

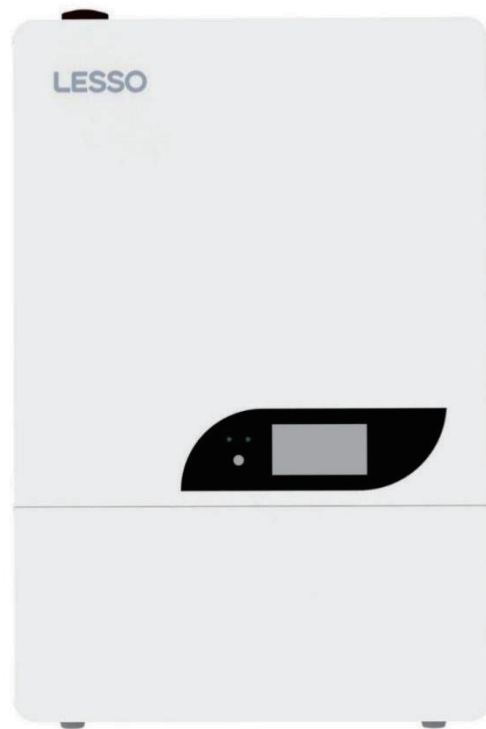


Residential Wall-mounted Energy Storage User Manual

LSRW51V100AH-LFP

LSRW51V120AH-LFP

LSRW51V150AH-LFP



Document Revision: V1.0

About This Product

LESSO 5.12kWh Battery are manufactured according UL1973 & UL9540A. Its materials meeting the flame retardant requirements. And the BMS is designed with redundant protection. Support WIFI platform Monitor. It supports up to 14 units in parallel, so that compose a wall mounted Energy Storage System with 70 kWh energy.

This installation manual contains information concerning important procedures and features Of LESSO Lithium batteries.

Read all the instructions in this manual before installation, operation, transportation, storage And maintenance. LESSO 5.12kWh Battery are manufactured according UL1973 & UL9540A. Its Materials meeting the flame retardant requirements. And the BMS is designed with redundant protection. Support WIFI platform Monitor. It supports up to 14 units in parallel, so that compose a Wall mounted Energy Storage System with 70 kWh energy.

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1. Safety Attention


Any improper operation may lead to electrical shocks, burns and other personal injury or equipment damage, please read the important security information and strictly abide by all the safety rules of this manual instruction. The following is a list of the safety rules to be followed in order to operate this product. Please refer to the warning note in the appropriate section for the security instructions in the use and maintenance process.

 **Risk:** Violation of the following provisions may result in casualties, or equipment damage.

Do not touch the live parts of the equipment without confirming the voltage or temperature of the equipment.

Only professional electricians or professionally qualified personnel can install, operate, overhaul and maintain the equipment. During maintenance or overhaul, at least two people must be guaranteed to wear safety shoes, wear insulated gloves, and establish warning signs.

The operation of this product must be carried out in accordance with the safety instructions in this manual and in strict compliance with all safety instructions in the installation manual of this product.

 **Warning:** Violation of the following provisions may result in personnel injury or equipment damage.

When moving, transporting and placing equipment, the equipment must be placed horizontally.

Should be installed on fire-retardant objects, do not place flammable materials inside and near the box.

Do not leave the thread, paper, metal crumbs, tools and other foreign bodies in the product.

In non-emergency cases, the operation and stop of the monitoring system shall not be controlled by means of connecting and disconnecting the input power.

The product should be regularly maintained and cleaned.

Should form the recording equipment operation condition and the application maintenance system.

 **Electrostatic warning**

The personnel to contact printing monitor cabinet and cabinet equipment needs to wear a good grounding anti-static bracelet ring, hand-held printed circuit board, please hold the edge part to prevent static electricity. In addition, electrostatic can be eliminated by contacting electrically conductive bodies such as metal sheets.

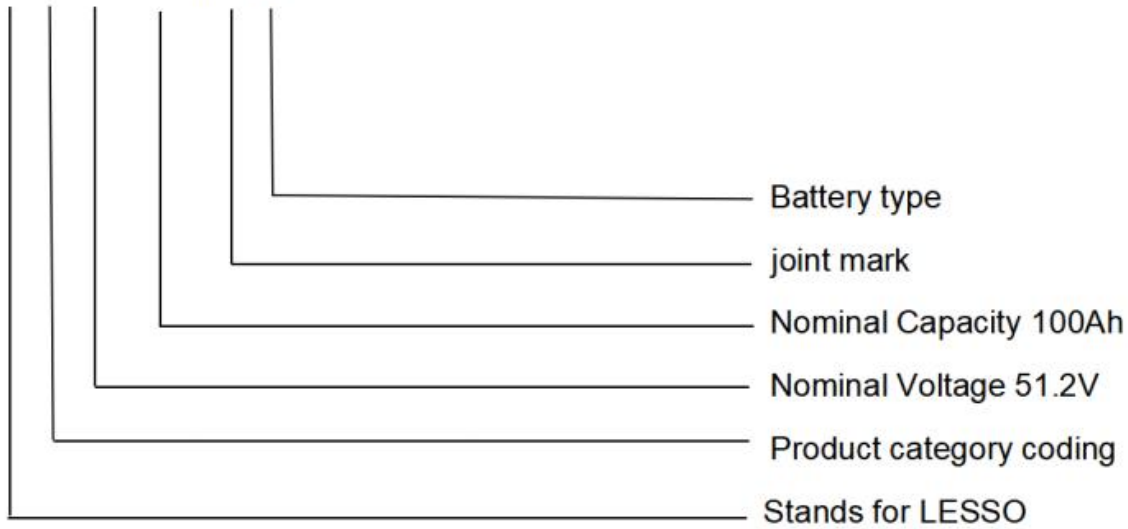
 **Remind**

When the system is during the electrical debugging, please pay attention to the warning marks showing on the LCD display.

2. Product Introduction

2.1 Product Name

LS RW 51V 100AH — LA



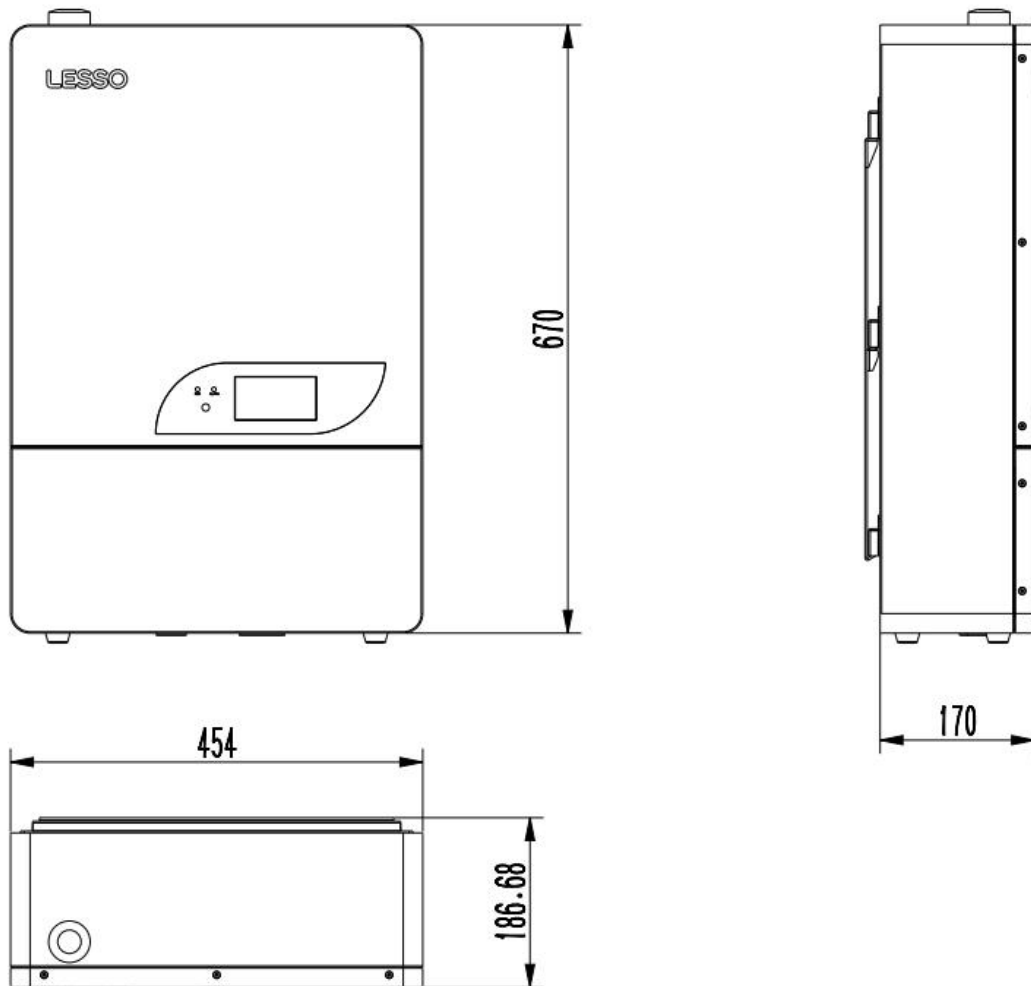
2.2 Technical Parameter

Item	Specification
Battery type	LiFePO4
Nominal voltage	51.2V
Nominal capacity	100Ah
Nominal energy	5.12kWh
Usable energy	5.0kWh
Recommended charge current	50A
Max continuous charge current	80A
Max continuous discharge current	100A
Peak discharge current (3s)	350A
Max continuous discharge power	5kW
Peak discharge power (3s)	15kW
Standard charge voltage	56.0V
Recommended floating charge voltage	54.0V

End discharging voltage	43.2V
IP rating	IP55
Self-discharge rate (Sleep mode)	Residualcapacity≤3%/month;≤20%/years
Dimensions(W * H* D) in mm	454* 670 * 170
Battery module weight	~60.7kg
operation temperature	0~45°C(32~113°F)
Recommended operation temperature	15-30°C(59~86°F)
Storage temperature for short time	-10~45°C (14~113°F)
Storage temperature for long time	10~35°C (50~95°F)

2.3 Product pictures

Product dimension (Unit: mm) :



3. Storage & Transport

Storage:

Proper environment and timely charging are needed to be prepared for the battery.

- Battery should be stayed in the warehouse where is dry, clean, shade, and well-ventilated. Storage Temperature (Min./Max.): $-10\sim 30^{\circ}\text{C}$, Relative Humidity (Min./Max.): 45%~85%RH.
- Deep-discharge could damage the battery modules. Therefore, the battery must be timely charged (within 15days) after over-discharged.
- Keep the batteries against dropping, turning over and serious stack.
- Store the battery in the places away from child and pets.
- Systems should be put into storage at 50% SOC and checked monthly to ensure the system SOC does not fall below 20%. At 20% SOC the battery will self-discharge in approximately 2 months. Also check the voltage every 3 months and recycle every 6 months if the battery is not use for long time.

Transport:

- Lithium-ion batteries are hazardous goods. Therefore the following points must be observed when transporting the battery modules:
- Observe the general transport regulations based on the mode of transport as well as all legal regulations.
- No fall down, no pile up over 4 layers and keep face up.
- Do not transport battery upside down.
- Do not lift battery by the terminal cables.
- Do not vibrate battery.
- Check the battery immediately after transport the battery.



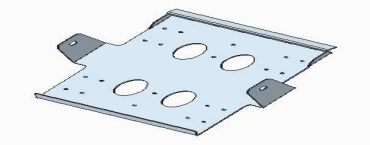

4. Installation

4.1 Installation Preparation

1) Environment Requirement

Application scenarios	Residential energy storage systems
Operating Environment	Indoors or under a dark eave and place away from strong electromagnetic radiation
Recommended salt spray	An area 2km from the coast
Operating Temperature	0~45℃ (32~113°F)
IP grade	IP55
Storage Temperature	-10℃~30℃ (14°F~86°F)
Operating Humidity	5%~95%
Install Altitude	≤4000m
Install location	Under the roof

2) Check the packing list

Parts	QTY	Photo
Inverter communication cable	1pcs	
Expanding screw M8*60	10pcs	
Wall mounting bracket	1 pcs	
Modules communication cable	1pcs	

- Check if there is any damage on the battery box.
- Check the battery terminals and connections to make sure they are clean, free of dirt, fluids and corrosion.
- All battery cables and their connections should be tight, intact, and NOT broken or frayed.

- Check torque on terminal bolts.
- Replace any damaged batteries and cables.

3) Tools & Materials

The following insulated tools and materials are required:

- Positive and negative battery cables. We recommend copper cables 2AWG. The battery power cables are not included. Please refer to the published Battery Cable Sizing Chart for the proper size, based on your system specification.
- Positive and Negative Terminal luge recommendation: M10*1.5 (diameter: 10mm or 3/8in).
- Screwdriver.
- RJ45 cable.
- Wall Mount hangers.
- OSHA (Occupational Health and Safety Administration) approved personal protective equipment.

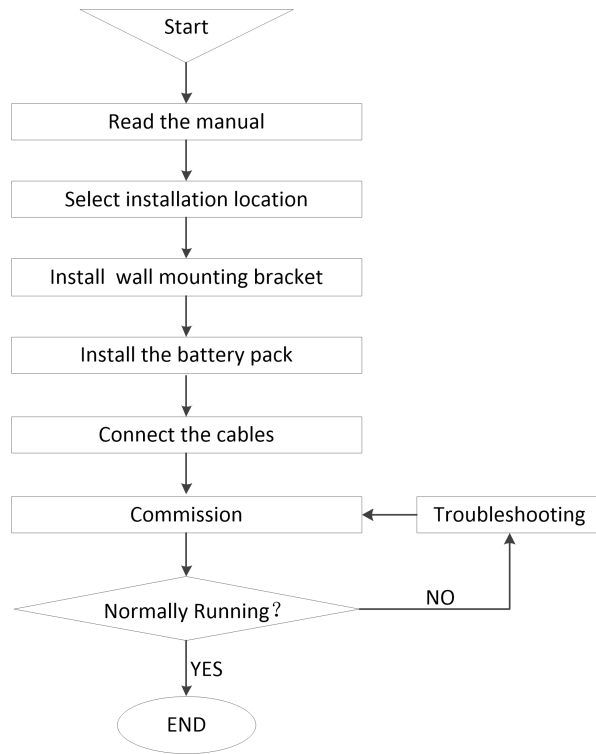
		
Insulated gloves	Safety Glasses	Safety Shoes

⚠ CAUTION:

- The ambient temperature exceeds the operating range, the battery pack may stop operating to protect itself. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery pack.
- This battery pack weighs is about 61~83kg. To prevent personal injury, using proper lifting equipment during installation is recommended.
- If user finds shell deformation of the battery pack, please stop installation and contact us.
- The total weight of the battery is about 61kg. Please ensure that the wall is strong enough to withstand battery hanging.
- Battery system should be installed and ventilated in cool and dry place, to ensure the battery is away from the heat source, to avoid sunlight, to prevent the battery system cutting off power output or system failure due to over temperature.
- Keep away from the transformer and other strong electromagnetic field environment, to prevent the battery system communication and power supply control abnormal.
- Keep away from fire、 flammable and explosive items.
- The system is limited to professional maintenance, please ensure that the installation site is away from child and pets.

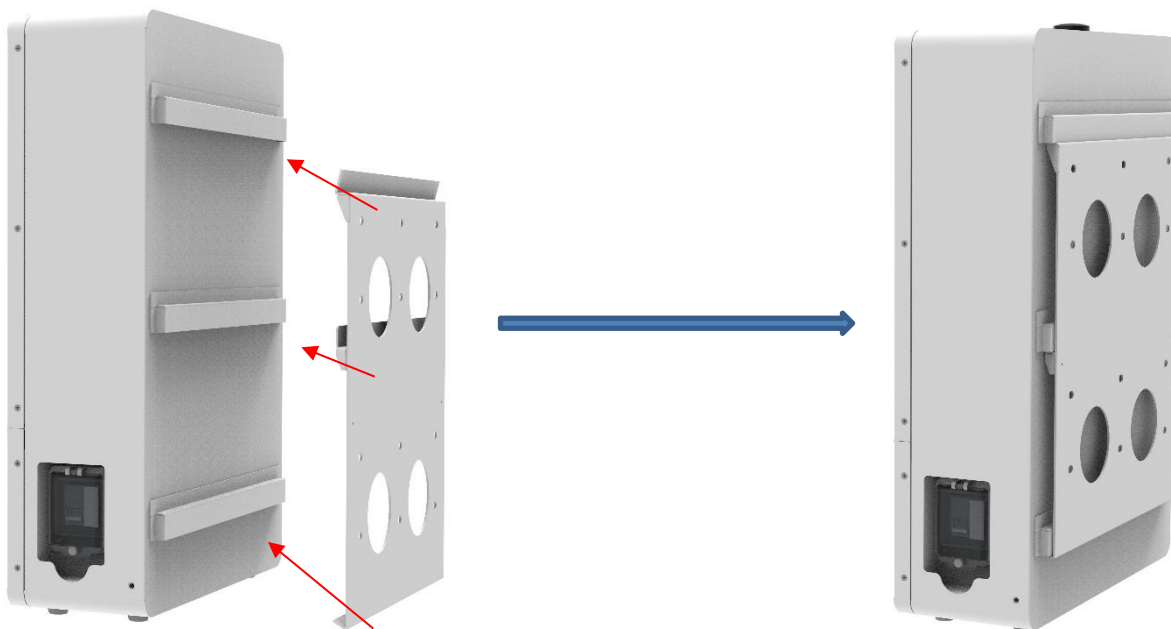
4.2 Installation Steps

Please follow the flowchart below to install the battery system. For more details, please refer to the 1~3 item.



1. Structure Installation

1) Install wall mounting bracket



The LESSO LSRW51V100AH-LFP 5.12kWh is designed to be completed installation by wall mounted . The rack should be fixed on wall with expanding screw .Please refer to the LESSO Lithium Battery Data Sheet for weight and dimension.

2) Installation battery pack

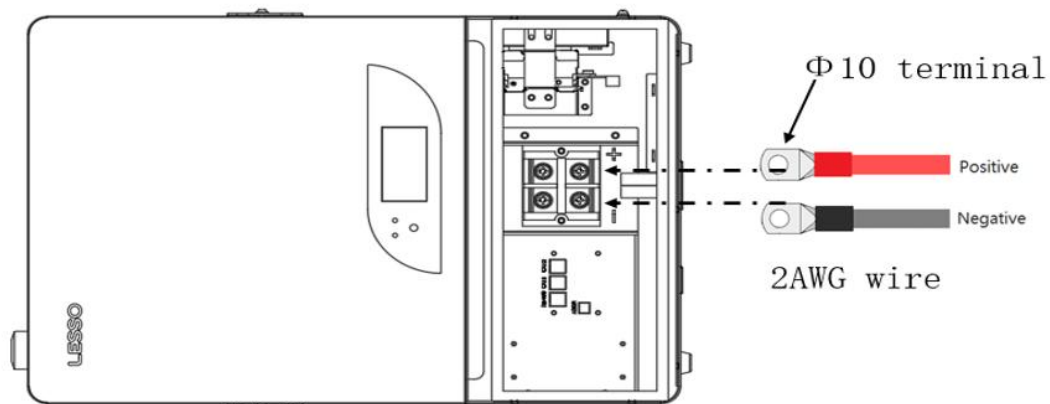
- a) Use two handles on the side of the battery pack to lift the battery out of the wooden case.
- b) Install wall mounting bracket.
- c) Lift the battery box with lifting equipment and align it with the mounting hole of the wall-mounted bracket and clip it.
- d) Hang the battery pack on the wall bracket.
- e) Lock the wall-mounted bracket and battery box with the marked screws.

2. Cable Connection

1) Connecting the battery

The battery terminals are positioned in the bottom of the front cover. Please make sure the breaker on the right side of rack is in the OFF position. Please install the positive cable first and the negative cable second. Please do not cross the positive and negative terminals; also, ensure the terminals are not connected to any metal mounting, fixture, or body part. Recommended terminal torque range is 10.0 –19.1 N·m (7.4 – 14.1 ft.lb).

The LESSO Lithium Batteries are equipped with two M10 threaded terminals with a lock washer and nut.10mm ring terminals along with proper size wiring cables are required to connect battery to inverter/charger. Positive use red wire and connect to “+” electrode; negative use black wire and connect to “-” electrode. **Do not reverse polarity to void warranty.**



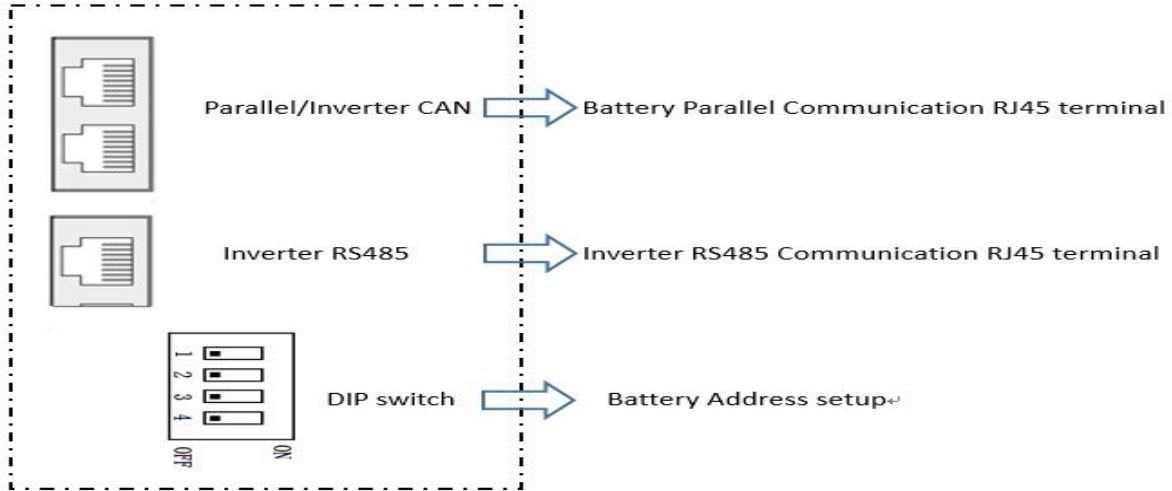
Top View



NOTE! Without exception, products experiencing terminal burn out will not covered under the warrant .

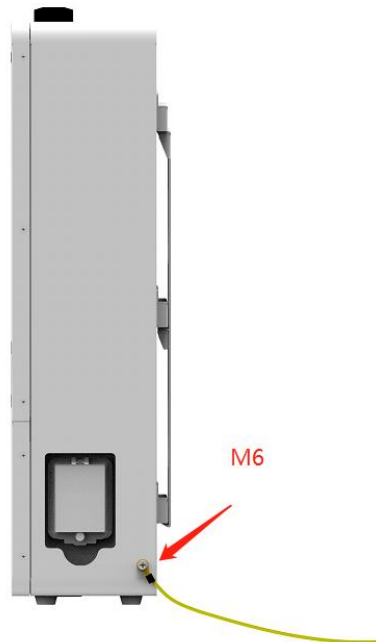
2) Communication Port

LESSO LSRW series battery has a self-managed Battery Management System (BMS). The Communication board has three ports which are designed to support Inverter RS485 and CAN communication, battery parallel communication (see Parallel Connection). When batteries need to communicate in parallel, the user needs to set the battery address through the DIP switch, and the CAN communication port of the last battery needs to connect to the terminal resistor.



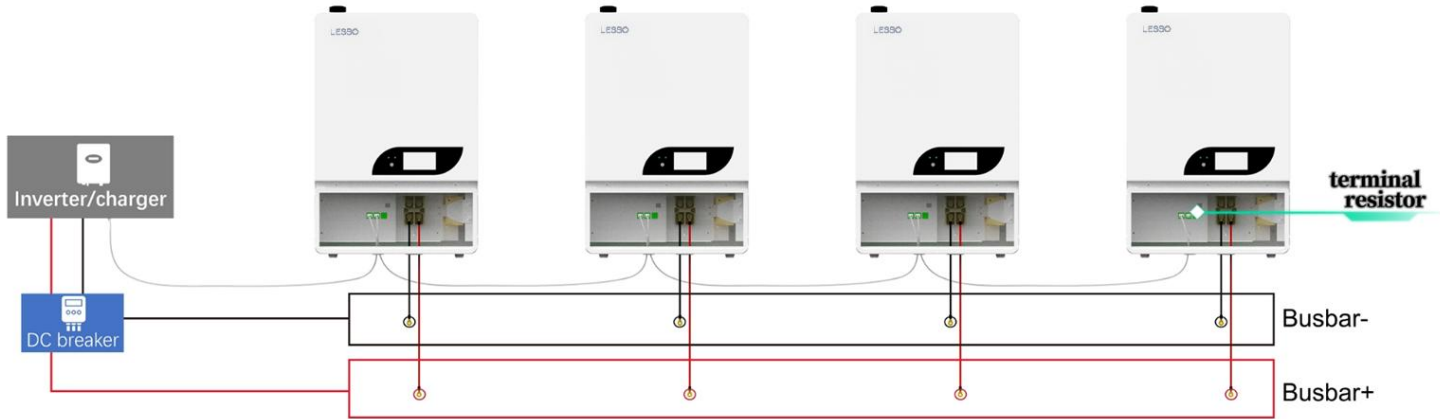
3) Grounding

Grounding the battery, if necessary. LESSO LSRW series battery has 1 grounding holes on the bottom of battery case.



4) Parallel Connection

The following illustration shows how to connect multiple batteries in parallel.



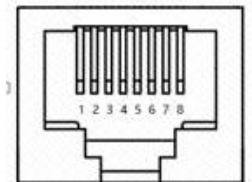
Please follow the procedure to parallel LSRW series batteries:

- 1) Prepare communication cable. Each unit comes with 1pcs RJ45 cable (for inter- battery Parallel CAN port). Cables for communicating with the inverter are provided by the customer. If the cable is missing, please make sure the cable you purchase on the market meets the following standards. Please note that a standard RS485 cable is used.

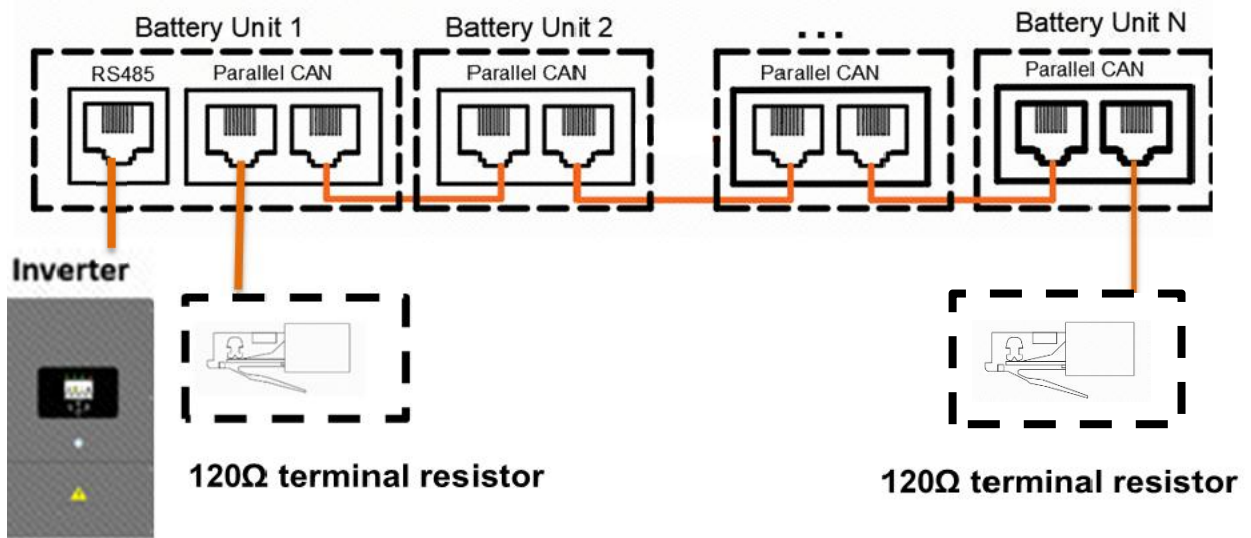
Communication cable Pin definition:

Parallel & Inverter CAN Port	
Pin No.	Definition
1	NC
2	NC
3	CANL
4	CANL
5	CANH
6	CANH
7	NC
8	NC

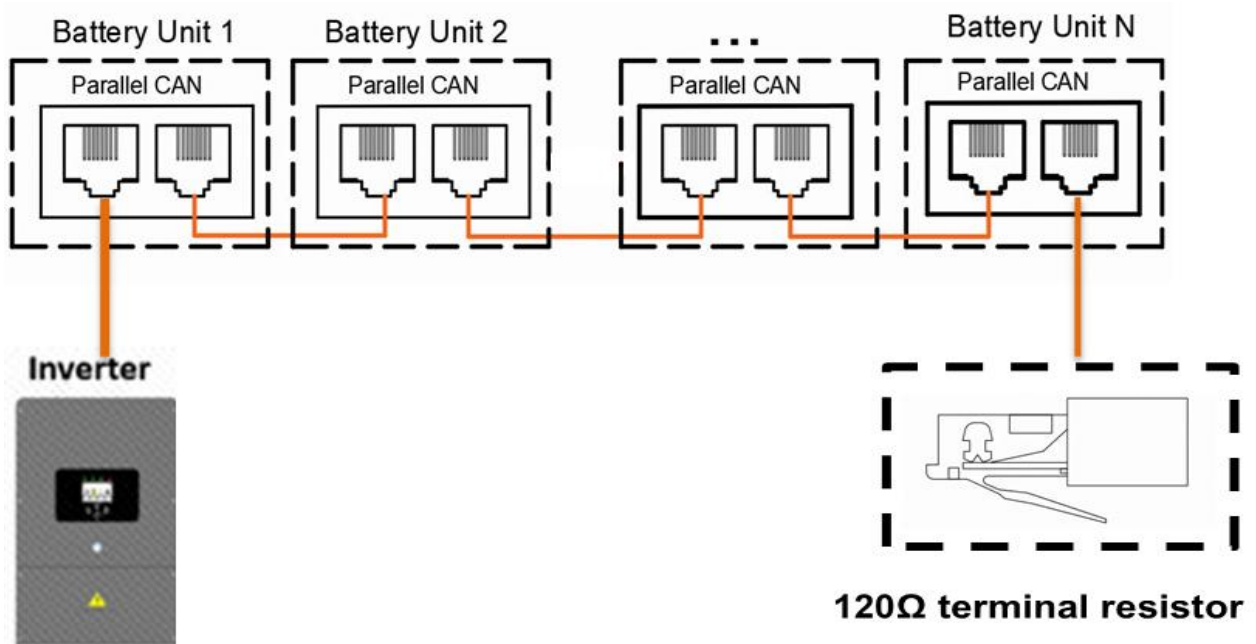
Battery & Inverter RS485 Port	
Pin No.	Definition
1	Inverter_RS485B
2	Inverter_RS485A
3	NC
4	NC
5	NC
6	NC
7	BMS debug_RS485A
8	BMS debug_RS485B



- 2) Confirm the Battery DC breaker is in the “OFF” position.
 - 3) Wire each battery’s Power bus to Inverter. And wire inverter’s cable to PV, Grid and Load.
 - 4) Use the RJ45 cables to connect the batteries’ Parallel CAN port, as illustrated in the chart below. Ensure that the communication port of the last terminal (N) is connected to 120Ω terminal resistor.
- a. The battery host communicates with the RS485 inverter.

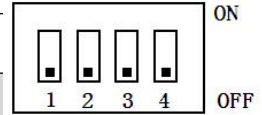


The battery host communicates with the CAN inverter.



- 5) Press the button on the front of each battery for 3+seconds one by one, until all batteries wake up.
- 6) Set the address of the Dial Switch.

Module number		Dial Switch			
		#1	#2	#3	#4
0	Single module	OFF	OFF	OFF	OFF
1	Parallel mode(Master)	ON	OFF	OFF	OFF
2	Parallel mode(Slave)	OFF	ON	OFF	OFF
3	Parallel mode(Slave)	ON	ON	OFF	OFF
4	Parallel mode(Slave)	OFF	OFF	ON	OFF
5	Parallel mode(Slave)	ON	OFF	ON	OFF
6	Parallel mode(Slave)	OFF	ON	ON	OFF
7	Parallel mode(Slave)	ON	ON	ON	OFF
8	Parallel mode(Slave)	OFF	OFF	OFF	ON
9	Parallel mode(Slave)	ON	OFF	OFF	ON
10	Parallel mode(Slave)	OFF	ON	OFF	ON
11	Parallel mode(Slave)	ON	ON	OFF	ON
12	Parallel mode(Slave)	OFF	OFF	ON	ON
13	Parallel mode(Slave)	ON	OFF	ON	ON
14	Parallel mode(Slave)	OFF	ON	ON	ON



NOTE!

- If used for single battery without parallel, must set Address as 0.
- When used for several batteries parallel, please set the master battery number as 1, and the other battery number as 2~14.

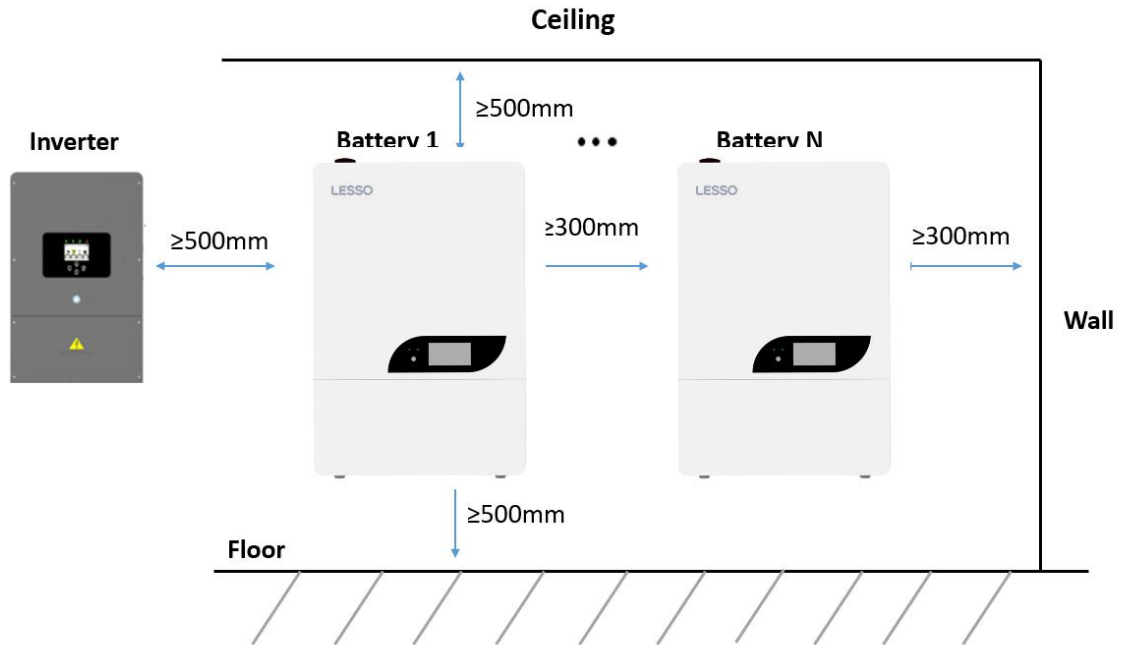
7) Touch the Upper computer to set Inverter as the following form.

Inverter Setup	Support Inverter Protocol
1	Schneider Modbus, 19200bps
2	Solark(Deye) Modbus , 9600bps
3	Victron CANbus,250kbps
4	UZ-CANbus,500kbps
5	Reserved
6	Growwat Modbus,9600bps
7	Reserved
8	Voltronic Modbus 9600bps
9	(Deye)00-CANbus, 500kbps
10	Solark CANbus,500kbps
11	SMA CANbus,500kbps

- 8) Use RJ45 cable to connect the inverter CAN or RS485 port of master battery (which Battery ID set as 1) to inverter communication port.
- 9) Turn ON inverter’s breaker, then turn ON all batteries’ DC breaker, and then press the button of master battery (Battery ID 1) for 6+ seconds to turn ON , at last press master battery’s button for 3+ seconds to start automatically parallel process as below:
 - a) Master battery requests the lowest voltage battery of the whole bank to pre-charge and turn on relay, and request charge current from inverter.
 - b) As the battery voltage increase by inverter, other battery join in to parallel one by one.
 - c) After all normal batteries complete parallel, the parallel process end up, and recover normal request from inverter.

3. Wire the battery cables

For connecting multiple units: Maintain the recommended distance among battery units’s side or wall- at least 12inches (300mm). And keep battery unit’ side at lease 20inches (500mm) away from Inverter 、 ceiling or floor.



CAUTION! If Paralleling the LSRW series batteries without connecting them via RJ45 cable(s), please make sure the voltage difference between the highest voltage and lowest voltage does not exceed 1.0 volts. A large current flow from the higher voltage battery to the lower voltage battery could potentially damage one or both batteries. Resulting damage to the battery will void the warranty.

4. System Commission

If you only install single LSRW series battery, please follow the below steps to start up:

- Check system connection cables for correct polarity.
- Put the battery's breaker on the "ON" position.
- Put inverter breaker in the "ON" position.
- Push the power button on the front of the unit for 3 seconds to turn on the battery LCD display.

5. Final Connection of the Installation

Final installation and operation guidelines will be dictated by your Electrician and Installer based on the overall properties of and procedures for the equipment in your installation and any code requirements that apply to your region. LESSO technicians and sales staff are available to provide any additional information on the LESSO Lithium Batteries as needed. Please be aware of the potential electrical hazards before interacting with any and all electrical or mechanical devices. Please take all necessary safety precautions in your projects and installations.

5. Operation

5.1 Operating Environment

See “2.2 Technical Parameter” Table on page 4

5.2 Charging



CAUTION!

- Never attempt to charge a battery without first reviewing and understanding the instructions for the charger being used. Only use a LESSO Approved Lithium Ferro Phosphate (LFP) charger if ancillary charging is required before installation, testing or troubleshooting. Failure to use a LESSO approved LFP charger will damage the battery and void the warranty. **Please follow the specification on LESSO Lithium Battery Datasheet.**

Please follow the following steps to use the charger to charge the battery:

- 1) Connect the charger leads to the battery;
- 2) Make sure that the charger lead, both at the charger and the battery side, connections are tight;
- 3) Turn on the breaker of battery;
- 4) Startup the battery by holding the power button of battery for about 3second;
- 5) Turn the charger on.

5.3 Discharging

- Do not discharge battery below operating voltage.
- Do not discharge battery at rates greater than maximum continuous current.
- Do not operate in conditions that will exceed the internal operating temperatures of the battery.

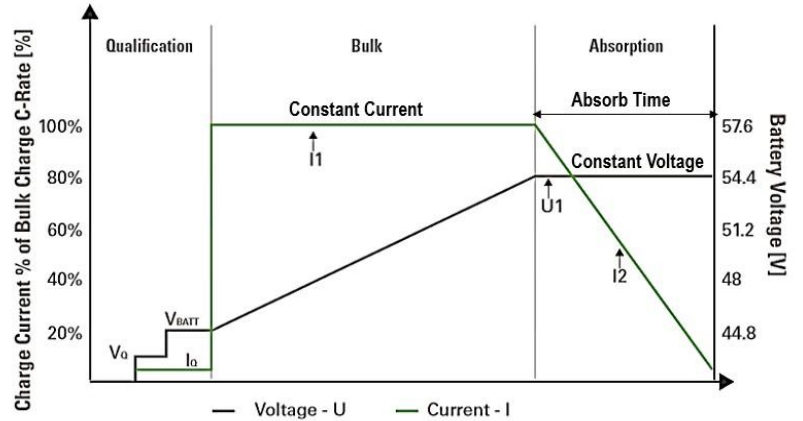
5.4 Parameter set up guide in Charger/Inverter

Before commissioning the energy storage system, the appropriate controller and inverter settings must be programmed per the manufacturer’s recommendations. Consult the manufacturer’s manuals and/or access technical support (Schneider, Sol-Ark, Victron, SMA, Growatt, Deye).

Although LESSO Lithium batteries can perform at very high rates and depths of discharge within a very wide temperature range, in order to achieve extended life cycles and to comply with the Warranty, the following guidelines should be followed:

1. Understand Charge Stage

- Bulk Charge: Charge at Constant Current (CC) to Bulk/Absorb Voltage;
- Absorption Charge: Maintain Constant Bulk/Absorb Voltage (CV);
- Terminate when charge current drops below 0.05C;
- Unlike Lead Acid batteries, Lithium Ferro Phosphate batteries do not require Float Charge.



2. Charger/Inverter configuration recommendation for best Performance

- Recommended operating parameters of charger/Inverters For 3,000 Cycles:
Operating temperature range: 32 F to 15.12 F (0 °C to 49°C)
- Recommended operating parameters of charger/Inverters For 6,000 Cycles:
Operating temperature range: 50 F to 110 F (10°C to 43°C)



CAUTION! Do Not Operate LESSO Lithium Batteries at an average temperature exceeding 30 °C / 86 °F over the life of the battery.

6. Protective circuit specification

6.1 BMS alarm & protection parameter

The Battery Management System (BMS) can monitor and optimized each single cell during charge & discharge, to protect the battery pack overcharge, over discharge, short circuit, etc. Overall, the BMS helps to ensure safe and accurate operation.

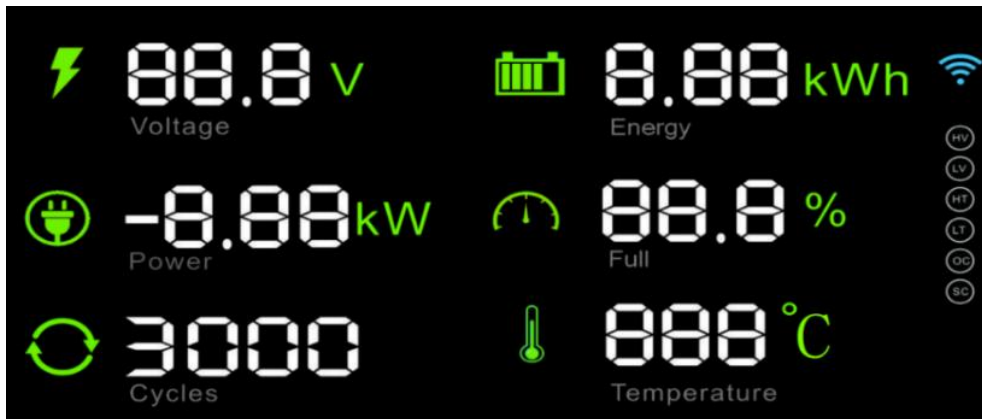
Items		LSRW51V100AH -LFP	LSRW51V1 20AH-LFP	LSRW51V150 AH-LFP
Battery Alarm &Protection		Description		
Over voltage	Over-voltage alarm for each cell	3.55±0.03V		
	Over-voltage protection for each cell	3.75±0.03V for 1±0.5s		
	Over-voltage release for each cell	3.35±0.03V		
	Over-voltage alarmfor total voltage	57.2V±0.2V		
	Over-voltage protection for total voltage	58.4V±0.5V for 1±0.5s		
	Over-voltage release for total voltage	53.6V±0.5V		
	Over-voltage release method	Under the release voltage		
Under voltage	Under-voltagefor each cell	2.90±0.03V		
	Under-voltage protection for each cell	2.70±0.03V for 1±0.5s		
	Under- voltage release for each cell	3.15±0.03V		
	Under-voltage alarm for total voltage	46.4V±0.5V		
	Under-voltage protection for total voltage	43.2V±0.5V for 1±0.5s		
	Under-voltage release for total voltage	50.4V±0.5V		
	Under-voltage release method	Charge to recovery		
Over current	Charge over current alarm	135±5A	135±5A	165±10A
	Charge over current protection	120±5A	150±5A	180±20A
	Protection delay time	5±1s		
	Charge over current release method	Auto release after 1 min		
	Discharge over current alarm	110±10A	135±10A	165±10A
	Discharge over current protection	120±10A	150±10A	180±20A
	Protection delay time	5±1s		
	Over current release method	Auto release after 1min		
Charge over temperature	Charge over temperature alarm	50±3℃		
	Charge over temperature protection	55±3℃		
	Charge over temperature release	45±3℃		
Discharge	Discharge over temperature alarm	60±3℃		

over temperature	Discharge over temperature protection	65±3℃
	Discharge over temperature release	55±3℃
Charge low temperature protection	Charge under temperature alarm	3±3℃
	Charge under temperature protection	0±3℃
	Charge under temperature release	5±3℃
SOC	Low SOC Alarm	10%
LCD	Battery information display	Voltage, Power, SOC, Cycles, Temperature, Residual energy, Errors alerts
Monitor & Communication		
WIFI Monitoring		Available
Communication		Can-bus, RS485 Optional
Series &Parallel connection		No series connection; Support max. 14sets in parallel.









6.2 Battery Information Display

LCD display:

Touch the power button and will automatically activate the LCD Screen.



Supplementary instructions:







Display	Indicator	Note
	Battery voltage	
	Residual energy	
	Current power	Negative value indicates discharging. Positive value indicates charging.
	SOC	State of charge
	Cycle Numbers	
	Battery temperature	
	WIFI mark	<p>OFF: Not connect to router, or battery is configured to router, but router connection fails;</p> <p>Rolling: One-click configuration, in this mode user can check battery status through local connections, can also configure the battery to connect to router;</p> <p>Flash: user can check the battery status through local connections;</p> <p>ON: user can check the battery status through local connections;</p> <p>ON: Signal displays normally according to the signal strength, connect to router, and can check the battery status remotely.</p>
	Alarm or protection sign	<p>System will activate related mark when alarm or protection:</p> <p>HV: High Voltage;</p> <p>LV: Low Voltage;</p> <p>HT: High Temperature;</p> <p>LT: Low Temperature;</p> <p>OC: (Charge & Discharge)Over Current;</p> <p>SC: Short Circuit.</p>

7. Maintenance

7.1 Troubleshooting referring to error marks

When the battery falls beyond the prescribed range, it goes into fault state by turning on red LED “ALARM”. User can check the status from LCD screen of battery to determine in what state the battery is.

The possible error marks are as follows:

Error signal	Troubleshooting
Battery High-Voltage 	Reduce charging voltage or stop charging.
Battery Low-voltage 	Low power, please charge immediately.
Battery High-temperature 	Stop charging or discharging until battery temperature fall below the recover temperature.
Battery Low-temperature 	Stop charging or discharging until battery temperature rise above the recover temperature.
Battery charge/discharge Over-Current 	Reduce the charging current or discharging power, and battery will auto release in 1minutes.
Battery Short-Circuit 	Check the external power wire of the battery, eliminate short-circuit connection. Pay attention to the correct the start-up sequences.
SOC Light-bar flashing	This means LCD screen & SOC light-bar lose connection with BMS. Please restart the battery by pressing the power button.

7.2 Troubleshooting under other situations

If all above error marks are OFF on the display, and the green LED "RUN" is on, but user still can't use normally, please troubleshooting as next table:

Description	Troubleshooting
Battery module can't start the inverter	<ol style="list-style-type: none"> 1. Check power and communicate wire connection to inverter. 2. Contact with inverter manufacturer.
Inverter can't charge the battery	<ol style="list-style-type: none"> 1. Check power and communication wire connection to inverter. 2. Check inverter specification, make sure its charge voltage is suitable for this type of battery referring "2.2 Technical Parameter".
When battery modules are connected in parallel, one of them does not output.	<p>Check this module's voltage and current on LCD screen. If its voltage difference compared with others is more than 2V and there is a certain current, it means this module is equilibrating. This process make take several hours, please wait patiently.</p> <p>If not, please check next:</p> <ol style="list-style-type: none"> 1. Check the dial switch ; 2. Check the module communication cable.

Note: If the problem is still not solved after troubleshooting, please contact the manufacturer.

7.3 Other Chemical Reaction

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges, the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the discharge time is much shorter than the normal after full charged, even battery is charged correctly, and this may indicate it is time to change the battery.

LESSO

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