Spec.No. ： 20210708005
File. No.：EnrSaver-AXXX
Ver： A/00
Date：2021-07-08

Foshan EnrSaver New Energy Technology Co., Ltd

Specification For Approval

Customer Name Code		
Model	ESLB-150/48	
Description	15S3P-48V150Ah	
Effective Date	2021-07-08	
Made By	**Checked By**	**Approved By**
Jack Li		

Customer Confirmation	**Company Name**
	Signature
	Company Stamp

Factory address：No 407, Building A8, Hantian Industrial City, Shenhai Road, Nanhai District, Foshan, Guangdong, China
Web: https://enrsaver.com/
Facebook: https://www.facebook.com/EnrSaver

History of specification

Date	Versi	Contents	Remarks	Edit
2021-07-08	A0	1st Edition	Specifications	Jack Li

Catalogue

1、Scope of application documents

The specification of this product is only applicable to the protection parameters of a rechargeable lithium-ion battery Product and cell designed by Foshan EnrSaver New Energy Technology Co., Ltd.

2、The Specification Amendment

If the raw materials, production processing, production system or battery usage environments & other conditions need to be changed, the amendment side needs provide the written advice to the other side, only the both sides come to agreement, the amendment will be effective.

3、Product or Cell testing conditions

It is recommended to use newly produced battery packs and new cells for related tests.Unless specified, testing and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~75%.

4、Standard

4.1 Reference Standard

GB 31241-2014
UL1642
GB/T 31486-2015
GB/T 31485-2015
GB/T 31484-2015

4.2 Measuring Instrument and Apparatus

.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.02mm.

.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

.4 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method(1kHz LCR meter).

4.3 Testing Conditions (Unless Specially Requirements)

Atmosphere Pressure : 86~106kPa
Temperature: 20℃±5℃
Relative Humidity: ≤75%

5.Main specifications (IFP23140160-50Ah)

5.1 Cell Battery specifications

No	Item	General Parameter		Remark
1	Rated Capacity	Typical	50Ah	Standard discharge after Standard charge
		Minimum	50Ah	
2	Nominal Voltage	3.2V		Mean Operation Voltage
3	Internal Impedance	≤0.65mΩ		Under 20±5℃ Environment Temperature , the Usage Frequency of Fully Charge(1KHz) , Use AC Internal Impedance test machine to test
4	Standard charge	Constant Current 0.5C_5A Constant Voltage 3.6V 0.02C_5A cut-off		Charge time : Approx2.5h
5	Rapid Charge	Constant Current 1C_5A Constant Voltage 3.6V 0.02C_5A cut-off		Charge time : Approx1.5h
6	Standard Charge Cut-off Voltage	3.6V		Voltage of the battery when the Charge is stopped
7	Standard Discharge Cut-off Voltage	2.5V		Voltage of the battery when the discharge is stopped
8	Standard discharge	Constant current 1C_5A end voltage 2.5 V		50A
9	Maximum discharge current	Constant current: 1C_5A end voltage: 2.5 V		50A@≧0℃
10	Dimension	Thickness:24±0.5mm		Initial Dimension
		Width: 140.2±0.8mm		
		Height: 163±0.8mm		
11	Weight	1150g±0.05kg		APPROX
12	Operating Temperature Range	Temperature:-20~60℃ Humidity: ≤65%RH		Recommended charge/discharge current≤ 1I1 (50A),when cell temperature is lower than0℃, Recommended cool the cell, when cell temperature is higher than 60℃
13	Storage Temperature Range	-20℃ ~25℃		Recommend (25±3℃) ; ≤90%RH storage moisture range.

5.2 Battery Pack specifications for single module

No	Item	General Parameter		Remark
1	Combination method	15S3P		
2	Rated Capacity	Typical	150Ah	Standard discharge after Standard charge (package)
		Minimum	147Ah	
3	Factory Voltage	48V-50.5V		Mean Operation Voltage
4	Voltage at end of Discharge	<=40.5V		Discharge Cut-off Voltage
5	Charging Voltage	54.6V		
6	Internal Impedance	≤100mΩ		Under 20±5℃ Environment Temperature , the Usage Frequency of Fully Charge(1KHz) , Use AC Internal Impedance test machine to test
7	Max Charging Current(Icm)	50A		Ampere-meter ,Maximum allowable charging current of the battery pack
8	Limited Charging Voltage(Ucl)	54.6V		Volta-meter (Serial*3.6V) ,Battery pack safe charging voltage
9	Max Discharging current	100A		Maximum discharge current allowed by the battery pack
10	Discharge Cut-off voltage(Udo)	40.5V		Voltage of the battery when the discharge is stopped
11	Operation Temperature Range	Charge:0~55℃		
		Discharge: -20~60℃		
12	Storage Temperature Range	-20℃~25℃		Recommend (25±3℃) ; ≤90%RH storage moisture range.
13	Single module Size/weight	480*442* 220mm /75Kg		1PCS of module weight: 75kg
	Main control box size/weight	/		/

5.3 System composition parameters

No	Item	General Parameter		Remark
1	Combination method	PACK*2-15		Support 2 to 15 sets of battery pack to work in parallel or series
2	Rated Capacity	Typical	standard	Standard discharge after Standard charge (package)
3		Minimum	standard	
4	Factory Voltage	48V-50V		Mean Operation Voltage
5	Voltage at end of Discharge	<=40.5V		Discharge Cut-off Voltage
6	Charging Voltage	54.6V		3.6V/cell
7	Internal Impedance	≤100mΩ		Internal resistance measured at AC 1KHz after 50% charge The measure must uses the new batteries that within one week after shipment and cycles less than 5 times
8	Standard charge	standard		50A*number of parallel strings
9	Standard discharge	standard		100A* number of parallel strings
10	Maximum Continuous Charge Current	standard		50A* number of parallel strings
11	Maximum Continuous Discharge Current	standard		100A* number of parallel strings
12	Operation Temperature Range	Charge:0~55℃		
13		Discharge: -20~60℃		
14	Storage Temperature Range	-20℃~25℃		Recommend (25±3℃); ≤90%RH storage moisture range.
15	System size	standard		
16	System weight	standard		
17				

5.3.1 Battery Management System

A: BMS function introduction

1）:The BMS is designed for 15 series lithium battery.

2）: The BMS have all functions which are :

.1 overcharge detection function

.2 over discharge detection function

.3 over current detection function

.4 short detection function

.5 Temperature detection function

.6 balance function

.7 communicate function

.8 Alarm function

.9 Total capacity function

.10 Storage history function

B: BMS Protect parameter (software set)

Items	Details	Standard
Cell overcharge protection	Overcharge detection voltage	3.65±0.025V
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	3.4±0.05V
Cell over-discharge protection	Over-discharge detection voltage	2.7±0.5V
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	3.0±0.1V or charge
Over-current protection	discharge Over-current protection current1	120±10A
	discharge Over-current detection delay time 1	5S
	discharge Over-current protection current 2	200±10A
	discharge Over-current detection delay time 2	≤600m±50ms
	Charge Over-current protection current	120±10A
Short protection	Short protection current	300±50A
	Protection condition	Load short
	Detection delay time	≤30ms
	Protection release condition	Charging release
Temperature(T) protection	Charge high T protection	55±3℃
	Charge high T recover	50±5℃
	Discharge high T protection	65±5℃
	Discharge high T recover	55±5℃
	Charge low T protection	-5±5℃
	Charge low T recover	0±5℃
	Discharge low T protection	-20±5℃
	Discharge low T recover	-15±5℃
Balance	Balance threshold voltage	3.4V

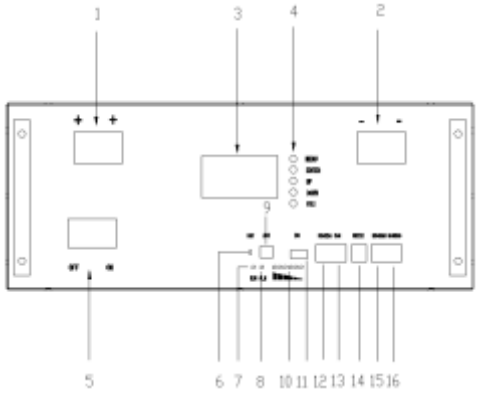
Communication	It has CAN and RS485 ,RS232 standard communication interface, it real-time monitoring the capacity of battery bank, the voltage, current,environment temperature, and charging/discharging current, RS485,RS232,Baud rate:9600Kb/S, CAN common Baud rate:500K/S, Master address:CODE 1.slave address:2-15 ,any number Host software:
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm Function.

6. Appearance and structural dimensions

There shall be no such defect as scratch, bur and other mechanical scratch, and the connector should be no rust dirt. The structure and dimensions see attached drawing of the product.

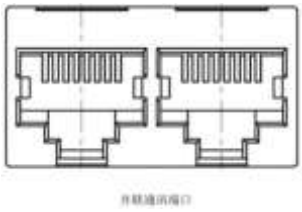
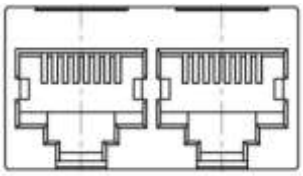
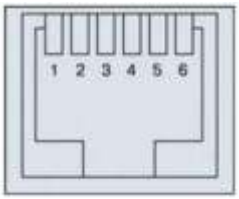
6.1 Main control box

Battery module



No.	Description	Silk-screen	Remark
1	UES0600	P+ P+	Output terminal
2	UES0600	P- P-	Output terminal
3	LCD		
4	LCD Key		
5	Switch		
6	port Reset button	RST	For reset the batter
7	LED	RUN	Operation indicator
8	LED	ALM	Alarm indicator
9	Dial switch	ADS	Set the address
10	LED	CAPACITY	Capacity indicator
11	Do		
12	RS485A Port	RS485	RS485 and inverter connection port
13	CANbus Port	CANbus	CANbus and inverter connection port
14	RS232 Port	RS232	RS232 communication port
15	RS485B port	RS485	RS485 parallel communication interface
16	RS485B port	RS485	RS485 parallel communication interface

If there is any change in the pin position of the communication line, the customer shall be notified in writing or provided with supporting communication wire.

Parallel communication		RS485-8P8C socket		RS485-8P8C socket	
		RJ45	Definition	RJ45	Definition
		1,8	RS485-B	9,16	RS485-B
		2,7	RS485-A	10,15	RS485-A
		3,6	GND	11,14	GND
		4,5	NC	12,13	NC
External communication		RS485 socket		CAN RJ45 socket	
		RJ45	Definition	RJ45	Definition
		1,8	RS485-B1	9,10,11,14,16	
		2,7	RS485-A1	12	CAN-L
		3,6	GND	13	CAN-H
		4,5	NC	15	GND
Communication with host computer		RS232 立式 RJ11 插座			
		RJ11	Definition	RJ11	Definition
		1	NC	4	RX
		2	NC	5	GND
		3	TX	6	NC

6.2 SOC Indicator & Status Indicator Guides

Chart 1: Battery Status

SOC						ALARM	RUN	ON/OFF

Chart 2: Battery Capacity

status	charge						discharge					
SOC(%)	L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
0-16.6%	OFF	OFF	OFF	OFF	OFF	Flash2	OFF	OFF	OFF	OFF	OFF	light
16.6-33.2%	OFF	OFF	OFF	OFF	Flash2	light	OFF	OFF	OFF	OFF	light	light
33.2-49.8%	OFF	OFF	OFF	Flash2	light	light	OFF	OFF	OFF	light	light	light
49.8-66.4%	OFF	OFF	Flash2	light	light	light	OFF	OFF	light	light	light	light
66.4-83%	OFF	Flash2	light	light	light	light	OFF	light	light	light	light	light
83-100%	Flash2	light	light	light	light	light	light	light	light	light	light	light
RUN LED	light						Flash(flash 3)					

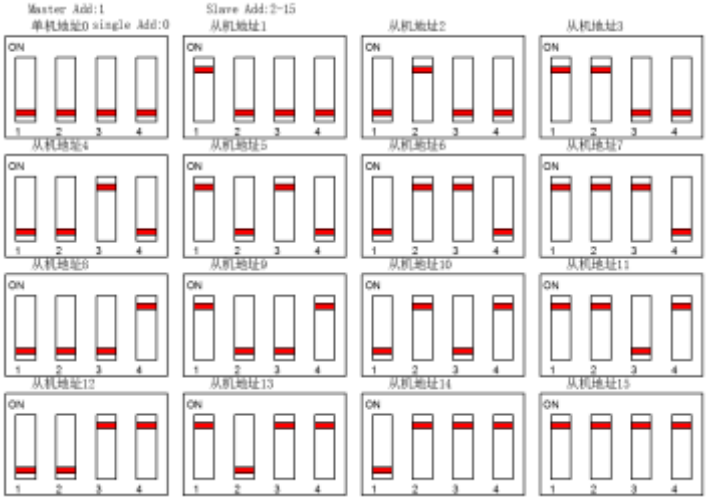
Chart 3: LED flash and buzzer mode(Off by default)

MODE	ON	OFF
Led Flash1	0.25S	3.75S
Led Flash2	0.5S	0.5S
Led Flash3	0.5S	1.5S
Buzzer1	0.25S	0.25S
Buzzer2	0.25S	2S
Buzzer3	0.25S	3S

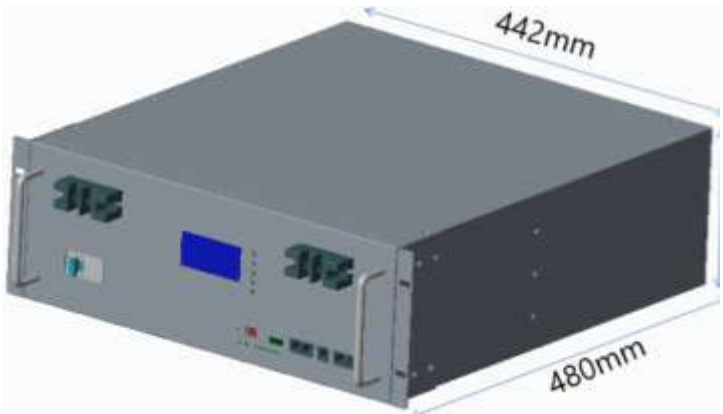
Chart4: LED flash mode

System status	Run status	ON/OFF	RUN	ALM	SOC						REMARK
Power off	SLEEP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All led off
Stand by	NORMAL	Light	Flash1	OFF	Lighting for SOC						stand by mode
	ALARM	Light	Flash1	Flash3							Low volt alarm
CHARGE	NORMAL	Light	Light	OFF	Lighting for SOC(The LED flash2,while it is the high						
	ALARM	Light	light	Flash3	SOC)Alarm LED do not flash,when the BMS into OVP mode.						
	OVP	Light	Light	OFF	Light	Light	Light	Light	Light	Light	No charge in,into standby
	OTP,OCP,Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Stop charge
Discharge	NORMAL	Light	Flash3	OFF	Lighting for SOC						
	ALARM	Light	Flash3	Flash3							
	UVP	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
	OTP,OCP,SCP, invert connect,Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
FAIL		OFF	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	NO Charge or discharge

Address Switch function (Only in Parallel)



Complete product image：



7.Storage and Others

7.1 Long Time Storage

If stored for a long time(don’ t used,exceed three months), the cell should be stored in drying and cooling place. The PACK is to be stored in a condition that the temperature of 23±2℃ and the humidity 0f 45%- 75%. Long-term use of unused batteries to recharge every 3 months。Ensure that the battery voltage is within the above range。

Appendix

Li-ion battery operation instructions and precautions

Preface

This document of 'Handling Precautions and Guideline Li-ion Rechargeable Batteries' shall be applied to the battery cells manufactured by EnrSaver.

Note (1) :

The customer is requested to contact Foshan EnrSaver New Energy Technology Co., Ltd.. in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

Note (2) :

Foshan EnrSaver New Energy Technology Co., Ltd. will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

Note (3): 声明三

Foshan EnrSaver New Energy Technology Co., Ltd. will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

Warning!

— Do not immerse the battery in water or allow it to get wet.
— Do not use or store the battery near sources of heat such as a fire or heater.
— Do not use any chargers other than those recommended by TGPRO.
— Do not reverse the positive(+) and negative(-) terminals.
— Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
— Do not put the battery into a fire or apply direct heat to it.
— Do not short-circuit the battery by connecting wires or other metal objects to the positive(+) and negative(-) terminals.
— Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
— Do not strike, throw or subject the battery to sever physical shock.
— Do not directly solder the battery terminals.
— Do not attempt to disassemble or modify the battery in any way.
— Do not place the battery in a microwave oven or pressurized container.
— Do not use the battery in combination with primary batteries(such as dry-cell batteries) or batteries of different capacity, type or brand.
— Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from

the device or charger immediately and discontinue use.

Caution!

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.

If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.