Photonic Universe
www.photonicuniverse.com
+44 (0) 203 150 11 11

1kW – 6kW
Low Frequency Power Inverter

ST Series

INSTRUCTION MANUAL

Table of Contents

General Precautions 4
- General Safety Information 4
- Personnel Safety Precautions 4
- Warranty Exclusions 5

Introduction 6
- Features 6
- LCD Panel Overview 6
- AC and DC Terminals Overview 7

Installation 8
- Unpacking and Inspection 8
- Preparation 8
- Mounting the Unit 8
- DC Wiring Suggestions 9
- Battery Connection 9
- AC Input and Output Connection 10
- Recommended AC Cable Sizes 11
- AC Input Connection 11
- AC Output Connection 12

Operation 13
- LED Indicators 13
- Buzzer 13
- LCD Display Information 13
- Operation Key Instructions 15
- Settings Menu 15
- Automatic Generator Start (AGS) and Dry Contact 18
- BMS CAN Communication 19
- Computer Communication 20

Fault Mode Information 22
- Fault Codes 22
- Troubleshooting 23

Specifications 25
- Inverter Mode Specifications 25
- AC Bypass Mode Specifications 26
- AC Charger Mode Specifications 26

General Precautions

This manual applies to all ST inverter-charger models. It contains important instructions that must be followed during installation, operation, and maintenance of the inverter.

General Safety Information

Read this manual carefully before installation and operation. Before using the inverter, read all instructions and markings on the inverter and the battery, and ensure that this manual is fully understood.

Caution!

- To reduce the risk of injury, charge only approved rechargeable batteries compatible with the inverter settings. If flooded batteries are used, exercise extreme caution as they may emit significant amounts of explosive gases. Such batteries must also be maintained regularly.
- Do not expose the inverter to rain, snow, or any type of liquid or excessive humidity. This inverter is designed for indoor use only.
- Do not disassemble the inverter. Servicing must be carried out by a qualified service centre.
- To prevent the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Switching off the unit alone does not eliminate the risk of electric shock.

Warning!

- Provide ventilation from the battery compartment to the outdoors. The battery enclosure should be designed to prevent the accumulation of hydrogen gas, especially at the top of the compartment.
- NEVER charge a frozen battery or connect a frozen 12V/24V/48V battery to the inverter.
- Input/output AC wiring must be no smaller than 4 mm^2 / 12 AWG and must be rated for at least 75 °C. Battery cables must also be rated for at least 75 °C and must be correctly sized according to the inverter power rating and maximum current.
- Pay special attention when working with metal tools around batteries. A battery short circuit can generate extremely high current and may cause burns, sparks, or an explosion.
- Read the battery installation and maintenance instructions carefully before operation.

Personnel Safety Precautions

- Keep plenty of fresh water and soap nearby in case battery acid comes into contact with skin, clothing, or eyes.
- Avoid touching your eyes while working near batteries.
- NEVER smoke or allow sparks or open flames near batteries.

- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with batteries. Batteries may provide very high short-circuit current, which can cause metal objects to melt and result in severe burns.
- If a remote or automatic generator start system is used, disable the automatic starting circuit or disconnect the generator before servicing to prevent accidental start-up.

Warranty Exclusions

The following cases are not within the scope of the warranty:

- Damage caused by improper installation, incorrect wiring, or failure to follow the instructions in this manual.
- Damage occurring during transportation, storage, or handling after delivery.
- Damage caused by force majeure events (e.g., natural disasters such as lightning, flooding, fire, or earthquakes).
- Damage resulting from operation outside specified electrical conditions, including over-voltage, under-voltage, reverse polarity, incorrect battery connection, short circuits or overloads.
- Damage caused by use with incompatible or unsupported battery types (e.g., incorrect chemistry or voltage).
- Damage caused by inadequate ventilation, overheating, or installation in an unsuitable environment (e.g., excessive humidity, dust, or temperature).
- Damage caused by unauthorized repair, modification, or disassembly of the inverter.
- Normal wear and tear, including reduced battery capacity due to aging or usage.

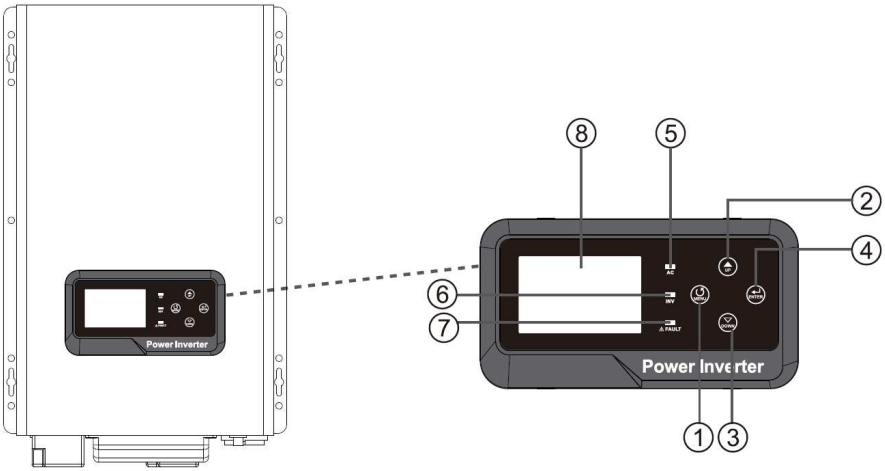
Introduction

This series is a cost-effective pure sine wave inverter with a built-in AC charger (20 A to 60 A). Utility and battery priority can be configured. When solar priority is selected, the solar charger is used as the primary charging source, while AC charging is automatically enabled when the solar charging current is insufficient. This optimises battery charging and ensures reliable system performance. The inverter is suitable for operating a wide range of household appliances.

Features

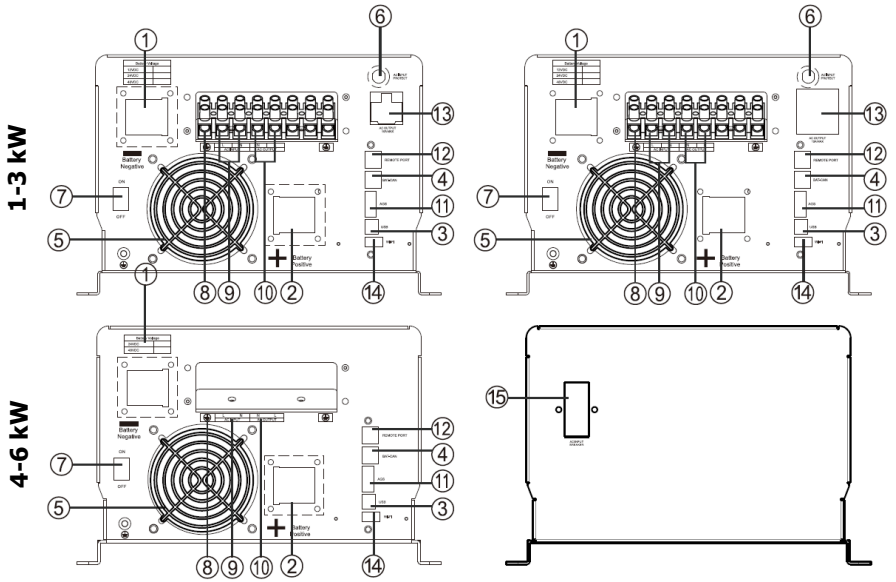
- Pure sine wave output
- User-friendly interface
- Three-stage battery charging
- Multi-function display
- Overload and short-circuit protection
- Adjustable charging voltage and charging current
- Configurable battery low-voltage shutdown point (e.g. for 12V models: 10 / 10.5 / 11 / 11.5 / 12V)
- Power-save mode
- Output source priority selection
- Selectable utility input voltage range (wide / narrow)
- Selectable output voltage (220 / 230 / 240 V) and frequency (50 Hz / 60 Hz)
- Utility charging enable/disable function
- Battery type selection (lead-acid or lithium)
- Wi-Fi port
- Battery CAN communication port

LCD Panel Overview



1. Menu
2. Up
3. Down
4. Enter
5. AC LED light
6. Inv LED light
7. Fault LED light
8. LCD screen

AC and DC Terminals Overview



1. Battery -
2. Battery +
3. USB
4. Battery CAN (BMS) port
5. Cooling fan
6. Charger input breaker
7. Power on/off switch
8. Ground
9. AC input
10. AC output
11. Auto generator start (AGS)
12. Remote port
13. AC Output socket (10A max)
14. Wi-Fi
15. AC INPUT BREAKER

Installation

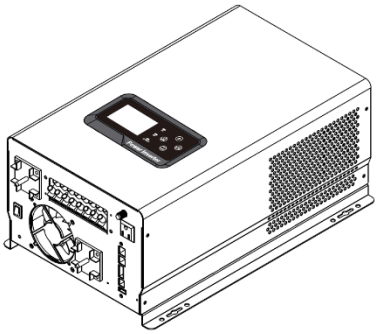
Unpacking and Inspection

Before installation, inspect the entire unit carefully. Ensure that the contents of the package are complete and undamaged. You should have received the following items:

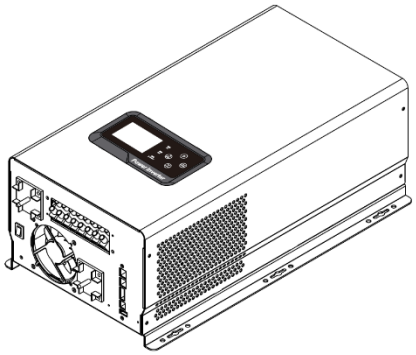
- Inverter x 1
- Communication cable x 1
- User manual x 1

Preparation

Before connecting any wiring, remove the inverter covers as shown below:



1-3 kW

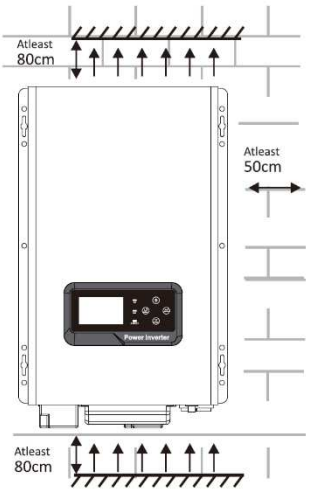


4-6 kW

Mounting the Unit

Consider the following points before selecting the installation location:

- Do not mount the inverter on combustible or flammable surfaces.
- Ensure the surface is solid and stable.
- It is recommended to install the inverter vertically on a wall. Fitting it at eye level would allow the LCD display to be read clearly.
- To ensure proper air circulation and heat dissipation, maintain a clearance of approximately 50 cm on each side and 80 cm above and below the unit.
- The ambient temperature should be between 0 °C and 40 °C to ensure optimal operation.



DC Wiring Suggestions

It is recommended to install the battery bank as close to the inverter as possible. A battery cable length of 1m maximum is recommended. Shorter and thicker cables will provide better system performance by reducing voltage drop and power loss.

Refer to the table below for the minimum cable cross-section. Use battery cables with a sufficiently large cross-sectional area to safely carry the required current. If the DC cable length exceeds 1m, use thicker battery cables to accommodate the higher current and reduce voltage drop. Alternatively, multiple smaller cables may be connected in parallel to achieve the required current capacity.

Inverter model	Battery voltage	Cable cross-section (length < 1m)
1 kW	12 VDC	16 mm²
1 kW	24 VDC	16 mm²
1.5 kW	12 VDC	25 mm²
1.5 kW	24 VDC	16 mm²
2 kW	12 VDC	35 mm²
2 kW	24 VDC	25 mm²
3 kW	12 VDC	35 mm²
3 kW	24 VDC	25 mm²
3 kW	48 VDC	16 mm²
4 kW	24 VDC	35 mm²
4 kW	48 VDC	25 mm²
5 kW	24 VDC	35 mm²
5 kW	48 VDC	25 mm²
6 kW	24 VDC	35 mm²
6 kW	48 VDC	25 mm²

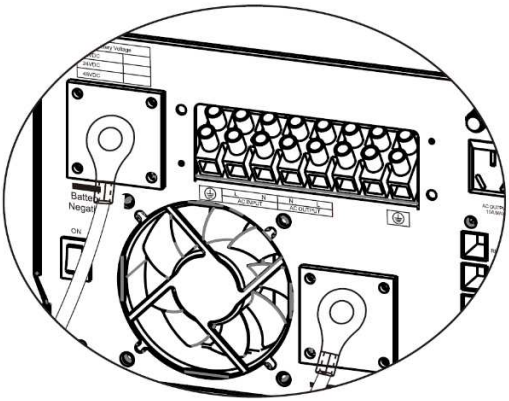
Battery Connection

Please refer to the recommended battery cable sizes above and follow the battery connection procedure below:

- Crimp suitable ring terminals onto the ends of the battery cables using a crimping tool. Apply a "pull test" to ensure the ring terminals are securely attached.
- Connect the battery packs according to the inverter system requirements (series / parallel, etc).
- Connect the battery leads to the inverter DC terminals first, before connecting them to the battery terminals.
- Keep the circuit breakers / fuses / isolator switches open at the time of connection, and then connect the leads to the battery terminals.

It is recommended to use a battery bank with a minimum capacity of 100 Ah for 1 kW - 3 kW inverter models, and a minimum capacity of 200 Ah for 4 kW - 6 kW models.

NOTE: Ensure that the DC terminals of the inverter are tightened to a torque of 2-3 Nm. Pay special attention to correct polarity when connecting the batteries and the inverter.

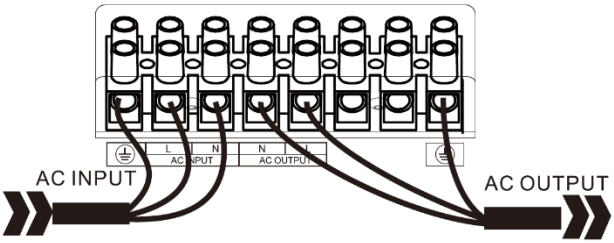


	WARNING! Shock Hazard. Installation requires special care due to the high battery pack voltage.

	CAUTION! Ensure that the ring terminals are mounted flat against the inverter terminal surface with full contact area. Do not install the ring terminals at an angle or with any gap or object between the contact surfaces, as poor contact may cause overheating. **CAUTION!** Do not apply an antioxidant or any other chemical substance on the surfaces before the terminals are connected tightly. **CAUTION!** Before making the final DC connection or closing the DC breaker/disconnector, ensure that positive (+) is connected to positive (+) and negative (-) is connected to negative (-). **Incorrect polarity may damage the inverter.**

AC Input and Output Connection

	CAUTION! Before connecting the inverter to the AC input power source, please install a separate AC breaker between the inverter and the AC input power source. This will ensure that the inverter can be disconnected safely during maintenance and protected against AC input over-current. **CAUTION!** Never connect the AC output terminals of the inverter to another source of AC power (grid, generator, etc) otherwise **the inverter will be damaged immediately**. AC sources can only be connected to the AC input terminals of the inverter. **WARNING!** All wiring must be performed by qualified personnel. **WARNING!** It is very important to use appropriate cables for AC connection to ensure system safety and efficient operation. To reduce the risk of injury, use the recommended cable sizes 4 - 16 mm² for AC wiring. The cable must be fully compliant with local regulations.

AC Wiring Input (Live + Neutral + Earth) Output (Live + Neutral + Earth)	

Recommended AC Cable Sizes

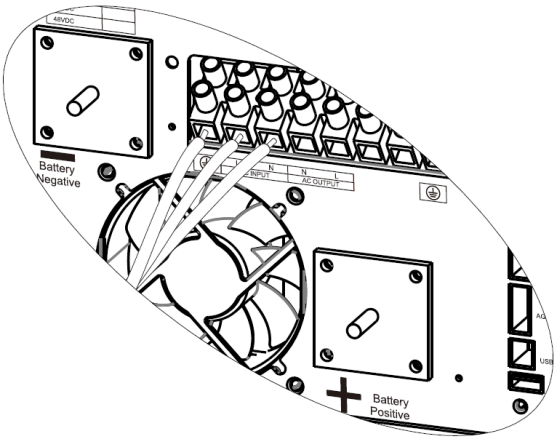
Inverter model	Cable cross-section	Torque value
1-3 kW	4 mm²	1.2 – 1.6 Nm
4-6 kW	6 mm²	1.4 – 1.6 Nm

Please follow the steps below to make the AC input (grid) / AC output (load) connection:

- Before connecting the AC wires, ensure that the DC and AC breakers or switches are open and that the inverter and wires are disconnected from all power sources.
- Remove 10 mm of insulation from the six conductors. Shorten the live (L) and neutral (N) conductors by 3 mm.
- Insert the AC input (grid) wires according to the polarities indicated on the terminal block on the inverter (which may differ from the polarities shown in this user manual) and tighten the terminal screws. Be sure to connect the Earth wire first.

AC Input Connection

⏚ → Earth (yellow-green)
L → Live (brown or black)
N → Neutral (blue)

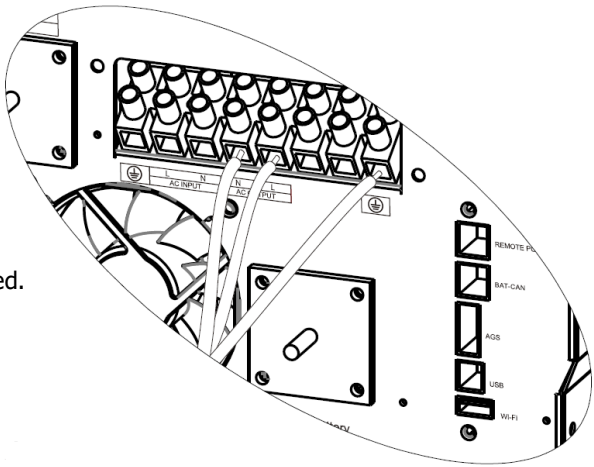


	WARNING! Ensure that the AC power source is disconnected before wiring it to the unit.

- Then insert the AC output (load) wires according to the polarities indicated on the terminal block on the inverter (which may differ from the polarities shown in this user manual) and tighten the terminal screws. Be sure to connect the Earth wire first.

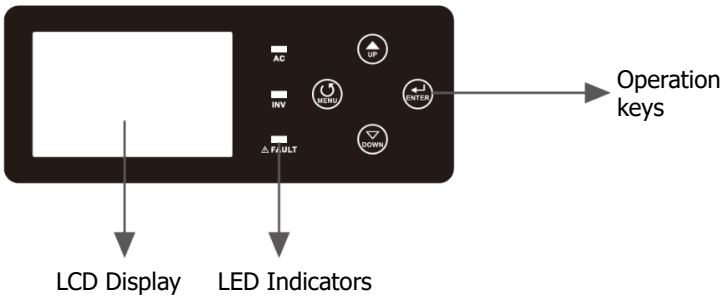
AC Output Connection

⏚ → Earth (yellow-green)
L → Live (brown or black)
N → Neutral (blue)



- Ensure that the wires are securely connected.

Operation



LED Indicators

LED indicators communicate the inverter status as follows:

LED indicator	Status	Description
AC	Off	No AC input available
	On	AC input is normal
	Blink	AC input is outside of the limits
Inv	On	The unit is in the inverter mode
Fault	Off	Normal operation
	On	Fault
	Blink	Caution

Buzzer

The following table provides the overview of the buzzer (alarm) function:

Status	Description
Buzzer is off	Normal operation
Buzzer is beeping	Caution
Buzzer is on	Fault

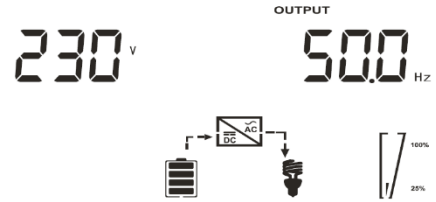
For more information on faults, please refer to the Fault Information section.

LCD Display Information

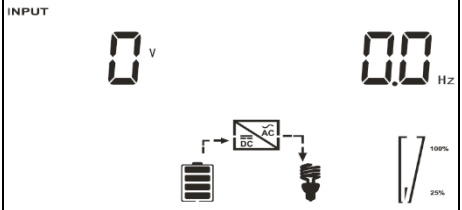
The following information is displayed on the LCD screen:

Software version	Rated battery voltage and rated load power
	

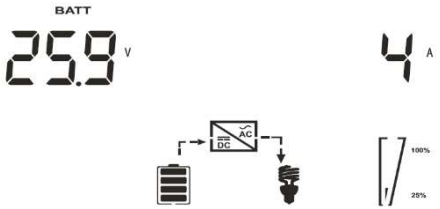
(default) AC output voltage and frequency



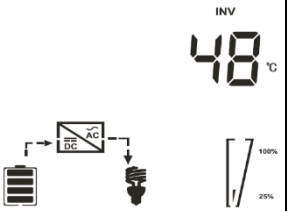
AC input voltage and frequency



Battery voltage and current



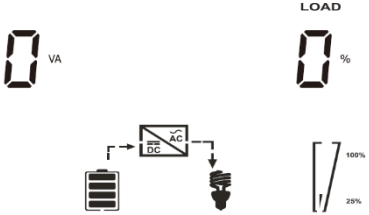
Inverter temperature



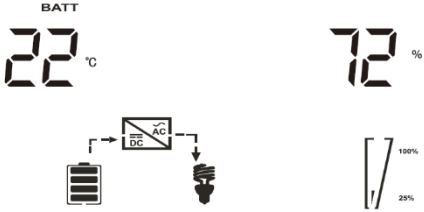
Load (W)



Load (VA)



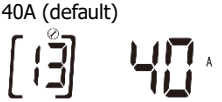
Battery temperature and capacity

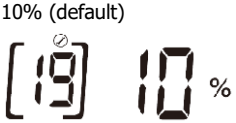
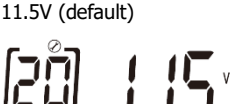


Operation Key Instructions

- The power switch button on the side of the inverter turns the unit ON and OFF.
- There are four buttons on the LCD panel: MENU, UP, DOWN, and ENTER.
- Use the UP and DOWN buttons to view the various parameter displays.
- Press and hold the MENU button for 2 seconds to enter the Settings Menu. Use the MENU and ENTER buttons to select menu pages, and use the UP and DOWN buttons to adjust the parameters. Use ENTER to confirm the selection.
- After completing the settings, press and hold the ENTER button for 2 seconds to exit.
- If you want to restore the factory settings, press and hold the UP and DOWN buttons simultaneously to enter the default settings menu. Select SET to keep the current settings or DEF to restore the factory settings. After the setting is complete, press and hold the ENTER button for 2 seconds to exit the settings menu.

Settings Menu

Program	Description	Options	Options description
01	Output source priority	Utility priority (default) 	If UTI is selected, the inverter operates in AC mode (bypass) until the AC supply is disconnected or goes outside the acceptable AC input range.
		Battery priority 	The inverter operates in AC mode (bypass) if the battery voltage falls below the setting value in Program 20. The inverter switches to DC mode if the battery voltage rises above the setting value in Program 21 for more than 1 min.
02	AC input voltage range limits	vdE: Wide (default) 	If Wide is selected, the AC input voltage range is 140 - 270 V.
		NRU: Narrow 	If NRU is selected, the AC input voltage range is 180 - 270 V.
03	AC output voltage in the battery mode	220V (default) 	Select the AC output voltage from: 200/210/220/230/240V
04	AC output frequency in the battery mode	50Hz (default) 	Select the AC output frequency from: 50/60Hz
13	Maximum AC charging current	40A (default) 	Select from the range: 10A – maximum current (depending on the inverter model). Increment of each step is 5A. To turn AC charging off, use Program 29.

14	Battery type	Lead-acid (default)  Lithium 	Set the correct battery type (Lead-acid or Lithium) according to the battery chemistry and required charging stages, voltages and charging algorithm described in the Specifications section.
17	Bulk charging voltage	14.1V (default) 	Select from the range: 12-14.5V (12V inverter model) 24-29V (24V inverter model) 48-58V (48V inverter model)
18	Float charging voltage	13.5V (default) 	Select from the range: 12-14.5V (12V inverter model) 24-29V (24V inverter model) 48-58V (48V inverter model)
19	Low battery shutdown voltage / capacity	10.5V (default for 12V model) 	Select from the range: 10-12V (12V inverter model) 20-24V (24V inverter model) 40-48V (48V inverter model)
		10% (default) 	Select from the range: 1%–50%. This Program is available only when the BMS communication with the battery is normal. Recovery low voltage point is: Cut-off point +25% (range 26% - 75%)
20	Battery Priority mode low-voltage cutoff	11.5V (default) 	Select from the range: 10.5-13V (12V inverter model) 21-26V (24V inverter model) 42-52V (48V inverter model) If Program 1 is set to SBU, and the battery voltage drops below this setting value, then the inverter will switch from Battery mode to AC mode (bypass).
21	Battery Priority mode recovery voltage	13.5V (default) 	Select from the range: 13-14V (12V inverter model) 26-28V (24V inverter model) 52-56V (48V inverter model) If Program 1 is set to SBU, and the battery voltage is above this setting value for longer than 1 minute, the inverter will switch from AC mode (bypass) back to Battery mode.
23	LCD backlight On/Off	LON: LCD On 	LCD backlight is On permanently.
		LOF: LCD Off (default) 	LCD backlight stays On for 1 minute as soon as any button is pressed.

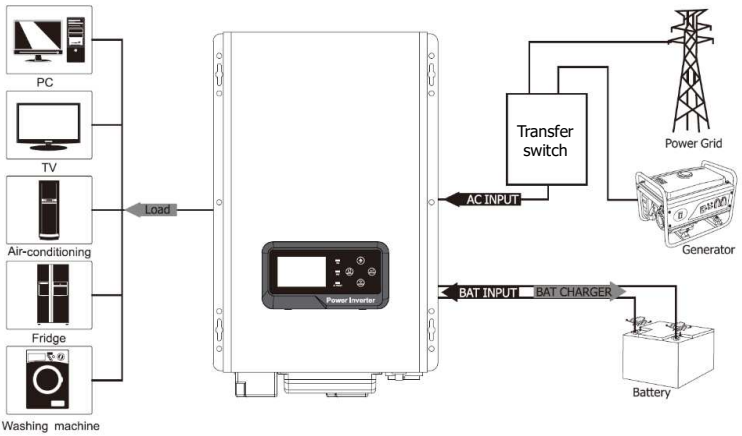
24	Buzzer On/Off	bON: Buzzer On (default)  bOF: Buzzer Off 	Use this setting to control the buzzer On/Off status.
27	Power saver mode On/Off	SEn: Power Saver On 	Turns the Power Saver mode On. If there is no load, the inverter will turn off the output to save battery energy and will check for a load every 5-30 seconds (the interval can be set in Program 28).
		Sdi: Power Saver Off (default) 	Turns the Power Saver mode Off. The inverter will provide full power at all times.
28	Power saver mode interval	5S (default) 	Setting range: 5-30 seconds. 5s: The inverter is set to detect the load every 5 seconds (lower power saving). 30s: The inverter is set to detect the load every 30 seconds (maximum power saving).
29	AC charging On/Off	UCE: AC charging On (default)  UCd: AC charging off 	Use this setting to control the AC charging On/Off status. When AC charging is on, use Program 13 to set the maximum AC charging current.
37	BMS control method	vOL: Voltage method (default)  SOC: SOC percentage method 	This setting applies to Lithium batteries (battery type is Li in Program 14) when BMS communication with the battery is functioning normally. Choose Voltage if you would like the inverter to start, resume, and stop charging based on the battery voltage. Choose SOC if you would like charging control to be based on the battery state of charge (%).
38	Battery Priority mode low-capacity cutoff	30% (default) 	Similar to Program 20, but for SOC control. If Program 1 is set to SBU, and the battery capacity drops below this setting value, then the inverter will switch from Battery mode to AC mode (bypass). Setting range: 1%-50% Increment of each step is 1%.

39	Battery Priority mode recovery capacity	80% (default) 	Similar to Program 21, but for SOC control. If Program 1 is set to SBU, and the battery capacity is above this setting value for longer than 1 minute, the inverter will switch from AC mode (bypass) back to Battery mode. Setting range: 51%-100% Increment for each step is 1%.
40	BMS communication failure shutdown	idP: Off (default) 	When communication between the BMS of the battery and the inverter is lost, the inverter will continue charging and discharging the battery.
		Uni: On 	When communication between the BMS of the battery and the inverter is lost, the inverter will stop charging and discharging the battery.
41	Lithium battery communication protocol	(default) 	Sets the communication protocol for a specific lithium battery make and model. Contact your supplier for more information on available protocols and compatible batteries. After this setting is changed, a restart is required for the change to take effect.

Automatic Generator Start (AGS) and Dry Contact

The AGS function allows the inverter to start the generator automatically via the dry contact when the battery voltage is low. Please note:

- The generator must support a dry contact start function.
- If both the AC grid and a generator are connected to the inverter input at the same time, a **transfer switch**, or a changeover switch, must be installed between the generator output and the inverter input. This device must ensure that the utility supply and generator cannot power the inverter simultaneously. The utility AC output and the generator AC output should never come into contact with each other.
- Such a transfer switch is not required if only a generator is connected to the inverter AC input (i.e. the system is fully off-grid).



Dry contact operating voltage depends on the value of the Low battery shutdown voltage setting (Program 19 in the Settings Menu):

- Dry contact closes when the battery voltage drops below the Program 19 voltage +0.5V / +1.0V / +2.0V (for 12V / 24V / 48V inverters).
- Dry contact opens when the battery voltage rises above 13.5V / 27V / 54V

The table below provides a summary for the dry contact operation.

Low battery shutdown voltage (Program 19)	Dry contact trigger voltage (closed)	Dry contact reset voltage (open)
10V/20V/40V	10.5V/21V/42V	13.5V/27V/54V
10.5V/21V/42V	11V/22V/44V	
11V/22V/44V	11.5V/23V/46V	
11.5V/23V/46V	12V/24V/48V	
12V/24V/48V	12.5V/25V/50V	

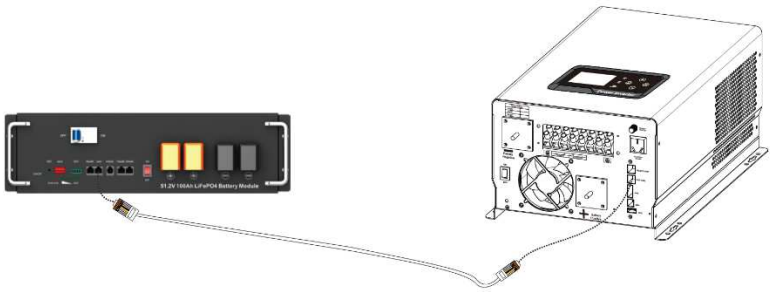
BMS CAN Communication

The inverter CAN communication interface can be connected to the lithium battery BMS to establish CAN communication. Before connecting, please ensure that all settings are configured correctly and that the inverter communication protocol setting matches the lithium battery BMS protocol.

An RJ45-to-RJ12 communication cable with the following pin assignment must be used between the inverter and the battery:



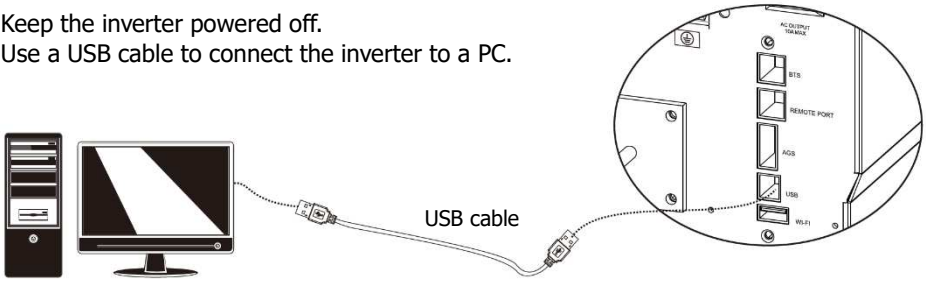
Lithium battery		Inverter	
PIN 1	not used	PIN 1	not used
PIN 2	not used	PIN 2	not used
PIN 3	not used	PIN 3	not used
PIN 4	CANL	PIN 4	CANL
PIN 5	CANH	PIN 5	CANH
PIN 6	not used	PIN 6	not used
PIN 7	not used	-	-
PIN 8	not used	-	-



Computer Communication

The inverter CAN communication interface can be connected to the lithium battery BMS to establish CAN communication. Before connecting, please ensure that all settings are

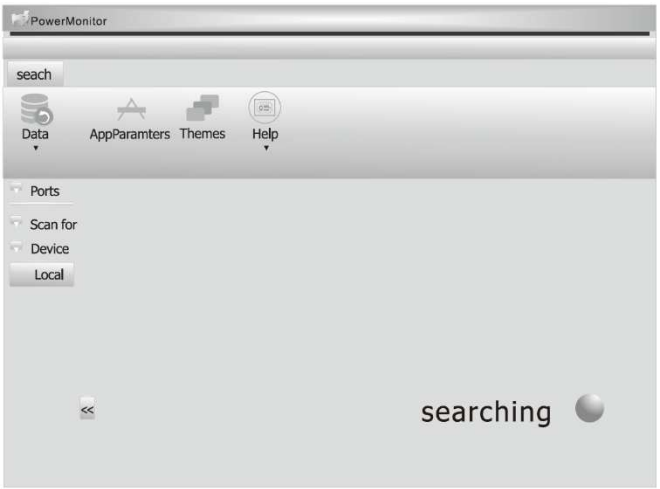
Keep the inverter powered off.
Use a USB cable to connect the inverter to a PC.



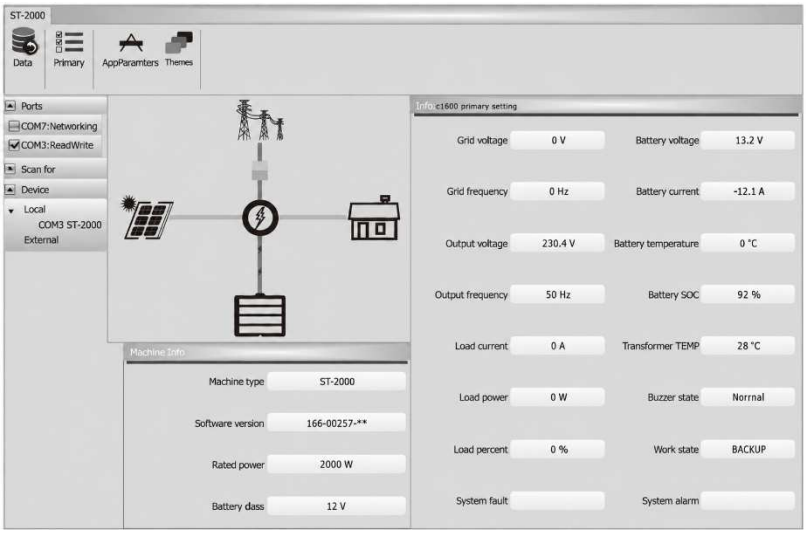
Download the monitoring software using the link or the QR code below:
https://www.photonicuniverse.com/upload/file/Software/Solar_Power_Monitor.zip

Scan to download PC software

Open the software and turn on the inverter.



The software will automatically scan communication ports to connect to the inverter. Please wait for a moment until the software starts operating normally.



For specific software functions and operation instructions, please refer to the Help Documentation after the connection has been established successfully.

Fault Mode Information

Fault Codes

The following table provides an overview of the fault codes of the inverter:

Fault code	Reason	Description
	Fan fault	The fan has stopped running unexpectedly.
	Over temperature	Temperature sensors have detected an over-temperature condition in the battery or inverter: • If the battery temperature exceeds 65 °C, a warning alarm (1 beep / 3 seconds) will sound for 1 minute, followed by fault code 02. The recovery point is when the temperature drops below 60 °C. • If the inverter temperature exceeds 90 °C, a warning alarm (1 beep / 3 seconds) will sound for 1 minute, followed by fault code 02. The recovery point is when the temperature drops below 85 °C.
	Battery voltage too high	Battery overvoltage occurs when the voltage at the inverter DC terminals exceeds the Bulk charging voltage (Program 17) +1V for a 12V battery (+2V/+4V for 24V/48V batteries). A warning alarm (1 beep / 3 seconds) will sound for 30 seconds, followed by fault code 03. The recovery point is when the voltage drops below the Bulk charging voltage + 0.8V for a 12V battery (+1.6V/+3.2V for 24V/48V batteries).
	Battery voltage too low	Battery undervoltage occurs when the voltage at the inverter DC terminals drops below the Cutoff voltage +0.5V for a 12V battery (+1V/+2V for 24V/48V batteries). A warning alarm (1 beep / 3 seconds) will sound, followed by fault code 04 if the voltage drops further below the Cutoff voltage. The recovery point is when the voltage rises above the Cutoff voltage +0.7V for a 12V battery (+1.4V/+2.8V for 24V/48V batteries).
	AC output short circuit in the inverter mode	The short circuit test in the inverter mode failed. The inverter generated fault code 05.
	AC output overvoltage	If the AC output voltage exceeds 270V for more than 500ms, the inverter generates fault code 06.
	AC output overload	AC overload occurs when the total load connected to the inverter output exceeds 100% of the nominal power of the inverter: • 100% < Load < 110%: a warning alarm (1 beep / 3 seconds) sounds for 5 min. • 110% < Load < 125%: a warning alarm (1 beep / 3 seconds) sounds for 60 sec. • Load > 125%: a warning alarm (1 beep / 3 seconds) sounds for 10 sec. If any of these conditions occur, the inverter shuts down with fault code 07.

	AC output overcurrent	The fault occurs in the following situations: • 1-3kW inverters: the AC output current exceeds 40A (RMS) for 200ms. • 4-6kW inverters: the AC output current exceeds 80A (RMS) for 200ms. In such cases, the inverter shuts down with fault code 51.
	BMS communication problem	This normally happens when the communication cable between the inverter and the BMS of the Lithium battery is disconnected, damaged or has a poor connection.
	AC output undervoltage	If the AC output voltage drops below 170V for more than 500ms, the inverter generates fault code 58.

Troubleshooting

If the inverter enters Fault Mode, please turn it off, disconnect it from all power sources, remove the load, and try to resolve the cause of the problem by following the guidance in the table below. Please note that after a fault code occurs, even if the inverter reaches the recovery point, you may need to restart the inverter.

LED / Buzzer	Fault code	Cause	Troubleshooting steps
Alarm sound is constant Red LED fault light is on	01	Fan stopped running	Check the fan for obstructions or damage. Restart the inverter in battery mode without any load or AC power connected. Contact your supplier if the issue has not been resolved.
	02	Temperature is too high	Wait for 5 minutes before restarting the inverter. Assess the space around the inverter available for ventilation, and remove any obstruction if found. Check the load and other factors, including external heat sources, which may have caused overheating. If the temperature issue was detected in the battery, carefully check the battery condition. Contact your supplier if the issue persists.
	03	Battery voltage is too high	Check the battery specifications. Remove any other charging sources if connected. Wait until the battery voltage stabilises before restarting the inverter. Contact your supplier if the issue has not been resolved.
	04	Battery voltage is too low	Check the battery specifications and replace the battery or recharge it by other means if applicable. Remove any other loads that be drawing power from the battery. Restart the inverter when the battery voltage returns to normal. Contact your supplier if the issue persists.
	05	Output short circuited	Disconnect the loads, and remove anything from the system which could have caused a short circuit. Restart the inverter without any loads connected. If the issue occurs even without any AC loads, contact your supplier.
	06	High AC output voltage	The product and output voltage should be checked by a qualified person and repaired if a hardware fault is confirmed. Please contact your supplier for assistance.
	07	Overload	Decrease the load, wait for 5 minutes, and restart the inverter. If the issue persists, turn the inverter off, remove all loads, and restart it. If the issue occurs without any load, contact your supplier.

	51	Output over current	Check whether the wiring is connected properly and remove any abnormal loads. Restart the inverter. If this doesn't help, remove all loads and restart the inverter without any load connected. If the issue persists, contact your supplier.
	56	BMS comm. failure	Check the BMS communication cable for any signs of damage, and ensure that it is plugged in securely. Confirm that the BMS protocol has been set correctly.
	58	Low AC output voltage	Decrease the load, wait for 5 minutes, and restart the inverter. If the issue persists, turn the inverter off, remove all loads, and restart it. If the issue is still present, the product and output voltage should be checked by a qualified person and repaired if a hardware fault is confirmed. Please contact your supplier for assistance.

Specifications

Inverter Mode Specifications

Rated power	1kW	1.5kW	2kW	3kW	4kW	5kW	6kW
Power factor	1						
Wave form	Pure sine wave						
Output voltage RMS	200V / 210V / 220V / 230V / 240V AC ±10%						
Output frequency	50Hz or 60Hz (±0.3Hz)						
Peak inverter efficiency	>80%						
Overload	100% < Load < 110%: alarm for 5 min, then shutdown with a fault code 07 110% < Load < 125%: alarm for 60s, then shutdown with a fault code 07 Load > 125%: alarm for 10s, then shutdown with a fault code 07						
Surge rating	3,000VA	4,500VA	6,000VA	9,000VA	12,000VA	15,000VA	15,000VA
Ability to start an electric motor	1 HP		1.5 HP		2 HP	3 HP	
Battery voltage	12V / 24V			24V / 48V		48V	
Low battery voltage cutoff	10/10.5/11/11.5/12V for 12V inverters 20/21/22/23/24V for 24V inverters 40/42/44/46/48V for 48V inverters (low voltage fault code 04)						
Low battery voltage alarm	Low battery cutoff level +0.5V for 12V inverters +1.0V for 24V inverters +2.0V for 48V inverters (low voltage alarm: 1 beep / 3 seconds)						
High battery voltage alarm	Battery voltage rises above Bulk charging voltage (Program 17) +1V for 12V inverters Bulk charging voltage (Program 17) +2V for 24V inverters Bulk charging voltage (Program 17) +4V for 48V inverters (high voltage alarm: 1 beep / 3 seconds, after 30s fault code 03)						
High battery voltage recovery	Battery voltage drops below Bulk charging voltage (Program 17) +0.8V for 12V inverters Bulk charging voltage (Program 17) +1.6V for 24V inverters Bulk charging voltage (Program 17) +3.2V for 48V inverters						
Power saver mode load level	Load <= 100W ± 20W						
Operating temperature range	-0°C to 40°C						
Storage temperature	-15°C to 60°C						
Audible noise	60db max						

AC Bypass Mode Specifications

Input waveform	Pure sine wave
Nominal AC input voltage	230Vac (±3%)
Max AC input voltage	270Vac
AC input frequency	50Hz / 60Hz (auto sensing)
Output waveform in bypass mode	Same as input waveform
Overload protection	Breaker + software protection
Output short circuit	Breaker + software protection
Efficiency (AC mode)	>95% (at rated load, battery fully charged)
Transfer time AC to DC	15ms max
Transfer time DC to AC	15ms max

AC input voltage range (± 5V):

Range (Program 02)	Parameter	Low cutoff	Low recovery	High cutoff	High recovery
Narrow	Voltage	< 180V	> 190V	> 270V	< 265V
	Frequency	< 40Hz	> 45Hz	> 70Hz	< 65Hz
Wide	Voltage	< 140V	> 150V	> 270V	< 265V
	Frequency	< 40Hz	> 45Hz	> 70Hz	< 65Hz

AC Charger Mode Specifications

Minimum charging current: 10A
Increment of each step in charging current settings: 5A (Program 13 in Settings Menu)
Maximum charging current depends on the inverter model:

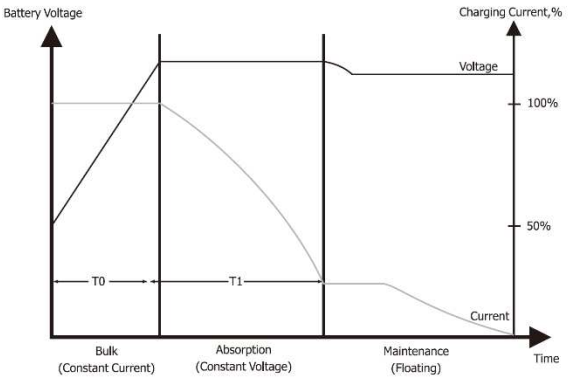
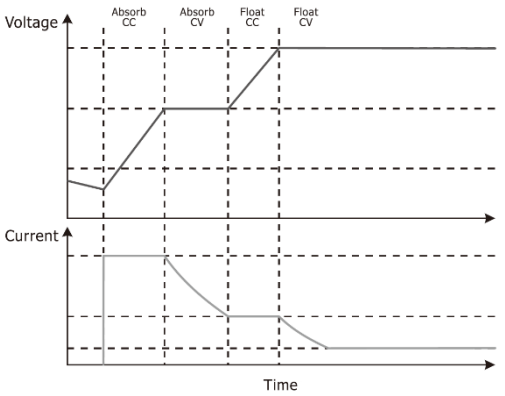
Inverter model	1kW	1.5kW	2kW	3kW	4kW	5kW	6kW
12V	30A	40A	60A	-	-	-	-
24V	20A	25A	30A	40A	60A	-	-
48V	-	-	-	20A	30A	35A	40A

Charger mode AC input voltage limits:

Range (Program 02)	Parameter	Low cutoff	Low recovery	High cutoff	High recovery
Narrow	Voltage	< 180V	> 190V	> 265V	< 260V
	Frequency	< 40Hz	> 45Hz	> 70Hz	< 65Hz

Wide	Voltage	< 155V	> 160V	> 265V	< 260V
	Frequency	< 40Hz	> 45Hz	> 70Hz	< 65Hz

AC charger mode parameters:

Battery voltage	10-14.5V for 12V inverters 20-29V for 24V inverters 40-58V for 48V inverters
Short circuit protection	Breaker
Overcharge protection	If battery voltage ≥ charging voltage + 1V: alarm (1 beep / 3 seconds) for 30s, then fault code 03
Charging stages	Bulk (Constant Current) -> Absorption (Constant Voltage) -> Float
Charging algorithm for lead acid battery	
Charging algorithm for Lithium battery	

Photonic Universe Ltd

E-mail: info@photonicuniverse.com
Web: www.photonicuniverse.com

Tel.: +44 (0) 203 150 11 11
Fax: +44 (0) 203 150 12 12