JingTsing

JTES-PCS100K-1000/400-L05C1,

JTES-PCS125K-1000/400-L05C1

USER MANUAL

JingTsing Technology Ltd.

Contents

FOREWORD

Sketch

- The main function of PCS is to realize the energy exchange between the battery and the power grid, and to control the charge and discharge of the battery. In the grid-connected system, PCS mainly operates in the current source (P/Q) mode to achieve peak cutting and valley filling, frequency modulation and peak regulation, active power reserve and reactive power support. At the same time, PCS also supports a variety of charge and discharge modes such as constant voltage, constant current and constant power.
- 125kW PCS series [Model abbreviation: JTES-PCS100K-1000/400-L05C1, JTES-PCS125K-1000/400-L05C1], the use of liquid cooling solution, with high response, high power density, high integration and other characteristics, support off-grid function, support no isolation of the grid.
- This manual is applicable to specific models of PCS:
    a) JTES-PCS125K-1000/400-L05C1;
    b) JTES-PCS100K-1000/400-L05C1;
- This document describes the functions, features and usage of JTES-PCS100K-1000/400-L05C1, JTES-PCS125K-1000/400-L05C1 series PCS, including product installation (electrical and mechanical parts), field commissioning, fault analysis, daily maintenance and maintenance, and other related instructions and precautions.
- Before using, be sure to read this manual carefully and understand the safety precautions before using the product.

Version record

Revision date	Versions	Change/add/delete content
July 30, 2024	01	The first edition
February 20, 2025	02	Add: ESS Adaptation Information
August 15, 2025	03	Fault Code Handling Measures Update
July 24, 2026	04	Update

Acquisition mode

This manual is not shipped with the product. To obtain the electronic PDF file, you can visit the website of Jing Tsing Technology Ltd. (www.jingtsing.com) and download it.

Warranty and After-Sales Service Policy

1. Warranty Commitment and Period

Under normal use, if the Power Conversion System (hereinafter referred to as "the Product") fails or is damaged due to defects in materials, design, or manufacturing workmanship, Jing Tsing Technology Ltd. commits to providing free repair or replacement services.

Hardware Warranty Period: The Product comes with a 12 months free warranty. The warranty period commences from the date of successful delivery and acceptance (or 90 days after the date of manufacture, whichever is applicable).

Key Components Warranty: During the 3-year hardware warranty period, core power modules (e.g., IGBTs), main control boards, and cooling systems are fully covered under the free warranty.

2. Out-of-Warranty Service

Upon expiration of the warranty period, Jing Tsing Technology Ltd. will continue to provide lifelong paid maintenance services for the Product. Out-of-warranty repair fees will be charged based on the actual costs of parts, labor, and travel, in accordance with the manufacturer's unified standard or a separately signed service agreement.

3. Disclaimer (Exclusions from Warranty)

Even if the Product is within the warranty period, Jing Tsing Technology Ltd. will provide paid repair services if the failure or damage is caused by any of the following conditions:

Improper Operation: Product damage resulting from failure to install, wire, commission, or operate the Product strictly in accordance with the User Manual and installation guidelines.

Unauthorized Modifications: Mechanical failure or damage caused by unauthorized disassembly, repair, or modification by non-authorized service agencies or the customer, or by unauthorized alteration of the device's serial number/nameplate.

Accessory Issues: Failure or damage caused by the use of non-standard accessories, or by inherent quality defects of customer-procured accessories.

Out-of-Scope Use: Product damage resulting from using the Product for abnormal/unintended functions, or operating it in environments that exceed the specified technical parameters (e.g., voltage, current, temperature, and humidity limits).

Force Majeure: Product damage or secondary damage caused by force majeure events, including but not limited to natural disasters (e.g., earthquakes, floods), lightning strikes, fire, or abnormal grid voltage fluctuations.

Normal Wear and Tear: Natural aging and wear of the entire machine and components beyond the free warranty period.

4. After-Sales Service and Response Mechanism

To ensure the safe and stable operation of the energy storage system, Jing Tsing Technology Ltd. provides the following after-sales support:

Technical Support: 24/7 telephone and online technical consultation to assist customers with daily O&M and basic troubleshooting.

Response Time: Upon receiving a repair request, our after-sales team will provide remote response and diagnostics within 2 hours. If on-site handling is required, our technicians will arrive at domestic project sites within 48 hours (subject to negotiation based on the specific location and urgency).

Spare Parts Supply: Beyond the warranty period, we will continuously supply spare parts that meet original factory standards to ensure the long-term stable operation of the equipment.

5. Supplementary Provisions

Fee Standards: Relevant fees for paid services will be calculated strictly according to the manufacturer's unified standard. However, if a separate written agreement exists, the terms of that agreement shall prevail.

Manual Disclaimer: This User Manual and related technical documents will be continuously updated and amended. Minor inconsistencies or errors between the manual and the actual product may inevitably occur; therefore, the actual product delivered shall prevail.

6. IMPORTANT NOTICE: AUSTRALIAN CONSUMER GUARANTEES

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Manufacturer: JingTsing Technology Ltd.

Address: Room 1003, 10th Floor, Building 1, Yard 5, Beihuang Muchang North Street, Tongzhou District 101100 Beijing P.R.China

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Official website: http://www.jingtsing.com/

Declaration of Country of Origin

We hereby declare that all the aforementioned products are manufactured in the People's Republic of China.

1 Safety precautions

Safety statement

- When installing, operating, and maintaining the product, read and follow these safety precautions.
- To ensure the safety of the human body and equipment, follow the label on the product and all the safety precautions described in this document when installing, operating, and maintaining the product.
- The "Danger", "Warning" and "Attention" in the manual do not represent all the safety matters that should be followed, but only supplement all the safety precautions.
- This product should be used in an environment that meets the design specifications; otherwise, it may cause malfunction. The function abnormality or component damage caused by non-compliance with the relevant regulations is not within the scope of product quality guarantee.
- Due to illegal operation of products caused by personal safety accidents, property losses, etc., our company will not assume any legal responsibility.

Use of symbols

To ensure the safety of the user's personal and property when using the product, and to use the product more efficiently and optimally, the manual provides relevant information and uses the following symbols to highlight it. The following is a list of symbols that may be used in this manual, please read carefully to make better use of this manual.

Safety class definition

 DANGER

Indicates a hazard with a high level of risk that will result in death or serious bodily injury if not performed according to the regulations.

 WARNING

Indicates a hazard with a medium level of risk that could result in death or serious bodily injury if not performed according to the regulations.

 ATTENTION

Indicates a hazard with a low level of risk that will result in minor injury or equipment damage if not performed according to the regulations.

DANGER

- The important safety instructions shall appear before the battery installation procedures and maintenance.
- Any touch of the copper bars, contacts, or terminals inside the device connected to the power grid circuit may cause combustion or fatal electric shock!
- Do not touch any copper bar or terminal connected to the power grid circuit.
- Pay attention to any instructions and safety documentation regarding grid connection.

WARNING

- Before connecting the input power supply, ensure that the ground is reliable.
- The device must be grounded and comply with local electrical regulations.
- When a battery is connected to the PCS, the input port may have DC voltage. Note or check the battery system user manual during operation.
- There may be electric shock hazard inside the equipment! Any operation related to this equipment must be carried out by a professional.
- Pay attention to the safety precautions listed in the safety instructions and installation documentation.
- Note the safety precautions listed in the operation and installation manuals and other documents.
- Do not touch live parts within 5 minutes of switching off the power supply!
- The internal capacitor stores dangerous energy. Do not touch live parts of the device, such as terminals, contacts, and copper bars, within 5 minutes after turning off all power supplies.
-

ATTENTION

- All internal maintenance the equipment shall be carried out by trained personnel.
- Internal components that need to be opened using the tool cannot be maintained by users.
- Please read this user manual before operation.

ATTENTION

Warning statements: Be sure to read the following warning statements and fully understand them before installing the device.

CAUTION：

All device parameters are pre-configured at the factory, so no user configuration is required.

Users do not have permission to modify parameters; please contact the manufacturer for any parameter adjustments.

However, users can monitor and view grid parameters, firmware versions, and other information through PCS integration.

2 Product information

2.1 Model and Nameplate description

（1）Specific model

Specific model：		JTES-PCS125K-1000/400-L05C1； JTES-PCS100K-1000/400-L05C1；
Identification	Analytic specification	
JTES	Product brand	Jing Tsing energy storage products ES/ Hydrogen energy products HS
PCS	Product series	PCS/STS
125K	Power class	Rated apparent power 100kW/125kW/215kW/450kW/500kW/1000kW and so on.
1000	Dc voltage class	Maximum input voltage on the DC side 2000Vdc/1600Vdc/1500Vdc/1000Vdc
400	AC voltage class	Rated AC voltage 400Vac/480Vac/690Vac/740Vac/1000Vac
L	Cooling mode	L：liquid cooling A：air cooling
05	Regional certification	01 China; 03 North America; 05 Europe;
C	installation	C: Drawer type; L: Vertical; G: Cabinet
1	products iteration	1/2/3 Iterate with product certification

Tab.2-1 product model

（2）Product abbreviation：JTES-125K-W compatible JTES-100K-W

This manual is declared as product abbreviation;

（3）Nameplate drawing:

Power Conversion System	
JTES-PCS100K-1000/400-L05C1	
DC Side	
Max. DC Voltage	1000 d.c. V
DC Voltage Range	680~1000 d.c. V
Nominal DC Power	100 kW
Max. DC Power	110 kW
Max. DC Current	162 d.c. A
AC Side	
Nominal AC Voltage	3P+N+PE, 230/400 a.c. V
AC Voltage Range	0.85 ~ 1.1Un
Nominal AC Frequency Range	50/60 Hz
Max. AC Current	159 a.c. A
Nominal Apparent AC Power	100 kVA
Nominal AC Power	100 kW
Max. Apparent AC Power	110 kVA
Max. AC Power	110 kW
Power Factor Range	-1 ~ +1
General	
Operating Ambient Temperature Range	-20°C ~ +50°C
Ingress Protection	IP65
Liquid coolant	50% glycol solution + 50% water
Nominal operating pressure	23 kPa
Weight	125 kg
Protective Class	Class I
Overvoltage Category	III (AC), II (DC)
Transformer or non-isolated	Non-isolated
Safety	IEC/EN 62477-1
EMC	EN 61000-6-2, EN 61000-6-4
Grid Code	EN 50549-1, EN 50549-2, AS/NZS 4777.2, VDE-AR-N 4110, VDE-AR-N 4120

MADE IN CHINA

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JingTsing

Power Conversion System	
JTES-PCS125K-1000/400-L05C1	
DC Side	
Max. DC Voltage	1000 d.c. V
DC Voltage Range	680~1000 d.c. V
Nominal DC Power	125 kW
Max. DC Power	137.5 kW
Max. DC Current	202 d.c. A
AC Side	
Nominal AC Voltage	3P+N+PE, 230/400 a.c. V
AC Voltage Range	0.85 ~ 1.1Un
Nominal AC Frequency Range	50/60 Hz
Max. AC Current	198 a.c. A
Nominal Apparent AC Power	125 kVA
Nominal AC Power	125 kW
Max. Apparent AC Power	137.5 kVA
Max. AC Power	137.5 kW
Power Factor Range	-1 ~ +1
General	
Operating Ambient Temperature Range	-20°C ~ +50°C
Ingress Protection	IP65
Liquid coolant	50% glycol solution + 50% water
Nominal operating pressure	23 kPa
Weight	125 kg
Protective Class	Class I
Overvoltage Category	III (AC), II (DC)
Transformer or non-isolated	Non-isolated
Safety	IEC/EN 62477-1
EMC	EN 61000-6-2, EN 61000-6-4
Grid Code	EN 50549-1, EN 50549-2, AS/NZS 4777.2, VDE-AR-N 4110, VDE-AR-N 4120

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Fig.2-1 Product nameplate

Remark：

CE	EU Certification Mark
	Australia and New Zealand Regulatory Compliance Mark (RCM)
	WEEE Symbol Mark

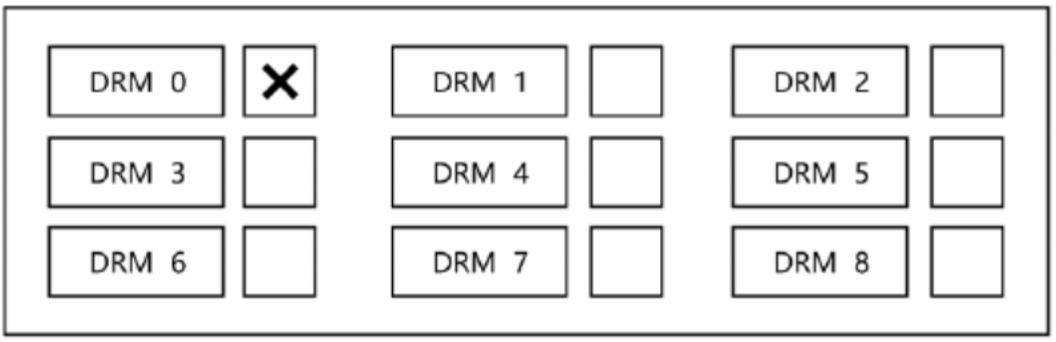


Fig.2-2 Product nameplate-DRM

Remark：

Mode	Requirement
DRM 0	Operate the disconnection device
DRM 1	Do not consume power
DRM 2	Do not consume at more than 50 % of rated power
DRM 3	Do not consume at more than 75 % of rated power AND supply reactive power if capable
DRM 4	Increase power consumption (subject to constraints from other active DRMs)
DRM 5	Do not generate power
DRM 6	Do not generate at more than 50 % of rated power
DRM 7	Do not generate at more than 75 % of rated power AND absorb reactive power if capable
DRM 8	Increase power generation (subject to constraints from other active DRMs)
NOTE Demand response modes of Table 3.1 are as described in AS/NZS 4755.3 series of Standards.	

2.2 Overview of PCS system

The main function of the PCS system is to realize the electric energy conversion between the grid and the battery, and to monitor and manage the exchange process. The system mainly includes PCS, battery packs, battery management equipment (BMS) and energy management equipment (EMS). The energy storage system diagram is as follows:

The Schematic diagram of Battery Energy storge system (BESS)

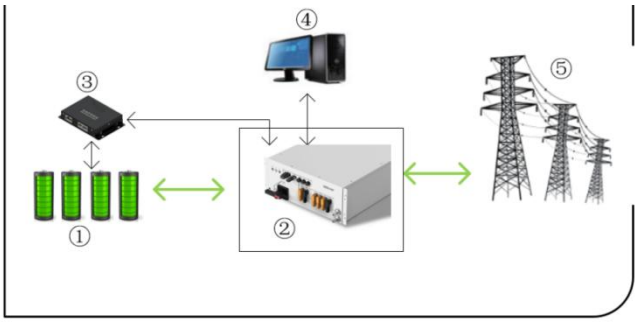
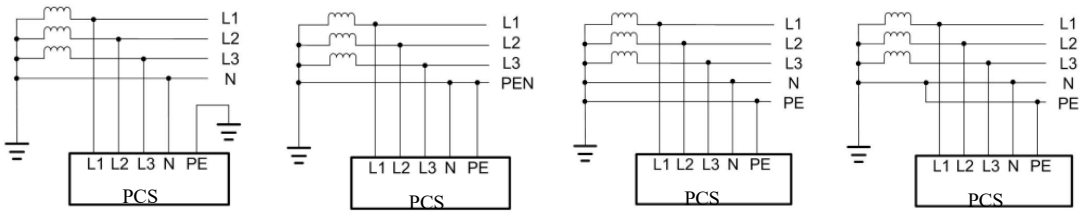


Fig.2-2 ESS System diagram

NO.	Name	Instructions
1	Battery	Battery composition system: The number and type of batteries in series and parallel are configured by users, and it is necessary to meet the voltage range on the DC side of PCS.
2	PCS	The PCS is responsible for the two-way energy exchange between the grid and the battery pack.
3	BMS	Battery management system, responsible for battery management, protection and monitoring.
4	EMS	The energy management system is responsible for energy scheduling and monitoring of the entire energy storage system.
5	Power Grid	When PCS works in grid-connected mode, the AC side must be connected to the power grid, and the DC side can be connected to the battery. The power grid types supported by PCS are as follows:

Tab.2-2 Description of energy storage system



TT TN-C TN-S TN-C-S

2.3 Overview of the principle of PCS

The PCS is the core component to realize the bidirectional flow of electric energy between the energy storage system and the power grid, which is used to control the charging and discharging process of the battery and perform AC/DC conversion。

The principal diagram is as follows:

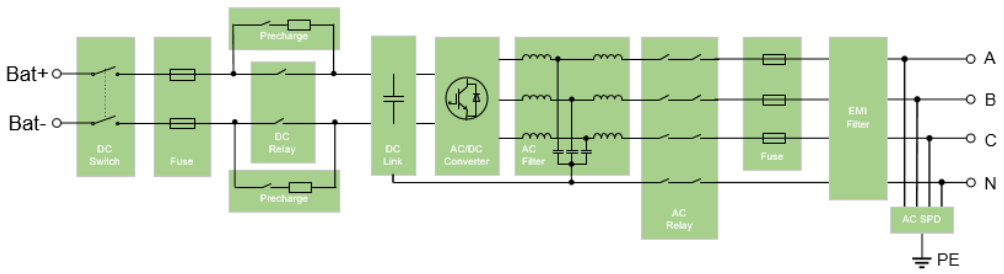


Fig.2-3 Schematic diagram of energy storage converter

Working mode:

The JTES-125K-W series PCS support both on-grid and off-grid operation modes.

In grid-connected operation, the AC side of the PCS connects to the power grid, and the DC side connects to the battery. Cooperate with the power grid dispatching system, and realize the peak cutting and valley filling of the power grid load. According to the selected operation mode, the battery can be charged and discharged at constant voltage, constant current and constant power.

2.4 Label Conventions

Remark: This equipment is not intended to use in residential environments and may not provide adequate protection to radio reception in such environments.

Warning signs are available on the PCS side, as described in Table 2-3.

Table 2-3 Warning signs and Symbol

Symbol	Label	Meaning
	Electric shock	■ Lethal voltages 1000 V DC. Keep out. ■ No user serviceable parts inside. Only trained service personnel are allowed access. ■ Both AC and DC voltage sources are terminated inside this equipment. Each circuit must be disconnected before servicing. ■ The Battery supply DC voltage to this equipment.
	Burn	Hot surfaces. To reduce the risk of burns do not touch heatsink nor the sides of the PCS.
	Delay discharge	■ Risk of electric shock from energy stored in capacitors. ■ Wait 5 minutes after disconnecting all sources of power to remove cover.
	Refer to documentation	Remind operators to refer to the documentation shipped with the JTES-125K-W user manual.
	Protection ground label	Indicates the position for connecting the protection ground cable.

2.5 Port description

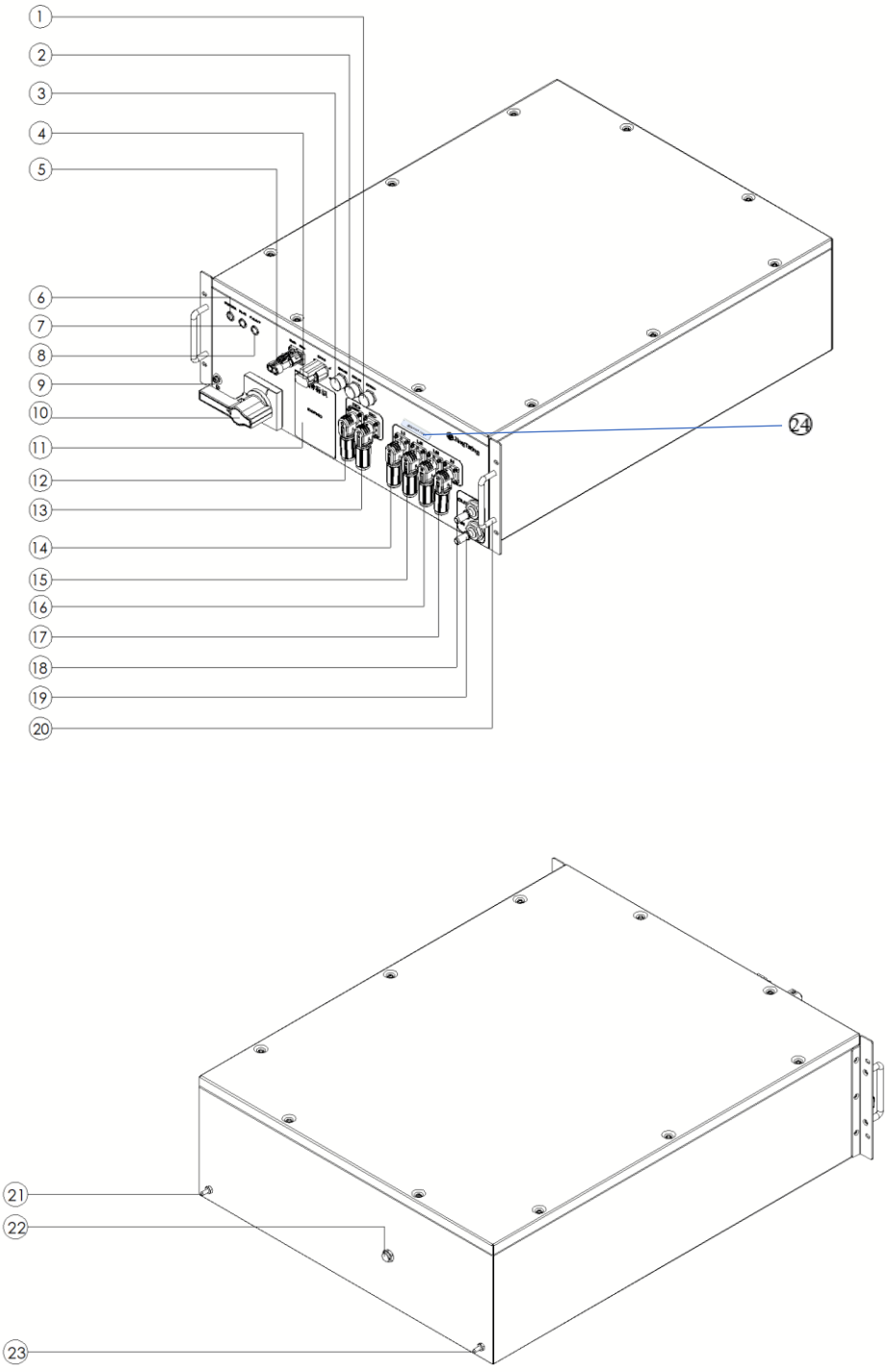


Fig.2-4 Product port identification (Drawer structure)

No.	Name	Instructions
1.	COM4	EMS Ethernet interface
2.	COM3	Port 2 on the off-grid parallel network
3.	COM2	Port 1 on the off-grid parallel network
4.	COM1	Communication and DI/DO signal interface
5.	Bat+/Bat-	High voltage output port (optional)
6.	Power indicator light	When the DC side is powered on, the DC indicator is steady on
7.	Running light	The green indicator is steady on in running mode and blinking in standby mode at a frequency of 1s.
8.	Fault light	When there is a fault, the red fault light is steady on. When there is no fault, the red fault light is not on.
9.	Gr	The ground resistance is less than 0.1Ω and the wire diameter is 35mm²
10.	DC isolation switch handle	Isolate and break the battery voltage. Do not break the battery with power
11.	Equipment nameplate	Manufacturer product information
12.	DC plug DC+	Connect the battery or the positive terminal of the high voltage switch box
13.	DC plug DC-	Connect the battery or the negative terminal of the high voltage switch box
14.	AC plug L1	The AC side outputs phase A
15.	AC plug L2	The AC side outputs phase B
16.	AC plug L3	The AC side outputs phase C
17.	AC plug N	The AC side outputs phase N
18.	Coolant outlet	Coolant output port
19.	Coolant inlet	Coolant input port
20.	Equipment handle	The handle of the PCS cannot load-bearing and is mainly used for pushing and pulling the PCS
21.	Locating pin	For mounting and fixing
22.	Breather valve	Adjust the air pressure in the module
23.	Locating pin	For mounting and fixing
24. 24	Warning Label	Warning Label

Tab.2-3 Product port description

2.6 Product size

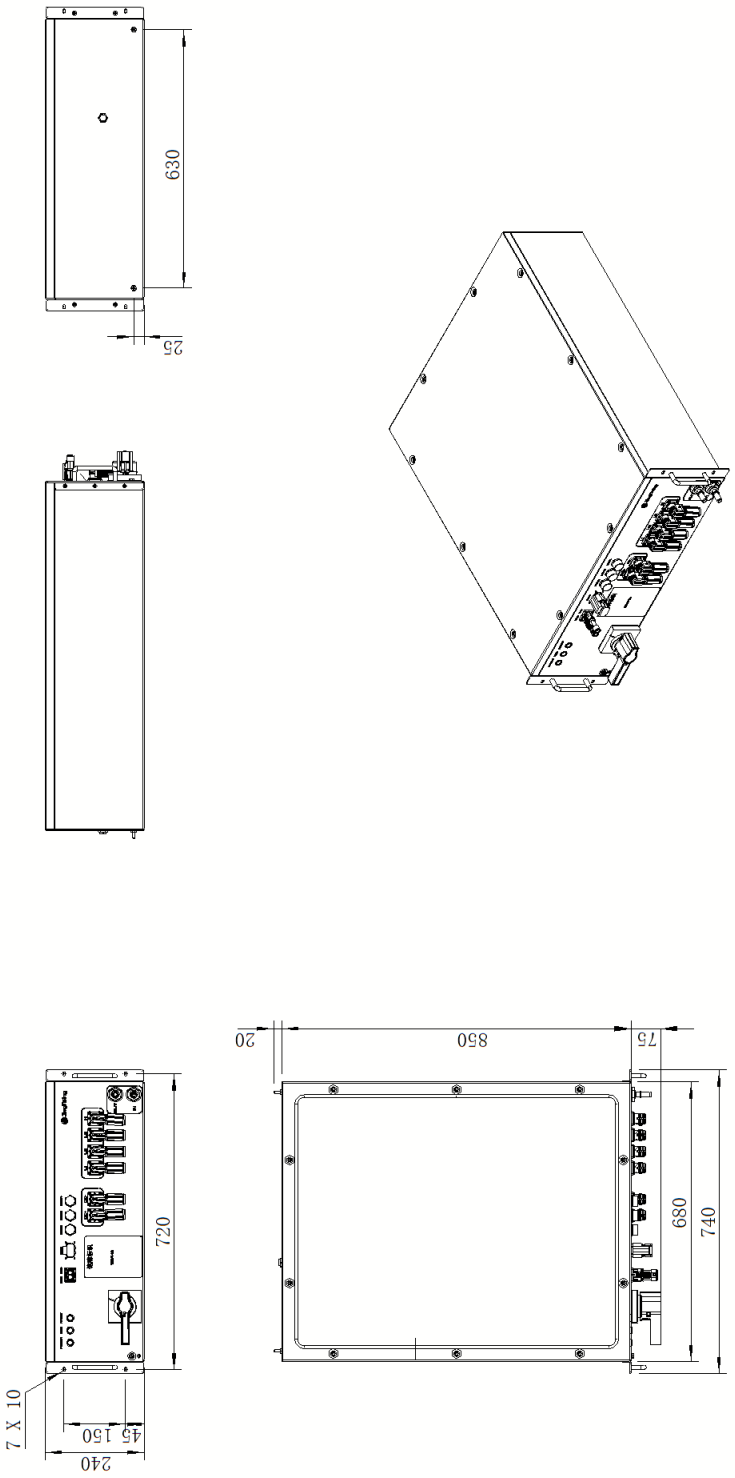


Fig.2-5 Product size drawing（Drawer structure）(unit：mm）

2.7 Product technical specifications

Tab.2-4 Product technical specifications

SPECIFICATION	JTES-PCS125K-1000/400-L05C1	
	Maximum DC Current	202A
	Maximum DC voltage	1000Vdc
	Range of input operating voltage with full power	680~1000Vdc
	Rated conditional short-circuit current [Ad.c.]	5.22 kA
	Overvoltage Category (OVC)	II
GRID SIDE PARAMETERS （grid-connected）	Rated apparent power	125kVA
	Maximum power	137.5kW
	Rated AC Current	180A
	Maximum Current	198A（1.1 times rated current for long-term operation） 217A（1.2 times the rated current run for 1min）
	Grid Connection Type	3P+N+PE
	Power Factor Range	>0.99（Rated apparent power）-1 ~ +1
	Rated Grid Voltage	230/400Vac
	Operating voltage range	340 ~ 440Vac
	Rated Grid Frequency	50/60Hz
	Overvoltage Category (OVC)	III
	Off grid switching time	<20ms
	THDI At Rated Power	<3%（Rated Condition）
	DC Component	<0.5%
SYSTEM PARAMETER	Maximum Efficiency	98.3% (Subject To Actual Measurement)
	The short-circuit current (Icc)	<10kA
	External Protective Device (circuit breaker)	250A/400Vac (line voltage)
	Overload Capacity	1.1 times rated long term
	Ambient Temperature	-20℃~ +50℃

	Permissible Humidity Range	0%~95%
	Maximum Operation Height	≤2000m
	Noise	1 meter away from the horizontal position of the equipment，≤70dB
	Cooling Function	Liquid Cooling
	Maximum Coolant Temperature	≤45℃
	Coolant ratio	50% glycol solution
	HVRT/LVRT	support
	Communication Interface	RS-485; Ethernet; CAN
	Communication Protocol	CAN / Modbus-TCP/RTU
	Weight	125 kg
	Protective IP	IP65
	Protective Class	Class I
	Intended environment	In Door (unconditioned)
	Active anti-islanding method	Frequency shift
Connect Location	Installation Method	Drawer Type
	DC Power	Front Connection，Heavy-duty Terminal
	AC Power	Front Connection，Heavy-duty Terminal
	Communication	Connection，Terminal/RJ45
	Battery type	Li-ion batteries
	Isolation type	Non-Isolated
	Liquid	Front Panel
	Dimension	W680mm*H240mm*D850mm

Tab.2-5 Product technical specifications

SPECIFICATION	JTES-PCS100K-1000/400-L05C1	
DC SIDE PARAMETERS	Maximum DC Current	162A
	Maximum DC Voltage	1000Vdc
	Range Of Input Operating Voltage with Full Power	680~1000Vdc
	Rated conditional short-circuit current [Ad.c.]	5.22 kA
	Overvoltage Category (OVC)	II
GRID SIDE PARAMETERS （grid-connected）	Rated Apparent Power	100kVA
	Maximum Power	110kW
	Rated AC Current	144A
	Maximum Current	159A（1.1 times rated current for long-term operation） 173A（1.2 times the rated current run for 1min）
	Grid Connection Type	3P+N+PE
	Power Factor Range	>0.99（Rated apparent power）-1 ~ +1
	Rated Grid Voltage	230/400Vac
	Operating Voltage Range	340 ~ 440Vac / -15% ~ +10%
	Rated Grid Frequency	50/60Hz
	Overvoltage Category (OVC)	III
	Off grid switching time	<20ms
	THDI At Rated Power	<3%（Rated Condition）
	DC Component	<0.5%

SYSTEM PARAMETER	Maximum Efficiency	98.3% (Subject To Actual Measurement)
	The short-circuit current (Icc)	<10kA
	External Protective Device (circuit breaker)	250A/400Vac (line voltage)
	Overload Capacity	1.1 times rated long term 1.2 times rated operation for 1min
	Ambient Temperature	-20℃~ +50℃
	Permissible Humidity Range	0%~95%
	Maximum Operation Height	≤2000m
	Noise	1 meter away from the horizontal position of the equipment，≤70dB
	Cooling Function	Liquid Cooling
	Maximum Coolant Temperature	≤45℃
	Coolant ratio	50% glycol solution
	HVRT/LVRT	support
	Communication Interface	RS-485; Ethernet; CAN
	Communication Protocol	CAN / Modbus-TCP/RTU
	Weight	125 kg
	Protective IP	IP65
	Protective Class	Class I
	Intended environment	In Door (unconditioned)
	Active anti-islanding method	Frequency shift
Connect Location	Installation Method	Drawer Type

	DC Power	Front Connection， Heavy-duty Terminal
	AC Power	Front Connection， Heavy-duty Terminal
	Battery type	Li-ion batteries
	Isolation type	Non-Isolated
	Communication	Connection，Terminal/RJ45
	Liquid	Front Panel
	Dimension	W680mm*H240mm* D850mm

3 Devanning/Transfer/Storage

3.1 Devanning

 ATTENTION

1) The packaging of PCS is not allowed to be removed during storage, and will be removed during installation.
2) When receiving goods from a shipping company, it is necessary to carefully inspect the product.
3) Check each received item against the supply list. If the goods are missing or damaged, the shipping company shall be notified immediately upon discovery.

Unpacking steps:

1) Remove all cable ties and cover the case
2) Remove all filler material
3) Take out the module and accessories
4) Cut the plastic wrap of the module
5) Make sure there are no signs of damage. Dispose of or recycle packaging in accordance with local regulations

The following items must be checked after unpacking:

1) Whether the packing case is damaged or not
2) Check the goods according to the delivery note for completeness and consistency
3) Appearance no damage, scratches, dents and other phenomena

If you have the above problems, please contact the transportation company or directly with JingTsing Technology Ltd, and provide damage or incomplete information to facilitate the provision of services.

3.2 Transfer

3.2.1 Transport precautions

 ATTENTION

- Try the forklift. If it does not fit, adjust the foot of the forklift. After the test fork is suitable, fork up the PCS and transfer horizontally to the appropriate position.
- The fluctuation height of PCS in the transport process should be as low as possible.

- Long distance transfer or slope road is prohibited for hydraulic vehicles, otherwise it may damage the hydraulic vehicles.
- Handle gently during takeoff and landing to avoid shock or vibration. When the forklift truck descends, be careful not to press the foot.
- When moving, make sure the ground is flat.

3.2.2 Transfer after unpacking

Adjust the width of the forklift foot so that the center of gravity is in the center of the forklift foot. If the packaging has been removed, fork it into the same position of the PCS, and transfer it horizontally to the appropriate position.

3.3 Storage

Storage requirements:

- Use original packing box to pack.
- The storage environment must be clean and tidy. The ring temperature ranges from -40 ℃~+70 ℃, and the ring temperature varies less than 1℃ /min. The relative humidity ranges from 0 to 95%, without condensation.
- When multiple devices are stacked, the number of stacked layers cannot exceed two.
- The packing case cannot be tilted or turned upside down.
- The storage time is one year or more, and it needs to be checked and tested by professionals before it can be put into use.

Note: Please store the product according to the storage requirements. If the storage conditions are not met, the product damage will not be covered by the warranty.

4 Mechanical installation

4.1 Requirements Of Installation Environment

Installation item	Environmental requirement
Pollution level	2
Altitude	≤ 2000m
Ambient temperature requirement	-20℃ ~ +50℃ (>50℃ derated operation)
Allowable relative humidity	0%RH - 95%RH

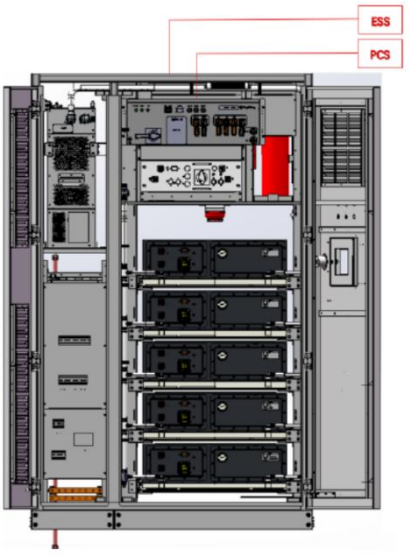
Tab.4-1 Installation environment requirements

4.2 Installation space requirement

This product must be installed in an electrical cabinet and applied in the final energy storage system. The electrical cabinet shall meet a minimum protection rating of IP20. The cabinet enclosure or door shall not be accessible/openable without authorization; the door shall be lockable or equipped with a similar locking mechanism to prevent accidental opening by users. It is recommended to reserve adequate safety clearance. The minimum clearance should be no less than 1 meter at the front, 0.5 meters on both sides, and 0.3 meters at the rear. If the equipment is installed vertically (one above the other), a minimum vertical clearance of 0.3 meters should be maintained.The cabinet must have a solid surface to meet the load-bearing requirements for installing PCS.

The space between two PCS must be at least 3mm.

The cabinet must be equipped with fire resistance. The minimu



- Front: ≥ 1 m
- Sides: ≥ 0.5 m
- Rear: ≥ 0.3 m
- Vertical clearance (if stacked): ≥ 0.3 m

4.3 Installation Tool Requirements

Tool	Instructions for use
Forklift	One forklift truck for indoor and outdoor transfer
Stripping tool	Peel off the sheath of the cable
Wire pressing tool	Crimp the wire core to the wire nose
Tape measure, steel ruler	Measuring wire length
Socket, wrench	One set of each, the maximum torque must be greater than 40N·M
Screwdriver	Phillips screwdriver (for M6 screws)

Tab.4-2 Installation Tool requirements

4.4 Grounding mode

ATTENTION

As shown in Figure 4-1, the front panels of the PCS feature external grounding ports (M6 x 12) for reliable grounding through the front panel. When installing, please ensure the PCS cabinet's ground resistance is less than 0.1 Ω, and apply a tightening torque of 3.5 N·m to the grounding terminals.

The PE end is protected and must be grounded reliably to ensure personnel safety.

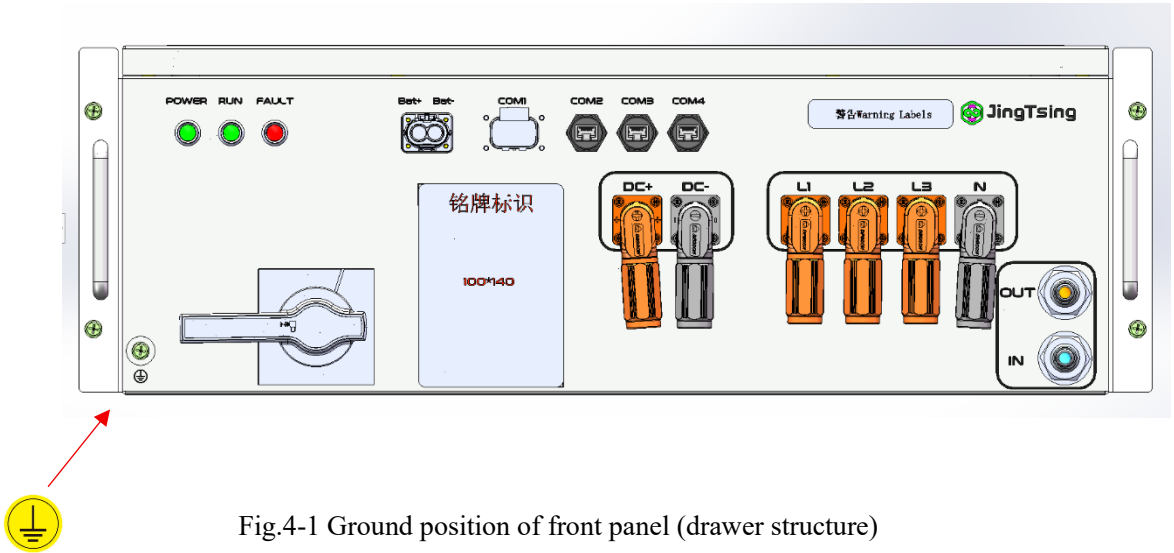


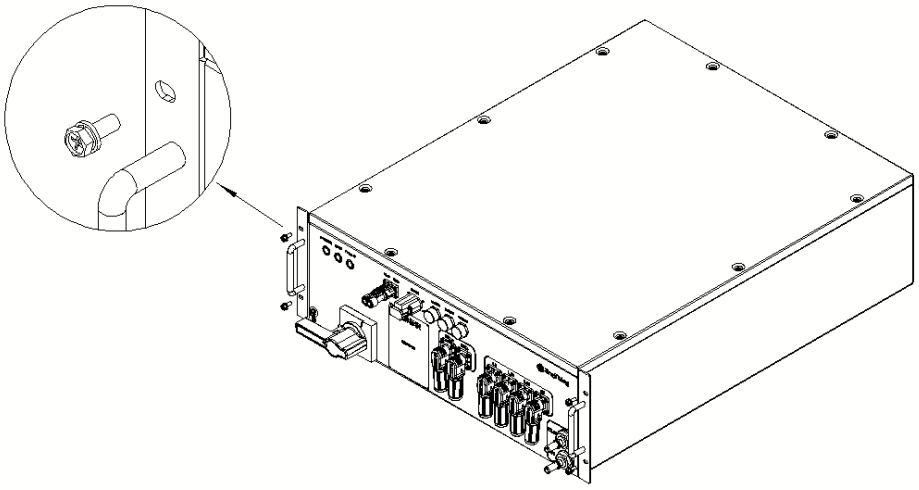
Fig.4-1 Ground position of front panel (drawer structure)

4.5 Installation

DANGER

When the module is installed, ensure that all AC and DC cables are powered off.

(1) Directly push the PCS module into the reserved orbit space. Insert the positioning pins into the positioning pin holes reserved in the cabinet.



ATTENTION

Push the PCS module horizontally into the cabinet. Vertical installation prohibited.

（2）The cabinet is connected with four M6x16 screws and the installation torque is 4.5N·M.

4.6 Installation of water pipe joints

（1）PCS extension water pipe interface (unit: mm), as shown in Fig. 4-4 below, the interface size conforms to SAEJ2044-2009 standard.

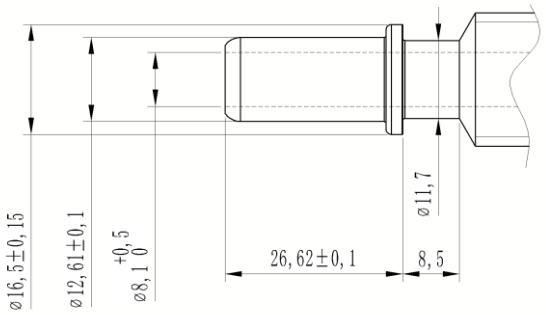


Fig.4-4 Size diagram of water nozzle

（2）It is recommended to use a 90° quick-plug connector for quick connection with the PCS water nozzle. The specification and model are SAE12.61, as shown in Fig. 4-5 below

Fig.4-5 Recommended water nozzle quick plug connector picture

The quick insert connector is prefabricated and connected to the water pipe. The water pipe is connected to the pagoda shaped side of the quick insert connector. The recommended inner diameter of the water pipe connecting to the pagoda shaped connector is 10mm.

Recommended pipe specifications (unit: mm): OD12 × ID10 (OD and ID indicate pipe outer diameter and inner diameter, respectively).

Cooling medium	Target water temperature	Flow rate	Refrigerating capacity	Flow resistance of PCS
50% glycol solution	20℃≤T≤45℃	≥7.5L/min	3.0kW	23kpa (Rated flow)

Tab.4-3 Water cooling configuration requirements for single PCS

Note: The cooling medium must be replaced by professional maintenance personnel, and it should be replaced along with the liquid-cooled PACK of the energy storage system.

5 Electrical Installation

5.1 Pre wiring check

 DANGER

To ensure the life safety of the installation personnel, necessary safety protection measures must be taken during the electrical installation of this product. When performing electrical installation, the following requirements must be followed:

Ensure that the AC/DC connector connected to the PCS is in no power condition.
Lock the power points of the AC and DC copper bars or give a warning to prevent other personnel from powering on the cables during installation.
Only professional personnel can perform installation operations.
The PCS is equipped with an energy storage capacitor. After powering off the PCS, wait for at least five minutes and ensure that the PCS is powered off. (Disconnecting or connecting terminals, or other operations requiring tools or tool-free handling)
The installation personnel must comply with the electrical operation regulations of the country or region where they are located.
Wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70 are to be used

5.2 Cable Protection

The cable diameter and outer diameter of the communication cable must meet the requirements of the connector to ensure reliable protection of the connector. If the cable is not connected, install the connector Pin using a plug to ensure protection. Copper wires are recommended for all wires.

5.3 Cable Connections to AC and DC Terminals

5.3.1 Cable Connections to AC Terminals

 DANGER

If AC terminals are heavy-duty, 70mm² copper wires are recommended for crimping. The insulation level of the wires must meet the maximum voltage on the AC side.

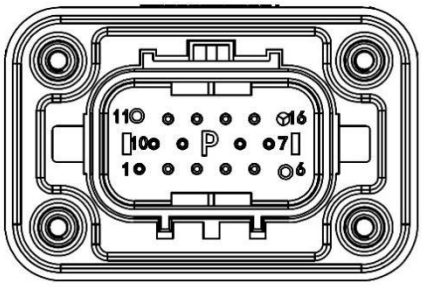
5.3.2 Cable Connections to DC Terminals

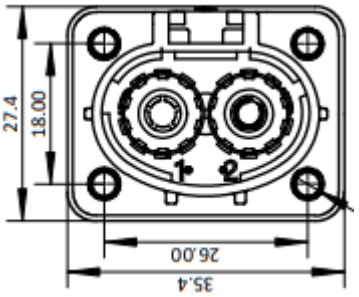
 DANGER

If DC terminals are heavy-duty, 70mm² copper wires are recommended for crimping. The

insulation level of the wires must meet the maximum voltage at the DC side.

5.4 Control power Supply and communication cable terminals





COM1 (HC08B-P16R-A)　　Bat+/Bat- (PNPR2NNA02)

Fig.5-1 Schematic diagram of panel terminals

COM1 definition:

NO.	Function	Connectable Systems / Functions Definition
1	RS485-A	485 Communication (connect to STS)
2	RS485-B	
3	CAN1-H	BMS For Communication
4	CAN1-L	
5	CAN2_H	EMS For Communication
6	+24V	External supply control power (not connected)
7	CAN2-L	EMS For Communication
8	EM_24V	External Emergency Stop signal; External Emergency Stop signal（Normal close）; DRM control signal;
9	EM_STOP	
10	Q1_A1	Isolation switch shunt trip A1
11	24VGND	External supply control power (not connected)
12	Q1_A2	Isolation switch shunt trip A2
13	Q1_F11	Isolation switch status F11
14	Q1_F14	Isolation switch status F14
15	DI	Zero crossing signa（ZC）

16	DI_24V	Zero crossing signa（RTN1）

Note: Pin 15/16 (**Please inform us when placing an order**) should be used with static transfer switch, such as KSiC1 switch, etc.

Bat+/Bat- definition: The output port can provide 680-1000 Vdc for the external DC system.

NO.	Function	Note
1	BAT+	DC positive (optional)
2	BAT-	DC negative (optional)

Note:

1, The DC side high voltage power is supplied from Bat+/Bat-, with a wire gauge of 2.5mm^2.

2, The rated current of the fast fuse is 25A (fuse element).

3, It is suggested that the power should not exceed 1.5kW.

4, Assemble the connectors using the accessories provided with the product. The Bat+/Bat- Terminal Assembly specified in Section 5.5 must be used. Please follow the instructions to assemble the connectors.

5, When connecting or disconnecting, ensure proper orientation to prevent reverse insertion or misalignment. Always verify that the PCS has been powered off for a sufficient period before proceeding. Observe all safety precautions.

COM2-COM4 definition:

NO.	Function	Note
COM2	Port 1 on the off-grid parallel network	
COM3	Port 2 on the off-grid parallel network	
COM4	EMS Ethernet interface	

Note: These ports are reserved. Do not use them without explicit guidance from the manufacturer. Usage of these ports may be restricted in certain countries or regions. Please contact the manufacturer for specific details and regional compliance.

5.5 Cables to communication terminals

Connector Plug Assembly Instructions (Using Included Accessories)

1、COM1 Assembly cable description Plug dust cover removal diagram

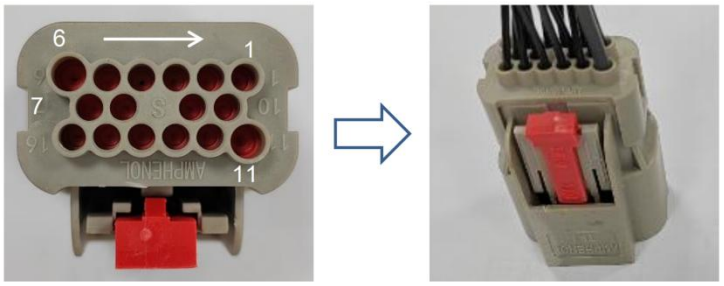
Move the CPA in the direction shown in the figure, press the CPA to the specified position, and remove the dust cover with even force.

2、Take the selected wire, cut and strip the wire according to the required length.

Corresponding pin	Conductor specification	Strip length	Moment requirement
6/11pin	16~18AWG（Power）	4.5±0.2	≥90N
1-5/7-10/12-16pin	20-22AWG（Signal）	4.5±0.2	≥75N

3、Use a crimping machine to crimp the corresponding terminal at the stripped end of the wire rod.

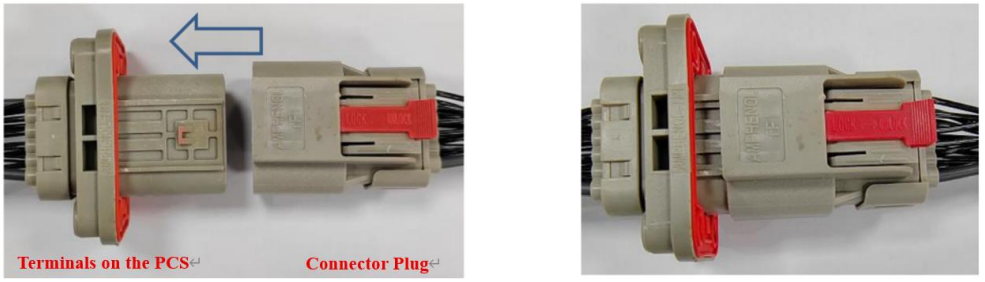
4、Insert the crimped terminal into the connector according to the PIN position, and ensure that the PIN position is correct to avoid damage to the connector during maintenance.



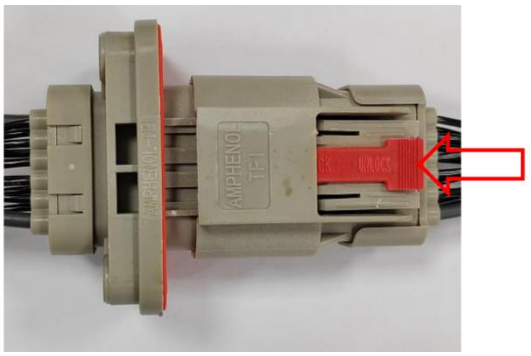
The terminals should be inserted vertically row by row. When the terminals are installed in place, you can hear the click sound. In this case, the rear pull should not loosen. Insert the unused PIN into the plug to plug the pin

5、Plug and socket pair

The key is aligned, the plug is inserted into the socket in the direction of the arrow shown, and the feedback of the "click" sound means that it has been inserted into place.

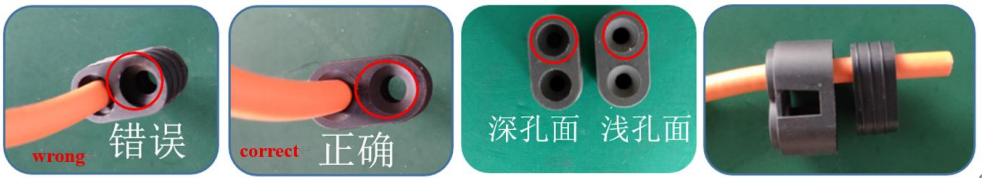


6、CPA lock: After the plug and socket are inserted, push the red CPA into the lock in the direction of the arrow shown.

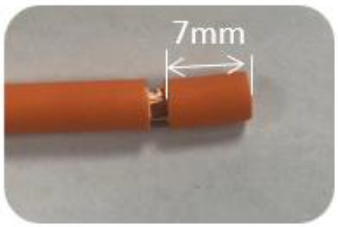


Bat+/Bat- Terminal Assembly:

1、Install the tail cover and the cable sealing body on the 2.5mm² cable in turn (Note: the cable is inserted through the shallow side of the hole of the cable sealing body) and thread the remaining cables in turn as shown in the figure.



2、Strip the cable and crimp the terminal 2.5mm² as shown in the following figure, and crimp the terminal. The height of the crimp terminal is recommended to be 2.5±0.1mm. After crimping, the cable is inserted into the rubber core (the hexagonal mold of the crimp machine is recommended).

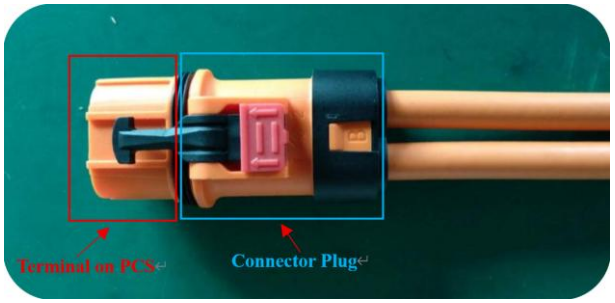


3、Insert the terminal into the connector. When installed, you can hear a click.

4、Insert the sealing wire body, which is flush with the shell (as shown below)

5、Install the tail cover, and the "click" sound during installation indicates that the tail cover is installed in place (as shown in the following figure).

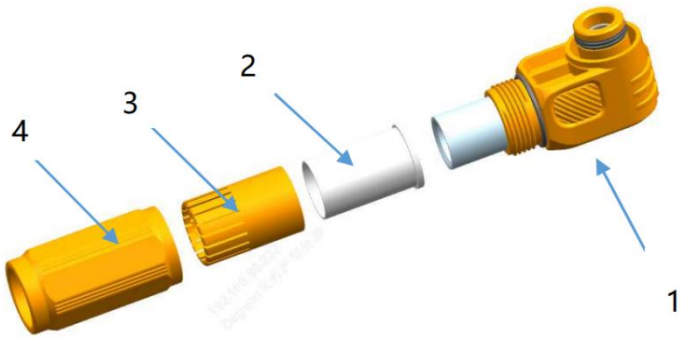
Finished product renderings



5.6 Power Cable Installation Description

These installation instructions apply to the fabrication of connectors for the DC+, DC-, L1, L2, L3, and N terminals.

List of connectors



1: jack assembly 2: sealing sleeve 3: jaw 4: nut housing

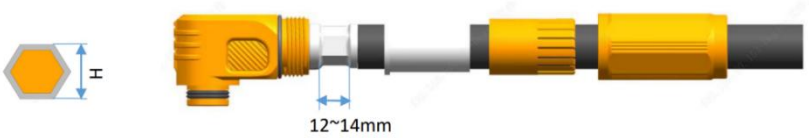
Assembly steps:

Step 1: Strip the outside of the wire

Step 2: As shown in the picture below, attach the nut and clamp to the wire

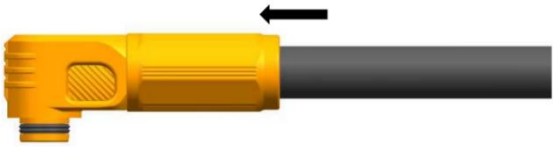
Step 3: Insert the conductor part into the lug

Step 4: As shown in the following figure, press the conductor part of the wire into the wire ear (leave a horn at the end of the wire connection to prevent damage to the wire), and use a crimping machine to crimp the wire with a suitable mold. A hexagonal mold is recommended.



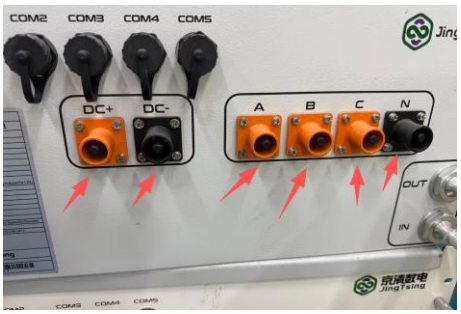
NO.	Cable Square (mm^2)	The crimp height of the plug H(mm)	Suggested compression ratio
1	50	10.30	65%
2	70	11.00	65%

Step 5: Push the clamp coil and nut to the plug and lock



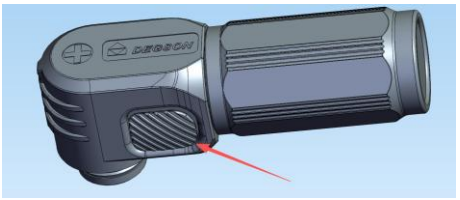
Step 6: Connection and disconnection with the terminals on the PCS;

Insert the connector prepared in Step 5 into the terminal indicated by the arrow in the figure below, following the correct wire sequence:

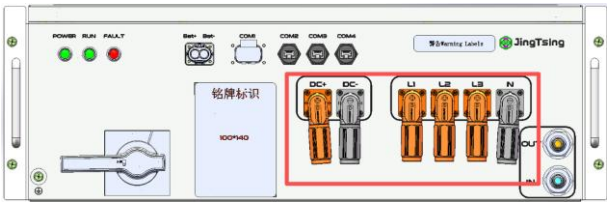


Before disconnecting the terminal, ensure that the safety requirements and conditions mentioned in

this document are met. Make sure the PCS is completely powered off.
Press the button at the position indicated in the figure below, and then pull it out.



This operation applies to the terminals marked with a red box in the figure below.



5.7 Installing Ground Cables

The ground conductor must be copper. The cable specification must be at least 1/2 of the power cable (35mm^2 or more is recommended), and the ground resistance must be less than 0.1Ω.

See Fig. 4-1 for the connection location. Apply a pre-tightening torque of at least 4 N·m to ensure a secure connection.

5.8 Check after wiring

1) Verify that the connector cables described in Section 5.6 are installed as required and are free from any visible damage. Ensure the cables are fully inserted and securely locked. This connector can withstand a maximum insertion force of 100 N. Provided there are no obvious visual defects, it is recommended to apply a force of no more than 30 N to verify that the cable is firmly secured.
2) Connector and PCS terminal mating: The withdrawal force must exceed 10 N. A force of no more than 10 N may be applied to verify that the terminal and connector are fully mated.
3) PCS internal network cables use parallel lines, and the external network cables must be parallel lines, exceeding the five types of network cables.
4) All connectors should be firmly inserted.
5) The grounding resistance is less than 0.1Ω, the cable is intact and has no damage or cracks.

5.9 PCS Parallel Connection

This section is subject to deletion pending internal confirmation. Please disregard it for now.

5.9.1 PCS Grid-tied Mode Connection

This section is subject to deletion pending internal confirmation. Please disregard it for now.

The maximum of 16 Jing Tsing PCS units is allowed for parallel connection on the AC side. The PCS incorporates built-in resonance suppression measures.

5.9.2 PCS Off-grid Mode Connection

This section is subject to deletion pending internal confirmation. Please disregard it for now

The maximum of 5 PCS units is allowed for parallel connection on the AC side in off-grid mode. This mode employs a master-slave control logic. The off-grid mode communication network uses impedance matching, with a default value of 120Ω. The guidelines for CAN communication parallel operation are as follows:

For example, in a system with 2 to 5 nodes, a daisy-chain topology is recommended. A 120Ω terminal resistor should be added at each end node.

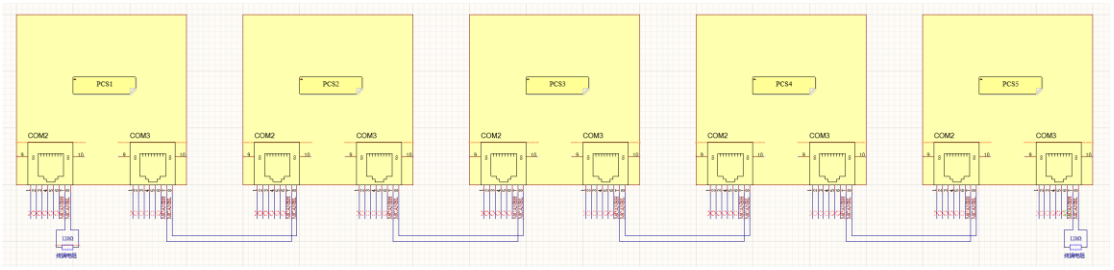


Fig5.2 Schematic Diagram of CAN Bus Network Connection

Fig5.3 CAN Bus Network Port Connection

Fig5.4 Network Port to Terminal Block Connector

6 Startup and shutdown of PCS

6.1 Pre-startup Physical & Safety Checks

Before initiating the startup sequence, ensure the following physical connections and safety conditions are met:

1. **Emergency Stop Signal:** If the emergency stop dry contact signal is not processed by the external system, the emergency stop dry contact must be short-circuited.
2. **Communication Interface:** Correctly connect the external communication interface of the PCS.
3. **Liquid Cooling System:** Correctly connect the water pipe plugs to the liquid cooling plate of the PCS.
4. **Grounding:** Ensure the ground terminals of the PCS are connected correctly and securely.
5. **AC & DC Connections:** Correctly connect the AC and DC load plugs of the PCS.

Electrical Isolation & System Startup Steps
Once the physical checks are complete, proceed with the following steps to start the PCS via the adapted user system:
6. **Close External Isolators:** Close the external AC and DC isolators (or circuit breakers) to prepare the grid and battery connections.
7. **Close Battery DC Isolator:** Close the integrated DC isolator at the battery port to establish the physical connection between the battery and the PCS DC side.
8. **PCS Power-on Self-check:** Power on the PCS. If there are no abnormalities, the PCS will default to a shutdown state, with the internal AC relay and DC contactor remaining disconnected.
9. **Issue Start Command:** Through the adapted user system, send the "Start" command via the communication port (COM1). The PCS will then automatically close the internal AC and DC loops and enter the running state.

6.2 PCS Shutdown Procedure

General Shutdown Guidelines

- Under normal circumstances, always use the **Normal Shutdown** procedure.
- In case of an emergency, use the **Emergency Shutdown** procedure to ensure a fast response and protect the PCS and peripheral devices.
- **Crucial Safety Warning:** After disconnecting the input power of the PCS, you must **wait for more than 5 minutes** to ensure the equipment is completely de-energized before opening the cover for inspection or removing the shell.

Normal Shutdown Steps

1. **Issue Stop Command:** Through the adapted user system, send the "Stop" command via the communication port (COM1).
2. **Internal Disconnection:** The PCS will stop running and automatically disconnect the internal AC and DC loops.

3. **Open Battery DC Isolator:** Open the integrated DC isolator at the battery port.
4. **Open External Isolators:** Disconnect the AC side and DC side external voltage isolators to completely isolate the PCS from the grid and the battery.
5. **Post Warning Signs:** After shutdown, post a clear warning sign on the equipment to prevent unauthorized personnel from powering it on.

6.3 Emergency Shutdown Steps

1. **Trigger Emergency Stop:** Send an external emergency stop signal (via the emergency stop signal on the COM1 port). The PCS will immediately shut down and automatically disconnect the internal AC and DC loops.
2. **Isolate Power Sources:** Safely open the integrated DC isolator at the battery port, and disconnect the AC side and DC side external voltage isolators.
3. **Wait for Discharge:** Wait for more than 5 minutes to allow internal capacitors to fully discharge before attempting any physical inspection or maintenance.

6.4 Indicator Light Description

Description of panel indicator lights for European standard JTES-125K-W:

Name	Color	Status	Meaning
Power Indicator (POWER)	Green	Constantly off	DC not powered
		Constantly on	DC powered
Run Indicator (RUN)	White (two-color)	Constantly on – Green	On-grid mode is running
		Constantly on – Red	Off-grid mode is running
		Constantly off	PCS stopped
Fault Indicator (FAULT)	Red	Constantly on	Alarm/fault present
		Constantly off	No alarm/fault

6.4 Control Description:

By integrating a local logic controller and providing a standard communication interface, this 125kW Power Conversion System (PCS) fully complies with the Demand Response (DR) mode requirements specified in the AS/NZS 4777.2 standard.

The system connects the PCS to the external Demand Response Enable Device (DRED) via a physical

interface.

- Communication Interface: A standard COM1 communication port is reserved on the front of the PCS(COM1 Definition: 8,9).
- Physical Connection: Shielded twisted-pair cables are used to connect the output of the DRED to the COM1 port of the PCS.
- Protocol Standard: The communication protocol adheres to the Modbus RTU standard, which is the widely adopted industrial protocol for distributed energy integration in Australia.

When the DRED detects abnormal grid frequency or receives dispatch instructions from the grid operator, it sends specific digital signals to the PCS. The internal control logic of the PCS responds immediately by executing the following operations:

1. Mode Identification: The system can identify various demand response modes, including reducing active power output, stopping charging, stopping discharging, or emergency shutdown.
2. Power Regulation: The output power is adjusted linearly and smoothly based on the received percentage command to prevent any impact on the grid.
3. Status Feedback: The PCS feeds back its current operating status and response results to the DRED or the upper-level monitoring system via the same communication link, forming a closed-loop control.

To ensure the proper operation of this function, the following steps must be followed during on-site implementation:

1. Physical Wiring: Ensure the COM1 cable is securely connected and the shielding layer is properly grounded to prevent interference.
2. Function Enablement: Enable the "Demand Response" or "External Logic Control" function in the system settings menu.
3. Joint Debugging & Testing: Simulate DRED signal inputs to verify whether the PCS correctly executes power reduction or shutdown actions according to the preset logic.

6.5 PCS-EMS Communication Protocol User Monitoring Information Guide

1. Overview

This protocol applies to communication protocols between PCS and EMS, as well as between PCS and BMS . It can read PCS operation information, fault status, and control system operation in real time.

2. Physical interfaces

Ethernet (PCS ⇆ EMS)

1) Transmission method: Standard ModBus-Tcp;

2) Network card type: 10M/100M

3) Frame length Maximum: 263 bytes;

4) Slave response time Maximum: 30ms;

5) Minimum host polling interval: 100ms;

6) IP Address: 172.16. 8.20 ;

7) Gateway address: 172.16.8.254 ;

8) Port number: 502;

9) Verification method: hardware verification;

10) Modbus station address: default is 1.

3. Agreement Explanation

1. Data type

Serial number	Data types	Explanation
1	Signed Integer_16	16-bit characters, 2 complements
2	Signed Integer_32	32-bit words, two consecutive Modbus addresses for transmission. Low font position Addresses at Modbus low
3	Unsigned Integer_16	16 characters
4	Unsigned Integer_32	32-bit words, two consecutive Modbus addresses for transmission. Low character position Modbus low address
5	Single-precision floating-point type	32-bit text, IEEE-754 floating-point format
Data transmission order bits in big-ender mode, with high bytes first, low bytes second. Example: U16 data 0x0102, transmission order is 01, 02		

2. Function code

Serial number	Function	Explanation
1	Read the slave coil register, bit operation	
2	Read discrete input registers and perform bit operations	
3	Read multiple preservation registers, byte operations	
4	Read multiple input registers and perform byte operations	
5	Write coil registers and bit operations	
6	Write a single holding register and perform byte operations	
7	Write multiple retention registers and byte operations	

4. Address information for communication between PCS and EMS

1. Define the address of a remote control variable (read and write to a single coil).

Serial number	Modbus location address (decimal)	Function	Authority	Data types	Coefficient	Unit	Note
1	00001	Fault reset	Reading and writing	Boer	1	1	1 - Reset
2	00002	Equipment startup	Reading and writing	Boer	1	1	1 - Start
3	00003	Equipment shutdown	Reading and writing	Boer	1	1	1 - Shutdown
4	00004	Remote emergency stop	Reading and writing	Boer	1	1	1- Emergency stop
5	00005	Accumulated charging power resets to zero	Reading and writing	Boer	1	1	1 - Zero COVID
6	00006	Total discharge power is reset to	Reading and writing	Boer	1	1	1 - Zero COVID

		zero					
7	00007	Remote/on-site setup	Reading and writing	Boer	1	1	1 - Remote; 0 - On-site (currently only supports remote range).
8	00008	Initiate insulation testing	Reading and writing	Boer	1	1	1 - Start insulation testing
9	00009	Reserve	Reading and writing	Boer	1	1	
10	00010	Reserve	Reading and writing	Boer	1	1	
11	00011	Reserve	Reading and writing	Boer	1	1	
12	00012	Reserve	Reading and writing	Boer	1	1	
13	00013	Reserve	Reading and writing	Boer	1	1	
14	00014	Reserve	Reading and writing	Boer	1	1	
15	00015	Reserve	Reading and writing	Boer	1	1	
16	00016	Reserve	Reading and writing	Boer	1	1	

Note: Addresses 00001~00004 can only support one state at the same time. When using, simply set the corresponding to 1, and the other bits will work, Auto clearing 0.

Communication Example 1 (ModBus-Tcp**):**

1) Starting from address 00001, read 16 status bits

EMS to PCS: 00 02 00 00 00 06 01 01 00 01 00 10

PCS to EMS: 00 02 00 00 00 05 01 01 02 5D 9A

2) Write address 00002 register to start the device

EMS to PCS: 00 06 00 00 00 06 01 05 00 02 FF 00

PCS to EMS: 00 06 00 00 00 06 01 05 00 02 FF 00

Communication Example 2 (ModBus-RTU**):**

1) Starting from address 00001, read 16 status bits

EMS to PCS: 01 01 00 01 00 10 6C 06

PCS to EMS: 01 01 02 5D 9A 01 07

2) Write address 00002 register to start the device

EMS to PCS: 01 05 00 02 FF 00 2D FA

PCS to EMS: 01 05 00 02 FF 00 2D FA

2. Definition of remote message data address (reading the input state of continuous discrete quantities).

Serial number	Modbus location address (decimal)	Function	Authority	Data types	Coefficient	Unit	Note
1	00081	Shutdown status	Read only	Boer	1	1	1 - Shutdown
2	00082	Standby mode	Read only	Boer	1	1	1 - Standby
3	00083	Operating status	Read only	Boer	1	1	1 - Run
4	00084	Total fault status	Read only	Boer	1	1	1 - Malfunction
5	00085	Overall alarm status	Read only	Boer	1	1	1 - Alert
6	00086	Remote/local status	Read only	Boer	1	1	1 - Remote; 0 - On-site (currently only supports remote range).
7	00087	Enter emergency stop status	Read only	Boer	1	1	1 - Emergency stop is effective

8	00088	Grid-connected status	Read only	Boer	1	1	1 - Grid connection
9	00089	off-grid status	Read only	Boer	1	1	1 - Gouwang VSG mode
10	00090	Reduced volume	Read only	Boer	1	1	1 - Volume reduction occurs
11	00091	Insulation testing status	Read only	Boer	1	1	0- Insulation testing has not been conducted 1- Insulation testing underway 2- Insulation testing completed
12	00092						
13	00093	High-low wear status	Read only	Boer	1	1	1 - High and low wear occurs
14	00094	BMS dry node input	Read only	Boer	1	1	1 - Limited fault (BMS dry node closed).
15	00095	PCS self-check status bit	Read only	Boer	1	1	0- but had not yet examined himself 1- Self-examination 2- Self-inspection completed
16	00096						

Communication Example 1 (ModBus-Tcp**):**

Starting from address 00081, read 16 status bits

EMS to PCS: 00 08 00 00 00 06 01 02 00 51 00 10

PCS to EMS: 00 08 00 00 00 05 01 02 02 FA 94

Communication Example 2 (ModBus-RTU**):**

Starting from address 00081, read 16 status bits

EMS to PCS: 01 02 00 51 00 10 28 17

PCS to EMS: 01 02 02 FA 94 FA B7

3. Telemetry data address definition (reads equipment operation status information and fault words).

Serial number	Modbus location address (decimal)	Function	Authority	Data types	Coefficient	Unit	Note
1.	00201	PCS port A phase voltage	Read only	U16	0.1	V	
2.	00202	PCS port B phase voltage	Read only	U16	0.1	V	
3.	00203	PCS port C phase voltage	Read only	U16	0.1	V	
4.	00204	PCS outputs phase A Flow	Read only	S16	0.1	A	
5.	00205	PCS outputs phase B current	Read only	S16	0.1	A	
6.	00206	PCS outputs phase C current	Read only	S16	0.1	A	
7.	00207	Grid frequency	Read only	U16	0.01	Hz	
8.	00208	PCS phase A outputs active performance Power	Read only	S16	0.1	kW	
9.	00209	PCS B phase outputs active performance Power	Read only	S16	0.1	kW	
10.	00210	PCS C phase outputs active output Power	Read only	S16	0.1	kW	
11.	00211	PCS total output is a bit of a merit Rate	Read only	S16	0.1	kW	
12.	00212	PCS phase A outputs reactive power Power	Read only	S16	0.1	kVar	
13.	00213	PCS phase B output is reactive power Power	Read only	S16	0.1	kVar	
14.	00214	PCS C phase output is reactive power Power	Read only	S16	0.1	kVar	
15.	00215	PCS total output reactive work Rate	Read only	S16	0.1	kVar	
16.	00216	PCS phase A output is visible Power	Read only	U16	0.1	KVA	
17.	00217	PCS B phase output is visible Power	Read only	U16	0.1	KVA	
18.	00218	PCS C phase output is visible	Read only	U16	0.1	KVA	

		Power					
19.	00219	PCS total output is considered work Rate	Read only	U16	0.1	KVA	
20.	00220	PCS outputs phase A power Factors	Read only	U16	0.001		
21.	00221	PCS outputs B-phase power Factors	Read only	U16	0.001		
22.	00222	PCS outputs the C phase power Factors	Read only	U16	0.001		
23.	00223	PCS output total power is Count	Read only	U16	0.001		
24.	00224	PCS input power	Read only	S16	0.1	kW	
25.	00225	PCS input voltage	Read only	S16	0.1	V	
26.	00226	PCS input current	Read only	S16	0.1	A	
27.	00227	PCS heatsink temperature	Read only	S16	1	℃	
28.	00228	Reserve	Read only	/	/		
29.	00229	Reserve	Read only	/	/		
30.	00230	PCS AC cumulative charging Battery is 16 bits lower	Read only	U16	0.001	kWh	
31.	00231	PCS AC cumulative charging Battery capacity is 16 bits higher	Read only	U16	0.001	kWh	
32.	00232	PCS AC cumulative discharge Battery is 16 bits lower	Read only	U16	0.001	kWh	
33.	00233	PCS AC cumulative discharge Battery capacity is 16 bits higher	Read only	U16	0.001	kWh	
34.	00234	PCS DC cumulative charging power Volume is 16 bits lower	Read only	U16	0.001	kWh	
35.	00235	PCS DC cumulative charging power Ranked 16th place	Read only	U16	0.001	kWh	
36.	00236	PCS DC cumulative discharge Volume is 16 bits lower	Read only	U16	0.001	kWh	
37.	00237	PCS DC cumulative discharge Battery capacity is 16 bits higher	Read only	U16	0.001	kWh	
38.	00238	PCS communication status word	Read only	U16	1		Increases by 1 per second
39.	00239	System clock speed: seconds	Read only	U16	1		
40.	00240	System clock time - minutes	Read only	U16	1		

41.	00241	System clock - hours	Read only	U16	1		
42.	00242	System clock - day	Read only	U16	1		
43.	00243	System clock - months	Read only	U16	1		
44.	00244	System clock—years	Read only	U16	1		
45.	00245	Reserve	Read only	U16	0.1		
46.	00246	Reserve	Read only	/	/		
47.	00247	N: Phase current RMS value	Read only	U16	0.1	A	
48.	00248	System insulation resistance	Read only	U16	1	KΩ	
49.	00249	Positive electrode insulation resistance	Read only	U16	1	KΩ	
50.	00250	Positive electrode insulation resistance	Read only	U16	1	KΩ	
51.	00251	Grid Phase A voltage	Read only	U16	0.1	V	
52.	00252	Grid phase B voltage	Read only	U16	0.1	V	
53.	00253	Grid C phase voltage	Read only	U16	0.1	V	
54.	00254	Low penetration trigger value	Read only	/	0.1		
55.	00255	High penetration trigger value	Read only	/	0.1		
56.	00256	PCS fault word 5	Read only	U16	1		
57.	00257	The R phase of the grid is zero-biased	Read only	U16	1		
58.	00258	Grid S phase zero bias	Read only	U16	1		
59.	00259	Grid T phase zero bias	Read only	U16	1		
60.	00260	Feedback signals occur on the island	Read only	/	/		0- Normal 1- Isolated islands of occurrence
61.	00261	Temperature of the water cooling plate	Read only	S16	1	℃	
62.	00262	Internal ambient temperature	Read only	S16	1	℃	
63.	00263	Phase A IGBT temperature	Read only	S16	1	℃	

64.	00264	B-phase IGBT temperature	Read only	S16	1	℃	
65.	00265	C-phase IGBT temperature	Read only	S16	1	℃	
66.	00266	Phase A reactor temperature	Read only	S16	1	℃	
67.	00267	Phase C reactor temperature	Read only	S16	1	℃	
68.	00268	Off-grid parallel device marker position	Read only	/	/		1 : Main unit; 0 : Slave
69.	00269	Effective offline parallel machine quantity	Read only	/	/		
70.	00270	Calculate the minimum value	Read only	/	0.1		
71.	00271	Calculate the maximum value	Read only	/	0.1		
72.	00272	PCS fault word 1	Read only	U16	1		
73.	00273	PCS fault word 2	Read only	U16	1		
74.	00274	PCS fault word 3	Read only	U16	1		
75.	00275	PCS fault word 4	Read only	U16	1		
76.	00276	Reserve	Read only	/	/		
77.	00277	Reserve	Read only	/	/		
78.	00278	Reserve	Read only	/	/		
79.	00279	Reserve	Read only	/	/		
80.	00280	BMS status	Read only	U16	1		0x1111 Prohibition of Appointment 0x2222 Prohibited release 0x5555 Standby (BMS alert). 0xAAAA Malfunction 0xBBBB Normal
81.	00281	From DSP software version word Paragraph 1	Read only	/	/		Fixed: 10101
82.	00282	From DSP software version word Paragraph 2	Read only	/	/		Network module communication version: 0

83.	00283	From DSP software version word Paragraph 3	Read only	/	/		Example: 6409 64::25 years left 8 places; 09:9 month
84.	00284	From DSP software version word Paragraph 4	Read only	/	/		Example: 30 30:30 AM
85.	00285	Main DSP software version word Paragraph 1	Read only	/	/		Fixed: 10101
86.	00286	Main DSP software version word Paragraph 2	Read only	/	/		Example: 772 (512+256+4) Hardware version: 1 Shift left 9 bits Authentication: 4 Move left 6 bits
87.	00287	Main DSP software version word Paragraph 3	Read only	/	/		Example: 6409 64::25 years left 8 places; 09:9 month
88.	00288	Main DSP software version word Paragraph 4	Read only	/	/		Example: 30 30:30 AM
89.	00289	CFG parameter version field 1	Read only	/	/		
90.	00290	CFG parameter version field 2	Read only	/	/		
91.	00291	STS is in a closed state	Read only	/	/		1-STS On, 0-STS off
92.	00292	DC contactor status	Read only	/	/		1 - Adhesion0-Cut off
93.	00293	CPLD version number	Read only	/	/		
94.	00294	STS alarm position	Read only	/	/		Bit0-485 alert Bit1-ZC triggered an alert BIT2-STS offline alarm Bit3-STS Execution Alert
95.	00295	STS voltage recovery flag position	Reading and writing	/	/	/	0- but it has not yet been restored 1- Recovery
96.	00296	AC contactor status bit	Read only	/	/		0-Adsorption

							1-Cut off
97.	00297	Reserve	Read only	/	/		
98.	00298	Reserve	Read only	/	/		
99.	00299	Reserve	Read only	/	/		
100.	00300	Reserve	Read only	/	/		

Note: Definition of fault words

PCS fault word 1				
1	Abnormal grid voltage	1 - Fault; 0 - Normal	Bit0 placement	ErrWord1=0x0001
2	Instantaneous grid voltage is high	1 - Fault; 0 - Normal	Bit1 placement	ErrWord1=0x0002
3	Fault of the RMS value of grid line voltage	1 - Fault; 0 - Normal	Bit2 placement	ErrWord1=0x0004
4	Grid voltage imbalance	1 - Fault; 0 - Normal	Bit3 placement	ErrWord1=0x0008
5	Uneven grid current	1 - Fault; 0 - Normal	Bit4 slots	ErrWord1=0x0010
6	Abnormal grid frequency	1 - Fault; 0 - Normal	Bit5 placement	ErrWord1=0x0020
7	The grid frequency is high	1 - Fault; 0 - Normal	Bit6 placement	ErrWord1=0x0040
8	Low grid frequency	1 - Fault; 0 - Normal	Bit7 placement	ErrWord1=0x0080
9	Grid frequency mismatch	1 - Fault; 0 - Normal	Bit8 placement	ErrWord1=0x0100
10	DC bus voltage overvoltage	1 - Fault; 0 - Normal	Bit9 positioning	ErrWord1=0x0200
11	The DC bus voltage deviation is large	1 - Fault; 0 - Normal	Bit10 positioning	ErrWord1=0x0400
12	DC bus voltage undervoltage	1 - Fault; 0 - Normal	Bit11 placement	ErrWord1=0x0800
13	Battery voltage overvoltage	1 - Fault; 0 - Normal	Bit12 placement	ErrWord1=0x1000
14	Battery voltage undervoltage	1 - Fault; 0 - Normal	Bit13 placement	ErrWord1=0x2000
15	Battery current overcurrent	1 - Fault; 0 - Normal	Bit14 positioning	ErrWord1=0x4000
16	CPLD failure	1 - Fault; 0 - Normal	Bit15 placement	ErrWord1=0x8000

PCS fault word 2				
1	Inverter current sampling offset fault	1 - Fault; 0 - Normal	Bit0 placement	ErrWord2=0x0001
2	Inverter current overcurrent	1 - Fault; 0 - Normal	Bit1 placement	ErrWord2=0x0002
3	Reserve	1 - Fault; 0 - Normal	Bit2 placement	ErrWord2=0x0004
4	Abnormal inverter current	1 - Fault; 0 - Normal	Bit3 placement	ErrWord2=0x0008
5	AC relay failure	1 - Fault; 0 - Normal	Bit4 slots	ErrWord2=0x0010
6	Pre-grid connection to detect faults	1 - Fault; 0 - Normal	Bit5 placement	ErrWord2=0x0020
7	Reactor 1: Over-temperature fault	1 - Fault; 0 - Normal	Bit6 placement	ErrWord2=0x0040
8	Internal ambient temperature overtemperature fault	1 - Fault; 0 - Normal	Bit7 placement	ErrWord2=0x0080
9	Reactor 2: Over-temperature fault	1 - Fault; 0 - Normal	Bit8 placement	ErrWord2=0x0100
10	AC relay adhesion fault	1 - Fault; 0 - Normal	Bit9 positioning	ErrWord2=0x0200
11	Phase A IGBT temperature is overheated	1 - Fault; 0 - Normal	Bit10 positioning	ErrWord2=0x0400
12	DC reverse connection fault	1 - Fault; 0 - Normal	Bit11 placement	ErrWord2=0x0800
13	B-phase IGBT temperature is overheated	1 - Fault; 0 - Normal	Bit12 placement	ErrWord2=0x1000
14	Phase C IGBT temperature is overheated	1 - Fault; 0 - Normal	Bit13 placement	ErrWord2=0x2000
15	The water cooling plate temperature is too cold	1 - Fault; 0 - Normal	Bit14 positioning	ErrWord2=0x4000
16	High and low penetration faults	1 - Fault; 0 - Normal	Bit15 placement	ErrWord2=0x8000

PCS fault word 3				
1	Reserve	1 - Fault; 0 - Normal	Bit0 placement	ErrWord3=0x0001
2	Reserve	1 - Fault; 0 - Normal	Bit1 placement	ErrWord3=0x0002
3	Reserve	1 - Fault; 0 - Normal	Bit2 placement	ErrWord3=0x0004
4	Reserve	1 - Fault; 0 - Normal	Bit3 placement	ErrWord3=0x0008

5	Reserve	1 - Fault; 0 - Normal	Bit4 slots	ErrWord3=0x0010
6	Reserve	1 - Fault; 0 - Normal	Bit5 placement	ErrWord3=0x0020
7	Reserve	1 - Fault; 0 - Normal	Bit6 placement	ErrWord3=0x0040
8	Reserve	1 - Fault; 0 - Normal	Bit7 placement	ErrWord3=0x0080
9	Reserve	1 - Fault; 0 - Normal	Bit8 placement	ErrWord3=0x0100
10	Reserve	1 - Fault; 0 - Normal	Bit9 positioning	ErrWord3=0x0200
11	Emergency stop detection	1 - Fault; 0 - Normal	Bit10 positioning	ErrWord3=0x0400
12	Insulation testing	1 - Fault; 0 - Normal	Bit11 placement	ErrWord3=0x0800
13	Fault of the RMS value of phase voltage in the power grid	1 - Fault; 0 - Normal	Bit12 placement	ErrWord3=0x1000
14	AC lightning protection fault	1 - Fault; 0 - Normal	Bit13 placement	ErrWord3=0x2000
15	Reactor thermal switch fault	1 - Fault; 0 - Normal	Bit14 positioning	ErrWord3=0x4000
16	Resonance fault detection	1 - Fault; 0 - Normal	Bit15 placement	ErrWord3=0x8000

PCS fault word 4				
1	Fan failure	1 - Fault; 0 - Normal	Bit0 placement	ErrWord4=0x0001
2	Leakage current fault detection	1 - Fault; 0 - Normal	Bit1 placement	ErrWord4=0x0002
3	Reserve	1 - Fault; 0 - Normal	Bit2 placement	ErrWord4=0x0004
4	EMS communication loss failure	1 - Fault; 0 - Normal	Bit3 placement	ErrWord4=0x0008
5	Internal PCS CAN communication failure	1 - Fault; 0 - Normal	Bit4 slots	ErrWord4=0x0010

6	BMS communication loss failure	1 - Fault; 0 - Normal	Bit5 placement	ErrWord4=0x0020
7	Reserve	1 - Fault; 0 - Normal	Bit6 placement	ErrWord4=0x0040
8	Reserve	1 - Fault; 0 - Normal	Bit7 placement	ErrWord4=0x0080
9	Reserve	1 - Fault; 0 - Normal	Bit8 placement	ErrWord4=0x0100
10	Reserve	1 - Fault; 0 - Normal	Bit9 positioning	ErrWord4=0x0200
11	Reserve	1 - Fault; 0 - Normal	Bit10 positioning	ErrWord4=0x0400
12	Reserve	1 - Fault; 0 - Normal	Bit11 placement	ErrWord4=0x0800
13	Reserve	1 - Fault; 0 - Normal	Bit12 placement	ErrWord4=0x1000
14	Reserve	1 - Fault; 0 - Normal	Bit13 placement	ErrWord4=0x2000
15	Reserve	1 - Fault; 0 - Normal	Bit14 positioning	ErrWord4=0x4000
16	Reserve	1 - Fault; 0 - Normal	Bit15 placement	ErrWord4=0x8000

PCS fault word 5				
1	Power failure	1 - Fault; 0 - Normal	Bit0 placement	ErrWord5=0x0001
2	T-phase drive protection	1 - Fault; 0 - Normal	Bit1 placement	ErrWord5=0x0002
3	S-phase drive protection	1 - Fault; 0 - Normal	Bit2 placement	ErrWord5=0x0004
4	R-phase drive protection	1 - Fault; 0 - Normal	Bit3 placement	ErrWord5=0x0008
5	T phase cross-flow	1 - Fault; 0 - Normal	Bit4 slots	ErrWord5=0x0010
6	S phase flows	1 - Fault; 0 - Normal	Bit5 placement	ErrWord5=0x0020
7	R phase cross-flow	1 - Fault; 0 - Normal	Bit6 placement	ErrWord5=0x0040
8	Battery current overcurrent	1 - Fault; 0 - Normal	Bit7 placement	ErrWord5=0x0080
9	Negative busbar overvoltage	1 - Fault; 0 - Normal	Bit8 placement	ErrWord5=0x0100
10	Positive busbar overvoltage	1 - Fault; 0 - Normal	Bit9 positioning	ErrWord5=0x0200
11	Battery voltage overvoltage	1 - Fault; 0 - Normal	Bit10 positioning	ErrWord5=0x0400
12	Emergency stop outside	1 - Fault; 0 - Normal	Bit11 placement	ErrWord5=0x0800
13	Verification error	1 - Fault; 0 - Normal	Bit12 placement	ErrWord5=0x1000
14	Communication timeout	1 - Fault; 0 - Normal	Bit13 placement	ErrWord5=0x2000
15	Chip reset	1 - Fault; 0 - Normal	Bit14 positioning	ErrWord5=0x4000

16	Reserve	1 - Fault; 0 - Normal	Bit15 placement	ErrWord5=0x8000

Communication Example 1 (ModBus-Tcp**):**

1) Read 6 consecutive data points from address 00201
2) EMS to PCS: 00 0D 00 00 00 06 01 04 00 C9 00 06
3) PCS to EMS: 00 0D 00 00 00 0F 01 04 0C 00 00 00 00 00 00 00 00 00 00 00 00

Communication Example 2 (ModBus-RTU**):**

1) Read 6 data points consecutively from address 00201
2) EMS to PCS: 01 04 00 C9 00 06 A0 36
3) PCS to EMS: 01 04 0C 00 00 00 00 00 00 00 00 00 00 00 00 95 B7

4. Definition of remote data address (reading and writing device operation data).

Serial number	Modbus location address (decimal)	Function	Authority	Data types	Coefficient	Unit	Note
101	00301	Run mode selection	Reading and writing	U16	1	/	Default 3 0-None; 1 - Constant current charging; 2 - Constant voltage charging; 3 - Constant power charging;
102	00302	Constant voltage charging voltage settings	Reading and writing	U16	1	V	Charging the battery above the current battery voltage, Discharge the battery below the current battery voltage
103	00303	Constant current charging current settings	Reading and writing	S16	1	A	Negative represents discharge to the grid, positive represents slave from the grid Charging, default 0
104	00304	Constant power active power period Hope	Reading and writing	S16	0.1	kW	Proper release, carrying the full charge 125kw - represents discharge 125kw
105	00305	Constant power reactive power period Hope	Reading and writing	S16	0.1	kVar	Proper release, carrying the full charge 125kw - represents discharge 125kw
106	00306	Grid-connected installation	Reading and writing	U16	1	/	The default is 0 0-grid connection mode 1-VSG Network Construction Mode
107	00307	Off-grid output voltage is set	Reading and	U16	1	V	Default is 230

			writing				
108	00308	Off-grid output frequency is set	Reading and writing	U16	0.01	Hz	Default is 5000
109	00309	Phase separation controls active power in phase A Power	Reading and writing	S16	0.1	kW	Negative discharge from the grid, positive slave power Network charging
110	00310	Phase separation controls active power in phase B Power	Reading and writing	S16	0.1	kW	Negative discharge from the grid, positive slave power Network charging
111	00311	Phase separation controls active power in phase C Power	Reading and writing	S16	0.1	kW	Negative discharge from the grid, positive slave power Network charging
112	00312	Phase separation control A phase is reactive Power	Reading and writing	S16	0.1	kVar	Negative sensitivity, upright tolerance of nature is futile
113	00313	Phase separation controls reactive phase B Power	Reading and writing	S16	0.1	kVar	Negative sensitivity, upright tolerance of nature is futile
114	00314	Phase separation controls reactive power of phase C Power	Reading and writing	S16	0.1	kVar	Negative sensitivity, upright tolerance of nature is futile
115	00315	Off-grid output voltage is phase-separated Given A	Reading and writing	U16	1	V	
116	00316	Off-grid output voltage is phase-separated Given B	Reading and writing	U16	1	V	
117	00317	Off-grid output voltage is phase-separated Given C	Reading and writing	U16	1	V	
118	00318	Microgrid voltage sag coefficient	Reading and writing	U16	1	/	Range 0-100, Q%=k*Δu%.
119	00319	Primary FM frequency dead zone	Reading and writing	U16	0.01	Hz	Range: 0-1Hz

120	00320	Primary frequency modulation K value	Reading and writing	U16	1	/	Range 0-200, P%=k*Δf%.
121	00321	The heartbeat of EMS	Reading and writing	/	/	/	0-255 Transformation count (sent once within 500ms).
122	00322	Insulation Testing Command 1	Reading and writing	/	/	/	Equipped with isolation transformers 0 - No detection instructions are sent 1 - Send detection commands
123	00323	Insulation Testing Command 2	Reading and writing	/	/	/	No isolation transformer 0 - No detection instructions are sent 1 - Send detection commands
124	00324	Allows STS closing instructions	Reading and writing	/	/	/	0- Prohibition 1- Allowed
125	00325						
126	00326	Battery/overcapacity allows charging Voltage	Reading and writing	U16	1	V	
127	00327	Battery/overcapacity allows discharge Voltage	Reading and writing	U16	1	V	
128	00328	Battery/overcapacity allows charging Current	Reading and writing	U16	1	A	
129	00329	Battery/overcapacity allows discharge Current	Reading and writing	U16	1	A	
130	00330	Seconds in time	Reading and writing	U16	1	/	
131	00331	Regarding the time—minute	Reading and writing	U16	1	/	
132	00332	Time-to-time	Reading and writing	U16	1	/	
133	00333	Regarding the time—day	Reading and writing	U16	1	/	

134	00334	Regarding the time—month	Reading and writing	U16	1	/	
135	00335	Regarding the time—years	Reading and writing	U16	1	/	
136	00336	Liquid cooling replenishment mode	Reading and writing	U16	1	/	(Each power-on is set to automatic mode by default) 0: Automatic mode 1: Manually request cooling 2: Manually request heating 5: Manual liquid injection mode 10: Temperature heating/cooling requests are prohibited (in this mode, PCS sends no requests to the liquid chiller).
137	00337	Target temperature for refrigeration	Reading and writing	S16	0.1	℃	The default is 450, which is the cooling request in automatic mode The target temperature is 45°C, which can be adjusted in manual mode
138	00338	Heating target temperature	Reading and writing	S16	0.1	℃	Default is -100, meaning heating is done in automatic mode The standard temperature is -10°C, which can be adjusted in manual mode
139	00339	EMS offline time check	Reading and writing	/	/	/	Default is 120, with testing every 500ms Table 60s Judgment EMS Offline; Power outage recovery 60s
140	00340	PCS ID	Reading and writing	/	/	/	

Communication Example 1 (ModBus-Tcp**):**

1) Read 6 data points consecutively from address 00301

EMS to PCS: 00 10 00 00 00 06 01 03 01 2D 00 06

PCS to EMS: 00 10 00 00 00 0F 01 03 0C 00 03 00 00 00 00 00 64 00 00 00 00

2) Write data 100 to address 00304

EMS to PCS: 00 14 00 00 00 06 01 06 01 06 01 53 00 64

PCS to EMS: 00 14 00 00 00 06 01 06 01 30 00 64

3) Write 6 consecutive data points to address 00330, setting the time to: 2024/5/4 03:02:01

(Time only supports continuous write settings)

EMS to PCS: 00 1E 00 00 00 13 01 10 01 4A 00 06 0C 00 01 00 02 00 03 00 04 00 05 07 E8

PCS to EMS: 00 1E 00 00 00 06 01 10 01 4A 00 06

Communication Example 2 (ModBus-RTU**):**

1) Read 6 data points consecutively from address 00301

EMS to PCS: 01 03 01 2D 00 06 54 3D

PCS to EMS: 01 03 0C 00 03 00 00 00 00 00 64 00 00 00 00 ED FC

2) Write data 100 to address 00304

EMS to PCS: 01 06 01 30 00 64 89 D2

PCS to EMS: 01 06 01 30 00 64 89 D2

3) Write 6 consecutive data points to address 00330, setting the time to: 2024/5/4 03:02:01

(Time only supports continuous write settings)

EMS to PCS: 01 10 01 4A 00 06 0C 00 01 00 02 00 03 00 04 00 05 07 E8 21 33

PCS to EMS: 01 10 01 4A 00 06

5. E2 Data address definition (read protected data information).

Serial number	Modbus address (decimal).	Function	Authority	Data type	Coefficient	Unit	Note
1	10000	Reserve	Read	/	/	/	/
2	10001	Reserve	Read	/	/	/	
3	10002	Reserve	Read	/	/	/	
4	10003	Reserve	Read	/	/	/	
5	10004	Reserve	Read	/	/	/	
6	10005	Reserve	Read	/	/	/	
7	10006	Reserve	Read	/	/	/	
8	10007	Reserve	Read	/	/	/	
9	10008	Reserve	Read	/	/	/	
10	10009	Reserve	Read	/	/	/	
11	20000	Reserve	Read	/	/	/	
12	20001	Function enable bit 0	Read	UINT16	1	/	
13	20002	Function enable bit 1	Read	UINT16	1	/	
14	20003	Function enable bit 2	Read	UINT16	1	/	
15	20004	Function enable bit 3	Read	UINT16	1	/	
16	20005	Function enabled bit 4	Read	UINT16	1	/	
17	20006	Function enable bit 5	Read	UINT16	1	/	
18	20007	Grid voltage level one overvoltage value	Read	UINT16	1	/	
19	20008	Level 1 overvoltage protection time for grid voltage	Read	UINT16	1	/	

20	20009	Grid voltage level 2 overvoltage value	Read	UINT16	1	/	
21	20010	Grid voltage level 2 overvoltage protection time	Read	UINT16	1	/	
22	20011	Grid voltage level 3 overvoltage value	Read	UINT16	1	/	
23	20012	Level 3 overvoltage protection time for grid voltage	Read	UINT16	1	/	
24	20013	Grid voltage level 1 undervoltage value	Read	UINT16	1	/	
25	20014	Level 1 Undervoltage Protection Time for Power Grid Voltage	Read	UINT16	1	/	
26	20015	Secondary undervoltage value of grid voltage	Read	UINT16	1	/	
27	20016	Level 2 undervoltage protection time for grid voltage	Read	UINT16	1	/	
28	20017	Grid voltage level 3 undervoltage value	Read	UINT16	1	/	
29	20018	Level 3 undervoltage protection time for grid voltage	Read	UINT16	1	/	
30	20019	Grid voltage overvoltage recovery value	Read	UINT16	1	/	
31	20020	Grid voltage undervoltage recovery value	Read	UINT16	1	/	
32	20021	Grid voltage protection recovery time	Read	UINT16	1	/	
33	20022	Grid voltage level one	Read	UINT16	1	/	

		overfrequency					
34	20023	Grid voltage level one overvoltage protection time	Read	UINT16	1	/	
35	20024	Grid voltage level 2 overfrequency	Read	UINT16	1	/	
36	20025	Grid voltage level 2 overvoltage protection time	Read	UINT16	1	/	
37	20026	Grid voltage level 3 overfrequency	Read	UINT16	1	/	
38	20027	Grid voltage level 3 overfrequency protection time	Read	UINT16	1	/	
39	20028	Grid voltage level one underfrequency	Read	UINT16	1	/	
40	20029	Grid voltage level 1 underfrequency protection time	Read	UINT16	1	/	
41	20030	Grid voltage secondary underfrequency	Read	UINT16	1	/	
42	20031	Grid voltage level 2 underfrequency protection time	Read	UINT16	1	/	
43	20032	Grid voltage level 3 underfrequency	Read	UINT16	1	/	
44	20033	Grid voltage level 3 underfrequency protection time	Read	UINT16	1	/	
45	20034	Grid voltage overfrequency recovery value	Read	UINT16	1	/	
46	20035	Grid voltage underfrequency recovery value	Read	UINT16	1	/	
47	20036	Grid frequency protection recovery time	Read	UINT16	1	/	
48	20037	Average grid voltage overvoltage value	Read	UINT16	1	/	
49	20038	The average overvoltage time of the grid voltage	Read	UINT16	1	/	

50	20039	Average grid voltage and undervoltage value	Read	UINT16	1	/	
51	20040	Average grid voltage undervoltage time	Read	UINT16	1	/	
52	20041	QU curve open-loop response time	Read	UINT16	1	/	
53	20042	QU curve voltage parameter 1	Read	UINT16	1	/	
54	20043	QU curve power parameter 1	Read	UINT16	1	/	
55	20044	QU curve voltage parameter 2	Read	UINT16	1	/	
56	20045	QU curve power parameter 2	Read	UINT16	1	/	
57	20046	Grid-connected current step	Read	UINT16	1	/	
58	20047	Grid-connected current fast loop 1KP	Read	UINT16	1	/	
59	20048	Grid-connected current fast loop 1KI	Read	UINT16	1	/	
60	20049	Grid-connected current fast loop 2KP	Read	UINT16	1	/	
61	20050	Grid-connected current fast loop 2KI	Read	UINT16	1	/	
62	20051	Grid-connected current slow loop KP	Read	UINT16	1	/	
63	20052	Grid-connected current slow loop KI	Read	UINT16	1	/	
64	20053	dq axis voltage feedforward coefficient	Read	UINT16	1	/	
65	20054	0 axis voltage feedforward coefficient	Read	UINT16	1	/	
66	20055	Reserve	Read	/	1	/	
67	20056	Instantaneous	Read	UINT16	1	/	

		voltage protection for the power grid					
68	20057	Off-grid current step	Read	UINT16	1	/	
69	20058	Off-grid voltage fast loop KP	Read	UINT16	1	/	
70	20059	Off-grid voltage fast loop KI	Read	UINT16	1	/	
71	20060	Off-grid voltage slow loop KP	Read	UINT16	1	/	
72	20061	Off-grid voltage slow loop KI	Read	UINT16	1	/	
73	20062	Low penetration threshold	Read	UINT16	1	/	
74	20063	High and low crossing normal sequence K value	Read	UINT16	1	/	
75	20064	The negative sequence K value for high and low crossing	Read	UINT16	1	/	
76	20065	Reserve	Read	/	/	/	
77	20066	Constant reactive power setpoint	Read	UINT16	1	/	
78	20067	Constant pf setting	Read	UINT16	1	/	
79	20068	PF_P Curve active power parameter 1	Read	UINT16	1	/	
80	20069	PF_P curve parameters 1	Read	UINT16	1	/	
81	20070	PF_P Curve active power parameter 2	Read	UINT16	1	/	
82	20071	PF_P curve parameters 2	Read	UINT16	1	/	
83	20072	PF_P curve lock-in value	Read	UINT16	1	/	
84	20073	PF_P Curve lock-out value	Read	UINT16	1	/	
85	20074	QU curve parameters 1	Read	UINT16	1	/	
86	20075	QU curve parameter 2	Read	UINT16	1	/	
87	20076	QU curve parameter 3	Read	UINT16	1	/	

88	20077	QU curve parameter 4	Read	UINT16	1	/	
89	20078	QU curve parameter 5	Read	UINT16	1	/	
90	20079	QU curve parameters 6	Read	UINT16	1	/	
91	20080	QU curve parameter 7	Read	UINT16	1	/	
92	20081	QU curve parameter 8	Read	UINT16	1	/	
93	20082	QU curve lock-in value	Read	UINT16	1	/	
94	20083	QU curve lock-out value	Read	UINT16	1	/	
95	20084	Reserve	Read	/	/	/	
96	20085	Reserve	Read	/	/	/	
97	20086	QU curve voltage reference parameters（4110)	Read	UINT16	1	/	
98	20087	QU curve reactive power maximum parameter（4110)	Read	UINT16	1	/	
99	20088	QU curve reactive power minimum parameter（4110)	Read	UINT16	1	/	
100	20089	QU curve slope parameter (4110).	Read	UINT16	1	/	
101	20090	High penetration threshold	Read	UINT16	1	/	
102	20091	Grid system frequency	Read	UINT16	1	/	
103	20092	QU curve selection	Read	UINT16	1	/	
104	20093	Reserve	Read	/	/	/	
105	20094	Reserve	Read	/	/	/	
106	20095	QU response time	Read	UINT16	1	/	
107	20096	Reserve	Read	/	/	/	
108	20097	Reserve	Read	/	/	/	
109	20098	Reserve	Read	/	/	/	
110	20099	PF drooping hyperfrequency dead zone	Read	UINT16	1	/	
111	20100	PF sagging overfrequency coefficient	Read	UINT16	1	/	
112	20101	PF sagging overfrequency	Read	UINT16	1	/	

		overfrequency recovery value					
113	20102	PF hyperptosis, hyperfrequency recovery time	Read	UINT16	1	/	
114	20103	PF sagging overfrequency overfrequency recovery slope	Read	UINT16	1	/	
115	20104	Active power limits target value	Read	UINT16	1	/	
116	20105	PF ptosis is a dead zone	Read	UINT16	1	/	
117	20106	PF ptosis underfrequency coefficient	Read	UINT16	1	/	
118	20107	PF ptosis delay time	Read	UINT16	1	/	
119	20108	If you have merit, limit the number of steps	Read	UINT16	1	/	
120	20109	Reactive power response time	Read	UINT16	1	/	
121	20110	Off-grid feedforward coefficient	Read	UINT16	1	/	
122	20111	Reserve	Read	/	/	/	
123	20112	Reserve	Read	/	/	/	
124	20113	Reserve	Read	/	/	/	
125	20114	Reserve	Read	/	/	/	
126	20115	Reserve	Read	/	/	/	
127	20116	Reserve	Read	/	/	/	
128	20117	Reserve	Read	/	/	/	
129	20118	Power response time	Read	UINT16	1	/	
130	20119	Low-wear Parameter 1	Read	UINT16	1	/	
131	20120	Low-wear Parameter 1	Read	UINT16	1	/	
132	20121	Low wear parameters 2	Read	UINT16	1	/	
133	20122	Low wear parameters 2	Read	UINT16	1	/	
134	20123	Low wear parameter 3	Read	UINT16	1	/	
135	20124	Low wear parameter 3	Read	UINT16	1	/	
136	20125	Low-wear Parameter 4	Read	UINT16	1	/	
137	20126	Low-wear Parameter 4	Read	UINT16	1	/	
138	20127	Low wear spec 5	Read	UINT16	1	/	
139	20128	Low wear spec 5	Read	UINT16	1	/	

140	20129	Low-wear Parameter 6	Read	UINT16	1	/	
141	20130	Low-wear Parameter 6	Read	UINT16	1	/	
142	20131	Low-wear spec 7	Read	UINT16	1	/	
143	20132	Low-wear spec 7	Read	UINT16	1	/	
144	20133	Low wear parameters 8	Read	UINT16	1	/	
145	20134	Low wear parameters 8	Read	UINT16	1	/	
146	20135	Low-wear Parameter 1	Read	UINT16	1	/	
147	20136	High penetration parameters 1	Read	UINT16	1	/	
148	20137	High penetration parameters 2	Read	UINT16	1	/	
149	20138	High penetration parameters 2	Read	UINT16	1	/	
150	20139	High penetration parameter 3	Read	UINT16	1	/	
151	20140	High penetration parameter 3	Read	UINT16	1	/	
152	20141	High-penetration parameter 4	Read	UINT16	1	/	
153	20142	High-penetration parameter 4	Read	UINT16	1	/	
154	20143	High penetration parameters 5	Read	UINT16	1	/	
155	20144	High penetration parameters 5	Read	UINT16	1	/	
156	20145	High penetration parameters 6	Read	UINT16	1	/	
157	20146	High penetration parameters 6	Read	UINT16	1	/	
158	20147	High-pass parameter 7	Read	UINT16	1	/	
159	20148	High-pass parameter 7	Read	UINT16	1	/	
160	20149	High penetration parameters 8	Read	UINT16	1	/	
161	20150	High penetration parameters 8	Read	UINT16	1	/	
162	20151	Off-grid current fast loop KP	Read	UINT16	1	/	
163	20152	Off-grid current fast loop KI	Read	UINT16	1	/	
164	20153	Off-grid current slow loop KP	Read	UINT16	1	/	
165	20154	Off-grid current slow loop KI	Read	UINT16	1	/	
166	20155	Reserve	Read	/	/	/	
167	20156	Reserve	Read	/	/	/	
168	20157	QP curve active parameters 1	Read	UINT16	1	/	
169	20158	QP curve reactive power parameter 1	Read	UINT16	1	/	
170	20159	QP curve active	Read	UINT16	1	/	

		parameters 2					
171	20160	QP curve reactive power parameter 2	Read	UINT16	1	/	
172	20161	QP curve active parameter 3	Read	UINT16	1	/	
173	20162	QP curve reactive power parameter 3	Read	UINT16	1	/	
174	20163	QP response time	Read	UINT16	1	/	
175	20164	QP curve active parameters 4	Read	UINT16	1	/	
176	20165	QP curve reactive power parameter 4	Read	UINT16	1	/	
177	20166	Isolated island disturbance coefficient	Read	UINT16	1	/	
178	20167	Passive islanding protection time threshold	Read	UINT16	1	/	
179	20168	Active island protection angle threshold	Read	UINT16	1	/	
180	20169	Passive island protection angle threshold	Read	UINT16	1	/	
181	20170	Input reactive current value	Read	UINT16	1	/	
182	20171	Voltage suppression threshold	Read	UINT16	1	/	
183	20172	Voltage suppression power threshold	Read	UINT16	1	/	
184	20173	Active power limits	Read	/	/	/	
185	20174	Apparent load power limit	Read	/	/	/	
186	20175	ROCOF threshold	Read	/	/	/	
187	20176	ROCOF time	Read	/	/	/	
188	20177	Reserve	Read	/	/	/	
189	20178	Reserve	Read	/	/	/	
190	20179	Reserve	Read	/	/	/	
191	20180	Reserve	Read	/	/	/	
192	20181	Reserve	Read	/	/	/	
193	20182	Reserve	Read	/	/	/	
194	20183	Reserve	Read	/	/	/	
195	20184	Reserve	Read	/	/	/	
196	20185	Reserve	Read	/	/	/	
197	20186	Reserve	Read	/	/	/	
198	20187	Reserve	Read	/	/	/	

199	20188	Reserve	Read	/	/	/	
200	20189	Reserve	Read	/	/	/	
201	20190	Reserve	Read	/	/	/	
202	20191	Half-bus voltage overvoltage protection value	Read	UINT16	1	/	
203	20192	The overvoltage protection value for the entire busbar voltage	Read	UINT16	1	/	
204	20193	The protection value for undervoltage voltage across the entire busbar	Read	UINT16	1	/	
205	20194	DC current overcurrent protection value	Read	UINT16	1	/	
206	20195	Inverter current overcurrent protection value	Read	UINT16	1	/	
207	20196	Reactor 1 Over-temperature protection value	Read	UINT16	1	/	
208	20197	Reactor 2 Over-temperature protection value	Read	UINT16	1	/	
209	20198	A-phase IGBT overtemperature protection value	Read	UINT16	1	/	
210	20199	B-phase IGBT overtemperature protection value	Read	UINT16	1	/	
211	20200	C-phase IGBT overtemperature protection value	Read	UINT16	1	/	
212	20201	Over-temperature protection value of the water cooling plate	Read	UINT16	1	/	
213	20202	Internal ambient temperature overtemperature protection value	Read	UINT16	1	/	
214	20203	Charging limit voltage	Read	UINT16	1	/	
215	20204	Charging limit current	Read	UINT16	1	/	
216	20205	Discharge limits voltage	Read	UINT16	1	/	
217	20206	Discharge limits current	Read	UINT16	1	/	
218	20207	DC voltage limit	Read	UINT16	1	/	
219	20208	Grid-connected active damping parameters	Read	UINT16	1	/	
220	20209	High-voltage reconnection limit	Read	UINT16	1	/	

221	20210	Low-voltage reconnection limit	Read	UINT16	1	/	
222	20211	High-frequency reconnection limits	Read	UINT16	1	/	
223	20212	Low-frequency reconnection limits	Read	UINT16	1	/	
224	20213	Reconnection waiting time	Read	UINT16	1	/	
225	20214	Reserve	Read	UINT16	1	/	
226	20215	Reconnection power recovery time	Read	UINT16	1	/	
227	20216	Internal ambient temperature drop-to-capacity value 1	Read	UINT16	1	/	
228	20217	Internal ambient temperature drops by 2	Read	UINT16	1	/	
229	20218	IGBT temperature drop: 1	Read	UINT16	1	/	
230	20219	IGBT temperature drops by 2	Read	UINT16	1	/	
231	20220	Temperature reduction time	Read	UINT16	1	/	
232	20221	Reserve	Read	/	/	/	
233	20222	Reserve	Read	/	/	/	
234	20223	Reserve	Read	/	/	/	
235	20224	Off-grid damping coefficient	Read	/	1	/	
236	20225	Reserve	Read	/	/	/	
237	20226	Reserve	Read	/	/	/	
238	20227	Reserve	Read	/	/	/	
239	20228	Reserve	Read	/	/	/	
240	20229	Reserve	Read	/	/	/	
241	20230	Reserve	Read	/	/	/	
242	20231	Reserve	Read	/	/	/	
243	20232	Reserve	Read	/	/	/	
244	20233	Reserve	Read	/	/	/	
245	20234	Power filter factor	Read	UINT16	1	/	
246	20235	Voltage filter coefficient	Read	UINT16	1	/	
247	20236	Frequency filter coefficient	Read	UINT16	1	/	
248	20237	VSG damping coefficient	Read	UINT16	1	/	
249	20238	VSG frequency drop coefficient	Read	UINT16	1	/	
250	20239	VSG voltage drop coefficient	Read	UINT16	1	/	

251	20240	Virtual resistance	Read	UINT16	1	/	
252	20241	Virtual inertia	Read	UINT16	1	/	
253	20242	Reactive ring Kp	Read	UINT16	1	/	
254	20243	Reactive ring Ki	Read	UINT16	1	/	
255	20244	3rd harmonic virtual reactance	Read	UINT16	1	/	
256	20245	3rd harmonic virtual resistor	Read	UINT16	1	/	
257	20246	5th harmonic virtual reactance	Read	UINT16	1	/	
258	20247	Fifth-order harmonic virtual resistor	Read	UINT16	1	/	
259	20248	Frequency dead zone	Read	UINT16	1	/	
260	20249	7th harmonic virtual reactance	Read	UINT16	1	/	
261	20250	7th harmonic virtual resistor	Read	UINT16	1	/	
262	20251	Voltage level selection	Read	UINT16	1	/	
263	20252	Reserve	Read	/	/	/	
264	20253	Off-grid output voltage step	Read	UINT16	1	/	
265	20254	PCS number	Read	UINT16	1	/	
266	20255	Reserve	Read	/	/	/	
267	30000	Reserve	Read	/	/	/	
268	30001	Negative busbar sampling coefficient	Read	UINT16	1	/	
269	30002	Negative busbar sampling with zero offset	Read	UINT16	1	/	
228	20217	Internal ambient temperature drops by 2	Read	UINT16	1	/	
229	20218	IGBT temperature drop: 1	Read	UINT16	1	/	
230	20219	IGBT temperature drops by 2	Read	UINT16	1	/	
231	20220	Temperature reduction time	Read	UINT16	1	/	
232	20221	Reserve	Read	/	/	/	
233	20222	Reserve	Read	/	/	/	
234	20223	Reserve	Read	/	/	/	
235	20224	Off-grid damping coefficient	Read	/	1	/	
236	20225	Reserve	Read	/	/	/	
237	20226	Reserve	Read	/	/	/	
238	20227	Reserve	Read	/	/	/	

239	20228	Reserve	Read	/	/	/	
240	20229	Reserve	Read	/	/	/	
241	20230	Reserve	Read	/	/	/	
242	20231	Reserve	Read	/	/	/	
243	20232	Reserve	Read	/	/	/	
244	20233	Reserve	Read	/	/	/	
245	20234	Power filter factor	Read	UINT16	1	/	
246	20235	Voltage filter coefficient	Read	UINT16	1	/	
247	20236	Frequency filter coefficient	Read	UINT16	1	/	
248	20237	VSG damping coefficient	Read	UINT16	1	/	
249	20238	VSG frequency drop coefficient	Read	UINT16	1	/	
250	20239	VSG voltage drop coefficient	Read	UINT16	1	/	
251	20240	Virtual resistance	Read	UINT16	1	/	
252	20241	Virtual inertia	Read	UINT16	1	/	
253	20242	Reactive ring Kp	Read	UINT16	1	/	
254	20243	Reactive ring Ki	Read	UINT16	1	/	
255	20244	3rd harmonic virtual reactance	Read	UINT16	1	/	
256	20245	3rd harmonic virtual resistor	Read	UINT16	1	/	
257	20246	5th harmonic virtual reactance	Read	UINT16	1	/	
258	20247	Fifth-order harmonic virtual resistor	Read	UINT16	1	/	
259	20248	Frequency dead zone	Read	UINT16	1	/	
260	20249	7th harmonic virtual reactance	Read	UINT16	1	/	
261	20250	7th harmonic virtual resistor	Read	UINT16	1	/	
262	20251	Voltage level selection	Read	UINT16	1	/	
263	20252	Reserve	Read	/	/	/	
264	20253	Off-grid output voltage step	Read	UINT16	1	/	
265	20254	PCS number	Read	UINT16	1	/	
266	20255	Reserve	Read	/	/	/	
267	30000	Reserve	Read	/	/	/	
268	30001	Negative busbar sampling coefficient	Read	UINT16	1	/	
269	30002	Negative busbar sampling with zero	Read	UINT16	1	/	

		offset					
270	30003	Sampling coefficient of the main busbar	Read	UINT16	1	/	
271	30004	The positive busbar samples zero offset	Read	UINT16	1	/	
272	30005	Reserve	Read	UINT16	/	/	
273	30006	Reserve	Read	UINT16	/	/	
274	30007	R is the sampling coefficient of the phase inverter current	Read	UINT16	1	/	
275	30008	R phase inverter current sampling zero bias	Read	UINT16	1	/	
276	30009	S-phase inverter current sampling coefficient	Read	UINT16	1	/	
277	30010	S-phase inverter current sampling zero deviation	Read	UINT16	1	/	
278	30011	T: Sampling coefficient of current in phase inverter inversion	Read	UINT16	1	/	
279	30012	T-phase inverter current sampling zero bias	Read	UINT16	1	/	
280	30013	R-phase grid voltage sampling coefficient	Read	UINT16	1	/	
281	30014	R-phase grid voltage sampling zero offset	Read	UINT16	1	/	
282	30015	S-phase grid voltage sampling coefficient	Read	UINT16	1	/	
283	30016	S-phase grid voltage sampling zero bias	Read	UINT16	1	/	
284	30017	T-phase grid voltage sampling coefficient	Read	UINT16	1	/	
285	30018	T-phase grid voltage sampling zero deviation	Read	UINT16	1	/	
286	30019	R-phase invert voltage sampling coefficient	Read	UINT16	1	/	
287	30020	R-phase inverter voltage sampling zero bias	Read	UINT16	1	/	
288	30021	S-phase inverter voltage sampling factor	Read	UINT16	1	/	
289	30022	S-phase inverter voltage sampling zero bias	Read	UINT16	1	/	

290	30023	T-phase inverter voltage sampling factor	Read	UINT16	1	/	
291	30024	T-phase inverter voltage sampling zero offset	Read	UINT16	1	/	
292	30025	Reserve	Read	/	/	/	
293	30026	Reserve	Read	/	/	/	
294	30027	Reserve	Read	/	/	/	
295	30028	Reserve	Read	/	/	/	
296	30029	Reserve	Read	/	/	/	
297	30030	Reserve	Read	/	/	/	
298	30031	Battery voltage sampling coefficient	Read	UINT16	1	/	
299	30032	Battery voltage sampling zero-bias number	Read	UINT16	1	/	
300	30033	Battery current sampling coefficient	Read	UINT16	1	/	
301	30034	Battery current sampling zero bias	Read	UINT16	1	/	
302	30035	Reserve	Read	/	/	/	
303	30036	Reserve	Read	/	/	/	
304	30037	Reserve	Read	/	/	/	
305	30038	Reserve	Read	/	/	/	
306	30039	Reserve	Read	/	/	/	
307	30040	Reserve	Read	/	/	/	
308	30041	Reserve	Read	/	/	/	
309	30042	Reserve	Read	/	/	/	
310	30043	Reserve	Read	/	/	/	
311	30044	Reserve	Read	/	/	/	
312	30045	Reserve	Read	/	/	/	
313	30046	Reserve	Read	/	/	/	
314	30047	Reserve	Read	/	/	/	
315	30048	Reserve	Read	/	/	/	
316	30049	Reserve	Read	/	/	/	
317	30050	Reserve	Read	/	/	/	
318	30051	Reserve	Read	/	/	/	
319	30052	Reserve	Read	/	/	/	
320	30053	Reserve	Read	/	/	/	

321	30054	Reserve	Read	/	/	/	
322	30055	Reserve	Read	/	/	/	
323	30056	Reserve	Read	/	/	/	
324	30057	Reserve	Read	/	/	/	
325	30058	Reserve	Read	/	/	/	
326	30059	Reserve	Read	/	/	/	
327	30060	Reserve	Read	/	/	/	
328	30061	Reserve	Read	/	/	/	
329	30062	Reserve	Read	/	/	/	
330	30063	Reserve	Read	/	/	/	
331	30064	Reserve	Read	/	/	/	
332	30065	Reserve	Read	/	/	/	
333	30066	Reserve	Read	/	/	/	
334	30067	Reserve	Read	/	/	/	
335	30068	Reserve	Read	/	/	/	
336	30069	Reserve	Read	/	/	/	
337	30070	Reserve	Read	/	/	/	
338	30071	Reserve	Read	/	/	/	
339	30072	Reserve	Read	/	/	/	
340	30073	Reserve	Read	/	/	/	
341	30074	Reserve	Read	/	/	/	
342	30075	Reserve	Read	/	/	/	
343	30076	Reserve	Read	/	/	/	
344	30077	Reserve	Read	/	/	/	
345	30078	Reserve	Read	/	/	/	
346	30079	Reserve	Read	/	/	/	
347	30080	Reserve	Read	/	/	/	
348	30081	Reserve	Read	/	/	/	
349	30082	Reserve	Read	/	/	/	
350	30083	Reserve	Read	/	/	/	
351	30084	Reserve	Read	/	/	/	
352	30085	Reserve	Read	/	/	/	
353	30086	Reserve	Read	/	/	/	
354	30087	Reserve	Read	/	/	/	

355	30088	Reserve	Read	/	/	/	
356	30089	Reserve	Read	/	/	/	
357	30090	Reserve	Read	/	/	/	
358	30091	Reserve	Read	/	/	/	
359	30092	Reserve	Read	/	/	/	
360	30093	Reserve	Read	/	/	/	
361	30094	Reserve	Read	/	/	/	
362	30095	Reserve	Read	/	/	/	
363	30096	Reserve	Read	/	/	/	
364	30097	Reserve	Read	/	/	/	
365	30098	Reserve	Read	/	/	/	
366	30099	Reserve	Read	/	/	/	
367	30100	Reserve	Read	/	/	/	
368	30101	Reserve	Read	/	/	/	
369	30102	Reserve	Read	/	/	/	
370	30103	Reserve	Read	/	/	/	
371	30104	Reserve	Read	/	/	/	
372	30105	Reserve	Read	/	/	/	
373	30106	Reserve	Read	/	/	/	
374	30107	Reserve	Read	/	/	/	
375	30108	Reserve	Read	/	/	/	
376	30109	Reserve	Read	/	/	/	
377	30110	Reserve	Read	/	/	/	
378	30111	Reserve	Read	/	/	/	
379	30112	Reserve	Read	/	/	/	
380	30113	Reserve	Read	/	/	/	
381	30114	Reserve	Read	/	/	/	
382	30115	Reserve	Read	/	/	/	
383	30116	Reserve	Read	/	/	/	
384	30117	Reserve	Read	/	/	/	
385	30118	Reserve	Read	/	/	/	
386	30119	Reserve	Read	/	/	/	
387	30120	Reserve	Read	/	/	/	
388	40000	Reserve	Read	/	/	/	

389	40001	Protection enable bit 0	Read	UINT16	1	/	
390	40002	Protect the enablement bit 1	Read	UINT16	1	/	
391	40003	Reserve	Read	/	/	/	
392	40004	Reserve	Read	/	/	/	
393	40005	Version number 1	Read	UINT16	1	/	
394	40006	Version 2	Read	UINT16	1	/	
395	40007	Reserve	Read	/	/	/	

Communication Example 1 (ModBus-Tcp**):**

1) Read data from address 10006
2) EMS to PCS: 02 2F 00 00 00 06 01 04 27 16 00 01
3) PCS to EMS: 00 10 00 00 00 05 01 04 02 00 03

. PCS Power-On Strategy

1. Self-check of low-voltage control power supply

2. Internal communication self-check, sampling circuit self-check, temperature self-check passed

3. Grid detection, adjusting frequency and phase sequence

4.BMS Communication,BMS No error

5. Insulation testing passed

6. Parallel communication to confirm the master machine's slave machine

7. Power on complete, wait for the startup command

. PCS Off-Offline Strategy

1. Block PWM pulses

2. Disconnect the DC contactor

3. Disconnect the AC relay

4. Power off complete

5. Keep work logs

8. PCS insulation testing strategy

1. Equipment responds to startup commands;

2. Pre-charge is completed on the DC side;

3. PCS Insulation Testing:

1) If the insulation detection value of both the DC upper and lower busbars exceeds 1

megaohm, the PCS executes grid connection logic;

2) If the insulation detection value of the DC upper and lower busbars does not exceed 1 megaohm, recalculate the insulation detection value. If all three tests do not exceed 1 megaohm, an insulation detection fault is reported;

3) If there is an insulation fault, the equipment must be troubled and resolved before starting operation

7 Fault List

JTES-125K-W series [compatible with JTES-100K-W] has perfect protection function and warning information, once the fault occurs, the relevant fault information can be read through EMS. Before seeking service, users can press the tips in the table below to conduct self-test, analyze the cause of the failure and find out the solution. Please do not disassemble the machine parts during self-inspection. If you cannot solve the problem, please contact the agent or our company directly.

Fault handling Level Meaning of the level:

- Recoverable fault: it indicates that PCS, power grid, battery and other external conditions are abnormal, and the machine is automatically shut down. After fault recovery, the equipment can recover from the fault.
- Shutdown fault: it indicates that PCS, power grid, battery and other external conditions are abnormal. It needs to be shut down for power inspection, and personnel are required to remove abnormalities in time.

Fault reset mode: automatic reset.

Automatic reset fault means that after the fault occurs, the system will clear the fault by itself at certain intervals. If the fault condition is eliminated, the system will exit the fault state. If the fault condition still exists, the fault will be reported again. The number of fault automatic reset can be set by the function code. When the number of automatic resets is used up, the fault will not be automatically reset until the user manually reset the system and the number of fault automatic reset is reloaded.

The handling of recoverable failures：

NO.	Fault code	Fault name	Fault possible cause	Fault handling suggestions
1	0x0001	Grid Voltage Fault (Phase Loss Protection)	The PCS does not detect the grid voltage, or the instantaneous values of all three phases of the grid voltage are simultaneously below 10V	Check whether the grid voltage is normal or if the AC power line is connected correctly.
2	0x0002	Instantaneous Grid Overvoltage	The instantaneous grid voltage value exceeds the limit (864V)	Check whether the grid voltage is normal or if the grid voltage is distorted.

3	0x0004	RMS fault of grid line voltage	The RMS value of the grid line voltage exceeds the allowable operating range	Check whether the grid voltage is normal
4	0x0008	Unbalanced source voltage	The voltage imbalance of the grid exceeds the high limit	Check whether the grid voltage balance is normal
5	0x0010	The current in the grid is unbalanced	The current imbalance of the grid exceeds the high limit	Check the PCS inverter current
6	0x0020	Power grid frequency anomaly	The grid frequency is out of the operating range	Check AC supply frequency
7	0x0040	High frequency of power grid	The grid frequency exceeds the high limit	Check AC supply frequency
8	0x0080	Low frequency of power grid	The grid frequency exceeds the low limit	Check AC supply frequency
9	0x0100	Grid frequency mismatch	The grid frequency deviates too much from the preset value	Check AC supply frequency
10	0x0200	DC bus voltage overvoltage	The DC bus voltage exceeds the high limit	Check DC bus voltage and control parameters
11	0x0400	The DC bus voltage deviation is large	The voltage deviation between positive and negative DC bus is large	Check positive and negative bus voltages and control parameters
12	0x0800	DC bus voltage undervoltage	Dc bus voltage exceeds low limit	Check DC bus voltage and control parameters
13	0x1000	The battery voltage is over voltage	The battery voltage is over the limit	Check battery voltage
14	0x2000	The battery voltage is low voltage	The battery voltage is below the low limit	Check battery voltage
15	0x4000	The battery current is overflowing	Battery current exceeds limit value	Check battery current
16	0x8000	CPLD fault	The fault is detected by CPLD	Check the specific CPLD sub-fault code
17	0x0001	Inverter current sampling offset value fault	The inverter current sampling offset value and default value exceed the normal range	Check the current sampling circuit (please contact our company for inspection)
18	0x0002	The inverter current overflows	The inverter current exceeds the high limit	Check the Hall and sample lines
19	0x0004	reserved		

20	0x0008	Abnormal inverter current	The deviation of the inverter current from the set value is too large	Check circuit.
21	0x0010	AC relay failure	AC relay closing fault	Check the AC relay
22	0x0020	Pre-connected to the grid to detect faults	Abnormal inverter voltage before closing	Check the filter capacitor wiring and sampling line
23	0x0040	Reactor 1 over temperature fault	Reactor 1 temperature exceeds limit value	Check reactor 1 temperature sampling line, water flow rate, water inlet temperature and limit parameters (if you need to modify the limit parameters, contact our staff in advance to determine before operation)
24	0x0080	Internal ambient temperature over temperature fault	Internal ambient temperature exceeds the limit value	Check the internal environmental temperature sampling line, water flow rate, water inlet temperature and limit parameters (if you need to modify the limit parameters, contact our staff in advance to determine before operation)
25	0x0100	Reactor 2 over temperature fault	Reactor 2 temperature exceeds limit value	Check the temperature sampling line of reactor 2, the flow rate of water generator, the inlet temperature of water generator and the limit parameters (if the limit parameters need to be modified, contact our staff in advance to determine before operation)
26	0x0200	AC relay adhesion fault	AC relay adhesion	Check the AC relay
27	0x0400	The temperature of phase A IGBT is overheated	The IGBT temperature of phase A exceeds the limit value	Check IGBT temperature sampling line, water flow rate, water inlet temperature and limit parameters of phase A (if the limit parameters need to be modified, contact our staff in advance to determine before operation)

28	0x0800	DC reverse connection fault	The DC+ and DC- lines are connected in reverse	Check DC+ and DC- wiring
29	0x1000	The temperature of phase B IGBT is overheated	The temperature of phase B IGBT exceeds the limit value	Check B phase IGBT temperature sampling line, water flow rate, water inlet temperature and limit parameters (if you need to modify the limit parameters, contact our staff in advance to determine before operation)
30	0x2000	The temperature of phase C IGBT is overheated	The temperature of phase C IGBT exceeds the limit value	Check C phase IGBT temperature sampling line, water flow rate, water inlet temperature and limit parameters (if you need to modify the limit parameters, contact our staff in advance to determine before operation)
31	0x4000	Water cooling plate temperature over temperature	Water cooling plate temperature exceeds the limit value	Check the water-cooling plate temperature sampling line, water machine flow rate, water machine inlet temperature and limit parameters (if you need to modify the limit parameters, contact our staff in advance to determine before operation)
32	0x8000	High/Low voltage ride through	PCS detected high and low voltage ride through beyond the curve range	Check the grid voltage
33	0x0001	Fault N-phase current too high	Detection N-phase current or N-phase current protection parameters	Detection N-phase current or N- phase current protection parameters
34	0x0002	reserved		
35	0x0004	reserved		
36	0x0008	reserved		
37	0x0010	reserved		
38	0x0020	reserved		
39	0x0040	reserved		
40	0x0080	DC Relay Welding Detection	The DC relay has welded shut.	Check the DC relay

41	0x0100	EMS communication lost contact failure	The communication signal of the EMS communication port of the equipment is lost	Check EMS communication lines
42	0x0200	BMS communication lost contact	Device BMS communication port communication signal loss	Check BMS communication lines
43	0x0400	Emergency stop detection	Emergency stop signal is given externally	Check the emergency stop signal
44	0x0800	insulation detection	Insulation detection calculation value is too low	Check the insulation system
45	0x1000	RMS fault of grid phase voltage	The effective value of the grid phase voltage exceeds the allowable operating range	Check whether the grid voltage is normal
46	0x2000	AC lightning protection fault	Lightning protection failure occurred	Check lightning fuse and wiring
47	0x4000	Reactor temperature rise failure	Temperature opening fault of reactor occurred	Check the reactor
48	0x8000	Resonant fault detection	The PCS resonates internally and externally	Adjust the resonance coefficient
49	0x0001	Fan fault	Fan damage	Check fan status
50	0x0002	Leakage fault detection	Leakage fault occurs / Protective earthing fault	Check the leakage current signal/ Check whether the protective earthing conductor is intact.
51	0x0004	reserved		
52	0x0008	reserved		
53	0x0010	reserved		
54	0x0020	reserved		
55	0x0040	reserved		
56	0x0080	reserved		
57	0x0100	reserved		
58	0x0200	reserved		
59	0x0400	reserved		
60	0x0800	reserved		
61	0x1000	reserved		
62	0x2000	reserved		
63	0x4000	reserved		
64	0x8000	reserved		

65	0x0001	power failure	CPLD detection	Check the power supply
66	0x0002	R phase drive protection	CPLD detection	Check drive board and power supply
67	0x0004	S phase drive protection	CPLD detection	Check drive board and power supply
68	0x0008	T phase drive protection	CPLD detection	Check drive board and power supply
69	0x0010	T phase overcurrent	CPLD detection	Check the driver board and power supply, check the CPLD version number
70	0x0020	S phase overcurrent	CPLD detection	Check the driver board and power supply, check the CPLD version number
71	0x0040	R phase overcurrent	CPLD detection	Check the driver board and power supply, check the CPLD version number
72	0x0080	The battery current is overflowing	CPLD detection	Check the battery current and control parameters, check the CPLD version number
73	0x0100	Negative bus overvoltage	CPLD detection	Check the control parameters and check the CPLD version number
74	0x0200	Positive bus overvoltage	CPLD detection	Check the control parameters and check the CPLD version number
75	0x0400	The battery voltage is overvoltage	CPLD detection	Check the battery voltage and control parameters and check the CPLD version number
76	0x0800	External emergency stop	The CPLD detects the emergency stop signal	Check the emergency stop signal
77	0x1000	CRC error	CPLD detection	Check the core board
78	0x2000	Communication timeout	CPLD detection	Check the core board
79	0x4000	Chip reset	CPLD detection	Check the core board
80	0x8000	reserved		
81	0x0001	reserved		
82	0x0002	reserved		
83	0x0004	reserved		
84	0x0008	reserved		
85	0x0010	reserved		
86	0x0020	reserved		
87	0x0040	reserved		

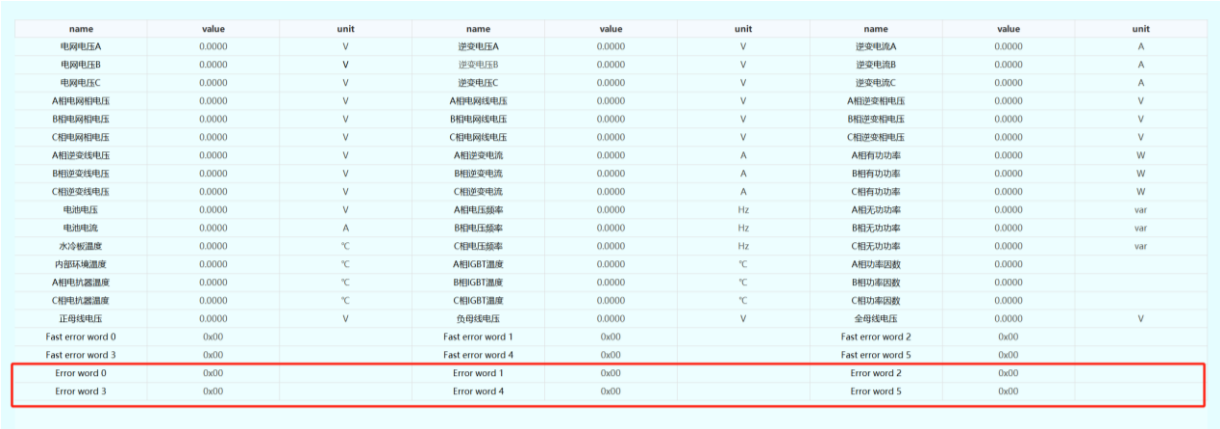
88	0x0080	reserved		
89	0x0100	reserved		
90	0x0200	reserved		
91	0x0400	reserved		
92	0x0800	reserved		
93	0x1000	reserved		
94	0x2000	reserved		
95	0x4000	reserved		
96	0x8000	reserved		

The handling of Shutdown Fault ：

No.	Fault code	Fault name	Fault cause	Fault handling
1	ErrWord0=0x0200	High DC bus voltage	High DC bus voltage fault report more than 3 times	Power off check
2	ErrWord0=0x0400	DC bus voltage deviation large	DC bus voltage deviation high fault report more than 3 times	Power off check
3	ErrWord1=0x0010	AC relay fault	AC relay closing fault	Check AC relay
4	ErrWord1=0x0200	Fault of AC relay sticking together	AC relay gets stuck together	Check the AC relay (if this fault is reported, the equipment will not automatically reset; it needs to be re-powered on to reset the fault)
5	ErrWord1=0x0020	Pre-Grid-Connection Test Fault	The system detected an abnormal inverter-side voltage during the internal self-test. The unit has registered this fault 3 or more times, causing a permanent lockout.	Check the wiring of the filter capacitors and the inverter-side voltage sampling lines.
6	ErrWord2=0x0800	Insulation Detection Fault	The fault is triggered when the calculated insulation value falls below 1 MΩ	Power down the system to inspect the insulation system.

Note: The Fault Code may be partially updated. Please contact our personnel promptly.

The Fault Code can be read from the host computer interface as follows:



name	value	unit	name	value	unit	name	value	unit
电网电压A	0.0000	V	逆变电压A	0.0000	V	逆变电流A	0.0000	A
电网电压B	0.0000	V	逆变电压B	0.0000	V	逆变电流B	0.0000	A
电网电压C	0.0000	V	逆变电压C	0.0000	V	逆变电流C	0.0000	A
A相电网相电压	0.0000	V	A相电网线电压	0.0000	V	A相逆变相电压	0.0000	V
B相电网相电压	0.0000	V	B相电网线电压	0.0000	V	B相逆变相电压	0.0000	V
C相电网相电压	0.0000	V	C相电网线电压	0.0000	V	C相逆变相电压	0.0000	V
A相逆变线电压	0.0000	V	A相逆变电流	0.0000	A	A相有功功率	0.0000	W
B相逆变线电压	0.0000	V	B相逆变电流	0.0000	A	B相有功功率	0.0000	W
C相逆变线电压	0.0000	V	C相逆变电流	0.0000	A	C相有功功率	0.0000	W
电池电压	0.0000	V	A相电压频率	0.0000	Hz	A相无功功率	0.0000	var
电池电流	0.0000	A	B相电压频率	0.0000	Hz	B相无功功率	0.0000	var
水冷板温度	0.0000	℃	C相电压频率	0.0000	Hz	C相无功功率	0.0000	var
内部环境温度	0.0000	℃	A相IGBT温度	0.0000	℃	A相功率因数	0.0000	
A相电抗器温度	0.0000	℃	B相IGBT温度	0.0000	℃	B相功率因数	0.0000	
C相电抗器温度	0.0000	℃	C相IGBT温度	0.0000	℃	C相功率因数	0.0000	
正母线电压	0.0000	V	负母线电压	0.0000	V	全母线电压	0.0000	V
Fast error word 0	0x00		Fast error word 1	0x00		Fast error word 2	0x00	
Fast error word 3	0x00		Fast error word 4	0x00		Fast error word 5	0x00	
Error word 0	0x00		Error word 1	0x00		Error word 2	0x00	
Error word 3	0x00		Error word 4	0x00		Error word 5	0x00	

8 Maintenance

Due to the influence of temperature, humidity, dust, and vibration in the application environment, the internal components of PCS may undergo aging, potentially leading to faults or a reduced service life. Compared with air cooling, liquid cooling has a more effective temperature control effect. In practical applications, stable and reliable operation of liquid-cooled energy conversion converters can be achieved by controlling the temperature of the cooling liquid using a liquid cooling unit. Therefore, it is necessary to conduct daily and periodic maintenance on PCS.

1) Correct operating procedures must be strictly adhered to prior to maintenance.
2) The input and output of the PCS involve high voltage electricity. Necessary safety precautions must be taken prior to maintenance.
3) Prior to maintenance, it is essential to ensure that the power supply on both the DC side and AC side has been disconnected.
4) The PCS contains an internal energy storage capacitor. After powering down, a waiting period of at least 5 minutes is required to confirm that the PCS is completely devoid of power before commencing maintenance.
5) Following disconnection of power, a warning sign should be prominently displayed at the point of disconnection to prevent accidental re-energization during maintenance activities.
6) To mitigate potential hazards, personnel conducting maintenance should wear appropriate insulation protective equipment throughout the process.
7) Qualified personnel with expertise in this product manual are required for maintaining the PCS.

8.1 Routine checks

Recommendation: Perform regular inspections.

a) Listen for any abnormal sounds coming from the energy storage converter.
b) Check for any unusual odors emitted by the energy storage converter.
c) Monitor the internal temperature of the energy storage converter to ensure it remains within normal range.
d) Continuously monitor the operation of the energy storage converter, including input and output voltage and current, promptly addressing any abnormalities.

8.2 Electrical and fixed connection inspection

Recommendation:

- Inspections should be conducted biannually and documented.
- Regular inspections of the electrical and fixed components of the equipment are necessary after operation, including
- checking the DC input and AC output electrical connections,
- module ground connection,
- communication cable connections,
- as well as ensuring there is no leakage in the liquid cooling interface.

8.3 Maintenance Work

1) Maintenance work can only be operated by professionals or with electrical qualified personnel, and live maintenance is prohibited;
2) Recommend regular visual inspection to determine whether maintenance is required;
3) Check whether the DC input and AC output voltage are reasonable;
4) Go through history and read error messages and warnings.
5) The recommended service life of the coolant is generally 3~5 years. It is recommended to replace the coolant using the PACK liquid cooling of the energy storage system after the service life.

8.4 Replacement of wearing parts

The internal fan used in this product is a long-life fan with high reliability, and the maintenance is free during the service cycle. Non-professionals do not recommend removing the cover for maintenance, and can contact the after-sales service for guidance and installation.

Judging basis: the PCS is in fan fault;

Fan has abnormal noise;

Good ventilation but abnormal PCS heating.

Replacement steps:

1) Ensure that all the power supplies have been disconnected before the fan replacement!

2) Open the chassis cover, remove the structural parts of the fixed fan, and replace the fan.

8.5 DC Fuse

The maximum voltage level on the DC side of the energy storage system is 1000V, with a maximum current of 202A.

The selection process must consider the following two points:

Rated Current Temperature Correction:

Temperature curve around the rated current of the fuse (as shown in Figure 8.1)

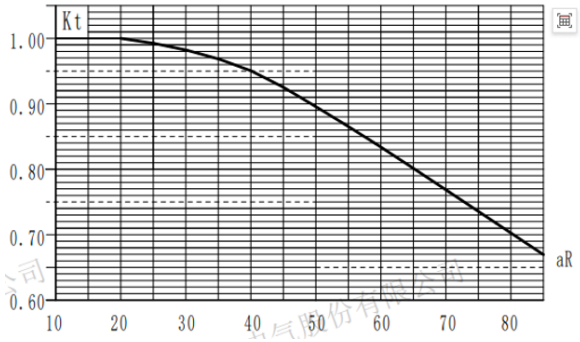


Fig. 8.1 Temperature Correction Curve

Example: When the ambient temperature of the fuse is 65℃ and Kt is 0.8,
the selected rated current of the fuse should be greater than 202A/0.8≈252.5A.

8.6 DC Isolation Switch

ATTENTION

The DC side isolation switch allows for on-load disconnection, but it affects its service life.
Please use in emergency situations!

8.7 RCD

This product can cause a DC current in the PE conductor.
With an integrated universal curent-sensitive residual current monitoring unit included,theinverter will disconnect immediately from the mains power once a fault current with a valueexceeding the limit is detected.

However.if an extemal residual current device(RCD) is mandatory,At the on-gnd port. theswitch must be triggered at a residual current of 300mA(recommended).

Where a residual current operated protective device (RCD) is used for protection against electric shock, only an RCD of type B isallowed on the supply side of this product.

RCD of type B (Recommended Parameter Range)	
Operating Voltage Range [V]	110 - 500
Operating Frequency Range [Hz]	45 - 66
Fault Current Frequency [Hz]	400-700-1000
Testing Voltage Range [V]	110 - 500

Rated Operating Current [A]	Max 225
Adjustable Trip Threshold [A]	0.03 - 0.5

8.8 External circuit breaker

External circuit breaker protection parameter values：

Rated Operational Voltage:≥400VAC ； Rated Current (In)：≥250 A； Rated Instantaneous

Short-Circuit Current Setting (Ii):≥10In； Icu≥25kA， Number of Poles:3P/4P