AESON POWER



HRESYS

OPERATION MANUAL
48V LI-ION BATTERY

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1 Safety & Warning

The personnel involved in the TL-LFP series LiFePO4 battery systems installation, operation and maintenance should follow the instructions of this manual:

- The equipment shall be installed by professionally trained staff.
- Battery maintenance should be carried out by skilled professionals who are aware of the danger whilst working on batteries and trained in safety measures to avoid potential harm.
- *Attention:* Beware of the risk of electric shock by heavy current in case of battery short circuit, pay attention to the following points during operation.:
- Remove watches, rings or other metal objects.
- Use tools with insulated handles.
- Do not place tools or metal objects on the battery.
- Do not connect the battery system to the AC mains power outlet.
- Do not install or store the battery near the high temperature source or open fire.
- Do not place vessels with liquid or other objects on the battery system.
- Do not break up or cut the battery open, do not hit, throw or step on the battery.
- Use special communication between battery module and power plant to charge battery to monitor / control charging parameters.
- Make sure that the charge and discharge parameters are adhered to.
- The battery output terminals are still live (under voltage) even when the AC mains power is cut off. Avoid electric shock or short circuit when working on the battery.
- Please check if the container is damaged. If damaged, please immediately notify the supplier.

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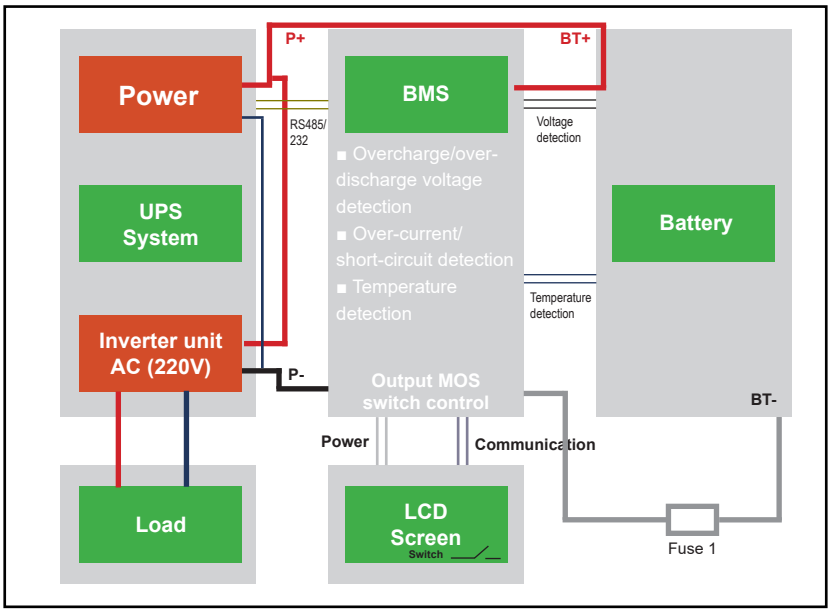
2 Product Introduction

2.1 – Overview

TL-LFP Series lithium ion battery is a series of battery modules built using advanced LiFePO4 technology and intelligent integrated BMS, which have the advantages of long cycle life, light weight, small size, safety and environmental protection. TL-LFP series lithium ion batteries can be used in a variety of indoor and outdoor applications.

2.2 – Working Principle

The TL Series standby battery module consists of several lithium iron-phosphate battery cells connected in series with the dedicated high performance and high reliability battery management system (BMS). The +/- output terminal of the battery is connected to the +/- terminal of the telco rectifier, inverter or other charging device. When the mains supply is normal, the power consuming equipment is supplied by mains via rectified power, and the battery pack is on float or is charged by rectified AC power. When the mains power is interrupted, the backup power supply will be provided to the equipment without delay until the mains power supply is restored or BMS automatically disconnects the battery from the equipment to protect the battery from overdischarge.

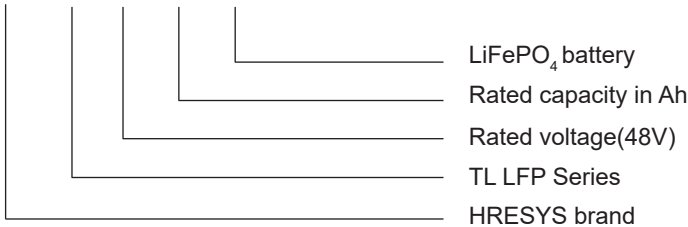


2.3 – Applications

- Energy storage system
- Terminal of FTTX
- Access network system
- Indoor distribution system
- Integrated outdoor power cabinet
- Internet data centre (IDC)
- Telecommunications

2.4 – Battery Model Name

VHR TL48XXXLFP



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2.5 – Battery Management System

The TL–LFP Series battery modules are equipped with technologically advanced Integrated Smart BMS.
Features of the BMS are described below:

2.5.1 - Overcharge Protection

When the voltage of any cell comprising a module, is greater than the Overvoltage setting, and the duration of the Overvoltage status exceeds the set time delay of the overcharge protection, the OV Protection plate closes the MOSFET on the charging circuit and the charging is interrupted.
When, after the OV status occurs, - the highest voltage cell indicates the voltage reduction to the overcharge recovery mode, or below - the OV Protection plate judges that the overcharge condition is over. Following that, the charging MOSFET is open, the charger starts to supply the battery module, and the green RUN light on the protection plate lights up signalling that the charging is ON.
During the Overcharge condition the battery module can still discharge on the load.

2.5.2 - Over-discharge Protection

In the case of any cell within the module, developing voltage that is lower than the over-discharge setting, and such condition lingers longer than the over-discharge time-delay setting – the protection plate judges that the module is in state of Over-discharge. The green RUN light and red ALM light are both extinguished, the MOSFET on the discharge circuit closes and the battery module discharge on the load is interrupted.
When over-discharge (undervoltage) condition occurs, the protection plate is de-activated.
When the charger supply is restored – the protection plate gets re-activated.

2.5.3 - Overcurrent/short circuit protection and recovery

When the discharge current exceeds the short-circuit protection current settings, and the duration of such current exceeds the time-delay of the short-circuit protection setting - - the red ALM light will come on, and the protection plate enters the overcurrent / short-circuit protection status, under which charge / discharge modes are prohibited.
After the protection plate entered the overcurrent / short-circuit protection condition, it will lock the OV/SC protection status until time the charger restores the power supply.

2.5.4 – Heat Management

The thermal management BMS function can be described as follows: if the battery temperature exceeds the set normal working parameters (higher or lower), the alarm will be raised - red ALM light will come on and the battery will be disconnected.
When the temperature of the battery, after having been disconnected due to over-temperature condition, drops to the set value of normal working parameters, the BMS reconnects the battery to the load / charge, and the red ALM light is off.
The BMS temperature sampling accuracy is less than ± 2°C within the operating temperature range. Four battery temperature detection points and one ambient temperature detection point are supported by default. Maximum available number of temperature detection points – 16.

2.5.5 – Battery internal heater

VHR TL48150LFP is equipped with an internal heater. The heater is rated 100W. If the battery is not under charge and the BMS sampling facility detects the ambient temperature that is below 0°C - the BMS will turn the heater ON.
The heater is optional for other models.

2.5.6 – Battery capacity calculation function

To calculate the State Of Charge (SOC) of the battery – the Amper-Hour Integral and Open Circuit Voltage (OCV) methods are implemented. The combination of adjustment of the algorithm, the higher precision data and the independent clock system - ensures accuracy (≤ ± 2%) of the SOC estimation.

2.5.7 – Balancing Function

If the module battery pack is fully charged, and one of its cells has the voltage set to start the equalization and at the same time, the cell's maximum voltage difference is greater than the equalization voltage difference – this cell activates the equalisation function.
The battery module is capable of conducting equalization on 7 channels simultaneously. The maximum equalization current around 75mA. The equalization balancing process will be finished when the voltage difference of the cells is less than pre-set value.

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2.5.8 – Sleep and Wake Function

No	Sleep condition	Wake-up condition	Remark
1	In the idle state (no charge, discharge, no communication), the lowest voltage of any cell is lower than the set sleep voltage (can be set), after 30 minutes, enter normal sleep.	Charge and discharge, communication, reset button, soft switch.	The battery with a soft switch can be wakened up.
2	When the minimum cell voltage is lower than the cell over-discharge protection value (can be set) or the total voltage is lower than the overall over-discharge protection value (can be set), and after 1 minute, the under-voltage sleep is entered.	Charge, reset button, soft switch.	The battery with a soft switch can be wakened up.
3	Battery will enter to normal sleep after keeping idle state (no charge and discharge, no communication) for 24 hours.	Charge and discharge, communication, reset button, soft switch.	The battery with a soft switch can be wakened up.
4	Forcing sleep through the host computer or soft switch.	Reset button, soft switch.	N.A.

3 Operation & Maintenance

3.1 – Operating Temperature and Humidity

Table 3.1 – Operating temperature and humidity

Temperature Range (°C)	Discharge	-20 °C ~ 60 °C
	Charge	0 °C ~ 60 °C
	Storage	0 °C ~ 40 °C
Recommended Temperature (°C)	Discharge	15 °C ~ 35 °C
	Charge	15 °C ~ 35 °C
	Storage	15 °C ~ 30 °C
Humidity		5% ~ 95%

3.2 – Charging Parameter Settings

Lead-acid batteries can be replaced by lithium battery of TL-LFP series if voltage and capacity are matched.

Table 3.2 – Charging Parameter Settings for TL48V-LFP Series Batteries

No	Parameters	Unit	Defaults
1	Charging voltage range	V	54
2	Equal voltage charge	V	NA
3	Standard charge current	A	0.2C
4	Charge current limitation	A	0.5C ~ 1.0C
5	LVLD (Low voltage load disconnection)	V	>44
6	LVBD (Low voltage battery disconnection)	V	>41
7	Temperature compensation for float charge	-mV/ °C	NA
8	Temperature compensation for equalisation charge	-mV/ °C	NA

NOTE: 1.Equalisation charge is requested to switch off for TL-LFP series battery.
2.Charger parameters shall be set according to specific site requirement based on battery units used.
3.System instantaneous discharge and charge current shall be less than 250A for each module.

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3.3 – Charge/Discharge Modes and Conditions

Table 3.3 Charge Modes and Conditions

Cell Temperature	Recommended Charge	Fast Continuous Charge
<0°C	No Charge Allowed	No Charge Allowed
0°C~ 10°C	Charge Current: 0.1C	Charge Current: 0.2C
10°C~20°C	Charge Current: 0.2C	Charge Current: 0.5C
20°C~30°C	Charge Current: 0.3C	Charge Current: 1.0C
30°C~40°C	Charge Current: 0.3C	Charge Current: 1.0C
40°C~60°C	Charge Current: 0.3C	Charge Current:0.5C
> 60°C	No Charge Allowed	

Table 3.4 Discharge Modes and Conditions

Cell Temperature	Recommended Charge	Fast Continuous Charge
<20°C	No Discharge Allowed	No Discharge Allowed
-20°C~ 0°C	Discharge Current: 0.2C	Discharge Current: 0.2C
0°C~20°C	Discharge Current: 0.5C	Discharge Current: 1.0C
20°C~50°C	Discharge Current: 0.5C	Discharge Current: 1.0C
50°C~60°C	Discharge Current: 0.2	Discharge Current: 0.5C
> 60°C	No Charge Allowed	

3.4 – Layout of the Front panel



Fig. 3.1 – Layout of Front Panel for TL-LFP Series Batteries

Table 3.5 – Instruction for Layout of Front Panel

No	Marks	Functions	Detailed Information
1	Power Switch	ON/OFF switch	When turned-off, battery goes into Sleep Mode, and cuts-off the output, the Output Alarm will be off.
2	SOC	Indicators for capacity	There are 4 green LED lights in front panel indicating SOC.SOC is short for state of charge. Each SOC LED light represents 25% of rated capacity. Detailed information is shown in Annexed Table 1.1.
3	ALM	Indicator for alarms	There is one red LED light on the front panel indicating the alarms. Detailed information is shown in Annexed Table 1.2.
4	RUN	Indicator for running status	There is one green LED light on the front panel indicating running status. Detailed information is shown in Annexed Table 1.2.
5	ADD	Address of communication	ADD is applicable to modules connected in parallel. ADD consists of four binary bits. The maximum quantity of battery modules connected in parallel is 64pcs. (2^6). Detailed information is shown in Annex 2.
6	RS232	Up-link communication port	The RS-232 series port is used to upload data. The data transmitted include BMS parameters, battery running status, alarms, etc. Generally, speed rate of RS-232 is 1200bps. The RS232 up-link communication can be available for the battery module with a binary communication address of 0000 (Master PACK). Protocol for RS232 communication is shown in Annexed Table 3.1
7	RS485	Cascading communication port	It is adopting RS485 series port communication pattern to upload data. Communication of modules connected in parallel (Slave PACKs) is available through RS 485. Data of slave PACKs will be transmitted to Master PACK. Protocol for RS232 communication is shown in Annexed Table 3.2.
8	RESET	Reset button	Press RESET button when abnormity occurs to assure stability of battery performance.
9	Battery Output	Terminals for battery output	Using terminals with two or four cores. Polarities are +, -, +, - from left to right. The two '+' and '-' are equal relatively.
10	GND	Protective ground	M4 screw

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3.5 – Shipping

The battery should be packed in cartons under the condition of half capacity 20%-50% for shipment. The violent vibration, impaction or squeezing should be avoided in the transport process; neither is exposed in the sunlight nor rain. The batteries shall be shipped by normal transportation such as by road, by train, by ocean or by air.

3.6 – Installation

3.6.1 - Unboxing and Inspection

- Please read this manual before installation.
- Please inspect the package before unboxing, if any destroy with appearance, contact with the supplier as soon as possible.
- This device shall be installed and operated by professionals.

3.6.2 - Preparation for Installation

- Batteries shall not be placed in direct sunshine or close to heat source.
- Batteries shall be installed in place with good ventilation to assure enough heat dissipation.
- Batteries shall be placed in are with clean ambient and low humidity.
- Heavy weight shall not be placed on any cable.
- Required tools and materials are available. Use insulated tools. The following figure is for reference only.

Item	Tool Item	Remark for use
1	Insulation gloves	Insulation protection for body
2	Insulation taps	Insulation protection for tools
3	Screw drivers	Fix the cables of the batteries & power plant
4	Multi meter	Measure the module voltage in commission
5	Current meter	Measure the module current in commission
6	USB to RS485 cable	For communication between the batteries and laptop
7	Laptop	Operate the software

Phillips screwdriver*	 Flathead screwdriver*	 Adjustable torque wrench*	 Heat shrink tubing
 Diagonal plier*	 Power cable cutting pliers*	 Power cable crimping tool*	 Network cable pliers*
 Wire clippers*	 Clamp meter	 Hot air gun	 Heat shrink tubing
 Protective gloves	 Protective gloves		

*insulated tools recommended

3.6.3 - Preparation for Installation

1) Installation and fixation

Battery modules of TL-LFP series are applicable for installation in 19-inch racks and cabinets.

- 19inch cabinet installation

  Insert battery module into 19 inch cabinet, and fix two handles of battery module with cabinet rack using 4pcs M6 screws.

2) Ground connection

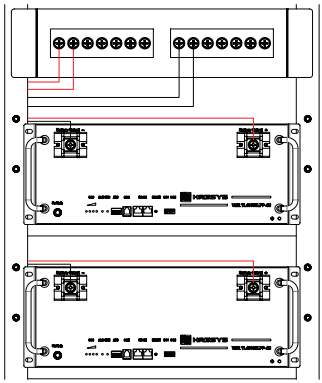
- GND screw in front panel of battery is connected with ground through a flexible cable no less than 10 sq.mm.

3) Battery output connection

- Before connecting the battery power cables, open the battery isolator / circuit breaker of the battery charging device and make sure the battery is disconnected.
- Connect '+' of Battery Output with positive terminal of and '-' with negative terminal of the charging device.
- If multi battery modules will be connected in parallel, connect '+' of Battery Output of each battery module with positive copper bus bar of power plant, and '-' with negative copper bus bar separately.

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- Length of cable between battery module and power plant shall be less than 2.0m. To make sure similar voltage drop of cable for each battery, length of all positive and negative cables should be the same.
- Color for cable between '+' and positive female bar is suggested as red, and cable between '-' and negative breaker or fuse as black.



4) Power on for battery module

- When installation is accomplished, firstly turn on the battery switch and the LED indicator will light up, then close the circuit breaker of the rectifier to power on. Once power on for power plant, battery module will go into normal running status, and discharge/charge can be available.
- Parameter settings for lithium battery modules in power plant are shown in Table 3.2.

5) RS232/RS485 connection

- If there is only one battery module in operation, communication between battery module and upper computer can available through both RS232 and RS485.
- If there are more than one battery modules in operation, parallel communication can be available using RS485.
- Communication protocols for RS232 and RS485 are shown in Appendix 3.

6) Discharge with dummy load

- Dummy load cannot be larger maximum discharge current of each battery model in Table 3.2, and LVBD is larger than 41.0V.
  Voltage drop on cable between battery module and power plant shall be less than 0.5V.

3.7 – Storage

3.7.1 Storage Requirements

1. Place modules according to the signs on the packing case during storage. Do not put modules upside down or sidelong.
2. Stack modules packing cases by complying with the stacking requirements on the external package.
3. The storage environment requirements are as follows:
   – Ambient temperature: 0–40°C; recommended storage temperature: 20–30°C
   − Relative humidity: ≤ 95%
   − In a dry clean place with proper ventilation
   − In a place that is away from corrosive and organic substances (including gas)
   − In a place free from direct sunlight
   − At least 2 meters away from heat sources (such as a heater)
4. The warehouse manager should collect TL-LFP modules storage information every month and periodically report the modules inventory information to the planning department. The modules that have been stored longer than required by instruction should be recharged in a timely manner.
5. The modules should be delivered based on the “first in, first out” rule.
6. Install modules in a dry, clean, and ventilated environment that is free from sources of strong infrared radiation, organic solvents, and corrosive gases. Do not expose the modules to sunlight or water and keep them far away from sources of ignition.

3.7.2 Storage Periods & Refresher Charge

The battery storage shall be in the clean and dry ventilation room at the temperature of 0~40°C. It is recommended that the modules should not be stored for a long period.

Actual Storage Temperature	Recharge Interval	Acceptance Criteria
0°C≤T≤30°C	12 months	Not reaching the time for recharge: Use the module as soon as possible. Reaching the time for recharge: Recharge the module.
30°C≤T≤40°C	8 months	

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Note:

1. Storage battery over 45°C or under 0°C will reduce battery life.
2. The storage duration (t) starts from the latest charge time on the module. The latest charge time is updated after every charge.
3. If a module has been refresher charged, mark the latest charge date and the next recharge date on the module packing case. The next recharge date is in 8 months (if stored above 30°C) or in 12 months (if stored below 30°C) after the latest refresher charge date. The total storage duration should not exceed the warranty period.
4. Directly handle bulging modules, no matter how long they are stored.
5. Battery performance degrades after long term storage. Please keep the storage time as short as possible.

3.7.3 Recharge process

Recharge the module using a power system:Connect the positive and negative terminals of the module to the output positive and negative terminals on the DC regulated power supply, respectively.

Recharge parameter setting

Recharge parameter	Recharge Interval
Charge voltage	54.0V
Charge current	Using the default charge current limit; typically ≤ 0.2C
Termination condition	The charge duration is greater than 10 minutes and the charge current is less than 0.03C, or the BMS is protected.

Note: Do not perform operations with power on when connecting the recharge cables.

4 Troubleshooting

Table 4.1 – Troubleshooting and Solutions

Issue	Troubleshooting	Solutions
Battery cannot discharge	Protection against under-voltage	Charge battery.
	Protection against over-temperature or under-temperature (Ambient temperature is lower than -20°C or higher than 60°C)	Regulate ambient temperature in the range of -20°C to 60°C for discharge.
	Battery output is short circuit	Relieve short circuit and charge battery.
	Protection against over-current	Remove some unimportant load and charge battery.
	System failure	Shutdown system and call maintenance service.
Battery cannot charge	Battery is fully charged. Normal charge management	Do not need to solve, will recovery automatically.
	The positive and negative power cable inversely connected to the terminal of the battery	Check the cable connection.
	Protection against over-temperature or under-temperature (Ambient temperature is lower than 0°C or higher than 60°C)	Regulate ambient temperature in the range of 0°C to 60°C for charge.
	System failure	Shutdown system and call maintenance service.
Failure to start	The total battery voltage is too low, so the BMS cannot start	Contact the supplier to recovery the battery voltage.
	The switch damaged, unable to start	Contact the supplier to replace the switch.
	LED damaged, battery on	Observe whether the battery can operate normal or not, contact the supplier to replace the LED.
	The battery is disconnected internally	Shutdown system Call for maintenance service.
	BMS power supply circuit damaged	Shutdown system Call for maintenance service.

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Issue	Troubleshooting	Solutions
All LED indicators on	System failure	Shut the system down. Call for maintenance service.
Communication failure	Fault of communication cable	Inspect communication cable,check the cable definition.
	System failure	Shut the system down. Call for maintenance service.
	Plug the wrong communication port	Check the communication port.
Alarm light flash during charging or discharging	Cell temperature abnormal	Check the ambient temperature, check the connections. If unable to fix – call maintenance service.
	Low SOC alarm	Do not need to troubleshoot.
	Cell or system low voltage alarm	Do not need to troubleshoot.
	Environment temperature abnormal	Do not need to troubleshoot.
Battery display capacity different from actual capacity	SOC display deviation	Calibrate the SOC by fully charge and discharge battery.

Different flash status of LED indicators represents corresponding running status or alarms. Detailed information is shown Appendix 1.

Flat battery:

Field experience has shown that the most common problem is the battery being discharged to the point where the internal BMS in it shuts down the battery. Follow the procedure shown below to restart the battery.
If this is unsuccessful you need to apply a 48Vdc voltage to the terminals of battery to “jump-start” it. Aeson Power can supply a suitable charger, which needs to be plugged into 230Vac.

Flat battery restart:

If your battery has shutdown it may be discharged below the internal protection cut-off voltage.

1) Turn off all loads.
2) Connect charging source (48V DC nominal) e.g. solar, generator, AC charges.
3) Switch off OVERCURRENT PROTECTION switch for 5 seconds then switch back on.
4) Power should begin flowing into the battery. The light and display should come on. Monitor the battery voltage in the display. It should rise about 50.0V, before any loads are reconnected.
5) If unsuccessful, contact **Aeson Power** on 3 9545 5993.

Adding additional batteries:

It is possible to add additional batteries to an existing HRESYS installation at a later date. If you are to add extra capacity the battery must be of the same type, part number, and specification.
Before adding the new battery, the original battery bank and the new battery must be bought up to a similar same voltage (within 0.5 volts as shown on the battery displays). This is achieved by discharging or recharging the existing battery until it is the same voltage as the new battery. The new battery can then be connected to the existing batteries.

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1 Appendix

Instructions for LED Flicker

Table 1.1 – SOC LED Indicators Description

●	●	●	●	SOC
☼	☼	☼	☼	75%~100%
☼	☼	☼	○	50%~75%
☼	☼	○	○	25%~50%
☼	○	○	○	0%~25%

Note: ☼ means light on, ○ means light off

Table 1.2 LED instructions

Pack Status	**Protect/Alarm/ Normal**	**RUN**	**ALM**	**SOC LED**				**Description**
		●	●	●	●	●	●	
Power down/Sleep	----------	OFF	OFF	OFF	OFF	OFF	OFF	----------
Standby	Normal	Flash 1	OFF	According to the SOC				Standby
	Alarm	Flash 1	OFF					Temp alarm ALM flash 3
Charge	Normal	Flash 3	OFF	According to the SOC				----------
	Temparature alarm	Flash 3	Flash 2					Temp alarm ALM flash 3
	Overcharge volatge protection	Flash 1	OFF					
	Over-temperature, under-temperature, over-current protection	Flash 1	Flash 2					
Discharge	Normal	Normally on	OFF	According to the SOC				----------
	Temp Alarm	Normally on	Flash 2					----------
	Under voltage protection	Flash 1	OFF					
	Over-temperature, under-temperature, over-current protection	Flash 1	Flash 2					
Charge / Discharge / Standby	The fault	OFF	Normal-ly on	OFF				The fault means BMS sampling components damaged, MOS damaged, etc

LED Flash State

	Light	Extinguish
Flash1	0.25S	3.75S
Flash2	0.5S	0.5S
Flash3	0.5S	1.5S

2 Appendix

Instructions for ADD Dialing

ADD is applicable to modules connected in parallel. ADD consists of four binary bits, and maximum quantity of batteries connected in parallel is 64pcs (2^6). BMS only identify ADD dialing one time after reset, so reset BMS as change ADD dialing.

Annexed Table 2.1 –Instruction for Addresses of Communication

Instructions for ADD Dialing						Module No.	Binary Code	Remarks
1	2	3	4	5	6			
OFF	OFF	OFF	OFF	OFF	OFF	PACK 1	000000	Master PACK, supports RS232
ON	OFF	OFF	OFF	OFF	OFF	PACK 2	000001	Slave PACK
OFF	ON	OFF	OFF	OFF	OFF	PACK 3	000010	Slave PACK
ON	ON	OFF	OFF	OFF	OFF	PACK 4	000011	Slave PACK
OFF	OFF	ON	OFF	OFF	OFF	PACK 5	000100	Slave PACK
ON	OFF	ON	OFF	OFF	OFF	PACK 6	000101	Slave PACK
OFF	ON	ON	OFF	OFF	OFF	PACK 7	000110	Slave PACK
ON	ON	ON	OFF	OFF	OFF	PACK 8	000111	Slave PACK
OFF	OFF	OFF	ON	OFF	OFF	PACK 9	001000	Slave PACK
ON	OFF	OFF	ON	OFF	OFF	PACK 10	001001	Slave PACK
OFF	ON	OFF	ON	OFF	OFF	PACK 11	001010	Slave PACK
ON	ON	OFF	ON	OFF	OFF	PACK 12	001011	Slave PACK
OFF	OFF	ON	ON	OFF	OFF	PACK 13	001100	Slave PACK
ON	OFF	ON	ON	OFF	OFF	PACK 14	001101	Slave PACK
OFF	ON	ON	ON	OFF	OFF	PACK 15	001110	Slave PACK
ON	ON	ON	ON	OFF	OFF	PACK 16	001111	Slave PACK

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Instructions for ADD Dialing						Module No.	Binary Code	Remarks
1	2	3	4	5	6			
OFF	OFF	OFF	OFF	ON	OFF	PACK 17	010000	Slave PACK
ON	OFF	OFF	OFF	ON	OFF	PACK 18	010001	Slave PACK
OFF	ON	OFF	OFF	ON	OFF	PACK 19	010010	Slave PACK
ON	ON	OFF	OFF	ON	OFF	PACK 20	010011	Slave PACK
OFF	ON	OFF	OFF	ON	OFF	PACK 21	010100	Slave PACK
ON	OFF	ON	OFF	ON	OFF	PACK 22	010101	Slave PACK
OFF	ON	ON	OFF	ON	OFF	PACK 23	010110	Slave PACK
ON	ON	ON	OFF	ON	OFF	PACK 24	010111	Slave PACK
OFF	OFF	OFF	ON	ON	OFF	PACK 25	011000	Slave PACK
ON	OFF	OFF	ON	ON	OFF	PACK 26	011001	Slave PACK
OFF	ON	OFF	ON	ON	OFF	PACK 27	011010	Slave PACK
ON	ON	OFF	ON	ON	OFF	PACK 28	011011	Slave PACK
OFF	OFF	ON	ON	ON	OFF	PACK 29	011100	Slave PACK
ON	OFF	ON	ON	ON	OFF	PACK 30	011101	Slave PACK
OFF	ON	ON	ON	ON	OFF	PACK 31	011110	Slave PACK
ON	ON	ON	ON	ON	OFF	PACK 32	011111	Slave PACK

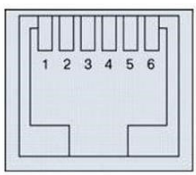
3 Appendix

Communication Protocol for RS232 and RS485

There is one RS232 port in front panel for up-link communication between batter module and upper computer, and one or two RS485 port in front panel for cascade communication for battery modules connected in parallel.

1)RS 232

The system uses/through 6Pin straight PCB welding socket(RJ11) to provide RS 232 protocol, the pin assignment of RJ11 is defined as follows:



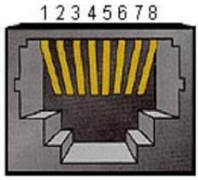
RS232

Table 3.1 RJ11 Pin Assignment

RJ11 Pin	Definition Description
1	GND
2	SWCLK
3	Pack transmitter; Computer receiver
4	BMS receiver; Computer transmitter
5	RS232_GND
6	SWDIO

2) RS 485

The system uses/through 8Pin straight PCB welding socket(RJ45) to provide RS 485 protocol, the pin assignment of RJ45 is defined as follows:



RS485

Table 3.2 RJ45 Interface definition

RJ45 Pin	Definition Description	
	TL4850/48100	TL48150
1	RS485_B	RS485_B
2	RS485_A	RS485_A
3	RS485_B	GND
4	CAN_L	CAN_L
5	CAN_H	CAN_H
6	485_A	485_A
7	GND	GND
8	485_B	485_B

3 FAQ

Q1: What is the type of 48V Lithium Ion battery?

A1: It is a Lithium iron phosphate battery.

Q2: What kind of cell is used in 48V battery range?

A2: 48V HRESYS Battery uses high quality prismatic cell.

Q3: How can I get the battery information when it flashes red light?

A3: By downloading battery software from websites, it allows users to read battery status via an RS485 link.

Q4: Where can I get RS485 link that works with the battery?

A4: RS485 link is available on website or talk to local distributor to purchase. It might differ from the market, hence, we recommend you get it with the battery.

Q5: I don't have an RS485 link, how do I solve the battery issue?

A5: You can contact Aeson Power to assist you further.



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