



BI-DIRECTIONAL INVERTER

USER MANUAL

Kinergier Mobile Series





5min



WARNING: HIGH VOLTAGE INSIDE

CAUTION: THE DC FUSE MUST HAVE BEEN TURNED OFF BEFORE SERVICING

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

WARNING: NEUTRAL FLOATING. Risk of electric shock. Use only Shock Sentru™#GF15V-SP, Leviton Smart Lock #8899-A, Hubbel #GF520EMBKA ground fault circuit interrupter. Other types may fail to operate properly when connected to this unit.

The power unit is to be installed so that it is not likely to be contacted by people.

CAUTION: Risk of Fire. Do not replace any vehicle fuse with a rating higher than recommended by the vehicle manufacturer. This product is rated to draw 50 amperes from a 120 V vehicle outlet. Ensure that the electrical system in your vehicle can supply this product without causing the vehicle fusing to open. This can be determined by making sure the fuse in the vehicle which protects the outlet is rated higher than 50 amperes. Information on the vehicle fuse ratings are typically found in the vehicle operator's manual. If a vehicle fuse opens repeatedly, do not keep on replacing it. The cause of the overload must be found. On no account should fuses be patched up with tin foil or wire as this may cause serious damage elsewhere in the electrical circuit or cause fire.

The AC over current protection device must be a circuit breaker or a fuse/disconnect and be properly sized and branch circuit rated for the wire it is protecting and the appliance being powered.

The Inverter/ Charger is intended to recharge batteries. The battery that is connected to this product is only suitable if it complies with the given battery standard for that battery type and is provided with a battery management system that will monitor and control the electrical and thermal health of the battery during charging. When installing this Inverter/ Charger, the battery is to be verified as in compliance with the applicable battery standard.

Disclaimer

Unless specially agreed in writing, TBB Power Co., Ltd

- Take no warranty as to the accuracy, sufficiency of suitability of any technical or other information provided in this manual or other documentation.
- Assumes no responsibility or liability for loss or damage, or expense whether direct, indirect, consequential, or incidental which might arise out of the use of such information.
- TBB offers standard warranty with its products, taking no responsibility for direct or indirect loss due to equipment failure.

About this Manual

This manual describes our product features and provides procedure of installations. This manual is for anyone intending to install our equipment.

General Instruction

Thanks for choosing our products and this manual were suitable for Kinergier Mobile. This chapter contains important safety and operation instructions. Read and keep this User Guide well for later reference.

The Kinergier Mobile needs to be installed by professionals and please pay attention to the following points prior to installation:

Please check the input voltage or voltage of battery is same to the nominal input voltage of this inverter.

- Please connect positive terminal “+” of battery to “+” input of the inverter.
- Please connect negative terminal “-” of battery to “-” input of the inverter.
- Please use the shortest cable to connect and ensure the secure connection.
- While connecting, please secure the connection and avoid short-circuiting the positive and negative poles of the battery, which will cause damage of battery.
- Inverter will have high voltage inside. Only authorized electrician can open the case.
- The inverter WAS NOT designed to use in any life retaining equipment.

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1. General Safety Instruction

1.1 Safety Instruction

As dangerous voltages and high temperature exists within the Kinergier Mobile, only qualified and authorized maintenance personnel are permitted to open and repair it. Please make sure that Kinergier Mobile is turned off before opening and repairing it.

This manual contains information concerning the installation and operation of the Kinergier Mobile. All relevant parts of the manual should be read prior to commence the installation. Please follow the local stipulation as well.

Any operation against safety requirement or against design, manufacture, safety standard is out of the manufacturer warranty.

1.2 General precaution

- DO NOT expose to dust, rain, snow or liquids of any type, it is designed for indoor use. DO NOT block ventilation, otherwise the Kinergier Mobile would be overheating.
- To avoid fire and electric shock, make sure all cables selected with right gauge and being connected well. Smaller diameter and broken cable are not allowed to use.
- Please do not put any inflammable goods near to inverter.
- NEVER place unit directly above batteries; gases from a battery will corrode and damage Kinergier Mobile.
- DO NOT place battery over Kinergier Mobile.

1.3 Precaution regarding battery operation

- Use plenty of fresh water to clean in case battery acid contacts skin, clothing, or eyes and consult with doctor as soon as possible.
- The battery may generate flammable gas during charging. NEVER smoke or allow a spark or flame in vicinity of battery.
- DO NOT put the metal tool on the battery, spark and short circuit might lead to explosion.
- REMOVE all personal metal items such as rings, bracelets, necklaces, and watches while working with batteries. Batteries can cause short-circuit current high enough to make metal melt, and could cause severe burns.

2. Instruction

2.1 Brief Instruction

2.1.1 General Description

Kinergier Mobile is a new generation bi-directional inverter designed for various on-board power application such as for RV, Utility Vehicle, Marine etc.

Kinergier Mobile can deliver a high reliability, performance and industry leading efficiency for critical application. Its outstanding surge capability makes it capable to power most demanding appliances, such as air conditioner, water pump, washing machine, freezer, compressor, power tool etc.

With the function of power assist & power control, it can be used to work with a limited AC source such as generator or grid. Kinergier Mobile can automatically adjust its charging current avoiding generator or grid to be overloaded. In case of temporary peak power appear, it can work as the supplement source to generator or grid.

2.1.2 Naming Rules

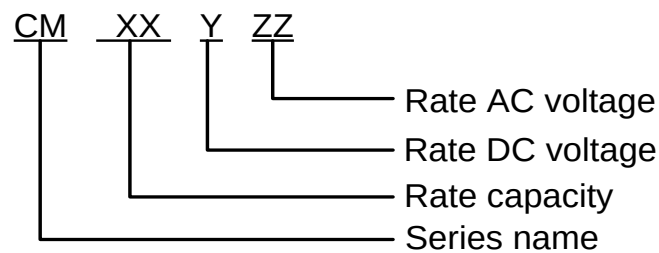


Figure	Explanation	
CM	series name	
2.0	Represent rated capacity	1600W(cont)
3.0		2400W(cont)
3.6		2700W(cont)
4.8		3600W(cont)
L	Represent rated DC voltage	12VDC
S		48VDC
-LV	Represent rated AC voltage	120VAC

Naming example: CM3.0L-LV

Kinergier Mobile

Rated capacity: 2400W(nom)

Rated DC voltage: 12V

Rated AC voltage: 120V

2.2 Structure

2.2.1 Front



Figure 2-1 Kinergier Mobile Structure in Front View

2.2.2 Control panel

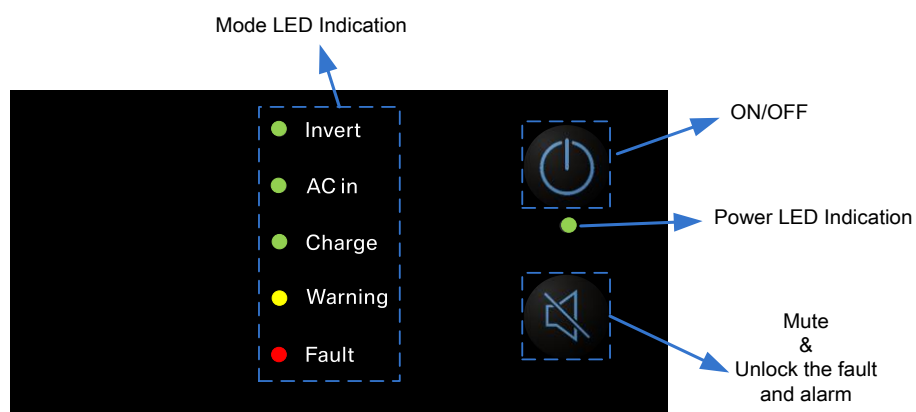


Figure 2-2 Kinergier Mobile Control Buttons

Table 2-1 LED Directive Function

LED	Function
Invert	➤ It will illuminate when CM is inverting.
AC In	➤ It will flash when CM detects any input from grid or generator.
Charge	➤ It will flash when CM is in float charging. ➤ It will illuminate when CM is in bulk or absorption charging.
Warning	➤ It will flash when CM has warning.
Fault	➤ It will flash when CM has error.

2.2.3 Remote Control and Monitor MCK

Apart from above control panel, the user is also allowed to monitor, control and configure CM by a remote controller MCK. The MCK could be installed at an easy access location for the user.



Figure 2-3 Remote Control and Monitor MCK

More details of MCK about installation, connection and operation, please refers to the dedicated user manual which is packed in the box of MCK.

2.2.4 Connection Compartments

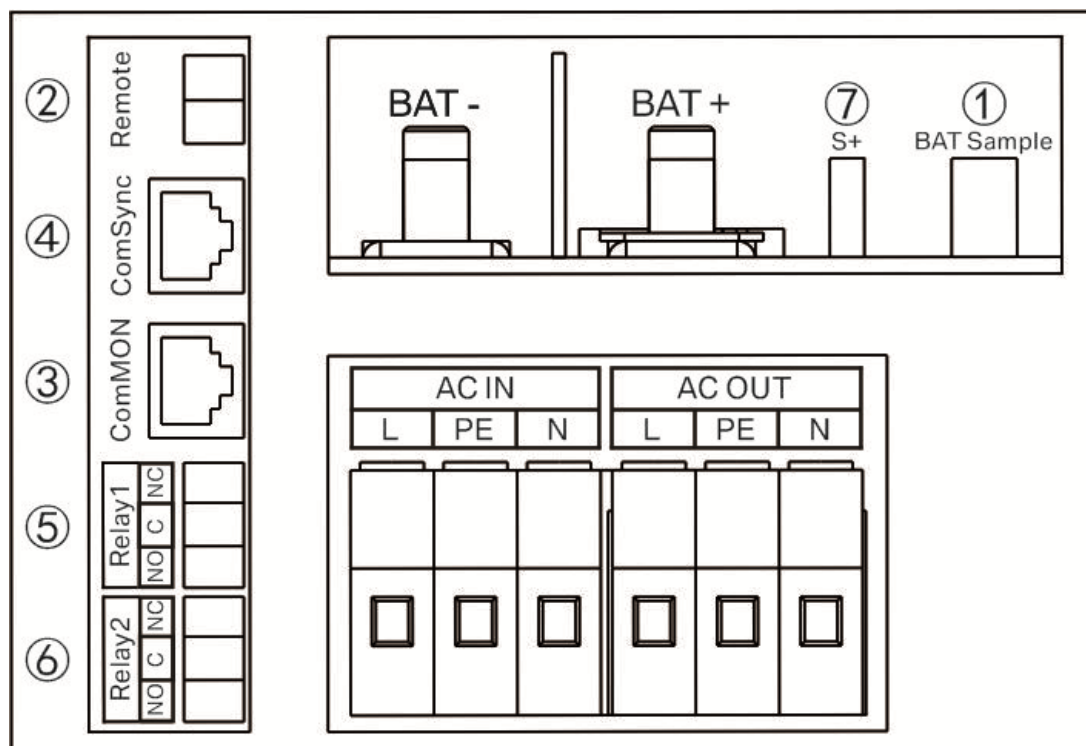


Figure 2-4 Signal Terminal

Table 2-2 Signal Terminal Introduction

No.	Silk-screen	Definition
①	Bat Sample	Battery temperature and voltage sampling.
②	Remote	A dry contact input for inverter remote ON/OFF.
③	ComMON	RS485 port for external monitor such as MCK
④	ComSync	Communication with TBB's M lithium battery to synchronize lithium battery's charging and discharging strategy
⑤	Relay1	Dry contact output control 1(NO, C, NC)
	(NO, C, NC)	
⑥	Relay2	Dry contact output control 2(NO, C, NC)
	(NO, C, NC)	
⑦	S+	Slave charger for starter battery

2.2.5 Dimension

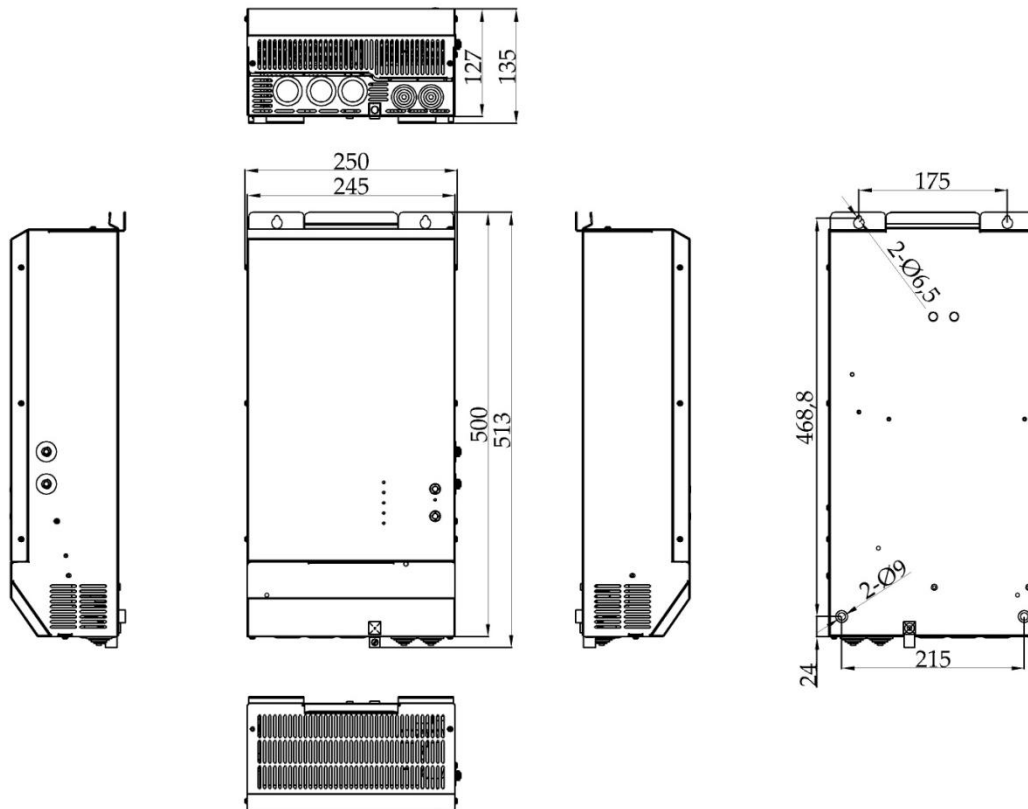


Figure 2-5 Dimension of Kinergier Mobile

2.3 Function

2.3.1 Power Control and Power Assist

Kinergier Mobile offers a unique feature of power control & power assist, which is very useful upon you have a limited grid or generator. Kinergier Mobile will take control of energy flow automatically, using extra power to charge the battery or inverting as the supplement to the grid or generator. With this feature, you can avoid tripping on shore power MCB or reduce generator capacity by up to 50%.

2.3.2 Powerful and Reliable Inverter

High performance pure sine wave

Kinergier Mobile is a pure sine wave inverter generating a near perfect sinusoidal AC wave power output that is very similar or even better to what you can get from the utility grid. Pure sine wave can guarantee the correct function of sensitive equipment (computer, laser printer, TV etc.). Also, your home appliances will work smoother, cooler and more efficient, such as fridge, microwave and power tools.

High surge power capability

Provided with outstanding surge power capability and low frequency transformer, Kinergier Mobile is suitable for heavy inductive load like fridge, coffee maker, microwave, power tools, air conditioner etc.

Battery low voltage protect

Kinergier Mobile provides configurable battery low voltage protection.

2.3.3 Professional Battery Charger for Lead Acid Battery

Multi stage sophisticated charging algorithm for lead acid battery

Fitted with multistage charging algorithm (bulk-absorption-float-recycle), the built-in charger of Kinergier Mobile is designed to charge the battery quickly. Microprocessor controlled charging algorithm with variable absorption charging timer could guarantee the optimal charging for batteries on different discharged state.

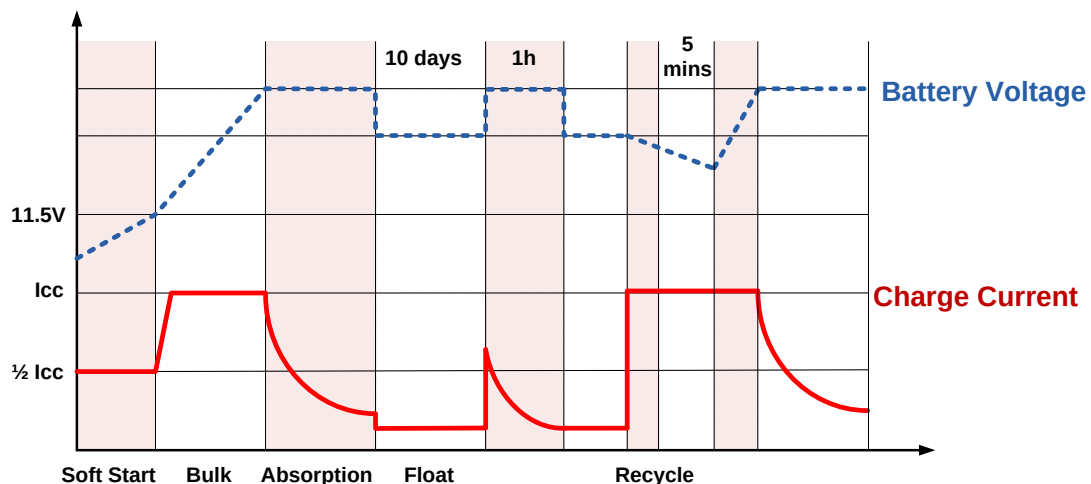


Figure 2-6 Multistage Sophisticated Charging Algorithm for Lead Acid Battery

Float charging and recycle charging program guarantee your battery getting proper maintenance in case of long time connected and less aging in case of long time connected without operation.

Battery Sample Cable (Temperature and voltage)

Battery temperature is a key factor in correct charging for lead acid battery. The charging formula must be adjusted in real time (automatically) according to the actual battery temperature to ensure the battery getting fully charged and avoiding overcharged or undercharged. All charging voltages recommended by battery manufacturer are in fact ONLY applied at the temperature 20°C~25°C.

The Bat sample cable (battery temperature and voltage sensor) supplied with Kinergier Mobile measures the temperature of battery and automatically adjusts in real time to properly charge your batteries at compensation rate -4mV/°C/cell. In case of Bat sample cable is not present, Kinergier Mobile will use 25°C as default setting. This feature is especially recommended for sealed batteries and/ or when important fluctuations of battery temperature are expected.

Multi battery chemical available

Kinergier Mobile offers premium charging algorithm for commonly encountered lead acid battery chemicals include AGM, GEL, Flooded, lead-carbon and Lithium battery, of which you can set through external monitor and TBB Link software.

2.3.4 Lithium Battery Compatible

Kinergier Mobile supports universal LFP charging profile and offered pre-defined LFP charging profile for TBB M lithium battery.

Built in BMS pre-defined LFP charging and communication.

According to cell temperature and real time SOC, BMS will send command to battery charger asking for optimum charging voltage and current. This synchronization will prevent overheating or overcharging especially at the end of charging stage, to ensure the lithium battery reaches its target cycle life

In the meantime, instead of using voltage as protection, SOC value is used with more accuracy thus to avoid permanently dead of lithium battery due to discharge over time.

2.3.5 Transfer

Uninterrupted AC power

Once the voltage/ frequency/ waveform of AC input meets the minimum quality requirements, it transfer to AC output directly. Kinergier Mobile will work as a battery charger and load will be powered by AC input. The AC output voltage is same to AC input.

In case of AC input fails or exceeds the preset maximum AC input current, Kinergier Mobile will switch to “invert mode” to guarantee an undisturbed power. Upon AC input resume or match the quality, it will switch back again. Due to its ultra quick transfer design, as quick as 0ms, Kinergier Mobile could be used as an UPS.

Ground Relay

The neutral output of Kinergier Mobile is automatically connected to earth upon no external AC sources is available. Once external AC sources present, the ground relay will open. This feature can be disabled through TBB Link.

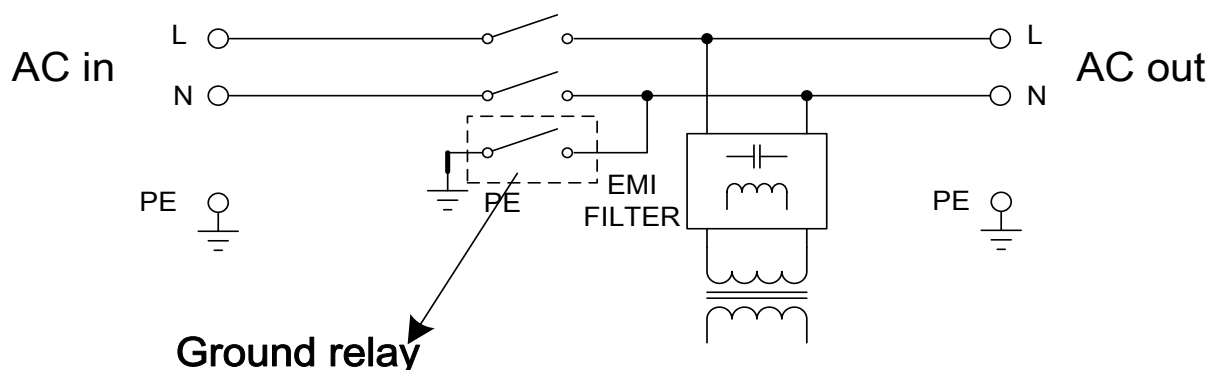


Figure 2-7 Ground Relay Schematic

2.3.6 Protection

The Kinergier Mobile is designed with a series of complete hardware and software protection functions to ensure its stable and reliable operation.

Overload protection

When overload protection is triggered, the Kinergier Mobile will shut down and restart automatically after 60s. If the protection happens in three consecutive time, it will require the user to restart the device manually.

Over temperature protection

When the internal temperature is too high, Kinergier Mobile will trigger the over-temperature protection. After the internal temperature returns to normal, it can automatically resume normal operation.

Short circuit protection

The equipment will shut down automatically when the AC output is circuit-shortened and requires to restart manually.

Battery over temperature protection

During the charging, the equipment will continuously monitor the battery temperature. When the battery temperature is too high, the equipment will automatically reduce the charging current. When the battery is severely heated, the charger will automatically stop charging.

Battery low voltage protection

To prevent the permanent damage caused by the over discharge of battery, the equipment will automatically cut off the output according to the preset low voltage protection value.

2.3.7 Communication

Dry contact input

Kinergier Mobile is designed with a set dry contact input for the remote ON/ OFF.

Dry contact output

Kinergier Mobile is designed with two sets NO/ NC dry contact output in relay type, the user can set specific functions through the TBB Link. Following is the default setting.

- Relay1: The relay is closed when the battery is under-voltage.
- Relya2: The relay is closed when a fault or overload occurs.

RS485

Kinergier Mobile supports a RS485 port.

3. Installation and Wiring



Keep away from fire, avoid direct sunlight and rain; do not store flammable, explosive or corrosive gases or liquids in the working environment. Don't install in a working environment with metal conductive dust.

- Please install the equipment in a location of dry, clean, cool with good ventilation.
- Operating temperature: $-20\sim 65^{\circ}\text{C}$
- Storage temperature: $-40\sim 70^{\circ}\text{C}$
- Cooling: Force fan
- Relative humidity in operation: 95% without condensation.

4. Operation

4.1 Check before Operation

Please check before Operation according to the following.

- Inverter is installed correctly and steady.
- Reasonable cable layout to meet customer requirements.
- Make sure the grounding is reliable.
- Make sure the ground wire is properly connected correctly and securely.
- Double check the battery breaker is OFF.
- Make sure the cables are properly connected correctly and securely.
- Reasonable installation space, clean and tidy environment, no construction residue.

4.2 Power ON



Make sure the battery voltage is within the permissible range before turning ON the breaker.

Please follow the following instruction step by step.

- Step 1: Turn on the circuit breaker between the battery and the inverter.
- Step 2: Press the ON/ OFF button to turn on the inverter entering self-diagnostic.
- Step 3: Set the parameters following the setup wizard.
- Step 4: Press the ON/ OFF button Again to turn on the inverter.
- Step 5: Observe the LED light to make sure the inverter is running normally.

(Refer to Table 2-2 LED directive function)

4.3 Power OFF



After the inverter is power OFF, there is still residual power and heat in the chassis, which may lead to electric shock or burn.

- Method 1: Press the ON/ OFF button 2 secs to cut off the output (into the standby mode). Afterwards, press and hold the ON/ OFF 5secs until hearing consecutive beep, the inverter is shut down totally.
- Method 2: Press and hold the ON/ OFF 5 secs until hearing consecutive beep, the inverter is shut down directly.

5. Configuration



Settings may only be changed by a qualified electrical engineer.
Read the instructions thoroughly before implementing changes.
During setting of the charger, the AC input must be cut off.

5.1 Default Setting

Table 5-1 Factory settings

System	Rate AC Voltage	120VAC
	Rate AC Frequency	60Hz
Battery	Battery Type	AGM
	Battery AH	200AH
	Max Charge Current	100% of the Max charge current
	Absorption Voltage	14.4V (single battery voltage)
	Float Voltage	13.5V (single battery voltage)
	Undervoltage Protect Recover	13.0V (single battery voltage)
	Undervoltage Warning	11.0V (single battery voltage)
	Undervoltage Protect	10.5V (single battery voltage)
	Deep Undervoltage Protect	9.9V (single battery voltage)
AC Input	Power Assist Cur	32

5.2 Configuration

5.2.1 TBB Interface

The TBB Interface is a RS485 to USB communication module.

Connect the inverter to the computer requires a TBB Interface, which goes between the COMMON port on the inverter, and a USB port on the computer.



Figure 5-1 TBB Interface

5.2.2 TBB Link

The TBB Link is a powerful tool for CM series inverter Configuration. The TBB Link can be installed on the computer, open the TBB Link and turn on the inverter, the inverter can be configured.

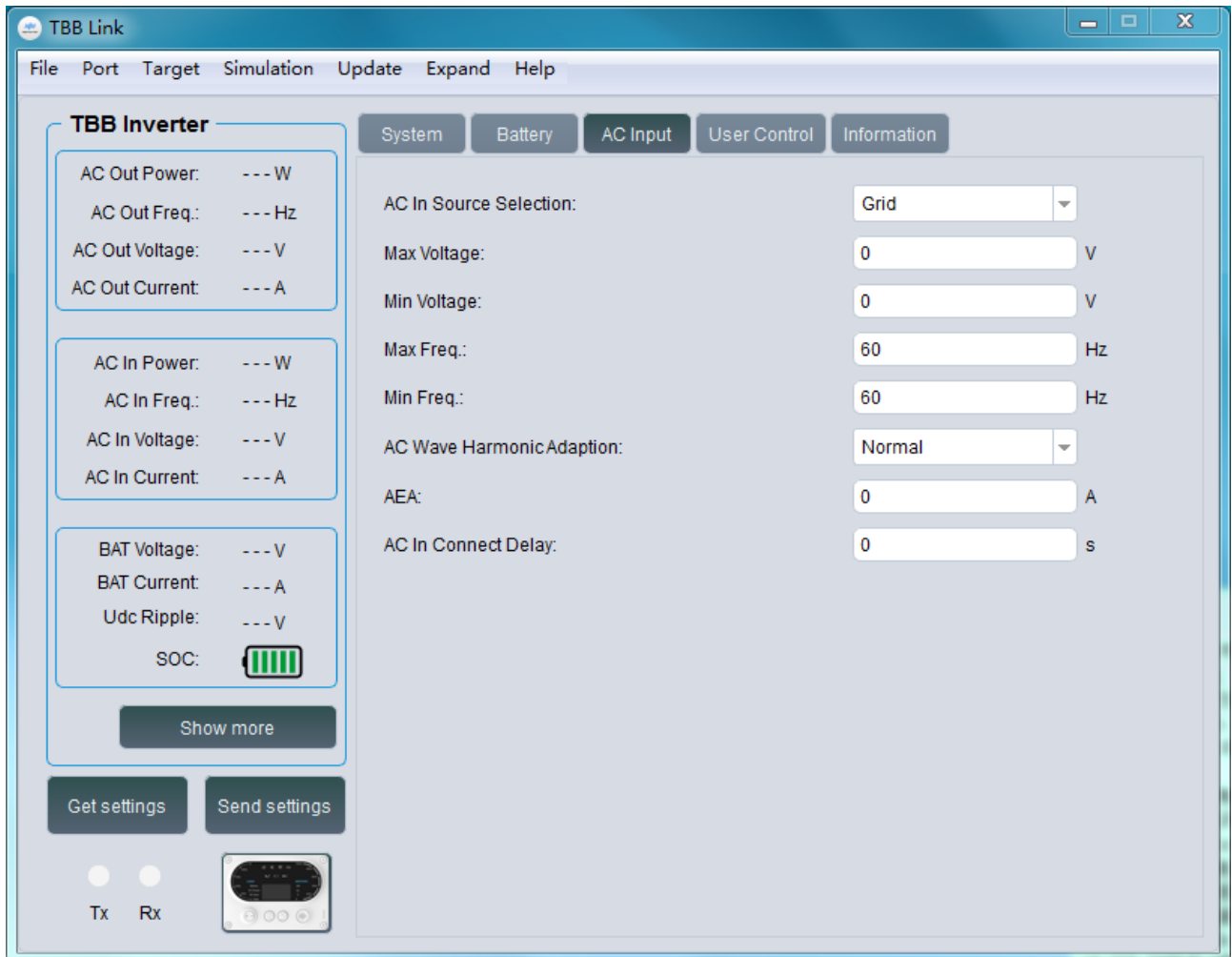


Figure 5-2 TBB-Link

6. Specification

Model	CM2.0L-LV	CM3.0L-LV
Power Assist	Yes	
AC inputs	Input voltage range:85~140 VAC, Input frequency:55~65Hz	
AC input Current	50A (transfer switch)	
Inverter		
Nominal battery voltage	12VDC	
Input voltage range	10.5~17VDC	
Output	Voltage: 110/115/120 VAC ± 2%, Frequency: 60 Hz ± 0.1%	
Harmonic distortion	<2%	
Power factor	1.0	
Cont. output power at 25°C	1600W	2400W
Output power (90min) at 25°C	2000W	3000W
Peak power	4000W	6000W
Cont. output power at 40°C	1500W	2200W
Maximum efficiency	93%	
Zero load power	12W	16W
Charger		
Charge voltage 'absorption'	14.4VDC	
Charge voltage 'float'	13.5VDC	
Battery types	AGM / GEL / OPZV / Lead-Carbon / Li-ion / Flooded	
Battery Charge current	100A	150A
Temperature compensation	Yes	
General data		
AC Out Current	50A	
Transfer time	<4ms (<15ms when Weak Grid Mode)	
Remote on-off	Yes	
Programmable relay	2x	
Protection	a) output short circuit, b) overload, c) battery voltage over voltage d) battery voltage under voltage, e) over temperature, f) Fan block g) input voltage out of range, h) input voltage ripple too high	
General purpose com. Port	RS485	
Operating temperature range	-20 to +65°C	
Storage temperature range	-40 to +70°C	
Relative humidity in operation	95% without condensation	
Altitude	2000m / 6562'	
Mechanical Data		
Dimension	510*245*135mm / 20.1*9.6*5.3"	
Net Weight	15kg / 33lb	20kg / 44lb
Cooling	Forced fan	
Protection index	IP20	
Standards		
Safety	UL458 & CSA107.1	
EMC	FCC Part 15 Class B	

Model	CM3.6S-LV	CM4.8S-LV
Power Assist	Yes	
AC inputs	Input voltage range:85~140 VAC, Input frequency:55~65Hz	
AC input Current	50A (transfer switch)	
Inverter		
Nominal battery voltage	48VDC	
Input voltage range	42~68VDC	
Output	Voltage: 110/115/120 VAC ± 2%, Frequency: 60 Hz ± 0.1%	
Harmonic distortion	<2%	
Power factor	1.0	
Cont. output power at 25°C	2700W	3600W
Output power (30min) at 25°C	3600W	4800W
Peak power	6000W	8000W
Cont. output power at 40°C	2400W	3200W
Maximum efficiency	95%	
Zero load power	14W	16W
Charger		
Charge voltage 'absorption'	57.6VDC	
Charge voltage 'float'	54VDC	
Battery types	AGM / GEL / OPZV / Lead-Carbon / Li-ion / Flooded	
Battery Charge current	45A	60A
Temperature compensation	Yes	
General data		
AC Out Current	50A	
Transfer time	<4ms (<15ms when Weak Grid Mode)	
Remote on-off	Yes	
Programmable relay	2x	
Protection	a) output short circuit, b) overload, c) battery voltage over voltage d) battery voltage under voltage, e) over temperature, f) Fan block g) input voltage out of range, h) input voltage ripple too high	
General purpose com. Port	RS485	
Operating temperature range	-20 to +65°C	
Storage temperature range	-40 to +70°C	
Relative humidity in operation	95% without condensation	
Altitude	2000m / 6562'	
Mechanical Data		
Dimension	510*245*135mm / 20.1*9.6*5.3"	
Net Weight	20kg / 44lb	22kg / 48.5lb
Cooling	Forced fan	
Protection index	IP20	
Standards		
Safety	UL458 & CSA107.1	
EMC	FCC Part 15 Class B	

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