USER MANUAL

X-3.6KW-M / X-5.6KW-M
Hybrid Inverter
With MPPT Solar Charger

Version: 1.0

Table Of Contents

ABOUT THIS MANUAL **2**

Purpose 2
Scope 2

SAFETY INSTRUCTIONS **2**

INTRODUCTION **3**

Features 3
Basic System Architecture 3
Product Overview 4

INSTALLATION **5**

Unpacking and Inspection 5
Preparation 5
Mounting the Unit 5
Battery Connection 6
AC Input/Output Connection 7
PV Connection 9
Final Assembly 11
Communication Options 11

OPERATION **12**

Power ON/OFF 12
Operation and Display Panel 12
LCD Display Icons 13
LCD Setting 16
Display Setting 24
Operating Mode Description 27
Battery Equalization Description 30
Fault Reference Code 32
Warning Indicator 33

CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT **34**

Overview 34
Clearance and Maintenance 34

SPECIFICATIONS **35**

Table 1 Line Mode Specifications 35
Table 2 Inverter Mode Specifications 36
Table 3 Charge Mode Specifications 37
Table 4 General Specifications 37

TROUBLE SHOOTING **38**

Appendix I: Approximate Back-up Time Table **39**

Appendix II: The Wi-Fi Operation Guide **40**

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
- Inverter running without battery
- 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

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.

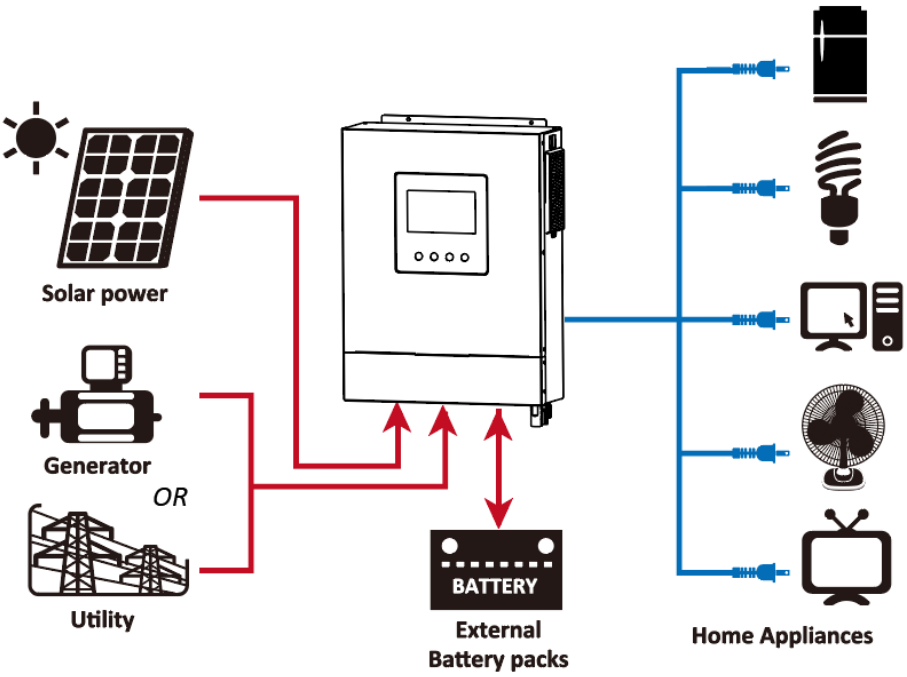
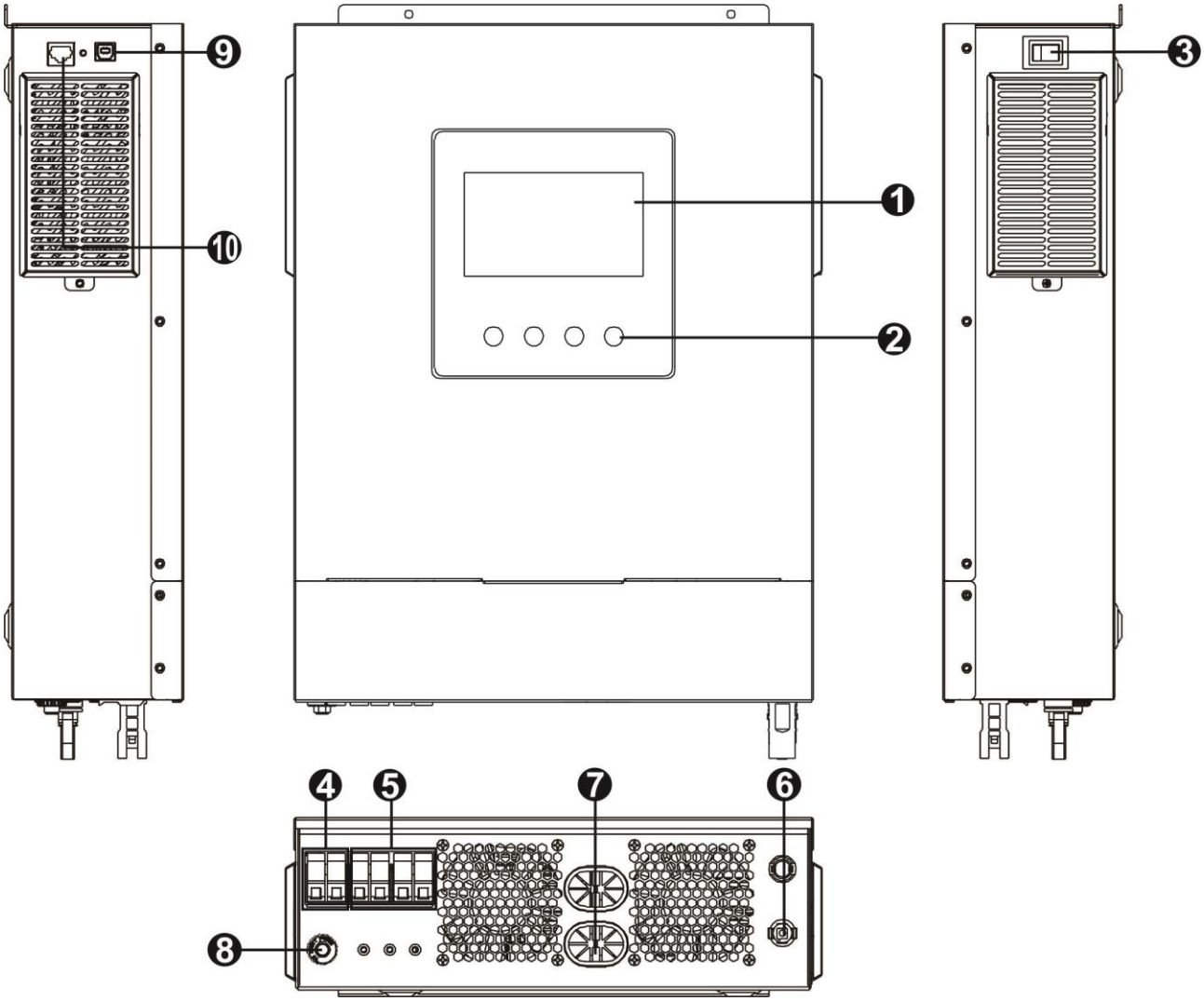


Figure 1 Hybrid Power System

Product Overview



1. LCD display
2. Function keys
3. Power on/off switch
4. AC input
5. AC output
6. PV input
7. Battery input
8. Circuit breaker
9. USB communication port
10. RS-232 communication port

INSTALLATION

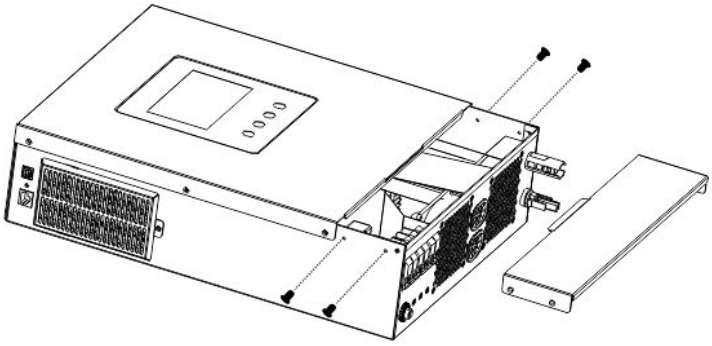
Unpacking and Inspection

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
- DC Fuse x 1
- PV connectors x 1 set

Preparation

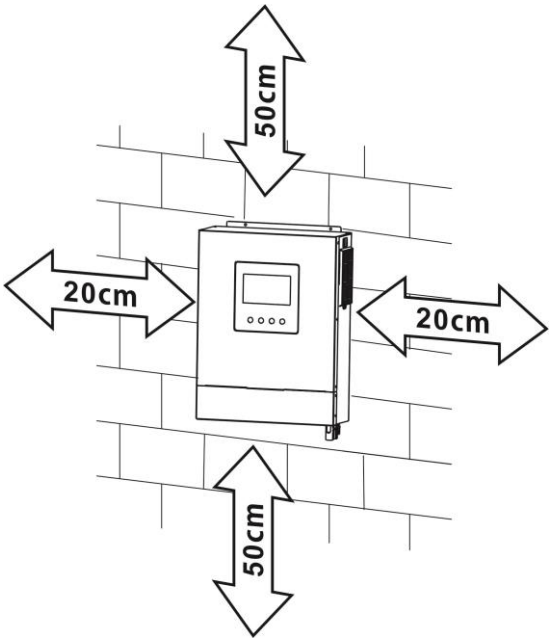
Before connecting all wirings, please take off bottom cover by removing four screws as shown below.



Mounting the Unit

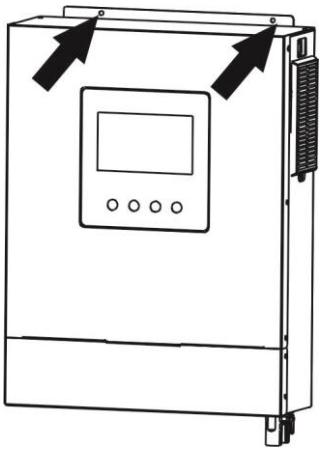
Consider the following points before selecting where to install:

- 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.
- 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.
- 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.**

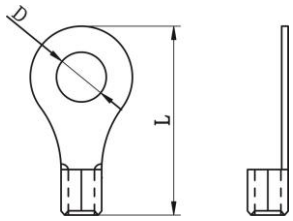
Install the unit by screwing two screws. It's recommended to use M4 or M5 screws.



Battery Connection

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

Ring terminal:



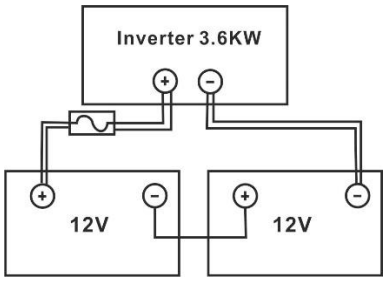
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

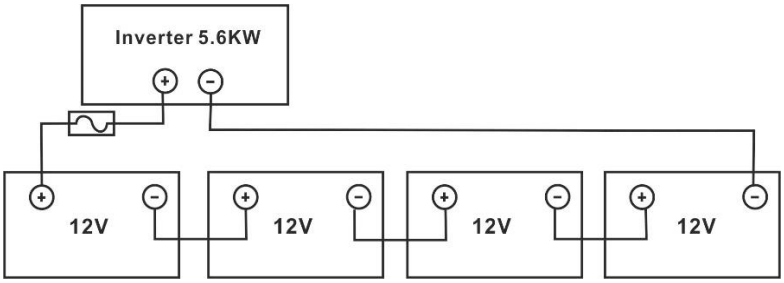
Recommended battery cable and terminal size:

Model	Typical Amperage	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque Value
				D (mm)	L (mm)	
X-3.6KW-M	167A	2*4AWG	25	8.4	33.2	5 Nm
X-5.6KW-M	129.6A	1*2AWG	38	8.4	39.2	
		2*4AWG	25	8.4	33.2	

Please follow below steps to implement battery connection:

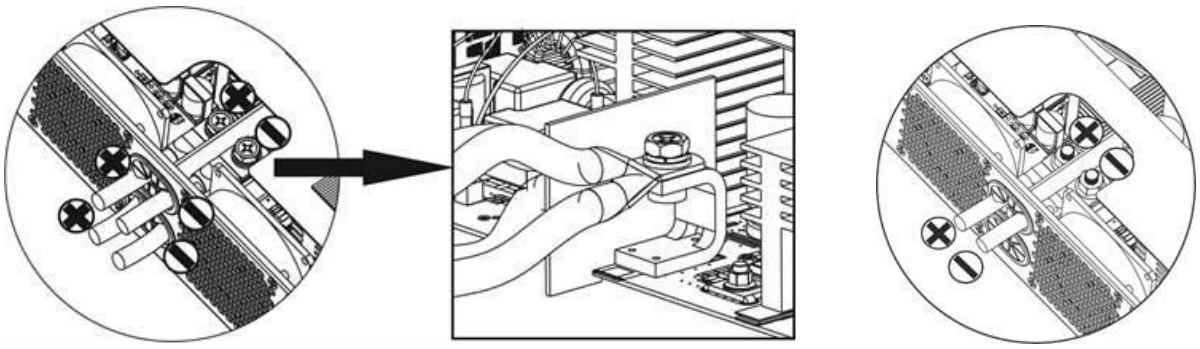
1. 3.6KW model supports 24VDC system and 5.6KW model supports 48VDC system. Connect all battery packs as below chart. It is recommend to connect minimum of 100Ah capacity battery for 3.6KW model and 200Ah capacity battery for 5.6KW model.





2. Prepare four battery wires for 3.6KW model and two or four battery wires for 5.6KW model depending on cable size (refer to recommended cable size table). Apply ring terminals to your battery wires and secure it to the battery terminal block with the bolts properly tightened. Refer to battery cable size for torque value.

Make sure polarity at both the battery and the inverter is correctly connected and ring terminals are secured to the battery terminals.



X-3.6KW-M/ X-5.6KW-M X-5.6KW-M

⚠	**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 3.6KW and 50A for 5.6KW.

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 (mm^2)	Torque Value
X-3.6KW-M	12 AWG	4	1.2 Nm
X-5.6KW-M	10 AWG	6	1.2 Nm

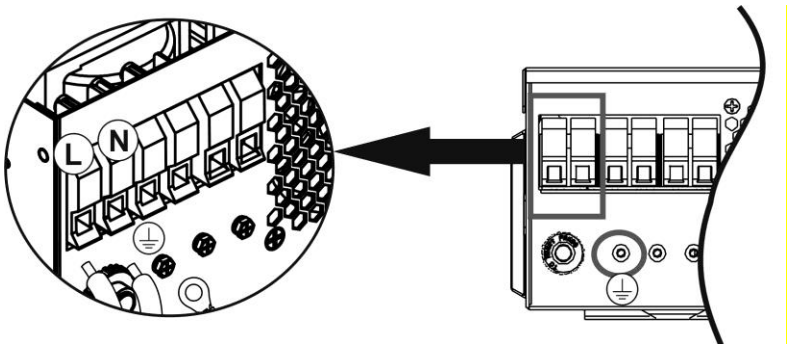
Please follow below steps to implement AC input/output connection:

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.

   ⏚→**Ground (yellow-green)**

   L→LINE (brown or black)

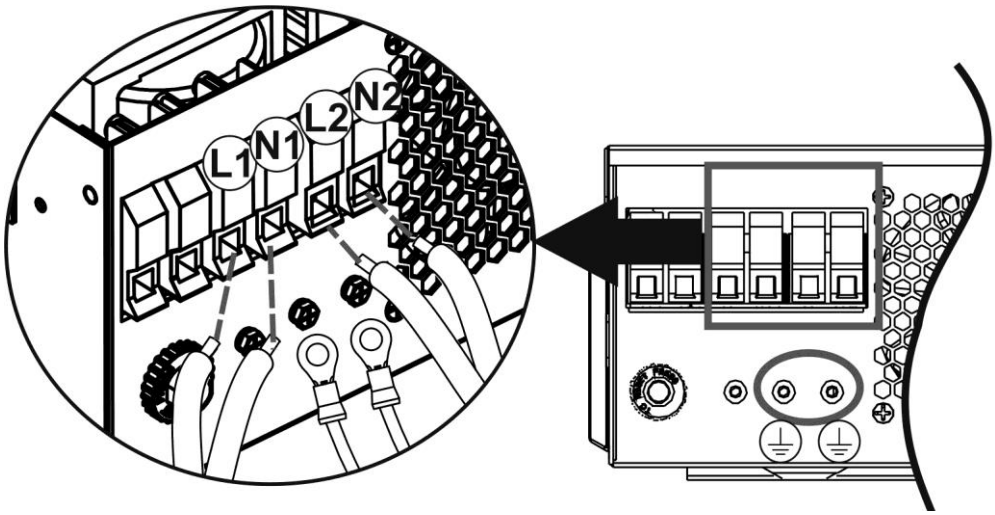
   N→Neutral (blue)



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

4. This inverter is equipped with dual-output. There are four terminals (L1/N1, L2/N2) available on output port. It's set up through LCD program or monitoring software to turn on and off the second output. Refer to "LCD setting" section for the details.
   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)**
   L1→LINE (brown or black)
   N1→Neutral (blue)
   L2→LINE (brown or black)
   N2→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** DC circuit breakers between inverter and PV modules.
NOTE1: Please use 600VDC/30A circuit breaker.
NOTE2: The overvoltage category of the PV input is II.
Please follow the steps below to implement PV module connection:

> **WARNING:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline and 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 required to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

Step 1: Check the input voltage of PV array modules. This system is applied with two strings of PV array. Please make sure that the maximum current load of each PV input connector is 18A.

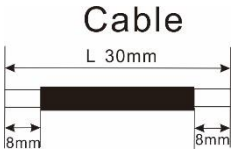
> **CAUTION:** Exceeding the maximum input voltage can destroy the unit!! Check the system before wire connection.

Step 2: Disconnect the circuit breaker and switch off the DC switch.
Step 3: Assemble provided PV connectors with PV modules by the following steps.
Components for PV connectors and Tools:

Female connector housing	
Female terminal	
Male connector housing	
Male terminal	
Crimping tool and spanner	

Prepare the cable and follow the connector assembly process:

Strip one cable 8 mm on both end sides and be careful NOT to nick conductors.

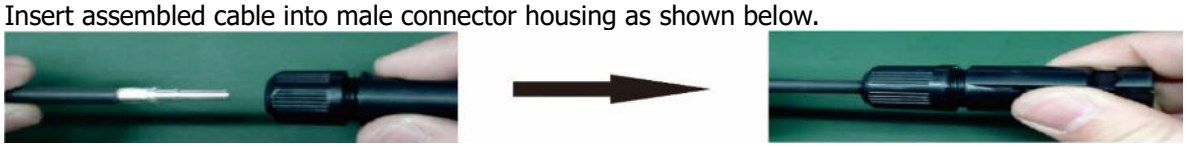


Insert striped cable into female terminal and crimp female terminal as shown below.

Insert assembled cable into female connector housing as shown below.

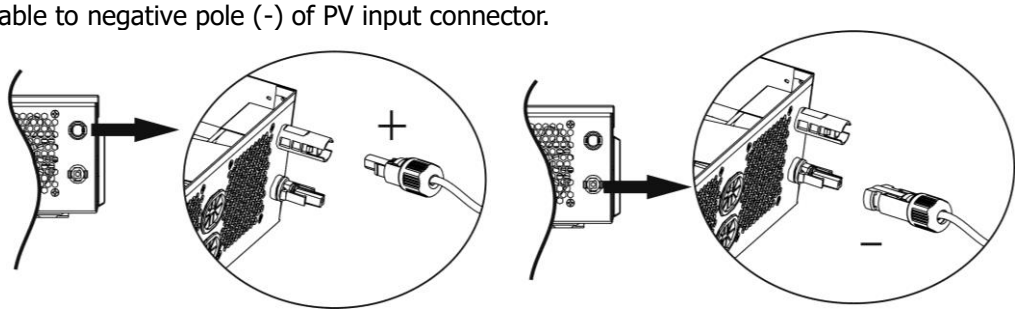
Insert striped cable into male terminal and crimp male terminal as shown below.

Insert assembled cable into male connector housing as shown below.



Then, use spanner to screw pressure dome tightly to female connector and male connector as shown below.

Step 4: 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.



WARNING! For safety and efficiency, it's very important to use appropriate cables for PV module connection. To reduce risk of injury, please use the proper cable size as recommended below.

Conductor cross-section (mm^2)	AWG no.
4~6	10~12

CAUTION: Never directly touch the terminals of inverter. It might cause lethal electric shock.

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. Start-up Voltage.

INVERTER MODEL	X-3.6KW-M	X-5.6KW-M
Max. PV Array Power	4000W	6000W
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	120Vdc~450Vdc	
Start-up Voltage	150Vdc +/- 10Vdc	

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

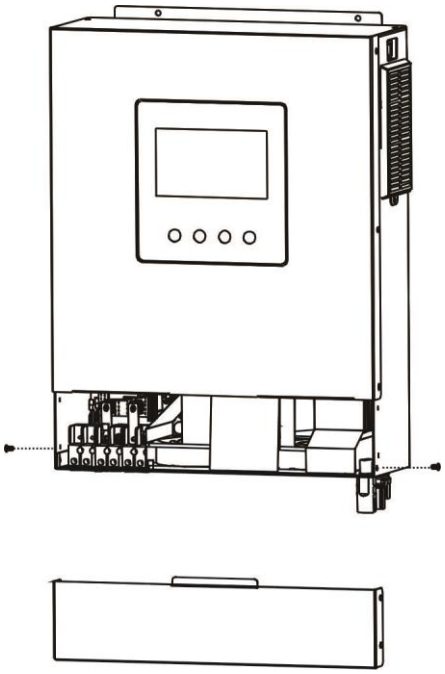
Solar Panel Spec. (reference) - 250Wp - Vmp: 30.1Vdc - Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A - Cells: 60	SOLAR INPUT Min in series: 6 pcs, max. in series: 12 pcs.	Q'ty of panels	Total input power
	6 pcs in series	6 pcs	1500W
	8 pcs in series	8 pcs	2000W
	12 pcs in series	12 pcs	3000W
	8 pieces in series and 2 sets in parallel	16 pcs	4000W
	10 pieces in series and 2 sets in parallel (only for 5.6KVA model)	20 pcs	5000W
	11 pieces in series and 2 sets in parallel (only for 5.6KVA model)	22 pcs	5500W
	12 pieces in series and 2 sets in parallel (only for 5.6KVA model)	24 pcs	6000W

Take the 555Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

Solar Panel Spec. (reference) - 555Wp - Imp: 17.32A - Voc: 38.46Vdc - Isc: 18.33A - Cells: 110	SOLAR INPUT Min in series: 2 pcs, max. in series: 11 pcs.	Q'ty of panels	Total input power
	2pcs in series	2 pcs	1110W
	4pcs in series	4 pcs	2220W
	6 pcs in series	6 pcs	3330W
	7 pcs in series	7 pcs	3885W
	8 pcs in series (only for X-5.6KW-M model)	8 pcs	4440W
	10 pcs in series (only for X-5.6KW-M model)	10 pcs	5550W
	11 pcs in series (only for X-5.6KW-M model)	11 pcs	6000W

Final Assembly

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



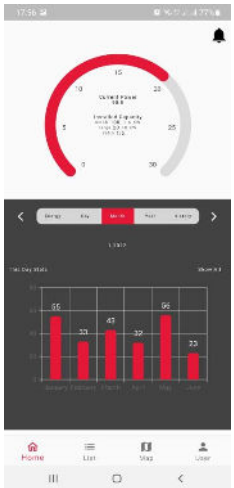
Communication Options

Serial Connection

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

Wi-Fi Connection

Wi-Fi module needs to be installed on the inverter for Wi-Fi Connection. Wi-Fi module can enable wireless communication between inverters and monitoring platform. Simply put this module connected to an inverter with communication cable and you may find "Crown Monitor" app from the Apple® Store or Google® Play Store. All data loggers and parameters are saved in iCloud. For quick installation and operation, please check Appendix II.

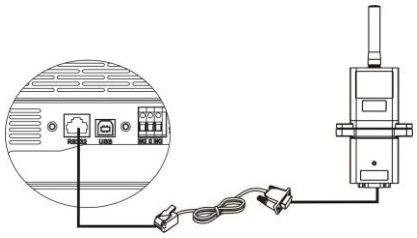


Wi-Fi Module Installation

Please follow below steps to install Wi-Fi module:

Step 1: The module contains four strong magnetics backing and can be easily be placed on the side of the inverter.

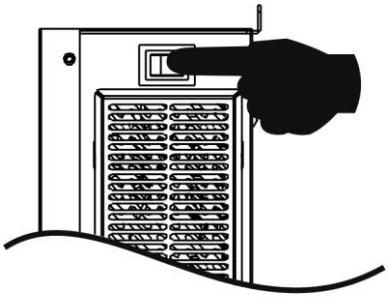
Step 2: Please use one RJ45 to RS-232 communication cable to connect an inverter and Wi-Fi module as below chart.



OPERATION

Power ON/OFF

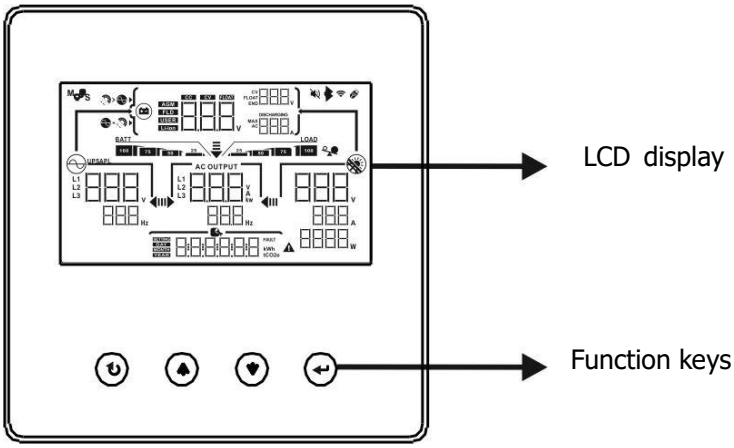
Side view of unit



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

Operation and Display Panel

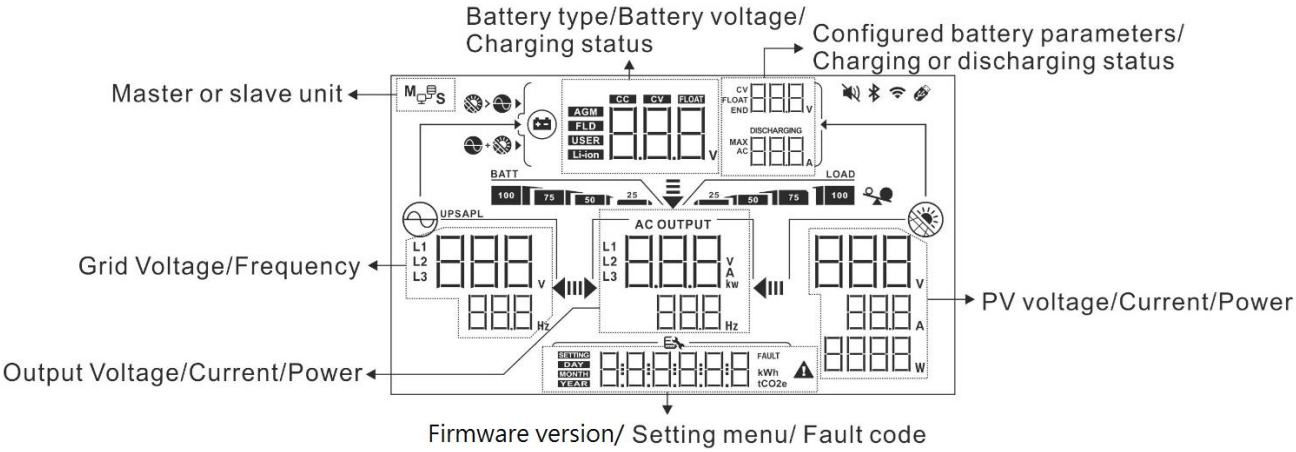
The operation LCD panel, shown in the chart below, includes one RGB LED ring, four function keys and a LCD display to indicate the operating status and input/output power information.

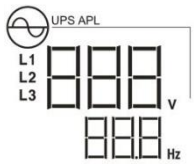
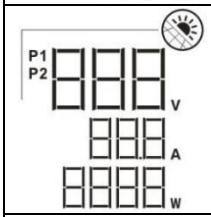
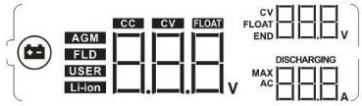
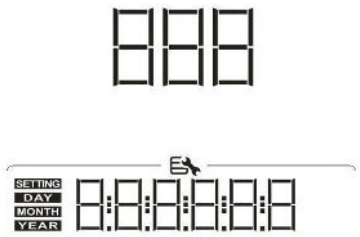
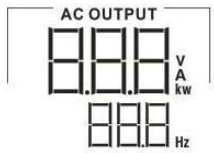


Function Keys

Function Key		Description
↻	ESC	To exit the setting
▲	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	
	Indicates the AC input voltage and frequency.
	Indicates the PV voltage, current and power.
	Indicates the battery voltage, charging stage, configured battery parameters, charging or discharging current.
Configuration Program and Fault Information	
	Indicates the setting programs.
	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code.
Output Information	
	Indicate the output voltage, load in VA, and load in Watt and output frequency.
	The ICON flashing indicates the unit with AC output and setting programs 60, 61 different from default setting.

Battery Information	
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

When battery is charging, it will present battery charging status.

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

In battery mode, it will present battery capacity.

Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.85V/cell	
	1.85V/cell ~ 1.933V/cell	
	1.933V/cell ~ 2.017V/cell	
	> 2.017V/cell	
Load < 50%	< 1.892V/cell	
	1.892V/cell ~ 1.975V/cell	
	1.975V/cell ~ 2.058V/cell	
	> 2.058V/cell	

Load Information		
	Indicates overload.	
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.	
	0%~24%	25%~49%
	50%~74%	75%~100%
Charger Source Priority Setting Display		
	Indicates setting program 16 "Charger source priority" is selected as "Solar first".	
	Indicates setting program 16 "Charger source priority" is selected as "Solar and Utility".	
	Indicates setting program 16 "Charger source priority" is selected as "Solar only".	
Output source priority setting display		

	Indicates setting program 01 “Output source priority” is selected as “Utility first”.
	Indicates setting program 01 “Output source priority” is selected as “Solar first”.
	Indicates setting program 01 “Output source priority” is selected as “SBU”.
AC Input Voltage Range Setting Display	
UPS	Indicates setting program 03 is selected as “UPS”. The acceptable AC input voltage range will be within 170-280VAC.
APL	Indicates setting program 03 is selected as “APL”. The acceptable AC input voltage range will be within 90-280VAC.
Operation Status Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
AGM FLD USER Li-ion	Indicates battery type.
	Indicates unit alarm is disabled.

LCD Setting

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

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape 00 SETTING ESC	
01	Output source priority: To configure load power source priority	Utility first (default) 01 SETTING USb	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.
		Solar first 01 SETTING SUb	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority 01 SETTING 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.
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) 02 SETTING 60	Setting range is from 10A to 100A. Increment of each click is 10A.

03	AC input voltage range	Appliances (default) 03 SETTING APL	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 03 SETTING UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
05	Battery type	AGM (default) 05 SETTING AGn	Flooded 05 SETTING FLd
		User-Defined 05 SETTING USE	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
06	Auto restart when overload occurs	Restart disable (default) 06 SETTING LRd	Restart enable 06 SETTING LRE
07	Auto restart when over temperature occurs	Restart disable (default) 07 SETTING tRd	Restart enable 07 SETTING tRE
09	Output frequency	50Hz (default) 09 SETTING 50	60Hz 09 SETTING 60

10	Output voltage	220V 10 SETTING 220	230V (default) 10 SETTING 230
		240V 10 SETTING 240	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 11 SETTING UtI 30	Setting range is 2A, then from 10A to 100A. Increment of each click is 10A.
12	Setting voltage point back to utility source when selecting "SBU" (SBU priority) in program 01.	Available options in 3.6KW model:	
		23.0V (default) 12 SETTING 23	Setting range is from 22V to 25.5V. Increment of each click is 0.5V.
		Available options in 5.6KW model:	
		46V (default) 12 SETTING 46	Setting range is from 44V to 51V. Increment of each click is 1V.
13	Setting voltage point back to battery mode when selecting "SBU" (SBU priority) in program 01.	Available options in 3.6KW model:	
		Battery fully charged 13 SETTING FUL	27V (default) 13 SETTING 27
		Setting range is from 24V to 29V. Increment of each click is 0.5V.	

13	Setting voltage point back to battery mode when selecting "SBU" (SBU priority) in program 01.	Available options in 5.6KW model:	
		Battery fully charged 13 SETTING FUL	54V (default) 13 SETTING 54
		Setting range is from 48V to 58V. Increment of each click is 1V.	
16	Charger source priority: To configure charger source priority	Solar first 16 SETTING CSO	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 16 SETTING SNU	Solar energy and utility will charge battery at the same time.
		Only Solar 16 SETTING OSO	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Alarm control	Alarm on (default) 18 SETTING bON	Alarm off 18 SETTING bOF

19	Auto return to default display screen	Return to default display screen (default) 19 SETTING ESP	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.
		Stay at latest screen 19 SETTING HEP	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 20 SETTING LON	Backlight off 20 SETTING LOF
22	Beeps while primary source is interrupted	Alarm on (default) 22 SETTING AON	Alarm off 22 SETTING AOF
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 23 SETTING byd	Bypass enable 23 SETTING byE
25	Record Fault code	Record enable (default) 25 SETTING FEN	Record disable 25 SETTING FdS

26	Bulk charging voltage (C.V voltage)	3.6KW default setting: 28.2V 26 SETTING CV 28.2	5.6KW default setting: 56.4V 26 SETTING CV 56.4
		If self-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V for 3.6KW model and 48.0V to 61.0V for 5.6KW model. Increment of each click is 0.1V.	
27	Floating charging voltage	3.6KW default setting: 27.0V 27 SETTING FL 27.0	5.6KW default setting: 54.0V 27 SETTING FL 54.0
		If self-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V for 3.6KW model and 48.0V to 61.0V for 5.6KW model. Increment of each click is 0.1V.	
29	Low DC cut-off voltage	3.6KW default setting: 21.0V 29 SETTING CO 21.0	5.6KW default setting: 42.0V 29 SETTING CO 42.0
		If self-defined is selected in program 5, this program can be set up. Setting range is from 21.0V to 24.0V for 3.6KW model and 42.0V to 48.0V for 5.6KW 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.	
30	Battery equalization	Battery equalization 30 SETTING EEN	Battery equalization disable (default) 30 SETTING EdS
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	

31	Battery equalization voltage	3.6KW default setting: 29.2V 31 SETTING EU 29.2	5.6KW default setting: 58.4V 31 SETTING EU 58.4
		Setting range is from 25.0V to 31.5V for 3.6KW model and 48.0V to 61.0V for 5.6KW model. Increment of each click is 0.1V.	
33	Battery equalized time	60min (default) 33 SETTING 60	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 34 SETTING 120	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 35 SETTING 30d	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 36 SETTING AEN	Disable (default) 36 SETTING Ads
		If equalization function is enabled in program 30, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "E9" will not be shown in LCD main page.	

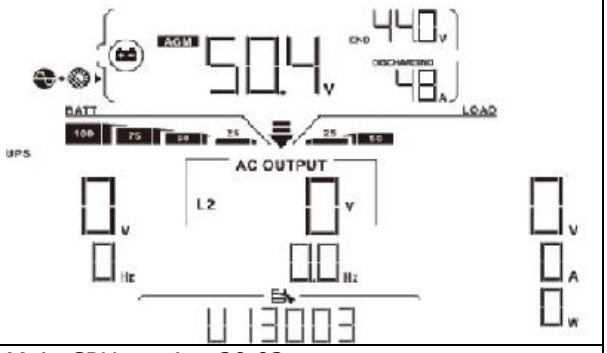
38	Solar energy feed to grid configuration (It's requested to enter password)	Disable (default) 38 SETTING Grd	Enable 38 SETTING GrE
60	Low DC cut off voltage on second output	3.6KW default setting: 21.0V 60 SETTING 21.0	If "User-defined" is selected in program 05, this setting range is from 21.0V to 31.5V for 24V model. Increment of each click is 0.1V.
		5.6KW default setting: 42.0V 60 SETTING 42.0	If "User-defined" is selected in program 05, this setting range is from 42.0V to 61.0V for 48V model. Increment of each click is 0.1V.
61	Setting discharge time on the second output	Disable (Default) 61 SETTING dd5	Setting range is disable and then from 0 min to 990 min. Increment of each click is 5 min. *If the battery discharge time achieves the setting time in program 61 and the program 60 function is not triggered, the second output will be turned off.

Display Setting

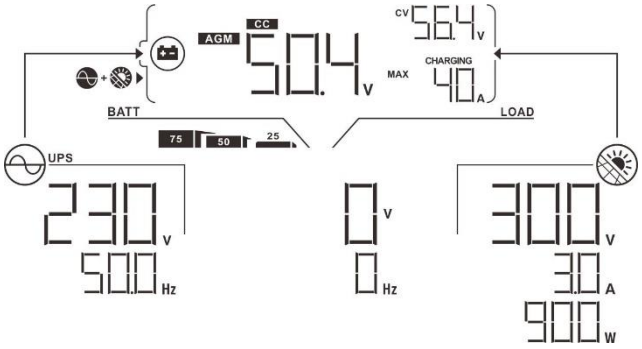
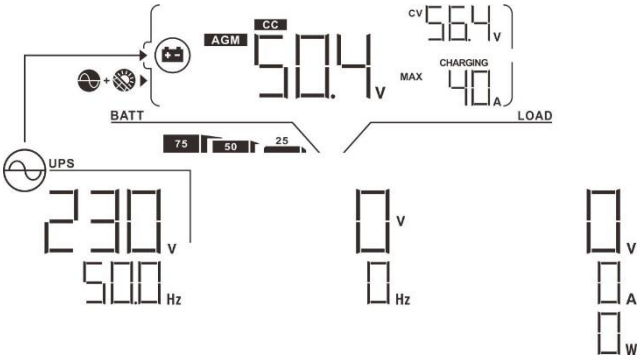
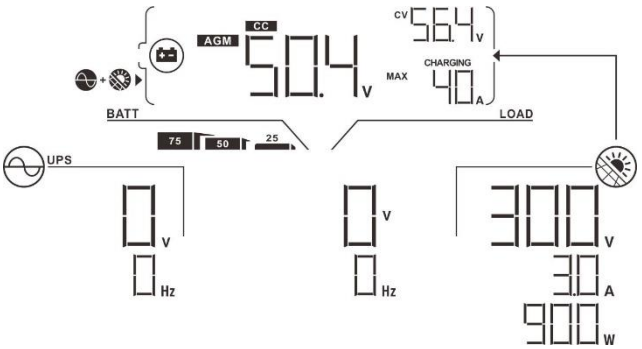
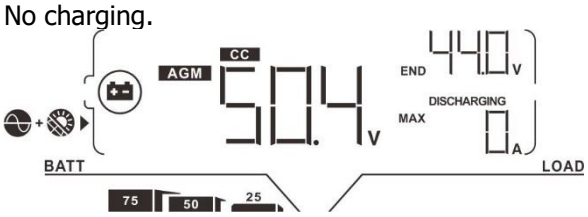
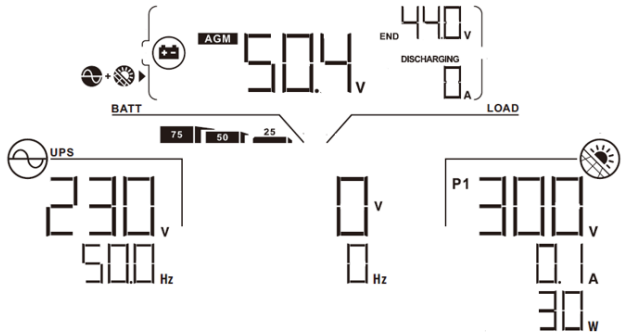
The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.

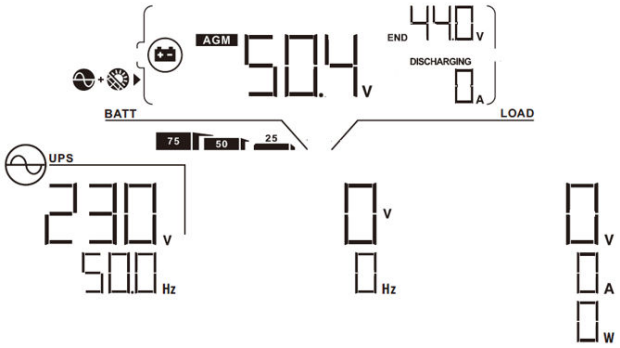
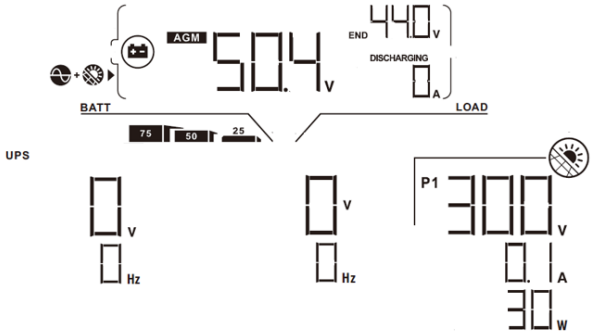
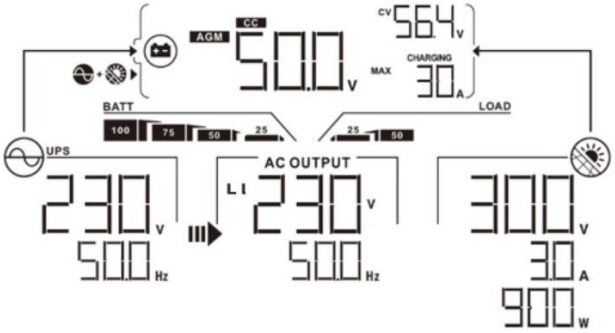
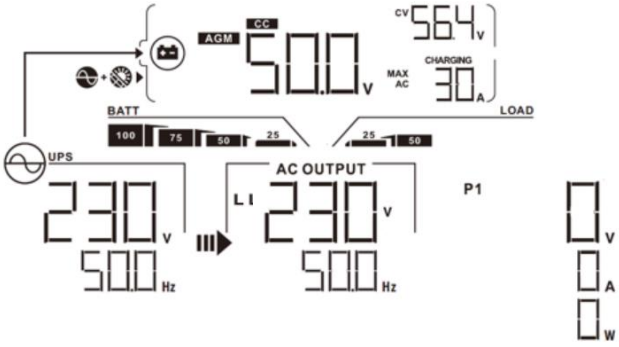
Selectable information	LCD display
Input voltage/ Input frequency (Default Display Screen)	Input Voltage=230V, Input frequency=50Hz
PV voltage/ PV current/ PV power	PV voltage=300V, PV current=2.0A, PV power=600W
Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=50.4V, Bulk charging voltage=56.4V, Charging current=20A
	Battery voltage=53.9V, Floating charging voltage=54.0V, Charging current=1A

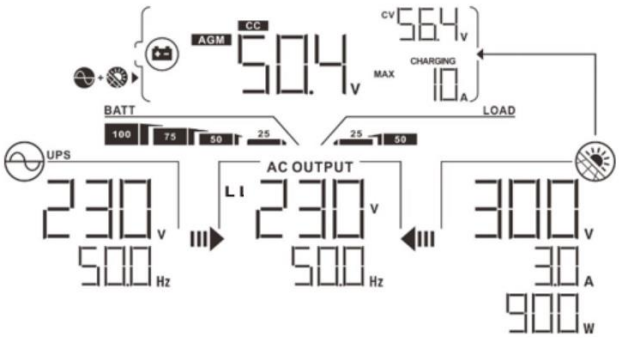
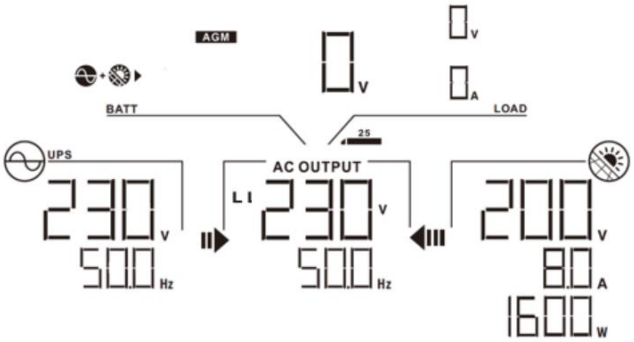
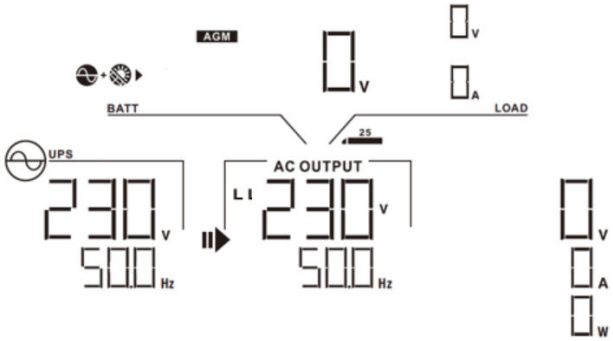
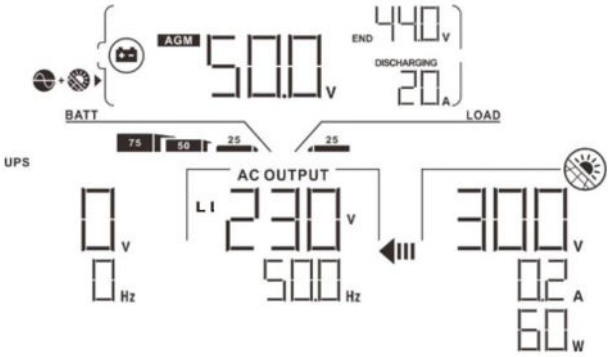
	Battery voltage=50.4V, Low DC cut-off voltage=44.0V, Discharging current=48A
L1 output voltage/output frequency, load in VA, load in Watt, L2 output voltage/output frequency switch every 5 second	L1 output voltage=230V, L1 output frequency=50Hz
	Load in VA=2.4kVA, Output frequency=50Hz
	Load in Watt=2.4kW, Output frequency=50Hz

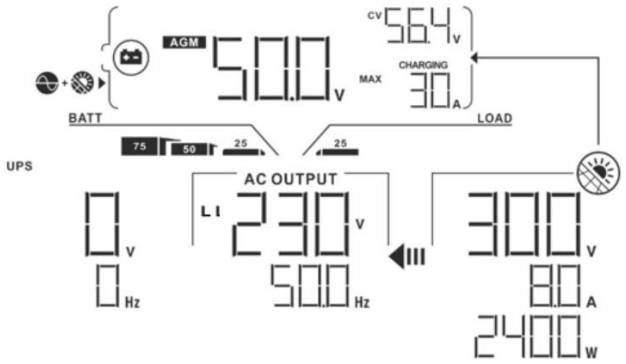
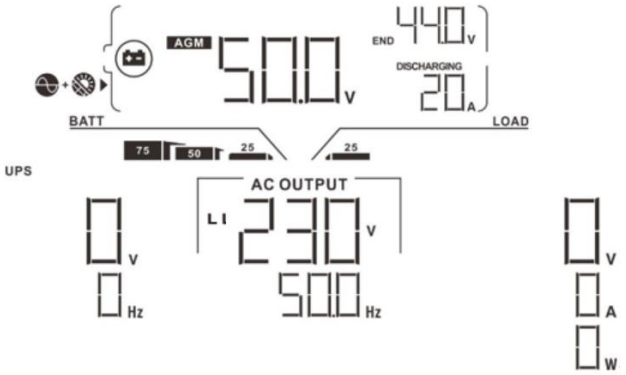
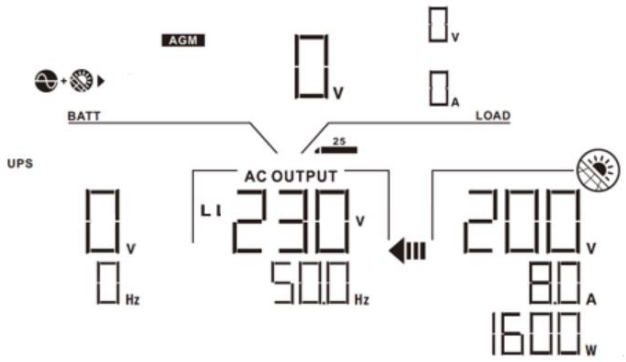
	L2 output voltage=230V, L2 output frequency=50 Hz Second output (L2) is off. L2 output voltage=0, L2 output frequency=0 Hz 
Main CPU version checking	Main CPU version 30.03

Operating Mode Description

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

Operation mode	Description	LCD display
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.	No charging at all no matter if grid or PV power is available.	Grid is available. 
		PV power is available. 
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. 

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 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. 
		If either "SUB" (solar first) or "SBU" is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads. 
		Power from utility 
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV energy. 

Operation mode	Description	LCD display
Battery Mode	The unit will provide output power from battery and PV power.	PV energy will supply power to the loads and charge battery at the same time. No utility is available. 
		Power from battery only. 
		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.

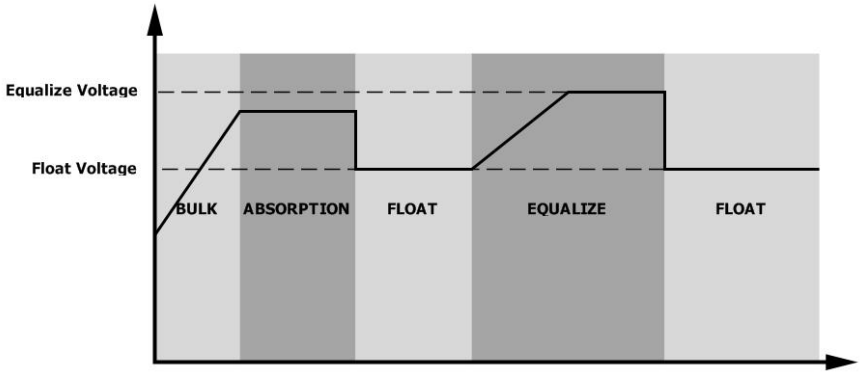
- **How to Apply Equalization Function**

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.

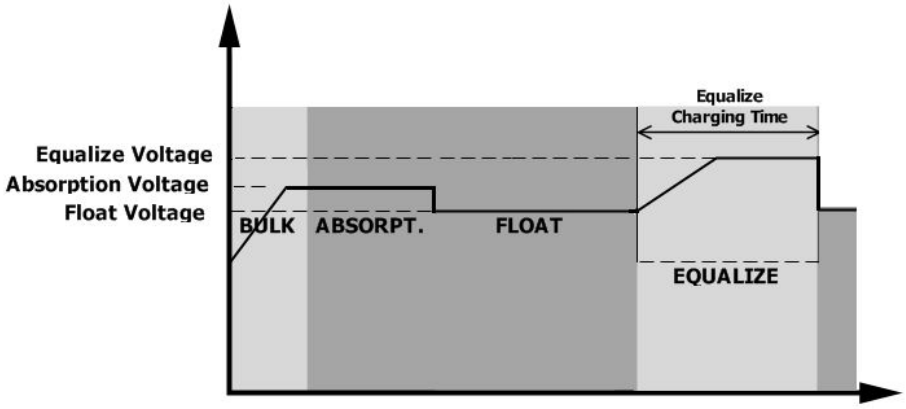
- **When to Equalize**

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.

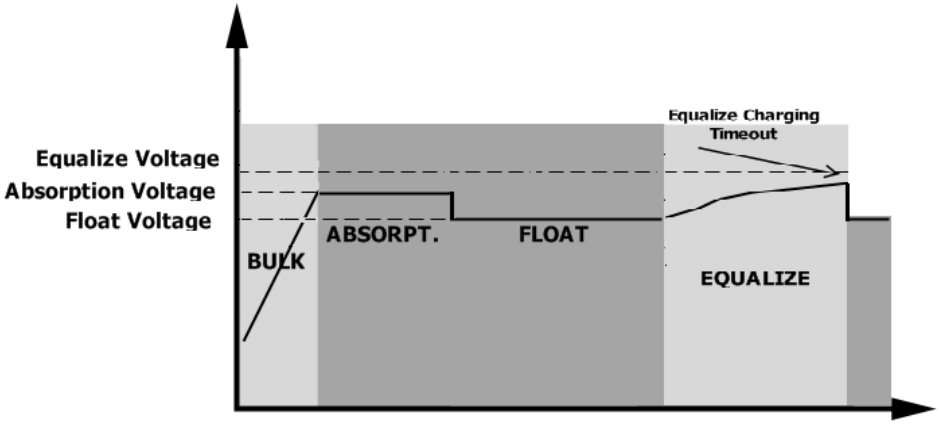


- **Equalize charging time and timeout**

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.	F01
02	Over temperature or NTC is not connected well.	F02
03	Battery voltage is too high	F03
04	Battery voltage is too low	F04
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
10	PV over current	F 10
51	Over current or surge	F51
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	01
02	Over temperature	None	02
03	Battery is over-charged	Beep once every second	03
04	Low battery	Beep once every second	04
07	Overload	Beep once every 0.5 second	07 LOAD 25 50 75 100
10	Output power derating	Beep twice every 3 seconds	10
15	PV energy is low.	Beep twice every 3 seconds	15
16	High AC input (>280VAC) during BUS soft start	None	16
E9	Battery equalization	None	E9

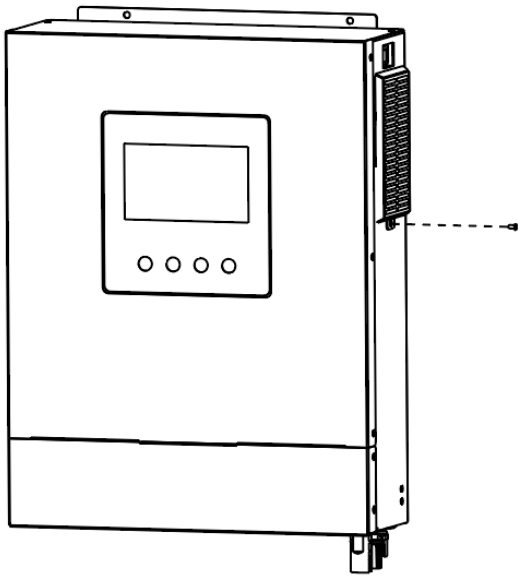
CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

Overview

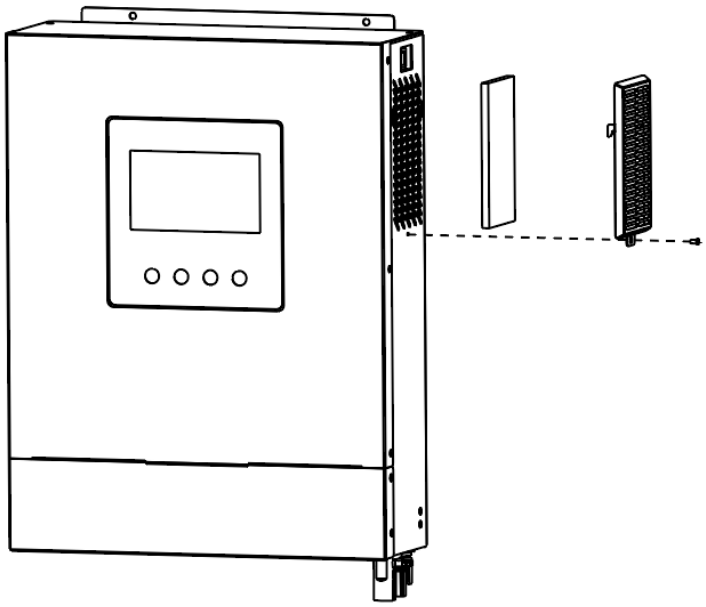
Every inverter is already installed with anti-dusk kit from factory. Inverter will automatically detect this kit and activate internal thermal sensor to adjust internal temperature. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

Clearance and Maintenance

Step 1: Please loosen the screw in counterclockwise direction on the top of the inverter.



Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.



Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

NOTICE: The anti-dust kit should be cleaned from dust every one month.

SPECIFICATIONS

Table 1 Line Mode Specifications

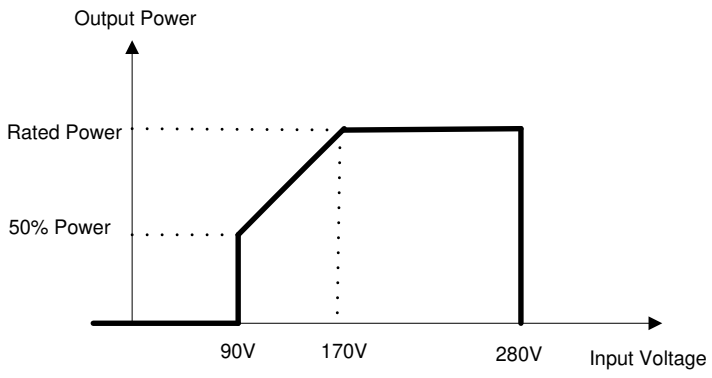
INVERTER MODEL	X-3.6KW-M	X-5.6KW-M
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS); 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Max AC Input Current	30A	40A
Max 2nd Output Current	30A	40A
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.		

Table 2 Inverter Mode Specifications

INVERTER MODEL	X-3.6KW-M	X-5.6KW-M
Rated Output Power	3.6KVA/3.6KW	5.6KVA/5.6KW
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	48Vdc
Cold Start Voltage	23.0Vdc	46.0Vdc
Low DC Warning Voltage @ load < 50% @ load ≥ 50%	 23.0Vdc 22.0Vdc	 46.0Vdc 44.0Vdc
Low DC Warning Return Voltage @ load < 50% @ load ≥ 50%	 23.5Vdc 23.0Vdc	 47.0Vdc 46.0Vdc
Low DC Cut-off Voltage @ load < 50% @ load ≥ 50%	 21.5Vdc 21.0Vdc	 43.0Vdc 42.0Vdc
High DC Recovery Voltage	32Vdc	62Vdc
High DC Cut-off Voltage	33Vdc	63Vdc
No Load Power Consumption	<40W	<55W

Table 3 Charge Mode Specifications

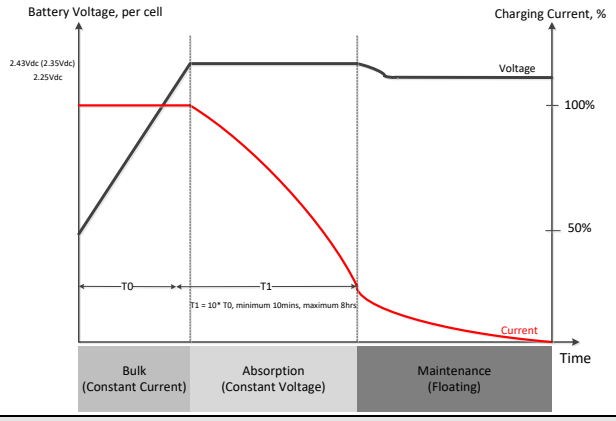
Utility Charging Mode			
INVERTER MODEL		**X-3.6KW-M**	**X-5.6KW-M**
Charging Algorithm		3-Step	
AC Charging Current (Max)		100Amp (@$V_{I/P}$=230Vac)	
Bulk Charging Voltage	**Flooded Battery**	29.2	58.4
	AGM / Gel Battery	28.2	56.4
Floating Charging Voltage		27Vdc	54Vdc
Charging Curve			
MPPT Solar Charging Mode			
INVERTER MODEL		**X-3.6KW-M**	**X-5.6KW-M**
Max. PV Array Power		4000W	6000W
Nominal PV Voltage		240Vdc	360Vdc
Start-up Voltage		150Vdc +/- 10Vdc	
PV Array MPPT Voltage Range		120~450Vdc	
Max. PV Array Open Circuit Voltage		500Vdc	
Max Charging Current (AC charger plus solar charger)		100Amp	

Table 4 General Specifications

INVERTER MODEL	**X-3.6KW-M**	**X-5.6KW-M**
Safety Certification	CE	
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	107 x 322.6 x 420	
Net Weight, kg	9.5	10.5

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)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Internal fuse tripped.	1. Contact repair center for replacing the fuse. 2. Re-charge battery. 3. 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 "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.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 105% 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)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	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 I: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 24Vdc 100Ah (min)	Backup Time @ 24Vdc 200Ah (min)
X-M-3.6KW	300	359	880
	600	176	420
	900	99.2	242
	1200	76	182
	1500	54	131
	1800	45	101
	2100	38	86
	2400	28	75
	2700	25	59
	3200	20	50
	3600	15	41

Model	Load (VA)	Backup Time @ 48Vdc 100Ah (min)	Backup Time @ 48Vdc 200Ah (min)
X-M-5.6KW	500	490	1030
	1000	214	490
	1500	126	322
	2000	89	217
	2500	72	172
	3000	61	146
	3500	52	113
	4000	40	90
	4500	35	80
	5200	30	70
	5600	25	60

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 II: The Wi-Fi Operation Guide

1. Introduction

Wi-Fi module can enable wireless communication between off-grid inverters and monitoring platform. Users have complete and remote monitoring and controlling experience for inverters when combining Wi-Fi module with Crown Monitor App, available for both iOS and Android based device. All data loggers and parameters are saved in iCloud.

The major functions of this APP:

- Delivers device status during normal operation.
- Allows to configure device setting after installation.
- Notifies users when a warning or alarm occurs.
- Allows users to query inverter history data.

2. Crown Monitor App

2-1. Download and install APP

Operating system requirement for your smart phone:

iOS system supports iOS 9.0 and above

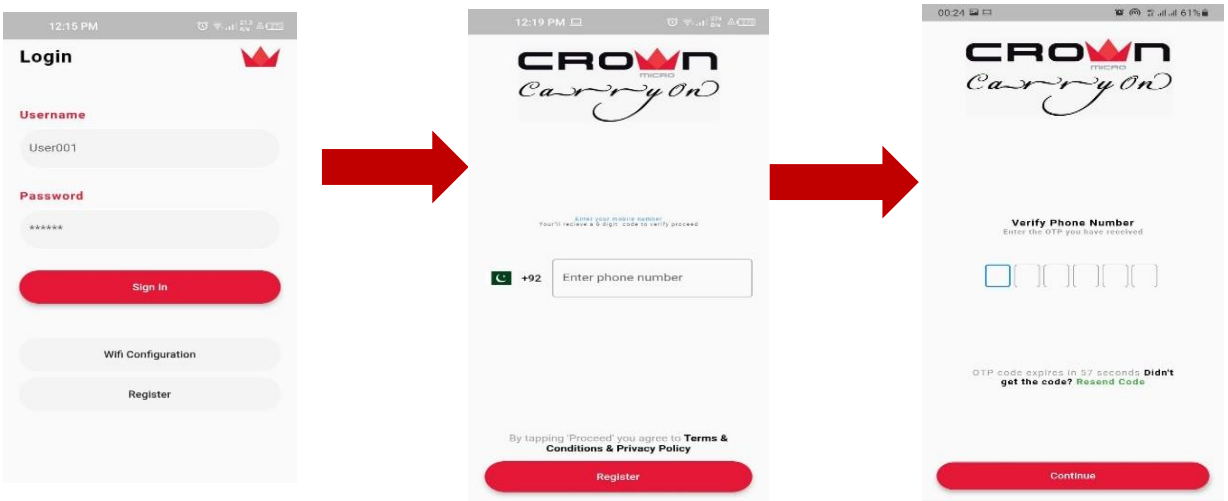
Android system supports Android 5.0 and above

User may Download "**Crown Monitor** " app from Apple Store or Google Play Store.

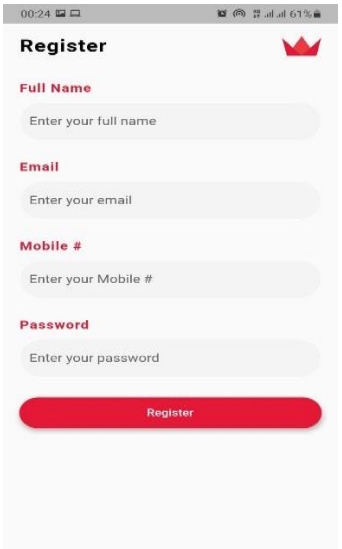
2-2. Initial Setup:

Step 1: Registration at first time

After the installation, please tap the shortcut icon to access this APP on your mobile screen. In the Home screen of App, tap "Register" to access "User Registration" page. Fill in your phone number then Crown Monitor App send OTP (One-time password) to your Number. Verify your phone number by entering OTP.

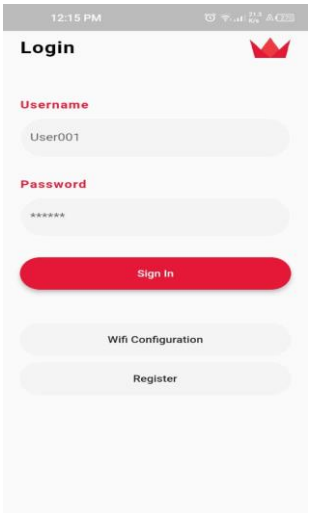


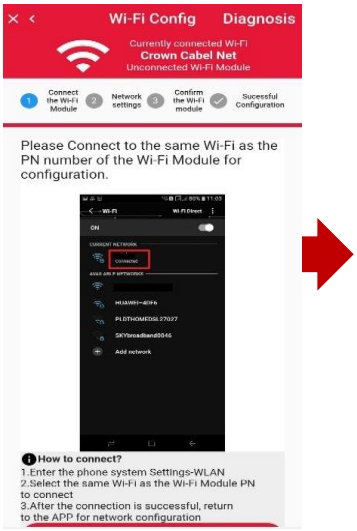
Then Registration window will pop up. Fill in all your Relevant Information and Tap "Register" icon to continue to other settings.



Step:2 Local Wi-Fi Module Configuration

In the Home Screen, tap "Wi-Fi Configuration" to access Wi-Fi Settings. There are detailed setup procedure listed below "How to Connect?" section. You may follow it to connect Module to Wi-Fi.

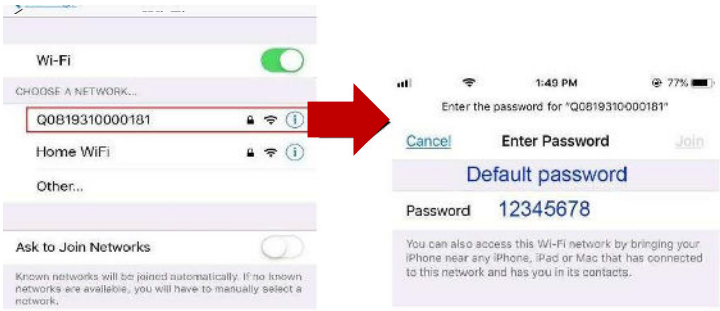




How to Connect?

1. Enter the phone system Settings WLAN
2. Select the Same Wi-Fi Module PN to connect
3. After the connection is successful, return to the App for network configuration

Go to "WLAN Settings" of phone and select connected Wi-Fi name. The connected Wi-Fi name is the same to your Wi-Fi Module PN number and enter default password "12345678".

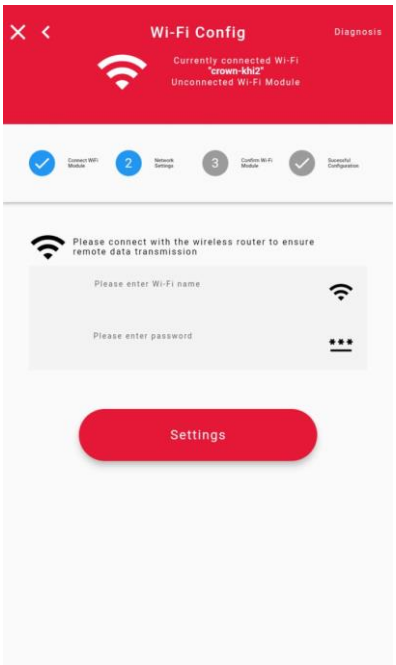


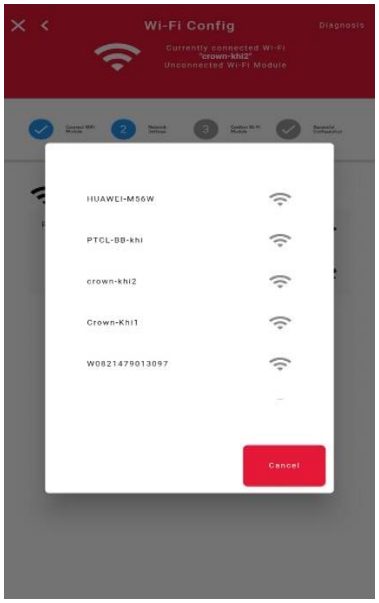
Then Return to “Crown Monitor App” and tap

button, when Wi-Fi module is connected successfully.

Step 3: Wi-Fi Network Settings:

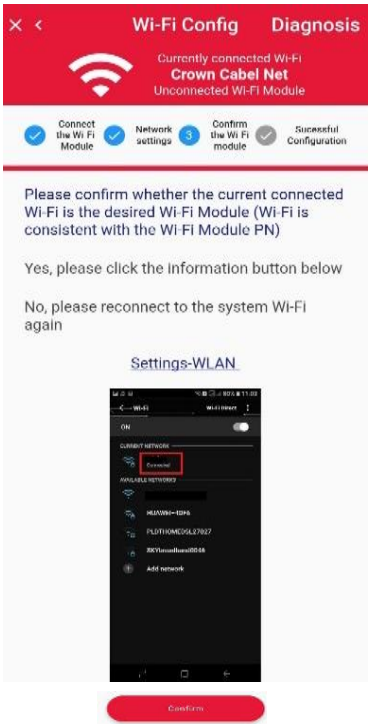
Tap icon to select your local Wi-Fi Router name (to access the Internet) and enter password.



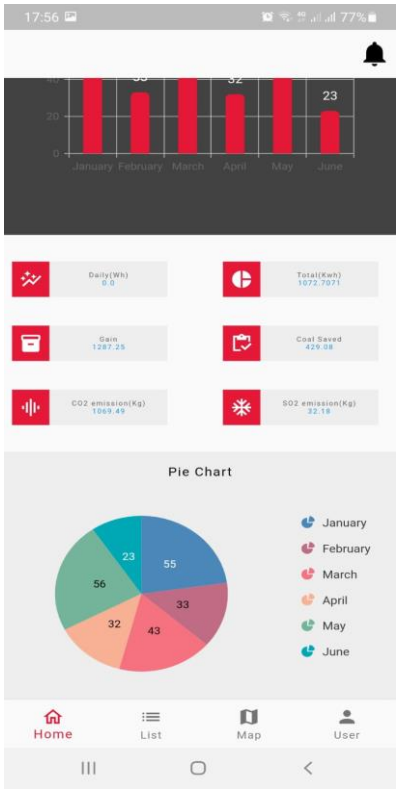


Step 4:

Tap "Confirm" to complete the Wi-Fi configuration between the Wi-Fi module and the Internet.



If the Connection Fails, please Repeat Step1 and Step2

Step 5: Login Successful

After Successful Login, User can access "Dashboard" page to Monitor currently Running devices.
User can Monitor overall situation and Energy information for Current power and Today power as below diagram.