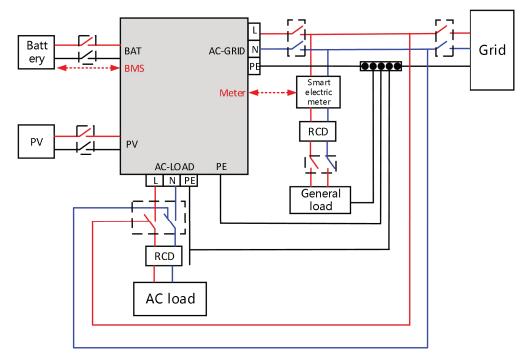Recommended circuit breaker specifications: DC circuit breaker 120A; AC circuit breaker: 40A.

System electrical connection

If AC load needs to be connected to the Grid, a single-pole double-throw switch is required, as shown in the following figure。

Note：AC load can not be connected to the Grid and the Inverter at the same time.

6.2 Wiring Instructions for External Ports

Table 6-1 Cable models and specifications

Port	Definition	Cable type	Cable size
BATTERY	+: Positive pole of battery	Outdoor multi-core copper cable	Conductor cross-sectional area: 16mm²~25mm²
	-: Negative pole of battery		
PV1 PV2	+: Positive pole of PV	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²
	-: Negative pole of PV		

		L3	Outdoor multi-core copper cable	Conductor cross-sectional area: 6mm²~10mm²
AC LOAD	Load	N		
		PE		
AC GRID	Grid	L3	Outdoor multi-core copper cable	Conductor cross-sectional area: 6mm²~10mm²
		N		
		PE		

6.3 Connecting Protective Earth (PE)
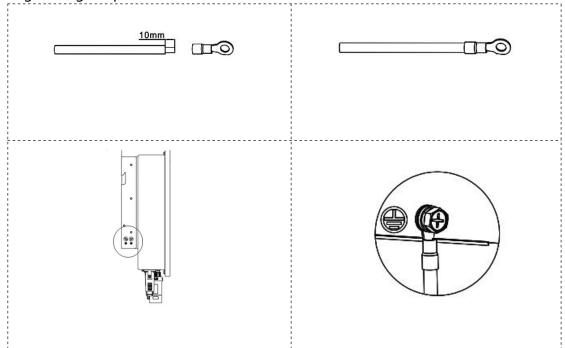
⚠️ **Attention**	Since the inverter is a transformerless type, it is required that the positive and negative poles of the PV array cannot be grounded, Otherwise, it will cause fault to the inverter. In the PV power generation system, all non-current-carrying metal parts (such as brackets, distribution cabinet housing, inverter housing, etc.) should be connected to the ground.

Step 1: Use yellow-green outdoor cable ≥4mm², Strip the insulation layer of the grounding cable to an appropriate length with wire stripper;

Step 2: Put the wire core stripped of the insulation layer into the conductor crimping area of the OT terminal, and press it tightly with crimping pliers;

Step 3: Fix the OT terminal with M6 inner hexagon screws, and the recommended tightening torque is 5N•m.

6.4 Connecting PV Cables

⚠️ **Danger**	➢ Do not connect the same PV string to multiple inverters, or the inverter may be damaged. ➢ Before connecting the PV strings to the inverter, please confirm the following information, or it may cause permanent damage to the inverter, and even cause a fire and result in

	personal and property losses. ➤ Please ensure that the maximum short-circuit current and maximum input voltage of each PV are within the allowable range of the inverter. ➤ Please ensure that the positive pole of the PV string is connected to the PV+ of the inverter, and the negative pole of the PV string is connected to the PV- of the inverter.
⚠️ **Warning**	The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance of the PV string to ground meets the minimum insulation resistance requirements.

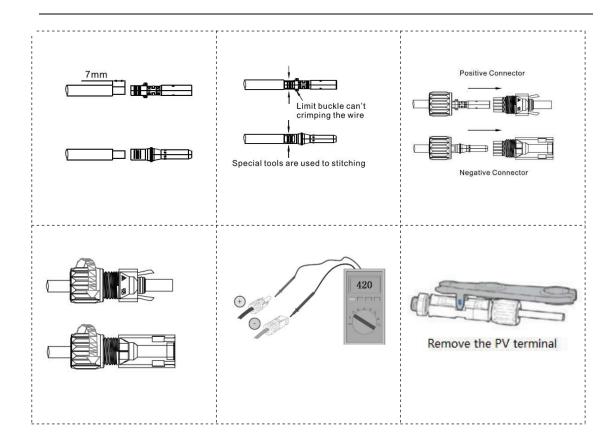Step 1: Check and ensure that the PV knob switch is set to "OFF".

Step 2: According to the cable model and specification in Table 6-1, cable with appropriate type and specification, then strip the cable insulation layer. The specific stripping length is shown in the figure below.

Step 3: Insert the positive and negative cables with the insulation layer stripped into the positive and negative metal terminals respectively, and use crimping pliers to press the cable and the metal core of the terminal tightly to ensure that the cable and the metal core are crimped firmly.

Step 4: Pass the crimped positive and negative cables through the lock nut, and insert them into the corresponding plastic shells until you hear a "click". This indicating that the metal core has been snapped into place, and tighten the lock nut.

Step 5: Check the positive and negative poles with a multimeter. After confirming that they are correct, insert them into the PV input terminal of the inverter.

To remove the PV connector from the inverter, you can use a disassembly wrench to insert into the fixing bayonet, press down firmly, and carefully remove the DC connector.

7mm

Limit buckle can't
crimping the wire

Special tools are used to stitching

Positive Connector

Negative Connector

420

Remove the PV terminal

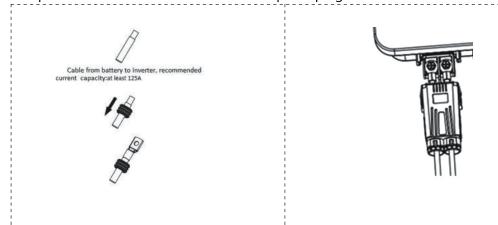# 6.5 Connecting the Battery Cable

⚠️ **Danger**	➢ Battery short circuit may cause personal injury, and the instantaneous high current caused by the short circuit may release a large amount of energy, which may cause a fire. ➢ Before connecting the battery cable, please confirm that the inverter and the battery are powered off, and the front and rear switches of the equipment are disconnected. ➢ When the inverter is running, it is forbidden to connect or disconnect the battery cable, or the operation may cause electric shock. ➢ Do not connect the same battery pack to multiple inverters, or the inverter may be damaged. ➢ Do not connect loads between the inverter and the battery. ➢ When connecting the battery cable, please use insulated tools to prevent accidental electric shock or short circuit of the battery. ➢ Please ensure that the open circuit voltage of the battery is

	within the allowable range of the inverter.
⚠️ **Warning**	➢ When wiring, the battery cable should match the "BAT+" and "BAT-" of the battery terminal completely. If the cable is connected incorrectly, the equipment will be damaged. ➢ Please make sure that the wire core is completely inserted into the terminal wiring hole without being exposed. ➢ Make sure the cable connection is tight, or the terminal may be overheated and the equipment may be damaged when it is running.

Step 1: According to the cable model and specification in Table 6-1, select the appropriate cable type and specification, and strip the cable insulation layer;

Step 2: Put the wire core stripped of the insulation layer through the waterproof plug and the battery junction box, and then press the OT terminal tightly;

Step 3: Lock the crimped positive and negative cables into the corresponding terminals respectively, with a locking torque of 3.5N•m;

Step 4: Use a multimeter to check the positive and negative poles to ensure that the open circuit voltage is less than 60V;

Step 5: Install the rear cover of the waterproof plug.

Cable from battery to inverter, recommended current capacity:at least 125A

6.6 Connecting Off-grid Port (AC LOAD) and Grid-connected Port (AC GRID)

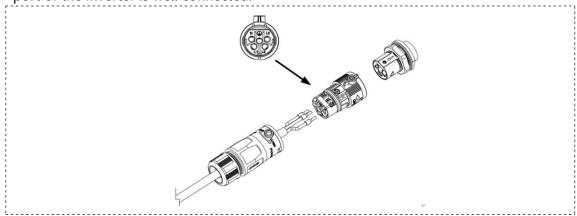|	
⚠️ **Warning**	➢ When wiring, the AC wire should fully match the "L", "N" and grounding ports of the AC terminal. If the cable is connected incorrectly, it will cause equipment damage.
	➢ Please make sure that the wire core is completely inserted into the terminal wiring hole without being exposed.
	➢ Please ensure that the insulating plate at the AC terminal is clamped tightly without loosening.
	➢ Make sure the cable connection is tight, or the terminal may be overheated and the equipment may be damaged when it is running.

Step 1: According to the cable model and specification in Table 6-1, select the appropriate cable type and specification, and strip the cable insulation layer. For the specific stripping length, refer to the figure below;
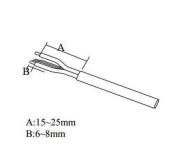
Step 2: Unlock the terminal according to the figure, and pass the stripped cable through each part of the terminal;
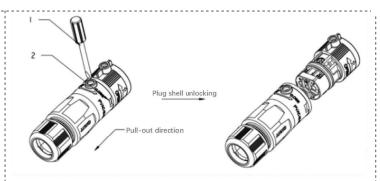
Step 3: Press the terminal on the cable conductor core, lock the cable in the lock hole on the terminal according to the mark, and fasten it with a screwdriver;

Step 4: After plugging in the terminal shell and hearing a "click", tighten the waterproof nut clockwise to ensure that the cable is firmly connected;

Step 5: Connect the connected load terminal to the load port of the inverter, push it forward until a "click" sound is heard, which indicates the load terminal and the load port of the inverter is well connected.
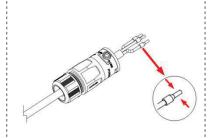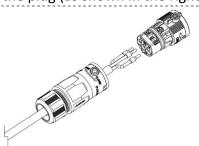
A:15~25mm
B:6~8mm

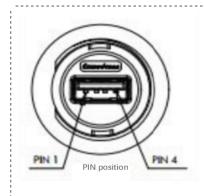Plug shell unlocking

Pull-out direction

Unlocking operation:

1. Insert a flathead screwdriver or cross screwdriver (diameter < 3-5mm) into the hole shown on the left, and turn clockwise to tighten the screw (the screw and nut are loose before turning).

2. Then press the buckles (mark 2) on both sides of the shell with a screwdriver in turn, and apply a backward pull-out force (as shown by the arrow) to the shell while pressing.

3. The pull-out force of the outward force will make the buckle and shell loose. After pressing the two buckles, the shell can be separated from the front of the plug (as shown in the right picture).

6.7 Installing WIFI/Bluetooth/4G Module

The collector is connected to WIFI/Bluetooth module by default and is used for remote monitoring and control of the inverter.

PIN 1   PIN 4
PIN position

Indicator light description of WIFI/Bluetooth module

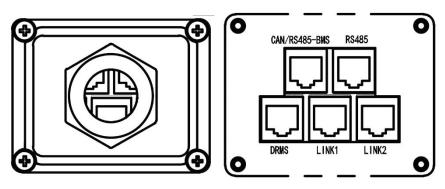| No.	Status	Description
1	RUN	Indicates normal operation, flashing every second.
2	COM	Indicates that the equipment data can be collected; it is always on and goes out for a short time, goes out when sending data, and turns on after receiving the data and verifying it is correct.
3	NET	Network status indicator. Flashing quickly: Searching for network, 20ms on, 180ms off. Always on: Connected to the network. Flashing slowly: The cloud platform has been registered successfully, 500ms on and 500ms off.

6.8Connecting Communication Cables

Multi-function communication port, including BMS communication, meter communication, DRMS, external dry contact signal and parallel communication.
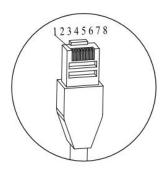
Step 1: Pass the cables through the waterproof cover of the signal interface and their respective waterproof plugs, and crimp the RJ45 terminals according to the order of the pins.

Step 2: Plug the cable into the communication port on the inverter side.

Step 3: Fasten the waterproof cover with screws.

Step 4: Tighten the waterproof nut.

The pin assignment of the RJ45 socket of the communication cable is as follows:

The interfaces are described as follows:

CAN/RS485-BMS interface

PIN	Definition	Function	Remarks
1	GND_SELV	Communication ground	Communicates
2	GND_SELV	Communication ground	with lithium
3	/	NC	battery BMS, and
4	CAN_A_H	CAN high bit data	can provide CAN

5	CAN_A_L	CAN low bit data	and RS485
6	/	NC	communication
7	RS485_A_BMS	RS485 differential signal A	for lithium
8	RS485_B_BMS	RS485 differential signal B	batteries adaptively

Note: ① When communicating with a lithium battery, you need to pay attention to the order of the battery's communication ports and pin definitions;

② Pay attention to whether there is a prohibition on wiring at the battery port;

DRMS interface

PIN	Definition	Function	Remarks
1	DRM1/5	DRMS interface is suitable for the Australian AS-NZS-4777.2 (some European requirements) safety standard	DRMS logical interface
2	DRM2/6		
3	DRM3/7		
4	DRM4/8		
5	REF GEN		
6	COM LOAD		
7	OP-	Normally open dry contact signal (≦1A)	External dry contact interface
8	OP+		

LINK 1&2 interface (parallel communication)

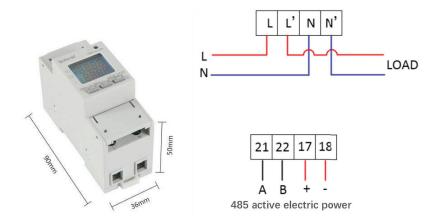| PIN	LINK1 definition	LINK2 definition	Remarks
1	CON2_AO	CON1_AO	Parallel signal
2	CON2_BO	CON1_BO	

3	CON2_AI	CON1_AI	
4	CON2_BI	CON1_BI	
5-6	/	/	
7	CON_SyncH	CON_SyncH	
8	CON_SyncL	CON_SyncL	

RS485 interface (electric meter communication)

PIN	Definition	Function	Remarks
1	GND_SELV	Communication ground	NC
2	GND_SELV	Communication ground	
3-6	/	NC	
7	RS485_A_EEM	RS485 differential signal A	Meter 485 communication
8	RS485_B_EEM	RS485 differential signal B	

Application notes:

PIN7 and PIN8 are used for meter communication and need to be connected to ports 21 and 22 of the meter respectively (Acrel ADL200 has a built-in CT single-phase electronic kilowatt-hour meter). The meter L/N is the incoming line side of the power grid, and L'/N' is the outgoing line side (load side). Connect the meter as shown in the figure below.

6.9 Parallel Wiring Operation

The terminal wiring steps of the parallel communication cable are as follows:

Step 1: Put the network cable plug on the table, and make sure the metal contact piece of the connector is facing up.
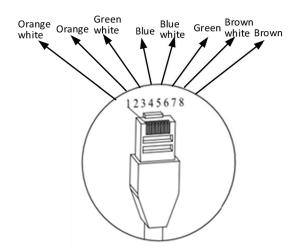
Step 2: Use a wire stripper to peel off the outer sheath of the network cable and uncover about 1.5cm of the insulation layer.

Step 3: Insert the LINK1 port to arrange the core sequence of the network cable. The order of the wire cores from left to right is: orange & white -orange-green & white-blue-blue & white-green-brown & white-brown. Insert the LINK2 port to arrange the core sequence of the network cable. Insert the cores of the network cable into the LINK2 port and arrange the cores in the order from left to right: green & white-blue-orange & white-orange-blue & white-green-brown & white-brown. Straighten each strand and arrange them in the correct order.
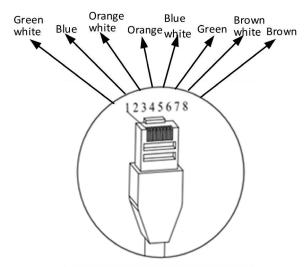
Step 4: Insert the cores into the slots of the plug, making sure that each core is fully inserted into the slot without being twisted or bent.

Step 5: Use pliers to fix the plug on the network cable, make sure the connection between the plug and the network cable is firm.

LINK1 port wiring method:

LINK2 port wiring method:

Parallel wiring is as follows:

 Application notes:

1) Up to 6 parallel inverters of the same model are supported, and can be set to parallel mode or three-phase mode;

2) Make sure that the inverters are connected to parallel cables;

3) The length specifications of the cables connecting the load end of the inverter to the AC LOAD end of each of the equipment must be consistent to ensure that the loop impedance is consistent, and the load current distribution to each inverter is approximately equal;

4) Make sure that the load power is less than the maximum power of parallel power.

6.10 Meter Operation and Display

(1) Description of key functions

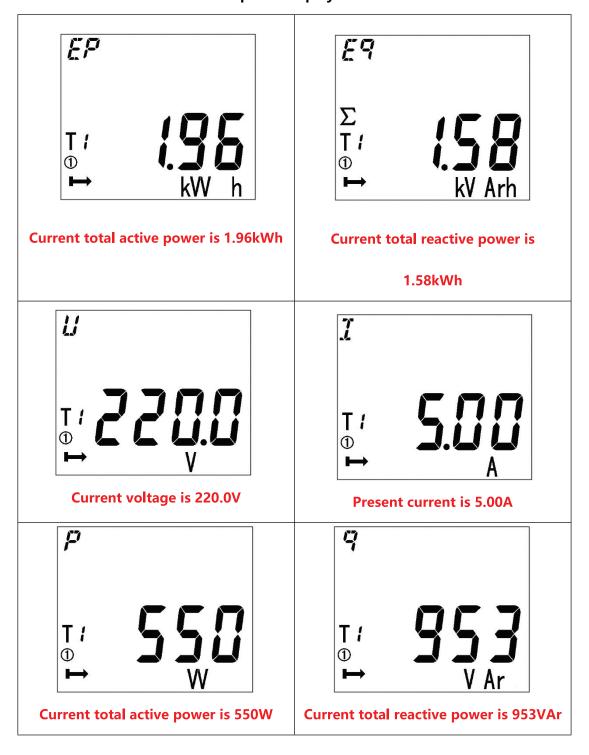| Icon	Name	Function
	Up key for voltage and current	Check the voltage and current in the view interface Scroll up and flash shift in the programming interface
	Down key for power	Check the power in the view interface Scroll down and modify the flashing bit in the programming interface
	Electricity Programming confirmation key	Check electricity in the view interface Press for 3 seconds to enter/exit menu Press OK in the programming interface to save the settings

(2) Display instructions

Display the total active energy after power on. The page turning can be realized through three types of viewing keys. The sequence of display pages is described as follows:
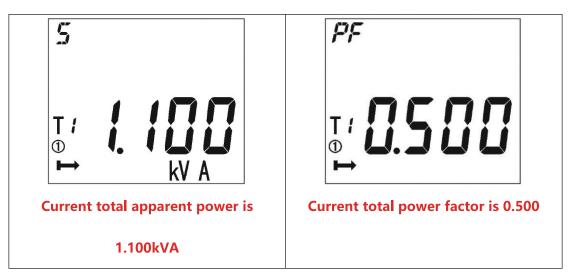
	Voltage, current, frequency, time, MODBUS protocol address, baud rate, check digit, DL/T645 address, software version number, full display detection.
	Total active power, total reactive power, total apparent power, and total power factor.
	Total active energy, forward active total energy, reverse active total energy, total active spike energy, total active peak energy, total active flat energy, total active valley energy, total reactive energy, forward total reactive energy, reverse reactive total energy, total reactive spike energy, total reactive peak energy, total reactive level energy, and total reactive valley energy.

Application notes:

● The above list is the name of all display interfaces of ADL200 meter with multi-rate function. The three buttons can switch different types of display content, and the switching sequence is as above;

● For ADL200 meters without multi-rate function, the date, time and time-of-use electric energy (that is, the electric energy in the four periods of spike, peak, flat, and valley) are not displayed.

Example of display interface

EP T1 ① ➡ **1.96** kW h **Current total active power is 1.96kWh**	*E9* Σ T1 ① ➡ **1.58** kV Arh **Current total reactive power is** **1.58kWh**
U T1 **220.0** ① ➡ V **Current voltage is 220.0V**	*I* T1 **5.00** ① ➡ A **Present current is 5.00A**
P T1 **550** ① ➡ W **Current total active power is 550W**	*q* T1 **953** ① ➡ V Ar **Current total reactive power is 953VAr**

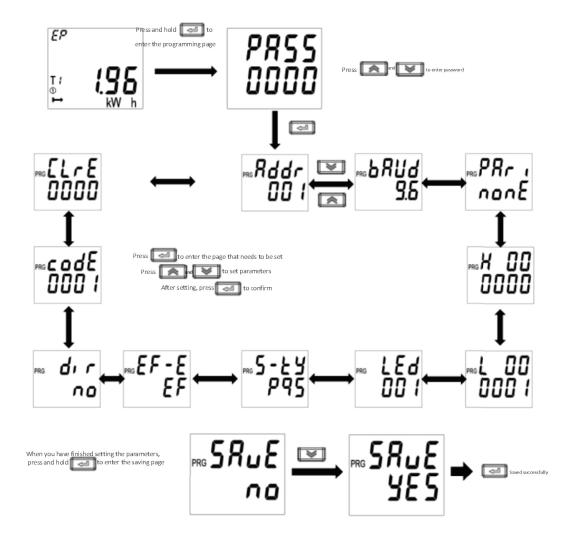|	
Current total apparent power is **1.100kVA**	**Current total power factor is 0.500**

Note: The above is only a part of the display interface, and the display modes of other interfaces are similar to the above figure. The display meaning can be judged according to the information displayed in the interface.

(3) Programming interface

Under any display item in the measurement display menu, press and hold to enter the "PASS" interface, enter the password and then press ; if the password is entered incorrectly, it will return "0000", please re-enter the password; if the password is correct, the parameters can be set. After setting, press and hold to enter the "SAVE" interface, select "YES" and then press to save and then exit, select "No" and then press to exit without saving. The programming interface flow is as follows:

EP

T1
① 1.96
kW h

Press and hold [⏎] to enter the programming page

PASS
0000

Press [⋀] and [⋁] to enter password

[⏎]

PRG CLrE
0000

PRG Addr
001

[⋁]
[⋀]

PRG bAUd
9.6

PRG PAr
nonE

PRG codE
0001

Press [⏎] to enter the page that needs to be set
Press [⋀] and [⋁] to set parameters
After setting, press [⏎] to confirm

PRG H 00
0000

PRG dir
no

PRG EF-E
EF

PRG S-tY
P95

PRG LEd
001

PRG L 00
0001

When you have finished setting the parameters, press and hold [⏎] to enter the saving page

PRG SAuE
no

[⋁]

PRG SAuE
YES

[⏎] Saved successfully

Application notes:

- The initialization password is 0001

- The communication address is set to 0001

- The baud rate is set to 38400

(4) Data items can be set

Setup menu description

No.	Secondary menu		
	Symbol	Meaning	Range
1	ADDR	Communication address setting	1-254

2	Baud	Baud rate selection	1200、2400、4800、9600、19200、38400
3	Pari	Parity selection	None、Odd、Even
4	HI	DL/T645 high 6-bit meter number	000000-999999
5	LO	DL/T645 low 6-bit meter number	000000-999999
6	LED	Backlight time setting	0-255 minutes, 0 is always on
7	S-TY	Apparent power calculation method	PQS,RMS
8	EF-E	Multi-rate function	EF-with multi-rate E-Without multi-rate
9	DIR	Current direction	No-Forward Yes-Reverse
10	CoDE	Password setting	1-9999
11	CLrE	Clear	0-9999

7. Equipment Trial Run

7.1 Check before Power-on

No.	Check item
1	The inverter is firmly fixed on the wall mounting bracket.
2	The cable binding meets the routing requirements, the distribution is reasonable, and there is no damage.
3	The PV+/PV-, BAT+/BAT- wires are firmly connected, the polarity is correct, and the voltage meets the connection range.
4	The DC switch is correctly connected between the battery and the inverter, and the DC switch is disconnected.
5	The AC circuit breaker is correctly connected between the grid port of the inverter and the grid, and the circuit breaker is disconnected.
6	The AC circuit breaker is correctly connected between the load port of the inverter and the power grid, and the circuit breaker is disconnected.
7	For lithium batteries, please make sure the communication cable is properly connected.

7.2 First Power-on

Important: Follow the steps below to turn on the inverter.

1) Make sure the inverter is not working;

2) Turn on the rotary switch of the inverter (when connected to PV);

3) Turn on the battery and close the DC switch between the battery and the inverter;

4) Close the AC circuit breaker between the grid port of the inverter and the grid;

5) Close the AC circuit breaker between the load port of the inverter and the load;

6) The inverter starts to run after the self-check is successful.

8. System Commissioning

8.1 Indicator Description

The LED indicator light is in the middle of the equipment panel,
and indicates the status of the inverter through three colors of red, green and blue.

Color of indicator light	Indicator status	Corresponding description	Remarks
Green	Always on	Grid connected	/
	Blinking	Standby (connected to the grid)	/
Blue	Always on	Off grid	/
	Blinking	Standby (off-grid)	/
Red	Always on	Non-recoverable fault	Inverter needs power-off inspection
	Blinking 2s/time	Alarm	Non-stop or reduced power operation
	Blinking 0.5s/time	Alarm	The inverter is shut down, waiting for the recovery condition to be met

8.2 App Introduction

Users need to choose a WiFi device or 4G device when using the app.

Please contact the manufacturer for ESS LINK operation and use, and refer to the ESS LINK operation and use manual.

IOS version:please scan the QR code below to obtain or go to the App Store to search for ESS LINK to download

Android version: Please scan the QR code below to obtain.

Android domestic QR code   Android foreign QR code

IOS Domestic and foreign QR code

9. Troubleshooting and Maintenance

This section will help you figure out the causes of malfunction during inverter operation.

9.1 Regular Maintenance

	Make sure the inverter is powered off. When operating the inverter, please wear personal protective equipment.

Maintenance items	Maintenance method	Maintenance cycle
System cleaning	Check the heat sink for foreign objects and dust. Clean the heat sink if necessary.	1 time/half a year~1 time/year (depending on ambient dust content)
DC switch	Turn the DC switch on and off 10 times continuously to ensure that the DC switch functions normally.	1 time/year
Electrical connection	Check whether the cable connection is loose or disconnected, whether the appearance of the cable is damaged, or whether there is copper leakage.	1 time/half a year~1 time/year
Airtightness	Check whether the leakproofness of the inverter inlet hole meets the requirements. If the gap is too large or not sealed, it needs to be sealed again.	1 time/year
THDi test	According to the requirements of Australia, Zref should be added between the inverter and the grid in the THDi test. L:0.24 Ω + j0.15 Ω; N:0.16 Ω +j0.10 Ω L:0.15 Ω + j0.15 Ω ; N:0.1 Ω + j0.1 Ω	Depending on demand

10. Technical Parameters

Product model	Isuna 3000S	Isuna 3600S	Isuna 4000S	Isuna 4600S	Isuna 5000S	Isuna 6000S
Battery parameters						
Number of battery input	1					
Battery type	Lithium battery					
Nominal battery voltage	51.2V					
Battery voltage range	42V-58V					
Max. charging voltage	60V					
Nominal charging/ discharging power	3kW	3.6kW	4kW	4.6kW	5kW	5kW
Max. continuous charging/ discharging	75A	85A	85A	100A	100A	100A

current						
Communication port	RS485/CAN					
PV input						
Number of MPPT	2					
Max. input power①	4500Wp	6000Wp	6000Wp	7500Wp	7500Wp	9000Wp
Max. input voltage	600V					
Starting voltage	95V					
MPPT voltage range	80~550V					
Full load MPPT voltage range	350~500V					
Nominal input voltage	360V					
Numbers of MPPT	2					
Max. input string per	1					

MPPT	
Max. input current	13A/13A
Max. short-circuit current	18A/18A

Remark ①: Two independent PV channels are recommended, and the maximum power of a single PV does not exceed 4500W.

Grid-connected parameters						
Nominal output power	3000W	3600W	4000W	4600W	5000W	6000W
Max. input power from grid	3600W	5000W	5000W	6000W	6000W	6000W
Max. output current	13.6A	16.4A	18.2A	20.8A	22.7A	27.2A
Max. input current from grid	16.4A	22.7A	22.7A	27.2A	27.2A	27.2A
Nominal grid voltage	230V					
Grid voltage range	184-276V					

Nominal grid frequency	50Hz					
Frequency range	45Hz~55Hz/55Hz~65Hz					
Power factor	~1 (0.8 lead-0.8 lag)					
THDi(@rated power)	<3%					
Off-grid parameters						
Nominal output power	3kVA	3.6kVA	4kVA	4.6kVA	5kVA	6kVA
Max. output power	3kVA	3.6kVA	4kVA	4.6kVA	5kVA	6kVA
Max. output current	13.6A	16.4A	18.2A	20.8A	22.7A	27.2A
Nominal voltage	230V					
Nominal frequency	50Hz					
THDu (@linear load)	<2%					
Switching time	<20ms					
Efficiency						

European efficiency	97.2%	97.3%	97.3%	97.4%	97.5%	97.5%
Max. efficiency	97.5%	97.5%	97.8%	97.8%	98%	98%
Max. battery charging/ discharging efficiency	95.2%					
Protection						
Insulation resistance detection	Integrated					
Residual current monitoring	Integrated					
Input reverse polarity protection	Integrated					
Islanding protection	Integrated					
Overvoltage and	Integrated					

overload protection	
AC short circuit protection	Integrated
AC side overvoltage level	III
Battery and PV overvoltage level	II
Surge protection	Integrated
Lightning protection	Integrated
General parameters	
Installation method	Wall-mount
Size(W*H*D)	500mm*470mm*180mm (without terminals)
Weight	21kg
Standby power	≤10W

consumption	
Operating temperature range	-25℃~+60℃ （>40℃，Derated operation）
Permissible humidity range	0~100%
Noise	<25dB（A）
Permissible altitude	<4000m （≤3000m under full load, every increase of 100m, the power will be reduced by 5%）
Condensation method	Self-heating and heat dissipation
Ingress protection grade	IP65
Monitoring	H5/LED/APP/WIFI/4G/Bluetooth (optional)
Communication port	RS485/CAN/DRED/dry contact/parallel communication
Performance and Certification	

Parallel function	Yes
Standard warranty	10 years
Safety standard	IEC 62109-1, IEC 62109-2, EN 62109-1, EN 62109-2
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4
Grid-connected standard	VDE-AR-N 4105, VDE V 0126-1-1, G98/G99, CEI 0-21, EN50549 NRS 097-2-1, AS 4777.2, R25

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