Photovoltaic monitoring sub-array communication cabinet S2-SCC

User Manual

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Foreword

Overview

This manual mainly introduces the installation, electrical connection, system operation, maintenance and troubleshooting methods of S2-SCC and PV monitoring system sub-array communication cabinet (hereinafter referred to as sub-array communication cabinet). Before installing and using the sub-array communication cabinet, please familiarize yourself with the functions and features of the subarray communication cabinet, and carefully read the safety information in this manual.

The graphics in this manual are for illustration only. Please refer to the actual product on site for the specific appearance of the product. You can print the electronic user manual into paper as needed, and keep the paper in a safe place for subsequent reference.

The contents of the manual will be continuously updated and revised, but there will inevitably be slight discrepancies or errors with the actual product. Users please refer to the actual product purchased, and can obtain the latest version of the manual through the sales channel.

1. Safety Notes

Electrical requirements

- When installing equipment that needs to be grounded, the protective ground wire must be installed first; when removing the equipment, the protective ground wire must be removed last.
- Damage to the ground conductor is prohibited.
- Do not operate the equipment without a grounding conductor installed.
- The equipment should be permanently grounded for protection. Before operating the equipment, check the electrical connections of the equipment to ensure that the equipment is properly grounded.
- All electrical connections must meet the country's electrical standards.
- Before connecting the power cord, make sure that the power cord label is correct.
- If the device has multiple inputs, all inputs of the device should be disconnected, and the device can be operated only after the device is completely powered off.
- When installing, operating, and maintaining the equipment, please follow the electrostatic protection regulations, wear anti-static work clothes, anti-static gloves and wrist straps.

2. Product introduction

2.1 Product Features

1) The sub-array communication cabinet is used to realize the data communication of the equipment in the photovoltaic array. Built-in power carrier equipment PLC-CCO, communication management machine, ring network switch and other equipment (specific equipment selection should be selected according to the actual needs of the site). And through the structural parts and wires, an intensive whole is formed inside the cabinet. The data can be collected from the photovoltaic sub-array equipment, and uploaded to the power station monitoring system through the optical fiber ring network to realize the communication control function between the photovoltaic sub-array and the station control layer.

2) Built-in PLC-CCO equipment, easily realize power line communication, save conventional cable investment, and effectively reduce system cost.

3) Seamless access to the station control layer to easily realize photovoltaic equipment management.

4) Built-in ring network switch, more convenient and flexible networking.

5) Built-in communication management machine, integrated sub-array AGC/AVC and other functions.

6) Built-in SPD, stable and reliable operation.

7) IP65 protection level to ensure long-term stable outdoor operation of the equipment.

8) Support common protocols such as MODBUS and IEC60870-104.

2. Product introduction

2.2 Network application

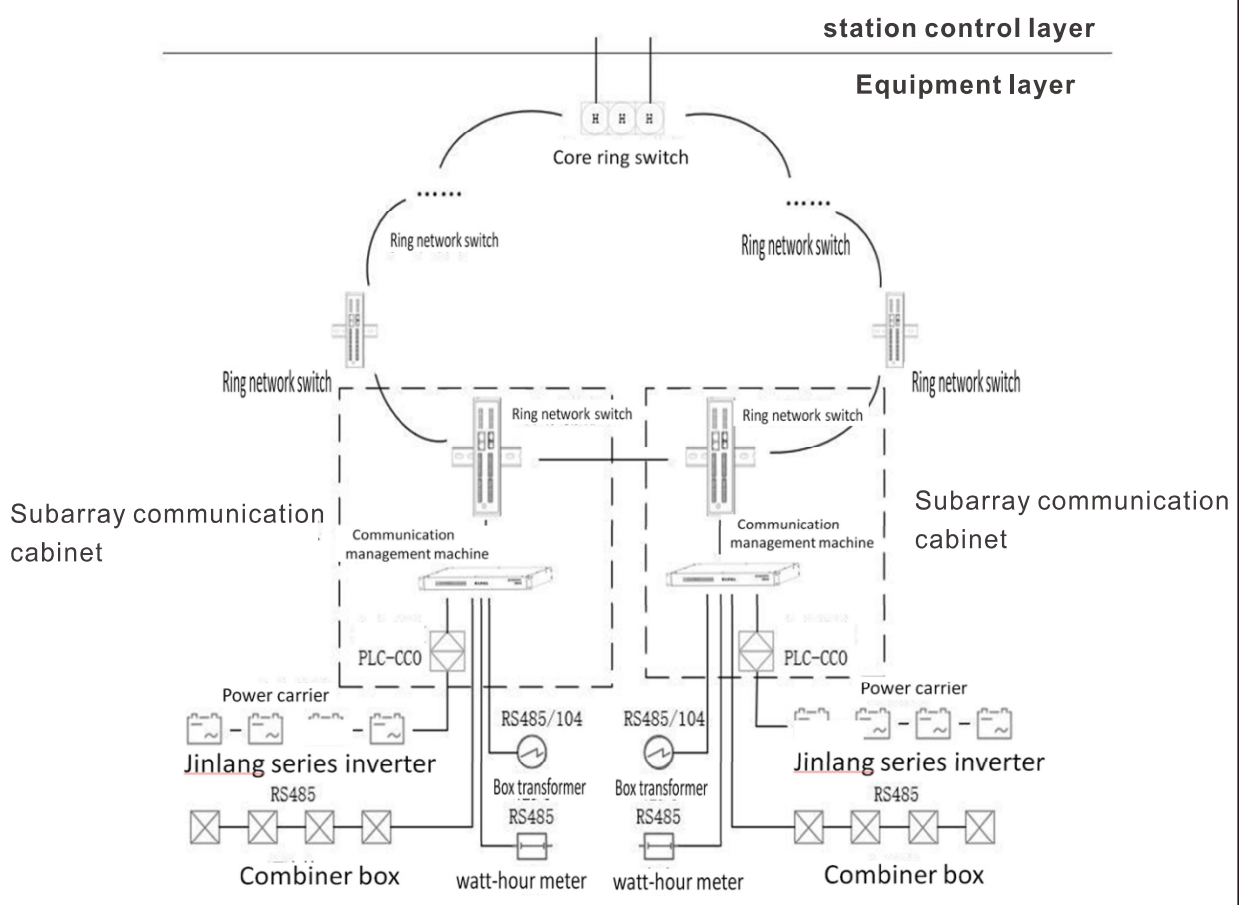
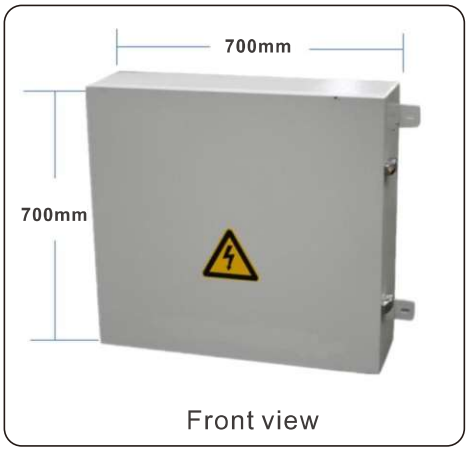


Figure 2-1 Network topology of sub-array communication cabinet

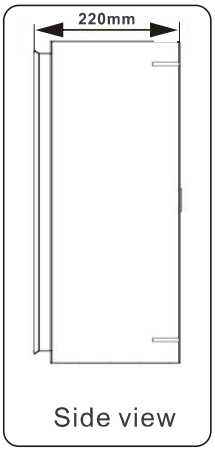
With the string inverter in the photovoltaic area, the PLC communication module is integrated inside, and the power line communication is carried out with the PLC-CCO through the AC output power cable to realize the RS485 transceiver. Then the data is transmitted to the communication management machine for data analysis and processing. Afterwards, the specified protocol is transmitted to the ring network switch for networking, which greatly improves communication reliability and communication efficiency.

2. Product introduction

2.3 Appearance description



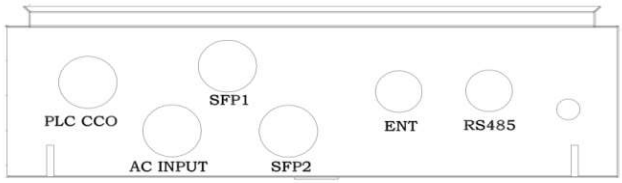
Front view



Side view

Communication cabinet size table

L	W(without bracket)	H(without bracket)
700mm	220mm	700mm



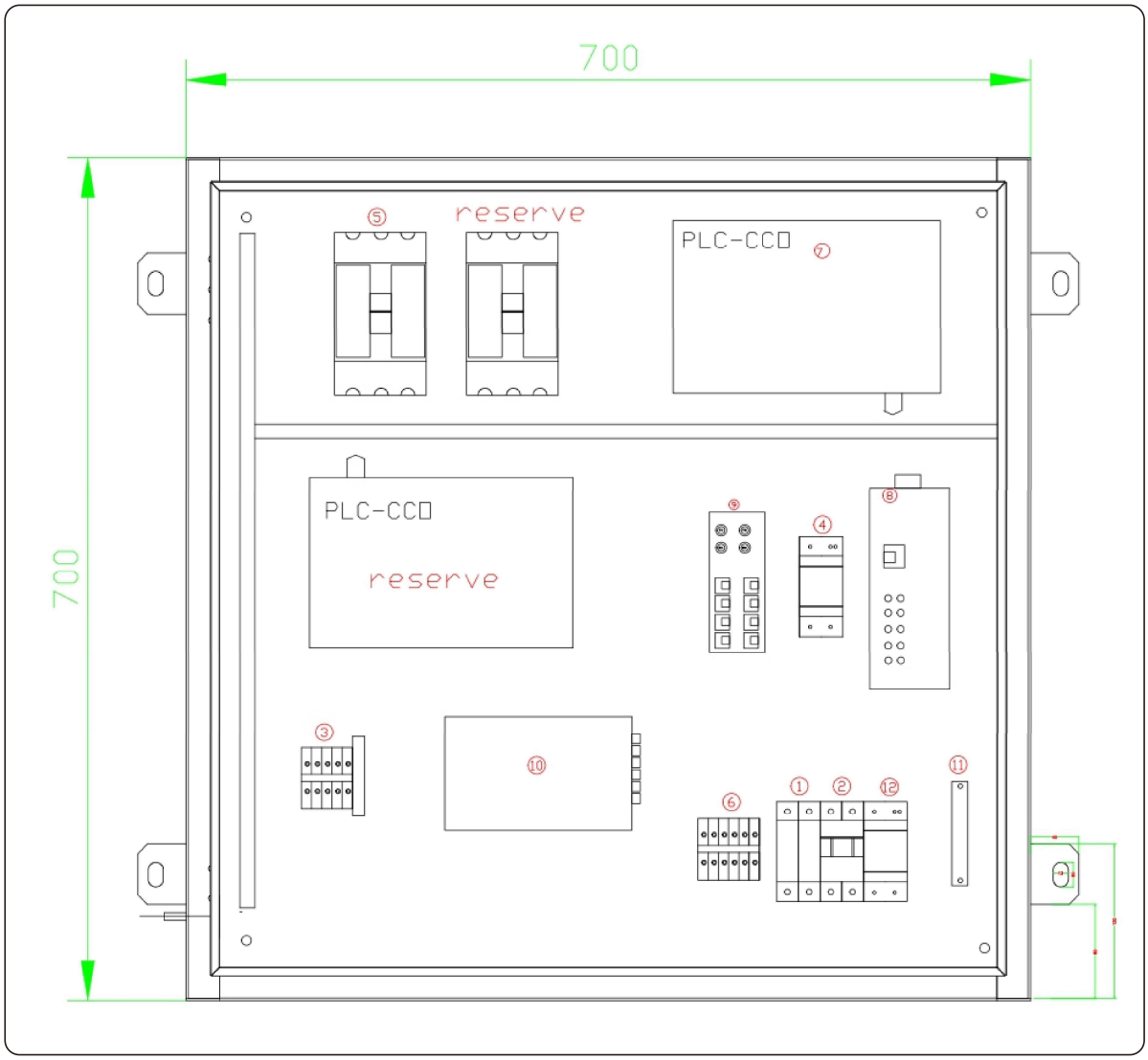
Bottom opening diagram

Bottom opening diagram description

NO.	Silkscreen	Description	Waterproof Gland Specifications	Applicable cable outer diameter
1	PLC-CCO	Three-phase AC wiring	Mg50	31-41mm
2	AC-INPUT	Single-phase AC wiring	Mg50	31-41mm
3	SFP1	Optical cable	Mg50	31-41mm
4	SFP2	Optical cable	Mg50	31-41mm
5	ENT	Network port wiring	Mg50	24-30mm
6	Rs485	Rs485 cable routing	Mg50	24-30mm

2. Product introduction

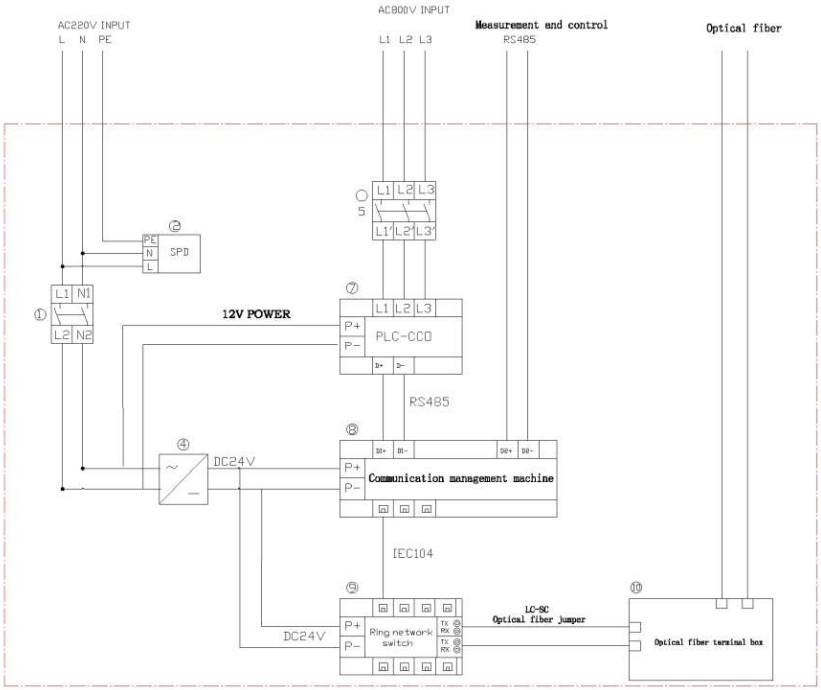
2.4 Product function description



2. Product introduction

NO.	Item	Specifications and models
1	Micro Circuit breaker	NBX_AC220V_2P_32A
2	SPD	AC220V_2P
3	AC800V power terminal block	AC800V power terminal block
4	DC 24V power	MDR6024
5	Molded Case Circuit Breakers	TeM7-125(HU)_AC800V_32A_3P
6	Power terminal block	Power terminal block
7	PLC device	PLC-CCO
8	Communication management machine	2 network ports & 8 serial ports
9	Industrial ring network switch	2 x 100M optical + 8 x gigabit electrical ports
10	Fiber Terminal Box	2 in 8 out, SC dual core with coupler fully equipped
11	Grounding bar	Ground side row

2.5 Electrical schematic

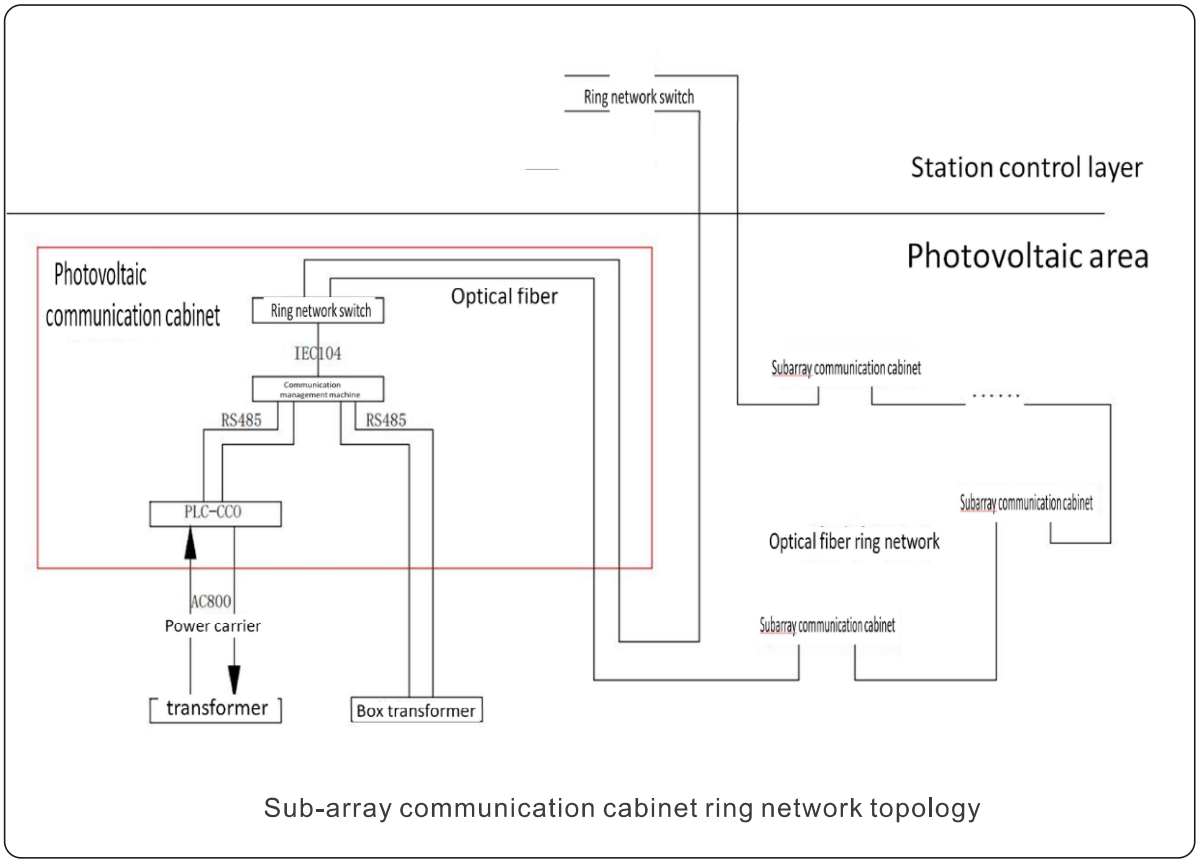


Sub-array communication cabinet electrical schematic diagram

When the sub-array communication cabinet is used in the double-split transformer scenario, there may be two PLC communications, with two PLC-CCO devices.

2. Product introduction

2.6 Optical ring network



Sub-array communication cabinet ring network topology

Network parameters

NO.	Item	Specifications and models
1	Ring network switch	2x100M optical ports, 8xgigabit electrical ports
2	Fiber Terminal Box	2 in and 8 out, SC dual-core terminal box
3	Fiber Patch Cord	SC, SM Duplex, 3m
4	Optical cable	1310nm, SM optical cable (prepared by the user)

3. Transportation and Storage

3.1 Transportation

- When loading, do not load wrong or missing, prevent eccentric load, overload and overrun, take protective measures to prevent moisture and fire
- When loading and unloading, hold it firmly, and do not collide or drop the goods.
- Loaded and unloaded goods do not roll, capsize, slump or fall during transshipment.
- During transportation, confirm the closing of doors, etc. and the fastening of goods.
- The loading and unloading operations of goods shall comply with the safety operation standards, regulations and systems, and shall be carried out under the on-site command or monitoring of the loading and unloading management personnel.

3.2 Storage

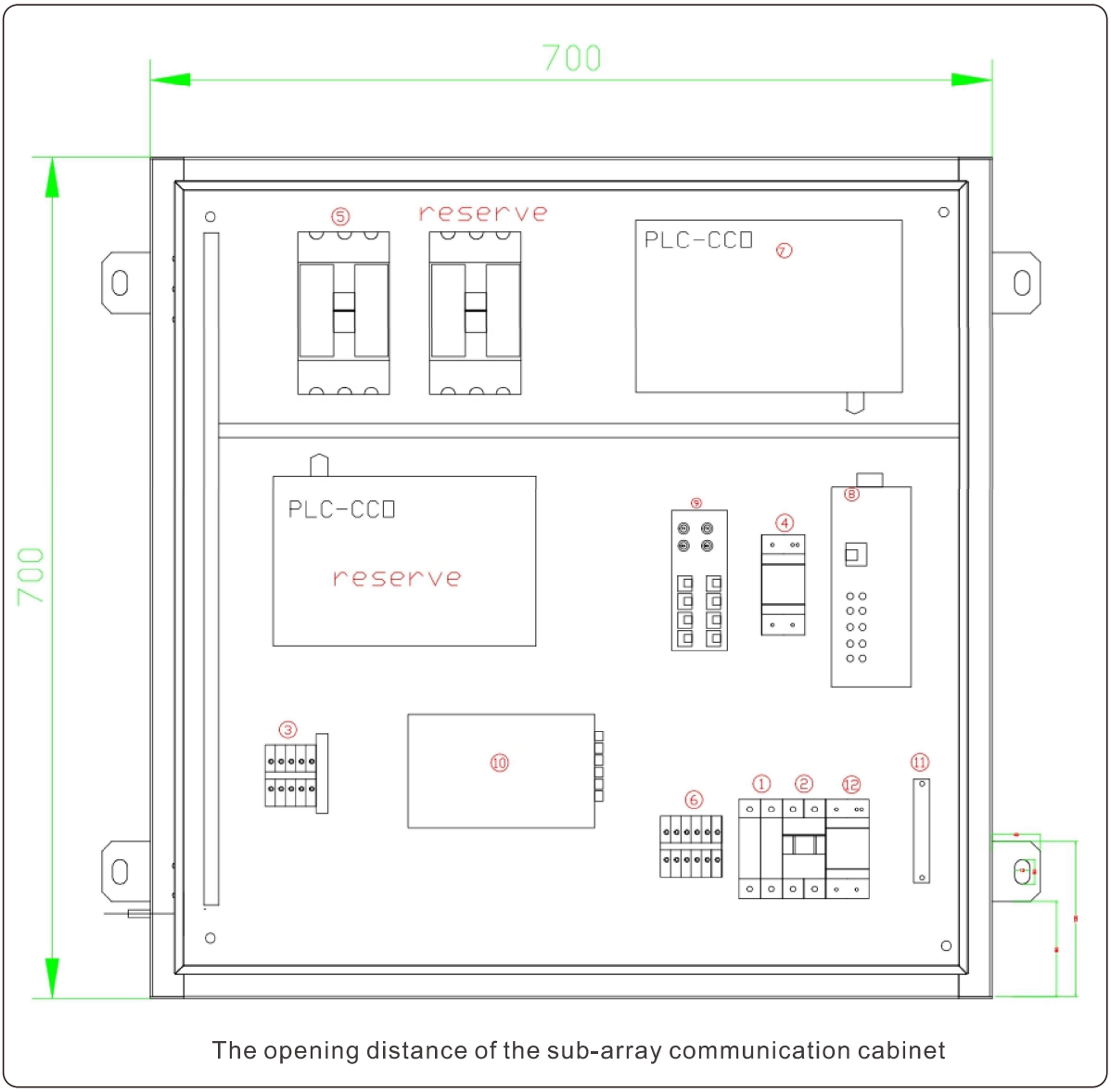
- If the sub-array communication cabinet is not put into use immediately, do not remove the outer packaging of it.
- Storage temperature should be kept at -40°C~+70°C; relative humidity at 5%RH~95%RH。
- Store in a clean and dry place and prevent dust and water mist erosion.
- After long-term storage, the cabinet needs to be inspected and tested by professionals before it can be put into use。
- Up to 2 layers can be stacked, please stack them neatly to prevent dumping.

4. Equipment installation

4.1 Installation Instructions

- The cabinet needs to be installed in a place without significant shaking, shock vibration and rain or snow。
- The installation height is preferably parallel to the line of sight for easy operation and maintenance.
- The installation site should be free of explosive dangerous medium, and the medium should be free of gas and dust that can corrode metals and damage insulation.
- The cabinet meets the protection level of IP65, and should be installed to avoid prolonged rain and snow.

4.2 Wall-mounted installation



The opening distance of the sub-array communication cabinet

- For wall-mounted installation, users need to prepare M12*60 stainless steel pressure-explosion expansion bolts. Install and fix the entire sub-array communication cabinet.

5. System operation

5.1 Check before power on

- The sub-array communication cabinet and components are installed in place.
- All cables are connected correctly and firmly, and no metal is exposed. Cables are bundled neatly and beautifully, with uniform spacing, moderate tightness, and consistent orientation, and no sharp corners are left at the cut. No excess tape, cable ties, etc. leftovers on cables.
- The inside of the cabinet is clean and tidy, free from dust, dirt and construction residues.

5.2 System power on

- Complete the pre-power-on check.
- Close the single-phase power switch that supplies power to the sub-array communication cabinet at the remote end.
- Close the PLC-CCO communication switch for the sub-array communication cabinet at the remote end.
- Close the mirco circuit breaker and molded case circuit breaker switch in the sub-array communication cabinet。
- Observe whether each indicator light works normally.

6. System maintenance

6.1 Equipment maintenance

- When maintaining the system, please power off the system. Make sure that all power is disconnected before proceeding.
- Check whether the sub-array communication cabinet is damaged or deformed.
- Check whether all devices in the sub-array communication cabinet are running normally, and whether the indicator lights are normal.
- Check whether the cable connection is disconnected, loose, and whether the ground wire is reliably grounded.

6.2 Troubleshooting

NO.	System error	Cause Analysis	Handling suggestions
1	System power outage	Incoming line no power	Check if the power input is normal
		The AC side is not reliably connected	Check the wiring on the AC side
		Switch power failure	Replacing a DIN-rail Power Supply
2	Communication problems	Communication cable is disconnected	Check the connection of the communication line
		Communication parameter configuration error	Check communication parameters
		Communication management machine failure	Replace the communication management machine
		PLC-CCO failure	Replace the PLC-CCO
		Inverter failure	Handling inverter failures

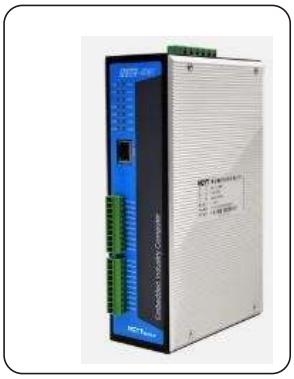
7. Parameter Configuration

7.1 Parameter configuration

Sub-array communication cabinet parameter configuration	
Basic configuration	
Communication management machine	2 x Ethernet ports +8 x RS485 ports
Optionalc	
PLC-CCO	Power line communication
Ring network switch	2x100M optical ports + 8x gigabit electrical ports
Fiber Terminal Box	8 core
Mechanical parameters	
Size	700*700*220mm
Weight	Approx. 40kg
Material	Carbon Steel
Color scale	RAL7035
Screen door	Single door, door lock right
Wiring in & out	Down in & down out
Power supply	AC100V-240V,50Hz/60Hz
Installation method	Wall mounting /Post mounting
Communication function	
Inverter	Power line communication
Maximum number of connected inverters	60 pcs
Combiner Box, Weather Meter	RS485 communication
Box Transformer	RS485 communication
Environmental parameters	
Operating temperature	-40℃~+80℃
Working relative humidity	5%~95%
Working altitude	<4000m
Protection	IP65

7. Parameter Configuration

7.2 Communication management machine



System	
CPU	ARM9 300MHz
RAM	32bit DDR2 SDRAM,128Mbyte
Operating system	Linux 2.6
Ethernet port	
Number of Ethernet ports	2 x 10M/100M， RJ45 interface
Data transfer rate	10/100Mbps
Isolation	Built-in 1.5KV magnetic isolation
Serial port	
Number of serial port	8 x RS485
Isolation	Electromagnetic isolation protection
LED indicator	
Power	Power
LAN	2 x Act,2 x Link
Serial port	8 x Rx,8 x Tx
Mechanical parameters	
Size	200(W)*121(D)*54(H)mm
Installation method	Desktop/Wall Mount
Working environment	
Operating temperature	-40~80℃
Working relative humidity	5~95%, no condensation
Storage temperature	-40~80℃

7. Parameter Configuration

Power requirements	
Power input	DC 9-48V
Interface	2-Pin Terminal
Terminal Definition	NC，L，N
Typical power consumption	5W/12V
Button	
Reset button	Restart the hardware
Reliability	
Alarm tool	Built-in buzzer and RTC (Real Time Clock)
Watchdog	Built-in WTD (watchdog clock), support 1-255 levels

7. Parameter Configuration

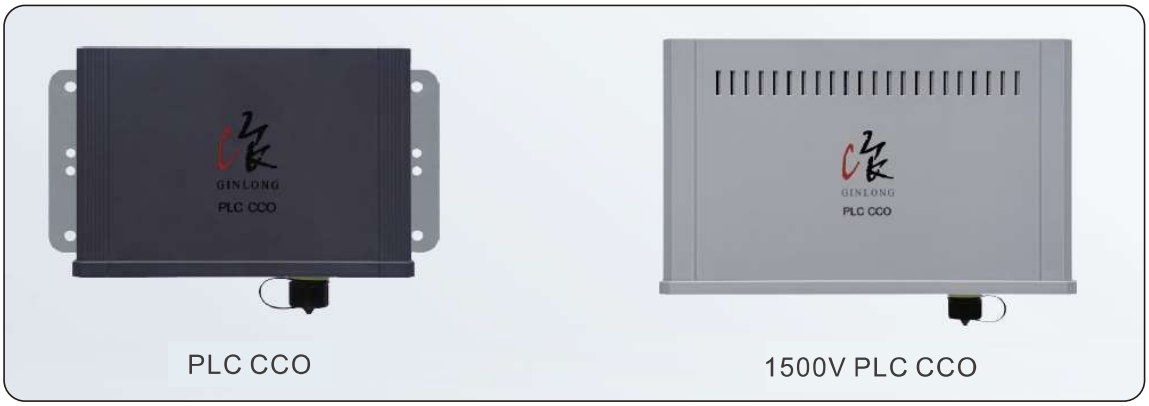
7.3 Optical ring network switch



Advantages and Features

◎ Support 8x10/100Base-T(X) electrical ports and 2 100Base-LC optical ports
◎ Support 8K MAC address table and MAC address filtering function
◎ Support ring network redundancy patent technology, network fault self-healing time <20ms
◎ Support RSTP Rapid Spanning Tree Protocol
◎ Support SNMP V2c/V3
◎ Support IEEE802.1Q VLAN
◎ Support IEEE802.1p QOS function
◎ Support IGMP Snooping function
◎ Support static multicast filtering, port aggregation, port mirroring and other functions
◎ Support port aggregation function, which is conducive to expanding network bandwidth and improving network transmission efficiency
◎ Support port mirroring function, which is conducive to online debugging and monitoring network data status
◎ Support port bandwidth limit function to optimize bandwidth utilization
◎ Support WEB management mode
◎ Meets industrial grade 4 design requirements
◎ Support 2 channels (12~48VDC) DC power input, 1 channel alarm output
◎ IP40 grade protection, corrugated high-strength metal shell, DIN rail mounting

7. Parameter Configuration



Product name	PLC CCO	1500V PLC CCO
Electrical parameters		
Input voltage of the power adapter	100V ~ 240V AC, 50Hz/60Hz	100V ~ 240V AC, 50Hz/60Hz
Power consumption	<5W	<5W
Input line voltage of the AC port	0-621V AC	0-920V AC
Hardware parameters		
Operating temperature	-25℃ ~ +70℃	-25℃ ~ +70℃
Relative humidity(non-condensing)	5% ~ 95%	5% ~ 95%
Operating altitude	0-4000m	0-4000m
Software parameters		
Installation method	Hanging installation or Din Rail installation	Hanging installation
Maximum number of PLC STAs that can be connected	80pcs	60pcs
Transmission rate	9600bit/s	9600bit/s
Physical parameters		
Dimensions (L×W×H)	180mm×120mm×45mm	255mm×165mm×45mm
Weight	325g	485g
IP level	IP20	IP20