User Manual

5KW SOLAR INVERTER / CHARGER

Table Of Contents

ABOUT THIS MANUAL	1
Purpose	
Scope	1
SAFETY INSTRUCTIONS	1
INTRODUCTION	2
Features	2
Basic System Architecture	2
Product Overview	
INSTALLATION	4
Unpacking and Inspection	4
Preparation	
Mounting the Unit	4
Battery Connection	5
AC Input/Output Connection	6
PV Connection	7
Final Assembly	
Remote Display Panel Installation	9
Communication Options	
Dry Contact Signal	
BMS Communication	
OPERATION	12
Power ON/OFF	
Operation and Display Panel	
LCD Display Icons	
LCD Setting	
Display Setting	
Operating Mode Description	
Battery Equalization Description	
Fault Reference Code	
Warning Indicator	35
SPECIFICATIONS	
Table 1 Line Mode Specifications	
Table 2 Inverter Mode Specifications	
Table 3 Charge Mode Specifications	
Table 4 General Specifications	
TROUBLE SHOOTING	
Appendix A: Approximate Back-up Time Table	40
Appendix B: BMS Communication Installation	41

ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

SAFETY INSTRUCTIONS



WARNING: All safety instructions in this document must be read, understood and followed. Failure to follow these instructions will result in death or serious injury.

- 1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
- 2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
- 3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
- 4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
- 5. **CAUTION** Only qualified personnel can install this device with battery.
- 6. **NEVER** charge a frozen battery.
- 7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
- 8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
- 9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
- 10. One piece of 150A fuse is provided as over-current protection for the battery supply.
- 11. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
- 12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
- 13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.
- 14. **WARNING:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding.
- 15. **CAUTION:** It's requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

This is a multi-function inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support in a single package. The comprehensive LCD display offers user-configurable and easy-accessible button operations such as battery charging current, AC or solar charging priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave inverter
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Configurable AC/Solar Charger priority via LCD control panel
- Compatible to utility mains or generator power
- Auto restart while AC is recovering
- Overload / Over temperature / short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function
- Removable LCD control module
- Multiple communication ports for BMS (RS485, CAN-BUS, RS232)
- Built-in Bluetooth for mobile monitoring (Requires App), OTG USB function, dusk filters
- Configurable AC/PV Output usage timer and prioritization

Basic System Architecture

The following illustration shows basic application for this unit. It also required the following devices to have a complete running system:

- Generator or Utility mains.
- PV modules

Consult with your system integrator for other possible system architectures depending on your requirements.

This inverter can power various appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioners.

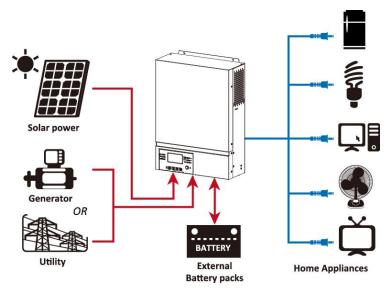
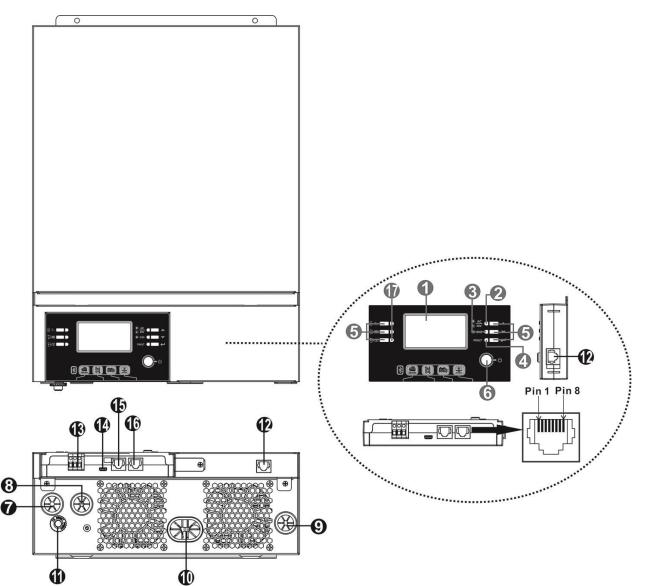


Figure 1 Hybrid Power System

Product Overview



- 1. LCD display
- 2. Status indicator
- 3. Charging indicator
- 4. Fault indicator
- 5. Function buttons
- 6. Power on/off switch
- 7. AC input
- 8. AC output
- 9. PV input
- 10. Battery input
- 11. Circuit breaker
- 12. Remote LCD panel communication port
- 13. Dry contact
- 14. USB communication port
- 15. BMS communication port: CAN and RS232 or RS485
- 16. RS-232 communication port
- 17. Output source indicators (refer to OPERATION/Operation and Display Panel section for details) and USB function setting reminder (refer to OPERATION/Function Setting for the details)

INSTALLATION

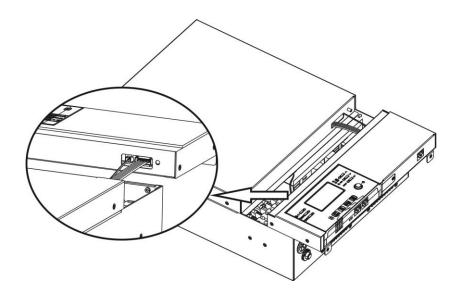
Unpacking and Inspection

Before installation, please inspect the content. Be sure that nothing inside the package is damaged. You should have received the following items inside the package:

- Inverter x 1
- User manual x 1
- RS232 Communication cable x 1
- Software CD x 1
- DC Fuse x 1

Preparation

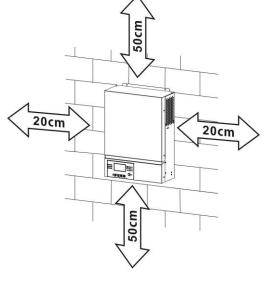
Before connecting all wirings, please take off the bottom cover by removing two screws as shown below. Detach the cables from the cover.



Mounting the Unit

Consider the followings before selecting your placements:

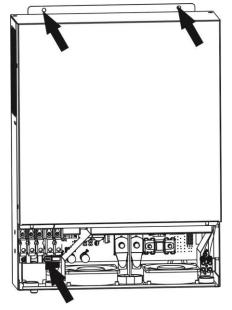
- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install the inverter at eye level in order to allow easy LCD display readout.
- For proper air circulation and heat dissipation, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended orientation is to adhered to the wall vertically. Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and to have enough space for wirings.





SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

Mounting the unit by screwing the three screws as shown below. It's recommended to use M4 or M5 screws.

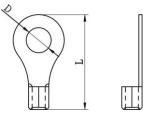


Battery Connection

CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnection device between battery and the inverter. It may not be necessary to have a disconnection device in some applications, however, it's still recommended to have over-current protection installed. Please refer to typical amperage as required.

WARNING! All wiring must be performed by a qualified electrical technician. **WARNING!** It's very important for system safety and efficient operation to use appropriate cables for battery connection. To reduce risk of injury, please use the proper recommended cable in the table below.



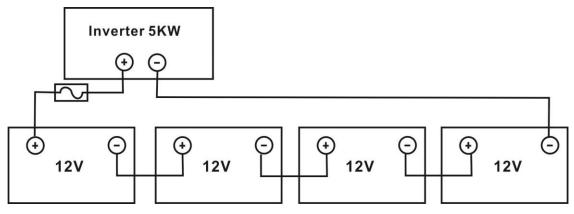


Recommended battery cable size:

Model	Typical	Wire Size	Cable	Ring Terminal		Torque
	Amperage		mm ²	Dimer	nsions	Value
				D (mm)	L (mm)	
5KW	118A	1*2AWG	38	8.4	39.2	5 Nm

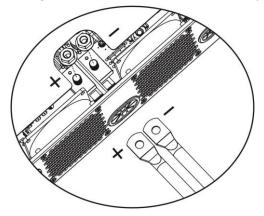
Please take the following steps to implement battery connection:

- 1. Assemble battery ring terminal based on recommended battery cable and terminal size.
- 2. Connect all battery packs as required. It is recommend to connect minimum of 1 200Ah capacity battery.



3. Apply ring terminals to your battery wires and secure it to the battery terminal block with the bolts properly

tightened. Refer to battery cable size for torque value. Make sure polarity at both the battery and the inverter is correctly connected and ring terminals are secured to the battery terminals.





WARNING: Shock Hazard

Installation must be performed with care due to high battery voltage in series.

CAUTION!! Do not place anything between inverter terminals and the ring terminals. Otherwise, overheating may occur.

CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are securely tightened.

CAUTION!! Before making final DC connection or closing DC breaker/disconnector, be sure that the positive (+) must be connected to positive (+) and negative (-) connected to negative (-).

AC Input/Output Connection

CAUTION!! Before connecting to 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 safely disconnected during maintenance and fully protected from over-current. The recommended spec of AC breaker is 50A for 5KW. **CAUTION!!** There are two power terminal blocks with "IN" (Input) and "OUT" (Output) markings. DO NOT mistakenly connect to the wrong connectors.

WARNING! All wiring must be performed by a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable size for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Cable (mm ²)	Torque Value
5KW	10 AWG	6	1.2 Nm

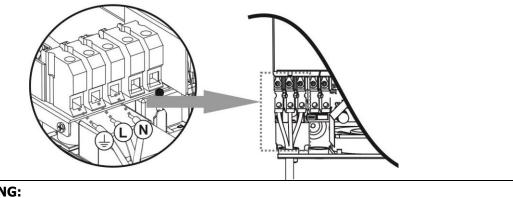
Please follow these steps to implement AC input/output connection:

- 1. Before making AC input/output connection, be sure to enable DC protector or disconnector first.
- 2. Remove insulation sleeves for about 10mm for the five screw terminals.
- 3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect the grounding wire () first.

 \oplus \rightarrow Ground (yellow-green)

L→LINE (brown or black)

N→Neutral (blue)



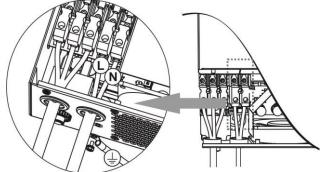
WARNING:

Be sure that the AC power source is disconnected before attempting wire connections.

4. Insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect the grounding wire () first.

➡→Ground (yellow-green)
L→LINE (brown or black)
N→Neutral (blue)

5. Make sure the wires are securely connected.



CAUTION: Appliances such as air conditioner required at least 2~3 minutes to spool up because it needs to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short period of time, it may cause damage to your connected appliances. To prevent this from happening, please check with manufacturer of air conditioner if it has time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it may still causes damage to the air conditioner.

PV Connection

CAUTION: Before connecting to PV modules, please install a **separately** DC circuit breaker between the inverter and PV modules.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size shown below.

Model	Wire Size	Cable (mm ²)	Torque value (max)
5KW	1 x 12AWG	4	1.2 Nm

WARNING: Because this inverter is non-isolated, are accepted: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunctions, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding connection.

CAUTION: It's requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

PV Module Selection:

When selecting proper PV modules, please be sure to consider the following parameters:

1. Open circuit Voltage (Voc) of PV modules not to exceeds maximum PV array open circuit voltage of the inverter.

2. Open circuit Voltage (Voc) of PV modules should be higher than the start-up voltage.

INVERTER MODEL	5KW
Max. PV Array Power	5000W
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	120Vdc~450Vdc
Start-up Voltage	150Vdc +/- 10Vdc

Take the 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

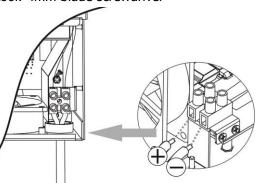
Solar Panel Spec.	SOLAR INPUT	O'try of papels	Total input
(reference) - 250Wp	Min in serial: 6 pcs, max. in serial: 12 pcs	Q'ty of panels	power
- Vmp: 30.1Vdc	6 pcs in serial	6 pcs	1500W
- Imp: 8.3A	8 pcs in serial	8 pcs	2000W
- Voc: 37.7Vdc	12 pcs in serial	12 pcs	3000W
- Isc: 8.4A	8 pieces in serial and 2 sets in parallel	16 pcs	4000W
- Cells: 60	10 pieces in serial and 2 sets in parallel	20 pcs	5000W

PV Module Wire Connection

Please take the following to implement PV module connection:

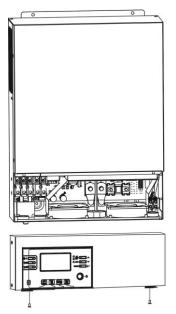
- 1. Remove insulation sleeve for about 7 mm on your positive and negative wires.
- 2. We recommend using bootlace ferrules on the wires for optimal performance.
- 3. Check polarities of wire connections from PV modules to PV input screw terminals. Connect your wires as illustrated below.

Recommended tool: 4mm blade screwdriver



Final Assembly

After connecting all wirings, replace the bottom cover as shown below.

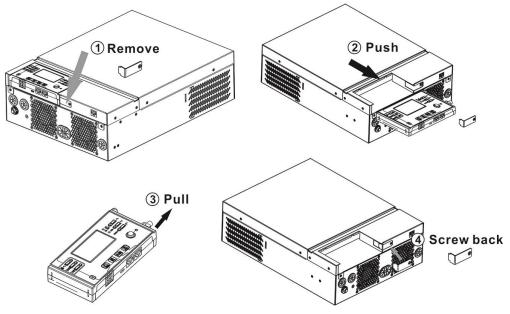




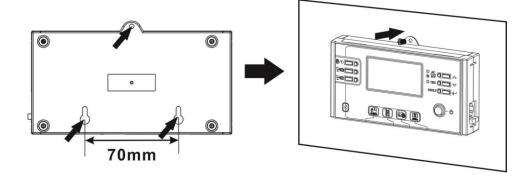
Remote Display Panel Installation

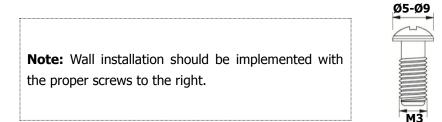
The LCD module can be removable and installed in a remote location with an optional communication cable. Please take the follow steps to implement this remote panel installation.

Step 1. Remove the screw on the bottom of LCD panel and pull down the module from the case. Detach the cable from the remote communication port. Be sure to replace the retention plate back to the inverter.

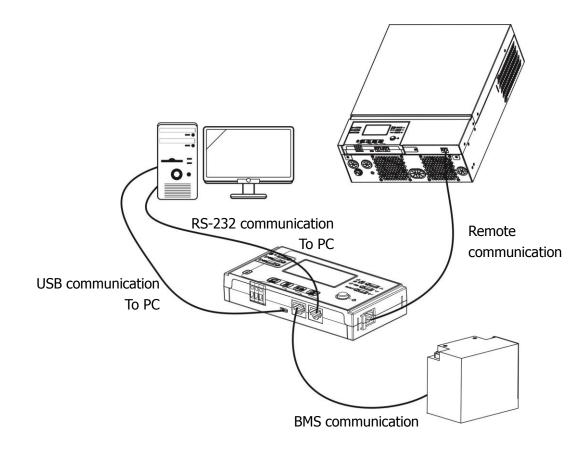


Step 2. Prepare your mounting holes in the marked locations as shown in the illustration below. The LCD module then can be securely mounted to your desired location.





Step 3. Connect LCD module to the inverter with an optional RJ45 communication cable as shown below.



Communication Options

Serial Connection

Please use the supplied serial cable to connect between the inverter and your PC. Install the monitoring software from the bundled CD and follow the on-screen instructions to complete your installation. For detailed software operation, refer to the software user manual on the bundled CD.

Bluetooth Connection

This unit is equipped with a Bluetooth transmitter. Download "WatchPower" APP from Google Play or Google Store. Once the APP is download, you may connect "WatchPower" APP to your inverter with the password "123456". The communication distance is roughly 6 ~ 7 meters.



Dry Contact Signal

There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status		Condi	tion	Dry contact port: NC C NO		
				NC & C	NO & C	
Power Off	Unit is off and	no output is pow	vered.	Close	Open	
	Output is powered	Program 01 set as USB	Battery voltage < Low DC warning voltage	Open	Close	
Power On	from Battery power or Solar energy.	(utility first)	Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open	
Power On		Program 01 is set as SBU	Battery voltage < Setting value in Program 12	Open	Close	
		(SBU priority)	Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open	

BMS Communication

It is recommended to purchase a special communication cable if you are connecting to Lithium-Ion battery banks. Please refer to Appendix B- BMS Communication Installation for details.

OPERATION

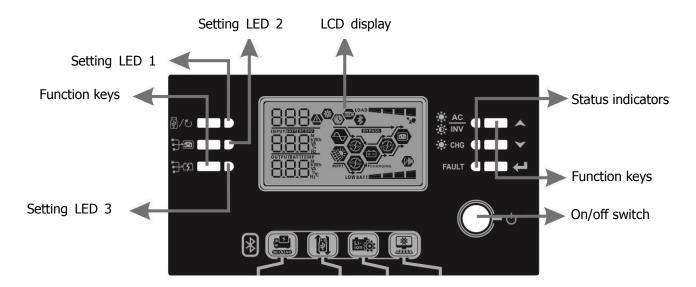
Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the LCD module) to turn on the unit.

Operation and Display Panel

The operation and the LCD module, shown in the chart below, includes six indicators, six function keys, on/off switch and a LCD display, indicating the operating status and input/output power information.

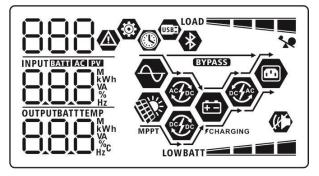


Indicators				
LED In	LED Indicator		Solid/Flashing	Messages
Setting	g LED 1	Green	Solid On	Output powered by utility
Setting	g LED 2	Green	Solid On	Output powered by PV
Setting	g LED 3	Green	Solid On	Output powered by battery
		Green	Solid On	Output is available in line mode
			Flashing	Output is powered by battery in battery mode
Status	-¤ָ- Chg	Green	Solid On	Battery is fully charged
indicators			Flashing	Battery is charging.
	FAULT	Ded	Solid On	Fault mode
	FAULI	Red	Flashing	Warning mode

Function Keys

Fu	Inction Key	Description	
₽ / U	ESC	Exit the setting	
W/O	USB function setting	Select USB OTG functions	
	Timer setting for the	Sature the timer for prioritizing the output course	
	Output source priority	Setup the timer for prioritizing the output source	
• ⊐	Timer setting for the	Sature the timer for prioritizing the charger course	
- 55	Charger source priority	Setup the timer for prioritizing the charger source	
▲ ▼	Up	To last selection	
\checkmark	Down	To next selection	
←	Enter	To confirm/enter the selection in setting mode	

LCD Display Icons



Icon	Function description			
Input Source Information				
AC	Indicates the AC input.			
PV	Indicates the PV input			
	Indicate input voltage, input frequency, PV voltage, charger current,			
888	charger power, battery voltage.			
Configuration Program and F	ault Information			
(())				
000	Indicates the setting programs.			
888				
	Indicates the warning and fault codes.			
888@	Warning:			
	Fault: FBB lighting with fault code			
Output Information				
	Indicate output voltage, output frequency, load percent, load in VA,			
	load in Watt and discharging current.			
Battery Information				
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in			
	battery mode and charging status in line mode.			
When battery is charging, it will present battery charging status.				

Status	Battery voltag	ge LCD Display				
	<2V/cell		4 bars will fla	ash	in turns.	
Constant	2 ~ 2.083V/ce	ell	Bottom bar will be on and the other three			
Current mode /			bars will flash in turns. Bottom two bars will be on and the other two			
Constant	2.083 ~ 2.167	2.083 ~ 2.167V/cell		bars will flash in turns.		
Voltage mode	> 2.167 V/cel	I		e ba	rs will be on and the top bar	
			will flash.			
Floating mode. B		-	4 bars will be	e on		
In battery mode, i						
Load Percentage	;	Battery Voltage		20022	LCD Display	
		< 1.85V/cell		LO	WBATT	
Load >50%		1.85V/cell ~ 1.9	-		BATT	
		1.933V/cell ~ 2.	01/V/cell		BATT	
		> 2.017V/cell			BATT	
		< 1.892V/cell		LO	WBATT	
Load < 50%		1.892V/cell ~ 1.	975V/cell		BATT	
		1.975V/cell ~ 2.	058V/cell		BATT	
		> 2.058V/cell			BATT	
Load Information	on	-				
	*	Indicates overlo	ad.			
		Indicates the loa	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
		0%~24%		25%~49%		
	_	LOAD		LOAD		
		50%~74%		75%~100%		
a,		LOAD	LOAD			
Mode Operation	Information					
		Indicates unit co	onnects to the	e ma	ins.	
MPPT		Indicates unit co	onnects to the	PV	panel.	
BYPASS		Indicates load is	supplied by u	utilit	y power.	
ACTO		Indicates the ut	ility charger ci	ircui	t is working.	
		Indicates the solar charger circuit is working.			is working.	
boffe		Indicates the DC/AC inverter circuit is working.			iit is working.	
		Indicates unit alarm is disabled.				
*		Indicates Bluetooth is ready to connect.				
USB		Indicates USB disk is connected.				
		Indicates timer setting or time display				

LCD Setting

General Setting

After pressing and holding "←" button for 3 seconds, the unit will enter the Setup Mode. Press "▲" or "▼"

button to select setting programs. Press " \leftarrow " button to confirm you selection or " \bigcirc / \circlearrowright " button to exit.

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape	
		Utility first (default)	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
01	Output source priority: To configure load power source priority	Solar first	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.
		568	Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	10A 02 © 10 ^	20A □2 @ 2□^

		30A	40A
		02 👁	02 👁
		20	
		38,	40.
		50A	60A (default)
		02 🐵	82 🐵
			00
		50-	50 [*]
		70A	80A
		02 🐵	02 👁
			00
			80*
		Appliances (default)	If selected, acceptable AC input
		07 👁	voltage range will be within
		00	90-280VAC.
		RPL	
03	AC input voltage range	UPS	If selected, acceptable AC input
		00.0	voltage range will be within
		UJ ®	170-280VAC.
		une	
		UPS	
		AGM (default)	Flooded
			<u>n</u> g 🐵
			00
		86n	FLd
05	Battery type	User-Defined	If "User-Defined" is selected,
			battery charge voltage and low DC
		05 🚳	cut-off voltage can be set up in
			program 26, 27 and 29.
		USE	
		Pylontech battery	If selected, programs of 02, 26, 27
		85 👁	and 29 will be automatically set
05	Battery type		up. No need for further setting.
		N-APPLIE STOR	
		P41	
	1	· _··-	

		Restart disable (default)	Restart enable
	Auto restart when overload	86 👁	86 👁
06	occurs		
		14	r F
		Restart disable (default)	Restart enable
07	Auto restart when over	07 🐵	07 👁
07	temperature occurs		
		644	242
		50Hz (default)	60Hz
		09 👁	09 🛛
09	Output frequency		00 -
			50 _m
		220V	230V (default)
] ®	1U @
		220.	220.
10	Output voltage	240V	
		⊗	
		-	
		240,	
		2A ! ! 🐼	10A
		i i 🤷	
		UEI	UEI
		<u>а.</u>	
	Maximum utility charging		
	current	20A	30A (default)
	Note: If setting value in		11
11	program 02 is smaller than that in program in 11, the		UEI
	inverter will apply charging current from program 02 for	20.	30,
	utility charger.	40A	 50A
		UEI	UEI
		40.	584
L	1		

		60A ◎ UE 5Ω^	
		Battery fully charged	48V
		49V	50V
		BATT 51V	52V
	Setting voltage point back	BATT	BATT
13	to battery mode when selecting "SBU" (SBU priority) in program 01.	53V 13 ©	54V (default)
		55V 13 🐵	56V
		S7V	S8V
		57V 13 🐵	58V
		BATT	S8 ^v

		If this inverter/charger is w	orking in Line, Standby or Fault mode,
		charger source can be prog	
		Solar first	Solar energy will charge battery as
		! ⊆ @	first priority.
			Utility will charge battery only when
			solar energy is not available.
		cco	
		<u>CS0</u>	
		Solar and Utility (default)	Solar energy and utility will charge
		15 ©	battery at the same time.
16	Charger source priority:		
16	To configure charger source		
	priority	SAU	
		Only Solar	Solar energy will be the only charger
			source no matter utility is available
			or not.
		000	
		050	
			orking in Battery mode, only solar
			Solar energy will charge battery if it's
		available and sufficient.	Alarm off
		Alarm on (default)	
		¦ 	18 ©
18	Alarm control		
		600	LOC
		Return to default display	If selected, no matter how users
		screen (default)	switch display screen, it will
			automatically return to default
			display screen (Input voltage
			/output voltage) after no button is pressed for 1 minute.
		cco	pressed for 1 minute.
19	Auto return to default	ESP	
	display screen	Stay at latest screen	If selected, the display screen will
			stay at latest screen user finally
			switches.
		FEb	
		-	

		Backlight or	n (default)	Backlight off	F
		20		20	(
20	Backlight control	LU			_
		LON		LOF	
		Alarm on (d	efault)	Alarm off	
		22		22	
22	Beeps while primary source is interrupted				
		800		80F	
		Bypass disa	ble (default)	Bypass enab	ble
	Overload bypass: When enabled, the unit will	23	Ø	-23	
23	transfer to line mode if overload occurs in battery				
	mode.				
		679		698	
		Record enal	ole (default)	Record disat	ble
		· 25		25	
25	Record Fault code				
		86U		645	
				• • •	
			t setting: 56.4V		ed is selected in program am can be set up.
	Bulk charging voltage	CD		Setting rang	e is from 48.0V to 61.0V.
26	(C.V voltage)	Γu		Increment o	f each click is 0.1V.
			1		
		5KW default	t setting: 54.0V		ed is selected in program
		27	O		am can be set up. e is from 48.0V to 61.0V.
27	Floating charging voltage	Ç! U			f each click is 0.1V.

29	 Low DC cut-off voltage: If battery power is only power source available, inverter will shut down. If PV energy and battery power are available, inverter will charge battery without AC output. If PV energy, battery power and utility are all available, inverter will transfer to line mode and provide output power to loads. 	5KW default setting: 42.0V	If self-defined is selected in program 5, this program can be set up. Setting range is from 42.0V to 48.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
30	Battery equalization	Battery equalization BO C EER If "Flooded" or "User-Define program can be set up.	Battery equalization disable (default) 30 EdS ed" is selected in program 05, this
31	Battery equalization voltage	5KW default setting: 58.4V	Setting range is from 48.0V to 61.0V. Increment of each click is 0.1V.
33	Battery equalized time	60min (default) 33 ©	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default)	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 35	Setting range is from 0 to 90 days. Increment of each click is 1 day

		Enable	Disable (default)
		JD "	JO 🖤
		000	
36	Equalization activated	860	865
	immediately		abled in program 30, this program can
			ected in this program, it's to activate ately and LCD main page will shows
			ed, it will cancel equalization function
		until next activated equaliza	tion time arrives based on program 35
		setting. At this time, "- ',	will not be shown in LCD main page.
		Not reset(Default)	Reset
	Reset all stored data for PV	⊗	
37	generated power and		
	output load energy		
		ՈԻՆ	FSE
		Not reset(Default)	Reset
		93 ®	93 ®
93	Erase all data log		
		NFF	1925
		3 minutes	5 minutes
	Data log recorded interval *The maximum data log number is 1440. If it's over 1440, it will re-write the first log.	· ·	J 1 -
		Q	C
		10 minutes (default)	20 minutes
		94 🐵	99 🖤
94			
			20
		10	20
		30 minutes	60 minutes
		94 🐵	94 🐵
		130	60
		For minute setting, the rang	je is from 0 to 59.
95			
	Time setting – Minute		
		niii	
		Ω	
		U	

96	Time setting – Hour	For hour setting, the range is from 0 to 23.
97	Time setting– Day	For day setting, the range is from 1 to 31.
98	Time setting– Month	For month setting, the range is from 1 to 12.
99	Time setting – Year	For year setting, the range is from 17 to 99.

Functional Setting

There are three function keys on the display panel to implement special functions such as USB OTG, timer setting for output source priority and timer setting for charger source priority.

1. USB Function Setting

Insert an OTG USB disk into the USB port (I). Press and hold ""/"" button for 3 seconds to enter USB

Setup Mode. These functions including inverter firmware upgrade, data log export and internal parameters re-write from the USB disk.

Procedure	LCD Screen
Step 1: Press and hold ""/U" button for 3 seconds to enter USB function setting mode.	
Step 2: Press ^w (U", ") ¹ の" or " ¹ ¹ ¹ ¹ ¹ ¹ button to enter the selectable setting programs (detail descriptions in Step 3)	UPC ♥ ♥ SEE LOC

Program#	Operation Procedure	LCD Screen
	This function is to upgrade inverter firmware. If firmware upgrade is needed, p	lease check with
Upgrade	your dealer or installer for detail instructions.	
firmware		

}@ :	This function is to over-write all parameter settings (TEXT file) with settings in t USB disk from a previous setup or to duplicate inverter settings. Please check	
Re-write	or installer for detail instructions.	
internal		
parameters		
	By pressing " $\exists \mathfrak{G}''$ button to export data log from USB disk to the inverter. If the selected function is ready, LCD will display " $\vdash \Box \sqcup \sqcup$ ". Press " $\mathfrak{G}/\mathfrak{O}''$ button to	[[[@ @
子 迩:	confirm the selection again.	FqA
Export data	 Press "Definition of the process. It will only display LOG and all LEDs will be on after this action is complete. Then, press "Definition of the process." 	LOC • • 985 NO
	• Or press " f''' button to select "No" to return to main screen.	

If no button is pressed for 1 minute, it will automatically return to main screen.

Error message for USB On-The-Go functions:

Error Code	Messages
UO I	No USB disk is detected.
50U	USB disk is protected from copying.
U03	Document inside the USB disk contains the wrong format.

If any error occurs, error code will only show for 3 seconds. After 3 seconds, it will automatically return to the main screen.

2. Timer Setting for Output Source Priority

This timer setting is to set up the output source priority per day.

Procedure	
Step 1: Press and hold "💬 we button for 3 seconds to enter Timer Setup Mode for output source	US6 🛛
priority.	000 ° 506
Step 2: Press "鄧/心", "宁圖" or "宁岱" button to enter the selectable programs (detail	
descriptions in Step 3).	56U /

Step 3: Please select setting program by following each procedure.

Program#	Operation Procedure	LCD Screen
₩/৩	Press " $\textcircled{P}/\textcircled{O}$ " button to set up Utility First Timer. Press " \textcircled{P} " button to select staring time. Press " \bigstar " or " \checkmark " button to adjust values and press " \bigstar " to confirm. Press " \textcircled{P} " button to select end time. Press " \bigstar " or " \checkmark " button to adjust values, press " \bigstar " button to confirm. The setting values are from 00 to 23, with 1-hour increment.	USB © 00 23

;- 0	Press " 💬 " button to set up Solar First Timer. Press " 💬 " button to select staring time. Press " ▲" or " ▼" button to adjust values and press " ↓" to confirm. Press " ♣" " button to select end time. Press " ▲" or " ▼" button to adjust values, press " ↓" button to confirm. The setting values are from 00 to 23, with 1-hour increment.	SUB @ 00 23
;- 32	Press "➡" button to set up SBU Priority Timer. Press "➡" button to select staring time. Press "▲" or "♥" button to adjust values and press "↓" to confirm. Press "➡" button to select end time. Press "▲" or "♥" button to adjust values, press "↓" button to confirm. The setting values are from 00 to 23, with 1-hour increment.	56U 🎯 00 23

Press " $\mathbb{Y}^{\mathcal{O}}$ " button to exit the Setup Mode.

3. Timer Setting for the Charger Source Priority

This timer setting is to set up the charger source priority per day.

LCD Screen
CS0 ♥ SNU
050
-

Step 3: Please select setting program by following each procedure.

Program#	Operation Procedure	LCD Screen
₿/℃	Press " \textcircled{P}' " button to set up Solar First Timer. Press " \textcircled{P} " button to select staring time. Press " \bigstar " or " \checkmark " button to adjust values and press " \Huge{L} " to confirm. Press " \textcircled{P} " button to select end time. Press " \bigstar " or " \checkmark " button to adjust values, press " \Huge{L} " button to confirm. The setting values are from 00 to 23, with 1-hour increment.	CSO © 00 23
	Press " \bigcirc " button to set up Solar & Utility Timer. Press " \bigcirc " button to select staring time. Press " \checkmark " or " \checkmark " button to adjust values and press " \leftarrow " to confirm. Press " \bigcirc "" button to select end time. Press " \checkmark " or " \checkmark " button to adjust values, press " \leftarrow " button to confirm. The setting values are from 00 to 23, with 1-hour increment.	SNU © 00 23
] 3	Press "♪ " button to set up Solar Only Timer. Press " Dem " button to select staring time. Press " A " or " ▼ " button to adjust values and press " 4 " to confirm. Press " Dem " button to select end time. Press " A " or " ▼ " button to adjust values, press " 4 " button to confirm. The setting values are from 00 to 23, with 1-hour increment.	050 © 00 23
Press "⊮⊄" I	button to exit the Setup Mode.	L

Display Setting

The LCD display information will be switched in turn by pressing the "UP" or "DOWN" button. The selective information will be switched as per the following orders:

Selectable information	LCD display
	Input Voltage=230V, output voltage=230V
Input voltage/Output voltage (Default Display Screen)	
	Input frequency=50Hz
Input frequency	
	PV voltage=260V
PV voltage	
	PV current = 2.5A
PV current	
	PV power = 500W
PV power	

AC and PV charging current=50A
PV charging current=50A
AC charging current=50A
AC and PV charging power=500W
OUTPUT OU
OUTPUT OUTPUT OUTPUT AC charging power=500W
Battery voltage=25.5V, output voltage=230V

	Output frequency=50Hz
Output frequency	
Load percentage	Load percent=70%
Load in VA	When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.
Load in Watt	When load is lower than 1kW, load in W will present xxxW like below chart.
Battery voltage/DC discharging current	Battery voltage=25.5V, discharging current=1A

PV energy generated today and Load output energy today	This PV Today energy = 3.88kWh, Load Today energy= 9.88kWh.
PV energy generated this month and Load output energy this month.	This PV month energy = 388kWh, Load month energy= 988kWh.
PV energy generated this year and Load output energy this year.	This PV year energy = 3.88MWh, Load year energy = 9.88MWh.
PV energy generated totally and Load output total energy.	PV Total energy = 38.8MWh, Load Output Total energy = 98.8MWh.
Real date.	Real date Nov 28, 2017.
Real time.	Real time 13:20.

Main CPU version checking.	Main CPU version 00014.04.
	Secondary CPU version 00003.03.
Secondary CPU version checking.	
	Secondary Bluetooth version 00003.03.
Secondary Bluetooth version checking.	
	BATT

Operating Mode Description

Operation mode	Description	LCD display
Standby mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	No output is supplied by the unit but it still can charge batteries.	Charging by utility and PV energy. Charging by utility. Charging by utility. Charging by PV energy. Charging by PV energy. No charging. No charging.
Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	PV energy and utility can charge batteries.	Charging by utility and PV energy.

Dperation mode De	escription	LCD display
ine Mode	e unit will provide output wer from the mains. It will to charge the battery at e mode.	LCD display Charging by utility and PV energy.

Operation mode	Description	LCD display
Operation mode	Description Image: construction of the second sec	LCD display Power from battery and PV energy. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery at the same time. No utility is available. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only. Image: Comparison of the loads and charge battery only.

Battery Equalization Description

Battery equalization function is built into the charge controller. It reverses the buildup of negative chemical effects such as stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that may have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize the battery periodically.

• How to Activate Equalization Function

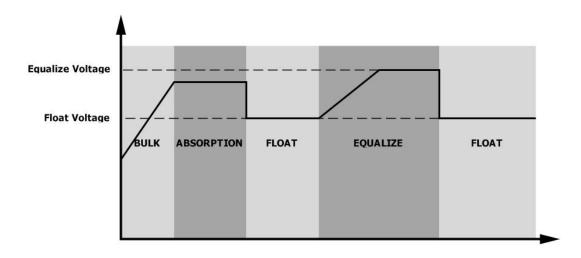
You must enable battery equalization function in LCD setting Program 30 first. You can then apply this function by either one of the following methods:

1. Setting equalization interval in Program 35.

2. Activate equalization immediately in Program 36.

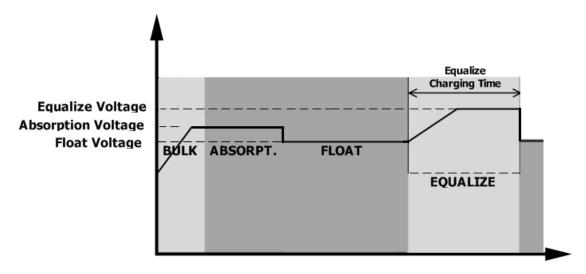
• When to Equalize

In floating charge stage, when setting the equalization interval (battery equalization cycle) is reached, or equalization is activated immediately, the controller will start to enter Equalize Mode.

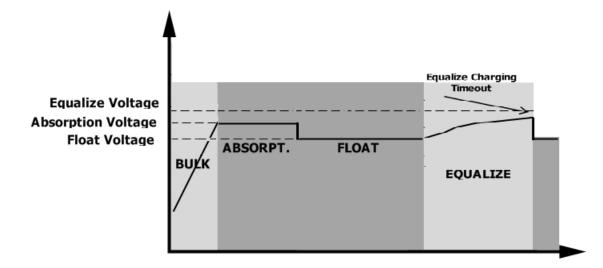


• Equalize Charging and Timeout

In Equalize Mode, the controller will supply power to charge battery as much as possible until battery voltage reach the equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the equalization level. The battery will remain in the Equalize Mode until the equalization timer runs out.



However, in Equalize Mode, if the battery equalization timer runs out and the battery voltage doesn't recover to the battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves equalization voltage. If the battery voltage is still lower than equalization voltage when the extension runs out, the charge controller will stop equalization and return to the floating charging stage.



Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	F8
02	Over temperature	503
03	Battery voltage is too high	F83
04	Battery voltage is too low	F84
05	Output short circuited or over temperature is detected by internal converter components.	FOS
06	Output voltage is too high.	F86
07	Overload time out	F87
08	Bus voltage is too high	F08
09	Bus soft start failed	F89
51	Over current or surge	IFS I
52	Bus voltage is too low	1852
53	Inverter soft start failed	IFS3
55	Over DC voltage in AC output	FSS
57	Current sensor failed	F57
58	Output voltage is too low	F58
59	PV voltage is over limitation	F59

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
02	Over temperature	None	@ 50
03	Battery is over-charged	Beep once every second	[]]@
04	Low battery	Beep once every second	[]Ч∞
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
15	PV energy is low.	Beep twice every 3 seconds	15 @
16	High AC input (>280VAC) during BUS soft start	None	15@
32	Communication failure between inverter and remote display panel	None	32@
69	Battery equalization	None	29 @
6P	Battery is not connected	None	

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	5KW		
Input Voltage Waveform	Sinusoidal (utility or generator)		
Nominal Input Voltage	230Vac		
Low Loss Voltage	170Vac±7V (UPS);		
	90Vac±7V (Appliances)		
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)		
High Loss Voltage	280Vac±7V		
High Loss Return Voltage	270Vac±7V		
Max AC Input Voltage	300Vac		
Nominal Input Frequency	50Hz / 60Hz (Auto detection)		
Low Loss Frequency	40±1Hz		
Low Loss Return Frequency	42±1Hz		
High Loss Frequency	65±1Hz		
High Loss Return Frequency	63±1Hz		
Output Short Circuit Protection	Circuit Breaker		
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)		
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)		
Output power derating: When AC input voltage drops to 170V, the output power will be derated.	Output Power Rated Power 50% Power 90V 170V 280V Input Voltage		

Table 2 Inverter Mode Specifications

INVERTER MODEL	5KW	
Rated Output Power	5KVA/5KW	
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	50Hz	
Peak Efficiency	93%	
Overload Protection	5s@≥130% load; 10s@105%~130% load	
Surge Capacity	2* rated power for 5 seconds	
Nominal DC Input Voltage	48Vdc	
Cold Start Voltage	46.0Vdc	
Low DC Warning Voltage		
@ load < 50%	46.0Vdc	
@ load ≥ 50%	44.0Vdc	
Low DC Warning Return Voltage		
@ load < 50%	47.0Vdc	
@ load ≥ 50%	46.0Vdc	
Low DC Cut-off Voltage		
@ load < 50%	43.0Vdc	
@ load ≥ 50%	42.0Vdc	
High DC Recovery Voltage	62Vdc	
High DC Cut-off Voltage	63Vdc	
No Load Power Consumption	<50W	

Table 3 Charge Mode Specifications

Utility Charging Mode				
INVE	RTER MODEL	5KW		
Charging Algor	ithm	3-Step		
AC Charging C	urrent (Max)	60Amp		
		(@V _{I/P} =230Vac)		
Bulk Charging	Flooded Battery	58.4		
Voltage	AGM / Gel Battery	56.4		
Floating Charg	ing Voltage	54Vdc		
Charging Curve MPPT Solar Charging Mode		2.23Vec 2.23Vec Voltage 100% 50% TO TI = 10 ⁺ T0, minimum Bin Current Bulk (Constant Current) Constant Voltage Time		
INVERTER MOD		5KW		
Max. PV Array I	Power	5000W		
Nominal PV Vol	tage	320Vdc		
Start-up Voltag	e	150Vdc +/- 10Vdc		
PV Array MPPT	Voltage Range	120~450Vdc		
Max. PV Array	Open Circuit Voltage	500Vdc		
Max Charging (Current	80Amp		
(AC charger plu	ıs solar charger)	δυΑπρ		

Table 4 General Specifications

INVERTER MODEL	5KW
Operating Temperature Range	-10°C to 50°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (D*W*H), mm	115 x 300 x 400
Net Weight, kg	10

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do	
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	 Re-charge battery. Replace battery. 	
No response after power on.	No indication.1. The battery voltage is far too low. (<1.4V/Cell)1. Contact re replacing the 2. Re-charge		 Contact repair center for replacing the fuse. Re-charge battery. Replace battery. 	
	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.	
Mains exist but the unit works in battery mode.	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	 Check if AC wires are too thin and/or too long. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance) 	
	Green LED is flashing.	Set "SUB" (solar first) as the priority of output source.	Change output source priority to "USB" (utility first).	
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.	
	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.	
		If PV input voltage is higher than specification, the output power will be derated. At this time, if connected loads is higher than derated output power, it will cause overload.	Reduce the number of PV modules in series or the connected load.	
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.	
		Temperature of internal converter component is over 120°C.	Check whether the air flow of the unit is blocked or whether	
Buzzer beeps	Fault code 02	Internal temperature of inverter component is over 100°C.	the ambient temperature is too high.	
continuously and		Battery is over-charged.	Return to repair center.	
red LED is on.	Fault code 03	The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.	
	Fault code 01	Fan fault	Replace the fan.	
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	 Reduce the connected load. Return to repair center 	
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.	
	Fault code 51	Over current or surge.	Restart the unit, if the error	
	Fault code 52	Bus voltage is too low.	happens again, please retur	
	Fault code 55	Output voltage is unbalanced.	to repair center.	
	Fault code 59	PV input voltage is beyond the specification.	Reduce the number of PV modules in series.	

Appendix A: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 48Vdc 100Ah (min)	Backup Time @ 48Vdc 200Ah (min)
	500	613	1288
	1000	268	613
	1500	158	402
	2000	111	271
5KW	2500	90	215
JNVV	3000	76	182
	3500	65	141
	4000	50	112
	4500	44	100
	5000	40	90

Note: Backup time depends on the quality of the battery, age of battery and type of battery. Specifications of batteries may vary depending on different manufacturers.

Appendix B: BMS Communication Installation

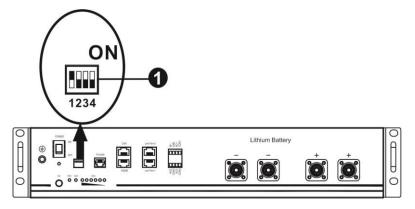
1. Introduction

If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

This custom-made RJ45 communication cable delivers information and signal between lithium battery and the inverter. These information are listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

2. Lithium Battery Communication Configuration



• Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are reserved for battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

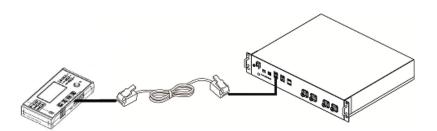
Dip 1	Dip 2	Dip 3	Dip 4	Group address
1: RS485	0	0	0	Single group only. It's necessary to set up master battery with this setting and slave batteries are unrestricted.
baud rate=9600 Restart to take	1	0	0	Two-group condition. It's necessary to set up master battery on the first group with this setting and slave batteries are unrestricted.
effect	0	1	0	Two-group condition. It's necessary to set up master battery on the second group with this setting and slave batteries are unrestricted.

NOTE: "1" is upper position and "0" is bottom position.

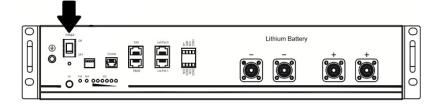
NOTE: The maximum groups of lithium battery is 2 and for maximum number for each group, please check with battery manufacturer.

3. Installation and Operation

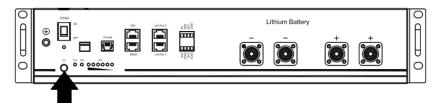
After configuration, please install LCD panel with inverter and Lithium battery with the following steps. Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery, power output ready.



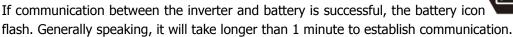
Step 4. Turn on the inverter.



Step 5. Be sure to select battery type as "PYL" in LCD program 5.



PYL





on LCD display will

Active Function

This function is to activate lithium battery automatically while commissioning. After battery wiring and commissioning is successfully, if battery is not detected, the inverter will automatically activate battery if the inverter is powered on.

4. LCD Display Information

Press "▲" or "▼" button to switch LCD display information. It will show battery pack and battery group number before "Main CPU version checking" as shown below.

Selectable information	LCD display
Battery pack numbers & Battery	Battery pack numbers = 3, battery group numbers = 1
group numbers	

5. Code Reference

Related information code will be displayed on LCD screen. Please check inverter LCD screen for the operation.

Code	Description	Action
60 @	If battery status is not allowed to charge and	
	discharge after the communication between the inverter and battery is successful, it will	
	show code 60 to stop charging and discharging battery.	
5 Iø	 Communication lost (only available when the battery type is setting as "Pylontech Battery".) After battery is connected, communication signal is not detected for 3 minutes, buzzer will beep. After 10 minutes, inverter will stop charging and discharging to lithium battery. Communication lost occurs after the inverter and battery is connected successfully, buzzer beeps immediately. 	
62 @	Battery number is changed. It probably is because of communication lost between battery packs.	Press "UP" or "DOWN" key to switch LCD display until below screen shows. It will have battery number re-checked and 62 warning code will be clear.