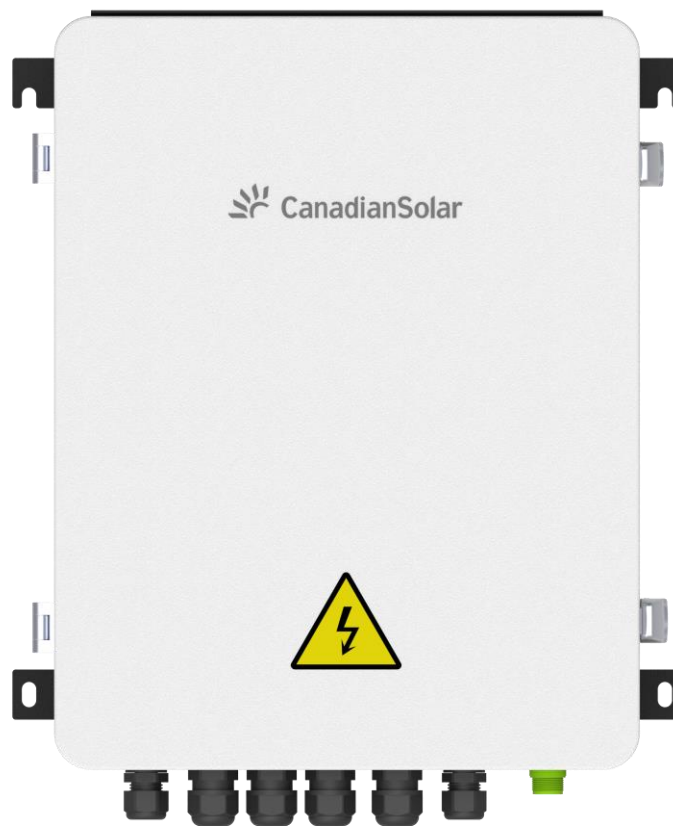


CSCU-EPM-01



Smart Power Control Box User Manual

(Document number: 91000459; Release date: 2023/10)

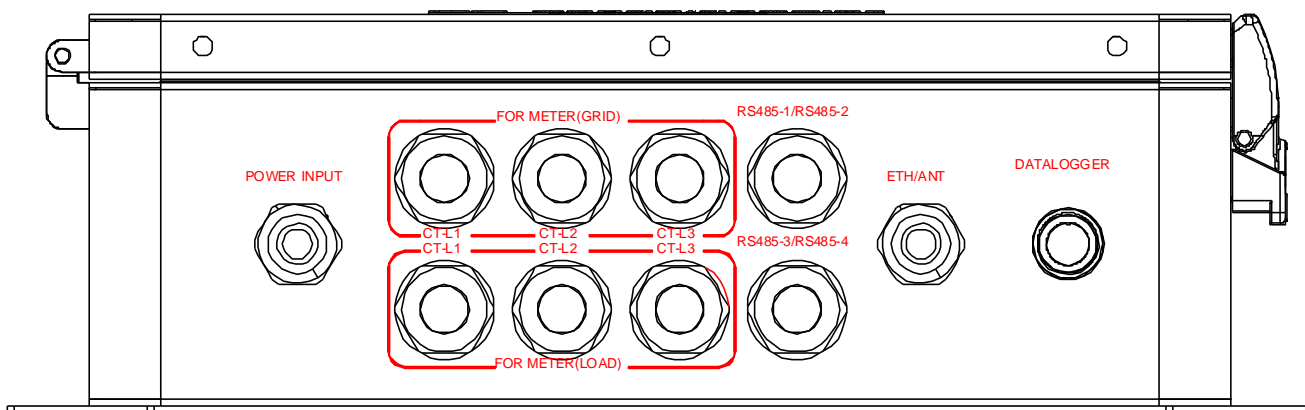
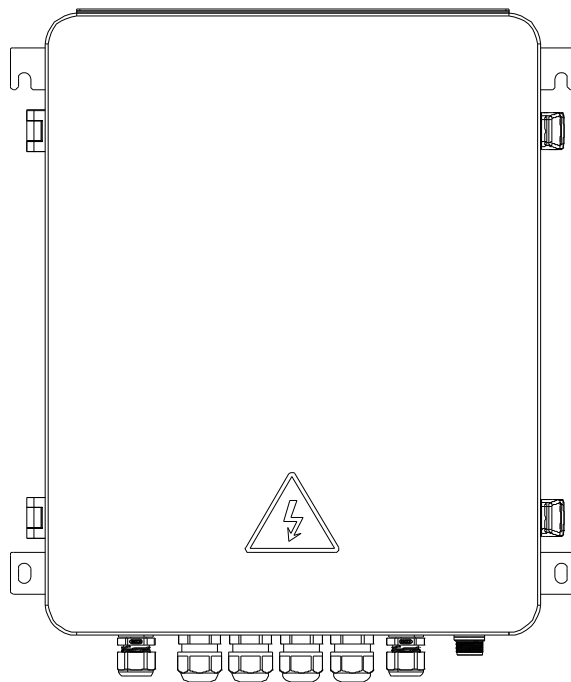
Contents

1.	Product appearance and internal structure	1
1.1	Appearance	1
1.2	Internal structure	2
1.3	Electric meter.....	2
1.4	Air isolation switch.....	4
1.5	Terminals	4
1.6	DC power supply	4
1.7	Current transformer (optional).....	5
2.	Working principle of anti-backflow.....	6
3.	Equipment installation and wiring.....	6
3.1	Unboxing	6
3.2	Installation tools	6
3.3	Installation location	7
3.4	Installation safety tips	7
3.5	Smart power control box installation.....	7
3.6	Wiring	10
3.7	Wiring to the inverter.....	12
4.	APP Download	13
5.	APP Guide	14
6.	Anti-reverse flow configuration	16
7.	Equipment specifications.....	19

1. Product appearance and internal structure

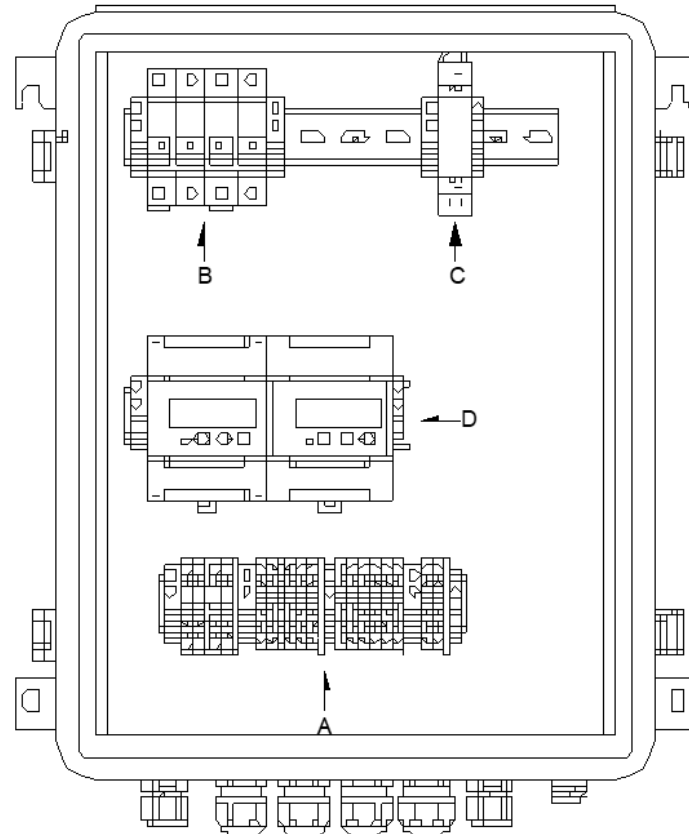
The smart power control box acquire data from the grid side meter and also the load side meter continuously, if there is reverse current(energy to gird), the EPM box will calculate the power(according to the data from the load side meter), and send commands to all inverters at the same time(a broadcast command), and the inverters will adjust the power to ensure there is no power to gird.

1.1 Appearance



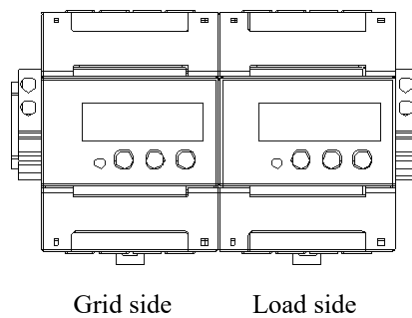
Name	illustrate
POWER INPUT	AC voltage sampling connection port
FOR METER(GRID)	Grid side ammeter current transformer connection port
FOR METER(LOAD)	Load side meter current transformer connection port
RS485-1/ RS485-2/ RS485-3/ RS485-4	RS485 wiring port
ETH/ANT	Ethernet/antenna connection port (reserved)
DATALOGGER	Data acquisition stick interface

1.2 Internal structure







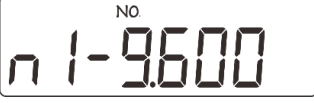

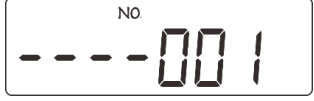












Serial number	illustrate
A	Terminals
B	Air isolation switch
C	DC power supply
D	Electricity meter

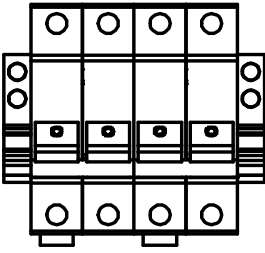
1.3 Electric meter



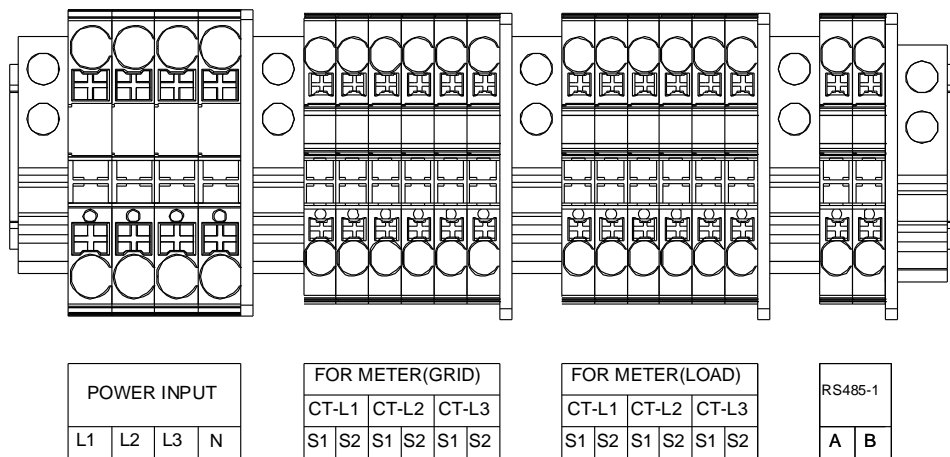
There are two electricity meters inside the smart power control box to measure various data on the load side and grid side. The electricity meter display screen can display power-related parameters: voltage, current, power (active power, reactive power), energy measurement, power factor, etc., power grid The factory default address of the side meter is 101, and the factory default address of the load side is 102. It is forbidden to modify the default parameters of the meter itself during installation or use. You can switch the screen display content by pressing the "→" button on the meter. The specific display content is explained as follows.

Serial number	UI	Illustrate	Serial number	UI	Illustrate
1		Combined active energy=10000.00kWh	11		C phase current=5.002A
2		Forward active energy=10000.00kWh	12		Combined active power=3.29kW
3		Reverse active energy=2345.67kWh	13		Phase A active power=1.090kW
4		The communication protocol is ModBus-RTU,n1 means no parity bit and 1 stop bit;9.600 means the baud rate is 9600bps 001 represents the table address	14		B phase active power=1.101kW
5			15		C phase active power=1.100kW
6		A phase voltage=220.0V	16		Conjunction Power factor PFt=0.500
7		B phase voltage=220.1V	17		Phase A power factor PFA=1.000
8		C phase voltage=220.2V	18		B phase power factor PFB=0.500
9		A phase current=5.000A	19		C phase power factor PFC=-0.500
10		B phase current=5.001A			

1.4 Air isolation switch

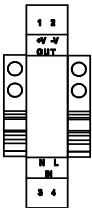
	<p>There is an air isolation switch inside the anti-reflux box as the power control switch of the anti-reflux box. This switch is closed by default when leaving the factory. After the connecting wires are connected and all the inverters are working normally, turn the switch up. At this time, the anti-reverse flow box starts to work.</p>
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1.5 Terminals



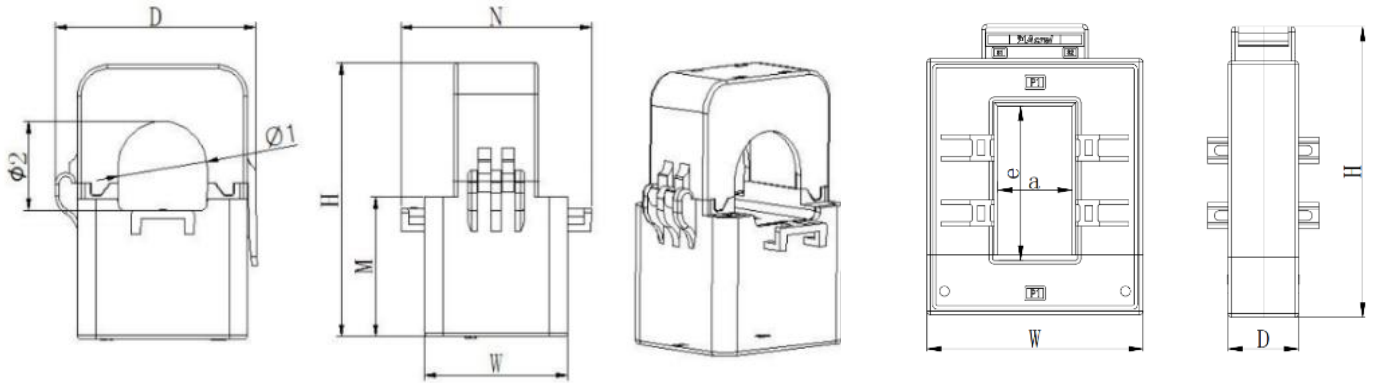
The wiring terminals are used to connect voltage sampling, CT, and 485 communication. The internal wiring terminals are divided into 4 parts as shown in the figure above, which are the voltage sampling connection terminal, the grid side CT connection terminal, the load side CT connection terminal, and the RS485 communication line connection terminal.

1.6 DC power supply

	<p>The internal DC power module is responsible for powering the smart power control box data collector.</p>
---	---

1.7 Current transformer (optional)

The smart power control box requires a total of 6 current transformers. You can choose round holes or square holes according to the actual situation. The wiring and installation direction must be completely consistent with the installation wiring instructions during installation. The secondary side must be 5A when selecting. (This product does not provide current transformers by default and needs to be equipped by yourself. If necessary, you can also contact our sales staff to purchase. For specific specifications, please refer to the table below).



	Specifications and models	Overall dimensions (mm)					Perforation size (mm)		Transformation ratio
		W	H	D	M	N	Φ1	Φ2	
Model A (round hole)	K-Φ24	39	70.5	55	36	52	24.5	23	150:5 A
									300:5 A
	K-Φ36	42	81.5	66	40	55.5	33	35	400:5 A
									600:5 A
	K-Φ50	46.5	110	90	54	66.5	47	52	500:5 A
									700:5 A
									900:5 A
								1000:5 A	

	Specifications and models	Size			Aperture		Transformation ratio
		W	H	D	a	e	
Model B (Square hole)	CT-30x20-100 A	90	114	40	22	32	100:5 A
	CT-60×40-300 A	114	140	36	42	62	300:5 A
	CT-80×40-600 A	122	162	40	42	82	600:5 A
	CT-80×40-1000 A	122	162	40	42	82	1000:5 A
	CT-160×80-2000 A	184	254	52	82	162	2000:5 A
	CT-160×80-3000 A	184	254	52	82	162	3000:5 A

2. Working principle of anti-backflow

When the device is working, it obtains whether reverse current occurs on the grid side through the power meter on the grid side and the corresponding CT, and then obtains the load size through the load side meter and the corresponding CT. Finally, the data acquisition rod performs calculations and then controls the power of all inverters in the system. The command regulates the inverter output power.

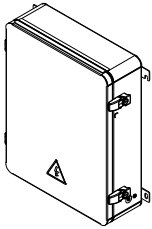
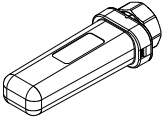


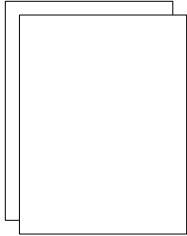
When this equipment is performing anti-backflow control, if there is a communication failure in the equipment in the system, the system output power will be limited based on the failure prompt to ensure system safety.

If a power outage occurs after the smart power control box is installed and enters normal working status, you must first check that the operating status and installation connections of all equipment in the system are normal, and finally turn on the power supply to the smart power control box after other equipment enters normal operation.

3. Equipment installation and wiring






Product installation must strictly comply with safety work regulations, and its installation location must fully meet the installation location requirements.





3.1 Unboxing

 <p>Smart Power Control Box (x1)</p>	 <p>Data logger(x1)</p>	 <p>Screw ST6.3x50(x4)</p>  <p>Expansion tube(x4)</p>	 <p>Document</p>
---	--	---	---

Note: The smart dongle is divided into different versions based on actual conditions. There are certain differences in appearance. The actual situation shall prevail.

3.2 Installation tools

Name	Icon	Purpose	Remarks
Wire strippers		For stripping cable insulation	
Phillips screwdriver		for wiring	
Expansion screw		For installing smart power control box	Specifications: M6*60
adjustable wrench		Used to fix expansion screws	
Impact drill		for turning holes	

communication line		Used for RS485 communication	(Twisted pair shielded) Diameter: 3-7mm
Voltage sampling cable		For voltage sampling signal connection	Cable specification: AWG 12-18, 105° 600V
Network cable and corresponding crimping tools		Connect to the router (prepare according to the actual networking method)	ISO/IEC 11801 standard network cable
Two-core cable		For current transformer signal connection	Cable specification: AWG 16-22, 105° 600V

3.3 Installation location

To ensure normal operation, the installation location must meet the following requirements:

- The maximum communication distance of the smart power control box should be less than 500 meters. Please ensure that the distance from the installation location to the inverter can meet the communication requirements; it must be far away from other wiring routes or pipes in the house, such as gas pipes, water pipes, wires, etc.
- Metal structures can block electromagnetic waves, and the installation location should be far away from metal structures to ensure the quality of the wireless network signal of the device.

3.4 Installation safety tips

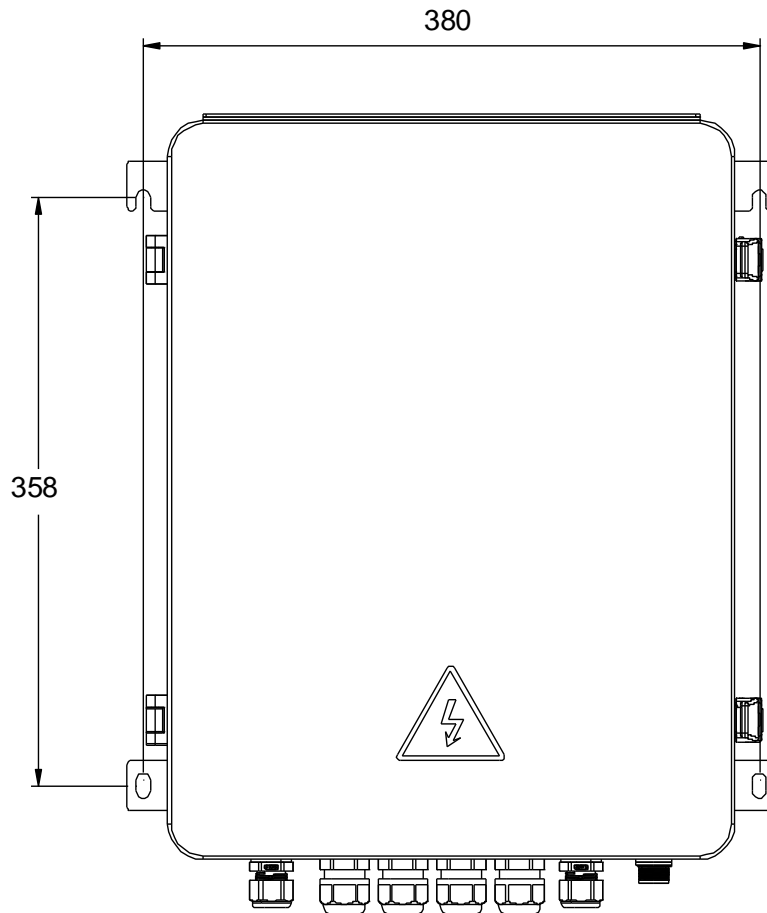
- The power must be cut off before installing the product.
- Product wiring must be confirmed to be installed correctly before powering on.

3.5 Smart power control box installation

Step 1: Please choose a solid, flat wall to install the smart power control box.

Step 2: Determine the drilling position according to the hole size of the mounting ear.

Step 3: Use expansion screws to fix the smart power control box to the wall.

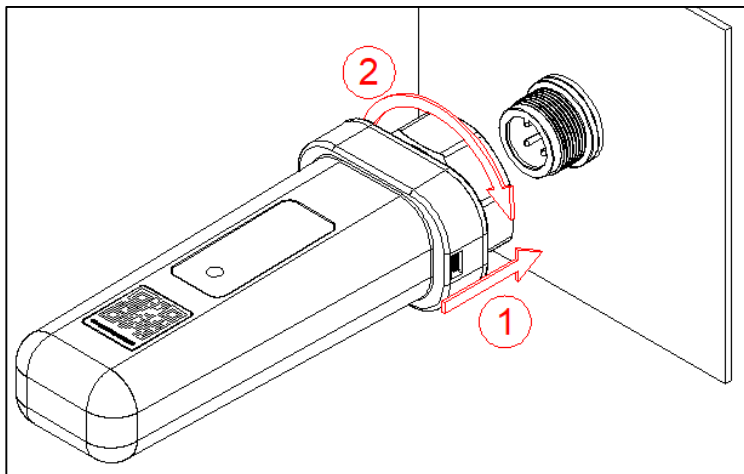


Installation diagram (unit: mm)

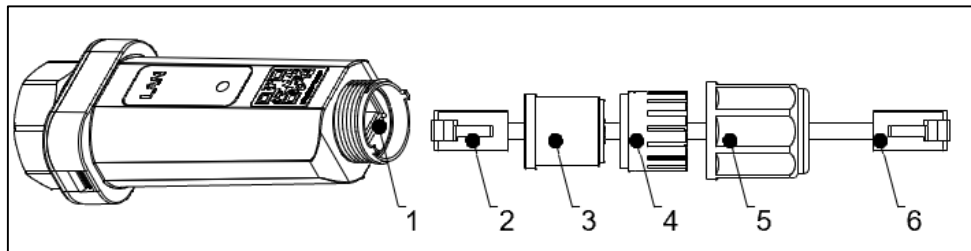
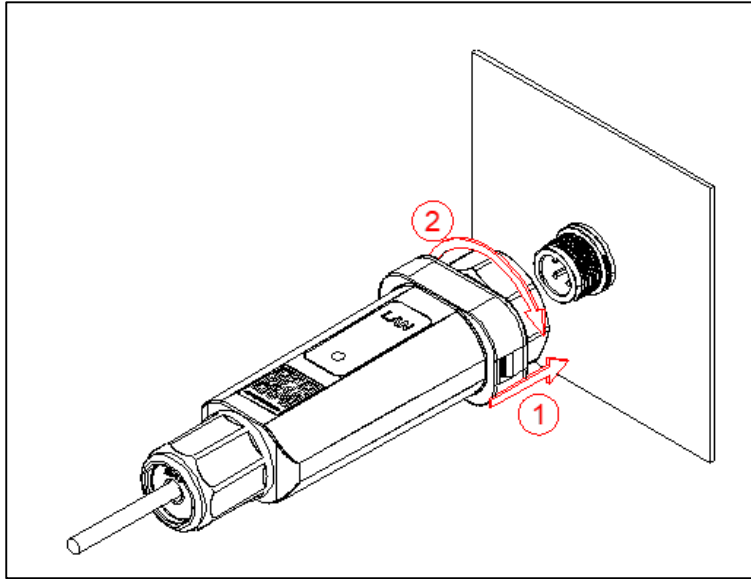
Step 4: Installation of smart dongle

- ① Find the corresponding communication interface on the smart power control box and unscrew the protective cap (make sure the power of the smart power control box is turned off before installing the smart dongle);
- ② Insert the data acquisition rod along the interface guide groove and tighten the large nut clockwise (as shown below).

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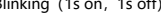


CSCU-ST-WLP01



1	2	3	4	5	6
Ethernet Port	RJ45 Plug to Stick	Sealing Ring	Thread Clamp Claw	Plastic Nut	RJ45 Plug to router

Step 5: Confirmation of Smart dongle Status






Confirm the status of the smart dongle through the indicator light

Color	Status	Note	Description
-	Off	powered off	smart dongle is not tightened or powered on
Yellow ●	Steady on for 5s 	power-on initialization	smart dongle is in a power on initialization state
Green ●	Blinking (1s on, 1s off) 	normal operation	communication with server and inverter both are normal
Yellow ●	Blinking (1s on, 1s off) 	error state	communication with the server is abnormal, communication with the inverter is normal
Red ●	Blinking (1s on, 1s off) 	error state	communication with the inverter is abnormal, communication with the server is normal
	Steady on 	error state	communication with the inverter and server both are abnormal

● Trouble shooting

If there is any abnormal platform data, please refer to the table below and complete simple troubleshooting based on the status of the LED lights. If the fault cannot be resolved or the indicator light fault status is not reflected in the table below, please contact after-sales service for assistance.

(NOTE: Use the following table one minute after the WIFI network is configured successfully)

Color	Status	Note	Quick Troubleshooting
Yellow 	Blinking (1s on, 1s off) 	error state	Check the WIFI connection status. If it cannot be solved, please contact the distributor.
Red 	Blinking (1s on, 1s off) 	error state	Check if the connection between the smart dongle and the photovoltaic equipment is normal.
	Steady on 	error state	1. Check if the connection between the smart dongle and the photovoltaic equipment is normal; 2. Check the WIFI connection status. If it cannot be solved, please contact the distributor.

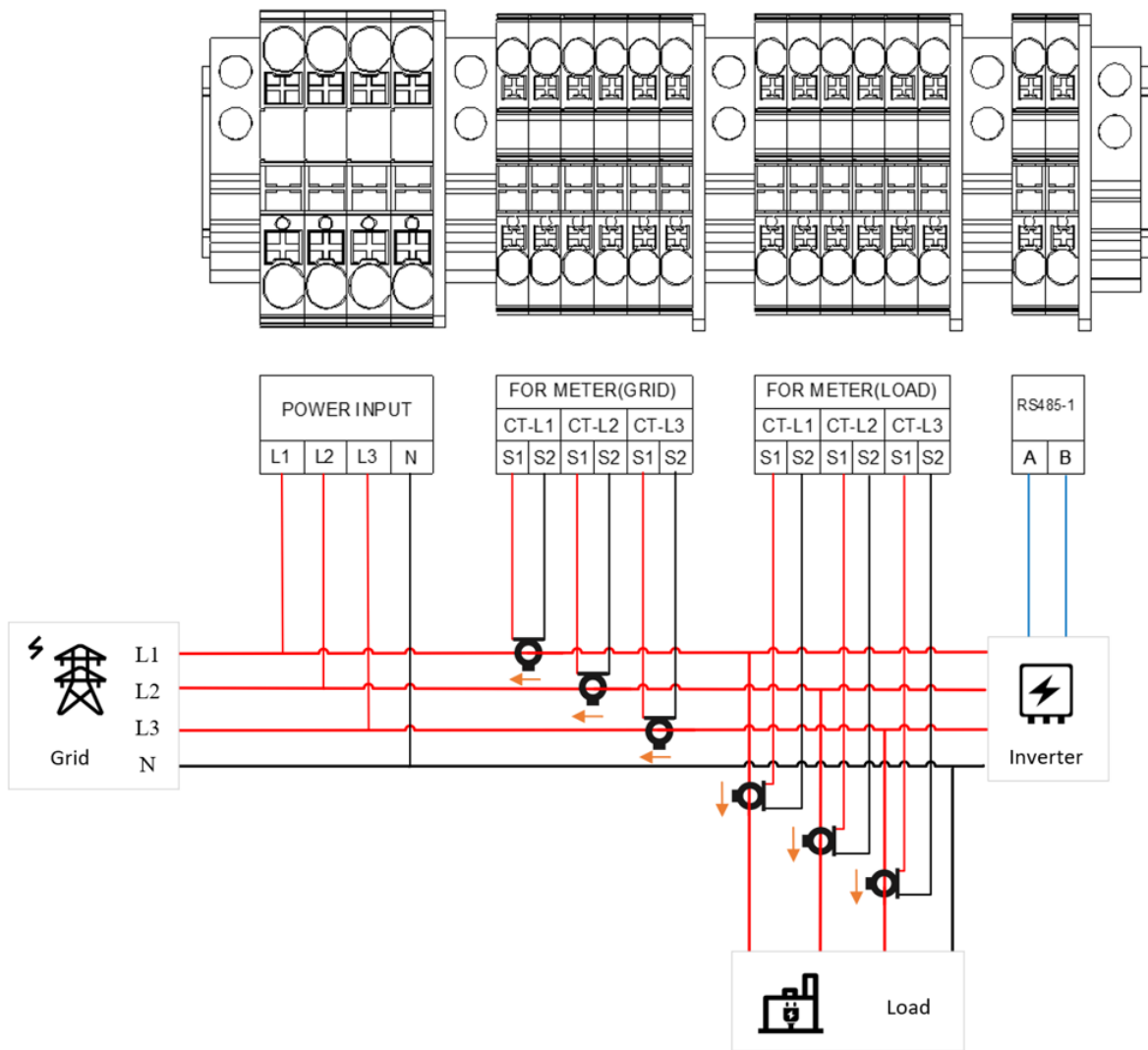
3.6 Wiring

Notice:

1. Connect the inverter output to the power grid and connect the phase lines L1, L2, L3, N. Be careful not to connect them in the wrong order.
2. Connect the voltage sampling signal line. The voltage communication distance should be less than 100 meters. When connecting the phase lines L1, L2, L3, N, be careful not to connect them in the wrong order.
3. Connect the current transformer. The CT communication distance should be less than 10 meters. The CT direction and wiring method are as shown in the figure below. It must be ensured that the L1 phase current transformer is connected to CT-L1, the L2 phase current transformer is connected to CT-L2, and the L3 phase current transformer is connected to CT-L3. Note that the phase sequence of the current transformer must be consistent with the phase sequence of the voltage sampling signal, and the positive and negative connections cannot be reversed.
4. The CT installation direction must be consistent with the diagram. (CT on the grid side points to the grid side, and CT on the load side points to the load)
5. RS485 connection, RS485A-B cannot be connected incorrectly when connecting RS485.
6. All equipment must be reliably grounded.



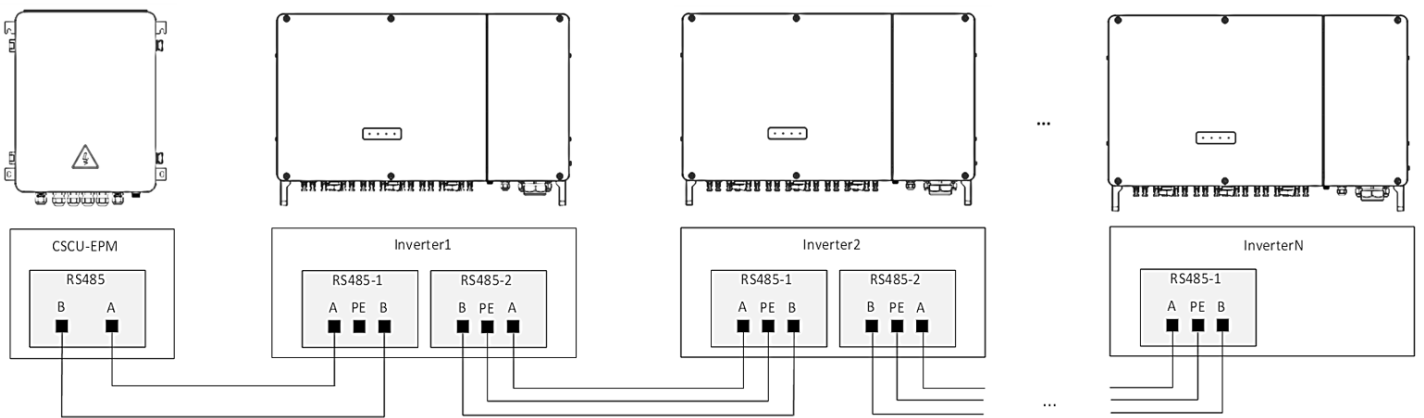
According to the wiring diagram of the internal terminals of the smart power control box, refer to the following figure (CT installation direction). If the selected CT is expressed in positive and negative terms, + means S1 and - means S2.



Note: Before powering on the smart power control box, you need to confirm that the wiring and installation are correct, and that all inverters are in normal working condition. It is necessary to check all wiring of the smart power control box after turning off the power or unexpected power outage, and finally open or restore the power supply to the smart power control box after all connected inverters are in normal working condition.

3.7 Wiring to the inverter

The RS485 interface of the intelligent power control box is used to connect the RS485 interface of the inverter. Multiple inverters are connected in a daisy chain (refer to the figure below). When multiple inverters are connected, they can support inverters of different powers. For the wiring method of power models, please refer to 3.7.1 and 3.7.



3.7.1 Connect with 15-25KW/40-60KW inverter

- 1) Prepare the cable connecting the inverter and anti-reverse current box according to the recommended specifications in the table below.

Type	Cross-sectional area of core wire	outside diameter of cable
Type of shielding Two core twisted pair	0.25-1mm ² (24~18AWG)	4~5.5mm

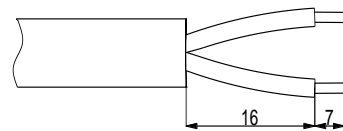
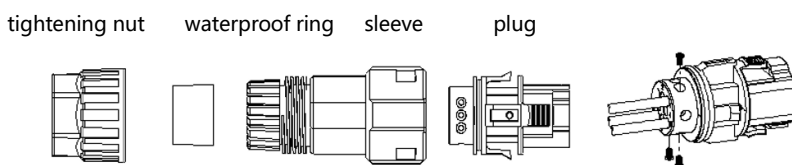


Fig.4.7-1 Stripping

- 2) Make both ends of the cable as shown in Figure 3.7-1, remove 23mm of the cable sheath, and 7mm of the core wire insulation.
- 3) Connect one end of the cable to the RS485 port of the smart power control box. (Tool: Phillips screwdriver. Torque: 0.6~0.8N.m.)
- 4) Pass the other end of the cable through the plug's tightening nut, waterproof ring, and sleeve in sequence, as shown in Figure 3.7-2.
- 5) Insert the prepared cable core wire into the corresponding PIN of the plug and tighten it with a screwdriver. (Tool: #1 Phillips screwdriver. Torque: 0.6~0.8N.m.)



Plug	Function	Connect
Pin-1	485-A	RS485-A
Pin-2	485-B	RS485-B
Pin-3	GND	Cable shield

Figure 3.7-2 Plug composition and wiring

- 6) According to Figure 3.7-3, adjust the cable length, tighten the plug's tightening nut on the sleeve, and then push the connected plug into the sleeve.

Find the corresponding socket position on the inverter, remove the protective cover on the socket, insert the plug into the socket, and make sure it is installed in place, as shown in Figure 3.7-4.

(Note: The socket is located at "COM-2" on the inverter.)

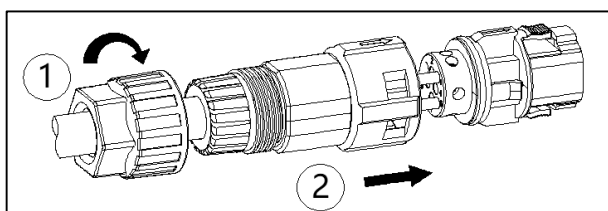


Figure 3.7-3 Assembling the plug

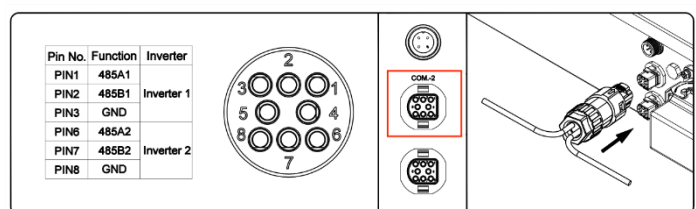


Figure 3.7-4 Plug the plug into the inverter

3.7.2 Connect with 110-125KW inverter

- 1) Same as 3.7-1, prepare cables.
 - 2) Same as 3.7-2, make both ends of the cable.
 - 3) Same as 3.7-3, connect the wire at the smart power control box end.
 - 4) According to Figure 3.7-5, first open the junction box; then remove the communication board protective cover.
 - 5) Loosen the locking nut of the communication port cable tightening head, remove the plug in the sealing ring as needed, and pass the cable through the locking nut and sealing ring in sequence.
 - 6) Fix the stripped core conductor to the terminal block plug, as shown in Figure 3.7-6.
- (Note: The terminal block plug has been pre-installed on the corresponding terminal block socket of the communication board and can be removed and used during wiring.)

Plug (pictured from top to bottom)	Function	connect
Pin-1	485-A	RS485-A
Pin-2	485-B	RS485-B
Pin-3	GND	cable shield

- 7) Insert the terminal block plug into the corresponding socket on the communication board (RS485/GPRS/WIFI).
- 8) Adjust the length of the communication cable in the chassis and tighten the locking nut clockwise.
- 9) After the wiring is completed, replace the communication board protective cover and close the junction box in the reverse order of Figure 3.7-5. M4 torque: 1.5N.m, M6 torque: 4.5N.m.

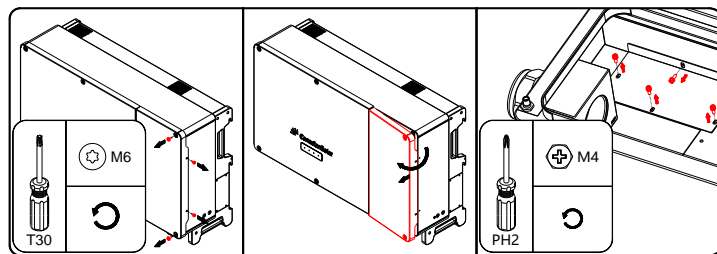


Figure 3.7-5 Open the junction box and remove the communication board protective cover

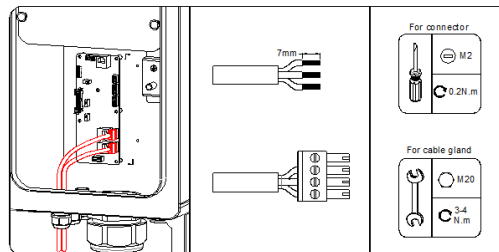


Figure 3.7-6 Communication board terminal wiring

4. APP Download

Please scan the following QR code to download.



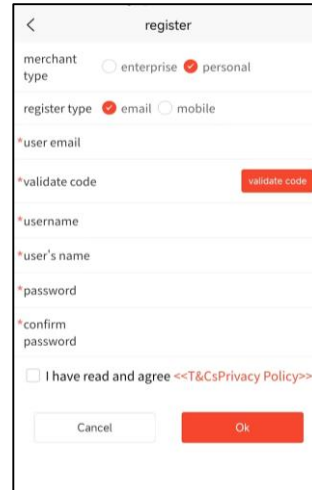
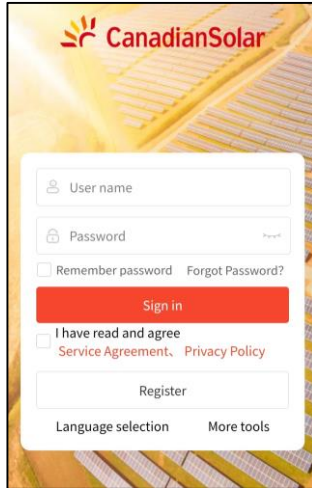
You can also log in <https://smartenergy.csisolar.com> to use web version.

5. APP Guide

NOTE: The screenshot of the APP is for reference only. Please refer to the actual interface.

1. Register & Log in

After entering the APP, please click the "Register" button to register the account.



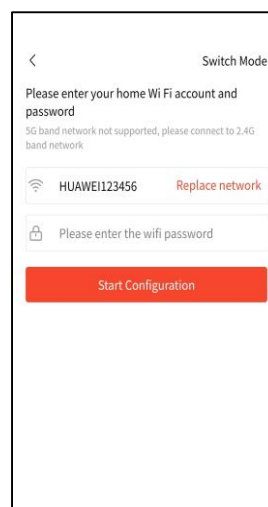
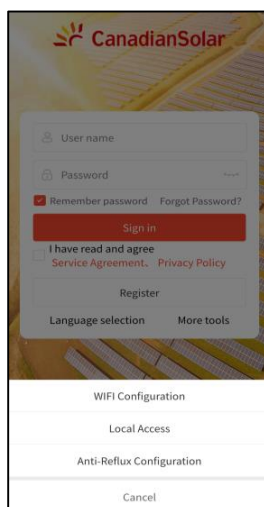
If you are a power station owner or end user, set the user type to **personal**.

If you are engaged in the photovoltaic industry dealers, equipment, operation and maintenance business, please select the user type as **enterprise**.

2. Smart dongle WIFI Network Configuration

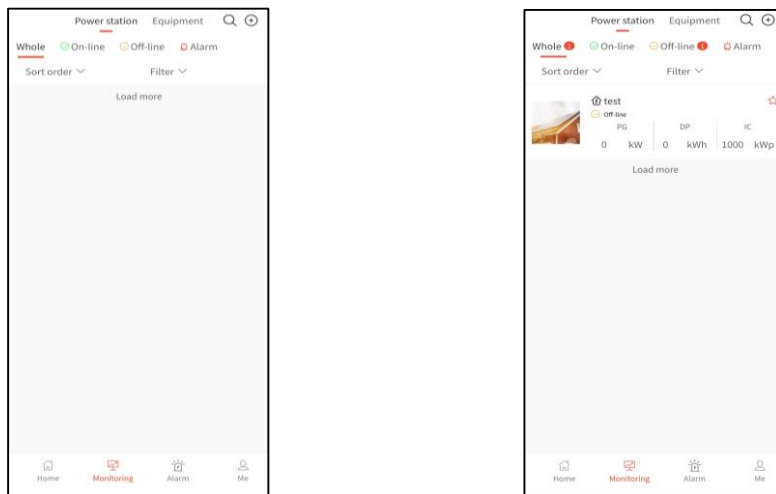
Connect the mobile phone to the target WIFI network in advance. On the login page, click on "More Tools" and select the "WIFI Configuration" option. Follow the prompts to scan the smart dongle QR code to enter the WIFI configuration page. Enter the account password of the WIFI router for network configuration. (Bluetooth needs to be turned on for distribution phones)

NOTE: Only supports 2.4GHz WIFI networks, 5GHz is not supported.



3. Create the Power Station

As shown in the following figure, click on "Monitoring" below to enter the monitoring page. Click on "+" in the upper right corner and fill in the information according to the prompts to start creating your photovoltaic power station. After creation, the monitoring page will display your power station information.



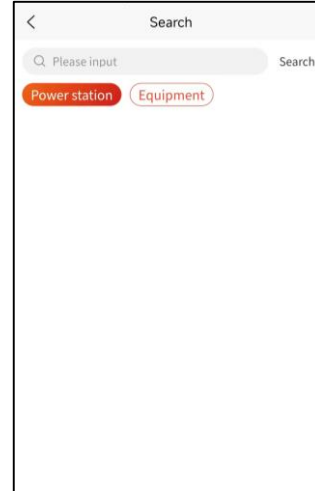
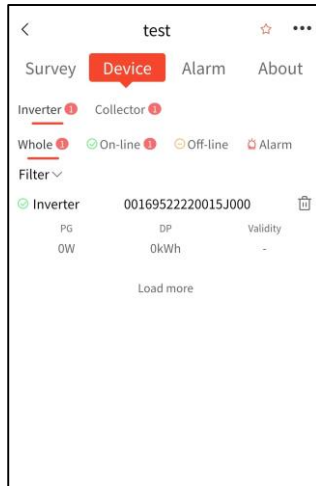
4. Add Smart dongle

After entering the power station, click on the "... " icon in the upper right corner, and a function page will pop up below. Select the associated device and go to the associated device page. You can manually enter the serial number of the smart dongle or scan the QR code of the serial number on the smart dongle to add it. The serial number is usually located on the packaging box of the device. If the packaging box has been lost, you can also find the code on the smart dongle body.



5. Check Information

After adding a smart dongle, you can view the data in your power station, and click on the power station to view the details. If it is difficult to find the power station you need due to the large number of power stations, you can search in the upper right corner of the monitoring column based on the name.



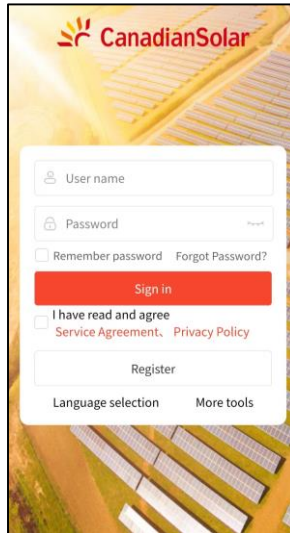
If you have any questions about the use or quality of our products, please contact us and provide the following information:

- smart dongle model and serial number
- connected inverter model and serial number
- problem description

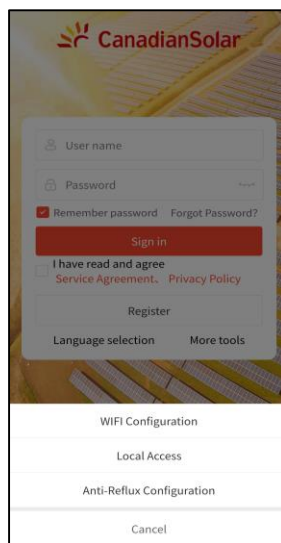
6. Anti-reverse flow configuration

After all the wiring of the anti-reflux box is completed and checked to comply with the installation rules, first ensure that all inverters and other equipment except the anti-reflux box can work normally, and finally turn on the power switch in the anti-reflux box and the anti-reflux box starts to work.

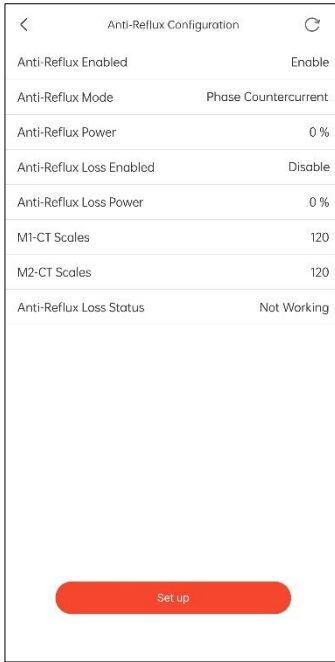
Step 1: Click "More Tools" on the homepage. (If you have logged in to your account, click "Application Tools" on the "My" page and then click "Anti-backflow configuration", and then configure according to step 3)



Step 2: Click on "Anti Backflow Configuration".



Step 3: After entering the scanning interface, scan the QR code on the data stick. After entering the configuration page, you can click on the corresponding parameters to modify. After completing all parameter checks and modifications, click the "Settings" button below to configure; click Configure. The refresh button in the upper right corner of the interface can read the current internal parameters of the anti-reflux box.



Parameter configuration:

- Anti-Reflux Enable: Enable;
- Anti-Reflux Mode: Phase Countercurrent;
- Anti-Reflux Power: 0%;
- Anti-Reflux Loss Enable: Disable;
- Anti-Reflux Loss Power: 0%;

(If there are no special requirements during actual installation, please keep it consistent with the above parameters. If you change it yourself, it may cause the anti-backflow system to malfunction.)

The M1-CT transformation ratio and M2-CT transformation ratio are set according to the actual CT specifications. M1-CT is the grid-side meter CT, and M2-CT is the load-side CT. For example: the grid side CT specification is 600A/5A, then the M1-CT transformation ratio is set to 120.

Tip: There is wireless interference in Bluetooth transmission. Please try again after parameter reading or setting fails; after confirming that the software is allowed to obtain relevant permissions of the mobile phone and the data stick is running normally, if the connection fails to scan the QR code and the reconnection still fails, Please disconnect the power supply of the data stick and restart it.

CT installation verification: Turn off all inverters, that is, the output of all inverters is 0. At this time, if the load power consumption is 10kw, the power meter on the grid side should show -10kw, and the power on the load side meter should show 10kw, which is the CT direction. The installation is correct. Otherwise, please check whether the CT at the corresponding position is installed in the opposite direction.

7. Equipment specifications

Name	Specification	Parameter
Intelligent anti-reflux box	Product number	CSCU-EPM-01
	Telecommunications	Wi-Fi/LAN
	Compatible models	Canadian Solar Inverter
	local communication	RS485
	Maximum number of connected inverters	≤10
	Access method	3W+N+PE
	Operating Voltage	230/400Vac 50/60Hz
	CT maximum input current	5A
	Protection level	IP65
	Operating temperature	-25°C-+60°C
	Working humidity	0%-100% No condensation
	Installation method	Wall-mounted
	Product dimensions (width x height x depth)	about 350x450x120 mm
	Product Weight	about 7 kg