



E O N

L I T H I U M

USER MANUAL
MODEL: EL5W

5KWH SOLAR STORAGE SOLUTION
LiFePO4 Lithium Iron Phosphate Battery

FEATURES

- CAN BUS, fully integrates and communicates with leading inverter brands.
- Compatible with most Inverters and chargers.
- 1C high-performance lithium battery.
- Advanced BMS with current limiting function.
- Advanced BMS with built-in protection for over-charge, over-discharge, and over-temperature.
- Easy wall mount or rack mount installation.
- High cycle life, service life, and temperature performance.
- High energy density and conversion efficiency



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STATEMENT OF LAW

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No part of this document may be excerpted, reproduced, translated, annotated, or duplicated in any form or by any means without prior written permission.

This product complies with the design requirements of environmental protection and personal safety. The storage, use and disposal of the products shall be carried out in accordance with the product manual, relevant contract or relevant laws and regulations.

Please note that the product can be modified without prior notice.

SAFETY PRECAUTIONS



WARNING

Please do not put the battery into water or fire, in case of explosion or any other situation that might endanger your life.

Please connect wires properly during installation, do not reverse connect.

To avoid short circuit, please do not connect the positive and negative poles with conductor.

Please avoid any form of damage to the battery. Do not stab, hit, trample, or strike.

Please shut off the power completely when removing the device or reconnecting wires during the daily use or it could cause the danger of electric shock.

Please use dry powder extinguisher to put out the flame when encountering a fire hazard, liquid extinguisher could result in the risk of an explosion.

For your safety, please do not arbitrarily dismantle any component under any circumstances. Maintenance and repairs are to be done by authorised personnel only. Device breakdown due to improper operation will not be covered under warranty.



CAUTION

The product has gone through strict testing before being shipped. Please contact us immediately if anything abnormal is noted, such as the case bulging.

For your safety, device must be grounded properly before normal use.

To assure the proper use please make sure parameters are matched with, and are compatible with, the inverter.

Please do not mixed-use batteries from different manufacturers, different types and models, as well as old and new together.

Ambient and storage method could impact the life span and product reliability. Environmental condition recommendations must be followed to ensure the product is able to perform optimally.

For long-term storage, the battery should be recharged once every 6 months, and the amount of electric charge shall exceed 80% of the rated capacity.

Please charge the battery in 18 hours after it discharges fully and starts over-discharging protection.

Formula of theoretical standby time: $t(\text{hrs}) = E(\text{Wh})/P(\text{W})$ (t is standby time, E is battery energy capacity in Watt-hour and P is the total power of all loads in Watt.

Example $t = 5120(\text{Wh}) / 2500(\text{W}) = 2.048 \text{ hrs}$

PREFACE



MANUAL DECLARATION

The lithium iron phosphate battery energy storage system can provide energy storage solutions for photovoltaic power generation users through parallel combination. During the day, the excess power of photovoltaic power generation can be stored in the battery. At night or when needed, the stored electrical energy can be used to supply power to the electrical equipment, which can improve the efficiency of photovoltaic power generation, peak load shifting, and emergency power backup.

Eon Lithium EL5W Battery is an external battery module, which can store electricity for home or business use. When you apply the grid or photovoltaic system as your power supply, this product can store electricity to charge the battery. When grid or photovoltaic system is off, the battery supplies electricity to the load.

This user manual details the basic structure, parameters, basic procedures and methods of installation and operation and maintenance of the equipment.

1. INTRODUCTION

1.1 BRIEF INTRODUCTION

The EON Lithium battery system comes in standard packaged sizes and can be connected in parallel (up to 15) to form a larger capacity battery pack, to meet the user's long-term power supply needs. The product is especially suitable for applications with high operating temperatures, limited installation space, long power backup time, and long service life.

1.2 PRODUCT PROPERTIES

The Energy Storage System (ESS) is managed effectively by the Battery Management System (BMS) to achieve better performance, the system's features are as below:

Anode materials are lithium iron phosphate (LiFePO₄), safer with longer life span.

Integrated battery management system with better performance, possesses protection function like over-discharge, over-charge, over-current, and abnormal temperature.

Self-management on charging and discharging, Single core balancing function.

Flexible configurations allow parallel of multi-battery for longer standby time.

Self-ventilation with lower system noise.

Low battery self-discharge, enabling the recharging period to be up to 6 months during the storage.

Complying with European ROHS, Certified SGS, employ non-toxic, non-pollution environment-friendly battery.

No memory effect so that battery can be charged and discharged shallowly.

With wide range of temperature for a working environment, -20°C ~ +65°C, circulation span and discharging performance are well under high temperature.

High energy density, lighter weight.

1.3 PRODUCT IDENTITY DEFINITION

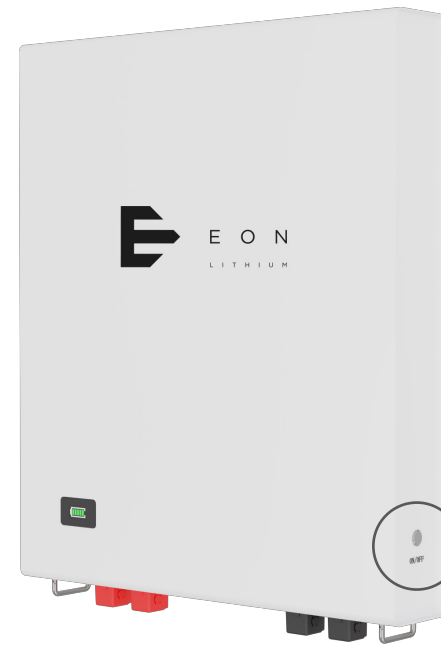
	Be careful with your actions and be aware of the dangers.
	Read the user manual before using.
	The scrapped battery cannot be put into the garbage can and must be professionally recycled.
	After the battery life is terminated, the battery can continue to be used after it recycled by the professional recycling organization and do not discard it at will.
	This battery product meets European directive requirements.
	Battery voltage is higher than safe voltage, direct contact with electric shock hazard.
 <p>Dangerous goods warning label on the top of the battery module.</p>	

2. PRODUCT SPECIFICATION

2.1 PERFORMANCE PARAMETER

Table 2-2 performance parameter

Item	Parameter value
Nominal Voltage(V)	51.2
Max. Work Voltage Range(V)	44.8-58.4
Nominal Capacity(Ah)	100
Nominal Energy(kWh)	5.12
C Rating	1.0
Charge Voltage(V)	55.2-56.8
Discharge Cut-off Voltage(V)	44.8
Equalized Charge Voltage(V)	56
Max. Continuous Charging Current(A)	100
Max. Continuous Discharging Current(A)	100



Power Switch
OFF/ON
Must be in the ON
position when in use.



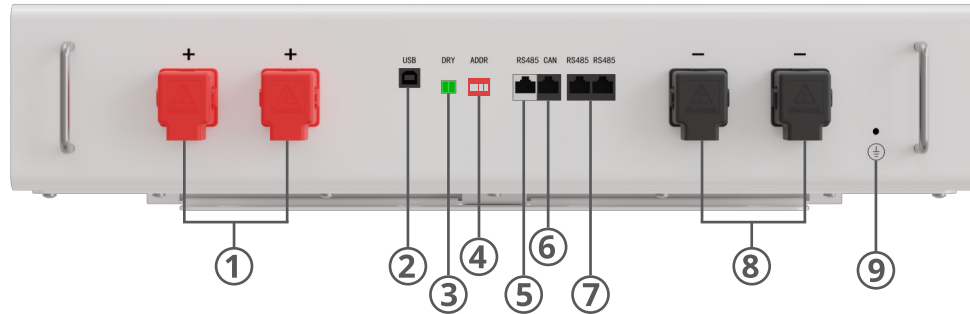
Weight: 53.8kg
Nominal Voltage: DC51.2V
Nominal Capacity: 100Ah



Mounting Bracket

2.2 INTERFACE DEFINITION

This section elaborates on interface functions of the front interface of the device.



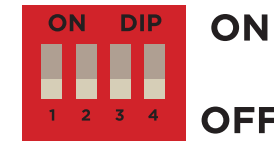
LCD Display Screen is Optional.

Item	Name	Definition
1	Positive Socket	Battery output positive or parallel positive line
2	USB	Communication cascade port - connects battery to host computer
3	Dry Contact	/
4	ADD	DIP switch
5	RS485	Communication cascade port - supports RS485 communication
6	CAN	Communication cascade port - supports CAN communication (factory default)
7	Parallel 1&2	Battery parallel connection ports
8	Negative Socket	Battery output negative or parallel negative line
9	Ground terminal	Grounding device

2.2.1 DIP switch definition and description

Table 2-4 Interface Definition

DIP switch position (host communication protocol and baud rate selection)			
#1	#2	#3	#4
Baud rate selection			
ON		OFF	
CAN: 250K,485: 9600		CAN: 500K,485: 9600	

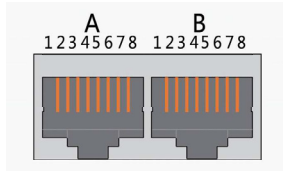


DIP switch description:

When the battery pack is connected in parallel, the host can communicate with the slave through the CAN interface. The host summarizes the information of the entire battery system and communicates with the inverter through CAN or 485. The connection mode is divided into the following two cases:

Address	Codes the switch position			
	#1	#2	#3	#4
1 (master)	OFF	OFF	OFF	OFF
2 (slave 1)	ON	OFF	OFF	OFF
3 (slave 2)	OFF	ON	OFF	OFF
4 (slave 3)	ON	ON	OFF	OFF
5 (slave 4)	OFF	OFF	ON	OFF
6 (slave 5)	ON	OFF	ON	OFF
7 (slave 6)	OFF	ON	ON	OFF
8 (slave 7)	ON	ON	ON	OFF
9 (slave 8)	OFF	OFF	OFF	ON
10 (slave 9)	ON	OFF	OFF	ON
11 (slave 10)	OFF	ON	OFF	ON
12 (slave 11)	ON	ON	OFF	ON
13 (slave 12)	OFF	OFF	ON	ON
14 (slave 13)	ON	OFF	ON	ON
15 (slave 14)	OFF	ON	ON	ON
16 (slave 15)	ON	ON	ON	ON

Table 2-4 Pin Definition
RS485-1 / CAN COMMUNICATION INTERFACE DEFINITION:



Interface	Defined declaration		Defined declaration			
X1 Communication port definition	A part CAN joggle	PIN 1	CANL	B part RS-485-1 Interface	PIN 1	RS485-B1
		PIN 2	CGND		PIN 2	RS485-A1
		PIN 3	NC(empty)		PIN 3	RS485-GND
		PIN 4	CANH		PIN 4	RS485-B1
		PIN 5	CANL		PIN 5	RS485-A1
		PIN 6	NC(empty)		PIN 6	RS485-GND
		PIN 7	CGND		PIN 7	NC(empty)
		PIN 8	CANH		PIN 8	NC(empty)

Table 7 The RS 485-1 / CAN port definition

State	Normal/Alarm/Protection	ALM	The power Level is indicated by LED BARS					Description
			20%	40%	60%	80%	100%	
Power Off		ALL OFF						Power Off
Standby	Normal	Off	Number of LED bars on according to the state of charge					Standby
	Alarm	Flash	Number of LED bars on according to the state of charge					Battery working in Normal
Charge	Overcharge Protection	On	On	On	On	On	On	Indicated battery is fully charged
	Temperature, Overcurrent Protection	On	Number of LED bars on according to the state of charge					Charge stopped
	Normal	Off	Number of LED bars on according to the state of charge					Battery working in Normal
Discharge	Alarm	Flash	Number of LED bars on according to the state of charge					Battery working in Normal
	Undervoltage Protection	On	Off	Off	Off	Off	Off	Indicated battery is fully discharged
	Temperature, Overcurrent Protection	On	Number of LED bars on according to the state of charge					Discharge stopped
Fail		Off	Off	Off	Off	Off	Off	Charge and discharge stopped

Table 2 Capacity indication instructions

Flash mode	Bright	off
Flash, 1	0.25S	3.75S
Flash, 2	0.5S	0.5S
Flash, 3	0.5S	1.5S

2.3 BATTERY MANAGEMENT SYSTEM(BMS)

2.3.1 Voltage Protection

Discharging Low Voltage Protection:

When any battery cell voltage is lower than the protection value during discharging, the over-discharging protection starts, and the battery buzzer makes an alarm sound. Then battery system stops supplying power to the outside. When the voltage of each cell recovers to rated return range, the protection is over.

Charging Over Voltage Protection:

When total voltage or any battery cell voltage reaches the protection value during charging, battery stops charging. When total voltage or a cell recover to rated return range, the protection is over.

2.3.2 Current Protection

Over Current Protection in Charging:

When the charging current is greater than the protection value, the battery buzzer alarms and the system stops charging. Protection is removed after rated time delaying.

Over Current Protection in Discharging:

When the discharge current is greater than the protection value, the battery buzzer alarms and the system stops discharging. Protection is released after rated time delaying.



NOTE: The buzzer sound alarm setting can be manually turned off on the background software, and the factory default is on.

2.3.3 Temperature Protection

Less/Over temperature protection in charging:

When the battery's temperature is beyond range of 0°C ~+45°C during charging,

Temperature protection starts, the device stops charging.

The protection is over when it recovers to the rated return range.

Less/Over temperature protection in discharging:

When the battery's temperature is beyond a range of -20°C~+55°C during discharging, temperature protection starts, the device stops supplying power to the outside.

2.3.4 Other Protection

Short Circuit Protection:

When the battery is activated from the shutdown state, if a short circuit occurs, the system starts short-circuit protection for 30 seconds.

Self-Shutdown:

When device connects no external loads and power supply and no external communication for over 72 hours, device will dormant standby automatically.



CAUTION: Battery's maximum discharging current should be more than load's maximum working current.

3. COMMUNICATION WITH THE INVERTER

3.1 METHOD 1: Communication with factory default inverters:

Step 1:

Select the cables used by the inverter by the label on the communication cables. Insert the RJ45 connector of the battery end(CAN/RS485) and the inverter end(CAN/RS485) into the interfaces on both sides.

Step 2:

Turn on the battery and inverter and wait until they are working properly. The battery is configured by factory default to communicate with the Voltronic (RS485) inverter and DEYE,Sunsynk,Luxpower, Megarevo Sofar, TBB(CAN)inverters, the battery will automatically select and communicate with one of these inverters.

Step 3:

After successful communication between battery and inverter, battery status will be displayed on inverter: voltage,current,SOC, temperature, etc.

3.2 METHOD 2: Communication with optional inverters (protocol select):

When communicating with other brands of inverters,such as: Growatt, Solax, Goodwe, Sorotech, LTW, MUST, SMA, etc.

Step 1:

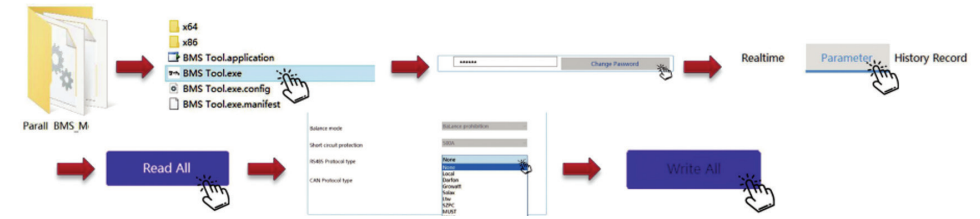
Turn on the battery,ensure BMS is normally powered on and not in sleep state, the RS232 crystal head of the communication cable is inserted into the battery communication port, the USB end is inserted into the computer;

Step 2:

Unzip the package of BMS monitoring software to the current computer(Windows Microsoft .NET Framework 2.0 or above). This software does not need to be installed independently, only the environment is satisfied, double-click the main program icon(BMS exe file) to run and use. Enter the password: **green1234** (space is green, the password is correct).

Step 3:

Click "Parameter "at the top of system page, click"Read All"button to read battery parameter.Select the inverter protocol at "Protocol type" eg:Darfon is Voltronic protocol. Click the "Write all"button to set the protocol,after the system displays the operation succeeds, protocol selection is complete(Please refer to the following pictures).



Step 4:

Select the cables used by the inverter by the label on the communication cables. Insert the RJ45 connector of the battery end(CAN/RS485) and the inverter end(CAN/RS485) into the interfaces on both sides. Restart the battery and inverter. The battery will automatically communicate with the inverter corresponding to the selected protocol.

3.3 INVERTER PROTOCOL CODE

RS485 Protocol		
Protocol shorthand	Protocol name	Compatible protocol
Local	BMS potocol	
Darfon	Voltronic	MOTOMA/Opti_Solar/Victron/Phocos
Growatt	Growatt	
SOLAX	Solax	
LTW	LT-POWER	
SZPC		
MUST	MUST	
SRNO	SRNE	PACE/EPEVER
Baykee	Baykee	
SMANK	SMK	
AFORE	AFORE	

CAN Protocol		
Protocol shorthand	Protocol name	Compatible protocol
Local	BMS protocol	
GOODWE	Goodwe	SOLARFAM
Growatt	Growatt (SPH)	
SOLAX	SOLAX	
MUST	MUST	
LTW	LT-POWER	
Victron	Victron	
PYLONTECH	PYLONTECH	DEYE/Sunsynk/TBB/LUXPower/SOFAR/Megarevo
SMA	SMA	

4. INSTALLATION GUIDE

4.1 READY FOR INSTALLATION

4.1.1 SAFETY REQUIREMENT

This system can only be installed by personnel who have been trained in the power supply system and have sufficient knowledge of the power system.

The safety regulations and local safety regulations listed below should always be followed during the installation.

All circuits connected to this power system with an external voltage of less than 48V must meet the SELV requirements defined in the IEC60950 standard.

If operating within the power system cabinet, make sure the power system is not charged. Battery devices should also be switched off.

Distribution cable wiring should be reasonable and has the protective measures to avoid touching these cables while operating power equipment.

when installing the battery system, must wear the protective items below:



The isolation gloves



Safety goggles



Safety shoes

4.1.2 Environmental requirements

Working temperature: -20°C ~ +55°C

Charging temperature range is 0°C~+45°C.

Discharging temperature range is -20°C ~+55°C Storage temperature: -10°C ~ +35°C.

The optimal ambient temperature is 15°C ~ 30°C.

Relative humidity: 5% ~ 85%RH

Elevation: no more than 4000m

Operating environment: Indoor installation, sites that avoid the sun and wind. No conductive dust and corrosive gas.

Installation location should be away from the sea to avoid brine and high humidity.

The ground is flat and level.

There is no flammable explosive near the installation location.

Keep away from dusty and messy areas.

And the following conditions are met:

Installation location should be away from the sea to avoid brine and high humidity environment.

- The ground is flat and level.
- There is no flammable explosive near to the installation places.
- The optimal ambient temperature is 15°C ~ 30°C
- Keep away from dust and messy zones

4.1.3 Tools

Tools and meters that may be used are shown in table 3-1.

Table 3-1 Tool instrument

Name	
Screwdriver	Insulating tape
Wrench	Thermometer
Multi-meter	Measuring tape
Camp meter	Wire stripper
Pliers	Drill

4.1.4 Technical preparation

Electrical interface check

Devices that can be connected directly to the battery can be user equipment, power supplies, or other power supplies.

- Confirm whether the user's PV power generation equipment, power supply or other power supply equipment has a DC output interface, and measure whether the DC power output voltage meets the voltage range requirements in Table 2-2.
- Confirm that the maximum discharge current capability of the DC power interface of the user's photovoltaic power generation equipment, power supply or other power supply equipment should be greater than the maximum charging current of the products used in Table 2-2.
- If the maximum discharge capacity of the DC power interface of the user's photovoltaic power generation equipment is less than the maximum charging current of the products used in Table 2-2, the DC power interface of the user's photovoltaic power generation equipment shall have a current limiting function to ensure the normal operation of the user's equipment.
- Verify that the maximum operating current of the battery-powered user equipment (inverter DC input) should be less than the maximum discharge current of the products used in Table 2-2.

The security check

Firefighting equipment (dry powder fire extinguishers) should be provided near the equipment.

An automatic fire fighting system shall be provided for the case where necessary.

No flammable, explosive, and other dangerous articles are placed beside the battery.

4.1.5 Unpacking inspection

Loading and unloading should be carried out according to the rules and regulations to prevent being exposed to sun and rain.

In the process of unpacking, handle with care and protect the surface coating of the object.

Open the package, the installation personnel should read the technical documents, verify the list, according to the configuration table and packing list, and ensure objects are complete and intact, if the internal packing is damaged, should be examined and recorded in detail.

4.1.6 Engineering coordination

Attention should be paid to the following items before construction:

The power line specification shall meet the requirements of maximum discharge current for each product. See Table 2-2 and the current rating of the cable.

Mounting space and bearing capacity. Make sure that the battery has enough room to install, and that the battery rack and bracket have enough load capacity.

Make sure the power line and ground wire are reasonable lengths, not easy to short-circuit, and that there is no water or corrosion present.

Battery disconnect / Fuse protection. Install the appropriate fuse protection between the battery and inverter system.

4.2 EQUIPMENT INSTALLATION

4.2.1 Installation steps

Table 3-2 Installation steps

Step 1	Installation preparation	Confirm that the ON/OFF switch on the front panel of unit is in the "OFF" state to ensure no live operation.
Step 2	Mechanical installation	1. Battery placement position determination
		2. Cable harness pre-installed
		3. Battery module installation
Step3	Electrical installation	1. Ground cable installation
		2. Battery module parallel cable installation
		3. Battery module total positive cable installation
		4. Battery module total negative cable installation
		5. Internal CAN communication interface connection
Step4	Battery system self-test	1. Press the ON/OFF switch to the "ON" state
		2. BMS system power-on activation
		3. Check the system output voltage
		4. Shut down the system
Step5	Connecting inverter	1. Connect total positive & total negative cable of the battery system to the inverter
		2. Connect the external CAN/RS485 communication cable to the inverter (as per guidelines under Performance Parameters)



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