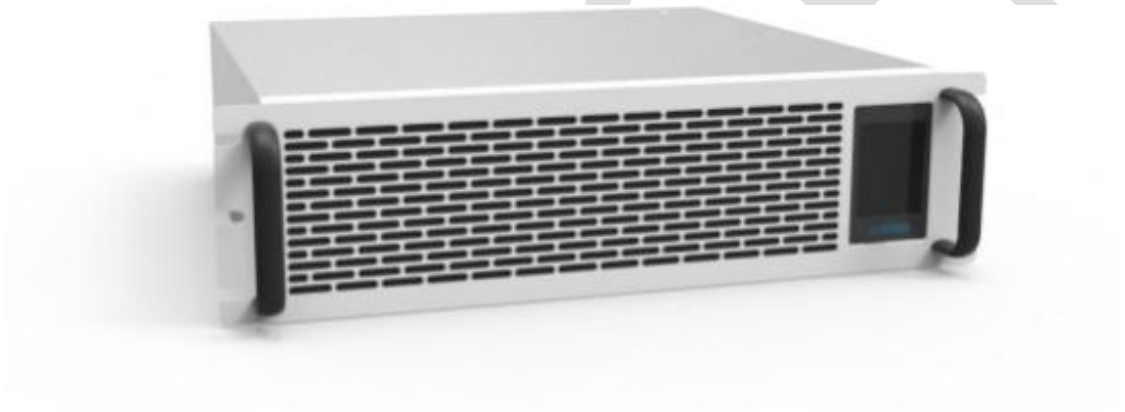
30KW-120Kw Series Non-Isolated Bidirectional AC/DC PCS Module Products

User Manual

用户手册



Contact us:

WeChat: +86 13559210897

WhatsApp: +86 13559210897

Email: yewsource@hotmail.com

WeChat

WhatsAp

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1、Safety Precautions

1.1 Declare

The Company does not assume any responsibility when any of the following occurs:

- Use equipment in harsh environments beyond those described in this manual;
- Use of equipment in any installed and functional environment beyond the relevant international standards;
- Change products or modify software code without authorization;
- Failure to follow the operation instructions and safety warnings in the product and document;
- Equipment damage caused by non-natural environment;

1.2 General Safety Precautions

◆ Electrical Safety

- Electrical connection must be in strict accordance with the manual description and electrical wiring diagram;
- Before power on, please confirm that the equipment is properly grounded, and check the wiring connection is correct;
- Special tools should be used when performing related electrical operations;
- When the device needs to be moved or rewired, the power should be disconnected and ensure that the device is fully powered off before the appropriate operation;
- To meet EMC requirements, the length of the output line should be within 10 meters;

◆ Personnel Safety

- Personnel engaged in various electrical operations and equipment installation must hold relevant qualifications;
- In the installation, maintenance and other operations of the equipment, the relevant personnel should take appropriate protective measures according to the needs, such as wearing anti-static work clothes, wearing anti-static gloves, and removing conductive objects such as jewelry and watches, so as to avoid electric shock or burns.

◆ Handling Safety

- Please read the ' Safety Precautions ' carefully before using this product to ensure correct and safe use;
- Please operate as required during operation;
- Avoid direct sunlight, rain or humid environment Use this device;
- Don't put the equipment in the fire, or electric heater, hot stove and similar equipment nearby;
- In case of fire, please properly use dry powder fire extinguisher to extinguish the fire, if the use of liquid fire extinguisher is electric shock risk.

1.3 Working Environment

Please be careful to avoid using in the following work environments:

- High and low temperature and wet places beyond technical specifications

(Temperature : -20 °C ~ 45 ℃, relative humidity : 0 % RH ~ 95 % RH);

- Places with direct sunlight or near heat sources;
- Shocking, crash-prone sites;
- Places containing dust, corrosive substances and salt.

1.4 Safe use instructions

In order to ensure the user 's personal and property safety when using this product, the manual provides relevant information and highlights it with appropriate symbols. The following lists the symbols that may be used in this manual. Please read them carefully to make better use of this manual.

This product needs to be operated by professionally qualified personnel. Operators should fully understand the composition and principle of battery charge and discharge detection equipment, familiar with the relevant regulations and standards.

△ Warning! Failure to observe a warning indicated in this manual may result in injury.

 Danger of high voltage and electric shock!

 Instructions.

 After closing the device, wait at least 10 minutes until the capacitor discharge is completed.

 Danger of hot surface!

 Protective earth.

2、Product Introduction

The bidirectional AC/DC converter module developed by YSTECH adopts modular design, adopts advanced control algorithm to realize multi- machine parallel connection, and the power level of the parallel system covers 30KW ~ 1MW. The module has both LCD(30Kw version) local monitoring and EMS system remote scheduling functions, with excellent load adaptability and grid adaptability. At the same time, the independent air duct design makes it effectively respond to various complex application environments, and the system runs more safely, reliably, economically and environmentally adaptable.

The important is Our this Bidirectional AC/DC series power supply module adopts the most advanced and mature hardware circuit design technology, which makes the module **built-in "N" neutral line, supporting off-grid application** to provide loads with three-phase AC power "N" neutral line, so that the loads can be used in the off-grid state, and the loads can be used in the off-grid state to provide loads with three-phase AC power "N" neutral line, so that the load electrical power balance, without the need to add an external transformer, and supports three-phase unbalanced load application, but also supports each phase independent control, to meet the load flexible power needs.

In addition, our Bidirectional AC/DC series power modules have a **built-in "STS Auto Switch" Device**, which realizes **automatic switching** to the backup power supply mode in a super short period of time when there is a sudden power outage in the grid, without the need of external On/Off grid switching device, so the loads are in an uninterrupted power supply state, and the loads do not need to add external transformers. The load is in the uninterrupted power supply state, the load power supply impact is minimized, similar to the realization of the uninterruptible power supply function of the UPS, when the power grid returns to normal power supply can be automatically switched to grid-connected mode, does not require human operation, maximize the realization of the system design of the unattended.

2.1 Product Characteristic

- AC side PF value ± 1,improve the loading capacity;
- Modules adopt patented technology to achieve bidirectional flow of energy;
- Positive and negative seam switching;
- Dynamic response, STS full load switching time is **10ms** lower;
- Power density, volume, light weight;
- Touch screen operation control, simple and intuitive;
- Modular design, easy maintenance, easy expansion;
- The external connection is rich;
- **Built in STS switching device**, achieving automatic switching off grid or on grid without the need for additional device switching.
- **Built in "N" neutral line, supports ON/Off grid use,** and supports unbalanced load carrying without the need for additional transformer support.
- Support **Battery pack + Solar (MPPT Module)** input at the same time **for hybrid energy storage systems**;
- Direct interaction with BMS;

- Reliable protection performance, resistance to low temperature, humidity, salt spray and other harsh environments.
- Interleaved parallel technology to reduce ripple current;
- Multi-dimensional intelligent fan adjustment technology to reduce power consumption and noise;
- DSP design for full digital control;

2.2 Main Standard

Standard Number	Standard Name
CQC3310-2014	Technical specification of energy storage converter for photovoltaic power generation system
NBT32004-2013	Technical specification for photovoltaic grid-connected inverter
NBT33001-2010	Technical conditions of non-conductive four-quadrant power conversion system for electric vehicles
NBT33008.1-2013	Electric vehicle charging equipment inspection and test specification Part 1: Non-vehicle chargers and other current normative standards
QGDW 1885-2013	Technical conditions of energy storage converter for battery energy storage system
GB/T 34133-2017	Technical specification for energy storage converter detection
GB/T 34120-2017	Technical specification for energy storage converter of electrochemical energy storage system
IEC 62477-1	Safety requirements for power electronic converter systems and equipment-Part 1:General inverter

Table 1 Main standards met by modules

2.3 Appearance Description

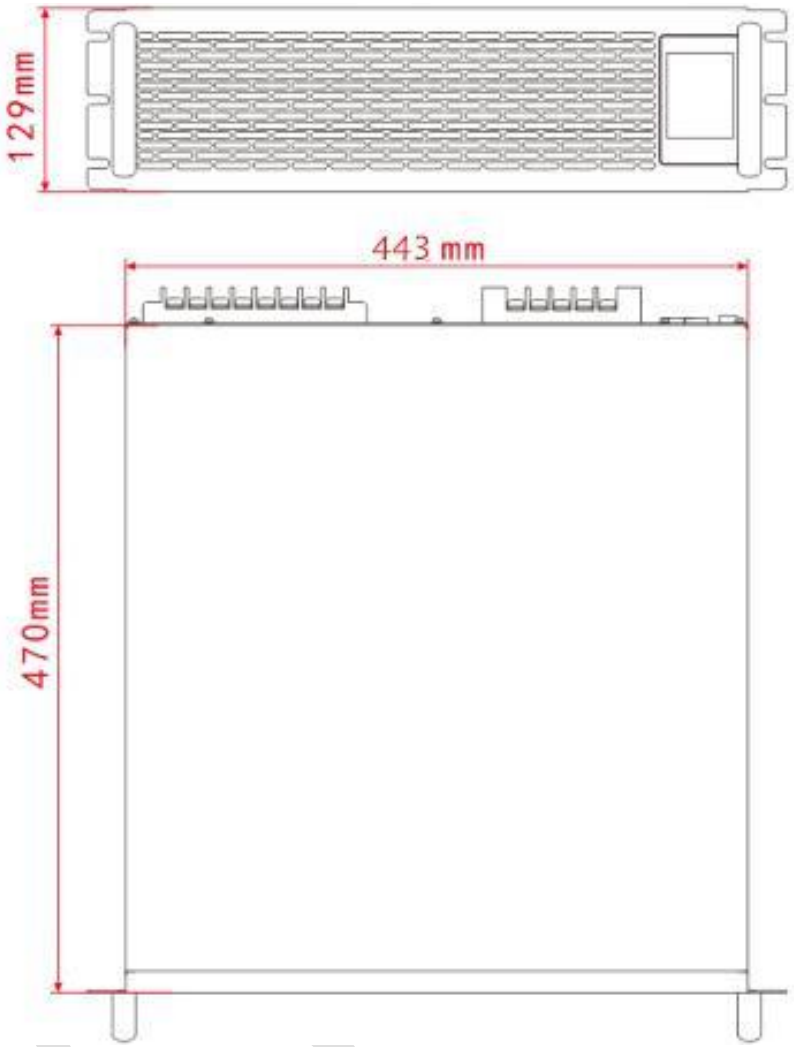

Fig. 1 PMA Series installation size

3、Installation

Danger

Direct touch with live terminals is strictly prohibited. Before installation and maintenance, ensure that AC and dc sides are not live.

3.1 Installation Environment

- The area where the equipment is placed should be well ventilated, away from water sources, heat sources, corrosive substances, flammable and explosive materials and other dangerous goods;
- Avoid installation in the environment with direct sunlight, dust, volatile gas, corrosive substances and high salt content;
- It is strictly prohibited to install the equipment in the working environment with metal conductive dust;
- Keep the inlet and outlet air holes of front and rear panels unobstructed.

3.2 Unpacking Inspection

Check availability of random accessories against shipping list (Table 2).

Warning

- Complete packaging is required in the process of equipment transportation, and transportation without packaging is strictly prohibited.
- Remove equipment packaging, visual inspection of machine appearance to check for collision damage during transport.

Attachment Name	Quantity	Unit
Series Module	1	pcs
Accessories	1	pcs

Table 2 Shipping List

The following is the optional list:

Optional Name	Quantity	Unit
Current Sensor	1	pcs
Parallel Connection Cable	1	pcs

Optional List

3.3 Mounting tool

Tool	Specification and type
Flat Screwdriver	2 x 75mm
Cross-Point Screwdriver	PH3 x 150

Table 3 Tool List

3.4 Power Cable Preparation

Rated power	Wiring	Number of cables	Rated voltage	Rated current	Wiring cross-sectional area	Terminal type
30kW	DC	2	300Vdc	100A	25mm²	OT-25mm²-M6 Terminal
	AC	8(with PE)	380Vdc	45A	10mm²	OT-10mm²-M6 Terminal
60kW	DC	2	750Vdc	80A	25mm²	OT-25mm²-M6 Terminal
	AC	8(with PE)	380Vdc	92A	25mm²	OT-25mm²-M6 Terminal
75kW	DC	2	800Vdc	94A	35mm²	OT-35mm²-M6 Terminal
	AC	8(with PE)	380Vdc	115A	35mm²	OT-35mm²-M6 Terminal
120kW	DC	2	800Vdc	150A	50mm²	OT-50mm²-M6 Terminal
	AC	8(with PE)	380Vdc	183A	50mm²	OT-50mm²-M6 Terminal

Table 4 Recommended power cable specifications

Warning

Before installation, all switches of the equipment and external distribution cabinet must be disconnected to confirm that all cables and equipment are in a state of no electricity. Not allowed to install in the state of charge, otherwise there is a danger

of electric shock.

3.5 Device Application Scenarios

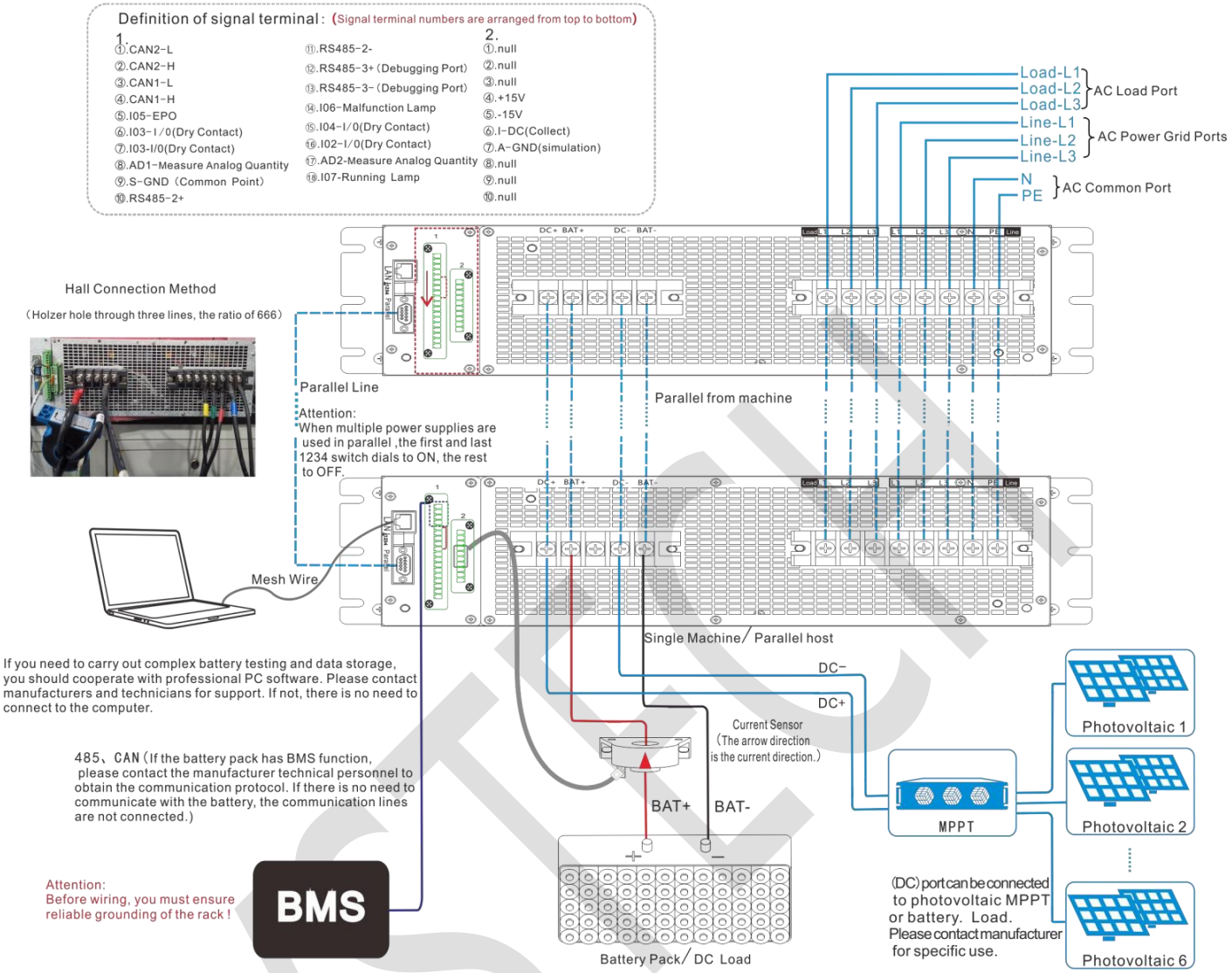

Fig. 2 Device application scenario diagram

Danger

When connecting the cable, ensure that the cable and the terminal are pressed tightly and not loose, so as to prevent the arc and heat generated by the gap, resulting in

equipment damage and casualties.

Warning

Grounding cable must be well grounded, otherwise there are the following risks :

Possible fatal electric shock hazard to operator in case of failure;

May cause damage to equipment when struck by lightning;

May cause the device to fail to function properly.

4、Display Operation Guide（Only for 30Kw Series with LCD Version）

4.1 Setting Parameters

（1）Boundary Settings

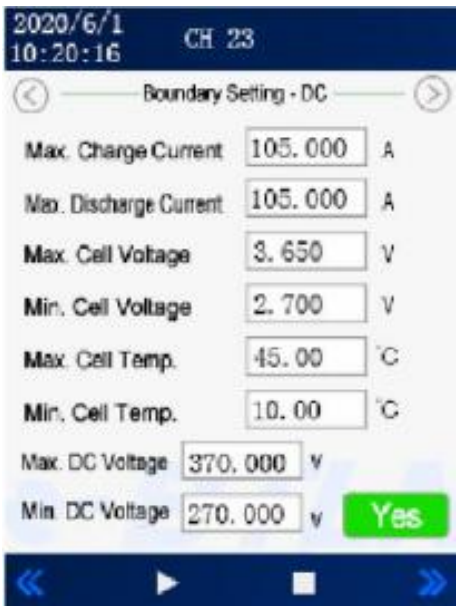

Fig. 3 Boundary Settings -DC Interface

Fig. 4 Boundary Settings -AC Interface

①. The voltage/current protection boundary and the cell voltage/temperature protection boundary need to be set according to the battery under

② . AC side parameter setting, keep the factory default value

（2）.System Setting

Fig. 5 System setting interface

Fig. 6 Date and time calibration interface

③ . If you need to use the network /CAN/485 for external communication, set the parameters as shown in the figure above. Leave the factory defaults if not required.

④ . Click the time display area in the upper left
corner to set the date and time.

4.2 Start Running

After setting the working mode and operating parameters and saving them according to the interface instructions below, click the Start button to start the device.

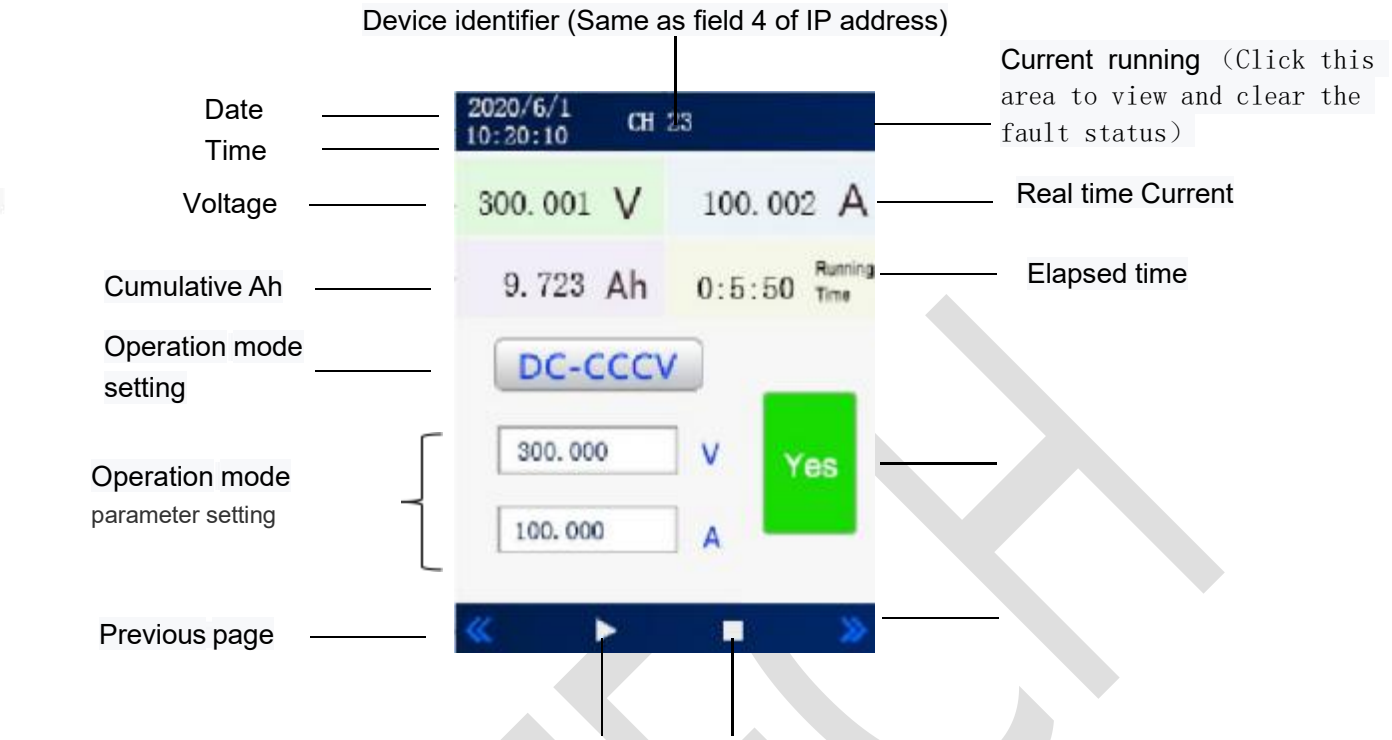

Fig. 7 Main interface of display screen

Number	Operation Mode	Description
1	DC constant current	Operation Mode of DC Constant Current Source(When the current parameter is set to negative value, it is constant current charging mode.)
2	DC constant voltage	Operation Mode of DC Constant Voltage Source
3	DC constant power	DC Constant Power Operation Mode(When the power parameter is set to negative value, it is constant power charging mode)
4	DC-CCCV	DC Constant Current Constant Voltage Operation Mode（First, run in constant current mode. After reaching the set voltage, run in constant voltage mode. Setting the current parameter to a negative value means first running in constant current charging mode.）
5	DC fixed resistance	DC Constant Resistance Operation Mode
6	AC constant power	AC side Constant Power Operation Mode
7	Impedance Testing	Battery Internal Resistance Test (according to the set current pulse amplitude and time length, calculate the battery internal resistance; Setting the current parameter to a negative value indicates the charging resistance test)
8	Independent Inverter	AC Side 220V 50 Hz Constant Voltage Operations.
9	BMS-CCCV	It is suitable for the battery with BMS communication. First, it runs at the current given by BMS at constant current. After reaching the voltage given by BMS, it runs in constant voltage mode.
10	Built-in project	If you need to use this mode for complex test projects or BMS communication protocol adaptation, please contact the manufacturer's technical personnel for detailed operation.

Table 5 Introduction to operation mode Settings

4.3 View real-time Operation Data

Click the interface switch arrow to enter the real-time data interface of device operation. You can view the real-time monitoring data of cell voltage and cell temperature during the battery charge and discharge process and the equalization process, as well as the real-time data of the DC side and AC side of the device.

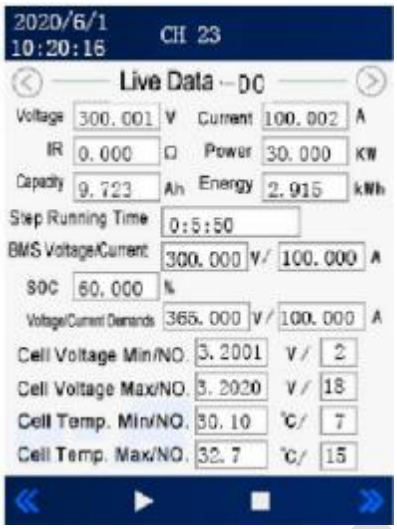

Fig. 8. Real-time data-DC interface

① .Real-time data of the DC side of the equipment and the real-time data reported by the battery BMS.

Fig. 9 Real-time data -AC interface

② .Real-time data on the AC side of the equipment.

Touch forbidden

During the operation of the device, hand touch is prohibited.

5、Maintenance

Warning

Qualified electrical engineers are required to be allowed to perform the work described in this manual. In the maintenance work, don't leave screws, washers and other metal parts in the equipment, otherwise it may damage the equipment.

Each on-site maintenance, the power supply module should be routine functional inspection, including the following aspects:

1) Check the working condition of the power module;
2) Check the operation mode switching of the power module;
3) Check the indicator display of the power module;
4) Check connection cables and wiring.

After closing the device, wait at least 10 minutes until the capacitor discharge is completed.

6、Fault Handling

Fault code	Description	Fault handling
1	High battery voltage overrun	Check battery voltage and boundary conditions
2	Battery voltage low overrun	Check battery voltage and boundary conditions
3	Battery reverse connection	Check battery wiring
4	Overrunning current	Check steps and boundary conditions
5	Overtemperature fault	Check fan, ambient temperature
6	DC soft timeout	Restart the module ; rewrite the program
7	Parallel address overrun	Check parallel connection
8	Parallel address conflict	Check the parallel wiring, re-powering
9	Parallel cable fault	Check the parallel wiring, re-powering
10	Parallel host conflict	Check the parallel wiring, re-powering
11	Signal cable fault	Check the wiring connection
12	Busbar low voltage fault	Check the bus voltage sampling ; check LLC tubes and drives
13	Bus High Voltage Fault	Check the bus voltage sampling ; check LLC tubes and drives
14	Write FLASH fault	Re-powering
15	Overcurrent times overrun	Check steps and boundary conditions
16	Over-voltage times overrun	Check the bus voltage sampling ; check LLC tubes and drives
17	Power overrun	Check steps and boundary conditions
18	Press the emergency stop button	Check the emergency stop button
19	Hardware overcurrent	Check module, contact manufacturer
20	Current unbalancing	Check output HALL wiring and ratio settings
21	Communication malfunction	Re-powering
22	Remote voltage sampling abnormality	Check remote voltage sampling
23	Reservation	
24	Reservation	
25	Balance module overcurrent	Check the load
26~29	Reservation	
30	Slave failure	Check slave machine
31	Fault from channel	Check the channel from
32	ARM fault	Check ARM
33-36	Wave-by-wave current limiting	Check the DC drive
37	Busbar overvoltage	Check the bus voltage sampling ; check LLC tubes and drives

38	PFC bus speed drop	Check LLC tubes and drives
39	Parallel mode error	Check Parallel Mode Settings
40	DC bus speed drop	Check the DC tube and drive
41~44	Parallel Communication Failure	Check Parallel Lines and Dialing Codes
45	DC bus short circuit	Check LLC tubes and drives
46	PFC bus short circuit	Check LLC tubes and drives
47	Balance module overload	Check the load
48~256	Reservation	
257	High grid voltage fault	Check grid voltage
258	Low grid voltage fault	Check grid voltage
259	Low inverter voltage fault	Check inverter voltage
260	High grid frequency fault	Check grid frequency
261	Low grid frequency fault	Check grid frequency
262	Failure of phase lock	Check grid voltage
263	Inverter soft starting relay fault	Check AC soft-start relay and load voltage sampling
264	Inverter soft fault	Check the AC tube and drive
265	Input voltage negative sequence fault	Check the input voltage phase sequence
266	AC output short circuit fault	Check AC wiring
267	AC output current imbalance fault	Check the load
268	Output overcurrent fault	Check the AC tube and drive
269	Output current 1.1 times overload fault	Check the load
270	Output current 1.2 times overload fault	Check the load
271	PFC bus voltage low fault	Check the AC tube and drive
272~274	PFC bus voltage high fault	Check the N-line connection
275	PFC bus voltage sampling fault	Check bus sampling
276	DC soft fault	Check module, contact manufacturer
277	PFC bus voltage imbalance fault	Check bus sampling
278	Bus voltage asymmetry fault	Check bus sampling
279	DC output short circuit fault	Check the AC tube and drive ; check output wiring
280	Radiator high temperature fault	Check fan, ambient temperature
281	PFC Soft Start Timeout	Check the AC tube and drive
282	Reservation	

283	Reservation	
284	Reservation	
285	Reservation	
286	Reservation	
287	Auxiliary source fault	Check 12V power supply
288	Power plate type mismatch fault	Check power boards and programs
289	Signal cable fault	Check the wiring connection
290	Low wear fault	Check AC voltage
291	Rectifier soft fault	Check soft drive of side plate
292	Reservation	
293	Reverse Bus Fault	Check bus wiring
294	Reservation	
295	Reservation	
296	Reservation	
297	Reservation	
298	U-phase current sealing fault	Check the A-phase tube
299	V-phase current sealing fault	Check the A-phase tube
300	W phase current sealing fault	Check the A-phase tube
301	Output 1.1 times current failure	Check the load
302	Output 1.2 times current failure	Check the load
303	DC mode soft fault	Check soft relay and load voltage sampling
304	DC mode output voltage high fault	Check DC output voltage
305	DC mode voltage reverse fault	Check DC wiring
306	Phase A insurance failure	Check Phase A insurance
307	Phase B insurance failure	Check Phase B insurance
308	Phase C insurance failure	Check Phase C insurance
310	System side overload 1.2 times	Check the load
311	Line Load voltage phase inconsistency	Check load wiring
312-330	Reservation	
331	A phase host relay adhesion	Checking module
332	B phase host relay adhesion	Checking module
333	C phase host relay adhesion	Checking module
334~511	Reservation	
32790	DSP communication interrupt	Check power supply

7、Technical Parameter

7.1 AC Side Parameters

Base model Series	**PMA030**	**PMA060**	**PMA075**	**PMA120**
Rated input Power	30Kw	60Kw	75Kw	120Kw
Input type	3P+N+PE			
Rated voltage	380Vac ±15% (380/400/415Vac)			
Rated current	45A	92A	115A	183A
Rated frequency and range	50/60Hz			
Power factor adjustment range	±1			
Harmonic content THDi	≤3%			

7.2 DC Side Parameters

Base model Series	**PMA030**	**PMA060**	**PMA075**	**PMA120**
Rated voltage （BAT+/-）	300Vdc	750Vdc	800Vdc	800Vdc
Rated current （BAT+/-）	100A	80A	94A	150A
Voltage range （DC+/-）	**50Vdc-950Vdc** (10~450V optional)	**680Vdc-1000Vdc**		
Current range （BAT+/-）	±100A	±88A	±110A	±176A
voltage error	±1%			
Voltage accuracy	±1%			
Current error	±1%			
Current accuracy	±1%			
Voltage limiting function	Yes			
Current limiting function	Yes			

7.3 Basic Characteristic

Base model Series	**PMA030**	**PMA060**	**PMA075**	**PMA120**
AC / DC startup function	Yes			
Power switching time	≤10ms			
Peak efficiency	95%	97%	98.6%	98.6%
Built In STS Device	Yes			
Built in "N" neutral line	Yes			
Multi module parallel support	Yes			
LCD	Yes	No		
IP Level	IP20			
Dimensions (H*W*D)	129*443*70mm (3U Size)			
Weight (kg)	30kg	28kg	32kg	32Kg

7.4 Environmental Condition

Operating temperature range	°C	-20℃~+45℃	
Operating humidity range	%RH	<+95	Relative humidity, non-condensing
Storage temperature	°C	-40 ~ +55	
Storage humidity	%RH	0 ~ +95	Relative humidity, non-condensing
Cooling type	-	Forced-air cooling	
Elevation	m	3000	/
IP level	-	IP20	
Noise	dB	< 70	

7.5 Communication

Communication methods	-	CAN BUS, RS485 , ethernet, dry contact
Upload signal	-	Various protection signals, voltage and current signals
receiving signal		According to the communication protocol

7.6 Security Property

Safety Specification Standards	-	Reference 18487.1
Hipot：Input & Output-PE	-	3535Vdc
Hipot：Input & Output-Communication	-	4242Vdc
Surge：Input & Output-PE	kV	6
EMC characteristic	-	Reference33008.1
Radiation	-	CLASS A
ESD	-	Compatibility level 3
EFT	-	Compatibility level 3
Radiated susceptibility	-	Compatibility level 3
MTBF	hrs	100000

8、Quality Assurance

Products that failed during the warranty period, sent back to the factory for repair or replace new products.

1. Evidence

During the warranty period, please protect necessary usage scenarios and business transaction data.

2. Condition

- Disqualified products after replacement shall be handled by the Company;
- The customer should reserve a reasonable time for the company to repair the defective equipment.

3. Liability exemption

If the following occurs, our company has the right not to provide quality assurance:

- Machine, parts have exceeded the free warranty period
- Transportation damage
- Incorrect installation, modification or use
- Very harsh environment operation beyond what is described in this manual
- Machine failure or damage caused by installation, repair, change or disassembly by non-service personnel of the company
- Machine failure or damage caused by the use of non-standard or non-company components or software
- Any installation and use beyond those specified in relevant international standards
- Damage caused by abnormal natural environment

The product failure caused by the above situation, the customer requires maintenance services. After the company ' s service agency to determine, can provide paid maintenance services

In order to continuously improve customer satisfaction, the company ' s products and

user manuals are in continuous improvement and upgrading. If the manual in your hand is different from the product, it may be due to the version, please refer to the specific

product. If there are still doubts, please contact the company.

Instructions

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product is 1 year.