User Manual

SOLAR INVERTER 3KW

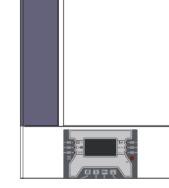




Table Of Contents

ABOUT THIS MANUAL	1
Purpose ·····	1
Scope	1
SAFETY INSTRUCTIONS	1
INTRODUCTION	2
Features ·····	2
Basic System Architecture	2
Product Overview	3
INSTALLATION	4
Unpacking and Inspection	4
Preparation ·····	4
Mounting the Unit	4
Battery Connection · · · · · · · · · · · · · · · · · · ·	5
AC Input/Output Connection	7
PV Connection	9
Final Assembly · · · · · · · · · · · · · · · · · · ·	11
Remote Display Panel Installation	11
Communication Connection	12
Dry Contact Signal	12
OPERATION	12
Power ON/OFF ·····	
Operation and Display Panel	13
LCD Display Icons	15
LCD Setting	21
Display Setting	
Operating Mode Description	27
Battery Equalization Description	29
Fault Reference Code ·····	30
Warning Indicator ·····	30
SPECIFICATIONS	
Table 1 Line Mode Specifications	31
Table 2 Inverter Mode Specifications	
Table 3 Charge Mode Specifications	
Table 4 General Specifications	
TROUBLE SHOOTING	34
Annendiy: Annrovimate Back-up Time Table	36

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: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

- 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/charger, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- · Pure sine wave inverter
- \cdot Configurable input voltage range for home appliances and personal computers via LCD setting
- · Configurable battery charging current based on applications via LCD setting
- · Configurable AC/Solar Charger priority via LCD setting
- · Compatible to mains voltage 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
- ·Reversed communication port for BMS (RS485, CAN-BUS, RS232)
- ·Build-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 inverter/charger. It also includes following devices to have a complete running system:

- · Generator or Utility.
- ·PV modules

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

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

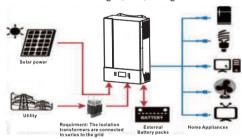
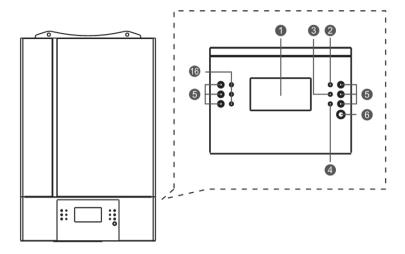


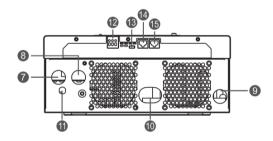
Figure 1 Hybrid Power System

One detection device needs be connected between the PV + and PV- & the ground, to ensure leakage current between PV + and PV- & the ground is less than 30mA.

Isolation transformer Specs. : 10 KW - 220:220 V 60*100 single phase Isolation transformer.

Product Overview





- 1. LCD display
- 2. Status indicator
- 3. Charging indicator
- 4. Fault indicator
- 5. Function buttons
- 6. Power on/off switch
- 12. Dry contact
- 13. USB communication port
- 14. BMS Communication port: CAN and RS232 or RS485
- 15. RS-232 communication port
- 16. LED indicators for USB function setting/ Output source priority timer / Charger source priority setting

- 8. AC output
- 9. PV input
- 10. Battery input
- 11. Circuit breaker

INSTALLATION

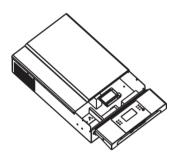
Unpacking and Inspection

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

- ·The unit x 1
- ·User manual x 1
- ·RS232 Communication cable x 1

Preparation

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



Mounting the Unit

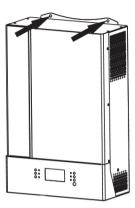
Consider the following points before selecting where to install:

- · Do not mount the inverter on flammable construction materials.
- · Mount on a solid surface
- ·Install this inverter at eye level in order to allow the LCD display to be read at all times.
- ·For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and belowthe unit.
- ·The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- ·The recommended installation position is to be 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 removing wires.



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

Install the unit by screwing two screws. 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 disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.

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 for battery connection. To reduce risk of injury, please use the proper recommended cable as below.

Ring terminal:

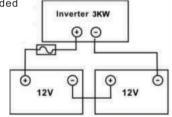


Recommended battery cable size:

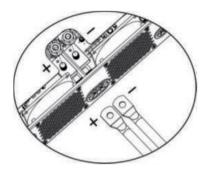
Model	Typical	Wire Size	Cable	Ring Termina	l Dimensions	Torque
Wodei	Amperage	Wile Size	(mm²)	D(mm)	L(mm)	value
3KW	148A	1 x 2AWG	38	8.4	39.2	5 Nm

Please follow below steps to implement battery connection:

- 1.Assemble battery ring terminal based on recommended battery cable and terminal size.
- 2.Connect all battery packs as units requires. It's suggested to connect at least 100Ah capacity battery for 3KW model and at least 200Ah capacity battery for 5KW model.



3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 5 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed 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 the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.

CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 32A for 3KW and 50A for 5KW. **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis -connect input and output 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 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(mm²)	Torque value
3 KW	12AWG	4	1.2 Nm

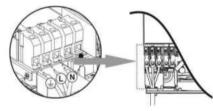
Please follow below steps to implement AC input/output connection:

- 1.Before making AC input/output connection, be sure to open DC protector or disconnector first.
- 2.Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
- 3.Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (+) first.

 \oplus \rightarrow Ground (yellow-green)

L→LINE (brown or black)

N→Neutral (blue)





WARNING:

Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.

Be sure to connect PE protective conductor (1) 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 are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter/charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

CAUTION: Before connecting to PV modules, please install separately a DC circuit breaker between 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 recommend cable size as below.

Model	Wire Size	Cable(mm²)	Torque value(max)
3KW	1 x 12AWG	4	0.8 Nm

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.

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 below parameters:

- 1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- 2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

INVERTER MODEL	3KW
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	120Vdc~450Vdc

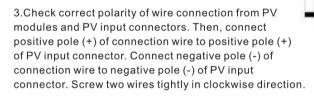
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

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

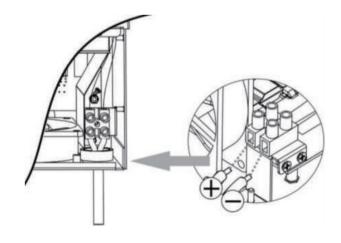
PV Module Wire Connection

Please follow below steps to implement PV module connection:

- 1.Remove insulation sleeve 7 mm for positive and negative conductors.
- 2.Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.

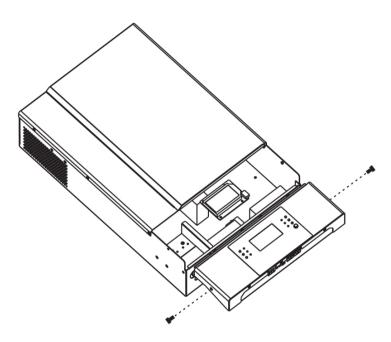


Recommended tool: 4mm blade screwdriver

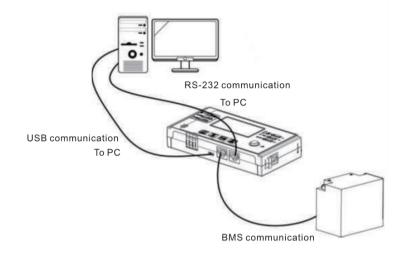


Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws as shown below.



Connect LCD panel to the inverter with an optional RJ45 communication cable as below chart.



Communication Connection

Serial Connection

Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

Wifi Connection

This series is built in Wifi technology. It allows wireless communication up to 6~7m in an open space.



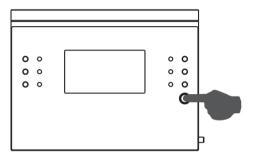
Dry Contact Signal

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	Condition			Condition			Dry con	
				NC & C	NO & C			
Power Off	Unit is	off and no o	utput is powered.	Close	Open			
	Out	put is power	ed from Utility.	Close	Open			
	Output is powered from Battery power or Solar Program 01 set as USB (utility first) Program 01 is set as SBU		Battery voltage < Low DC warning voltage	Open	Close			
Power On		Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open				
		01 is set	Battery voltage < Setting value in Program 12	Open	Close			
	energy.	(SBU priority) or SUB (solar first)	Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open			

OPERATION

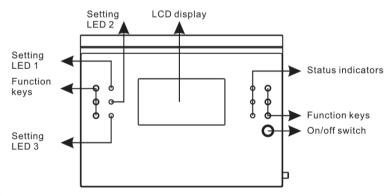
Power ON/OFF



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

Operation and Display Panel

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



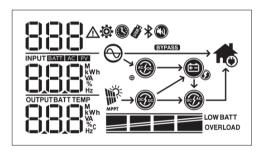
Indicators

LED In	LED Indicator (Solid/Flashing	Messages		
Setting	Setting LED 1		ing LED 1 Gree		Solid On	Output powered by utility
Setting	Setting LED 2		Solid On	Output powered by PV		
Setting	LED 3	Green	Solid On	Output powered by battery		
		0	Solid On	Output is available in bypass mode		
	₩INV	Green	Flashing	Output is powered by battery in inverter mode		
Status	O CHG	Green	Solid On	Battery is fully charged		
indicators	CHU	Green	Flashing	Battery is charging		
	FALLET	Pod	Solid On	Fault mode		
	FAULI	FAULT Red	Flashing	Warning mode		

Function Keys

Fu	unction Key	Description	
₩/ U	ESC	Exit the setting	
USB function setting		Select USB OTG functions	
	Timer setting for the Output source priority	Setup the timer for prioritizing the output source	
] \$	Timer setting for the Charger source priority	Setup the timer for prioritizing the charger source	
_	Up	To last selection	
~	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		
INPUTBATT AC PY	Indicate input voltage, input frequency, PV voltage, charger current, charger power, battery voltage.		
Configuration Progra	m and Fault Information		
8.8.8°	Indicates the setting programs.		
888 ø	Indicates the warning and fault codes. Warning: 888 flashing with warning code. Fault: 888 lighting with fault code		

Output Information

OUTPUTBATTEMP

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.

In AC mode, it will present battery charging status.

Status	Battery voltage	LCD Display
	<2V/cell	4 bars will flash in turns.
Constant Current mode	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
/ Constant Voltage mode	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.

In battery mode, it will present battery capacity.

attery mode, it will pro		
Load Percentage	Battery Voltage	LCD Display
	<1.85V/cell	LOWBATT
Load > 50%	1.85 ~ 1.933V/cell	BATT
Load >50%	1.933 ~ 2.017V/cell	BATT
	> 2.017 V/cell	BATT
	<1.892V/cell	LOWBATT
Load < 50%	1.892 ~ 1.975V/cell	BATT
Load < 50%	1.975 ~ 2.058V/cell	BATT
	> 2.058 V/cell	BATT

Mode Operation Info	Mode Operation Information				
Θ	Indicates unit connects to the mains				
MAPPE	Indicates unit connects to the PV panel				
(BYPASS)	Indicates load is supplied by utility power				
	Indicates the utility charger circuit is working				
	Indicates the solar charger circuit is working				
	Indicates the DC/AC inverter circuit is working				
	Indicates unit alarm is disabled				
8	Indicates Bluetooth/Wifi is connected				
USB	Indicates USB disk is connected				
(L)	Time display page				

LCD Setting

General Setting

After pressin and holding' \(\ldot\) 'button for 3 seconds, the unit will enter setting mode. press' \(\ldot\) 'or' \(\ldot\) 'Button to select setting programs. And then, press' \(\ldot\) 'button to confirm the selection or' \(\ldot\) 'button to exit.

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape 00 •	
		ESC	

Program	Description	Selectable option		
		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 OI * SUb	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, utility will supply power the loads at the same time. If there is no utility power and the solar is insufficient, battery will power the load.	
		SBU priority O I * SbU	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. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.	
		10A D2 •	20A 02 *	
		108	208	
	Maximum charging current:To configure	30A 02 •	40A 02 *	
02	total charging current for solar and utility chargers.	308	408	
	(Max.charging current=utiliy charging current	50A 02 *	60A (default) 02 *	
	+solar charging current)	508	608	
		70A 02 *	80A 02 *	
		708	808	

Program	Description	Selectable option			
	AC input voltage range	Appliances (default)	03 * 8PL	If selected, acceptable AC input voltage range will be within 90-280VAC	
03		UPS	03 * UPS	If selected, acceptable AC input voltage range will be within 170 -280VAC	
		AGM (default)	85 *	Flooded 05 *	
			86ი	FLS	
05	Battery type	User -Defined	OS *	If "User-Defined" is selected, battery charge voltage and low DC cut-off	
			USE	voltage can be set up in program 26, 27 and 29	
06	Auto restart when overload occurs	Restart disable	06 🌣	Restart 06 o	
		(default)	LFd	LFE	
07	Auto restart when over temperature	Restart disable	07 ©	Restart 0 0	
	occurs	(default)	FFG	Ł⊦E	
		50Hz	09 🌣	09 🌣	
09	Output frequency	Output frequency	(default)	50.	60Hz 60 L
			. ID @	230V	
10	Output voltage	220V	950	(default)	
			10 0		
		240V	240		

	Program	Description	Selectable option			
			2A	110	10A	0
				5.		10.
		Maximum utility charging current		110	20.4	110
	11	Note: If setting value in program 02 is smaller than that in	20A	50·	30A (default)	30∙
	"	program in 11, the inverter will apply		110		110
		charging current from program 02 for utility charger.	40A	40.	50A	50-
				110		
			60A	60·		
			22.0V	15 @		15 @
		Setting voltage point back to utility source		~ 0.5 Patt	22.5V	22.5
			23.0V (default)	15 @		15 @
				2 <u>B</u> ATT v	23.5V	2 3.5 v
		priority" or "solar		15 ⊚		15 @
			24.0V	2 Ч∏ ∨	24.5V	Z 45 v
				•		15 @
		25.0V	25.0 v	25.5V	25.5 v	

Program	Description		Selectal	ole option	
		Battery	{∃ ®	24V	(∃ ⊚
		fully charged	FUL	240	24.0
		0.4.537	(3 ©	05)/	(∃ 🍩
		24. 5V	24.5 v	25V	25.0 v
		05.5)/	(∃ ⊚	201/	(3 ©
40	Setting voltage point back to battery mode when selecting "SBU"	25.5V	25.5 v	26V	26.0 v
13	(SBUpriority) or "SUB" (solar first) in program 01.	20.51/	(∃ ⊚	27V	(∃ 🍩
	program o r.	26.5V	26.5 v	(default)	Z ∏∏ v
		27.5V	(∃ ⊚	001/	(3 ©
			2 7.5 v	28V	ZBII v
		00.51/	(3 ©	001/	(3 ©
		28.5V	28.5 v	29V	290 v
		If this inverter/charger is working in Line, Standby Fault mode, charger source can be programmed a below:			
	Charger source	Solar	¦E ⊚	battery as i	gy will charge irst priority.
		first	C50		harge battery solar energy is le.
		Solar and Utility	15 ⊚		y and utility
16	priority: To configure charger source priority	(default)	SNU	will charge battery at the same time.	battery at the
		Only	(6 ❷	Solar energ	gy will be the er source no
		Solar	050	matter utili or not.	ty is available
		Powersaving	er/charger is wo g mode, only so r energy will ch t.	olar energy cai	n charge

Program	Description	Selectable option			
18	Alarm control	Alarm on (default)	(8 ⊗	Alarm off	{B ⊚
		(derault)	P0U		60F
19	Auto return to default display screen	Return to de screen (defa	fault display nult) (9 ESP	users switch	automatically ault display t voltage ge) after no
	display screen	Stay at lates	t screen	screen will	the display stay at latest
			⊦EP	screen user switches.	r finally
20	Backlight control	Backlight on (default)	50 ®	Backlight off	50 💩
			LON	Oii	LOF
22	Beeps while primary source is interrupted	Alarm on (default)	55 💩	Alarm off	55 💩
	source is interrupted		RON		ROF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload	Bypass disable	23 ®	Bypass enable	55 💩
	occurs in battery mode.	(default)	РЯЧ		PAE
25	Record Fault code	Record enable	25 🛮	Record disable	25 🛮
		(default)	FEN	disable	FdS
26	Bulk charging voltage (C.V voltage)	282√ <u>Cu</u>			
		can be set u	p. Setting ran	in program 5, t ge is from 25.0 each click is 0	V to 31.5V for

Program	Description	Selectal	ble option
27	Floating charging voltage	27 ® F <u>L</u> " 210v	
		If self-defined is selected can be set up. Setting ran for 3KW model . Incremen	
29	Low DC cut-off voltage	If self-defined is selected in program 5, this program can be set up. Setting range is from 21.0V to 24.0V	
		for 3KW model . 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.	
		Battery equalization	Battery equalization disable (default)
30	Battery equalization	EEN	E45
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
31	Battery equalization voltage	5 <u>8</u> 2^ E⊓ ∃ (®	
		Setting range is from 25.0 Increment of each click is	V to 31.5V for 3KW model . 0.1V.

Program	Description	Selectable option		
33	Battery equalized time	60min (default)	Setting range is from 5min to 900min. Increment of each click is 5min.	
		60		
34	Battery equalized timeout	120min (default) 금낙 [©]	Setting range is from 5min to 900min. Increment of each click is 5min.	
		120		
35	Equalization interval	30days (default) 35 ®	Setting range is from 0 to 90 days. Increment of each click is 1 day	
		304		
		Enable ∃Б ®	Disable (default) ∃Б ◎	
	Equalization activated	ЯЕП	RdS	
36	immediately	If equalization function is enabled in program 3 program can be set up. If "Enable" is selected in program, it's to activate battery equalization immediately and LCD main page will shows "E "Disable" is selected, it will cancel equalization function until next activated equalization time a based on program 35 setting. At this time, "E9 not be shown in LCD main page.		
37	Reset PV and Load	Not reset(Default)	Reset	
37	energy storage	ПгЕ	-5E	
		Not reset(Default)	Reset	
93	Erase all data log	93 🛮	93 🛛	
		ПсЕ	rSE	

Program	Description	Selectable option		
, .		3 days	5 days	
		94 🛮	94 ⊚	
		3	5	
		10 days(Default)	20 days	
94	Data log stored period	94 ◎	94 🛮	
		10	20	
		30 days	60 days	
		94 🛛	94 🛛	
		30	60	
		For minute setting, the range is from 00 to 59		
95	Time setting – Minute	95 🛮		
		ا ا		
		00		
		For hour setting, the range	e is from 00 to 23	
96	Time setting – Hour	96 🔮		
		XOU 00		
			in from 00 to 24	
		For day setting, the range	15 110111 00 to 3 1	
97	Time setting– Day	31°		
		For month setting, the ran	ge is from 01 to 12	
98	Time setting– Month	98 🛛		
		~ <u>0</u> ∏		
		01		
		For year setting, the range	e is from 16 to 99	
99	Time setting – Year	99 🛮		
		46 46		
		10		

Function 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

Please insert USB disk into USB port (). Press and hold " () button for 3 seconds to enter USB function setting mode. These functions include to upgrade inverter firmware, export data log and re-write internal parameters from USB disk.

Procedure	LCD Screen
Step 1: Press and hold " 🖥/७ " button for 3 seconds to enter USB function setting mode.	
Step 2: Press " ∰/o ", " → " or " → " button to enter the selectable setting programs.	5EL LOG

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

Program#	Operation Procedure	LCD Screen
圏/ シ	If pressing " () () " button to proceed the firmware upgrade function. If the selected function is ready, LCD will display " 노ਰ노 ". Please press " () " button to confirm the selection again.	구 주 구 구 구 구 구 구 구 구 구 구 구 구 구 구 구 구 구 구
Upgrade firmware	Press "	115 115 115 115 115 115 115 115 115 115
If pressing " button to proceed parameters re-write from USB function. If selected function is ready, LCD will display " H d y ". Please press " U" button to confirm the selection again.		⊦97 2EF ® ©
parameters	Press " 子雪 " to select "Yes" or " 子勁 " button to select "No". Then, press " 劉/o " button to exit setting mode.	SEF ® AE2 UU

Program#	Operation Procedure	LCD Screen
Export data log	If pressing " 100 " button to export data log from USB disk to the inverter. If selected function is ready, LCD will display " + d \(\frac{1}{2} \) ". Please press " \(\frac{1}{2} \) " button to confirm the selection again. Press " \(\frac{1}{2} \) " to select "Yes" or " \(\frac{1}{2} \) " button to select "No". Then, press " \(\frac{1}{2} \) " button to exit setting mode.	100 & • F 9 A A A A A A A A A A A A A A A A A A
	IMPORTANT NOTE: After this function is executed, partial LCD setting programs will be locked. For the detailed information, please check your installer directly.	

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.
005	USB disk is protected from copy.
U03	Document inside the USB disk with wrong format.

If any error occurs, error code will only show 3 seconds. After three seconds, it will automatically return todisplay screen.

2. Timer Setting for Output Source Priority

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

Procedure	LCD Screen
Step 1: Press and hold " 🍱 " button for 3 seconds to enter timer setting mode for output source priority.	US b ⊗
Step 2: Press " ∰/o ", " → " or " → " button to enter the selectable setting programs.	506 560

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

Program#	Operation Procedure	LCD Screen
∰/∪	If pressing " ∰/o" button to set up timer. Press " → " to select start time. Press " ヘ " or " ✓ " button to set the start time and then press " ← " button to confirm. Press " → " button to select end time. Press " ヘ " or " ✓ " button to set the end time and then press " ← " button to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	77 00 7 8 8

Program#	Operation Procedure	LCD Screen
] -99	If pressing "→ " button to set up timer. Press "→ " to select start time. Press " → " or " ✓ " button to set the start time and then press " → " button to confirm. Press "→ " button to select end time. Press " → " or " ✓ " button to set the end time and then press " → " button to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	53 00 8
∌∞	If pressing " a " button to set up timer. Press " to select start time. Press " n or " n outton to set the start time and then press " n or " n outton to set the start time and then press " n outton to confirm. Press " n outton to select end time. Press " n or " n outton to set the end time and then press " n outton to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	59 00 2PN ®

Press "

" button to exit setting mode.

3. Timer Setting for the Charger Source Priority

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

Procedure	LCD Screen
Step 1: Press and hold " 🖽 " button for 3 seconds to enter timer setting mode for charger source priority.	[50 © 50U
Step 2: Press " ∰/o ", " 尹■ " or " 尹④ " button to enter the selectable setting programs.	050

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

Program#	Operation Procedure	LCD Screen
∰/∪	If pressing " o " button to set up timer. Press " o " to select start time. Press " o " o " v " button to set the start time and then press " u " button to confirm. Press " o " button to select end time. Press " o " o " button to select end time and then press " u " button to set the end time and then press " u " button to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	C50 ♥ 00 23
∄•	If pressing " he " button to set up timer. Press " To select start time. Press " " or " " " button to set the start time and then press " " button to confirm. Press " hutton to select end time. Press " " or " " button to set the end time and then press " button to set the end time and then press " button to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	5NU ® 00 23

Program#	Operation Procedure	LCD Screen
∌∞	If pressing " 100 " button to set up timer. Press " 100 " to select start time. Press" 100 " v" button to set the start time and then press " 100 " button to confirm. Press " 100 " button to select end time. Press" 100 " or " v" button to set the end time and then press" 100 " button to confirm. The setting range is from 00 to 23. Increment of each click is 1 hour.	050 © 00 23

Press " 🖔 " button to exit setting mode.

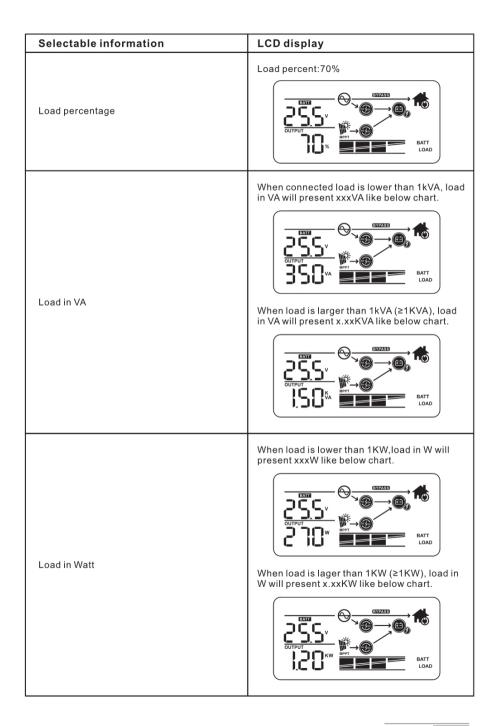
Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as the following table in order.

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V
Input frequency	Input frequency=50Hz Suzzass Output Batt Load
PV voltage	PV voltage=260V OUTPUT OUTPUT OUTPUT BATT LOAD

Selectable information	LCD display
PV current	PV current = 2.5A INPUT OUTPUT OUTPUT OUTPUT BATT LOAD
PV power	PV power = 500W SOLUTION OUTPUT BATT LOAD
Charging current	AC and PV charging current=50A OUTPUT OUTPUT

Selectable information	LCD display
Charging power	AC and PV charging power=500W PV charging power=500W AC charging power=500W AC charging power=500W BAIT LOAD BAIT LOAD BAIT LOAD BAIT LOAD
Battery voltage and output voltage	Battery voltage=25.5V,output voltage=230V
Output frequency	Output frequency=50Hz Output Output Solution Output Bartt Load



Selectable information	LCD display
Battery voltage/Inverter temperature and solar charger controller temperature inside (Inverter temperature and SCC temperature is displayed in turns)	Battery voltage=25.5V, Inverter temperature=50°C STATES STATES BATT LOAD BATT LOAD BATT LOAD
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 Today energy=988kWh.

Selectable information	LCD display
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 00020.43.

Selectable information	LCD display
Secondary CPU version checking	Secondary CPU version 00001.08.
Wifi version checking	Wifi version 00002.00.

Operating Mode Description

Operation mode	Description	LCD display
Standby mode / Power saving mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output. *Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.	No output is supplied by the unit but it still can charge batteries	Charging by utility and PV energy BATT Charging by utility BATT Charging by PV energy. BATT No charging

Operation mode	Description	LCD display
Fault mode		Charging by utility and PV energy
Note:		Charging by utility
*Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and	PV energy and utility can charge batteries.	⊕
so on.		
		Charging by PV energy.
		No charging
	The unit will porvide output power from the mains. It will also charge the battery at line mode.	Charging by utility and PV energy
Line Mode		Charging by utility
	The unit will provide output power from the mains. It will also charge the battery at line mode.	If "SUB" (solar first) is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will provide the loads and charge the battery at the same time.

Operation mode	Description	LCD display
Line Mode	The unit will provide output power from the mains.It will also charge the battery at line mode.	If "SUB" (solar first) is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads. Power from utility BATT LOAD
Batter Mode	The unit will provide output power from battery and/or PV power	Power from battery and PV energy. BATT LOAD PV energy will supply power to the loads and charge battery at the same time. No utility is available. Power from battery only. BATT LOAD Power from battery only.
	The unit will provide output power from battery and PV power	Power from PV energy only.

Battery Equalization Description

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like 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 might 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 battery periodically.

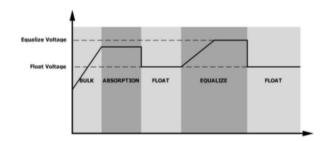
• How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 30 first. Then, you may apply this function in device by either one of following methods:

- 1. Setting equalization interval in program 35.
- 2. Active equalization immediately in program 36.

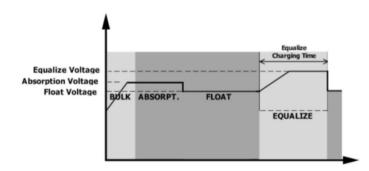
When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

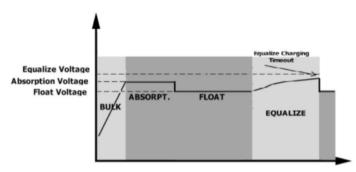


• Equalize charging time and timeout

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off	F0 (
02	Over temperature	F02
03	Battery voltage is too high	F03
04	Battery voltage is too low	FOY
05	Output short circuited or over temperature is detected by internal converter components	F05
06	Output voltage is too high	F06
07	Overload time out	F07
08	Bus voltage is too high	F08
09	Bus soft start failed	F09
51	Over current or surge	F5
52	Bus voltage is too low	F52
53	Inverter soft start failed	F53
55	Over DC voltage in AC output	F55
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	020
03	Battery is over-charged	Beep once every second	03 0
04	Low battery	Beep once every second	[] H@
07	Overload	Beep once every 0.5 second	LOAD
10	Output power derating	Beep twice every 3 seconds	100
15	PV energy is low	Beep twice every 3 seconds	150
16	High AC input (>280VAC) during BUS soft start	None	150
32	Communication interrupted	None	32 0
E9	Battery equalization	None	E90
ьР	Battery is not connected	None	6₽ ⊗ =====

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	3KW	
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	Sinusoidal (utility or generator) Output Power Fated Power 90V- 170V- 280V- Input Voltage-	

Table 2 Inverter Mode Specifications

INVERTER MODEL	3KW
Rated Output Power	3KVA/3KW
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	24Vdc
Cold Start Voltage	23.0Vdc
Low DC Warning Voltage @ load < 50% @ load ≥ 50%	23.0Vdc 22.0Vdc
Low DC Warning Return Voltage @ load < 50% @ load ≥ 50%	23.5Vdc 23.0Vdc
Low DC Cut-off Voltage @ load < 50% @ load ≥ 50%	21.5Vdc 21.0Vdc
High DC Recovery Voltage	32Vdc
High DC Cut-off Voltage	33Vdc
No Load Power Consumption	<35W

Table 3 Charge Mode Specifications

Utility Charging Mode		
INVERTER N	IODEL	3KW
Charging Algor	ithm	3-Step
AC Charging C	urrent (Max)	60Amp (@VI/P=230Vac)
Bulk Charging	Flooded Battery	29.2
Voltage	AGM / Gel Battery	28.2
Floating Charg	ing Voltage	27Vdc
Floating Charging Voltage Charging Curve		Setting Violage, per cel. Charging Committ 5 Authority Charges Voltage 1975. Assembler Committy Charges Charges Manage Total Charges Total Assembler Committy Charges Charges Manage Total

MPPT Solar Charging Mode	
INVERTER MODEL	3KW
Max. PV Array Power	4000W
Nominal PV Voltage	240Vdc
PV Array MPPT Voltage Range	120~450Vdc
Max. PV Array Open Circuit Voltage	500Vdc
Max Charging Current (AC charger plus solar charger)	80Amp

Table 4 General Specifications

INVERTER MODEL	3KW
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	130 x 300 x 492
Net Weight, kg	9.3

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.	The battery voltage is far too low. (<1.4V/Cell) Internal fuse tripped.	Contact repair center for replacing the fuse. Re-charge battery. Replace battery.
Mains exist but the unit works in battery mode.	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.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. 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).

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do	
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.	
Buzzer beeps continuously and red LED is on.	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 the ambient temperature is too high.	
	Fault code 02	Internal temperature of inverter component is over 100°C.		
	Fault code 03	Battery is over-charged.	Return to repair center.	
		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	
	Fault code 52	Bus voltage is too low.	error happens again, please return to repair center.	
	Fault code 55	Output voltage is unbalanced.		
	Fault code 59	PV input voltage is beyond the specification.	Reduce the number of PV modules in series.	

Appendix: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 24Vdc 100Ah (min)	Backup Time @ 24Vdc 200Ah (min)
3KW	300	449	1100
	600	222	525
	900	124	303
	1200	95	227
	1500	68	164
	1800	56	126
	2100	48	108
	2400	35	94
	2700	31	74
	3000	28	67
	3200	25	61