SMART ENERGY LIGHTS UP THE GREEN EARTH

PotisPCS-30~105K-1000/400E-A01E
User Manual

This picture shows iPotisEdge standard products. Actual products may vary due to customization.

VIP Customization | Module Assembly | Efficient and Flexible | Intelligent Stability | Comprehensive After-sales Service

iPotisEdge Co.,Ltd.

Content

Preface

Attention

Your purchase of products, services or features, etc. shall be governed by our commercial contracts and terms, and all or some of the products and service features described in this document may not be included in your purchase. Unless otherwise agreed in the contract, we make no representations or warranties, express or implied, regarding the contents of this document.

Keep your manuals safe

This manual serves as an important part of this equipment. You may print the electronic copy of the user's manual on paper as needed, and keep the paper copy and the electronic file in a safe place for subsequent reference. Anyone operating this equipment at any time must follow the requirements of this manual.

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Use And Warranty Coverage Only Applicable To Mainland China

Overview

Please read the product manual carefully before installation, operation and maintenance. This manual contains important safety instructions and installation instructions that must be followed during the installation and maintenance of the equipment.

Open box inspection notes

When opening the box, please carefully confirm: whether the product is broken or damaged;
Whether the nameplate rating of the machine corresponds to your order requirements;
Our company has been strictly inspected in the manufacturing and packaging of our products, so if you

find any kind of omission, please contact our company quickly to solve the problem.

Scope of application

This product manual describes the installation, electrical connection, commissioning, maintenance and troubleshooting of 50-105KW Power Control System.

Readers

This manual applies to professional electrical technicians responsible for the installation and commissioning of Power Control System (PCS).

Model number（s）

PotisPCS-30K-1000/400E-A02E
PotisPCS-50K-1000/400E-A02E
PotisPCS-63K-1000/400E-A02E
PotisPCS-80K-1000/400E-A02E
PotisPCS-105K-1000/400E-A02E
PotisPCS-105K-1000/400E-A02E-F

Chapter1 Security Information

1.1. Necessary conditions for installation and maintenance of Power Control System

The installation of Power Control System must fully comply with national and local grid standards and regulations.

Read and understand all instructions contained in this manual and familiarize yourself with the relevant safety symbols before you begin installation and commissioning of the equipment.

In accordance with national and state/provincial regulations, access to the grid can only be obtained with the permission of the electricity department and the operation can only be performed by a qualified electrical engineer.

If you need any maintenance or repair, please contact our after-sales staff, please do not repair yourself, it may lead to personal or property injury.

Before installing and maintaining the equipment, you should use the DC switch to cut off the high voltage DC of the battery, otherwise, the high voltage generated may bring serious injury.

1.1.1. Installation and maintenance personnel requirements

When an Power Control System (PCS) is in operation, some parts may be electrically charged and some parts may become hot. Improper use, incorrect installation, or incorrect operation can result in serious injury to persons or property. Transportation, handling, installation, start-up and maintenance operations must be performed by a qualified electrical engineer (all accident precautions in effect in the user's country must be observed!) We are not responsible for any personal or property injury caused by any misuse.

The shipping company is responsible for any damage caused to the machine during the process. Please check the PCS thoroughly when picking up the goods. If you find any packaging problems that may cause damage to the PCS, or if you find any visible damage to the PCS, please notify the responsible shipping company immediately.

1.1.2. Precautions for electrical connection

When handling energized PCS, please observe all current national regulations related to the prevention of electrical accidents.

1.1.3. Compatibility with RCD

This product can cause a DC current in the PE conductor. Where a residual current-operated protective device(RCD) is used for protection against electric shock, only a RCD of type B is allowed on the supply side of this product.

The recommended leakage current rating for the RCD is 30mA.

1.2. Explanation of symbols

In order to ensure the safety of users' personal property or efficient use of this product, please read this manual carefully before installation and use.

1.2.1. Manual prompt identifier

The following is a list of the identifiers used in this manual. Please read and understand what each identifier represents.

 **Danger**	This instruction indicates that there are hazards during operation and that failure to comply with such warning messages will directly result in serious personal injury or death.
 **Warning**	This instruction indicates that there are potential hazards during operation and that failure to comply with such warning messages may result in personal injury or death.
 **Attention**	This instruction indicates that there are potential hazards during operation and that failure to comply with such warning messages may result in damage to the equipment.

1.2.2. Safety instructions

 **Warning**	All installation, commissioning and maintenance operations must be performed by professional personnel. Professional technicians must meet the following requirements： Professionally trained； Read this manual completely and be familiar with the safety aspects of operating electrical and electronic equipment;be familiar with the safety codes related to electrical systems.

The Power Control System are designed and tested in strict accordance with relevant international safety standards, and their installation, commissioning, operation and maintenance processes must

comply with the safety codes of operation for electrical and electronic equipment. Improper use or misuse may endanger the personal safety of the operator or third parties, as well as damage the converter or other property safety. To avoid this, the following safety precautions must be strictly followed during operation and maintenance, which are described in detail in the corresponding sections.

Meet the above conditions professional and technical personnel can carry out the following work:

（1） Installation of converters;

（2） Construction of energy storage systems in accordance with customer requirements;

（3） Commissioning of energy storage systems;

（4） Operation, commissioning and maintenance of energy storage systems.

 **Attention**	Risk of injury if you mishandle the equipment! The instructions in the manual must always be followed when moving and placing the converter; Improper handling of equipment may result in electric shocks, burns, contusions, etc; Damage to the equipment caused by any unauthorized modification and disassembly of the system (or equipment) operation is not covered by the warranty.

1.2.3. Safety instructions in mechanical installation

 **Danger**	Always ensure that the converter is free of any electrical connections before installing it.
 **Attention**	Poor ventilation of the installation environment will affect the system performance! Good ventilation needs to be ensured during the operation of the equipment. The equipment must be kept upright and the air ducts smooth, with no strong air currents blocking the air flow near the air outlets to ensure adequate cooling inside the unit.

1.2.4. Safety instructions in the electrical connection

 **Danger**	Do not touch the metal terminals of the battery without adequate protection.
 **Warning**	The cables used in the energy storage system must be securely connected, well insulated and of appropriate gauge.

 **Attention**	All electrical installations must meet national/regional electrical standards; Must be licensed by the electricity authority of the country/region in which it is located in order to operate on the grid; Before connecting to the input power, be sure to ground it reliably and comply with local electrical standards.

1.2.5. Safety instructions in converter operation

 **Danger**	Any touching of the equipment inside with the grid circuit connected to the copper row, contacts, terminals and other acts may lead to burning or electric shock fatal! Do not touch the terminals and conductors connected to the grid circuit; Pay attention to any instructions and safety instruction documents regarding connection to the grid.
 **Warning**	There is a risk of electric shock inside the device! Do not open the converter housing while the converter is operating or under electric condition. Complete and closed cabinet shell to protect the safety of the operator's personal property; Any operation of this equipment must be performed or directed by a professional; Please note the safety precautions listed in the user manual and other documents. Do not disconnect the DC side of the converter when the AC side is under load. If you need to disconnect, please perform a shutdown first. Disconnect the DC connection only after disconnecting the AC load disconnect switch of the converter and confirming that no voltage is present.
 **Attention**	When the converter is running, it is strictly prohibited to block the air duct with foreign objects.

1.2.6. Repair and replacement safety instructions

 **Danger**	Improper maintenance operations on the equipment may result in injury to personnel or damage to the equipment. Before performing any operation, the user must strictly follow the following steps: Disconnect the grid AC load disconnect switch first, then cut the battery box DC circuit breaker; Wait at least 10 minutes until the internal energy storage components are discharged, during which time it is strictly forbidden to touch the equipment terminals, contacts, copper row and other electrically charged parts with human body or any conductor;Use testing equipment to inspect to ensure that no voltage or current is present.
	Please prohibit unrelated personnel from entering the maintenance site! Temporary warning signs must be posted or barriers erected during electrical connections and maintenance work to prevent extraneous personnel from entering the electrical connection or

Attention	maintenance area.
 **Attention**	Restart the converter only after removing faults that affect the safety performance of the converter; Complete power down of the converter 1 minute before re-powering; The converter does not contain maintenance parts inside, if you need any maintenance service, please contact our after-sales service staff.
 **Attention**	Please do not replace the internal components of the converter without permission. We will not be responsible for any warranty or joint and several liability for the resulting damage.
 **Attention**	Contact or improper handling of printed circuit boards or other electrostatic sensitive components can lead to device damage; avoid unnecessary board contact; Comply with electrostatic protection norms and wear anti-static bracelets.

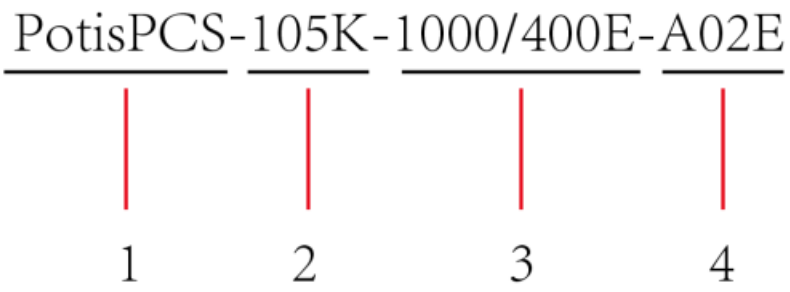
1.2.7. Other

 **Attention**	All safety markings, warning labels and nameplates on the converter: Must be clearly visible; Cannot be removed or overwritten.

Chapter2 Introduction to Product Specifications

2.1. Product introduction and features

The Power Control System, with three electrical level topology, can realize bidirectional conversion from DC to AC and AC to DC, which can convert AC to DC to charge the battery, or convert DC to AC to supply power to the load or feed back to the grid.



Number	Implication	Instructions	Remark
1	Brand identity	Brand identity	
2	Power class	105kW	Other：50kW/63kW/80kW
3	Converter type	Three-phase AC/DC conversion	
4	Assembly mode	Module	

Table2-1

2.1.1. Product characteristics

Table2-2

Powerful performance	Typical Applications	Smart and friendly
• Three-level topology, conversion efficiency up to >98.5% • High dynamic response, full load switching time down to 10ms • Supports parallel operation of multiple machines, expandable to 2MW • Modular equipment allows for more flexible configuration and easy maintenance • High-speed IGBT, low internal resistance filter • And off-grid seamless switching, fast response, to ensure continuous uninterrupted power supply for critical loads • Wide DC input range, supporting ladder battery utilization • Independent regulation of active and reactive power to improve power quality	• Peak-shaving and valley-filling: store electricity during low electricity prices and discharge it during peak periods to save electricity costs • Uninterrupted power supply: When the power grid is down, the system can supply power off-grid without interruption to ensure normal operation of the load • Dynamic capacity increase: compensate for short term power resource shortage and defer distribution investment • Power quality management, compensation of transient dips in grid voltage, power factor of loads and harmonic currents • Can form a hybrid micro-grid system	• Perfect fault protection function • Adaptable to multiple types of batteries for different charging and discharging strategies • With PQ, VF, VSG, SVG and other functions • Accepting grid dispatch • Multiple communication methods are available • Support parallel operation of multiple machines, expandable to 2MW

2.1.2. Electrical principle

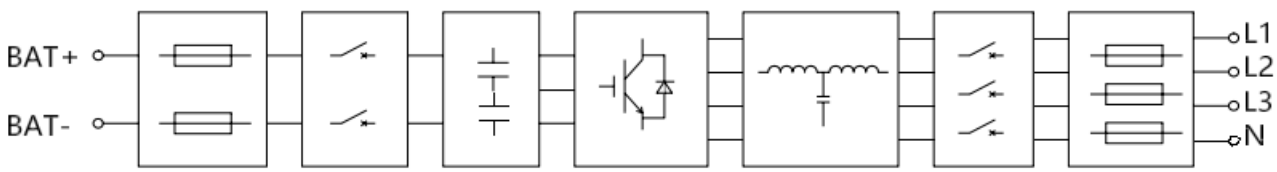


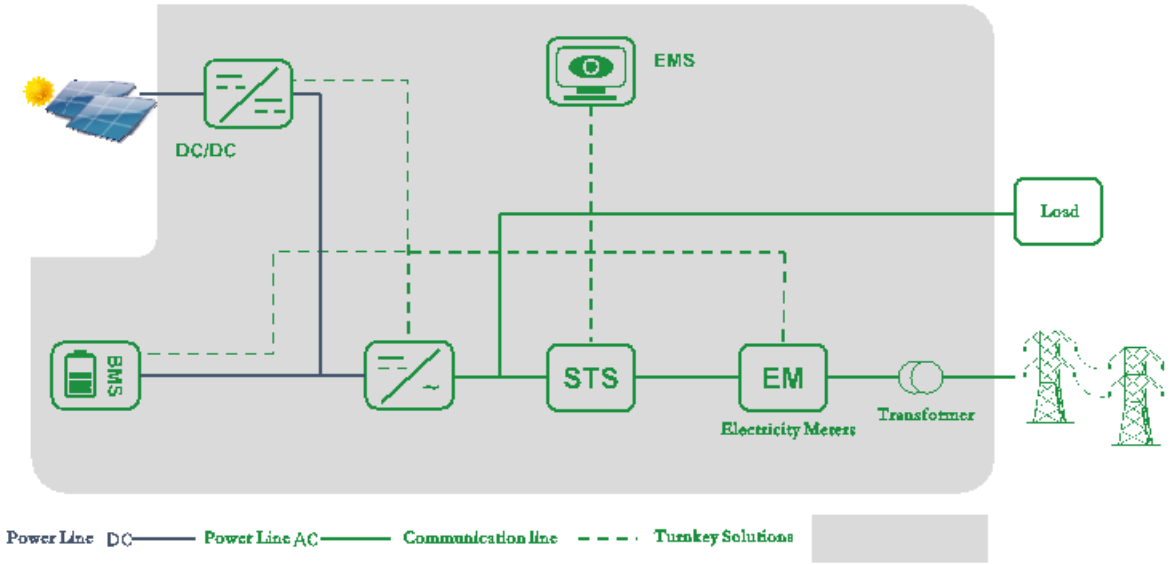
Figure 2-1 Electrical topology diagram of Power Control System

2.2. System application

As shown in Figure2-2, the grid-connected energy storage system built by PCS module consists of STS, energy storage device, battery, EMS and BMS. The battery is connected to the energy storage device, which is connected to the load through the STS to achieve uninterrupted switching between grid-connected and off-grid. The energy storage device communicates with the EMS through RS485 interface to indirectly realize the charging and discharging control of the battery bank, and the EMS communicates with the energy storage device, BMS and smart meter through RS485 interface to realize the energy scheduling of the energy storage system.

2.2.1. System utilization diagram

The structure of the energy storage system is shown below. The PCS energy storage device pushes the data to the EMS or other upper computer system in real time. Specific instructions on the seamless switching of STS to and from the grid can be found in **section 4.4**.



The drawing shows the applied electrical system, BMS will be connected with EMS and PCS to realize the functions of the battery' alarm、 protection and controlling. The electricity meter is connected to EMS.

Figure 2-2 Energy storage system switching between grid and off-grid

Expansion:

The above system supports the integrated application of light and storage, and connects to DCDC bi-directional converter and PV panel. The DCDC bi-directional converter can do either step-up MPPT or step-down MPPT according to the system configuration to detect the power generation voltage of the solar panel in real time, and track the highest voltage and current value (VI), so that the system can output the maximum power to the storage battery. Battery Charging.

2.3. Product Structure

Table2-3 Product dimensions and specifications

specification	pattern	W×D×H (mm)	remark	Wind direction
50kW、63kW、80kW	Uniform style	440×590×233.5	Rear connection (Reference A)	Advancing wind
105kW	A	484×620×256.5	Rear connection	
	B	484×620×256.5	Front connection	

Figure 2-3 A heat dissipation model

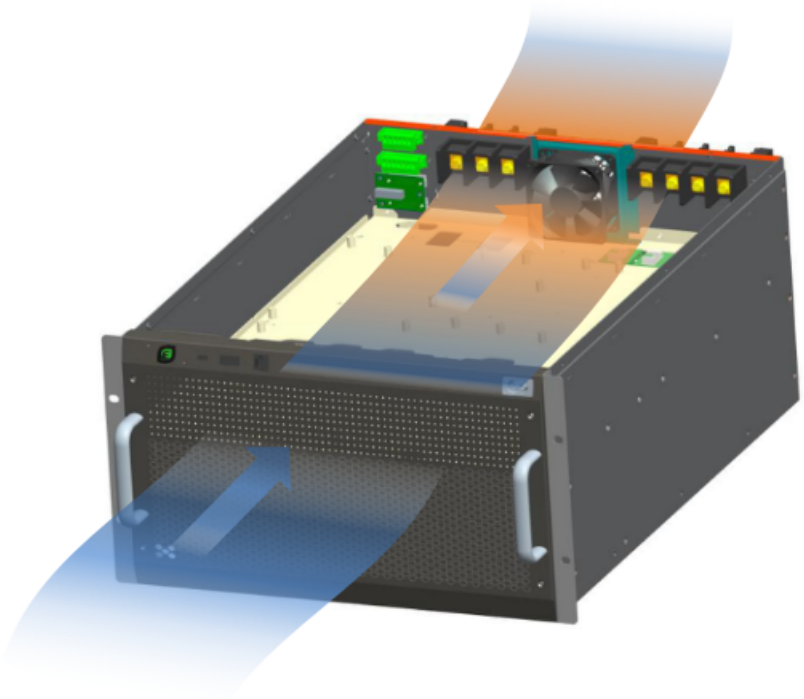


Figure 2-4 B heat dissipation model

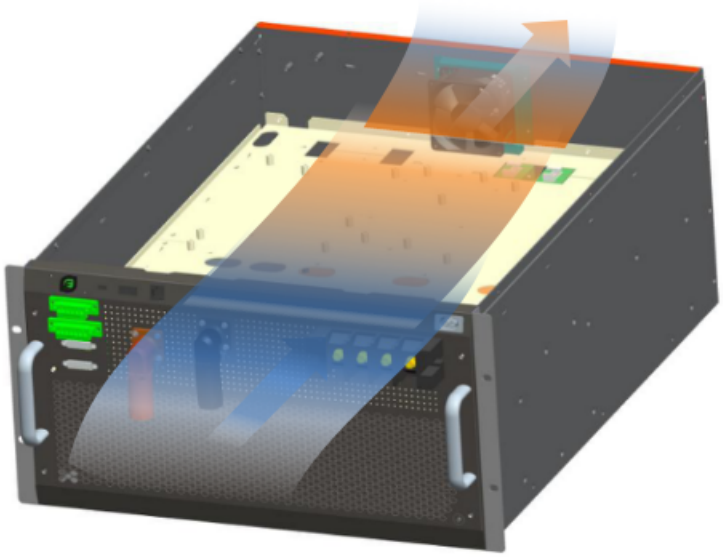


Figure 2-5 50kW/63kW/80kW dimensions

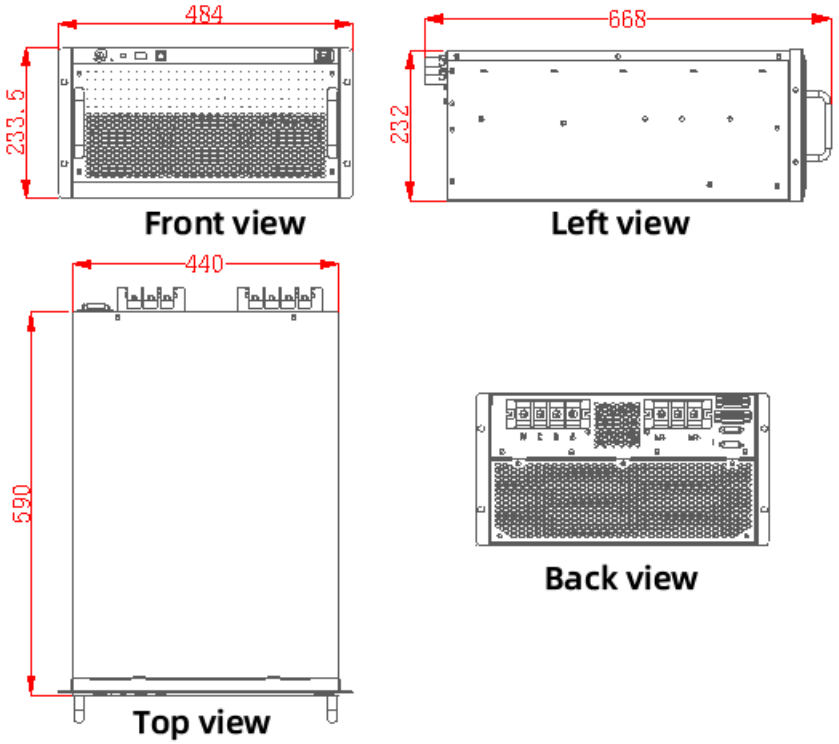


Figure 2-6 105kW-A dimensions

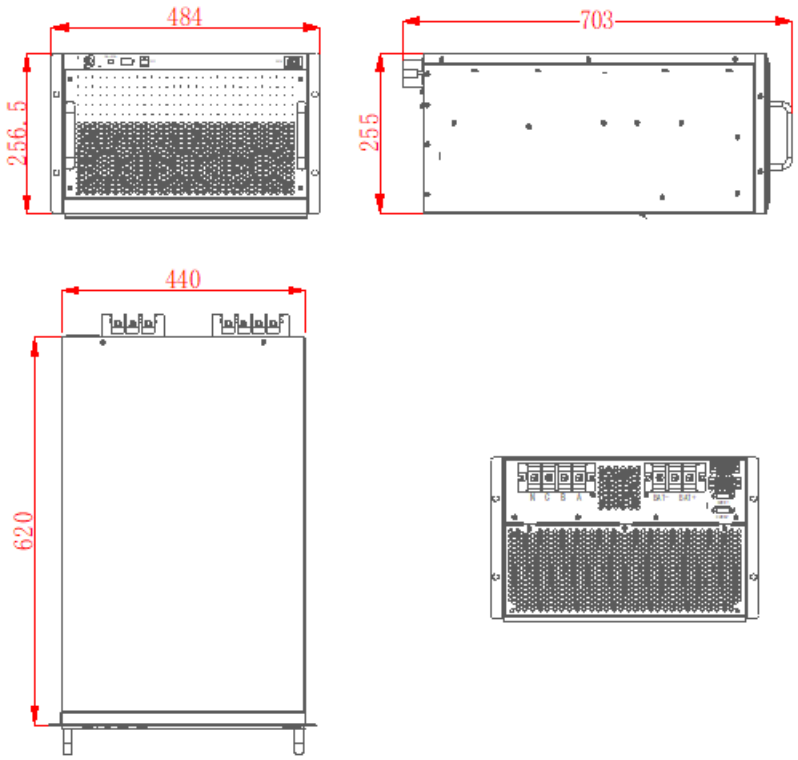
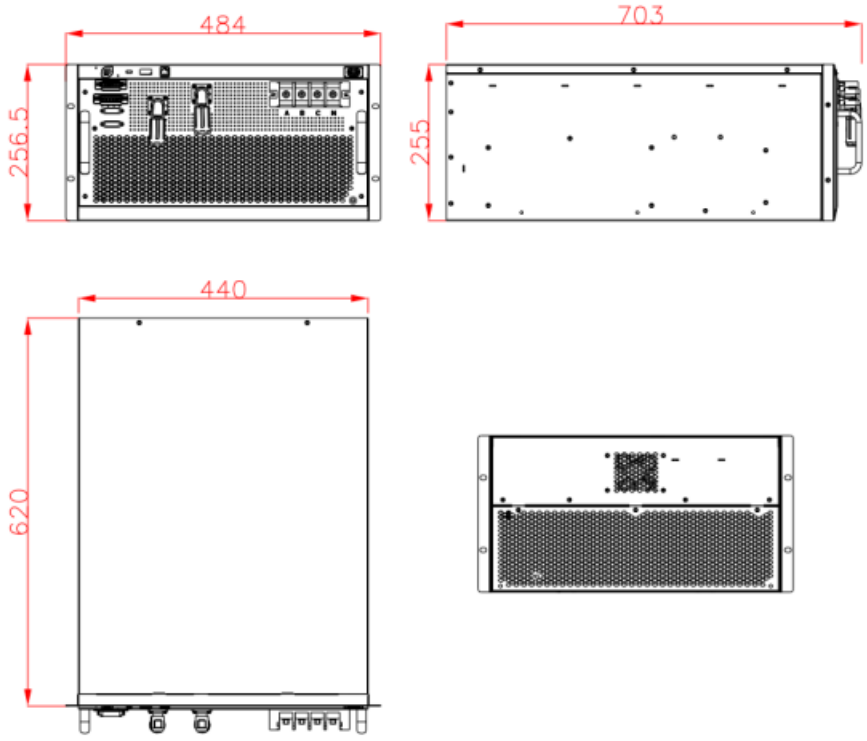


Figure 2-7 105kW-B dimensions



2.4. Appearance display diagram

The appearance of the panel of the PCS modular machine model is shown in Figure below:

Figure 2-8 PCS module - Rear maintenance front view and rear view

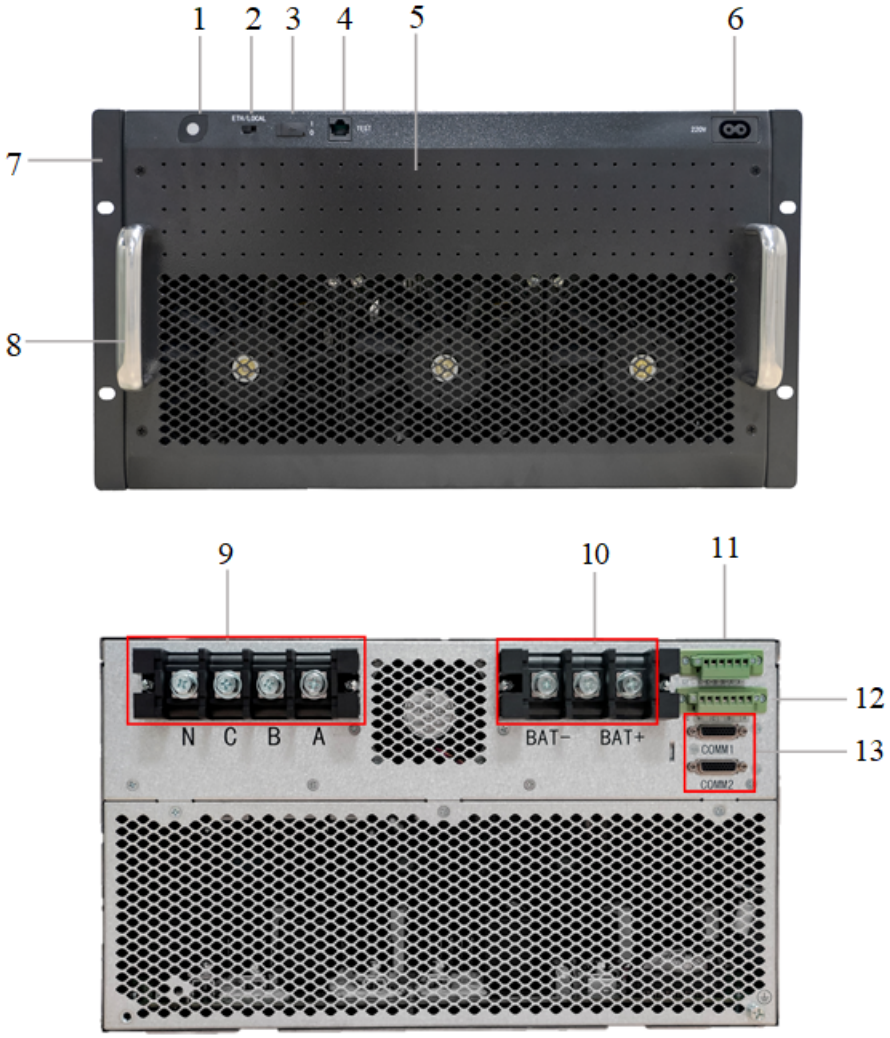
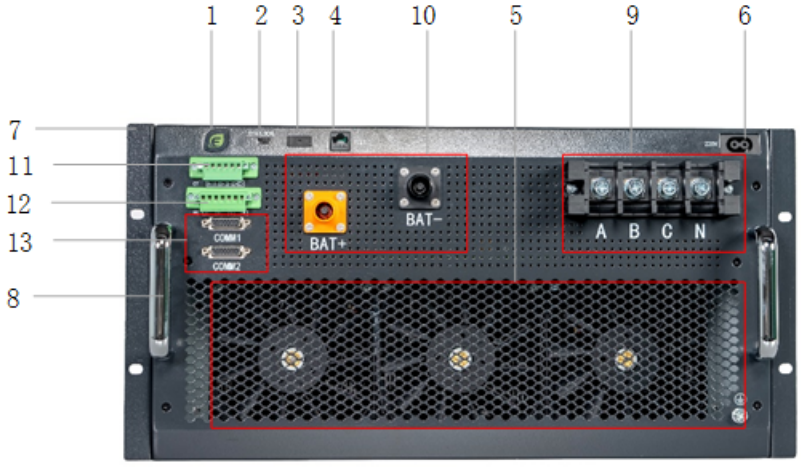


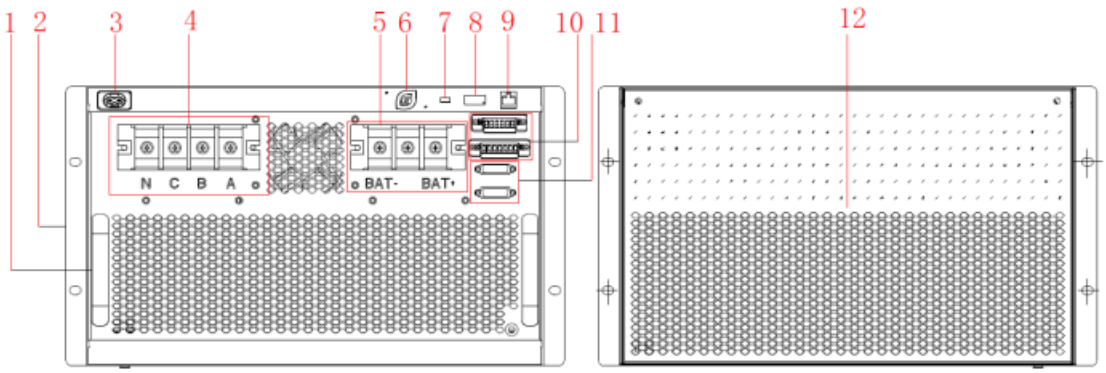
Figure 2-9 PCS front maintenance front view (socket terminal on the DC side)



Number	Name	Description
1	Indicator light	Green light is always on when running, green light flashes when in standby, red light is always on when there is a fault
2	ETH/LOCAL	Remote/local switching (reserved)
3	(IO) 6-digit DIP Switch	Bits 1-2 are CAN communication matching resistor access; bits 3-6 are module address settings (binary) - bit 6 is the lowest bit (right to left) - see 2.4.1 DIP Switch settings
4	TEST debugging network port	Factory background debugging communication port (internal dedicated)
5	Ventilator	Duct ventilation holes, forward air and backward air
6	220V power supply interface	220V AC input (internal dedicated)
7	Fixed bracket	Module left and right mounting bracket for connecting cabinet fixing
8	Puller	Drawer type modular puller, not for load-bearing
9	AC side interface	AC terminal wiring (please see 3.3.2 terminal introduction for terminal details)
10	DC side interface	DC terminal wiring (please see 3.3.2 terminal introduction for terminal details)
11	Grid current sampling interface	A/B/C three-phase current in/out interface (reserved for equipment)
12	Grid voltage sampling interface	A/B/C/N grid voltage sampling input interface (reserved for equipment)
13	External communication port	COM (26pin signal terminal) signal port (check the port definition description in 3.3.3.)

Table 2-4 Appearance description table

Figure 2-10 PCS front maintenance front view



Number	Name	Description
1	Puller	Drawer type modular puller, not for load-bearing
2	Fixed bracket	Module left and right mounting bracket for connecting cabinet fixing
3	220V power supply interface	220V AC input (internal dedicated)
4	AC side interface	AC terminal wiring (please see **3.3.2 terminal introduction for** terminal details)
5	DC side interface	DC terminal wiring (please see **3.3.2 terminal introduction for** terminal details)
6	Indicator light	Green light is always on when running, green light flashes when in standby, red light is always on when there is a fault
7	ETH/LOCAL	Remote/local switching (reserved)
8	(IO) 6-digit DIP Switch	Bits 1-2 are CAN communication matching resistor access; bits 3-6 are module address settings (binary) - bit 6 is the lowest bit (right to left) - see **2.4.1 DIP Switch settings**
9	TEST debugging network port	Factory background debugging communication port (internal dedicated)
10	Grid current sampling interface	A/B/C three-phase current in/out interface (reserved for equipment)
	Grid voltage sampling interface	A/B/C/N grid voltage sampling input interface (reserved for equipment)
11	External communication port	COM (26pin signal terminal) signal port **(check the port definition description in 3.3.3.)**
12	Ventilator	Duct ventilation holes, forward air and backward air

Table 2-5 Appearance description table

2.4.1. DIP Switch setting (address assignment)

The DIP Switch for the Power Control System is a 6-digit DIP Switch for manual assignment of the converter's communication address. The down position is OFF, which means "0". The upward position is ON, indicating "1". The first bit is the internal CAN parallel signal resistor bit (dial up "1" for multiple parallel modules), the second bit is the external BMS-CAN communication resistor bit (factory default "0"), the third to sixth bits are used for address communication dialing (in binary) The third bit is the high bit, the sixth bit is the low bit, and the address bits are set from right to left (refer to the figure below).

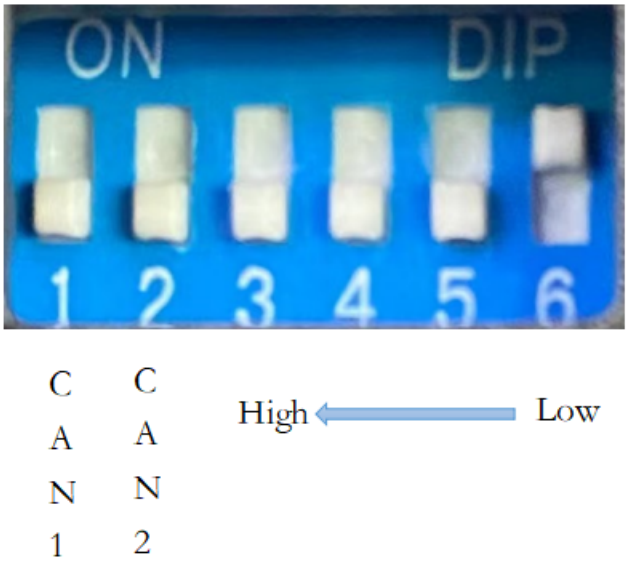


Figure 2-11 Schematic diagram of the 6-digit dip switch of the Power Control System

When we need more than one parallel use, you can set the communication address of the module according to the "6-digit DIP Switch" dial code. For example, address 1, our 6-digit DIP Switch address dial code can be low - the 6th digit dial code up, at this time 000001 is the address 1, according to the binary and so on to set the address (the following table describes the 6-digit dial code number of address 1-8).

Correspondence address	Address Dialing Bits
1	000001
2	100010
3	100011
4	100100
5	100101
6	100110
7	100111
8	101000

Table 2-6

Caution:

The first two communication matching resistor DIP Switches are not recommended to make changes. When multiple devices are in parallel, the first DIP Switch needs to be dialed up, and if direct communication between PCS and BMS is required (matching the BMS communication protocol), the second DIP Switch will be dialed up.

2.5. Technical specification parameters

The technical parameters of 30KW-105KW Power Control System are shown in the following table:

Technical data and specifications					
Specification (KW)	PotisPCS-30K-1000/400	PotisPCS-50K-1000/400	PotisPCS-63K-1000/400E-A02E	PotisPCS-80K-1000/400E-A02E	PotisPCS-105K-1000/400E-A02E
					PotisPCS-105K

	E-A02E	E-A02E			-1000/400E-A02E-F
DC side					
DC voltage range (V)	615~950Vdc（3W3L）/650~950Vdc（3W4L）				
Number of input channels	1				
Maximum current (A)	49	82	103	130	171
Peak short-circuit current(A)	4000				
Busbar capacitor discharge time	10min				
Battery type	Lithium Battery				
AC side (On-grid)					
Voltage range/rated voltage (V)	400V±10%				
Frequency range (Hz)	50/60±5 Adaptive				
Rated power (KW)	30	50	63	80	105
Maximum power (KW)	33	55	69	88	115
Rated current (A)	44	73	91	116	152
Max. Apparent Current（A）	48	80	101	128	167
Short circuit current (A)	177	177	177	177	177
Power Factor	0.99				
Power factor adjustment range	1 (ahead of) ~ 1 (behind)				
Current distortion rate (KW)	<3% (rated power)				
DC component	0.5%				
Overload capacity	110% long term				
Maximum discharge efficiency	98.2%				
AC side (Off-grid)					
Rated output voltage (V)	400				
AC voltage harmonics	<3% (linear load)				
Frequency (Hz)	50±5Hz				
AC output power (KW)	30	50	63	80	105
Equipment Protection					
With function	Battery anti-reverse connection, DC over current protection, AC over current protection, AC over voltage protection, surge protection, grid monitoring				
Dimension (W*D*H,mm)	484*590*233.5mm				484*620*256.5mm
Weight (kg)	38				50
Altitude	2000m				
Operating temperature	-30°C to 55°C (45°C derating use ; derating to 80% of total current at 55°C)				
Storage temperature	-45°C~70°C				
Humidity	Less than 95% RH, non-condensing				
Cooling method	Intelligent air cooling				

Type of converter	Non-Isolated
Protective class	I
Protection level	IP20
Communication Interface	CAN/RS485
Conformity to standards	GB/T 34120-2017 , GB/T 34133-2017 . EN 62477 ,EN IEC 61000,IEC 62109-1， IEC 62109-2 ， AS/NZS 4777.2
Inverter Overvoltage Category For All Ports	AC OVCIII
Inverter Method Of Active Anti-Islanding	Active frequency shift for anti-islanding protection
Pollution degree classification	PD3
Overvoltage category for each port	II(DC),III(AC)
The decisive voltage class (DVC)	Auxiliary control circuit: DVC A AC power circuit: DVC C DC power circuit:DVC C
Country of origin	Made in China

Table 2-7 Technical parameters table

Chapter3 Product Installation

3.1. Pre-installation inspection

3.1.1. Check the outer packaging materials

Packaging materials and components may be damaged during transportation. Therefore, before installing the inverter, please check its outer packaging material. Check the outer packaging material for any damage, such as holes, cracks, etc. If you find any damage to the inverter, please do not open the package and contact us as soon as possible. It is recommended that you remove the packing material within 24 hours before installing the inverter.
The schematic diagram of the modular converter package can be found in the following figure:

Figure 3-1 Module packaging diagram

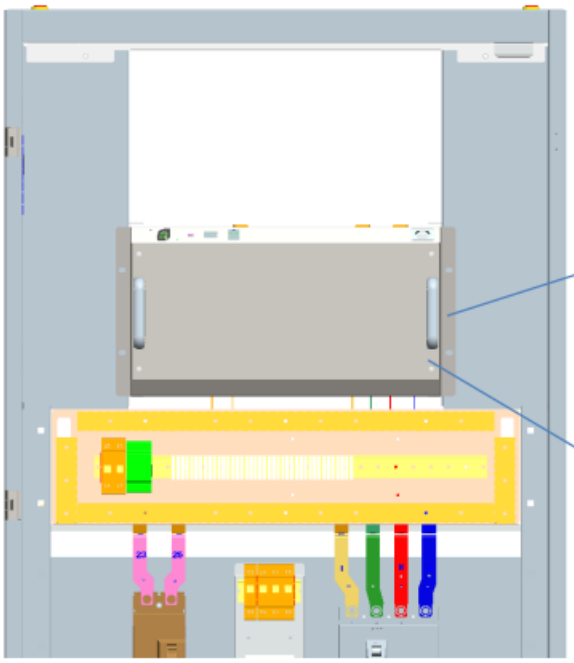
After removing the package, please pay attention to the nameplate label on the equipment and check whether the capacity of the model and other technical parameters on the nameplate are the same as when placing the order!

3.1.2. Packing list inspection

After unpacking the Power Control System, check with the delivery note to see if the deliverables are complete or missing. If you find any damage or any component missing, please contact the manufacturer.

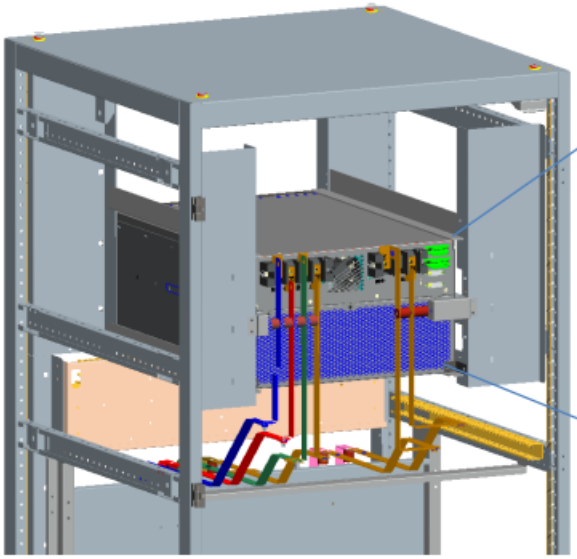
3.2. Mechanical installation

When installing the modular converter drawer, it is fixed to the cabinet mounting column by the front two side lugs (please refer to the figure below), please work together with two people to lift the converter, push the converter into the cabinet and turn the rails to place it smoothly, and reinforce the stability of the connection between the cabinet and the module by the back fixing parts.



1.The front left and right fixed lugs using φ8 * 11mm mounting holes (fixed screws do not exceed this specification) up and down the installation hole spacing: 125mm. (cabinet drilling need to pay attention to)

2.Please note that this puller is only used for pulling and dragging during equipment installation, and it is prohibited to be used for load-bearing.



3.Installation of fixed guide rails: easy to push and pull the PCS module machine, so that the equipment is placed flat. (Cabinet factory provides)

4.Back fixed parts: for the back of the cabinet and the module machine connection fixed to ensure that the module machine will not shake up and down in the cabinet (left and right installed a), fixed parts recommended aperture φ7.5 * 10.5mm. (Cabinet factory to provide)

5,The reserved hole position for the connection between sheet metal and cabinet, contactor and sheet metal is M5.

6,First install the sheet metal, then sequentially install the contactor, connect the power harness, and finally connect the communication harness.

Figure 3-2

Information on clearances required around inverters: There is no detail requirement about the distance around inverters. But installation shall be in a well-ventilated environment, which ensures good heat dissipation; Ventilation requirements refer to 3.2.3.

We use one 4-pole contactor， it is controlled by PCS, The 4-pole contactor is supplied with inverter. Pls Kindly find the following wiring diagram.

The KM contact's coil is controlled by a middle-relay which is controlled by PCS directly. The aux contact of KM are detected by PCS directly.

Note: Disable the contactor of KM3 when used in Australian & New Zealand market. The KA23 is canceled.

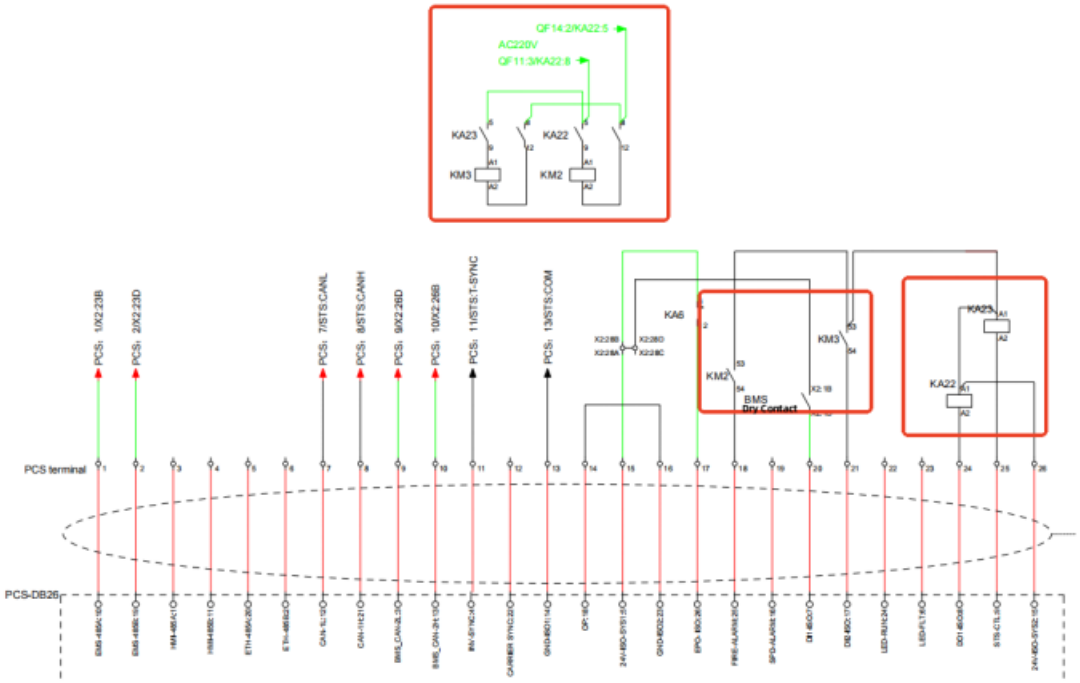


Figure 3-3 Schematic diagram of rack-mounted Power Control System

3.2.1. Installation environment requirements

- Installed indoors, protected from sunlight, rain and standing water;
- Clean installation environment, avoiding large amounts of dust in the air;
- Installation in a well-ventilated environment, which ensures good heat dissipation;
- Avoid blocking air inlets and outlets to ensure smooth air ducts;
- The ambient temperature should be ensured at -20~45°C to ensure the best operating condition of the converter, too high or too low temperature will lead to shortened life.

3.2.2. Carrier requirements

- The converter installation carrier must be fire resistant;

- Some noise will be generated during the operation of the equipment, try to install it in a place far away from the residents' life;
- The installation location should ensure easy maintenance;
- Do not install converters on flammable building materials;
- Please ensure that the mounting surface is solid and meets the load-bearing requirements for the installation of the converter.

3.2.3. Ventilation requirements

The cooling method of PCS module adopts forced air-cooling, and the module heat dissipation method is front air in and rear air out. In the integrated system, the inlet and outlet air of the cabinet must face the module, and the module air inlet distance from cabinet air inlet ⩾110mm. An air duct must be added to the outlet air of the module to directly send hot air to the outlet air of the cabinet to prevent hot air from backflowing in the cabinet.

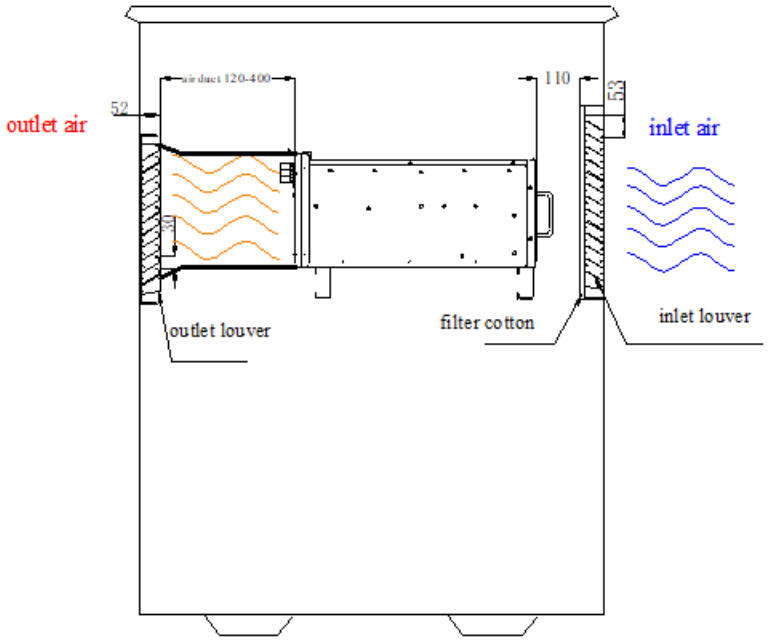


Figure 3-4 Heat dissipation diagram

NOTE

It is recommended that the filter cotton of the inlet and outlet louver be 40PPI dense-polyurethane mesh foam and flame retardant, and the louver of the outlet louver be 10-mesh insect-proof steel mesh.

If you do not add air ducts out of the air outlet, you can install a fan in the outlet exhaust, corresponding to the fan selection should be based on the actual effective air volume of 2 times the choice of fan (fan specifications on the nominal maximum air volume can not be achieved, the actual efficiency point is probably in the 0.5 times the maximum air volume).

Table3-1 Ventilation parameters of PCS module in cabinet

Model number	Actual effective air volume of the module		Actual effective air intake area of the cabinet (m^2)	Actual effective air outlet area of the cabinet (m^2)
	(CFM)	(m^3/min)		
EPCS50-AM	350	9.91	0.05	0.06
EPCS63-AM	350	9.91	0.05	0.06
EPCS80-AM	350	9.91	0.05	0.06
EPCS105-AM	556	15.75	0.06	0.072
EPCS105-AM-F	556	15.75	0.06	0.072

NOTE

- The **Actual effective air intake area of the cabinet** and **Actual effective air outlet area of the cabinet** in the table above refers to the area of the cabinet through holes;
- The parameters in the table above apply only to a single PCS module, and the heat dissipation of other components in the cabinet is not taken into account.

3.3. Electrical installation

3.3.1. Recommended system configuration

1.In order to use this converter in a safer and standardized way, the recommended configuration of the energy storage system is shown below:

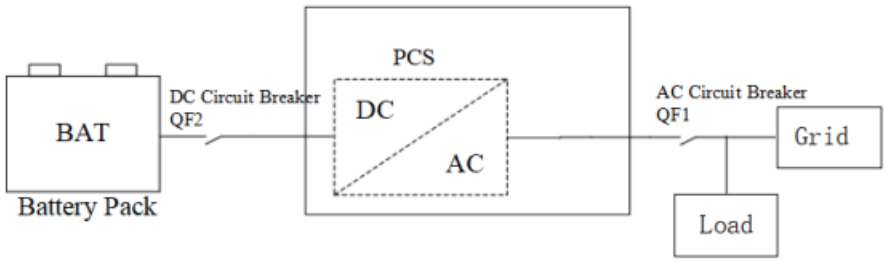


Figure 3-5 Single module grid-connected configuration diagram

Commendations for QF1 :

The minimum requirement for QF1 as below:

Item	Rated power for PCS	Rated current	Rated voltage
1	105kW	200A	AC400V
2	80kW	160A	AC400V
3	63kW	125A	AC400V

4	50kW	100A	AC400V
5	30kW	63A	AC400V

Table 3-2

2.Single module and off-grid applications need to cooperate with the external STS (transfer switch), three-phase power line, N line, PE line connection as shown in the figure below.

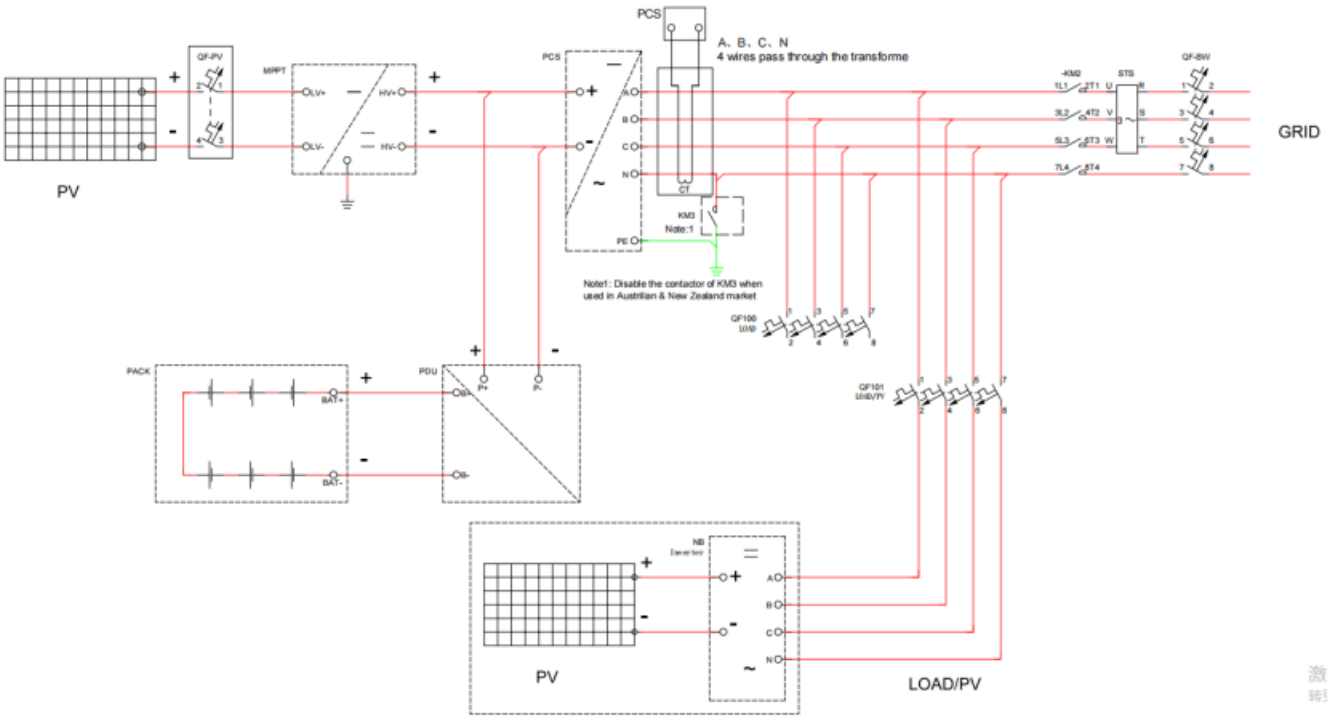


Figure 3-6 Systematic configuration diagram of parallel and off-grid switching

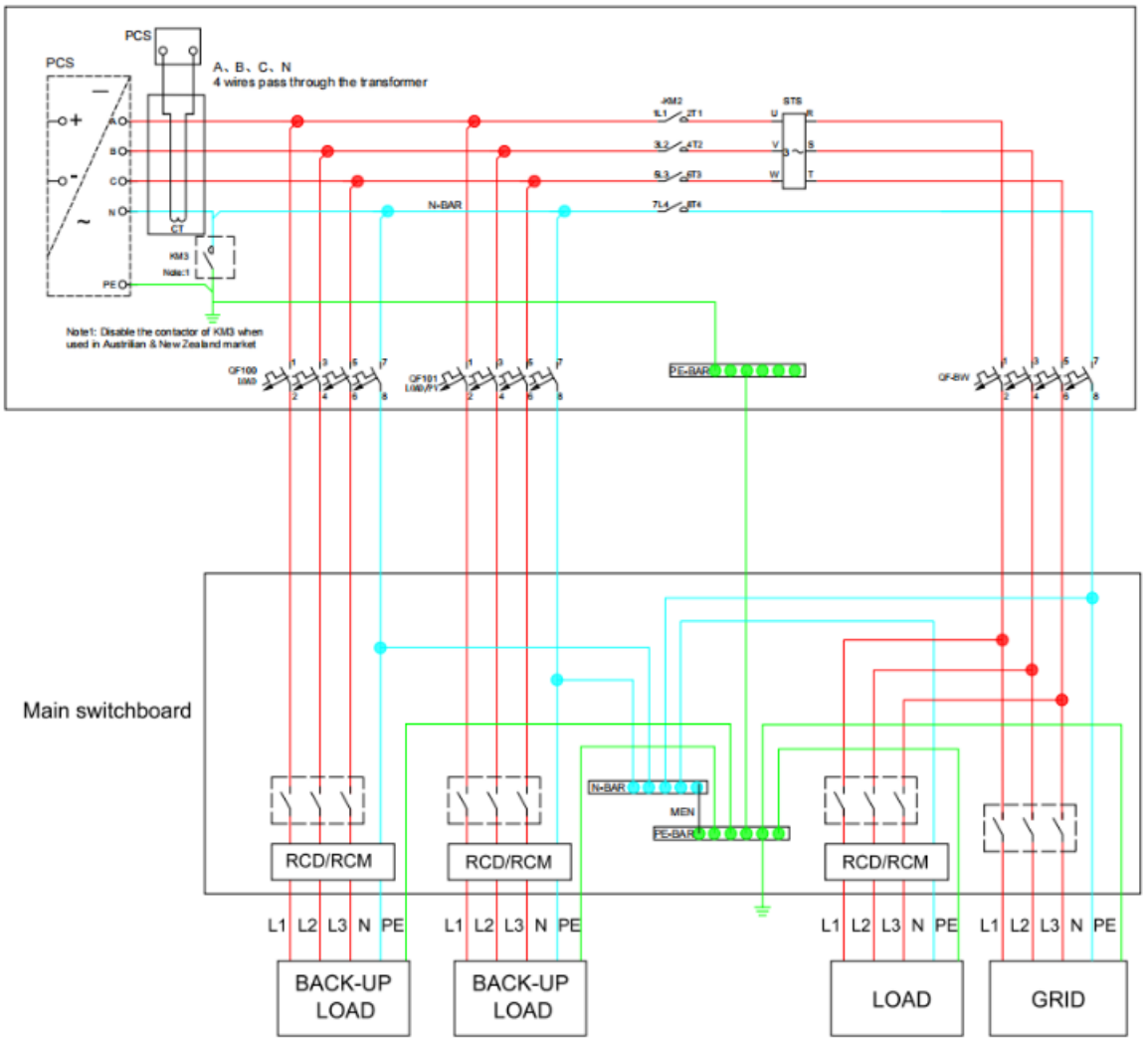


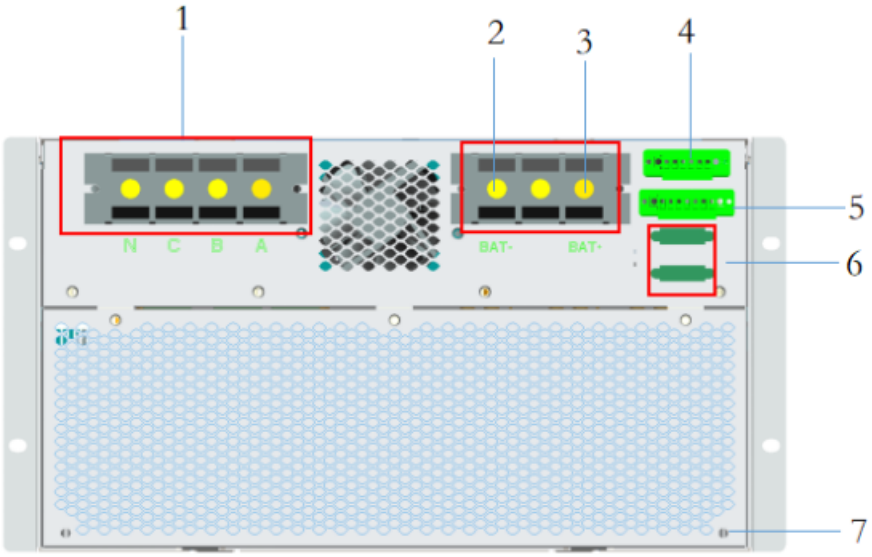
Figure 3-7 Systematic external connection block diagram

Warning	DC voltage input on the battery side of the energy storage device should be within its required range, otherwise the energy storage device will not work; When connecting power cables, please pay attention to the incoming and outgoing wire sequence not to connect wrong or reverse, and strictly follow the system drawing wiring; When configuring the number of batteries in series and parallel, users need to take full account of the maximum charging voltage and minimum discharging voltage. You can consult our technical service staff for details. Note: When used in Australian & New Zealand markets, the contactor of KM3 is disabled. To maintain neutral continuity, the neutral lines MUST connect the main neutral and the back up circuit neutrals. There MUST be a Main Earth Neutral(MEN) connection at the main neutral bar in the main switchboard.

Preparation tools:

- Torque wrench
- Screwdriver
- Wire stripping pliers
- Multimeter
- Heat gun (or heat out fan), heat shrinkable tubing

3.3.2. Introduction to terminals



The torque of the M8 screw of the power terminal is 11-13 N.M.

The torque of the M6 screw of the fixed module is 3-4 N.M.

Figure 3-8 Terminal diagram of PCS-105KW modular machine model

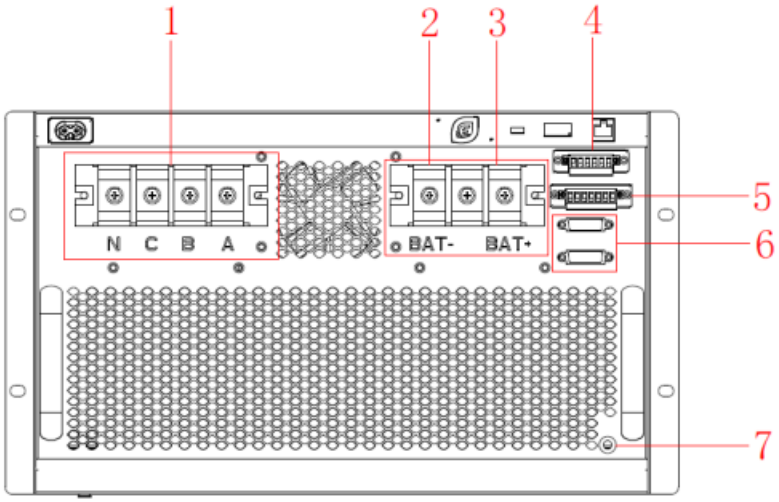


Figure 3-9 Terminal diagram of PCS-105KW modular machine model（Front maintenance）

Number	Description
1	For AC terminals, M8 type crimp terminals are recommended. (Each P terminal spacing 23mm)
2	BAT-, connects to the positive terminal of the battery. The recommended connection terminal is M8*12 type. (Each P terminal spacing 23mm)
3	BAT+, connects to the positive terminal of the battery. The recommended connection terminal is M8*12 type. (Each P terminal spacing 23mm)
4	Grid current sampling interface (this port can be left unconnected, refer to Figure 3-6)
5	Grid voltage sampling interface (this port can be left unconnected, refer to Figure 3-6)
6	COM (26pin signal terminal) signal port (signal)
7	For the protective earth terminal, the M4 type crimp terminal is recommended.

Table 3-3

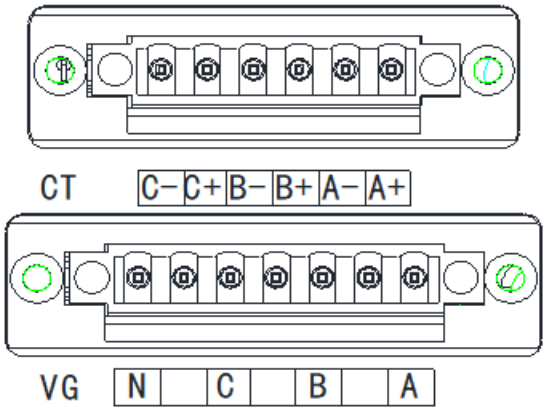


Figure 3-10 105KW module electrical network voltage and current sampling wiring port diagram

Table 3-4 Sampling Terminal Definition Description Table

Name	Terminal Symbols	Terminal Function Description
Grid current sampling interface (CT)	A+	Connect the S1 terminal of the CT of phase A
	A-	Connect to the S2 end of phase A CT
	B+	Connect to S1 end of B-phase CT
	B-	Connect to the S2 end of the B-phase CT
	C+	Connect to the S1 terminal of C-phase CT
	C-	Connect to the S2 end of the C-phase CT
Grid voltage sampling interface (VG)	A	A-phase grid voltage sampling input
	NC	No access required
	B	B-phase grid voltage sampling input
	NC	No access required

	C	C-phase grid voltage sampling input
	NC	No access required
	N	N phase grid voltage sampling input

3.3.3. COM1/COM2 signal terminal definition description

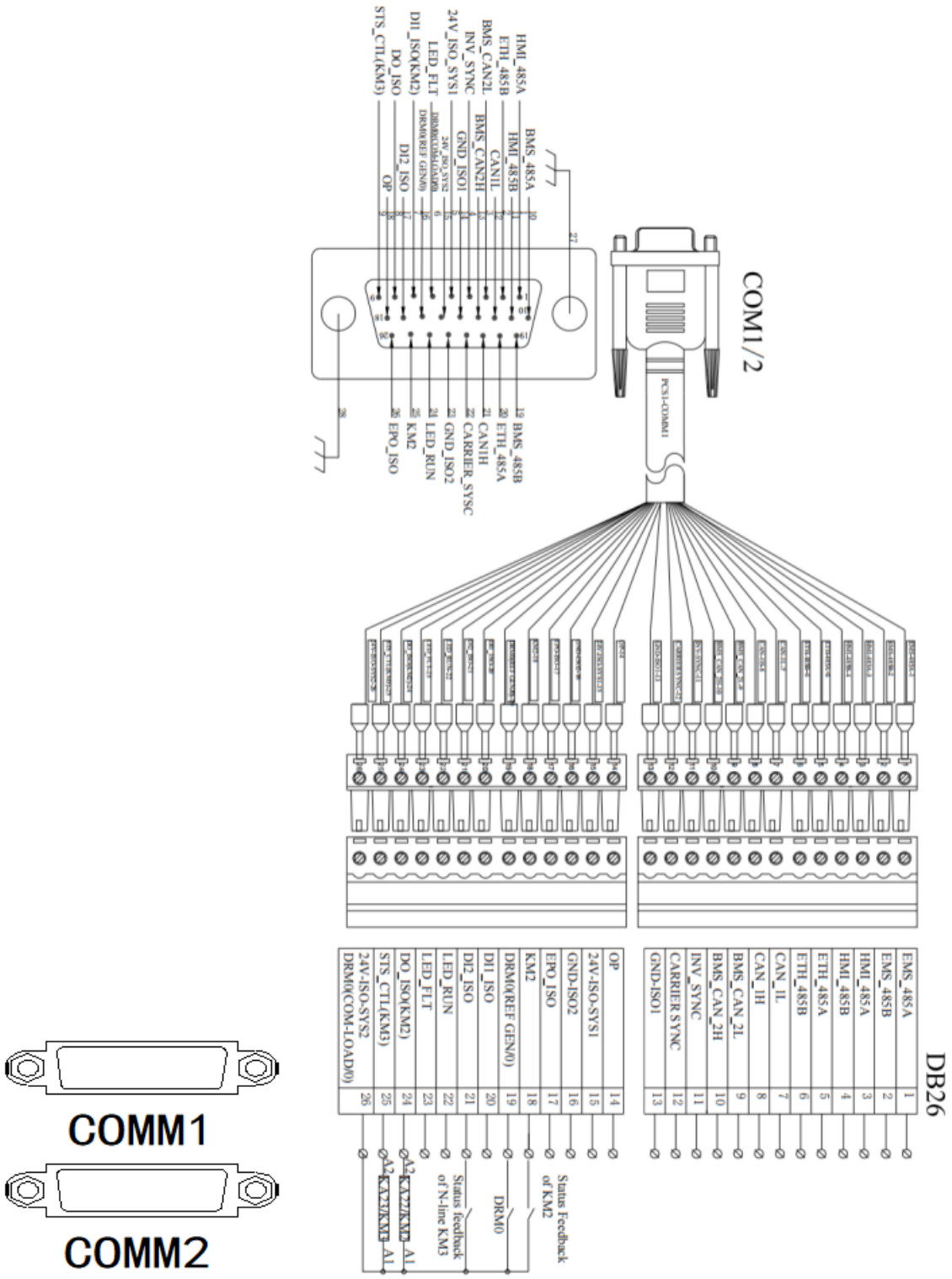


Figure 3-11 Pinout diagram of COM1/COM2-DP26 interface of converter

Signal Name		Pin number	Signal Name	Pin number	Function Description
External 485 signal	BMS_485A	10	BMS_485B	19	This 485 signal is used for external signal interface - can be connected to EMS, upper computer, etc.
HMI-485 signal	HMI_485A	1	HMI_485B	11	Reserved for 485 (external HMI touch screen)
No definition	ETH_485A	20	ETH_485B	3	485 communication (no signal at the moment)
CAN parallel signal	CAN1L	12	CAN1H	21	Parallel CAN communication (for CAN communication with STS/PCS and other devices)
External CAN signal	CAN2L	3	CAN2H	13	BMS_CAN communication (for external BMS communication)

Table 3-5 COM1/COM2-485 and CAN signal terminals definition table

Function Description	Signal Name	Pin number	Function Description	Signal Name	Pin number
Internal industrial frequency synchronization signal	INV-SYNC-ISO	4	Internal carrier synchronization signal	CARRIER_SYNC-ISO	22
Signal common terminal 1	GND_ ISO1	14	Signal common end 2	GND_ ISO2	23
DC24V+output signal1	24V_ ISO_ SYS1	5	DC24V+output signal2	24V_ ISO_ SYS2 DRM0(COM-LOAD/0)	15
LED fault signal	LED_ FLT_ ISO	6	LED fault/operation signal	LED_ RUN_ ISO	24
DRM0	DRM0 (REF GEN/0)	16	KM2 input signal	KM2	25
DI1 digital input signal (BMS to PCS fault shutdown alarm)	DI1_ ISO	7	DI2 digital input signal (reserved)	DI2_ ISO	17
DO1 digital output (reserved)	DO_ ISO	8	EPO (Emergency Stop) input	EPO_ ISO	26
OP	OP	18	DO digital output (STS standby)	GND_ ISO4(KM3)	9

Table 3-6 COM1/COM2-Digital Signal Terminals Definition Description Table

3.3.4. Instruction for DRM0 setting.

How to enable/disable DRM:

1.Wiring.

The DRM0 can be realized through the wiring terminals （19 and 26 pin of DB26 terminal）of PCS.

Please refer to the Clause 3.3.3.

2. The software setting.

DRM0 enable: background address -80.145

Writing 0 to this register means disabling (this is the default factory configuration): setting to not support dry contact control of PCS device start and stop.

Writing 1 to this register means enabling: setting to support dry contact control of device start and stop.

DRM0 signal logic switching enable, background address: 02.05, Bit4:

This bit is checked to indicate: DRM0 signal closes PCS to perform power-on action; DRM0 signal disconnects PCS to perform power-off action. (This is the default factory configuration)

This bit is not checked to indicate: DRM0 signal disconnects PCS to perform power-on action; DRM0 signal closes PCS to perform power-off action.

	DI	ParameterID	ParameterName	ParameterValue	Unit	DisplayFormat	bserv	Description
	W	G 80.145	DRM0 enable	---		Signed Dec	☑	1: Enable, 0: Disable
	W	G 02.05	Harmonic Control Configuration 3	---		Binary	☑	Harmonic Control Configuration 3

Figure 3-12

3.3.5. AC side wiring

Step 1： Measure with a phase sequence meter to ensure that the phase sequence of the connected cables is positive;

Step 2： Disconnect the rear AC switch QF1 of the energy storage unit;

Step 3： Measure with a multimeter to confirm that the cable to the terminal is not charged;

Step 4： Strip the AC cable to the appropriate length with wire strippers, apply cold crimp terminals and crimp with crimpers;

Step 5： AC wire to AC terminal block: "A", "B", "C", "N".

 **Warning**	Wiring work is restricted to professionals; When wiring, ensure that no dangerous voltages are present at the connection points.

3.3.6. DC side wiring

Step 1： Measure the port voltage of the battery with a multimeter to ensure that it is within the input voltage range of the energy storage device;

Step 2： Disconnect the DC switch at the previous level and confirm that there is no voltage between the

positive and negative DC inputs by measuring with a multimeter, then the wiring operation can be performed;

Step 3： Strip the DC cable with wire strippers to the appropriate length, set on the M8 cold terminal and crimping pliers, 50-80KW recommended DC cable ≥ 25mm2, 105KW recommended DC cable ≥ 35mm2;

Step 4： Connect the positive and negative cables of the battery pack to "BAT+" and "BAT-" of the DC terminal block.

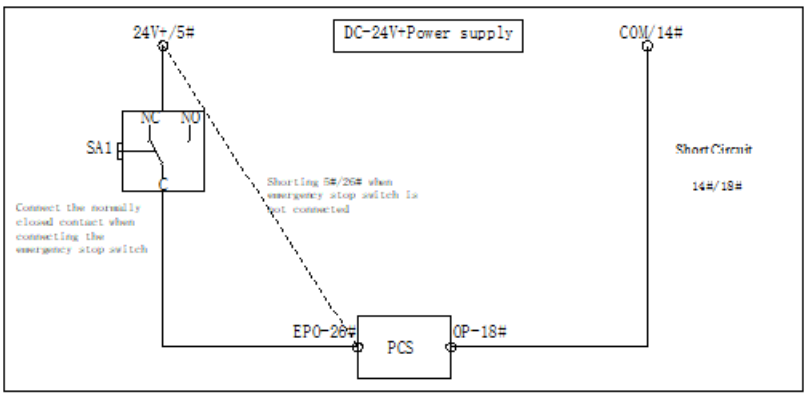
 Warning	Wiring is restricted to professionals.
 Danger	Disconnect the AC and DC distribution switches to ensure there are no dangerous voltages in the system when wired.
 Attention	The positive and negative voltage of the battery must not be reversed and must be measured with a multimeter before wiring.

3.3.7. Communication connection line

The COM1/COM2 ports on the rear of the PCS 50-105KW module are equipped with multiple signals (refer to Table 3-1 COM signal port definition description): We can provide the DB26 signal cable for the COM port to lead the required signal pins to one end of the XT terminal block, and the other end is connected to the XT terminal according to the corresponding line number to connect to EMS, BMS and other equipment.

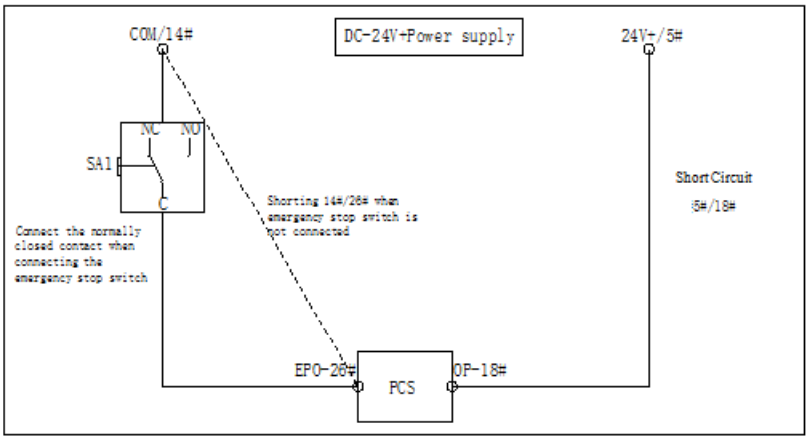
Refer to Figure 3-7 in Clause 3.3.3.

3.3.8. EPO Wiring



Option one:

Select 24V+ through the OP point inside PCS, refer to the figure on the left, at this time shorting 14# and 18# signals to GND, at this time if not connected to the emergency stop can be directly shorted 5# and 26# signals to lead 24V circuit to cancel the EPO signal alarm.



Option two:

Select GND through the OP point inside PCS, refer to the figure on the left, at this time shorting 5# and 18# signals to access 24V+, at this time if not connected to emergency stop can directly short 14# and 26# signals to lead 24V circuit to cancel the EPO signal alarm.

Figure 3-13 EPO wiring diagram

Note: Our factory equipment EPO function is enabled to open state, if you need to shield EPO function please note before placing an order, the factory tester will turn off the EPO function. If the site is not connected to the EPO emergency stop circuit and reported EPO fault reference to the above two options to short to cancel the EPO fault alarm.

3.4. Communication

This series of Power Control System supports Modbus protocol and RS485/CAN communication method, which is convenient for users to monitor the energy storage device system in the background and realize the telematics, telemetry and telecontrol of the energy storage system.

3.4.1. EMS communication

The BMS-485 signal from the COM port of the converter can be used to communicate with the EMS,

which is the energy dispatching unit of the energy storage system, accepting remote dispatching from the grid and receiving information from the BMS to complete automatic charging and discharging control and protection of the energy storage system.

3.4.2. BMS communication

It can get and detect the basic status and protection information of battery BMS, and shut down the storage converter according to the fault protection status information of battery to improve the safety of battery pack. The Power Control System does not communicate with BMS directly, but can be connected to BMS through RS485 interface of EMS.

If direct communication between PCS and BMS is required, a custom adaptation protocol and BMS high voltage box are required.

3.4.3. Single converter communication

The COM1 port of the converter leads to the terminal block through the external signal line (refer to Figure 3-5) terminal signal (the signal does not need to be led all the way to the terminal block, just access the corresponding signal as needed, the pin signal can refer to Table 3-1), and connects to the EMS/HMI controller etc. through the secondary cable.

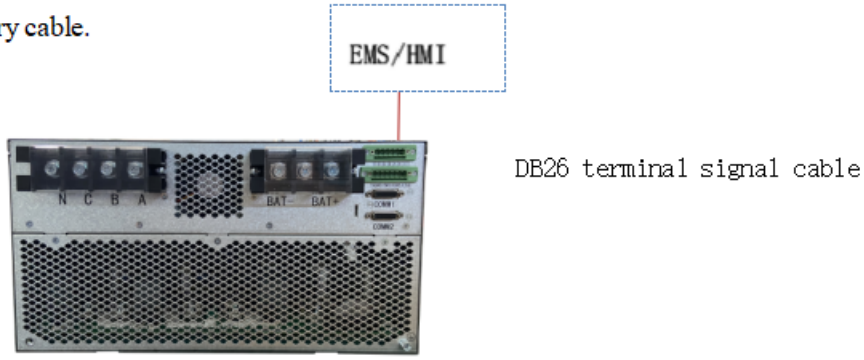


Figure 3-14 Single module communication diagram

3.4.4. Multi-converter communication

A statement: we advise that the inverters are not tested to Section 5 of AS/NZS 4777.2:2020 for multiple inverter combinations and that combinations should not be used, or external devices should be used in accordance with the requirements of AS/NZS 4777.1.

3.5. Post-installation inspection

3.5.1. Cable connection condition check

Post-installation inspection is required after the complete installation of the energy storage device:

1.Reasonable location of equipment placement and installation to meet load-bearing and environmental requirements;The earthing conductor size is 25 square mm at least.

2.The power line is correctly connected, the ground line is well connected to the ground network, the installer should confirm the continuity of the earthing system by measuring the resistance value which comply with local standard.

3.To check whether the main line is connected wrongly at one time/wire sequence reversed and to determine whether the difference will affect the safe operation of the energy storage system;

4.Confirm that the communication lines have all been properly connected, and that there are no disconnections or short circuits in the connection.

Note:setting earth fault alarms， when there is an earthing fault， the PCS will detect the fault and shut down， the fault lamp on the panel will be lighten.

3.5.2. Electrical and communication inspection

1. Disconnect the AC circuit breaker QF1, close the DC circuit breaker QF2 (refer to Figure 3-3), use a multimeter DC voltage gear to measure the voltage between the DC terminals of the converter "BAT +" and "BAT-", if the voltage and battery voltage consistent, and within the correct voltage range, then the wiring is correct. and within the correct voltage range, then the wiring is correct, otherwise disconnect the DC circuit breaker QF2 and re-check the DC side wiring;

2.Disconnect the DC circuit breaker QF2, close the AC circuit breaker QF1, using a multimeter AC voltage file to measure the AC terminals "A", "B", "C", "N" between the voltage, if the three-phase three-wire connection, the detected "AB", "BC", "CA", "N" between the voltage, if it is a three-phase three-wire connection, the detected "AB", "BC", "CA The voltage between "AB", "BC" and "CA" should be 400/380V; if it is a three-phase four-wire connection, the voltage between "AN", "BN" and "CN" should be 230/220V. The voltage between "AN", "BN" and "CN" should be 230/220V; if the measurement deviation is large, please disconnect the AC circuit breaker QF1 and recheck the AC side wiring.

 Danger	The electrical wiring inspection process needs to be completed by a qualified operator; After closing the switch, the system is already charged with high voltage and it is strictly forbidden to touch any parts inside the converter.

An inverter with storage connections will need to provide a means for temperature compensation of the battery charge voltages. This is particularly important for use with lead acid batteries in warm climates, to avoid damage to battery banks by overcharging in hot weather, and related hazards due to release of hydrogen gas and cell rupture. Most inverters control this function via a remote temperature sensor which is attached to the battery bank.

This product does not include a connection terminal for a remote battery temperature sensor. If installing with lead acid batteries please check with iPotisEdge for advice regarding charge settings.

Chapter4 Power-up operation instructions

4.1. Switching on and off of PCS devices

4.1.1. Pre-boot inspection

Before switching on the equipment, the following steps should be followed to check the equipment:

1. Visually inspect the module with no signs of external damage, DC circuit breaker QF2 and AC circuit breaker QF1 are in "OFF" (refer to Figure 3-3);

2. Check the DC input wiring of the energy storage device, the AC output wiring is normal and the grounding is good in accordance with the inspection items after the installation is completed in Chapter 3;

3. Check whether the battery voltage is normal;

4. Check whether the phase voltage and line voltage on the grid side are within the normal range and record the voltage value.

5. Before starting the machine need to check whether the EPO signal is connected, whether the emergency stop button is closed (emergency stop connected to normally open, refer to **3.3.7 - EPO wiring**), if you do not need to connect the emergency stop, you can explain before placing an order, otherwise it will always report EPO fault.

4.2. Switching mode

4.2.1. Power on automatically

Power on: When the converter does voltage source voltage stabilization, it can be factory set to power on automatically. AC side to the converter on the three-phase power, the equipment automatically start operation, the indicator light is always green, DC side output 750Vdc (voltage can be set) to establish the bus voltage.

Shutdown: If there is an emergency stop button switch connected, you can make it disconnect first. At this time the converter will report an EPO fault (indicator light on red) and the equipment stops running. Or use the background to make the converter stop running and disconnect the AC side switch.

4.2.2. HMI Control Switching

The Power Control System can be configured with HMI controller to control the converter on/off signal (HMI

is optional - recommended model: TPC-7012Et), HMI instructions can be found in Chapter 5 - Human Machine Interface Guide, this shutdown mode only turns off the operation of the power devices in the system, the machine is in standby mode and the output terminals are charged.

4.2.3. EMS Control Switching

The EMS (Energy Management System) can be configured to match the communication protocol of our Power Control System to control the switch-on signal (we provide the text of external communication protocol), this shutdown mode only turns off the operation of power devices in the system, the machine is in standby mode and the output terminals are charged.

 Attention	If you need to disconnect the whole system, you need to wait for the PCS to shut down, the AC and DC circuit breakers need to be disconnected; The top cover should not be opened until the electrical circuits connected to the converter have been disconnected for approximately 10 minutes and the DC bus capacitors inside the module have been discharged; To prevent personal injury, if you want to do maintenance or open the operation of the chassis after power down, please use a multimeter to measure the electricity at the terminals first. Make sure that all internal parts of the machine are not charged before carrying out relevant operations!

4.3. Manual/automatic operation

Through EMS/HMI controller, we can realize the switch of manual/automatic operation mode. After switching to automatic power on, PCS will automatically power on and run when it is powered on.

 Attention	When the converter is set to auto-on, be sure to note that the battery voltage needs to meet the voltage range of the PCS.

4.4. Parallel off-grid switching (without static transfer switch-STS case)

4.4.1. Grid-connected to off-grid steps:

Step 1：Automatically change the PCS operation mode to manual mode via EMS/HMI or background software;

Step 2：Set the PCS shutdown command; confirm that the PCS is in the shutdown state;

Step 3：Grid disconnection (grid master switch QF disconnected), confirm that there is no power on the grid; reference diagram as follows：

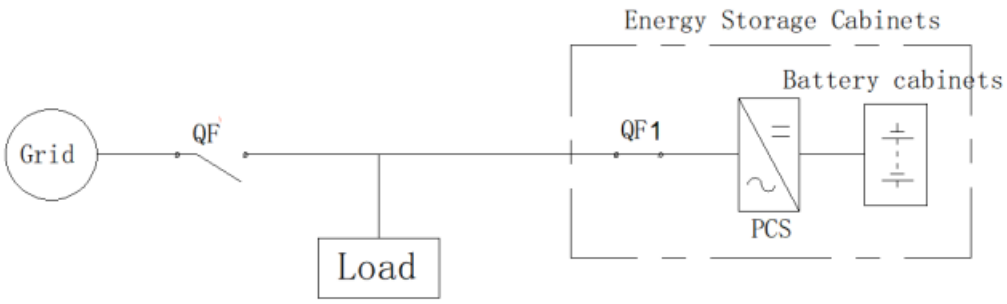


Figure 4-1

Step 4：Set the PCS to operate in off-grid mode;

Step 5：Set the PCS power-on command (select voltage source mode) through EMS/HMI or background software；(output function is determined by the load size).

4.4.2. Off-grid to on-grid steps:

Step 1：Automatically change the PCS operation mode to manual mode via EMS/HMI or background software;

Step 2：Set the PCS shutdown command; confirm that the PCS is in the shutdown state;

Step 3：Setting the PCS to grid-connected mode;

Step 4：Apply power to the grid (grid master switch QF is in the closed state) with the following reference diagram;

Step 5：Set the PCS boot command;

Step 6：Change the PCS manual mode to automatic mode.

4.5. Parallel off-grid switching (with static transfer switch-STS case)

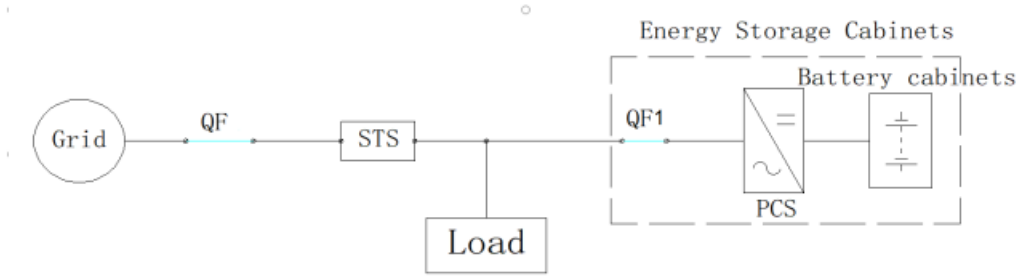


Figure 4-2

(a) the STS is split by default;

Conditions for STS closure:

STS and PCS need to be powered separately, (grid-connected STS is connected to the grid with power, off-grid UPS needs to be added to power the STS; the DC side of the PCS needs to be connected to the battery.)

STS and PCS wiring: 485 signal line needs to be connected; synchronization signal needs to be connected; Modbus address is the same; after both communication is normal, STS will close after 3 minutes. The following diagram:

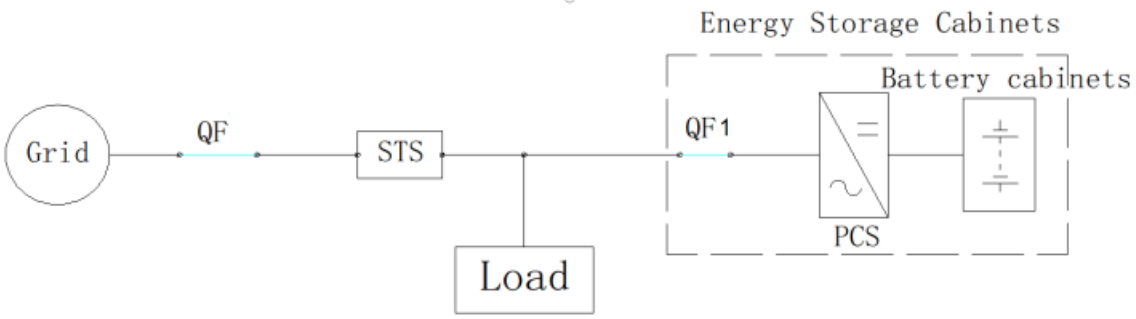


Figure 4-3

4.5.1. Description of the on-grid to off-grid process (STS fully automatic switching):

When the grid loses power, the STS detects the grid loss and quickly gives the grid loss signal to the PCS, and the PCS sends the break command to the STS, and the STS receives the command and breaks the break. And after the PCS receives the signal from STS, it will also immediately complete the switch from "grid-connected" to "off-grid" mode, from "current source mode" to "voltage source mode". Voltage source mode", at this time, to complete the switch from grid to off-grid, this process is completed by STS with PCS, the process time is about 20ms ~ 200ms.

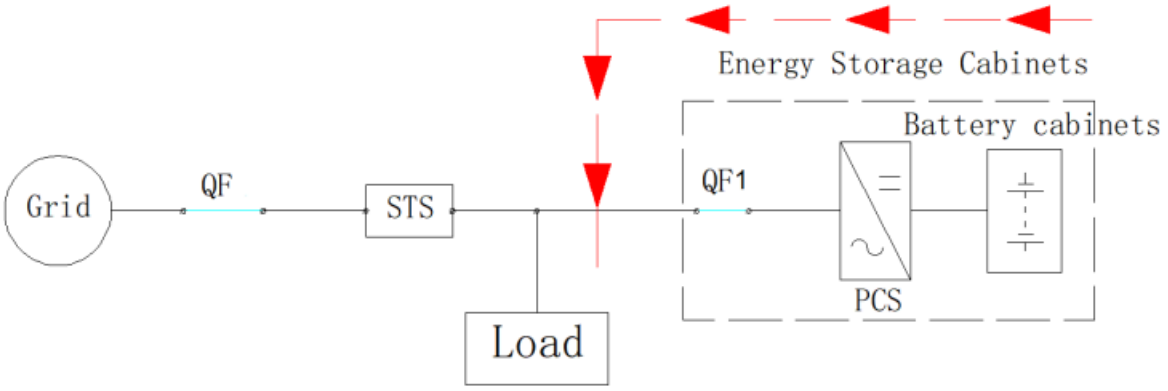


Figure 4-4

4.5.2 Description of the off-grid to on-grid process (STS fully automatic switching):

Loss of power from the grid, when the load part is supplied by energy storage and the PCS operates in off-grid, voltage source mode; the STS is powered by the UPS and normal communication is maintained between the STS and the PCS;

At that time, after the grid call, STS detects the grid call and quickly gives the grid call signal to PCS and PCS sends the closing command to STS, and STS receives the command and closes the gate. And PCS receives the signal from STS, PCS tracks the phase and amplitude of the grid through synchronization signal and communication, when the phase and amplitude are synchronized and confirmed for a period of time, PCS cuts back to grid-connected operation, thus completing the "off-grid" to "grid-connected" mode. This completes the switching from "off-grid" to "on-grid" mode.

At this time, it enters into grid-connected mode operation, and the process time is about 20ms~200ms.

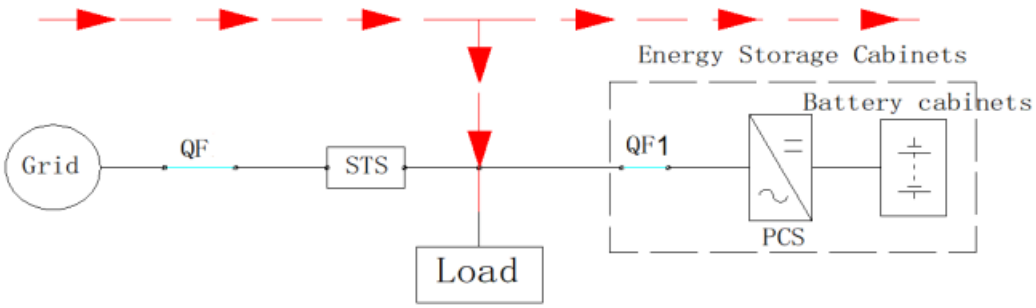


Figure 4-5

Chapter5 Human Machine Interface Operation Guide (HMI Option)

The touch screen can be installed on the front door panel of the cabinet with a resistive touch screen of 7" resolution. Through the touch screen, the converter can be operated and controlled, and the key parameters on the inverter side of the converter, the key parameters on the grid side, and the event and alarm information can be queried.

5.1. Touch screen operation

5.1.1. Launching the login screen

After the Power Control System is powered on, the touch screen will enter the initialization interface, and you can enter the login interface after clicking login.

The login level is divided into two categories: "general user" and "advanced user", and the login passwords are 1234 and 4321 respectively. The "General Users" can only switch on/off and view parameter events, while the "Advanced Users" has the authority to modify parameters.

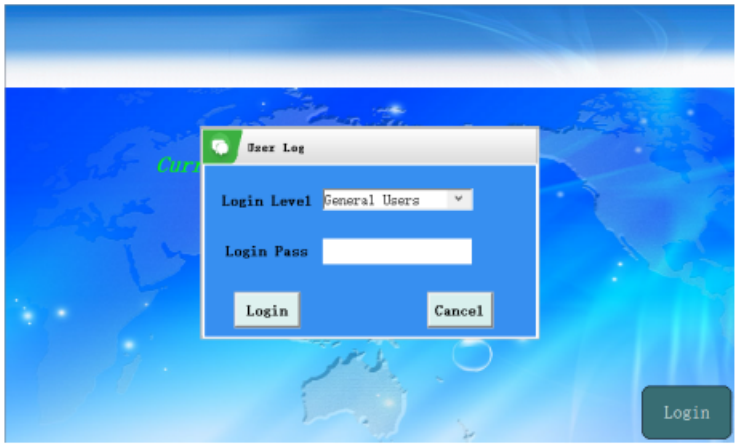


Figure 5-1 Login interface

5.1.2. Main page

After login, click the [Home] button to enter this page, the default is the information of module 1, if you need to see other module information, please refer to **5.2.8 Settings**.

The page contains information on the operating status of the Power Control System, the model, the input and output voltages and currents. You can switch to other pages by using the following common

function keys.

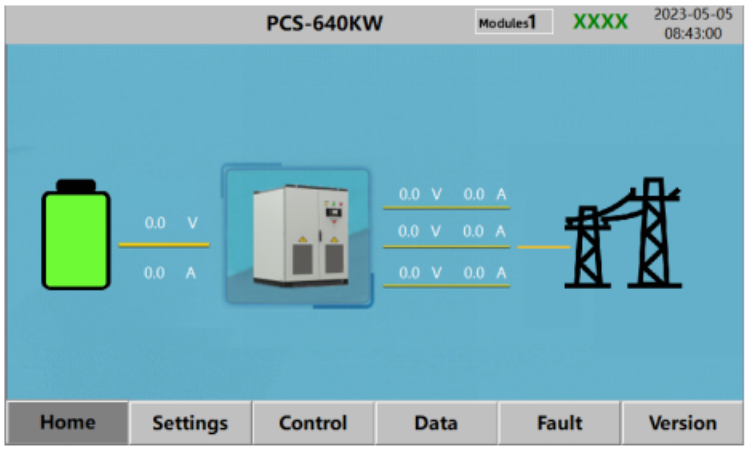


Figure 5-2 Home

5.1.3. Switching on/off control page

Click the [Control] button under any other screen to access this page.

In this page, there are mainly: **Power On button, Power Off button and Reset button.**

The Power On and Power Off buttons are used to select power on or power off operation, and the Reset button is used for fault reset.

Select[Yes]/[No] in the pop-up sub-window to confirm

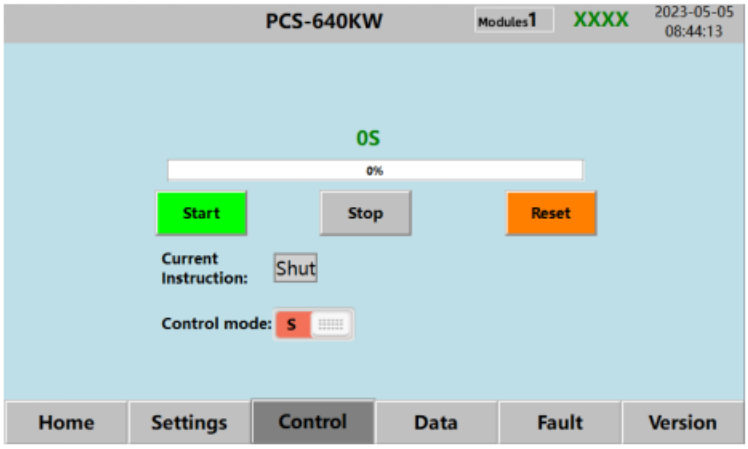


Figure 5-3 Switching page

5.1.4. Setup page

Click the [Settings] button from any other screen to enter the "Settings" submenu.

The settings page is only available to maintenance professionals and requires a login as a premium

account to see it.

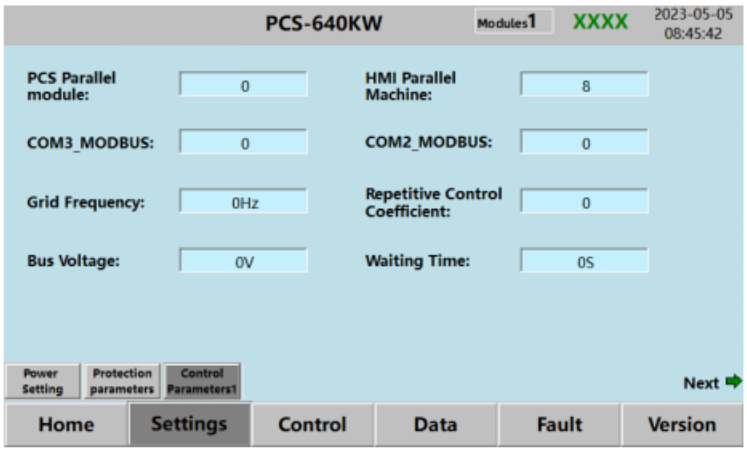


Figure 5-4 Setting-Control parameter 1-①

Description of parameter settings:

Number	Name	Description	Properties
1	PCS system parallel module	Total number of PCS system parallel machines	Reading and writing
2	HMI Parallel Machine	Number of parallel modules controlled by HMI	Reading and writing
3	COM3_MODBUS	COM3_MODBUS address	Reading and writing
4	COM2_MODBUS	COM2_MODBUS address	Reading and writing
5	Grid Frequency	Grid frequency, default 50 Hz	Reading and writing
6	Repetitive Control Coefficient	Repetitive Control Coefficient, which can speed up the system response and improve the system regulation accuracy	Reading and writing
7	Bus Voltage	In battery constant voltage mode, the battery voltage can be adjusted by this setting amount	Reading and writing
8	Waiting Time	Boot up waiting time	Reading and writing

Click the **"Next"** button to go to the next setting page.

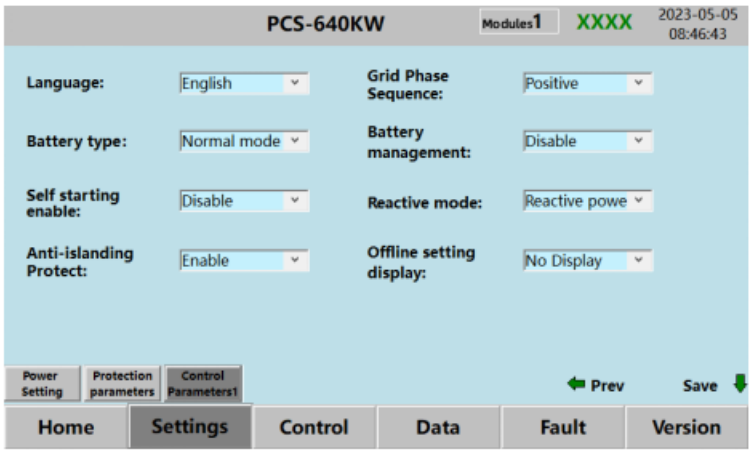


Figure 5-5 Setting-Control parameters1-②

Description of parameter settings:

Number	Name	Description	Properties
1	Language	Screen language can be selected as "Chinese (Simplified)" / "English" / "Chinese (Traditional)"	Reading and writing
2	Set the grid phase sequence	The default setting is "positive sequence", when the grid is negative sequence, set to "negative sequence"	Reading and writing
3	Battery Type	According to the battery type, you can choose "normal mode" / "lithium battery"	Reading and writing
4	Battery Management	Option to turn on the battery management function or not	Reading and writing
5	Self starting enable	Selectable whether to turn on the automatic power-on function of the device	Reading and writing
6	Reactive mode	Selectable "Reactive power" / "PF " / "Reactive current"	Reading and writing
7	Anti-islanding Protect	Optionally, you can turn on the anti-islanding protection function or not	Reading and writing
8	Offline setting display	Optional display of off-grid settings or not	Reading and writing

Fixed parameters: Click **"Save"**to save the parameter settings permanently, please note that saving parameters needs to be done in standby mode.

Clicking on the **"Protection Parameters"** button takes you to another settings page.

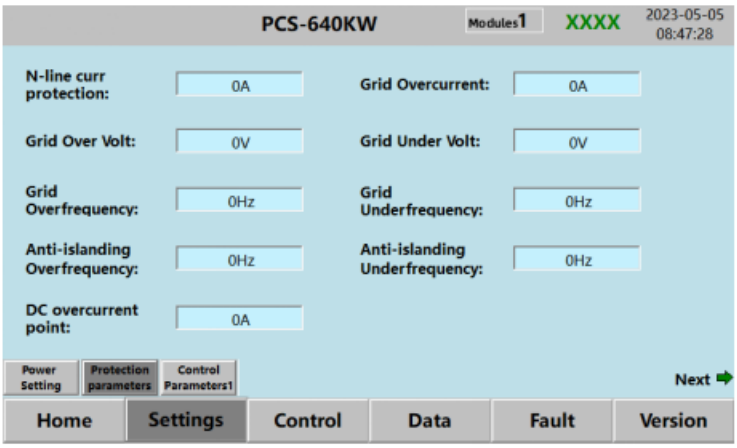


Figure 5-6 Setting-protection parameters ①

Description of parameter settings:

Number	Name	Description	Properties
1	N line current protection	N line maximum current	Reading and writing
2	Grid overcurrent point	Grid overcurrent fault set point	Reading and writing
3	Grid Over Volt	Grid over-voltage fault set point	Reading and writing

4	Grid Under Volt	Grid undervoltage fault set point	Reading and writing
5	Grid Overfrequency	Grid overfrequency fault set point	Reading and writing
6	Grid Underfrequency	Grid underfrequency fault set point	Reading and writing
7	Anti-islanding Overfrequency	Anti-islanding over-frequency fault protection point	Reading and writing
8	Anti-islanding Underfrequency	Anti-islanding under-frequency fault protection point	Reading and writing
9	DC overcurrent point	DC output overcurrent fault protection point	Reading and writing

Click the **"Next"** button to go to the next setting page.

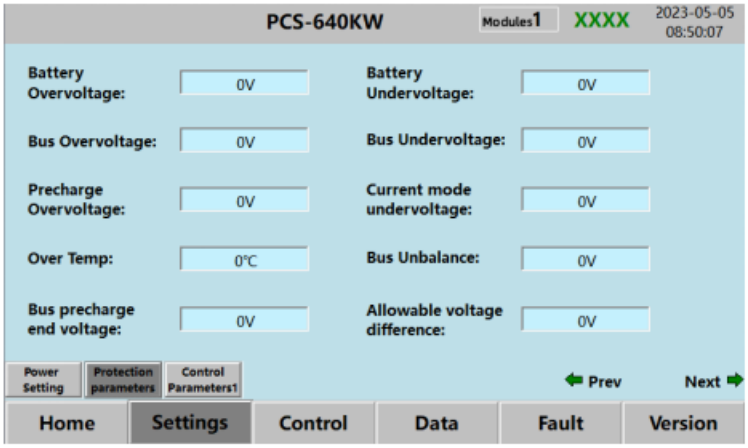


Figure 5-7 Setting-protection parameters ②

Description of parameter settings:

Number	Name	Description	Properties
1	Battery Overvoltage	Battery overvoltage fault setpoint	Reading and writing
2	Battery Undervoltage	Battery undervoltage fault setpoint	Reading and writing
3	Bus Overvoltage	Busbar over-voltage fault set point	Reading and writing
4	Bus Undervoltage	Bus undervoltage fault set point	Reading and writing
5	Precharge overvoltage	Busbar pre-charge over-voltage set point	Reading and writing
6	Current mode undervoltage	Current mode bus operation undervoltage fault point	Reading and writing
7	Over Temp	The maximum temperature that the IGBT can withstand for normal operation	Reading and writing
8	Busbar Unbalance	Power Control System bus unbalance fault shutdown point	Reading and writing
9	Busbar precharge end voltage	Voltage at the end of bus charging	Reading and writing
10	Allowable voltage difference	Allowable maximum voltage difference between the end of the bus pre-charge process and the beginning	Reading and writing

Click the **"Next"** button to go to the next setting page.

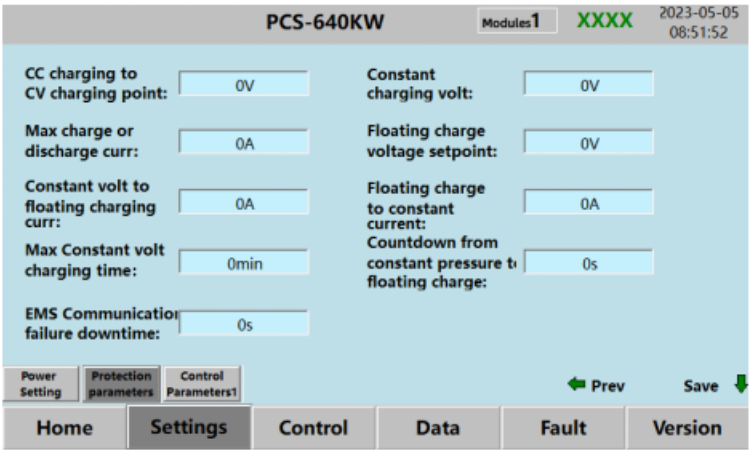


Figure 5-8 Setting-protection parameters ③

Description of parameter settings:

Number	Name	Description	Properties
1	CC charging to CV charging point	The constant current charging section is transformed into a constant voltage charging section with internal battery voltage	Reading and writing
2	Constant charging volt	Constant voltage value maintained at both poles of a constant voltage rechargeable battery	Reading and writing
3	Max charge or discharge current	The maximum charge/discharge current allowed during battery charging and discharging	Reading and writing
4	Floating charge voltage setpoint	Constant voltage to float charging voltage set point	Reading and writing
5	Constant volt to floating charging current	Constant voltage to float charging current set point	Reading and writing
6	Floating charge to constant current	Float to constant current charging current set point	Reading and writing
7	Max Constant volt charging time	Maximum duration of constant voltage charging process	Reading and writing
8	Countdown from constant pressure to floating charge:	Time required for constant pressure to float charging	Reading and writing
9	EMS communication failure downtime	Module shutdown time after EMS communication failure occurs	Reading and writing

Fixed parameters: Click **"Save"**to save the parameter settings permanently, please note that saving parameters needs to be done in standby mode.

Clicking on the **"Power Setting"** button will take you to another settings page.

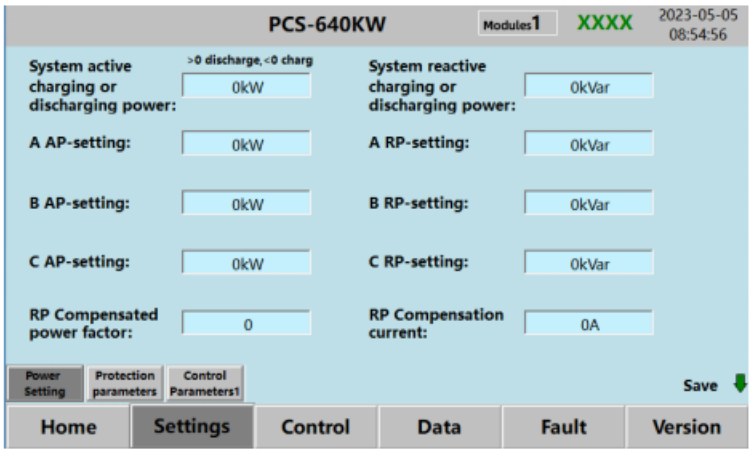


Figure 5-9 Setting-Power Setting

Description of parameter settings:

Number	Name	Description	Properties
1	System active charging or discharging power	System charging and discharging active power, greater than 0, for the discharge process; less than 0, for the charging process	Reading and writing
2	System reactive charging or discharging power	System charging and discharging reactive power	Reading and writing
3	A AP-setting	A-phase active power setting	Reading and writing
4	A RP-setting	A-phase reactive power setting	Reading and writing
5	B AP-setting	B-phase active power setting	Reading and writing
6	B RP-setting	B-phase reactive power setting	Reading and writing
7	C AP-setting:	C-phase active power setting	Reading and writing
8	C RP-setting	C-phase reactive power setting	Reading and writing
9	RP Compensated power factor	Power factor under reactive power compensation	Reading and writing
10	RP Compensation current	Compensation reactive current current value	Reading and writing

Fixed parameters: Click **"Save"**to save the parameter settings permanently, please note that saving parameters needs to be done in standby mode.

5.1.5. Data page

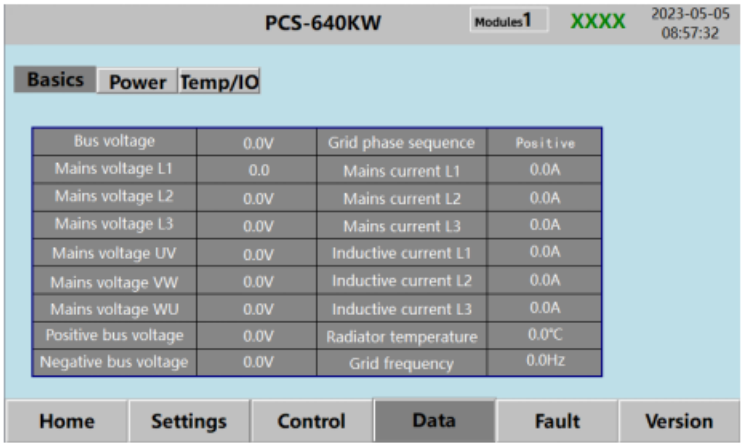


Figure 5-10 Data - Basic Page

Basic: Mainly used to display parameters related to the AC and DC sides of the converter, including the following 18 parameters: bus voltage, grid phase sequence, A-phase voltage, B-phase voltage, C-phase voltage, A-phase current, B-phase current, AB-phase line voltage, BC-phase line voltage, CA-phase line voltage, positive bus voltage, negative bus voltage, A-phase inductance current, B-phase inductance current, C-phase inductance current, heat sink temperature, grid frequency.

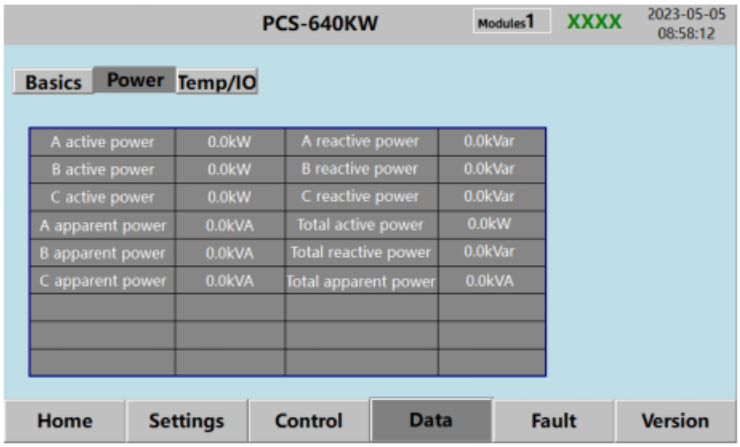


Figure 5-11 Data - Power page

Power: It is mainly used to display the relevant power parameters on the AC and DC sides of the converter, including the following 12 parameters: A-phase active power, B-phase active power, C-phase active power, A-phase apparent power, B-phase apparent power, C-phase apparent power, A-phase reactive power, B-phase reactive power, C-phase reactive power, total active power, total reactive power, total apparent power.

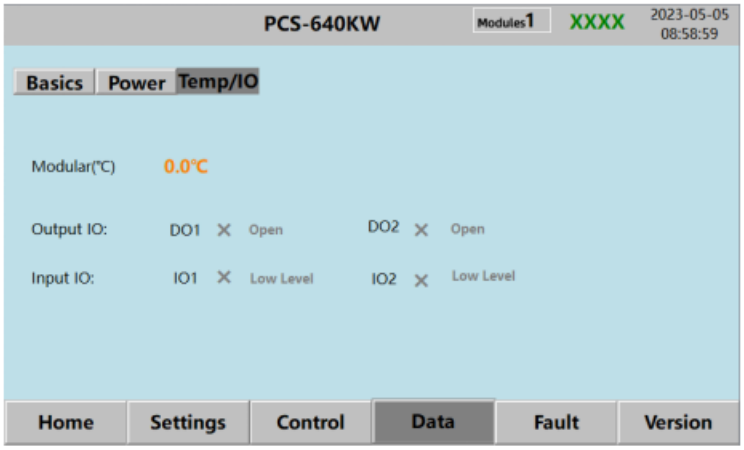


Figure 5-12 Data - Temperature page

Temperature I/O: Mainly used to display the internal IGBT case temperature and digital input port DI and digital output port DO status of the converter.

5.1.6. Fault page

Click the [Fault] button at the bottom of any other screen to enter the **"Fault"** submenu.

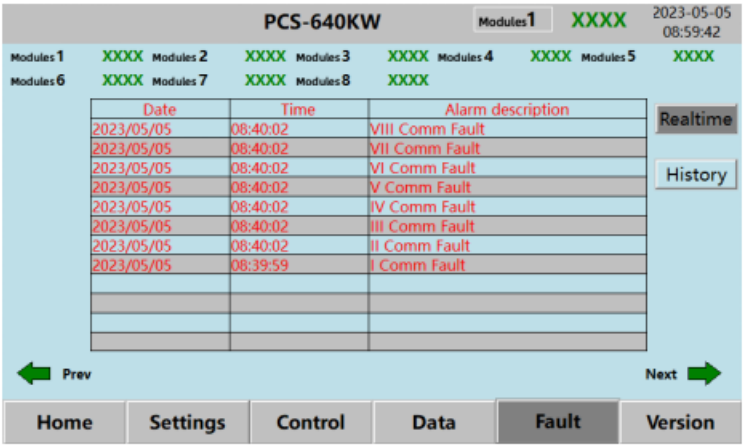


Figure 5-13 Fault page ①

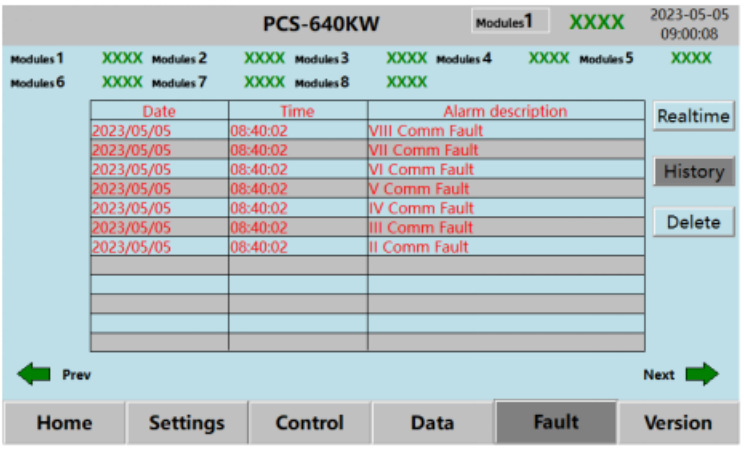


Figure 5-14 Fault page②

You can view historical fault records and current alarms on the current page.

5.1.7. Version page

Click the [Version] button at the bottom of any other screen to enter the **"Version"** submenu and view the software version information.

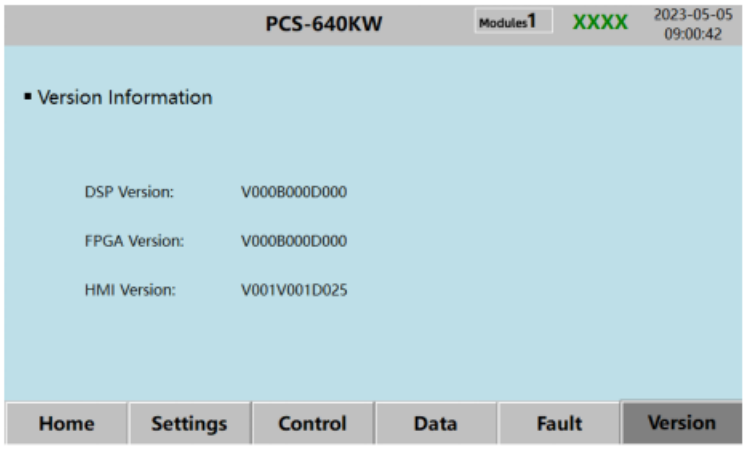


Figure 5-15 Version page

5.1.8. Selection Module

Click the [Module] button at the top of the screen in any other interface to select and set parameters for all modules of the large screen control.

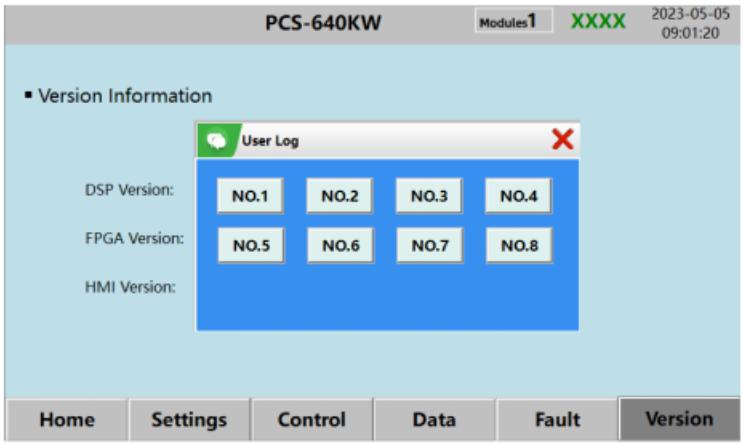


Figure 5-16 Select Module Operation

5.1.9. The regional settings

1、 How to select locale?

64.00 National category: Select 3 (Australia).

Set the region selection in the host computer parameter 64.06; 1 corresponds to Australia A; 2 corresponds to Australia B; 3 corresponds to Australia C.

ParameterID	ParameterName	ParameterValue	Unit	DisplayFormat	Observe	Description
G 64.00	National category	---		Signed Dec	☑	3:Australia
G 64.06	Australia Region	---		Signed Dec	☑	1:Australia A;2:Australia B;3:Australia C;4:New Zealand

Figure 5-17

2、Function enable settings

① Volt-watt model

64.128 Grid overvoltage active power response enable：1

② Volt-var model

64.144 Grid reactive power response enable：1

③ PF model

80.22 Reactive power compensation mode setting: 1 (PF mode)

02.214 Power factor set value: Set the corresponding PF value

Shut down and set the above parameters. After setting, you need to restart the machine to take effect.

④ Q (U) & P (U) voltage-reactive power and voltage-active power combined response mode

64.128 Grid overvoltage active power response enable: 1

64.135 Grid undervoltage active power response enable: 1

64.144 Grid reactive power response enable: 1

⑤ Fault reconnection settings

02.46 Reset time setting: 45000

20.52 Active power reference change step setting: 1

64.04 Power step gate setting value 1:150

64.05 Power step gate setting value 2: 150

Can meet the slope <16.7%Pn/min

⑥ Anti-islanding test

80.99 Island Enable: 1

02.04 Harmonic Control Configuration 2: Bit1 Bit2 High and Low Pass-Through Function Check Enable

	DI	ParameterID	ParameterName	ParameterValue	Unit	DisplayFormat	Observe	Description
🔍	W	G 64.128	Volt Watt Enable	---		Signed Dec	☑	0-disable;1-enable
🔍	W	G 64.144	Volt Var Enable	---		Signed Dec	☑	0-disable;1-enable
🔍	W	G 80.22	Reactive compensation mode setting	---		Signed Dec	☑	0: Reactive Power; 1: Power Factor Control; 2: Reactive Current
🔍	W	G 02.214	Power Factor Set Value	---		Signed Dec	☑	Power Factor Set Value [0.85-1.0 or -0.85--1]
🔍	W	G 64.135	Power grid undervoltage active response enables	---		Signed Dec	☑	0-disable;1-enable
🔍	W	G 02.46	Reset Time Setting	---		Unsigned Dec	☑	Reset Time Setting
🔍	W	G 20.52	Active power given change step size setting	---		Signed Dec	☑	Active power given change step size setting
🔍	W	G 64.04	Power step gate setting value 1	---		Signed Dec	☑	Power step gate setting value 1
🔍	W	G 64.05	Power step gate setting value 2	---		Signed Dec	☑	Power step gate setting value 2
🔍	W	G 80.99	COM3-communication fault detection	---		Signed Dec	☑	1: Enable; 0: Disable

Figure 5-18

3、How to select locale?

64.00 National category: Select 3 (Australia).

Set the region selection in the host computer parameter 64.06; 1 corresponds to Australia A; 2 corresponds to Australia B; 3 corresponds to Australia C.

The protection thresholds for different areas are shown below:

ParameterID	ParameterName	ParameterValue	Unit	Description	Variable Name
G - 64.06	Australia Region	1		1: Australia A; 2: Australia B; 3: Australia C; 4: New Zealand; 5: Allowed...	
G - 64.81	Over Frequency	52.00			
G - 64.82	Under Frequency	47.00			
G - 64.85	fhyst	0.10			
G - 64.129	Volt Watt-Vw1	253.0		V	
G - 64.130	Volt Watt-Vw2	260.0		V	
G - 64.136	Volt Watt-Vw2-Ch	215.0			
G - 64.137	Volt Watt-Vw1-Ch	207.0			
G - 64.145	Volt Var-Vv1	207.0		V	
G - 64.146	Volt Var-Vv2	220.0		V	
G - 64.147	Volt Var-Vv3	240.0		V	
G - 64.148	Volt Var-Vv4	258.0		V	

ParameterID	ParameterName	ParameterValue	Unit	Description	Variable Name
G - 64.06	Australia Region	2		1: Australia A; 2: Australia B; 3: Australia C; 4: New Zealand; 5: Allowed...	
G - 64.81	Over Frequency	52.00			
G - 64.82	Under Frequency	47.00			
G - 64.85	fhyst	0.10			
G - 64.129	Volt Watt-Vw1	250.0		V	
G - 64.130	Volt Watt-Vw2	260.0		V	
G - 64.136	Volt Watt-Vw2-Ch	215.0			
G - 64.137	Volt Watt-Vw1-Ch	195.0			
G - 64.145	Volt Var-Vv1	205.0		V	
G - 64.146	Volt Var-Vv2	220.0		V	
G - 64.147	Volt Var-Vv3	235.0		V	
G - 64.148	Volt Var-Vv4	255.0		V	

ParameterID	ParameterName	ParameterValue	Unit	Description	Variable Name
G - 64.06	Australia Region	3		1: Australia A; 2: Australia B; 3: Australia C; 4: New Zealand; 5: Allowed...	
G - 64.81	Over Frequency	55.00			
G - 64.82	Under Frequency	45.00			
G - 64.85	fhyst	0.05			
G - 64.129	Volt Watt-Vw1	253.0		V	
G - 64.130	Volt Watt-Vw2	260.0		V	
G - 64.136	Volt Watt-Vw2-Ch	215.0			
G - 64.137	Volt Watt-Vw1-Ch	207.0			
G - 64.145	Volt Var-Vv1	215.0		V	
G - 64.146	Volt Var-Vv2	230.0		V	
G - 64.147	Volt Var-Vv3	240.0		V	
G - 64.148	Volt Var-Vv4	255.0		V	

ParameterID	ParameterName	ParameterValue	Unit	Description	Variable Name
G - 64.06	Australia Region	4		1: Australia A; 2: Australia B; 3: Australia C; 4: New Zealand; 5: Allowed...	
G - 64.81	Over Frequency	55.00			
G - 64.82	Under Frequency	45.00			
G - 64.85	fhyst	0.10			
G - 64.129	Volt Watt-Vw1	242.0		V	
G - 64.130	Volt Watt-Vw2	250.0		V	
G - 64.136	Volt Watt-Vw2-Ch	224.0			
G - 64.137	Volt Watt-Vw1-Ch	216.0			
G - 64.145	Volt Var-Vv1	207.0		V	
G - 64.146	Volt Var-Vv2	220.0		V	
G - 64.147	Volt Var-Vv3	235.0		V	
G - 64.148	Volt Var-Vv4	244.0		V	

Figure 5-19

Inverter firmware version：A00

5.2. LCD display information schedule

5.2.1. Fault information

Note: This list only lists some of the faults, if you encounter other unknown faults, please contact the technician in time. Please do not handle without permission, so as not to cause other failures or even cause damage to the machine.

Number	Fault name (fault code)	Cause of failure	Troubleshooting
1	EPO failure (F01)	Front door panel EPO pressed	Check to see if the EPO button is

			pressed, and if it needs to be reset, follow the instructions on the button.
2	IGBT overcurrent (F02)	IGBT Hardware Vce Protection	Check if the red LED on the corresponding driver board is lit. Solution for red diode illumination: (1) Check whether the polarity of the line between the detection board and the driver board is correct and whether there is looseness - replace or insert the line tightly; (2) Check if the drive cable between the net-side power module drive board and the IGBT is loose - insert the drive cable tightly; (3) Check the appearance of the driver board to see if there are signs of destruction and confirm whether the driver board is damaged - replace the driver board; (4) Check whether the IGBT module is damaged - replace the damaged IGBT module. The red light-emitting diode is not lit solution measures: It means that the interference is caused by checking whether the system grounding is good; whether the connection between the control board and the detection board is well connected.
3	Busbar hardware overvoltage (F03)	Bus voltage exceeds the protection point set by the system hardware	(1) Confirm that there is no fault in the system causing busbar overvoltage; (2) Check that the bus bar sampling line is properly and reliably connected.
4	Module A phase hardware overcurrent (F04)	Peak A-phase current exceeds hardware overcurrent point	(1) Confirm that there is no system fault causing system overcurrent; (2) Check whether the polarity of the net-side current sampling line is correct and reliably connected - replace or plug in the sampling line tightly; (3) Check whether the detection board is working properly - replace the detection board.
5	Module B phase	Peak B-phase current exceeds	(1) Confirm that there is no system

	hardware overcurrent (F04)	hardware overcurrent point	fault causing system overcurrent; (2) Check whether the polarity of the net-side current sampling line is correct and reliably connected - replace or plug in the sampling line tightly; (3) Check whether the detection board is working properly - replace the detection board.
6	Module C phase hardware overcurrent (F04)	Peak C-phase current exceeds hardware overcurrent point	(1) Confirm that there is no system fault causing system overcurrent; (2) Check whether the polarity of the net-side current sampling line is correct and reliably connected - replace or plug in the sampling line tightly; (3) Check whether the detection board is working properly - replace the detection board.
7	Auxiliary power failure (F17)	Auxiliary power supply of +15V below +12V or auxiliary power supply of -15V above -12V	(1) Check whether the power supply to the signal processing board is out of range - repair the power supply; (2) Check whether the power cable between the auxiliary power board and the detection board is properly and reliably connected; (3) check whether the control board to detect the board of the row line is loose - plug tight row line; (4) Check whether the detection board is working properly - replace the detection board.
8	Fan failure (F18)	Fan has abnormalities	Check if the fan is blocked or not rotating
9	Internal connection line failure (F19)	Internal driver board to control board connection abnormal	Check the connection cable
10	DC lightning protector status abnormal (F22)	DC lightning protector auxiliary contact feedback abnormal	Please confirm whether the DC side lightning protector indication is normal, if it is red, it needs to be replaced
11	AC lightning protector status abnormal (F23)	AC lightning protector auxiliary contact feedback abnormal	Please confirm whether the AC side of the lightning protector indication is normal, if it is red means that it needs to be replaced
12	Module overheating	IGBT module temperature	(1) Confirm that the IGBT module is

	(F25)	detected above system set point	indeed overheating - check that the fan is working properly; (2) Check whether the net-side drive cable is connected reliably - plug in the drive cable; (3) Check whether the net-side detection board is working properly - replace the net-side detection board.
13	Grid AB line voltage overvoltage (F33)	The grid AB line voltage exceeds the system set overvoltage point	(1) Confirm whether the grid is over-voltage - the system needs to be shut down for protection when the grid is over-voltage; (2) Confirm that the grid overvoltage protection point is appropriate; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
14	Grid BC line voltage overvoltage (F34)	Grid BC line voltage exceeds the system set overvoltage point	(1) Confirm whether the grid is over-voltage - the system needs to be shut down for protection when the grid is over-voltage; (2) Confirm that the grid overvoltage protection point is appropriate; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
15	Grid CA line voltage overvoltage (F35)	Grid CA line voltage exceeds the system set overvoltage point	(1) Confirm whether the grid is over-voltage - the system needs to be shut down for protection when the grid is over-voltage; (2) Confirm that the grid overvoltage protection point is appropriate; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
16	Grid AB line voltage undervoltage (F36)	The grid AB line voltage is below the system set undervoltage point	(1) Confirm whether the grid is under-voltage - the system needs to be shut down for protection when the grid is under-voltage; (2) Confirmation of the suitability of the grid undervoltage protection point; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
17	Grid BC line voltage undervoltage (F37)	Grid BC line voltage is below the system set undervoltage	(1) Confirm whether the grid is under-voltage - the system needs to be

		point	shut down for protection when the grid is under-voltage; (2) Confirmation of the suitability of the grid undervoltage protection point; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
18	Grid CA line voltage undervoltage (F38)	Grid CA line voltage is below the system set undervoltage point	(1) Confirm whether the grid is under-voltage - the system needs to be shut down for protection when the grid is under-voltage; (2) Confirmation of the suitability of the grid undervoltage protection point; (3) Check whether the grid voltage detection line is loose or abnormal - insert the detection line tightly.
19	Grid overfrequency (F39)	Grid frequency exceeds the system set over frequency point	(1) Determine if the grid frequency is too high - system shutdown protection when the grid frequency is too high; (2) Determine whether the grid overfrequency protection point is appropriate.
20	Grid Underfrequency (F40)	Grid frequency is below the system set under frequency point	(1) Determine if the grid frequency is too low - system shutdown protection when the grid frequency is too low; (2) Determine whether the grid under-frequency protection point is appropriate.
21	Grid voltage phase sequence inversion (F41)	Phase sequence error in the power grid	(1) Determine whether the grid phase sequence is connected to the wrong - adjust the grid input phase sequence to ABC after power failure; (2) Check whether the grid voltage sampling line is connected wrong - adjust the grid sampling line phase sequence for ABC after power failure.
22	Grid A-phase overcurrent (F42)	A-phase overcurrent occurred in the module during system operation	(1) Determine whether an overcurrent has occurred in phase A of the grid - the system needs to be shut down for maintenance in the event of a module overcurrent; (2) Confirm that the overcurrent protection point is appropriate.
23	Grid B-phase overcurrent (F43)	B-phase overcurrent occurs in the module while the system is running	(1) Determine whether an overcurrent has occurred in phase B of the grid - the system needs to be shut down for

			maintenance in the event of a module overcurrent; (2) Confirm that the overcurrent protection point is appropriate.
24	Grid C-phase overcurrent (F44)	C-phase overcurrent occurs in the module while the system is running	(1) Determine if overcurrent has occurred in phase C of the grid - the system needs to be shut down for maintenance in the event of module overcurrent; (2) Confirm that the overcurrent protection point is appropriate.
25	Busbar pre-charge overvoltage (F49)	Bus voltage is too high when the bus is charging	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Determine if the pre-charge contactor is working properly - the pre-charge action can be tested in single-step commissioning mode; (3) Check if the pre-charge bus over-voltage point is set appropriately.
26	Bus pre-charge undervoltage (F50)	Bus voltage is too low when the bus is charging	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Determine if the pre-charge contactor is working properly - the pre-charge action can be tested in single-step commissioning mode; (3) Check if the pre-charge bus undervoltage point setting is appropriate.
27	Busbar uncontrolled rectification overvoltage (F51)	Too high bus voltage during uncontrolled rectification	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Check whether the setting of the overvoltage point of the uncontrolled rectifier bus is appropriate.
28	Bus uncontrolled rectifier undervoltage (F52)	The bus voltage is too low during uncontrolled rectification	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Determine if the main contactor is working properly - the main contactor action can be tested in single-step

			commissioning mode; (3) Check whether the over-voltage point of the uncontrolled rectifier bus is set appropriately.
29	Bus operation overvoltage (F53)	Bus voltage is too high during normal operation	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Check whether the normal operation busbar over-voltage point setting is appropriate.
30	Bus operation undervoltage (F54)	Bus voltage is too low during normal operation	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Determine if the main contactor is working properly - the main contactor action can be tested in single-step commissioning mode; (3) Check if the normal operation busbar undervoltage point setting is appropriate.
31	Current mode bus operation undervoltage (F57)	Bus voltage is too low during normal operation	Current mode bus is provided externally, please make sure the external battery or DCDC supply voltage is normal
32	Bus pre-charge timeout (F65)	When the bus is charged, the predetermined value is not reached within the specified time	(1) Determine whether the bus voltage detection is correct - check whether the detected value is consistent with the real bus voltage; (2) Determine if the pre-charge contactor is working properly - the pre-charge action can be tested in single-step commissioning mode; (3) Check whether the pre-charge end voltage and timeout time settings are appropriate.
33	A-phase pre-charge overcurrent (F66)	Module overcurrent during pre-charge phase	(1) Check if the pre-charge circuit is wired properly; (2) Check whether the current sampling circuit is normal.
34	B-phase pre-charge overcurrent (F67)	Module overcurrent during pre-charge phase	(1) Check if the pre-charge circuit is wired properly; (2) Check whether the current sampling circuit is normal.
35	C-phase pre-charge	Module overcurrent during	(1) Check if the pre-charge circuit is

	overcurrent (F68)	pre-charge phase	wired properly; (2) Check whether the current sampling circuit is normal.
36	A-phase capacitor overcurrent (F69)	Current on the filter capacitor exceeds the threshold value	Verify that overcurrent is not occurring on the filter capacitor.
37	B-phase capacitor overcurrent (F69)	Current on the filter capacitor exceeds the threshold value	Verify that overcurrent is not occurring on the filter capacitor.
38	C-phase capacitor overcurrent (F69)	Current on the filter capacitor exceeds the threshold value	Verify that overcurrent is not occurring on the filter capacitor.
39	Filter capacitor voltage check error (F70)	No voltage detected on the filter capacitor	Check the filter capacitor voltage detection circuit for abnormalities.
40	RAM self-test failure (F81)	Control board RAM chip read/write error occurred	Replace the net-side control board after confirming the problem.
41	EEPROM parameters back to default value (F82)	EEPROM read/write error occurred	Restore the parameters to their default settings by curing the default parameters and then clear the fault. If the fault can be cleared, the EEPROM hardware chip itself is fine and the user only needs to set the parameters to specific values again, otherwise the control board needs to be replaced.
42	AD sampling zero drift is too large (F83)	ADC analog sampling channel zero drift is too large	(1) Check for loose current sampling or voltage sampling lines - insert tight current and voltage detection lines; (2) If the fault still cannot be eliminated - replace the net side detection board.
43	DSP communication protocol mismatch (F84)	Mismatch of communication protocols between DSPs	Synchronized DSP firmware upgrade.
44	CPLD version mismatch (F86)	CPLD and DSP version mismatch	Upgrade the firmware of CPLD and DSP simultaneously.
45	Main contactor closure timeout (F101)	After the main contactor closing command is issued, the main contactor cannot be closed within the specified time	(1) Confirm that the main contactor closing time parameter is set appropriately; (2) Check whether the main contactor drive line and status line P1A are loose or disconnected - connect the main contactor drive line and status line; (3) Check if the relay controlling the main contactor is working properly - overhaul the relay; (4) Confirm whether the main

			contactor is faulty or not - Repair the main contactor.
46	Main contactor disconnection timeout (F102)	After the main contactor disconnection command is issued, the main contactor cannot be disconnected within the specified time	(1) Confirm that the main contactor disconnection time parameter is set appropriately; (2) Check whether the main contactor drive line and status line P1A are loose or disconnected - connect the main contactor drive line and status line; (3) Check if the relay controlling the main contactor is working properly - overhaul the relay; (4) Confirm whether the main contactor is faulty or not - Repair the main contactor.
47	Abnormal disconnection of main contactor (F103)	When the system is running, a main contact break is detected	(1) Confirm whether the main contactor is faulty - repair the main contactor; (2) Confirm whether the main contactor status feedback line P1A is loose or not connected - plug the main contactor status feedback line tightly.
48	Abnormal closure of main contactor (F104)	Main contact closure is detected during system shutdown	(1) Confirm whether the main contactor is faulty - repair the main contactor; (2) Confirm whether the main contactor status feedback line P1A is loose or not connected - plug the main contactor status feedback line tightly.
49	Silo failure (F116)	Power grid drop	Verify that the grid is in order
50	System resonance fault (F118)	Generation of system resonance	Confirm whether the grid resonance phenomenon, if still can not be ruled out please contact after-sales
51	Software fast overcurrent and overvoltage protection (F119)	Overcurrent or overvoltage events occur during operation	Confirm whether the grid has spike interference or resonance phenomenon, if still can not be ruled out please contact the after-sales
52	Internal inter-module power imbalance protection (F121)	Power imbalance between 2 internal modules	Confirm whether the grid is normal, if you still can not exclude please contact the after-sales

Chapter6 Maintenance and repair

6.1. Working environment requirements

The working environment of the equipment must meet the working environment required by the equipment:

- Allowable ambient temperature: -30~55°C (derate to 80% of total current at 55°C)
- Allowable relative humidity: 0~95% (non-condensing)

Expansion: It is recommended that the working temperature of the converter should be 20~45°C to ensure the best operating condition of the converter.

The energy storage device will be used in reduced amount when it exceeds 2000m per pull.

6.2. Electrical and fixed parts connection inspection

After the equipment is put into operation, the electrical and fixed parts connection of the equipment should be checked regularly, recommended once every three months, and records should be made after each check.

- All-in-one ground connection;
- The electrical connection of the DC input;
- The electrical connection of the AC output;
- The connection of communication cables;
- AC/DC switches, fans;
- Read the monitored fault information.

6.3. Cleaning and janitorial

Before the equipment is put into operation, the dust and debris at the terminals and mesh should be cleaned.

After the equipment is put into operation, the dust in the machine room should be cleaned regularly, and the ventilation and exhaust facilities in the machine room should be checked to see if they are normal, and it is recommended to clean them once every three months. After the equipment is put into operation, the dust on the fan of the converter and the insect-proof net of the air outlet should be cleaned regularly, and it is recommended to clean them once every three months.

 Attention	The accumulation of dust in the fan opening will lead to poor air ducts and over-temperature shutdown of the converter, which will seriously affect the normal operation of the converter and must be cleaned up regularly.

Chapter7 Appendix

NDC1-3304 AC220V 50/60Hz+NF1-11

Parameter \ Specification			NDC1-330
Rated current Ie /A	AC-3	415V	330
		690V	225
	AC-4	415V	117
		690V	107
	AC-1	690V	500
Agreed thermal current of the free air Ith /A			500
Impulse withstand voltage Wimp /kV			12
Rated insulation voltage Ui /V			1000
Rated voltage Ue /V			380/415 660/690
Rated power/kW AC-3	220V/240V		100
	380V/400V		160
	415V		180
	440V		200
	500V		200
	66V/690V		200
Rated making capacity	AG3、AG4 Ue≤415V		10xle(AC-3]、12xle{AC-4]、1.5xle(AC-1)
Rated making capacity	AG3、AG4 Ue≤415V		8xle(AC-3)、10xle(AC-4)、1.5xle(AC-1)
Short time withstand current(starting from the cold state, 0 C, no current 60 minutes before)	1s		2650
	10s		1800
	30s		1300
	1min		900
	10min		750
Mechanical life			300x 101(E1200 tirmes/h)
AG1	Electrical life		$35x10^4$
	Operating frequency h		150
AG3	Electrical life		$50x10^4$
	Operating frequency h		150
AG4	Electrical life		$15x10^4$
	Operating frequency h		150
Average impedance ofeagh pole(mR)			0.28
Main circuit connection cap acity	Cable	number	1
		size/ mm^2	250
	Copper bar	number	2
		size/ mm^2	30x5
Impact	contactor opened (gn)		6

resistance 1/2 sine wave =llms	contactor closed (gn)	15
Anti-vibration performance 8~30 Hz	contactor opened (gn)	2
	contactor closed (gn)	5

Coil control circuit characteristics

Model				NDC1-330
Normal coil	Rated control voltage Uc/V			AC:24、36、48、110、220、230、380、400（50/60Hz）
	Pull-in voltage range			85%Uc~110%Uc
	Discharge voltage range			20%Uc~75%Uc（AC）、10%Uc~70%Uc（DC）
	AC coil	Pull-in time/ms		≤70
		Discharge time/ms		≤170
		Pull-in power consumption/VA		≤650
		Retention power consumption/VA		≤15
	AC coil	Pull-in time/ms		≤50
		Discharge time/ms		≤65
		Pull-in power consumption/VA		≤810
		Retention power consumption/VA		≤5.0
Wide voltage coil	Rated control voltage Uc/V			AC/DC:48~132V、100~250V
	Pull-in voltage range			85%Ucmin~110%Ucmax
	Discharge voltage range			0.48Ucmin~0.52Ucmin
	48~132V AC/DC	Pull-in time/ms	PLC control	≤70
			Power control	≤70
		Discharge time/ms	PLC control	≤25
			Power control	≤120
		Pull-in power consumption VA/W		≤450
		Retention power consumption VA/W		≤13
	100~250V AC/DC	Pull-in time/ms	PLC control	≤70
			Power control	≤70
		Discharge time/ms	PLC control	≤25
			Power control	≤120
		Pull-in power consumption VA/W		≤450
		Retention power consumption VA/W		≤16
Control circuit connection capacity	Cord/mm^2	1piece/1pieces		2.5
	Hard wire/mm^2	1piece		4
	Tightening torque/N.m			0.8~1.2