User Manual

3KW/5KW INVERTER / CHARGER

Table Of Contents

ABOUT THIS MANUAL	
Purpose	1
Scope	
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	
PV Connection	
Final Assembly	
Remote Display Panel Installation	
Communication Connection	
Dry Contact Signal	
OPERATION	11
Power ON/OFF	
Operation and Display Panel	
LCD Display Icons	
LCD Setting	
Display Setting	
Operating Mode Description	
Fault Reference Code	
Warning Indicator	
Battery Equalization	
SPECIFICATIONS	
Table 1 Line Mode Specifications	
Table 2 Battery Mode Specifications	
Table 3 Charge Mode Specifications	
Table 4 ECO/Bypass Mode Specifications	
TROUBLE SHOOTING	39
PARALLEL FUNCTION	40
Annendiy I: Annrovimate Back-un Time Table	55

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. Fuses are 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.

INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, MPPT 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
- Built-in MPPT solar charge controller
- 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
- Zero-transfer Time

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.

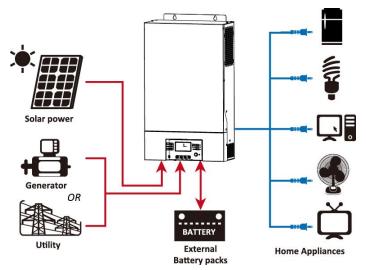
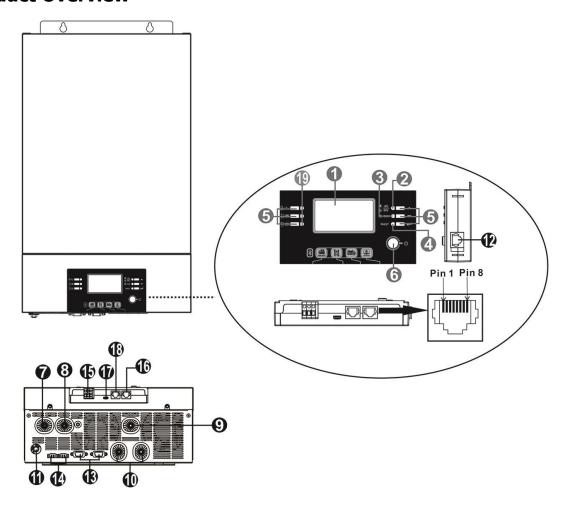


Figure 1 Hybrid Power System

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. Parallel communication port (only for parallel model)
- 14. Current sharing port (only for parallel model)
- 15. Dry contact
- 16. RS-232 communication port
- 17. USB port
- 18. BMS communication port: CAN and RS232 or RS485
- 19. LED indicator for USB function settings

NOTE: For parallel model installation and operation, please check separate parallel installation guide for the details.

INSTALLATION

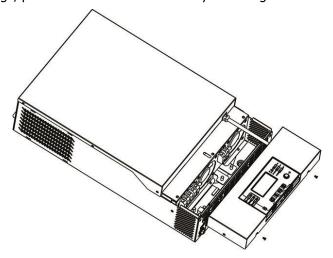
Unpacking and Inspection

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
- · Communication cable x 1
- Software CD x 1

Preparation

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



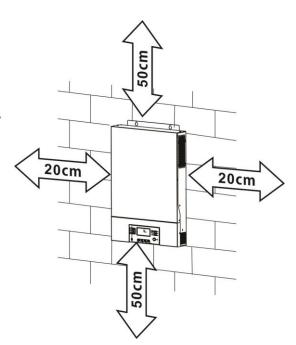
Mounting the Unit

Consider the following points before selecting where to install:

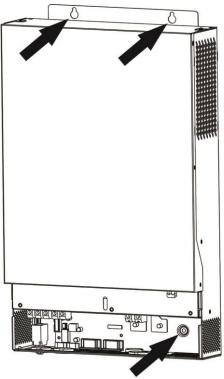
- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the right 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 three screws. It's recommended to use M4 or M5 screws.

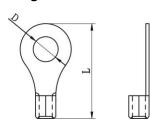


Battery Connection

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. **Ring terminal:**

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 and terminal size as below.

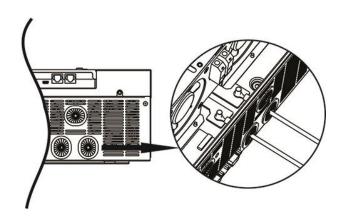


Recommended battery cable and terminal size:

Model	Typical	Battery	Wire Size	R	Ring Terminal		Torque
	Amperage	Capacity		Cable	Dimensions		Value
				mm²	D (mm)	L (mm)	
21/11/	2004	200411	1*1/0AWG	60	6.4	49.7	2 .2 Nm
3KW	200A	200AH	2*4AWG	44	6.4	49.7	2~3 Nm
EKW	2004	20041	1*1/0AWG	60	6.4	49.7	22 Nm
5KW	200A	200AH	2*4AWG	44	6.4	49.7	2~3 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 200Ah 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 2-3 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.



<u>/</u>!\

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 30A for 3KW, 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.

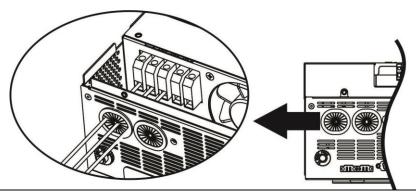
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
3KW	10 AWG	1.2~ 1.6 Nm
5KW	8 AWG	1.4~ 1.6Nm

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 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.
 - **⊕**→Ground (yellow-green)
 - L→LINE (brown or black)
 - N→Neutral (blue)



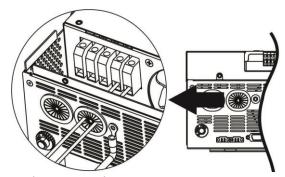
<u>/</u>!\

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 () first.
 - **Ground** (yellow-green)
 - L→LINE (brown or black)

N→Neutral (blue)



Make sure the wires are securely connected.

CAUTION: Important

Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

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.

CAUTION: Important

When input source is the generator, it's suggested to choose the generator by following parameters:

- The recommend generator rating should be at least 2X of inverter capacity.
- Generator output: Pure Sine Wave
- Generator output voltage rms range: 180 ~ 270Vac
- Generator output frequency range: 45Hz ~ 63Hz

It's recommended to test the generator with the inverter before the installation. Few generators complied above parameters may still not be accepted by the inverter as the input source.

PV Connection

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

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

WARNING! It'' 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 as below.

Model Typical Amperage		Cable Size	Torque
3KW	60A	6 AWG	1.2~1.6 Nm
5KW	80A	o Awg	1.2~1.0 NIII

PV Module Selection:

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

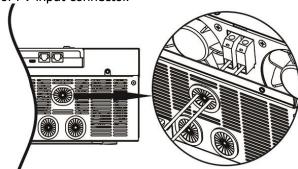
- 1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- 2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Solar Charging Mode						
INVERTER MODEL 3KW 5KW						
Max. PV Array Open Circuit Voltage 145Vdc						
PV Array MPPT Voltage Range	30~115Vdc	60~115Vdc				

Please follow below steps to implement PV module connection:

- 1. Remove insulation sleeve 10 mm for positive and negative conductors.
- Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.

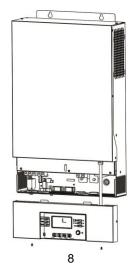




3. Make sure the wires are securely connected.

Final Assembly

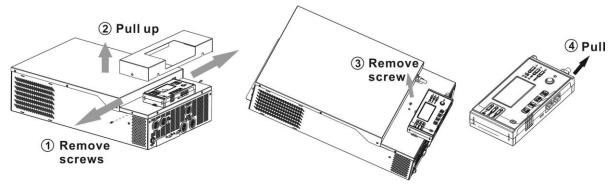
After connecting all wirings, please put bottom cover back by screwing two screws as shown on the below chart.



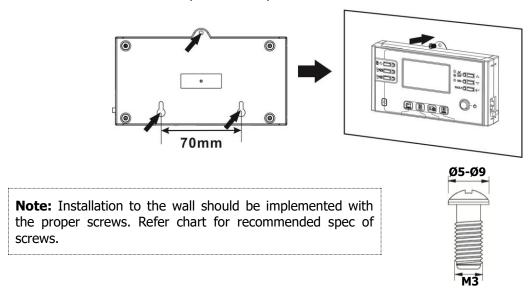
Remote Display Panel Installation

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

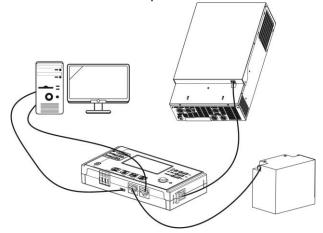
Step 1. Loosen the screw on the two sides of bottom case and push up the case cover. Then, remove screw on the top of the display panel. Now, the display can be removed from the bottom case. Then, pull out the cable from the remote communication port.



Step 2. Drill two holes in the marked locations with two screws as shown below chart. Place the panel on the surface and align the mounting holes with the two screws. Then, use one more screw on the top to fix the panel to the wall and check if the remote panel is firmly secured.



Step 3. 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.

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 $6 \sim 7$ 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		(Dry contact port: NC C NO		
				NC & C	NO & C
Power Off	Unit is off an	d no output is	powered.	Close	Open
	Output is pov	wered from Uti	lity.	Close	Open
	Output is powered	Program 01 set as USB	Battery voltage < Low DC warning voltage	Open	Close
Deviser On	from Battery power or	(utility first)	Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
Power On	Solar energy.	Program 01 is set as	Battery voltage < Setting value in Program 12	Open	Close
		SBU (SBU priority) or SUB (solar first)	Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open

BMS Communication

If connecting to lithium battery, it's requested to buy a special communication cable. For the detailed BMS communication and installation, please check Appendix B – BMS Communication Installation.

OPERATION

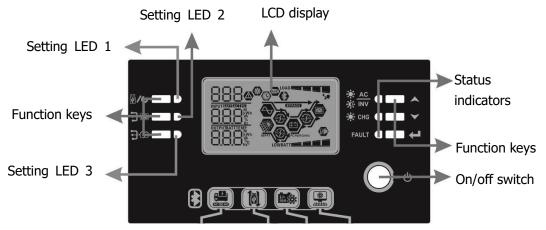
Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) 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 three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



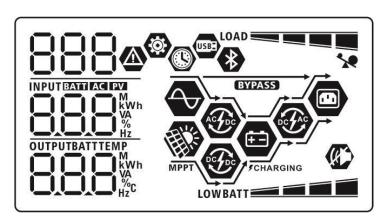
LED Indicators

	LED Indi	cator		Messages
Setting LED1		Green	Solid On	Output powered by utility
Setting	LED2	Green	Solid On	Output powered by PV
Setting	LED3	Green	Solid On	Output powered by battery
	→ AC	Green	Solid On	Output is available in bypass mode
	→ AC → INV		Flashing	Output is powered by battery or AC in inverter mode
Status	Status		Solid On	Battery is fully charged
Indicator - CHG		Green	Flashing	Battery is charging.
	EALILT	Red	Solid On	Fault mode
	FAULT		Flashing	Warning mode

Function Keys

Function Key		Description
ESC		Exit setting mode
USB function setting		Select USB OTG functions
	Up To last selection	
▼ Down To next selection		To next selection
← Enter To confirm the selection in setting mode or enter setting mode		To confirm the selection in setting mode or enter setting mode

LCD Display Icons



Ico	n	Function description				
Input Source In	Input Source Information					
AC		Indicates the AC input.				
PV		Indicates the PV input				
INPUTBATTI AG EV		Indicate input v	oltage, input frequency, PV voltage, charger current,			
		charger power,	battery voltage.			
Configuration P	rogram and F	ault Informatio	n			
888 👨		Indicates the se	tting programs.			
		Indicates the wa	arning and fault codes.			
888@		Warning: flashing with warning code.				
		Fault: Fault lighting with fault code				
Output Informa	tion					
OUTPUTBATTTEMP M kWh		Indicate output	voltage, output frequency, load percent, load in VA,			
		load in Watt and	d discharging current.			
Battery Informa	ation					
BATT ===			y level by 0-24%, 25-49%, 50-74% and 75-100% in and charging status in line mode.			
In AC mode, it wi	II present batter	y charging status				
Status	Battery voltage	е	LCD Display			
Constant	<2V/cell	·	4 bars will flash in turns.			
Constant Current mode /	2 ~ 2.083V/ce	·II	Bottom bar will be on and the other three bars will flash in turns.			
Constant 2.083 ~ 2.167\		V/cell	Bottom two bars will be on and the other two bars will flash in turns.			

Voltage mode	1 > 2.16/ V/CeII		Bottom three bars will be on and the top bar will flash.			
Floating mode. E	Floating mode. Batteries are fully charged.		4 bars will be on.			
In battery mode,	it will present b	attery capacity.				_
Load Percentage		Battery Voltage			LCD Display	
Load >50%		< 1.85V/cell		LO	LOWBATT	
		1.85V/cell ~ 1.93	•		BATT	
2000 7 50 70		1.933V/cell ~ 2.0	017V/cell		BATT	\vdash
		> 2.017V/cell		111111111111111111111111111111111111111	BATT	
		< 1.892V/cell		LO	OWBATT ====	
Load < 50%		1.892V/cell ~ 1.9	-		BATT	
2000 1 30 70		1.975V/cell ~ 2.0	058V/cell		BATT A STATE OF THE STATE OF TH	
		> 2.058V/cell			BATT	
Load Information	on					
	*	Indicates overlo	ad.			
		Indicates the loa	ad level by 0-2	24%	5, 25-49%, 50-74% and 75-100	%.
LOAD		0%~24%			25%~49%	
			LOAD		LOAD	
	••	50%~74%		75%~100%		
	· · · ·	LOAD		LOAD		
Mode Operation	Information	<u>'</u>				
◆		Indicates unit co	onnects to the	ma	ains.	
MPPT		Indicates unit co	onnects to the	PV	panel.	
BYPASS		Indicates load is	supplied by u	utility power.		
A GO		Indicates the ut	utility charger circuit is working.			
	Indicates the so		e solar charger circuit is working.			
Indicates the D		s the DC/AC inverter circuit is working.				
		Indicates unit alarm is disabled.				
*		Indicates Bluetooth is connected.				
USBE		Indicates USB disk is connected.				
		Indicates timer setting or time display				

LCD Setting

After pressing and holding "—" button for 3 seconds, the unit will enter setting mode. Press "—" or "—" button to select setting programs. And then, press "—" button to confirm the selection or "
button to exit.

Setting Programs:

Progra	Description	Selectable option	
m	Description	Selectable option	
00	Exit setting mode	Escape	
		ESC	
		USB : Utility first (default)	Utility will provide power to the loads as first priority. If Utility energy is unavailable, solar energy and battery provides power the loads.
		SUB: 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.
01	Output source priority: To configure load power source priority	SUb	Battery provides power to the loads only when solar and utility is not sufficient.
			Solar energy provides power to the loads as first priority. If solar energy is not sufficient
	SBU priority	to power all connected loads, battery energy will supply power to the loads at the same time.	
		S6U	Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting
			point in program 12 or solar and battery is not sufficient.

02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default)	3KW model setting range is from 10A to 120A and increment of each click is 10A. 5KW model setting range is from 10A to 140A and increment of each click is 10A.
		AGM (default) S User-Defined S USE Pylontech battery S O O O O O O O O O O O O	Flooded If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
05	Battery type	WECO battery (only for 48V model) Soltaro battery (only for 48V model)	If selected, programs of 02, 12, 26, 27 and 29 will be auto-configured per battery supplier recommended. No need for further adjustment. If selected, programs of 02, 26, 27 and 29 will be automatically
		SOL LIb-protocol compatible battery OS	set up. No need for further setting. Select " LIb" if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.

		2rd party Lithium battons	If colocted programs of 02, 26
5	Battery type	3 rd party Lithium battery	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting. Please contact the battery supplier for installation
		LI C	procedure.
		Restart disable (default)	Restart enable
06	Auto restart when overload occurs	06 ©	06 🛮
		LFd	LHE
		Restart disable (default)	Restart enable
07	Auto restart when over temperature occurs		
		FF명	F +E
		50Hz (default)	60Hz
		<u> </u>	C9 👁
09	Output frequency		
		50,,	60 _{*z}
		Automatically (default)	If selected and utility is available, inverter will work in line mode. Once utility frequency is unstable, inverter will work in bypass mode if bypass function is not forbidden in program 23.
		Online mode	If selected, inverter will work in
		🚳	line mode when utility is available.
10	Operation Logic		
		ONL	
		ECO Mode	If selected and bypass is not forbidden in program 23, inverter will work in ECO mode when
			utility is available.
		ECO	
	Maximum utility charging	2A	10A
	current	•	🚳
11	Note: If setting value in		
	program 02 is smaller than that in program in 11, the inverter will apply charging	۵,	IO^
	inverter will apply charging	_	10

	current from program 02 for utility charger.	20A	30A (default)
		S0.	30.
		40A	50A @
		40.	S0 [*]
		60A	
		60 _^	
		3KW default setting: 23.0V	5KW default setting: 46.0V
		¦2 ®	¦2 ⊚
12	Setting voltage point back to utility source when selecting "SBU" (SBU priority) or "SUB" (Solar first) in program 01	3KW model setting range is fro	om 22.0V to 28.5V and increment of
	moty in program of	each click is 0.5V.	om 44.0V to 57.0V and increment of
		3KW model: The setting range increment of each click is 0.5V	
	Setting voltage point back	Battery fully charged	27.0V (default)
13	to battery mode when selecting "SBU" (SBU priority) or "SUB" (Solar	} ❷	{ ∃ ●
	first) in program 01	FUL	S TO V
		5KW model: The setting range increment of each click is 1.0\	
	Setting voltage point back to battery mode when selecting "SBU" (SBU priority) or "SUB" (Solar		54.0V (default)
13		13 ◎	¦∃ ◎
	first) in program 01	FUL	S-IIIV

		SbL: Solar energy for battery first UCB: Allow utility to charge battery (Default)	Solar energy charges battery first and allow the utility to charge battery.
		SbL: Solar energy for battery first UdC: Disallow utility to charge battery	Solar energy charge battery first and disallow the utility to charge battery.
16	Solar energy priority: To configure solar energy priority for battery and load	56L 88C	
		SLb: Solar energy for load first UCb: Allow utility to charge battery	Solar energy provides power to the load first and also allow the utility to charge battery.
		SL6 886	
		SLb: Solar energy for load first UdC: Disallow utility to charge battery	Solar energy provides power to the load first and disallow the utility to charge battery.
		51.6 886	
18	Alarm control	Alarm on (default)	Alarm off
		P0U	60F
19	Auto return to default display screen	Return to default display screen (default)	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		ESP	

		Stay at latest screen	If selected, the display screen will
		<u> 19</u> 🐵	stay at latest screen user finally
			switches.
		FEP	
		Backlight on (default)	Backlight off
		50 ®	28 🚳
20	Backlight control		
		LON	LOF
		Alarm on (default)	Alarm off
		22 ®	22 ®
22	Beeps while primary source is interrupted		
	·	80N	805
		Bypass Forbidden	If selected, inverter won't work in
		^ @	bypass/ECO modes.
23	Bypass function:		
		64F	
		Bypass disable	If selected and power ON button is
		23 ®	pressed on, inverter can work in
			bypass/ECO mode only if utility is available.
23	Bypass function:	000	
		Bypass enable (default)	If selected and no matter power ON button is pressed on or not, inverter
		53 @	can work in bypass mode if utility is
			available.
		64E	
		Record enable	Record disable (default)
		25 🛮	25 🛮
25	Record Fault code		
		FEN	FdS
		3KW default setting: 28.2V	5KW default setting: 56.4V
		26 🐵	25 @
26	Bulk charging voltage (C.V voltage)		<u></u>
	(BATT	BATT
		c'bic' [*]	56,4'

		up. Setting range is from 24.	program 5, this program can be set 0V to 32.0V for 3KW model and 48.0V
27	Floating charging voltage		5KW default setting: 54.0V Columbia Col
		up. Setting range is from 24. to 64.0V for 5KW model. Inc Single	0V to 32.0V for 3KW model and 48.0V crement of each click is 0.1V. When the unit is operated alone,
28	AC output mode *This setting is able to set up only when the inverter is in standby mode, Be sure that on/off Switch is in "OFF" status.	SI C Parallel Parallel Paralle	When the units are used in parallel for single phase application, please select "PAL" in program 28. Please refer to 5-1 for detailed information. When the units are operated in 3-phase application, please choose "3PX" to define each inverter. It is required to have at least 3 inverters or maximum 9 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. Be sure to connect share current cable to units which are on the same phase. Do NOT connect share current cable between units on different phases.
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 	3KW default setting: 21.0V 29 8ATT BATT V	5KW default setting: 42.0V

	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.	If self-defined is selected in program 5, this program can be set up. Setting range is from 20.0V to 27.0V for 3KW model and 40.0V to 54.0V for 5KW 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.	
32	Bulk charging time	set up. Setting range is fro	5min 32 © ed in program 05, this program can be om 5min to 900min. Increment of each deeping auto-charging time.
33	Battery equalization	Battery equalization enable	
34	Battery equalization voltage	3KW default setting: 29.2V	V to 32.0V for 3KW model and 48.0V to rement of each click is 0.1V.
35	Battery equalized time	60min (default) 35 ©	Setting range is from 5min to 900min. Increment of each click is 5min.
36	Battery equalized timeout	120min (default) 36 🌣	Setting range is from 5min to 900 min. Increment of each click is 5 min.

37	Equalization interval	30days (default) 37 🍩	Setting range is from 0 to 90 days. Increment of each click is 1 day
39	Equalization activated	Disable (default)	Enable 39 👁 REN
39	immediately	be set up. If "Enable" is se battery equalization immed "E9". If "Disable" is select until next activated equalization.	enabled in program 33, this program can elected in this program, it's to activate diately and LCD main page will shows ted, it will cancel equalization function action time arrives based on program 37 will not be shown in LCD main page.
40	Reset all stored data for PV generated power and output load energy	Not reset(Default)	Reset
93	Erase all data log	Not reset(Default)	Reset
		3 minutes	5 minutes
94	Data log recorded interval *The maximum data log number is 1440. If it's over	10 minutes(default)	20 minutes
	1440, it will re-write the first log.	30 minutes	60 minutes
		30	- 68

95	Time setting – Minute	95 © nl N 00	For minute setting, the range is from 00 to 59.
96	Time setting – Hour	96 ∞ HOU OO	For hour setting, the range is from 00 to 23.
97	Time setting– Day	87 © 87 ©	For day setting, the range is from 00 to 31.
98	Time setting— Month	98 -0 -0	For month setting, the range is from 01 to 12.
99	Time setting – Year	99 © 988 17	For year setting, the range is from 17 to 99.

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 " button for 3 seconds to enter USB function setting mode. Step 2: Press " or " button to enter the selectable setting programs.	UPC ® ⊕ SEŁ LOG

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

Program#	Operation Procedure	LCD Screen
⊕/℧։	This function is to upgrade inverter firmware. If firmware upgrade is needed,	please check with
Upgrade	your dealer or installer for detail instructions.	
firmware		

Re-write internal parameters	This function is to over-write all parameter settings (TEXT file) with settings USB disk from a previous setup or to duplicate inverter settings. Please chec or installer for detail instructions.			
} ⊄:	Press "button to export data log from the inverter to USB disk. If the selected function is ready, LCD will display "button to confirm the selection again.	F93	©	USE ²
Export data log	 Press "button to select "Yes", LED 1 will flash once every second during the process. It will only display LOG and all LEDs will be on after this action is complete. Then, press "button to return to main screen. Or press "button to select "No" to return to main screen. 	L06 985 00	®	USE*

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

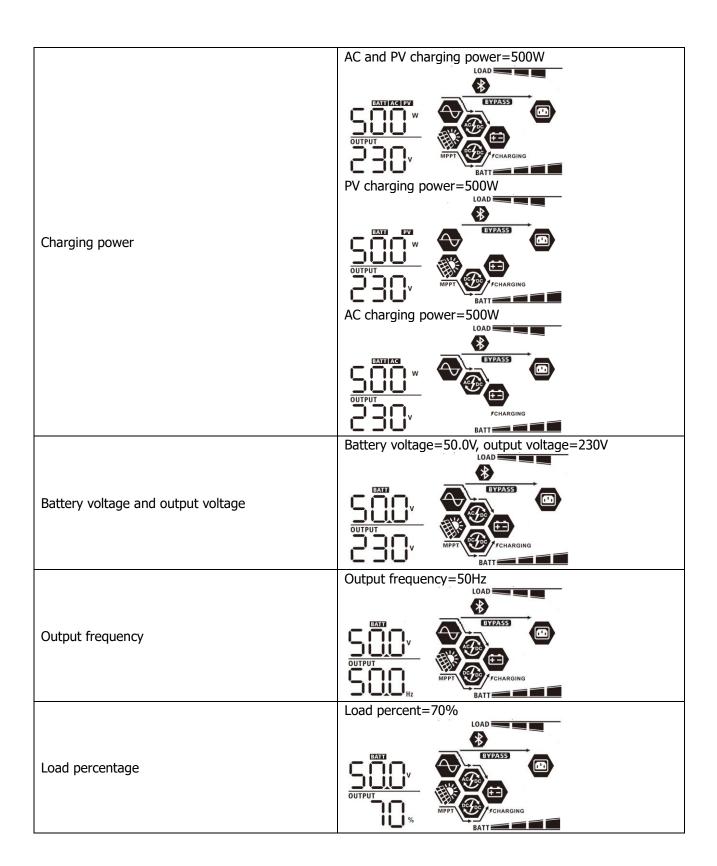
If any error occurs, error code will only show 5 seconds. After 5 seconds, it will automatically return to display screen.

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		
	LOAD		
Input voltage/Output voltage (Default Display Screen)	INPUT ASS OUTPUT		
	OUTPUT V MPPT FCHARGING		
	Input frequency=50Hz		
	LOAD		
Input frequency	INPUT AG OUTPUT OUTPUT OUTPUT		
	MPPT OF SCHARGING		

PV voltage	PV voltage=80V INPUT OUTPUT V MPPT CHARGING BATT
PV current	PV current = 2.5A INPUT OUTPUT OUTPUT MPPT MPPT
PV power	PV power = 500W INPUT W OUTPUT W OUTPUT W MPPT FCHARGING BATT
Charging current	AC and PV charging current=50A LOAD OUTPUT V DEATH ASSEN OUTPUT V A OUTPUT CHARGING BATT CHARGING CHARGING



	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.
	OUTPUT VA MPPT CONTING
Load in VA	When load is larger than 1kVA (≥1KVA), load in VA will
	present x.xkVA like below chart.
	OUTPUT WA MPPT OUTPUT BATT VA MPPT BATT
	When load is lower than 1kW, load in W will present xxxW like below chart.
	DAIT BYPASS
	OUTPUT W MPPT SCHARGING
Load in Watt	When load is larger than 1kW (≥1KW), load in W will
	present x.xkW like below chart.
	OUTPUT KW MPPT POPC FCHARGING
	Battery voltage=50.0V, discharging current=50A
	LOAD STATE OF THE PARTY OF THE
Battery voltage/DC discharging current	SOO MPPT BATT
	PV energy generated Today = 3.88kWh, Load output energy Today = 9.88kWh.
PV energy generated today and Load output energy today	LOAD STOCKWIN
	Wh MPPT FCHARGING BATT

PV energy generated this month and Load output energy this month.	PV energy generated this month = 388kWh, Load output energy this month = 988kWh.
PV energy generated this year and Load output energy this year.	PV energy generated this year energy = 3.88MWh, Load output energy this year = 9.88MWh. LOAD OUTPUT MWh MEPT METERS BATTI
PV energy generated totally and Load output total energy.	Total PV energy until now= 38.8MWh, Total load output energy until now= 98.8MWh. LOAD OUTPUT OUTPUT MARRING BATT
Real date.	Real date Nov 28, 2017. LOAD STATE OF THE PROPERTY OF THE PR
Real time.	Real time 13:20.
Main CPU version checking.	Main CPU version 00014.04. LOAD BATT BATT

Secondary CPU version checking.	Secondary CPU version 00001.23. LOAD BYPASS MPPT BATT BATT	
	Bluetooth version 00001.03.	
Bluetooth version checking.	EYPASS (D)	
	MPPT SCHARGING BATT	
	SCC version 00003.03.	
	LOAD S	
SCC version checking		
	MPPT FCHARGING 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. Charging by utility. Charging by PV energy. MPPT MPPT
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.	Utility can bypass.	No charging and Bypass BYPASS No charging The state of
Bypass/ECO Mode	The unit will provide output power from the utility. PV energy and utility can charge batteries.	Charging by utility and PV energy. BYPASS Charging by PV BYPASS BYPASS MPPT CC JCCHARGING

		Charging by utility
Bypass/ECO Mode	The unit will provide output power from the utility. PV energy and utility can charge batteries.	BYPASS BYPASS CHARGING No charging BYPASS BYPASS BYPASS
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	Charging by utility and PV energy. Charging by utility.
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV energy. PV energy will supply power to the loads and charge battery at the same time. Power from battery only.

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	F0
02	Over temperature	IF82
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.	F0S
06	Output voltage is too high.	IF88
07	Overload time out	F87
08	Bus voltage is too high	F08
09	Bus soft start failed	F89
50	PFC over current	FS0
51	OP over current	FS
52	Bus voltage is too low	F52
53	Inverter soft start failed	1853
55	Over DC voltage in AC output	FSS
56	Battery is not connected	F56
57	Current sensor failed	F57
58	Output voltage is too low	F58

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	02@
03	Battery is over-charged	Beep once every second	{}}�
04	Low battery	Beep once every second	<pre>[] \∞</pre>
07	Overload	Beep once every 0.5 second	LOAD
10	Output power derating	Beep twice every 3 seconds	¦[<mark> </mark> ♠
32	Communication interrupted	None	32@
<i>E</i> 9	Battery equalization	None	E9@
68	Battery is not connected	None	6₽△

Battery Equalization

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.

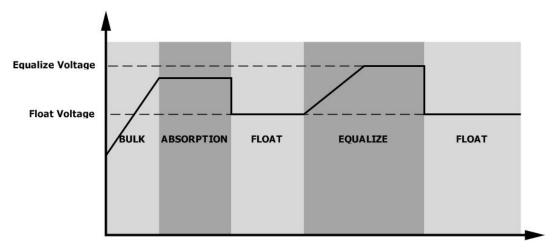
How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

- 1. Setting equalization interval in program 37.
- 2. Active equalization immediately in program 39.

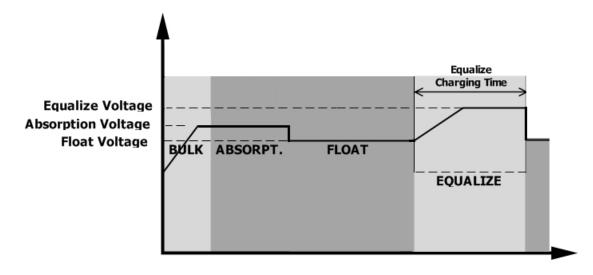
When to Equalize

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.

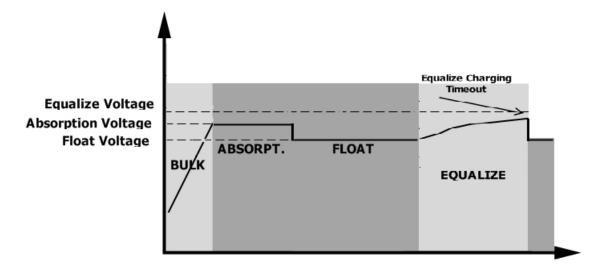


Equalize charging time and timeout

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.



SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	3KW	5KW	
Input Voltage Waveform	Sinu	ısoidal	
Nominal Input Voltage	23	0Vac	
Low Loss Voltage	110\	/ac±7V	
Low Loss Return Voltage	120\	/ac±7V	
High Loss Voltage	280\	/ac±7V	
High Loss Return Voltage	270\	/ac±7V	
Max AC Input Voltage	300Vac		
Nominal Input Frequency	50Hz / 60Hz (Auto detection)		
Low Loss Frequency	46(5)	6)±1Hz	
Low Loss Return Frequency	46.5(5	57)±1Hz	
High Loss Frequency	54(64	4)±1Hz	
High Loss Return Frequency	53(6:	3)±1Hz	
Power Factor	>	0.98	
Output Short Circuit Protection	Line mode: Circuit Breaker Battery mode: Electronic Circuits		
Efficiency (Line Mode)	93% (Peak Efficiency)		
Transfer Time		Battery mode 0ms →Bypass 4ms	

Table 2 Battery Mode Specifications

INVERTER MODEL	3KW	5KW		
Rated Output Power	3KVA/3KW	5KVA/5KW		
Output Voltage Waveform	Pure Sine Wave			
Output Voltage Regulation	230V	ac±5%		
Output Frequency	50Hz	or 60Hz		
Peak Efficiency	9	0%		
Overload Protection	5s@≥150% load; 10	0s@105%~150% load		
Surge Capacity	2* rated power	er for 5 seconds		
Nominal DC Input Voltage	24Vdc	48Vdc		
Operating Range	20Vdc -34Vdc	40Vdc -66Vdc		
Cold Start Voltage	23Vdc	46Vdc		
Low DC Warning Voltage				
@ load < 50%	22.5Vdc	45.0Vdc		
@ load ≥ 50%	22.0Vdc	44.0Vdc		
Low DC Warning Return Voltage				
@ load < 50%	23.5Vdc	47.0Vdc		
@ load ≥ 50%	23.0Vdc	46.0Vdc		
Low DC Cut-off Voltage				
@ load < 50%	21.5Vdc	43.0Vdc		
@ load ≥ 50%	21.0Vdc	42.0Vdc		
High DC Recovery Voltage	32Vdc	64Vdc		
High DC Cut-off Voltage	34Vdc	66Vdc		
No Load Power Consumption	<75W	<75W		

Table 3 Charge Mode Specifications

Utility Char	aina Mode						
INVERTER		3KW 5KW					
Charging C		Default: 30A, max: 60A					
Bulk	Flooded Battery	29.2Vdc	58.4Vdc				
Voltage AGM / Gel Battery		28.2Vdc	56.4Vdc				
Floating Ch	arging Voltage	27Vdc	54Vdc				
Overcharge	Protection	34Vdc	66Vdc				
Charging A	lgorithm	3-Step					
Charging C	Pging Curve Battery Voltage, per cell 2.43Vdc (2.55Vdc) Voltage T0 T1 T1 = 10* T0, minimum 10mins, maximum 8hrs Current		Time				

Solar Charging Mode (MF	PPT type)				
INVERTER MODEL	зкw	5KW			
Rated Power	1500W	4000W			
Maximum charging current	60A	80A			
Efficiency	98.0	% max.			
Max. PV Array Open Circuit Voltage	145Vdc				
PV Array MPPT Voltage Range	30~115Vdc	60~115Vdc			
Battery Voltage Accuracy	+/-0.3%				
PV Voltage Accuracy	+	-/-2V			
Charging Algorithm	3-9	Step			
Joint Utility and Solar Cha	arging				
Max Charging Current	120A	140A			
Default Charging Current	60A				

Table 4 ECO/Bypass Mode Specifications

Bypass Mode				
INVERTER MODEL	3KW	5KW		
Input Voltage Waveform		Sinusoidal		
Low Loss Voltage	1	76Vac±7V		
Low Loss Return Voltage	186Vac±7V			
High Loss Voltage	280Vac±7V			
High Loss Return Voltage	270Vac±7V			
Nominal Input Frequency	50Hz / 60Hz (Auto detection)			
Low Loss Frequency	46(56)±1Hz			
Low Loss Return Frequency	46.5(57)±1Hz			
High Loss Frequency	54(64)±1Hz			
High Loss Return Frequency	- 5	3(63)±1Hz		

Table 5 General Specifications

INVERTER MODEL	3KW 5KW					
SCC type	MF	PPT				
Parallel-able	YI	ES				
Communication	RS232 and	l Bluetooth				
Safety Certification	CE					
Operating Temperature	0°C to 55°C					
Range	0.033.0					
Storage temperature	-15°C~ 60°C					
Humidity	5% to 95% Relative Humidity (Non-condensing)					
Dimension	140 x 303 x 525					
(D*W*H), mm	11U X 3U3 X 323					
Net Weight, kg	13.0	13.5				

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) Battery polarity is connected reversed. 	 Check if batteries and the wiring are connected well. 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 "Solar First" as the priority of output source.	Change output source priority to 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.		
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.		
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.		
		Battery is over-charged.	Return to repair center.		
Buzzer beeps	Fault code 03	The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.		
continuously and red LED is on.	Fault code 01	Fan fault	Replace the fan.		
	Fault code 06/58 Output abnormal (Inverter below than 190Vac or is help 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 50	PFC over current or surge.			
	Fault code 51	OP over current or surge.	Restart the unit, if the error		
	Fault code 52	Bus voltage is too low.	happens again, please return to repair center.		
	Fault code 55	Output voltage is unbalanced.	to repuli certici.		
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.		

PARALLEL FUNCTION

1. Introduction

This inverter can be used in parallel for two applications.

- 1. Parallel operation in single phase with up to 9 units. The supported maximum output power is 45KW/45KVA.
- Maximum 9 units work together to support three-phase equipment. Seven units support one phase maximum. The supported maximum output power is 45KW/45KVA and one phase can be up to 35KW/35KVA

NOTE: If this unit is bundled with share current cable and parallel cable, this inverter is default supported parallel operation. You may skip section 3. If not, please purchase parallel kit and install this unit by following instruction from professional technical personnel in local dealer.

2. Package Contents

In parallel kit, you will find the following items in the package:

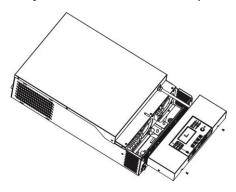


Parallel board

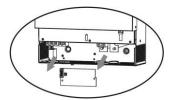
Parallel communication cable
Current sharing cable

3. Parallel board installation

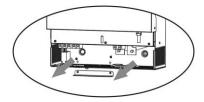
Step 1: Remove bottom case by unscrewing all screws as shown below.



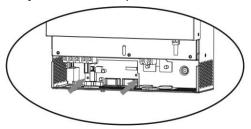
Step 2: Remove two screws as below chart and remove 2-pin and 14-pin cables. Take out the board under the communication board.



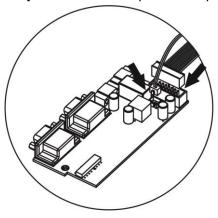
Step 3: Remove two screws as below chart to take out cover of parallel communication.



Step 4: Install new parallel board with 2 screws tightly.



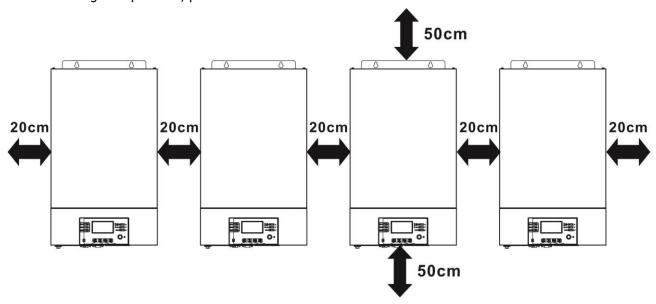
Step 5: Re-connect 2-pin and 14-pin to original position on parallel board as shown below chart.



Step 6: Put wire cover back to the unit. Now the inverter is providing parallel operation function.

4. Mounting the Unit

When installing multiple units, please follow below chart.



NOTE: For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit. Be sure to install each unit in the same level.

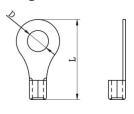
5. Wiring Connection

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

		R	Ring Terminal				
Model	Wire Size	Wire Size Cable Dimensions		sions	Torque value		
		mm ²	D (mm)	L (mm)	value		
21/1/1	1*1/0AWG	60	6.4	49.7	2 . 2 Nm		
3KW	2*4AWG	44	6.4	49.7	2~ 3 Nm		
FIZM	1*1/0AWG	60	6.4	49.7	2 . 2 Nm		
5KW	2 * 4AWG	44	6.4	49.7	2~ 3 Nm		

Ring terminal:



WARNING: Be sure the length of all battery cables is the same. Otherwise, there will be voltage difference between inverter and battery to cause parallel inverters not working.

Recommended AC input and output cable size for each inverter:

Model	Model AWG no.	
3KW	10 AWG	1.2~1.6Nm
5KW	8 AWG	1.4~1.6Nm

You need to connect the cables of each inverter together. Take the battery cables for example: You need to use a connector or bus-bar as a joint to connect the battery cables together, and then connect to the battery terminal. The cable size used from joint to battery should be X times cable size in the tables above. "X" indicates the number of inverters connected in parallel.

Regarding AC input and output, please also follow the same principle.

CAUTION!! Please install the breaker at the battery and AC input side. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of battery or AC input. The recommended mounted location of the breakers is shown in the figures in 5-1 and 5-2.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
3KW	150A/60VDC
5KW	125A/80VDC

^{*}If you want to use only one breaker at the battery side for the whole system, the rating of the breaker should be X times current of 1 unit. "X" indicates the number of inverters connected in parallel.

Recommended breaker specification of AC input:

Model	2 units	3 units	4 units	5 units	6 units	7 units	8 units	9 units
3KW	80A	120A	160A	200A	240A	280A	320A	360A
5KW	100A	150A	200A	250A	300A	350A	400A	450A

Note1: Also, you can use 40A breaker for 3KW and 50A for 5KW for only 1 unit and install one breaker at its AC input in each inverter.

Note2: Regarding three-phase system, you can use 4-pole breaker directly and the rating of the breaker should be compatible with the phase current limitation from the phase with maximum units

Recommended battery capacity

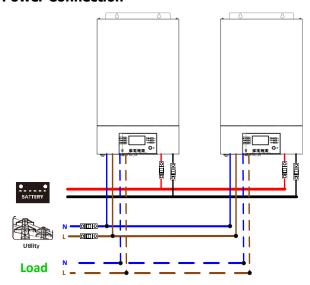
Inverter parallel numbers	2	3	4	5	6	7	8	9
Battery Capacity	800AH	1200AH	1600AH	2000AH	2400AH	2800AH	3200AH	3600AH

WARNING! Be sure that all inverters will share the same battery bank. Otherwise, the inverters will transfer to fault mode.

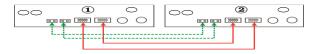
5-1. Parallel Operation in Single phase

Two inverters in parallel:

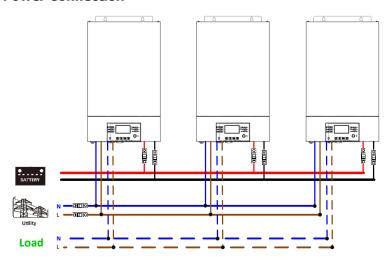
Power Connection

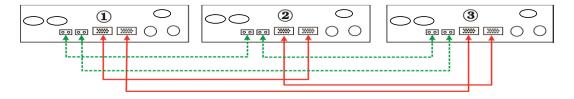


Communication Connection



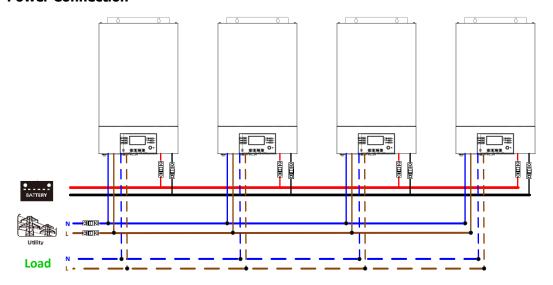
Three inverters in parallel:



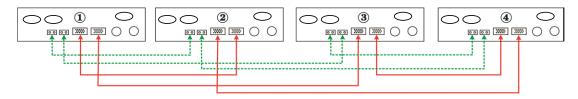


Four inverters in parallel:

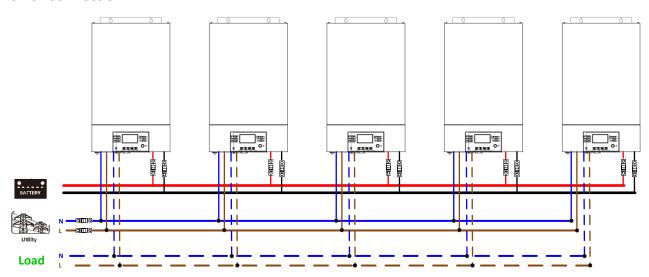
Power Connection

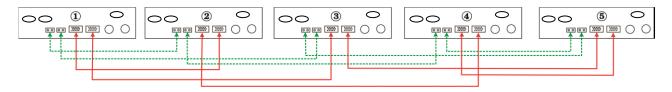


Communication Connection



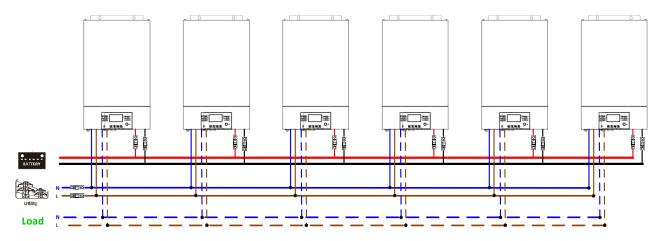
Five inverters in parallel:



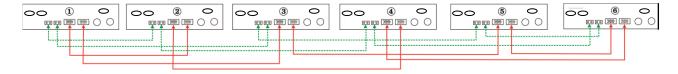


Six inverters in parallel:

Power Connection

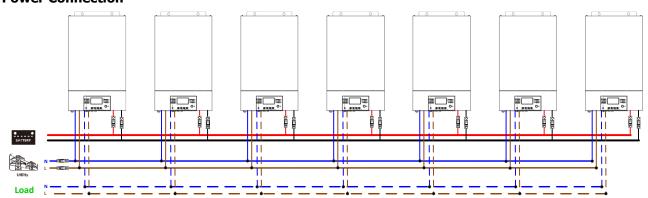


Communication Connection

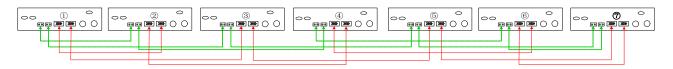


Seven inverters in parallel:

Power Connection

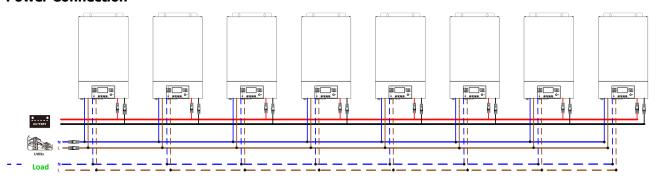


Communication Connection

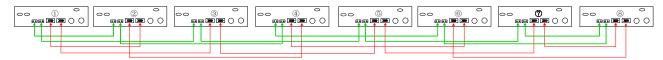


Eight inverters in parallel:

Power Connection

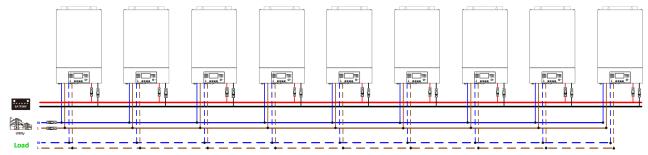


Communication Connection

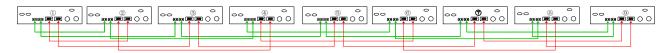


Nine inverters in parallel:

Power Connection

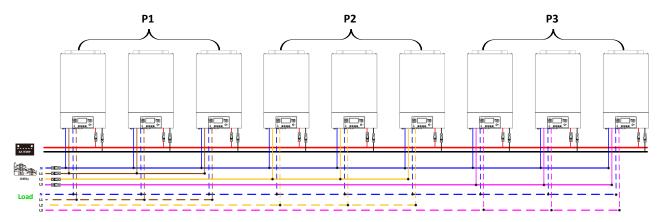


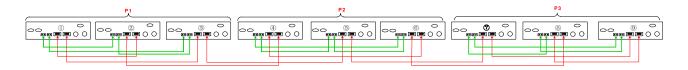
Communication Connection



5-2. Support 3-phase equipment

Three inverters in each phase:

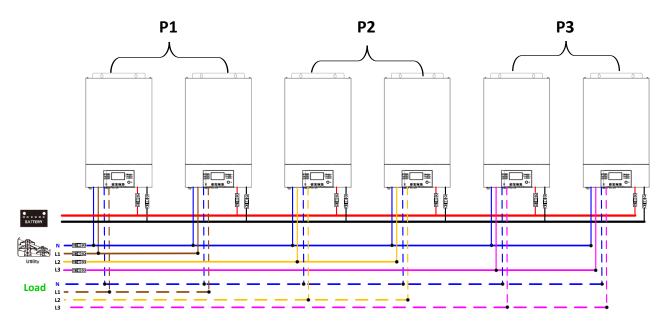




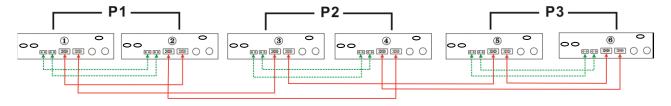
WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

Two inverters in each phase:

Power Connection

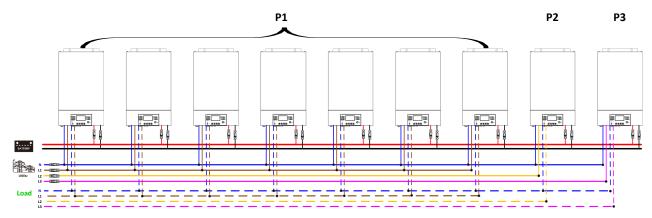


Communication Connection



Seven inverters in one phase and one inverter for the other two phases:

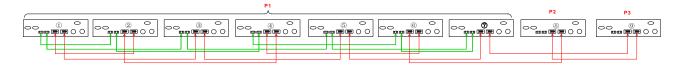
Power Connection



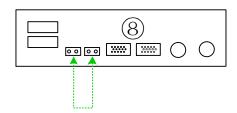
Note: It's up to customer's demand to pick 7 inverters on any phase.

P1: L1-phase, P2: L2-phase, P3: L3-phase.

Communication Connection

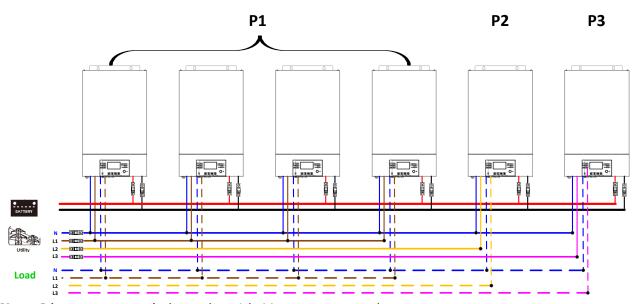


Note: If there is only one unit in one phase, this unit doesn't need to connect the current sharing cable. Or you connect it like as below:



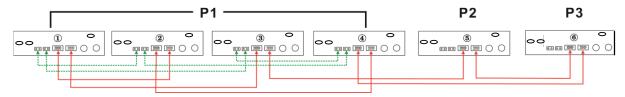
Four inverters in one phase and one inverter for the other two phases:

Power Connection



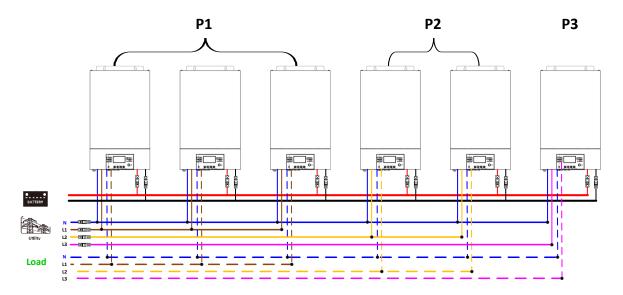
Note: It's up to customer's demand to pick 4 inverters on any phase.

P1: L1-phase, P2: L2-phase, P3: L3-phase.

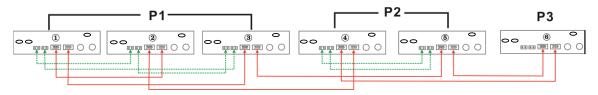


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

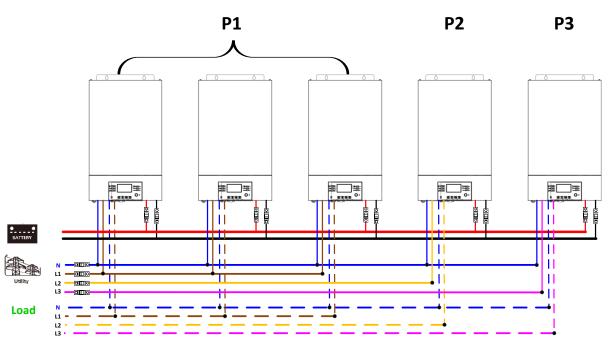
Power Connection

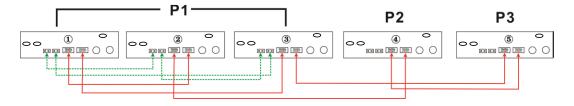


Communication Connection



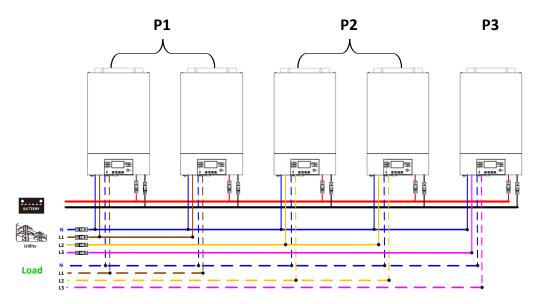
Three inverters in one phase and only one inverter for the remaining two phases:



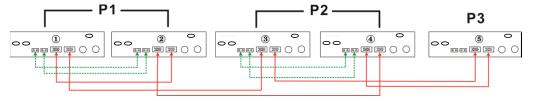


Two inverters in two phases and only one inverter for the remaining phase:

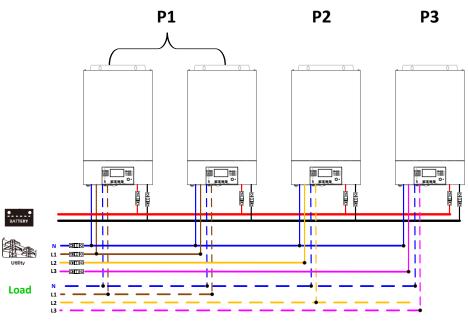
Power Connection

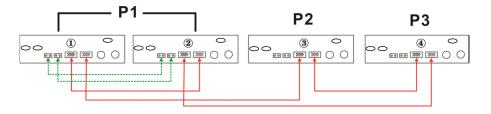


Communication Connection



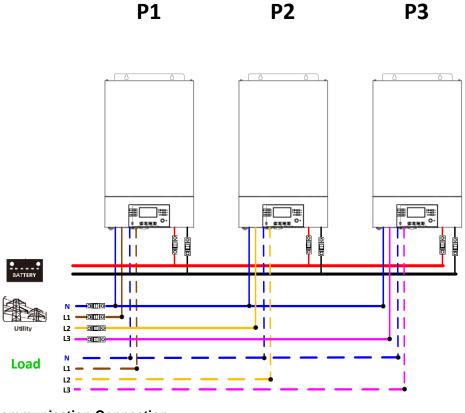
Two inverters in one phase and only one inverter for the remaining phases:



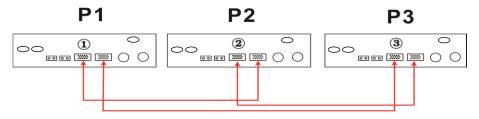


One inverter in each phase:

Power Connection



Communication Connection



WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

6. PV Connection

Please refer to user manual of single unit for PV Connection.

CAUTION: Each inverter should connect to PV modules separately.

7. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
	AC output mode *This setting is able to set up only when the inverter is in standby mode. Be sure that on/off switch is in "OFF" status.	Single	When the unit is operated alone, please select "SIG" in program 28.
		SLC	
28		Parallel 💮	When the units are used in parallel for single phase application, please select "PAL" in program 28. Please refer to 5-1 for detailed
		PAL	information.
		L1 phase:	When the units are operated in 3-phase application, please choose "3PX" to define each inverter. It is required to have at least 3 inverters or maximum 9 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the
		3P I	
		L2 phase:	
		385	
		L3 phase:	inverters connected to L3 phase. Be sure to connect share current cable to units
		323	which are on the same phase. Do NOT connect share current cable between units on different phases.

Fault code display:

Fault Code	Fault Event	Icon on
60	Power feedback protection	F60
71	Firmware version inconsistent	Fil
72	Current sharing fault	7
80	CAN fault	F80
81	Host loss	F8 I
82	Synchronization loss	F82
83	Battery voltage detected different	F83
84	AC input voltage and frequency detected different	F84
85	AC output current unbalance	F85
86	AC output mode setting is different	F86

8. Commissioning

Parallel in single phase

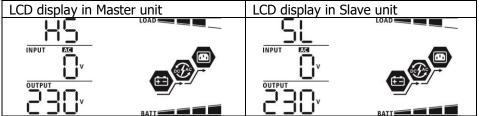
Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

Step 2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units.

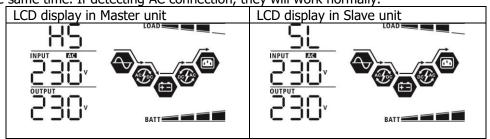
NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.

Step 3: Turn on each unit.



NOTE: Master and slave units are randomly defined.

Step 4: Switch on all AC breakers of Line wires in AC input. It's better to have all inverters connect to utility at the same time. If detecting AC connection, they will work normally.



Step 5: If there is no more fault alarm, the parallel system is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Support three-phase equipment

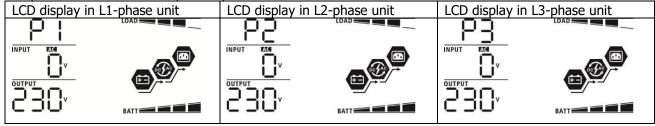
Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

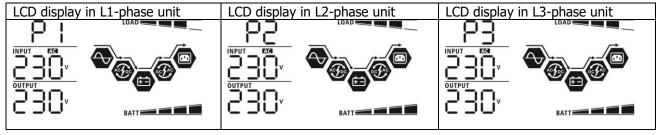
Step 2: Turn on all units and configure LCD program 28 as P1, P2 and P3 sequentially. And then shut down all units.

NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.

Step 3: Turn on all units sequentially.



Step 4: Switch on all AC breakers of Line wires in AC input. If AC connection is detected and three phases are matched with unit setting, they will work normally. Otherwise, the AC icon will flash and they will not work in line mode.



Step 5: If there is no more fault alarm, the system to support 3-phase equipment is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.

Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

9. Trouble shooting

9. Ir	ouble shooting	
E lt	Situation	Colletion
Fault Code	Fault Event Description	Solution
60	Current feedback into the inverter is detected.	 Restart the inverter. Check if L/N cables are not connected reversely in all inverters. For parallel system in single phase, make sure the sharing are connected in all inverters. For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inverters in different phases. If the problem remains, please contact your installer.
71	The firmware version of each inverter is not the same.	 Update all inverter firmware to the same version. Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your instraller to provide the firmware to update. After updating, if the problem still remains, please contact your installer.
72	The output current of each inverter is different.	 Check if sharing cables are connected well and restart the inverter. If the problem remains, please contact your installer.
80	CAN data loss	Check if communication cables are connected well and restart the
81	Host data loss	inverter.
82	Synchronization data loss	2. If the problem remains, please contact your installer.
83	The battery voltage of each inverter is not the same.	 Make sure all inverters share same groups of batteries together. Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are close, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter. If the problem still remains, please contact your installer.
84	AC input voltage and frequency are detected different.	 Check the utility wiring connection and restart the inverter. Make sure utility starts up at same time. If there are breakers installed between utility and inverters, please be sure all breakers can be turned on AC input at same time. If the problem remains, please contact your installer.
85	AC output current unbalance	 Restart the inverter. Remove some excessive loads and re-check load information from LCD of inverters. If the values are different, please check if AC input and output cables are in the same length and material type. If the problem remains, please contact your installer.
86	AC output mode setting is different.	 Switch off the inverter and check LCD setting #28. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on #28. For upporting three-phase system, make sure no "PAL" is set on #28. If the problem remains, please contact your installer.

Appendix A: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @24Vdc 200Ah (min)	Backup Time @24Vdc 400Ah (min)
	300	898	2200
	600	444	1050
	900	249	606
	1200	190	454
3KW	1500	136	328
3KW	1800	112	252
	2100	96	216
	2400	70	188
	2700	62	148
	3000	56	134

Model	Load (VA)	Backup Time @ 48Vdc 200Ah (min)	Backup Time @ 48Vdc 400Ah (min)
	500	1226	2576
	1000	536	1226
	1500	316	804
	2000	222	542
EKW	2500	180	430
5KW	3000	152	364
	3500	130	282
	4000	100	224
	4500	88	200
	5000	80	180

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

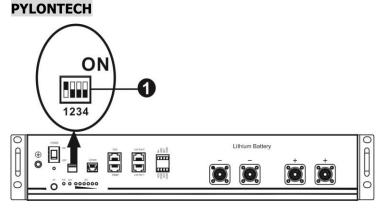
1. Introduction

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



• ADD Switch: There are 4 ADD switches are to define different baud rate and battery group address. If switch position is turned to bottom for "OFF" position, it means "0". If switch position is turned to upper for "ON" position, it means "1".

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

Dip 2, 3 and 4 are to set up battery group address.

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

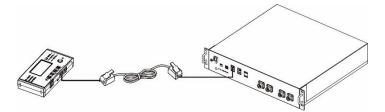
NOTE: "1" is upper position and "0" is bottom position.

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

NOTE: The maximum groups of lithium battery is 5 and for maximum number for each group, please check with battery manufacturer.

3. Installation and Operation

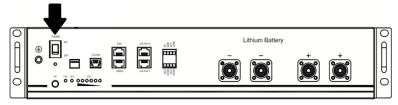
After configuration, please install LCD panel with inverter and Lithium battery with the following steps. Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



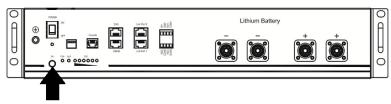
Please take notice for parallel system:

- 1. Only support common battery installation.
- 2. Use one custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set battery type of this inverter to "PYL" in LCD program 5. The remaining inverters are set as "USE".

Step 2. Switch on Lithium battery.



Step 3. Press more than three seconds to start Lithium battery. Output power is ready.



Step 4. Turn on the inverter.



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

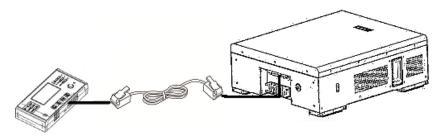




If communication between the inverter and battery is successful, the battery icon on LCD display will flash. Generally speaking, it will take longer than 1 minute to establish communication.

WECO

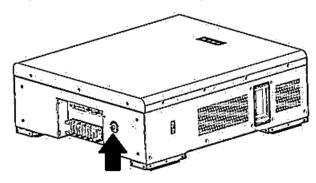
Step 1. Use a custom-made RJ45 cable to connect inverter and Lithium battery.



Please take notice for parallel system:

- 3. Only support common battery installation.
- 4. Use one custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set battery type of this inverter to "WEC" in LCD program 5. The remaining inverters are set as "USE".

Step 2. Switch on Lithium battery.



Step 3. Turn on the inverter.



Step 4. Be sure to select battery type as "WEC" in LCD program 5.

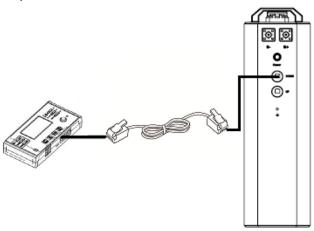




If communication between the inverter and battery is successful, the battery icon on LCD display will "flash". Generally speaking, it will take longer than 1 minute to establish communication.

SOLTARO

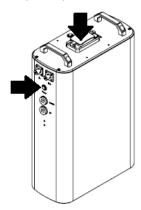
Step 1. Use a custom-made RJ45 cable to connect inverter and Lithium battery.



Please take notice for parallel system:

- 1. Only support common battery installation.
- 2. Use one custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set battery type of this inverter to "SOL" in LCD program 5. The remaining inverters are set as "USE".

Step 2. Open DC isolator and switch on Lithium battery.



Step 3. Turn on the inverter.



Step 4. Be sure to select battery type as "SOL" in LCD program 5.



SOL

If communication between the inverter and battery is successful, the battery icon on LCD display will "flash". Generally speaking, it will take longer than 1 minute to establish communication.

4. LCD Display Information

Press "UP" or "DOWN" key to switch LCD display information. It will show battery pack and battery group number before "Main CPU version checking" as below screen.

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

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 l a	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.	
59 &	If battery status is not allowed to charge after the communication between the inverter and battery is successful, it will show code 69 to stop charging battery.	
	If battery status must to charge after the communication between the inverter and battery is successful, it will show code 70 to charge battery.	
	If battery status is not allowed to discharge after the communication between the inverter and battery is successful, it will show code 71 to stop discharging battery.	