF	Pack6
7	ON	ON	ON	OFF	Pack7
8	OFF	OFF	OFF	ON	Pack8
9	ON	OFF	OFF	ON	pack9
10	OFF	ON	OFF	ON	pack10
eleven	ON	ON	OFF	ON	Pack11
12	OFF	OFF	ON	ON	pack12
13	ON	OFF	ON	ON	Pack13
14	OFF	ON	ON	ON	Pack14
fifteen	ON	ON	ON	ON	pack15

5.4. ON AND OFF

To turn it on, press the power button for 2 seconds. The BMS will start up and the LCD screen will light up.

To turn off batteries, please press the power button for more than 3-6 seconds.

sleep mode

When RS485/CAN communication interrupts, no upload and download, no button operation, 5 minutes later, the system will enter sleep mode to reduce self-consumption. In this mode, the battery power connectors still have normal battery voltage.

When the battery is in sleep mode and meets any of the following conditions, the system will leave sleep mode and wake up.

1. Charge or discharge current is detected.
2. Press the "ON/OFF" button for 1 second.
3. Order through the communication cable (RS485/CAN).

Off mode

When any of the following conditions is met, the system will go into off mode to reduce self-consumption and protect the cells:

1. Press the "ON/OFF" button for 3-6 seconds and release it.
- 2.
3. The lowest cell voltage is less than the limit voltage, and the duration reaches the power-off delay time (while there is no load current).

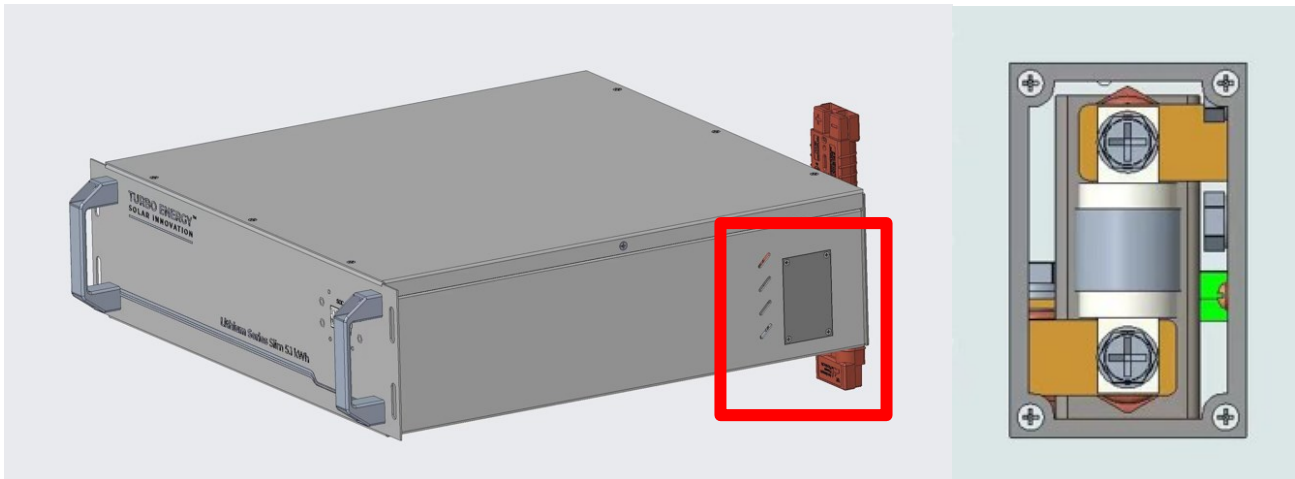
In this mode, the connectors battery power supply have no voltage.

When the battery is in the off mode and meets any of the following conditions, the battery will exit the off mode and wake up if:

- Charge current is detected (charge voltage must be greater than 51.2V)
- The "ON/OFF" button is pressed for 2 seconds.

5.5. FUSE CHANGE*

On the side of the battery there is a fuse that can be accessed without waiving the equipment warranty. This fuse is protected by means of screws on the side. It can be replaced for the purpose of repairing the equipment in some cases.



There are occasions when, due to an overcurrent, the fuse must be replaced with another of the same type.

One case in which we can see that it may be necessary to change it is in the case that the battery has communication with the inverter, but does not charge or discharge. In any case, it is always advisable to ask the sales department to resolve any doubts.

To change the fuse, it is necessary:

- 1- Turn off the battery.
- 2- Disconnect the power cables from the inverter and/or other batteries.
- 3- Make sure that the fuse does not work, using a voltmeter/tester.







The fuse used in the battery is from 160 A.

*The fuse is only included in batteries with SN above 849001-220505-00800


Manufacturing date

5.6. Leds DISPLAY









The LED light on the front of the battery will indicate the State of Charge (SOC) as shown in the following table:

SOCLED	charge status
	SOC < 5%
	5% ≤ SOC ≤ 25%
	25% ≤ SOC ≤ 55%
	50% ≤ SOC ≤ 75%
	75% ≤ SOC ≤ 95%
	SOC ≥ 95%

5.7. PROTECTION CODESLED

alarm:










Red Light: 1 blink	Green Light: Nu. of blinks = protection code
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protection code	LED-display	Description
1		temperature difference
3		High temperature
4		Low charging temperature
5		Load overcurrent
6		discharge overcurrent
8		cell overvoltage
9		low cell voltage
11		Low charging temperature

5.8. CODES ERROR LED

Alarm:

Red Light: 2 blinks	Green Light: Nu. of blinks = protection code
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Error code	LED-display	Description	Solution
error 01		Error of hardware	Wait for automatic recovery. In case the problem is not resolved, call for repair
error 03		Error of hardware	
error 05		Error of hardware	
error 06		switch open	Close the switch after turn off the battery system
error 07		Discrepancy in the DIP switches	Keep the dip switches consistent. reboot system
error 08		LMU disconnected (slave)	Reconnect the communications cable
error 09		NS absent	Enter the serial number. Reboot the system or call for repair
error 10		LMU disconnected (master)	Reconnect the communications cable
error 11		software version inconsistent	call to repair

It is recommended to do a charging cycle at least once every 30 days, so that the SOC calculation is correct.

6. Appendix

6.1. SECURITY INSTRUCTIONS

1. Please read the battery instructions before use.
2. Keep the battery away from high voltage and out of the reach of children.
3. In operation, the battery must be kept within the established temperature ranges (between -10°C and 50°C) and humidity below 85%.
4. During handling, be very careful to avoid bumping/dropping the battery.
5. Be careful not to touch the contacts at once.
6. The battery at the end of its useful life requires a recovery process, do not disassemble it.
7. Avoid locating batteries in wet places to avoid danger.
8. When not in use for a long time, store the battery intact and allow the

battery is half charged. wrap the battery with non-conductive material to avoid direct metal contact. Store the battery in a cool, dry place.

9. Never expose the battery to fire or water.

6.2. SAFETY WARNINGS

1. Do not disassemble the batteries. The inside of the battery has a protection mechanism and a protection circuit to avoid danger. Improper disassembly will damage the protection function definitely, leaving the battery unsafe.
2. Never short circuit the battery poles. Avoid contact of the positive and negative poles with metals.
3. Keep batteries away from fire and extreme temperatures. Monitor the distance to heat sources, stoves, etc.
4. Keep the battery away from water. Even take care that the battery is not located in humid places where the dew point can be reached.
5. Do not use batteries that show physical damage that may be due to falls or blows.
6. Do not weld near the battery.
7. Overheating will cause the loss of the protective function of its life cycle, it could even render the battery useless and, in extreme cases, it could self-ignite.
8. Never connect this battery in series, and in parallel connect it only with identical batteries.
9. If the battery is leaking liquid, completely avoid contact with it. It may be harmful to the skin, and if it touches the eyes, please wash and go to the hospital immediately for treatment.

6.3. WARRANTY

Please refer to the Warranty Document for specific warranty terms.

6.4. TRANSPORT

During transport, do not allow the battery to receive shock, extreme temperatures or get soaked.

6.5. STORE

Storage environment requirement:

- 1 month: Under temperature of -20°C~45°C and relative humidity of 45~85%.
- 3 months: Under the temperature of -20°C~ 35°C and relative humidity of 45~85%.
- 6 months and above: Under the temperature of -20°C~ 25°C and relative humidity of 45~85%.

The battery needs to be charged every six months, and must be charged and discharged one full cycle every nine months.

6.6. CONTACT INFORMATION

For any incident, contact us by filling out the form on our website: <https://www.turbo-e.com/technical-support-assistance/>

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