



ENERGY HUB

USER MANUAL



Thank you for choosing our products. This manual is suitable for Energy Hub lithium battery system. Please read this manual carefully. It includes installation and operation instructions, as well as its electrical performance and protection functions. Please install and operate in strict accordance with the requirements of the manual, and keep this manual properly.

This product should be installed, operated and maintained by professionals, and comply with the following requirements:

- Please ensure that the input and output of the connected product conform to the nominal rated working voltage value of the product.
- Please make sure that the cable between the product and the inverter is as short as possible.
- Please ensure that the polarity connections of the DC load and inverter are correct and reliable.
- Non-electrical professionals should not open the case.
- The product is not designed to be used in any life-sustaining equipment.



Warning: Pay attention to fire prevention, only suitable for installation on non-flammable surfaces.

Before checking, maintaining or replacing this product, please disconnect all batteries first, and do not operate with power.

Disclaimer: Due to the continuous update and improvement of products and technologies, the content in this document may not completely match the actual product, please understand. For product updates, please contact your sales or TBB Power.

MADE IN CHINA

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1. Safety Precautions

During product installation, operation, and maintenance, electrical safety regulations and related operating procedures must be observed, otherwise it may cause personal injury or product damage. The safety precautions mentioned in the manual are only a supplement to the safety regulations.

The manufacturer does not assume any responsibility caused by violation of general safety operation requirements or violation of safety standards for design, production and use of equipment.

Please ensure the following before use:

- Lithium batteries should be kept away from water, dust and pollution sources. Please install the lithium battery in a well-ventilated environment.
- Ensure that the positive (+) and negative (-) polarities of the lithium battery and the charging and discharging equipment are correctly connected.
- Ensure that all cables have good electrical characteristics and suitable wire diameter.
- Avoid direct sunlight.
- Do not connect the DC output with lithium batteries in parallel.
- Do not short-circuit the lithium battery output interface.

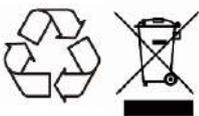
Especially keep these rules:

- Do not expose the Energy Hub to water or fire for risk of electrocution or explosion.
- Do not push any objects into the hub or crush the unit in any way.
- Do not open the Hub without prior permission.
- During use, when the system needs to be moved or rewired, the power must be completely cut off and the system must be completely shut down, otherwise there will be a risk of electric shock.
- In order to avoid fire and electric shock, it is forbidden to use damaged or too small cables.

General actions to be taken by the user if these dangers occur:

- When the electrolyte of the lithium battery leaks, it is necessary to prevent the electrolyte from contacting the skin or eyes; if it has been in contact, please wash it with water in time and seek medical attention as soon as possible.
- When encountering a fire, please use a dry powder fire extinguisher to extinguish the fire. The use of a liquid fire extinguisher may cause secondary hazards.

Disposal or recycle



Disposal and recycling of lithium batteries should comply with local, state, and federal laws and regulations. Mixed treatment with other (industrial) waste is prohibited.

2. Product Introduction

Energy Hub is a lithium battery energy storage system with built-in in-vehicle charging, and can be connected to an inverter, DC load, MEH display unit, WIFI/GPRS module, etc. The main features are as follows:

➤ **Lightweight and Compact**

Unlike traditional systems consisted of lead acid batteries and individual products, Energy Hub features integrated design with high performance lithium battery which keeps the overall weight below 20kg and meantime with a much smaller footprint. Designed with concept of plug and play, the installation time of Energy Hub can be dramatically reduced.

➤ **Professional Lithium Battery**

Energy Hub adopts lithium battery technology featuring 5 times more life expectancy compared with lead acid battery. To assure the best performance, sophisticated BMS has been designed integrating many unique features.

- High discharge current
- Built in precise shunt for battery SoC calculation
- Built in heating element for lithium battery, will automatically heat the lithium battery cell at low temperature to assure the safe charging during winter, but only upon external charging resources detected
- Built in energy management to protect the battery from deep discharge

➤ **Booster Charger**

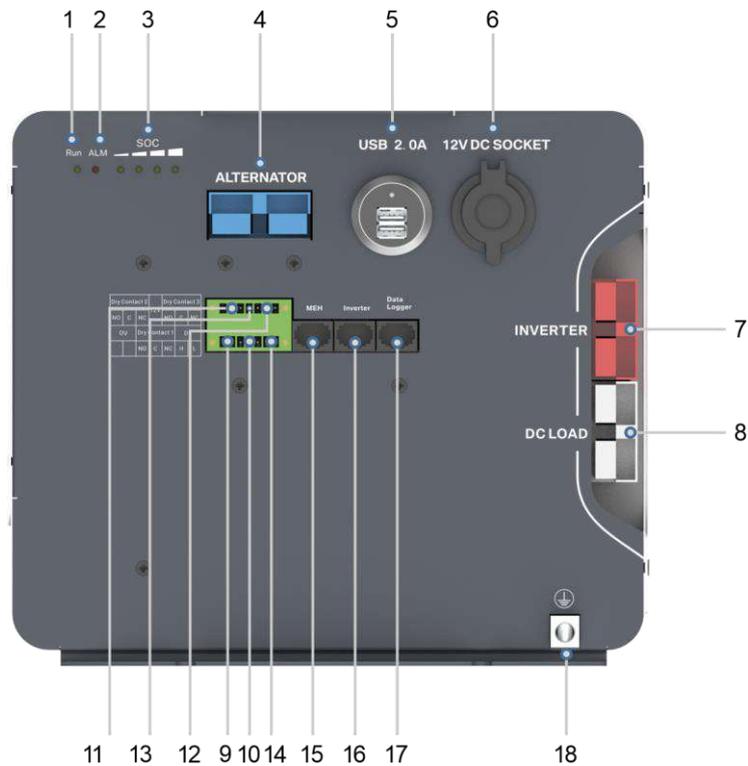
With powerful Euro 6 compatible booster charger built in, battery can fully charge the battery within 2 hours while driving to assure the energy.

➤ **Mobile and Cloud monitoring**

User can see multiple data via MEH panel. The built in Bluetooth of MEH panel supports app from mobile phone as well. With additional 4G data stick, fleet management can be achieved remotely via cloud.



3. External Interface Description



NO.	Silk screen		Definition
1	Run		System running indicator
2	ALM		Fault indicator
3			SOC indicator
4	ALTERNATOR		Alternator input interface
5	USB 2.0A		2.0A USB port
6	12V DC SOCKET		12V DC socket
7	INVERTER		Inverter DC interface
8	DC LOAD		DC load interface
9	0V		Negative pole of system
10	Dry Contact 1	NO	Relay output normally open contact
		C	Neutral point of relay output
		NC	Relay output normally closed contact
11	Dry Contact 2	NO	Relay output normally open contact
		C	Neutral point of relay output

		NC	Relay output normally closed contact
12	Dry Contact 3	NO	Relay output normally open contact
		C	Neutral point of relay output
		NC	Relay output normally closed contact
13	12V		Positive pole of system
14	D+	H	D+ signal interface, active high
		L	D+ signal interface, active low
15	MEH		MEH interface
16	Inverter		Inverter communication interface
17	Data Logger		WIFI/GPRS data collector interface
18			Grounded

Definition of Indicator Light

Battery Status	SOC	LED1	LED2	LED3	LED4	ALM	RUN	
Shutdown		Off	Off	Off	Off	Off	Off	
Start-up resting	$75\% \leq \text{SOC} \leq 100\%$	On	On	On	On	Flashes on fault, does not light up when normal, see section 8 for details	Blink 1	
	$50\% \leq \text{SOC} < 75\%$	On	On	On	Off		Blink 1	
	$25\% \leq \text{SOC} < 50\%$	On	On	Off	Off		Blink 1	
	$0\% < \text{SOC} < 25\%$	On	Off	Off	Off		Blink 1	
	SOC=0	Off	Off	Off	Off		Blink 1	
Battery charging	SOC=100%	On	On	On	On		Flashes on fault, does not light up when normal, see section 8 for details	On
	$75\% \leq \text{SOC} < 100\%$	On	On	On	Blink 2			On
	$50\% \leq \text{SOC} < 75\%$	On	On	Blink 2	Off			On
	$25\% \leq \text{SOC} < 50\%$	On	Blink 2	Off	Off			On
	$0\% \leq \text{SOC} < 25\%$	Blink 2	Off	Off	Off			On
Battery discharging	$75\% \leq \text{SOC} \leq 100\%$	On	On	On	On	Flashes on fault, does not light up when normal, see section 8 for details		Blink 3
	$50\% \leq \text{SOC} < 75\%$	On	On	On	Off			Blink 3
	$25\% \leq \text{SOC} < 50\%$	On	On	Off	Off			Blink 3
	$0\% < \text{SOC} < 25\%$	On	Off	Off	Off			Blink 3
	SOC=0	Off	Off	Off	Off			Blink 3

Note:
 Blink 1: light 0.25S, off 3.75S
 Blink 2: light 0.5S, off 0.5S
 Blink 3: light 0.5S, off 1.5S

4. Product Installation

Step 1: Wire Harness Preparation

If you have only purchased the following accessories(Standard accessory package), the harnesses need to be prepared by yourself.

Category	Connection port	Connector plugs	Recommended cable specifications			
			Polarity	Wire diameter	Length	Color
Standard	Alternator interface	 (Blue)	See the table below for details			
	Inverter Interface	 (Red)	See the table below for details			
	DC load interface	 (Gray)	See the table below for details			
	Connector plugs	 Connector pin*6	--			
	IGN signal		D+	0.3~1 .5mm ²	<9m	
	Dry contact 1		NO/C/NC	0.3~1.5 mm ²	<9m	
	Dry contact 2		NO/C/NC	0.3~1.5 mm ²	<9m	
	Dry contact 3		NO/C/NC	0.3~1 .5mm ²	<9m	
	For fixing Energy Hub	 M8 bolt*4	--			
	MEH communication interface	MEH comes standard with 5m Network cable				

	Inverter communication interface		Coming standard with 2.3m Network cable			
	RJ45 Adaptor		--			
Optional	Wireless module communication interface	--	--	Network cable	<5m	--

Alternator wire preparation

Alternator	Max DC current	Recommended Cable Size			
		Polarity	Wire diameter	Length	Color
EH128L	60A	Positive pole	16~25mm ²	<3m	Red
		Negative pole	16~25mm ²	<3m	Black
EH70L	30A	Positive pole	6~10mm ²	<3m	Red
		Negative pole	6~10mm ²	<3m	Black

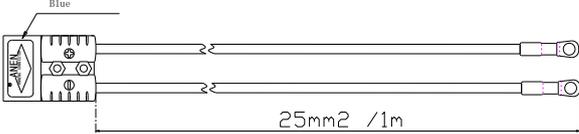
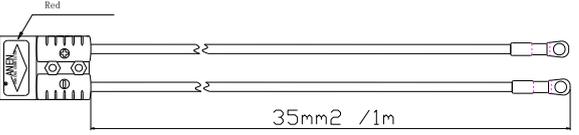
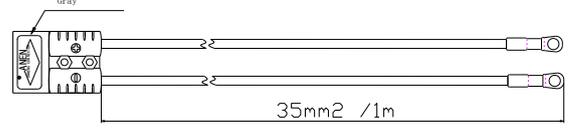
Inverter wire preparation

Inverter power	Max DC current	Recommended Cable Size			
		Polarity	Wire diameter	Length	Color
700W	70A	Positive pole	16~25mm ²	<3m	Red
		Negative pole	16~25mm ²	<3m	Black
1000W	100A	Positive pole	25~35mm ²	<3m	Red
		Negative pole	25~35mm ²	<3m	Black
1500W	150A	Positive pole	35~50mm ²	<3m	Red
		Negative pole	35~50mm ²	<3m	Black
2000W	200A	Positive pole	35~50mm ²	<3m	Red
		Negative pole	35~50mm ²	<3m	Black

DC load wire preparation

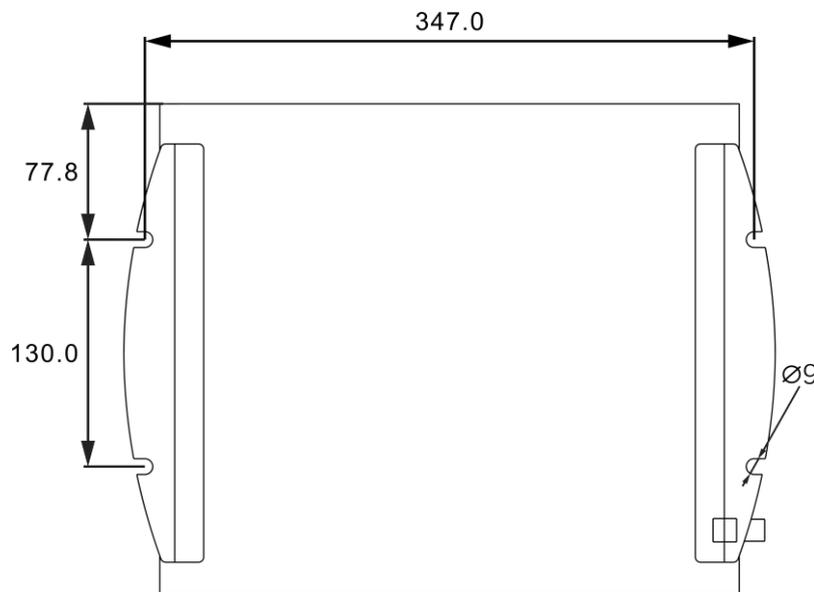
DC load	Max DC current	Recommended Cable Size			
		Polarity	Wire diameter	Length	Color
EH128L	120A	Positive pole	25~35mm ²	<3m	Red
		Negative pole	25~35mm ²	<3m	Black
EH70L	55A	Positive pole	16~25mm ²	<3m	Red
		Negative pole	16~25mm ²	<3m	Black

If you purchase the optional Wire Harness package, the following accessories will be supplied.

Category	Port	Connector plugs	Configuration
Standard	Alternator interface		
	Inverter Interface		
	DC load interface		

Step 2: Positioning and Perforation

Please select a plane and drill holes according to the installation positioning requirements in figure below.



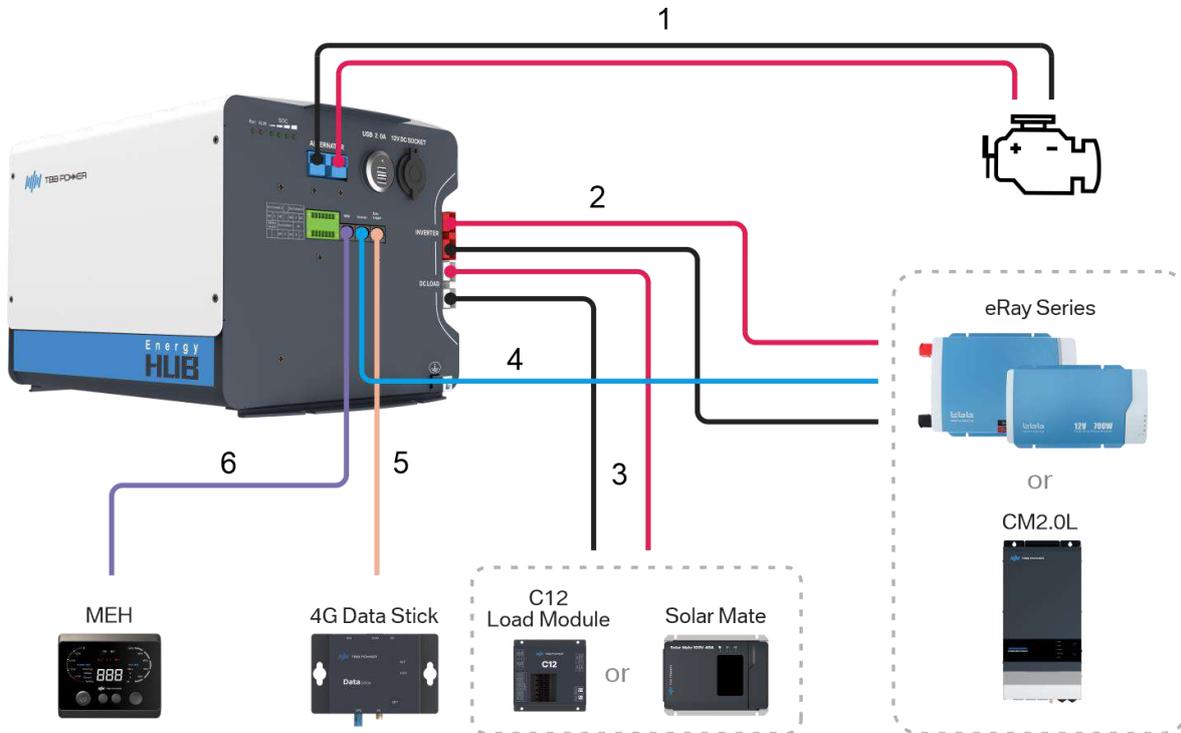
Attention:

- The product protection grade is IP21, and it is only allowed to be installed indoors.
- Please ensure that the mounting surface is strong enough to ensure reliable installation.
- Do not install near flammable and explosive materials.
- Do not install it where children can reach.

➤ Do not install on flammable building materials.

Step 3: Wiring the system

Please make sure that the positive and negative polarity connections are correct and reliable.



1. Please connect one end of the prepared wire to the generator and the other end to the **ALTERNATOR** interface of the Energy Hub with an Anderson connector.
2. Please connect one end of the prepared wire to the inverter and the other end to the **INVERTER** interface of the Energy Hub with an Anderson connector.
3. Please connect one end of the prepared wire to the C12 load module and the other end to the **DC LOAD** interface of Energy Hub with an Anderson connector. And please connect your DC load to the C12 load module. If you have purchased our Solar Mate, please connect the BAT+ and BAT- of the **Solar Mate** to the DC LOAD interface of the Energy Hub.
4. Please connect one end of the prepared network cable to the RS485 interface of the inverter and the other end to the **Inverter** interface of the Energy Hub. If you have purchased our Solar Mate, please use the RJ45 adapter to connect the RS485 port of the Solar Mate and the RS485 port of the inverter to the Inverter interface of the Energy Hub at the same time. Attached is the IH RS485 port wiring diagram:

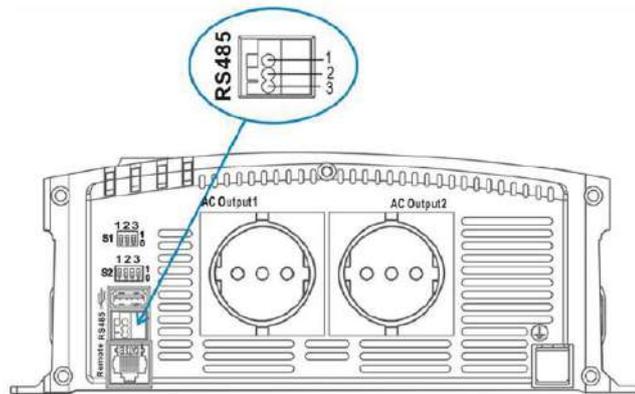


DIAGRAM OF RS485 PORT

RS485 PORT DEFINITION

PORT	DEFINITION
1	RS485_B
2	GND
3	RS485_A

5. Please connect one end of the prepared network cable to the 4G data stick or A7 touch screen, and the other end to the **Data Logger** interface of the Energy Hub.
6. Please connect one end of the prepared network cable to the MEH and the other end to the **MEH** interface of the Energy Hub.

5. Operation

1) Use MEH to turn on/off the system



The rocker switch  on the MEH can be used to turn the system on and off.

Press **I** to turn on, press **O** to turn off.

Note: After the switch is turned on, the Run, ALM, and SOC lights will flash in turn. After about 8s, the system will have DC output and MEH will start to work.

2) D+ function



When the vehicle is fitted with smart alternator, please connect the D+ to alternator control signal or ignition signal, otherwise the charger works in traditional alternator mode.

D+ signal control logic

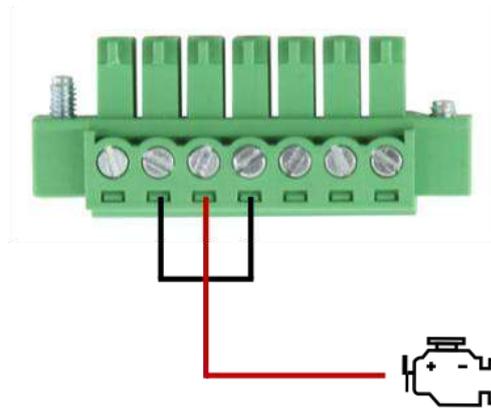
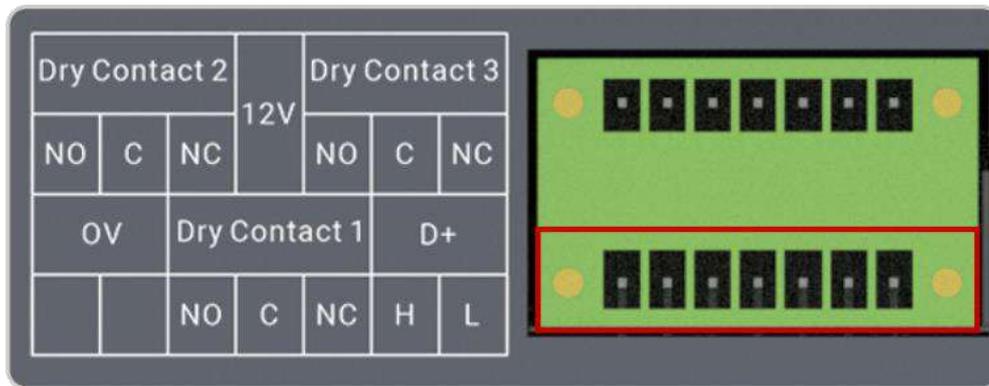
Generator Type	D+ signal status	Starting battery voltage conditions	Working Status
Smart Generators	With D+ signal	Start battery voltage $\geq 12V$ (default) (12~14.5V can be set) Working range: 12~16V(default)	Running
		Start battery voltage $\leq 11.6V$ (default) (11.6~13.5V can be set)	Stop operation
	No D+ signal	Irrelevant	Stop operation
Traditional Generators	No D+ signal	Start battery voltage $\geq 13.2V$ (default) (12~14.5V can be set) Working range: 13.2~16V(default)	Running
		Start battery voltage $\leq 12.8V$ (default) (11.6~13.5V can be set)	Stop operation

3) Dry contact output function

➤ Dry contact 1

The default setting of SOC $\leq 5\%$ (5%~50% can be set) will activate the output relay dry contact for starting the engine.

= 100% (10%~100% can be set) will break the relay output dry contact.



Wiring instructions:

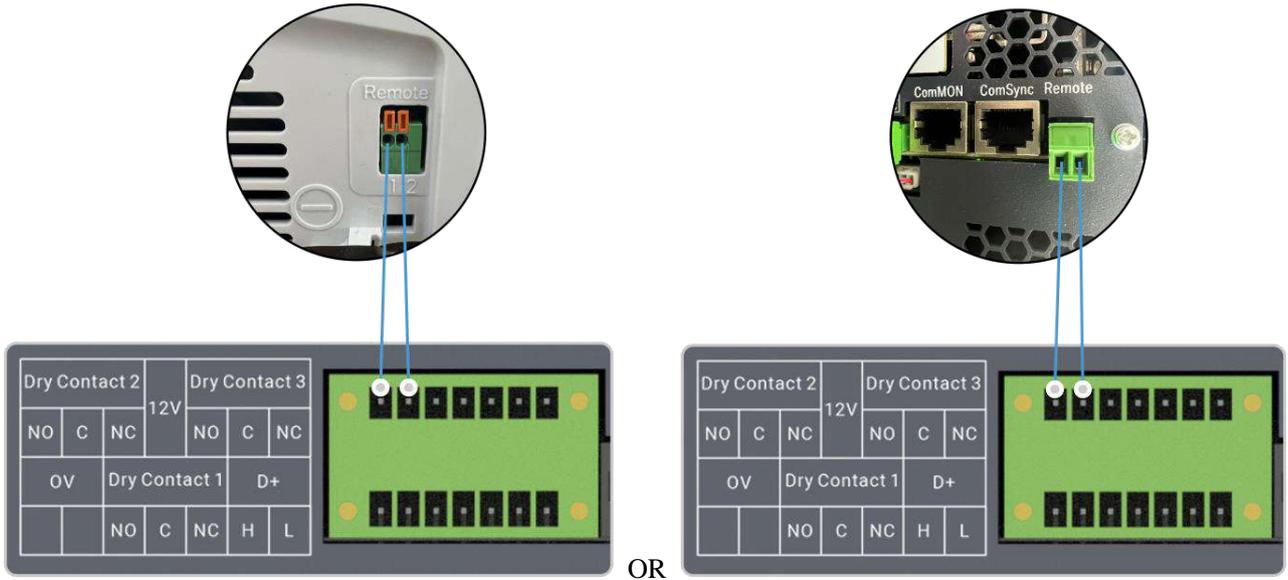
1. The output dry contact **C** interface is connected to the negative terminal of the DC load or the negative terminal of the inverter
2. Output dry contact **NO** interface is connected to Engine Start controller

➤ Dry contact 2

When the dry contact 2 connect to the remote of inverter, it will control the inverter power on or off. If the system is turned off, the inverter will be closed via Dry contact2. If the system is turned on and SOC $\geq 5\%$ (5%~50% can be set), the inverter will be turned on via Dry Contact2, SOC $\leq 0\%$ (0%~45% can be set, the SOC of inverter is turned on \geq the SOC of inverter is turned off +5%), the inverter will be turned off via Dry Contact2.

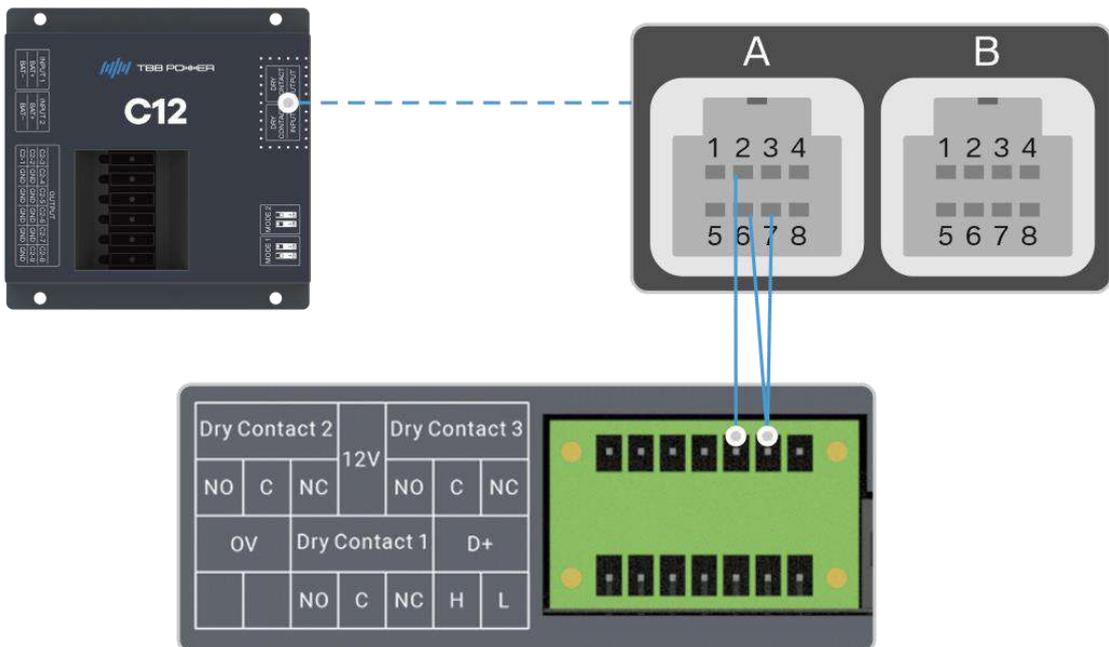
eRay Series

Kinergier Mobile



➤ Dry contact 3

When the dry contact 3 connect to the DRY CONTACT of C12, it will control the output of C12. If the system is turned off, the output of C12 will be closed via Dry contact3. If the system is turned on and SOC $\geq 5\%$ (5%~50% can be set), the output of C12 will be turned on via Dry Contact3, SOC $\leq 0\%$ (0%~45% can be set, SOC of the C12 output is turned on \geq SOC of the C12 output is turned off +5%) , the output of C12 will be turned off via Dry Contact3.



4) Regular inspections

In order for the BMS to calculate the SOC of lithium battery more accurately and eliminate the cumulative error of SOC, it is recommended to complete a full discharge (discharge to 0% SOC) and a full charge (charge to 100% SOC) every 3 months.

5) Charge Only function

Switch on MEH to **O**, when the system is turned off, the lithium battery can be charged by the Alternator /Solar / Grid. The system only allows charging and prohibits discharging. The system switches off the inverter and DC load via Dry Contact2 and Dry Contact3. Features as below:

- When the Alternator input voltage meets the operating conditions of the internal booster charger, the internal booster charger turns on the charging output, charging activates the wake-up system and charges the Hub. When charging to SOC 100%, the system will stop charging and turn off the lithium battery, and the system will all automatically power down.
- When the Solar input voltage meets the Solar Mate operating conditions, the Solar Mate is powered up to detect the status of the battery side:
 - a) When the system is switched off and other charging sources are not working, the Solar Mate has to wait 5min before the output starts, the charging activation wakes up the system and charges the Hub; if the Solar is underpowered, the first time causes the Solar Mate output to be pulled down, the second and subsequent times the Solar Mate has to wait another 20min before the output can be switched on again to start the system.
 - b) When other charging sources are charging the Hub, the SP starts outputting to charge the Hub after 30s of power-up self-test.
- When the Grid meets the CM operating conditions, the CM will turn on the charge output after 30s of power-up self-test, charge activation wakes up the system and charges the Hub.

6) Use the Hub in a low temperature environment

- When the cell temperature is $\leq 2^{\circ}\text{C}$, the user cannot directly charge the Hub. In the low temperature environment, when the internal charger is turned on, the Hub will automatically turn on the heating function. After the built-in lithium battery is heated to 5°C , the Hub can be charged normally.
- When the ambient temperature is lower than -20°C , the Hub cannot be discharged and a low temperature fault alarm will be reported. The user can via the internal charger to heat the built-in battery before starting to discharge it.
- At low temperatures, the battery discharge capacity decays by 10% to 30%. The lower the ambient temperature, the more the discharging capacity decays.

6. Storage and Transportation

Storage

Please follow the storage instructions in this manual to increase the service life of the lithium battery during storage. If you do not follow the storage instructions in this chapter for storage, the lithium battery may be over-discharged and damaged. If the inspection reveals that the lithium battery is damaged, please do not try to charge or use it.

Environmental conditions for storage: Keep away from water, dust and pollution sources, with good ventilation. The self-discharge rate of lithium battery during storage is less than 3% per month.



Be sure to store it in the power OFF state!

Note:

- Before storing the lithium battery, please charge the battery to 100% SOC.
- Please disconnect all loads and chargers connected to the Energy Hub.
- Please turn the rocker switch to the OFF position to turn off the system.
- Every 3 months, please charge the battery to 100% SOC; after charging is completed, please turn off the lithium battery.

Transportation

The product has a built-in lithium battery. Before transporting lithium batteries, please check all local, national and international applicable laws and regulations.

In some cases, the transportation of scrapped, damaged or recalled lithium batteries may be specifically restricted or prohibited.

Lithium battery transportation belongs to the ninth category of dangerous goods in the UN3841 standard.

7. Compatible Products

1) MEH



MEH can be used as a display unit of the Energy Hub system, with the following functions:

- Displays battery SOC, Voltage, Current.
- Inverter output data: Voltage, Current, Power.
- Solar data: PV voltage, Output current, Output power.
- Switch on/off Energy Hub and the Inverter
- With Bluetooth connectivity to support mobile APP

2) 4G data stick



Available with 4G version, wireless data logger is an external communication device which can connect Energy Hub to cloud. It offers a convenient way to monitor the system performance remotely.

3) Inverter

	EH128L	EH70L
eRay Series	IH1500L/IH2000L	IH700L/IH1000L
Kinergier Mobile	CM2.0L	/

➤ **eRay Series – Pure Sine Wave Inverter**

IH inverter series can be used to power AC loads such as microwave and power tools.



IH700L/IH1000L



IH1500L/IH2000L

➤ **Kinergier Mobile bi-directional inverter**



CM2.0L

Kinergier Mobile bi-directional inverter is the new generation of bi-directional inverter, which is widely used in vehicle and marine systems. Features as below:

- CM2.0L 2kW combi can be used
- Fully recharges from grid within one hour
- Powers any heavy duty inductive load such as air compressor, electric saw etc.

4) Solar Mate



Solar Mate

Solar Mate is a solar charge controller with built in Maximum Power Point Tracking (MPPT) technology, which can optimize the PV's output eliminate the fluctuation due to shading or temperatures variables. It tracked the maximum power point of a PV array to deliver the maximum charging current for battery, enabling PV array to increase the output by as much as 30% compared with PWM design.

- Maximum MPPT efficiency up to 99.9%.
- Maximum efficiency up to 98.2%.
- Excellent performance at sunrise and low solar insulation levels.
- High reliability with electronic protections.
- Wide MPPT operating voltage range.
- Easy installation and commissioning.
- Self cooling design for high reliability.

5) C12 Load Module



C12 Load Module

C12 Load Module is a power distribution module. Features as below:

- Rated current is 80A.
- Support 12-18 outputs, via three relays.
- Dry contact input control to cut off loads at different voltage or SOC.

8. FAQ

Type	Number of ALM light flashes	Name	Processing suggestions
Fault protection	1	Output short circuit protection	<ul style="list-style-type: none"> ➤ Please check that the INVERTER or DC LOAD positive and negative connections are not reversed or short-circuited. ➤ If there is no wiring error, please contact your dealer.
	2	Discharge overcurrent protection	<ul style="list-style-type: none"> ➤ Check that the discharge current of the Energy Hub does not exceed the rated discharge current, if it does, switch off part of the load. ➤ If the discharge current does not exceed the rated discharge current, please contact your dealer.
	3	Charging overcurrent protection	<ul style="list-style-type: none"> ➤ Check that the charging current of the external charger matches that of the Energy Hub. ➤ Check that the external charger is working. ➤ If all of the above are normal, please contact your dealer.
	4	General low voltage protection	<ul style="list-style-type: none"> ➤ The battery capacity is already low, please recharge the Energy Hub immediately.
	5	Cell low voltage protection	<ul style="list-style-type: none"> ➤ The battery capacity is already low, please recharge the Energy Hub immediately.
	6	General high voltage protection	<ul style="list-style-type: none"> ➤ Check that the charging voltage of the external charger matches that of the Energy Hub, which should be 14.0~14.2V. ➤ Check if there is any abnormality in the external charger. ➤ If all of the above are normal, please contact your dealer after switching off the charger.
	7	Cell high voltage protection	<ul style="list-style-type: none"> ➤ Check that the charging voltage of the external charger matches that of the Energy Hub; the charging voltage should be 14.0~14.2V. ➤ Check if there is any abnormality in the external charger. ➤ If all of the above are normal, please contact your dealer after switching off the charger.
	8	Discharge high temperature protection	<ul style="list-style-type: none"> ➤ Please check that the ambient temperature at the Energy Hub installation location is not too high. ➤ Please check that the wire diameter of the Energy Hub cable meets the requirements of the manual. ➤ Please check that the discharge current and discharge time of the Energy Hub do not exceed the specified requirements (see 9.Specification). ➤ If these are normal, please contact your dealer.

	9	Discharge low temperature protection	<ul style="list-style-type: none"> ➤ Please check if the ambient temperature at the Energy Hub installation location is below -20°C. If so, please connect the ALTERNATOR to raise the temperature of the lithium battery inside the Energy Hub by heating the heating film inside the Energy Hub. ➤ If this still does not solve the problem, please contact your dealer.
	10	Charging high temperature protection	<ul style="list-style-type: none"> ➤ Please check that the ambient temperature at the Energy Hub installation location is not too high. ➤ Check that the charging current of the external charger matches that of the Energy Hub. ➤ If this is correct, please contact your dealer.
	11	BMS circuit high temperature protection	<ul style="list-style-type: none"> ➤ Check that the ambient temperature at the Energy Hub installation location is not too high. ➤ Please check that the discharge current and discharge time of the Energy Hub do not exceed the specified requirements (see 9.Specification). ➤ If the above is correct, please contact your dealer.
	12	Low temperature protection for BMS circuits	<ul style="list-style-type: none"> ➤ Please check that the ambient temperature at the location where the Energy Hub is to be installed is below -40°C. If so, the Energy Hub is not suitable for operation at such a low ambient temperature and the best ambient temperature for the Energy Hub installation is above -20°C. ➤ If the above is normal, please contact your dealer.
	13	External input overvoltage protection	<ul style="list-style-type: none"> ➤ Check that the charging voltage of the external charger matches that of the Energy Hub, which should be 14.0~14.2V. ➤ Check if there is any abnormality in the external charger. ➤ If all of the above are normal, please contact your dealer after switching off the charger.
	14	BMS internal faults	<ul style="list-style-type: none"> ➤ Please contact your dealer.

9. Specification

Model		EH128L	EH70L
Battery	Battery type	LiFePO4	
	Battery capacity	12.8VDC 100Ah(1280Wh)	12.8VDC 55Ah(704Wh)
	Output voltage range	11.6-14.2VDC	
	Max charging current	100ADC	55ADC
	Continuous discharging current	150ADC	55ADC
	Max discharging current	200A -10mins	100ADC-10mins
Booster Charger	Input voltage range	12- 16 VDC	
	Max charging current	60ADC	30ADC
	Terminal	SA120(Blue)	
DC output 1 (To INVERTER)	Output voltage range	11.6-14.2VDC	
	Continuous current	150ADC	55ADC
	Peak current	200ADC-10mins	100ADC-10mins
	Terminal type	Anderson SA120(Red)	
DC output 2 (To DC LOAD)	Output voltage range	11.6-14.2VDC	
	Continuous current	Max120ADC	Max 55ADC
	Terminal type	Anderson SA120(Gray)	
DC output 3 (To 12V DC SOCKET)	continuous current	10ADC	
	Terminal type	DC 12V automotive socket	
DC output 4 (USB)	Output voltage	5VDC±0.25VDC	
	Continuous current	2*2ADC	
	Terminal type	USB *2	
Control and Display	Dry contact output	Engine start	2A/30VDC
		Inverter power control	10A/28VDC
		Distribution	2A/30VDC
	Remote Switch	YES	
	Display	LED	
	External monitor - optional	MEH	
	Data logging - optional	WIFI or GPRS or 4G	
Sleep mode consumption		<100uA	
Operating cell temperature	Charge	2°C~60°C	
	Discharge	-20°C~60°C	
Cooling	Natural cooling		
IP rating	IP21		
Product weight	19kg	15kg	
Product dimensions in mm		375*280.5*247	

TBB POWER CO.,LTD

 service@tbbpower.com

 www.tbbpower.com

 +86-592-5212299

 +86-592-5796070