

INSTRUCTION MANUAL

Lithium Series

Dual 48V 5.1kWh



 LONG-LASTING LITHIUM-ION BATTERIES

 MAXIMUM CUSTOMER SATISFACTION

 PLUG & PLAY

 PARALLEL/SERIES CONNECTION

10
YEARS
TURBO ENERGY
WARRANTY

LITHIUM SERIES DUAL 48V 5.1KWH BATTERY



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

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1. Scope

This document describes the basic operation of the Turbo Energy brand lithium-ion rechargeable battery (**Lithium Series Dual 48V 5.1 kWh model**). This manual contains all the necessary details for understanding the operation of the equipment and for its correct application.

2. Specifications

Model	Battery Lithium Series Dual 48V 5.1 kWh
Electrical	
Nominal Capacity	5.12 kWh
Usable Capacity	4.8 kWh
Depth of Discharge (DoD)	90 %
Nominal Voltage	51.2 V
Voltage operating range	48 – 56 V
Connection type	Series/Parallel
Cycle Life	>=6000
Physical	
Weight	45 kg
Dimensions	500 × 442 × 135 mm
Protection class	IP20
Battery type	LiFePO ⁴
Operation	
Maximum charge/discharge current	100 A (1 C)
Standard charge/discharge current	60 A (0,6 C)
Temperature operating range	0° C...50° C
Humidity	< 60 %
Parallel Connection	
Number of batteries	8
Serial Connection	
Number of batteries	8
WiFi	
Monitoring System	Yes
APP	Yes
Remote Updating	Yes
BMS	
Monitoring parameters	System voltage and current, Cell voltage and temperature
Comunicación	Compatible CAN and RS-485

3. Battery Dimensions



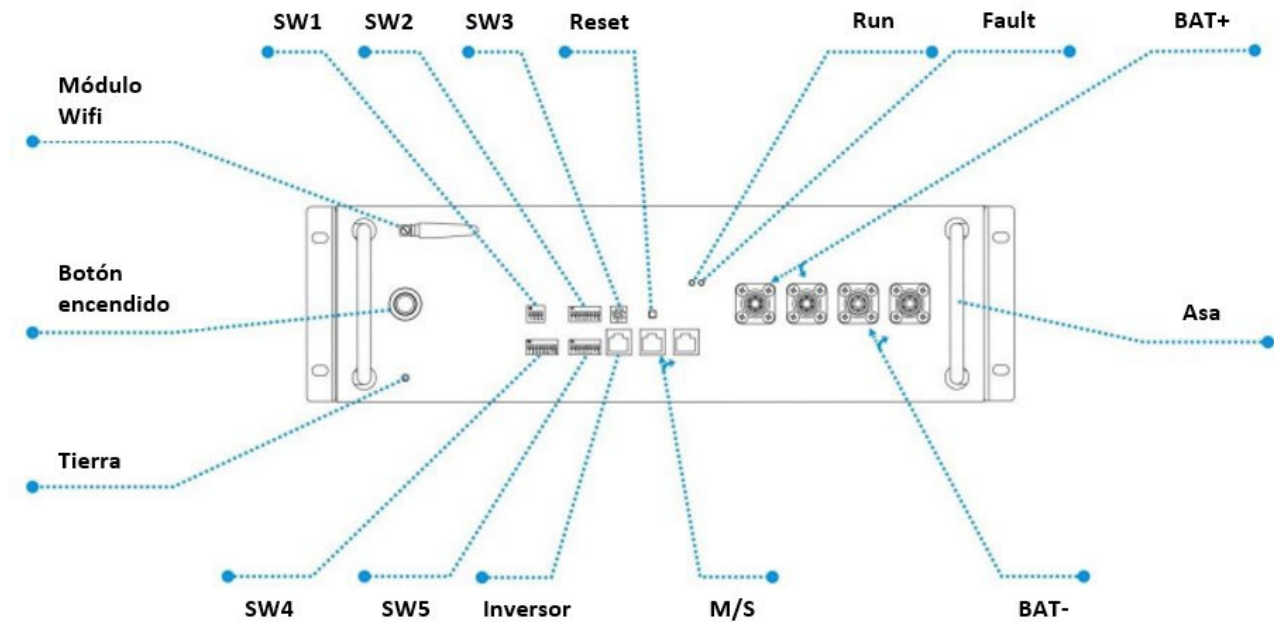
4. Features

The **Lithium Series Dual 48V 5.1 kWh** battery has the following features:

- Designed for use in photovoltaic applications.
- Battery Management System (BMS): The BMS system built into the battery that monitors its operation and does not allow it to work outside the bounds of the design regime (V, I).
- Expandability: The system's accumulation capacity can be expanded by incorporating more batteries.
- Can be connected in series and parallel connection.
- Wi-Fi module: The battery has a built-in Wi-Fi module, so you can see the battery information and operate it remotely..

5. Operation

5.1. BATTERY ELEMENTS



Item	Name	Definition
1	SW1	DIP switch for CAN or RS485
2	SW2	Resistance for communication and for parallel or series connection
3	SW3	Switch for battery's address
4	SW4 & SW5	Communication interface for battery or master battery
5	Reset	Restablecer la configuración del módulo WIFI

The standard packing list of **Lithium Series Dual** is as follows:

Part Name	Description	Quantity
Battery	Lithium Series Dual	1
Data cable	Communication cable	1
Power cable	Positive and negative power cables	1

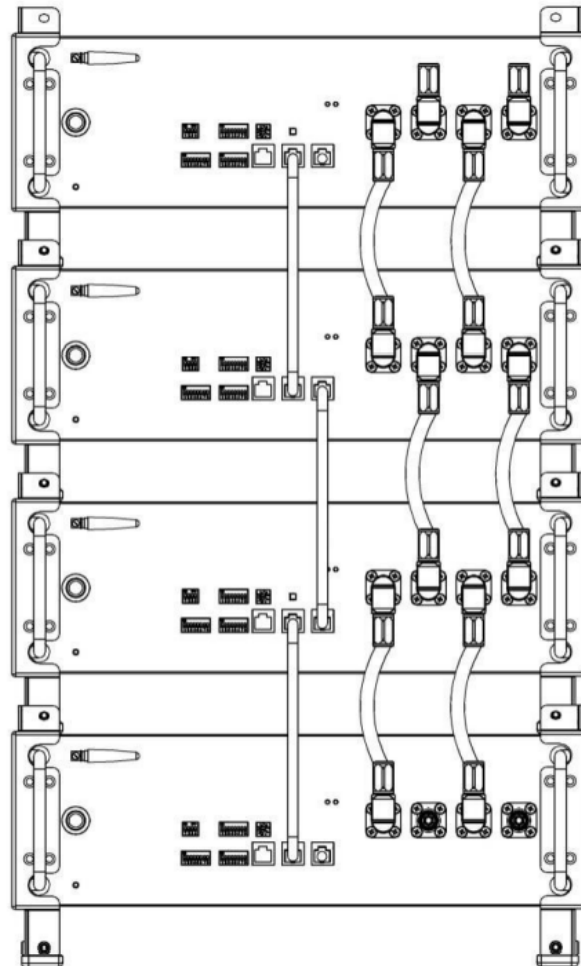
5.2. ASSEMBLY AND CONNECTION

5.2.1. PARALLEL CONNECTION

Batteries may be connected in parallel up to a maximum of 8. All batteries must be grounded. It is suggested to connect the installation ground to the rack at the same point as all battery lands.

Connection between batteries:

- Up to 8 batteries are allowed to be used in parallel.
- The batteries used in parallel must be the same batch of cases with the same SOC.
- The Voltage difference of batteries used in parallel must be within 1V.
- The dimensions of parallel cable must be the same.



Connection between battery and inverter:



Inverter connection

Battery connection

- 2AWG power cable (35 mm²)

NOTE: Each power cord can carry a maximum of 200 A, so every two batteries would need to connect a new cable to the inverter. However, if the inverter is 5 kW only with one cable it would be enough to be at the limit of the maximum current recommended.

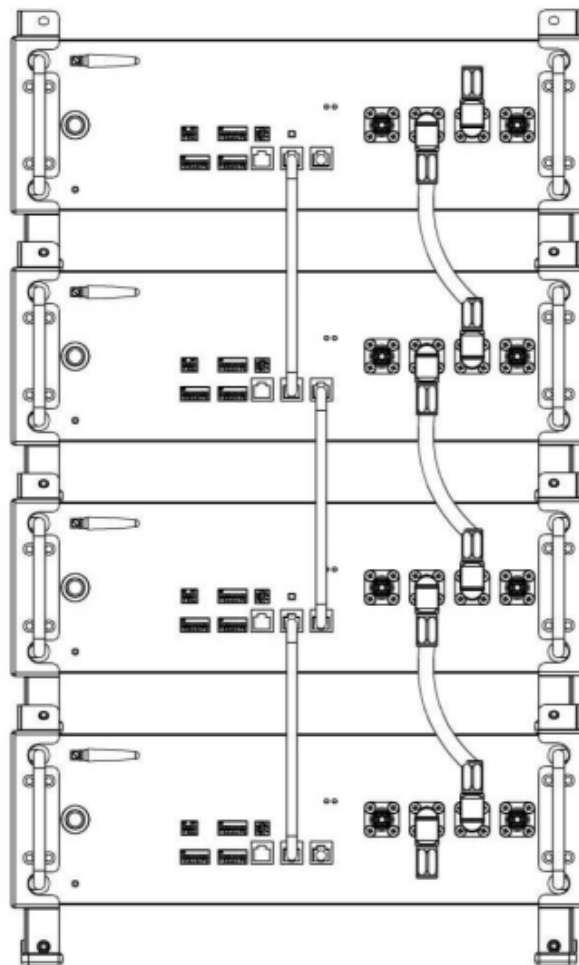
Warning when doing a battery expansion: It is very important that in the case of connecting batteries that are not new (for example, we add a new battery to an existing system), we previously perform a voltage balancing (without load) between them to avoid overcurrents that could damage the system. As an alternative to balancing voltages, balancing can be done by equalizing the SOC of the batteries. In addition, when connecting new batteries, we must take into account that the number of batteries at the time of connection must be similar to the number of batteries that are already connected in 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 in place to balance them, 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.

5.2.2. SERIE CONNECTION

Batteries may be connected in serie up to a maximum of 8. All batteries must be grounded. It is suggested to connect the installation ground to the rack at the same point as all battery lands.

Connection between batteries:

- Up to 8 batteries are allowed to be used in series.
- The batteries used in series must be the same batch of cases with the same SOC.
- The Voltage difference of batteries used in parallel must be within 0.1V.
- The dimensions of parallel cable must be the same.



For the serie connection of the batteries, we need yo modify the battery cables first. These are designed so that the negative conector only fits the negative terminal, the same with the positive one.

For the modification, we need to disassemble the head of the cable we want to interchange of pole, to later assemble the one we need to install.

We well require a M5 HEX wrench, a flat head screwdriver (optional), and both cables



The process will be described in the followen steps:

1. Unlock the head

- We need to ensure that the head of the cable is in the unlock position.



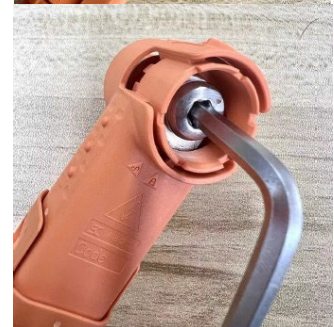
2. Withdraw the head of the connector

- We need to slightly move up both locking flange in order to unlock the head piece.



3. Unscrew

- We will use the M5 HEX wrench to withdraw the screw which ensures the head position of the cable.



4. Withdraw head

- We need to withdraw completely the head of the cable. Once done that, we will interchange it by the analogue cable



5. Final assemble

- We proceed to assemble the heads of cables once we have interchanged the head of the cables, following the previous steps inversely.



5.2.3. CONFIGURATION WITHOUT COMMUNICATIONS

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

5.2.4. DIP CONFIGURATION

Each module has 5 DIP switches (SW1, SW2, SW3, SW4 and SW5) that will be configured differently according to the system requirements, the battery connection and the inverter.



SW1 is for communication protocol with inverter. If CAN protocol is used, 1 and 2 must be ON. If 485 protocol is used, 3 and 4 must be ON.



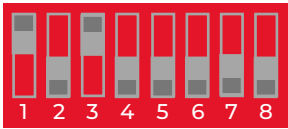

















SW4 and SW5 work to communicate with the inverter and depend on the communication cable and the inverter protocol.






If using a pin-to-pin cable, the DIP configuration is as follows:

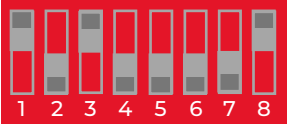













Protocol/ Inversor	SW1	SW4	SW5
CAN Turbo Energy, Goodwe, Sofar, Deye	 1=ON 0=OFF		
CAN Victron Energy	 1=ON 0=OFF		
485 Voltronic	 1=ON 0=OFF		

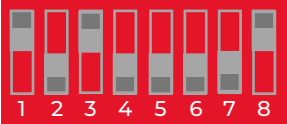















5.3. DIPS FOR COMMUNICATION ON SERIES

SW2 and SW3 are for communication between batteries.

Connected battery number	Group	SW2 Series connect	SW3 Address Set
1	-		
2	Primary		
	Sub		
3	Primary		
	Sub1		
	Sub2		
4	Primary		
	Sub1		
	Sub2		
	Sub3		

Connected battery number	Group	SW2 Series connect	SW3 Address Set
5	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
6	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		

Connected battery number	Group	SW2 Series connect	SW3 Address Set
7	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		
	Sub6		



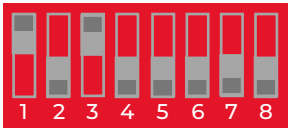



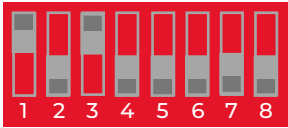













Connected battery number	Group	SW2 Series connect	SW3 Address Set
8	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		
	Sub6		
	Sub7		







































Make sure DIP switch SW2 is selected correctly. If the battery is connected in parallel mode, but DIP8 is in the ON position, a serious and dangerous fault may occur. On the other hand, **if the battery is connected in serial mode, but SW2 DIP8 is in the OFF position, a serious and dangerous fault may occur.**

















5.4. DIPS FOR COMMUNICATION ON PARALLEL

SW2 and SW3 are for communication between batteries.

Connected battery number	Group	SW2 Series connect	SW3 Address Set
1	-		
2	Primary		
	Sub		
3	Primary		
	Sub1		
	Sub2		
4	Primary		
	Sub1		
	Sub2		
	Sub3		

Connected battery number	Group	SW2 Series connect	SW3 Address Set
5	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
6	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		

Connected battery number	Group	SW2 Series connect	SW3 Address Set
7	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		
	Sub6		

Connected battery number	Group	SW2 Series connect	SW3 Address Set
8	Primary		
	Sub1		
	Sub2		
	Sub3		
	Sub4		
	Sub5		
	Sub6		
	Sub7		



Make sure DIP switch SW2 is selected correctly. **If the battery is connected in parallel mode, but DIP8 is in the ON position, a serious and dangerous fault may occur.** On the other hand, if the battery is connected in serial mode, but SW2 DIP8 is in the OFF position, a serious and dangerous fault may occur.

6. On and Off

To turn on, press the power button for few seconds. The BMS will start and the LED will light up.

To turn off the batteries, press the power button for more than 5 seconds.

7. Faults and troubleshooting

Each error is presented with a description. If the Fault light is on, check the error in the APP. If the battery cannot be seen on the app, please check the battery status first. If the battery status is OFF, turn on the battery and then check that you are connected to the Internet.

8. Appendix

8.1. SECURITY INSTRUCTIONS

1. Please read the battery instructions before use.
2. Keep the battery away from high voltage and out of reach of children.
3. In operation, the battery should be kept in the set temperature ranges (between -10°C and 50°C) and a humidity less than 80%.
4. During handling, be very careful to avoid bumps/falls of the battery.
5. Be careful not to touch the contacts at the same time.
6. The battery, at the end of its useful life, requires a recovery process, not disassemble it.
7. Avoid locating batteries in damp places to avoid danger.
8. When not in use for a long time, store the battery intact and let the battery be half charged. Wrap the battery with non-conductive material to avoid direct contact of the metal. Store the battery in a cool, dry place.
9. Never expose the battery to fire or water.

8.2. SAFETY WARNINGS

1. Do not disassemble the batteries. The inside of the battery has a protective mechanism and a protective circuit to avoid danger. Improper disassembly will damage the protection function permanently, leaving the battery without safety conditions.
2. Never short-circuit the poles of the Battery. Avoid contact of positive and negative poles with metals.
3. Keep the batteries away from fire and extreme temperatures. Monitor the distance to thermal bulbs, stoves, etc.
4. Keep the battery away from the water. Always be careful that the battery is not located in damp places where the dew point can be reached.
5. Do not use batteries that have physical damage that may be due to falls or bumps.
6. Do not weld near the battery.
7. Overheating will result in the loss of the protective function of its life cycle, even, it could render the battery useless and in extreme cases self-ignition of the battery occurs.
8. Connect this battery only with identical batteries up to a maximum number of 8 in series or parallel.
9. If the battery has liquid leakage, avoid contact with it completely. It can be harmful to the skin, and if you touch the eyes, wash, and go to the hospital immediately for treatment.

8.3. WARRANTY

Please refer to the **Warranty Document** for specific warranty terms.

8.4. SHIPPING

During transportation, keep the battery from acutely vibration, impacting, solarization, drenching.

8.5. ALMACÉN

Storage environment requirement:

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

The battery must be charged every six months, and must be charged and discharged a complete cycle every nine months

8.6. CONTACT DETAILS

For any incident, contact us by filling out the form on our website:

<https://www.turbo-e.com/technical-support/>