

TYCORUN

Specification For Approval

51V 200Ah



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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 our company.

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 $20\pm 5^{\circ}\text{C}$ and relative humidity of 45~75%.

4 Standard

4.1 Reference Standard

Refer to GB 31241-2014 Safety requirements for lithium-ion batteries and battery packs for portable electronic products

Refer to UL1642 safety standard - (lithium battery)

Refer to GB/T 31486-2015 Electrical performance requirements and test methods of traction batteries for electric vehicles

Refer to GB/T 31485-2015 Safety requirements and test methods for power batteries for electric vehicles

Refer to GB/T 31484-2015 Cycle life requirements and test methods of power batteries for electric vehicles

4.2 Measuring Instrument and Apparatus

4.2.1 Dimension Measuring Instrument

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

4.2.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than $10\text{k}\Omega/\text{V}$

4.2.3 Ammeter

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

4.2.4 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: $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$

Relative Humidity: $\leq 75\%$

5 Main specifications (24140160-50Ah)

5.1 Cell Battery specifications

ITEM	GENERAL PARAMETE	REMARK
Rated Capacity	Typical 50Ah	Standard dischargeafter Standard charge 0.2C ₅ A
	Minimum 50Ah	
Nominal Voltage	3.2V	Mean Operation Voltage
Internal Impedance	≤0.68mΩ	Under 20±5°C Environment Temperature , the Usage Frequency of Fully Charge(1KHz) , Use AC Internal Impedance test machine to test
Standard charge	Constant Current 0.5C ₅ A	Charge time Approx 2.5h
	Constant Voltage 3.6V	
	0.02C ₅ A cut-off	
Rapid Charge	Constant Current 1C ₅ A	Charge time Approx 1.5h
	Constant Voltage 3.6V	
	0.02C ₅ A cut-off	
Standard Charge Cut-off Voltage	3.6V	Voltage of the battery when the Charge is stopped
Standard Discharge Cut-off Voltage	2.5V	Voltage of the battery when the discharge is stopped
Standard discharge	Constant current 0.5C ₅ A	25A
	end voltage 2.5 V	
Maximum discharge current	Constant current 1C ₅ A	50A@≥0°C
	end voltage 2.5 V	
Dimension	Thickness 24±0.5mm	Initial Dimension
	Width 140.2±0.5mm	
	Height 163±0.5mm	
Weight	1150g±0.05kg	APPROX
Operating Temperature Range	Temperature -20~55°C	Recommended charge/discharge current≤111 (50A), when cell temperature is lower than 0°C, Recommended cool the cell, when cell temperature is higher than 55°C
	Humidity ≤85%RH	
	temperature -20~55°C	
	Relative humidity ≤85%	
Storage Temperature Range	-20°C~25°C	Recommend (25±3 C) ≤65% RH storage moisture range.

5.2 Battery Pack specifications for single module

ITEM	GENERAL PARAMETE	REMARK
Combination method	16S4P	/
Rated Capacity	Typical 200Ah Minimum 198Ah	Standard discharge after Standard charge
Factory Voltage	51.2V-53V	Mean Operation Voltage
Voltage at end of Discharge	<=43.2V	Discharge Cut-off Voltage
Charging Voltage	57V	/
Internal Impedance	≤100mΩ	Under 20±5 C Environment Temperature , the Usage Frequency of Fully Charge(1KHz) , Use AC Internal Impedance test machine to test
Max Charging Current (Icm)	100A	Ampere-meter ,Maximum allowable charging current of the battery pack
Limited Charging Voltage (Ucl)	57.6V	Volta-meter (Serial*3.6V) ,Battery pack safe charging voltage
Max Discharging current	100A	Maximum discharge current allowed by the battery pack
Discharge Cut-off voltage (Udo)	43.2V	Voltage of the battery when the discharge is stopped
Operation Temperature Range	Charge:0~55 C Discharge: -20~55 C	/
Storage Temperature Range	-20 C~25 C	Recommend (25±3°C) ≤85%RH storage moisture range.
Single module Size/weight	680*485*180mm /90Kg	1PCS, single module is about 90kg
Main control box size/weight	/	/

5.3 System composition parameters

ITEM	GENERAL PARAMETE	REMARK
Combination method	PACK*2-15	Can support 2-15 battery packs in parallel
Rated Capacity	Typical standard	Standard discharge after Standard charge (package)
	Minimum standard	
Factory Voltage	51.2V-53V	Mean Operation Voltage
Voltage at end of Discharge	<=43.2V	Discharge Cut-off Voltage
Charging Voltage	57V	Calculated by 3.65V/cell
Internal Impedance	≤100mΩ	nternal 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
Standard charge	standard	50A*Combined number
Standard dischargeSSSS	standard	90A*Combined number
Maximum Continuous Charge Current	standard	50A*Combined number
Maximum Continuous Discharge Current	standard	90A*Combined number
Operation Temperature Range	Charge: 0~55°C	/
	Discharge: -20~55°C	/
Storage Temperature Range	-20°C~25°C	Recommend (25±3°C) ≤85%RH storage moisture range.
System size	standard	/
System weight	standard	/

5.3.1 System composition parameters

A BMS function introduction

- | | | | |
|-------|--|--------|--------------------------------|
| A.1 | The BMS is designed for 16 series lithium battery. | A.2.5 | Temperature detection function |
| A.2 | The BMS have all functions which are | A.2.6 | balance function |
| A.2.1 | overcharge detection function | A.2.7 | communicate function |
| A.2.2 | over discharge detection function | A.2.8 | Alarm function |
| A.2.3 | over current detection function | A.2.9 | Total capacity function |
| A.2.4 | short detection function | A.2.10 | Storage history function |

B BMS Protect parameter

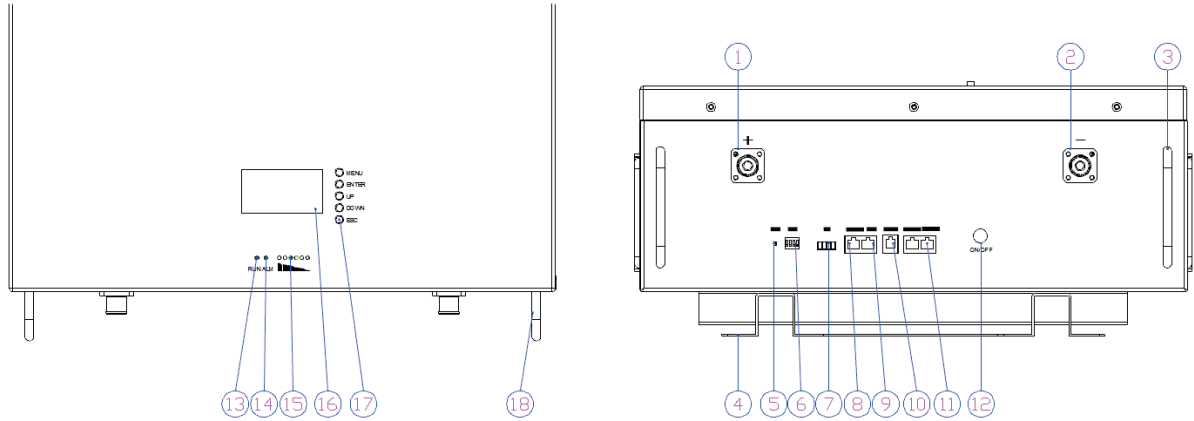
ITEM	DETAILS	STANDARD
Cell overcharge protection	Overcharge detection voltage	3.65±0.025V
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	3.4±0.05V
Cell over-discharge protection	Over-discharge detection voltage	2.7±0.5V
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	3.0±0.1V or charge release
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 C
	Charge high T recover	50±5 C
	Discharge high T protection	60±5 C
	Discharge high T recover	55±5 C
	Charge low T protection	-5±5 C
	Charge low T recover	0±5 C
	Discharge low T protection	-20±5 C
	Discharge low T recover	-15±5 C
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	/
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 Appearance and structural dimensions

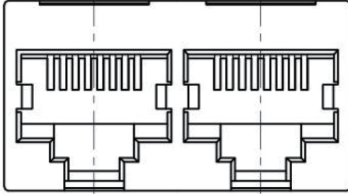
BATTERY MODULE



ITEM	SILK-SCREEN	REMARK
UES0600	P+	Output terminal
UES0600	P-	Output terminal
Handle	/	/
Fixed bracket	/	/
port Reset button	RST	For reset the batter
Dial switch	ADS	Set the address
DRY port	DO	/
RS485 Port	RS485A	RS485 and inverter connection port
CAN bus Port	CAN bus	CAN bus and inverter connection port
RS232 Port	RS232	RS232 and inverter connection port
RS485 Port	RS485B	Pack parallel connection common port
Switch	ON/OFF	/
RUN LED indicate	RUN	Operation indicator
ALARM LED indicate	ALM	Alarm indicator
SOC indicate	CAPACITY	Capacity indicator
LCD	/	/
LCD KEY	/	/

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.

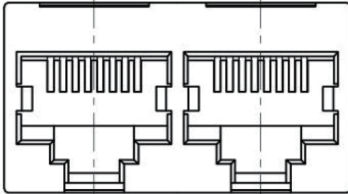
PARALLEL COMMUNICATION



RS485-8P8C Vertical RJ45 socket	
RJ45 pin	Definition description
1,8	RS485-B
2,7	RS485-A
3,6	GND
4,5	NC

RS485-8P8C Vertical RJ45 socket	
RJ45 pin	Definition description
9,16	RS485-B
10,15	RS485-A
11,14	GND
12,13	NC

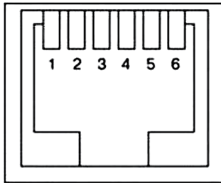
EXTERNAL COMMUNICATION



RS485 vertical RJ45 socket	
RJ45 pin	Definition description
1,8	RS485-B1
2,7	RS485-A1
3,6	GND
4,5	NC

CAN vertical RJ45 socket	
RJ45 pin	Definition description
9,10,11,14,16	/
12	CAN-L
13	CAN-H
15	GND

COMMUNICATION WITH HOST COMPUTER



RS232 vertical RJ11 socket			
RJ11 pin	Definition description	RJ11 pin	Definition description
1	NC	4	RX
2	NC	5	GND
3	TX	6	NC

6.2 SOC Indicator & Status Indicator Guides

Chart 1: Battery Status



Chart 2: Battery Capacity

STATUS	CHARGE						DISCHARGE					
	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
STATUS	LIGHT						FLASH(FLASH 3)					

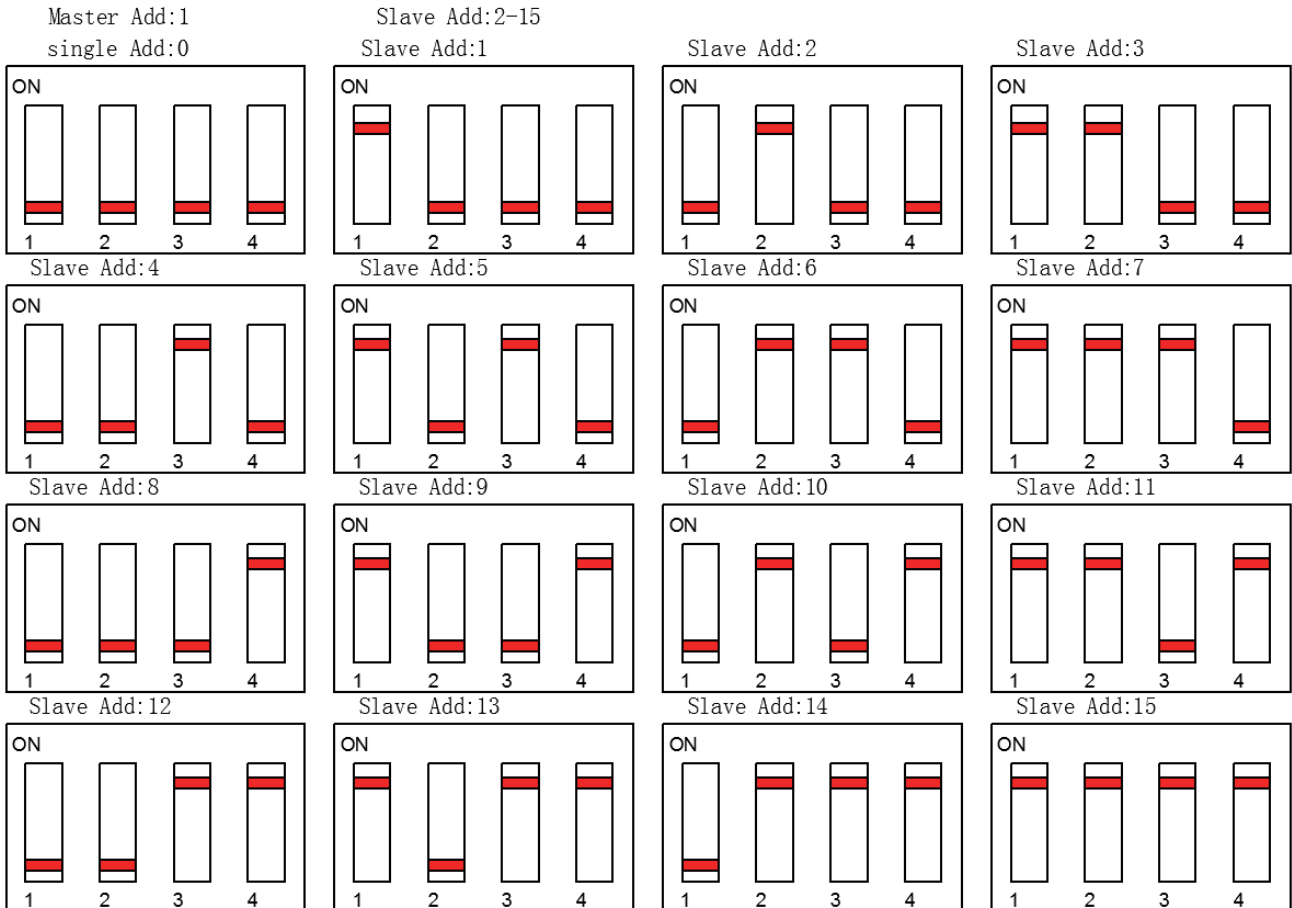
Chart 3: LED flash and buzzer mode(Off by default)

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

Chart4: LED flash mode

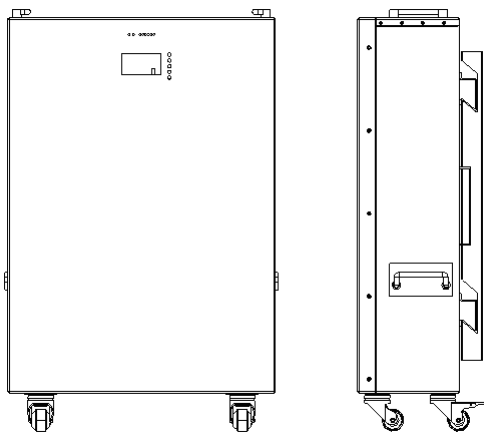
System status	Run status	ON/OFF	RUN	ALM	SOC						REMARK
		●	●	●	●	●	●	●	●	●	
Power off	SLEEP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All led off
Stand by	NORMAL	Light	Flash1	OFF	Lighting for SOC						stand by mode
	ALARM	Light	Flash1	Flash3							Low volt alarm
CHARGE	NORMAL	Light	Light	OFF	Lighting for SOC(The LED flash2,while it is the high SOC)Alarm LED do not flash,when the BMS into OVP mode.						
	ALARM	Light	Light	Flash3							
	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)

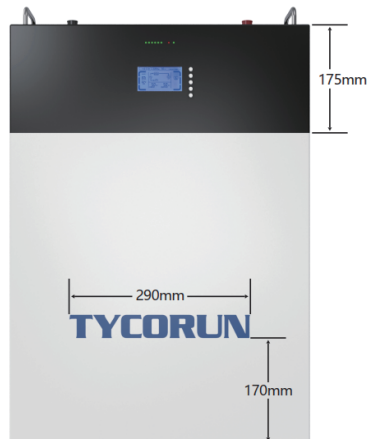


Complete product image

Wheeled



Wall hanging



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 $23\pm 2^{\circ}\text{C}$ and the humidity of 45%- 75%. Long-term use of unused batteries to recharge every 3 months. Ensure that the battery voltage is within the above range.

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 our company.

Note(1)

The customer is requested to contact TGPRO 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)

Our company will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

Note(3)

Our company will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

- 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.