USER MANUAL

8.6KW
Hybrid Inverter

Version: 1.0

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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.
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 required to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Customizable status LED ring with RGB lights
- Touchable button with 5” colored LCD
- Built-in Wi-Fi for mobile monitoring (APP is required)
- Supports USB On-the-Go function
- Built-in anti-dusk kit
- Reserved communication ports for BMS (RS485, CAN-BUS, RS232)
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable output usage timer and prioritization
- Configurable charger source priority via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Compatible to utility mains or generator power

Basic System Architecture

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

- Generator or Utility mains.
- PV modules

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

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

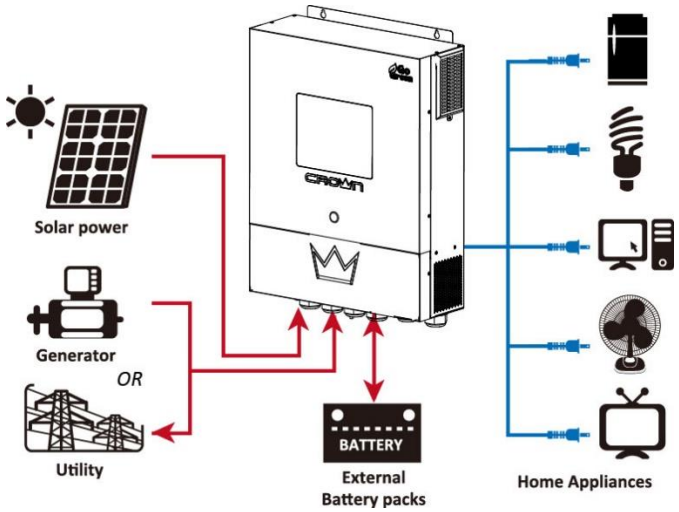
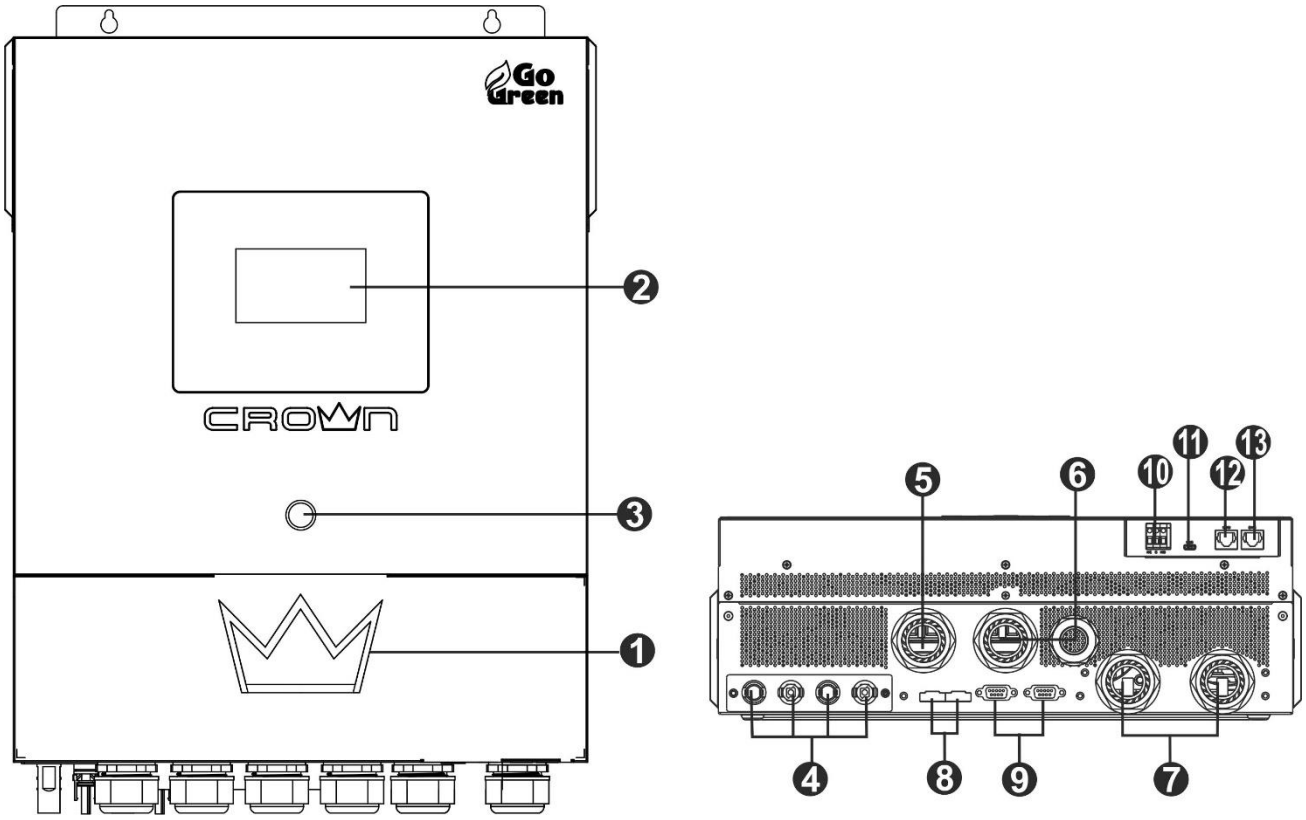


Figure 1 Basic hybrid PV System Overview

Product Overview



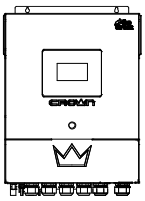
NOTE: For parallel installation and operation, please check *Appendix I.*

1. RGB LED ring (refer to LCD Setting section for the details)
2. LCD display
3. Power switch
4. PV connectors
5. Generator input connectors
6. AC input connectors
7. AC output connectors (Load connection)
8. Battery connectors
9. Current sharing port
10. Parallel communication port
11. Dry contact
12. USB port as USB communication port and USB function port
13. RS-232 communication port
14. BMS communication port: CAN, RS-485 or RS-232

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:


Inverter unit


Manual


software CD

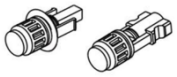

RS-232 cable


Parallel communication cable


Current sharing cable

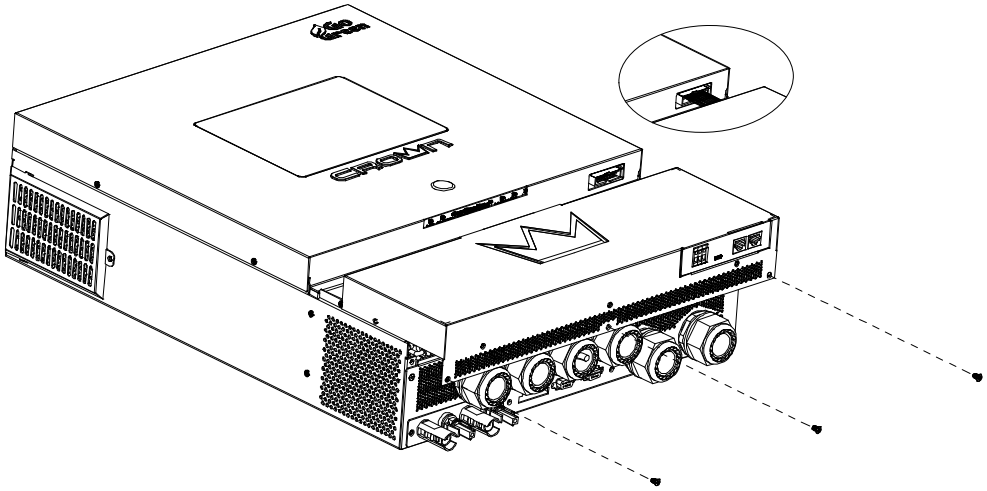

DC Fuse


Cable gland x 6 pcs


PV connectors x 2 sets

Preparation

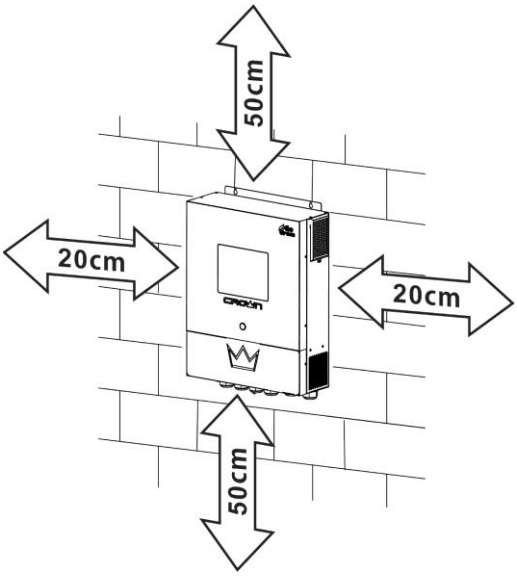
Before connecting all wirings, please take off bottom cover by removing five screws. When removing the bottom cover, be carefully to remove three cables as shown below.



Mounting the Unit

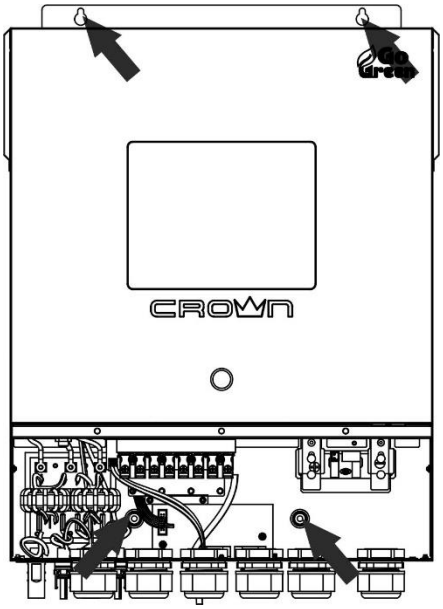
Consider the following points before selecting where to install:

- 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.**

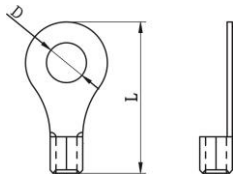
Install the unit by screwing four screws. It's recommended to use M4 or M5 screws.



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.

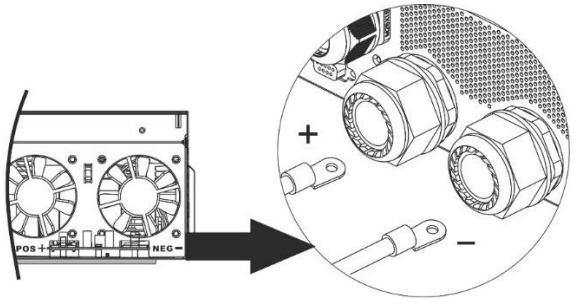
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Recommended battery cable and terminal size:

Model	Typical Amperage	Battery capacity	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
					D (mm)	L (mm)	
8.6KW	199A	250AH	1*3/0AWG	85	8.4	54	5 Nm

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Fix two cable glands into positive and negative terminals.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the nuts are tightened with torque of 5 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



⚠	**WARNING: Shock Hazard** Installation must be performed with care due to high battery voltage in series.

⚠	**CAUTION!!** Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur. **CAUTION!!** Do not apply anti-oxidant substance on the terminals before terminals are connected tightly. **CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input.

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.

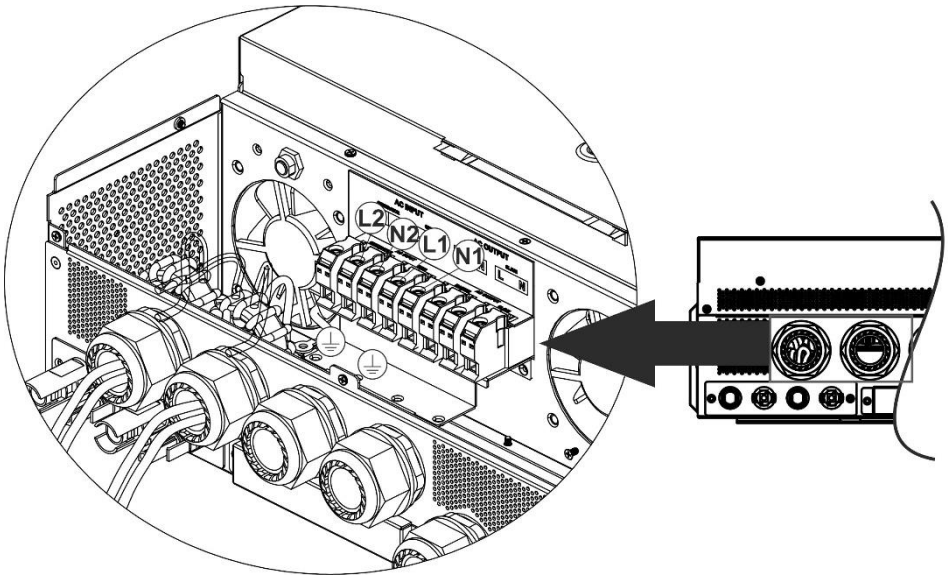
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
8.6KW	8 AWG	1.4~ 1.6Nm

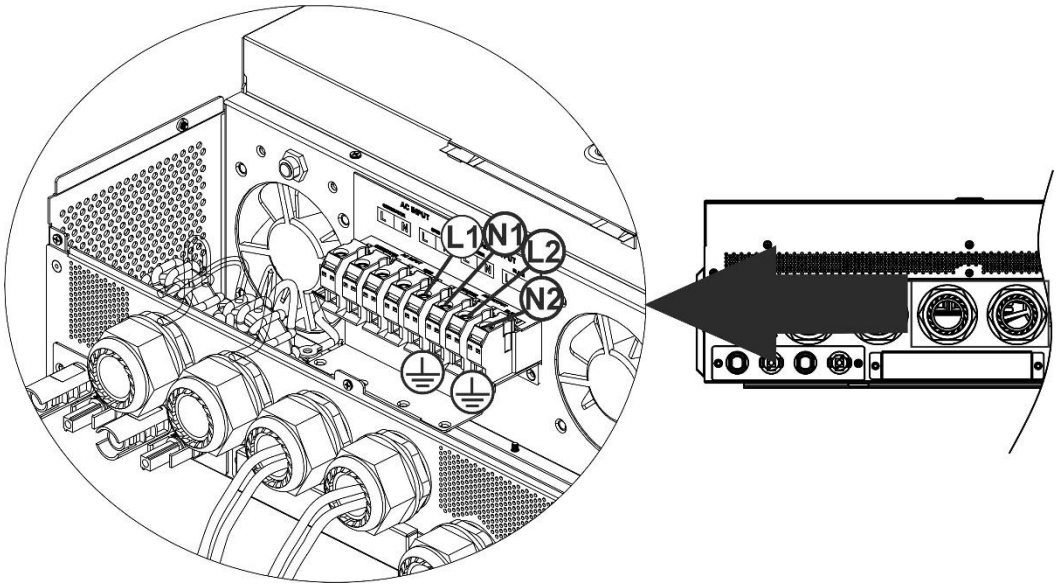
Please follow below steps to implement AC input/output connection:

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 N 3 mm.
3. Install three cable glands on input and output sides.
4. Insert AC input wires through cable gland and connect according to polarities indicated on terminal block. Tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.
   - ⏚→**Ground (yellow-green)**
   - **L1→LINE (brown or black)**
   - **N1→Neutral (blue)**
   - **L2→Generator (brown or black)**
   - **N2→Neutral (blue)**



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

5. Then, insert AC output wires through cable gland and connect according to polarities indicated on terminal block. 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)



6. 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 requires 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 be trigger 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 27A.

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

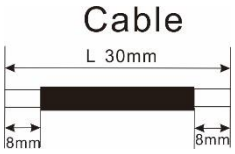
Step 2: Disconnect the circuit breaker and switch off the DC switch.
Step 3: Assemble provided PV connectors with PV modules by the following steps.

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.



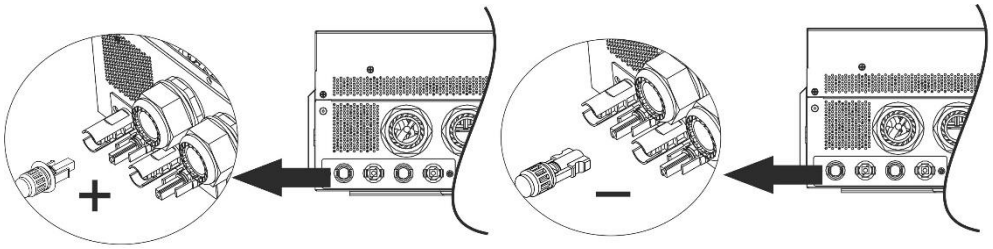
Insert assembled cable into male connector housing as shown below.



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.

Recommended Panel Configuration

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

1. Open circuit Voltage (Voc) of PV modules not to exceed maximum PV array open circuit voltage of the inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than the start-up voltage.

INVERTER MODEL	8.6KW
Max. PV Array Power	12000W
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	90Vdc~450Vdc
Start-up Voltage (Voc)	80Vdc

Recommended solar panel configuration:

Solar Panel Spec. (reference) - 250Wp - Vmp: 30.7Vdc - Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A - Cells: 60	**SOLAR INPUT 1** **Min in series: 4pcs, per input** **Max. in series: 12pcs, per input**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	4pcs in series	x	4pcs	1000W
	x	4pcs in series	4pcs	1000W
	12pcs in series	x	12pcs	3000W
	x	12pcs in series	12pcs	3000W
	6pcs in series	6pcs in series	12pcs	3000W
	6pcs in series, 2 strings	x	12pcs	3000W
	x	6pcs in series, 2 strings	12pcs	3000W
	8pcs in series, 2 strings	x	16pcs	4000W
	x	8pcs in series, 2 strings	16pcs	4000W
	10pcs in series, 2 strings	x	20pcs	5000W
	x	10pcs in series, 2 strings	20pcs	5000W
	9pcs in series, 1 string	9pcs in series, 1 string	18pcs	4500W
	10pcs in series, 1 string	10pcs in series, 1 string	20pcs	5000W
	12pcs in series, 1 string	12pcs in series, 1 string	24pcs	6000W

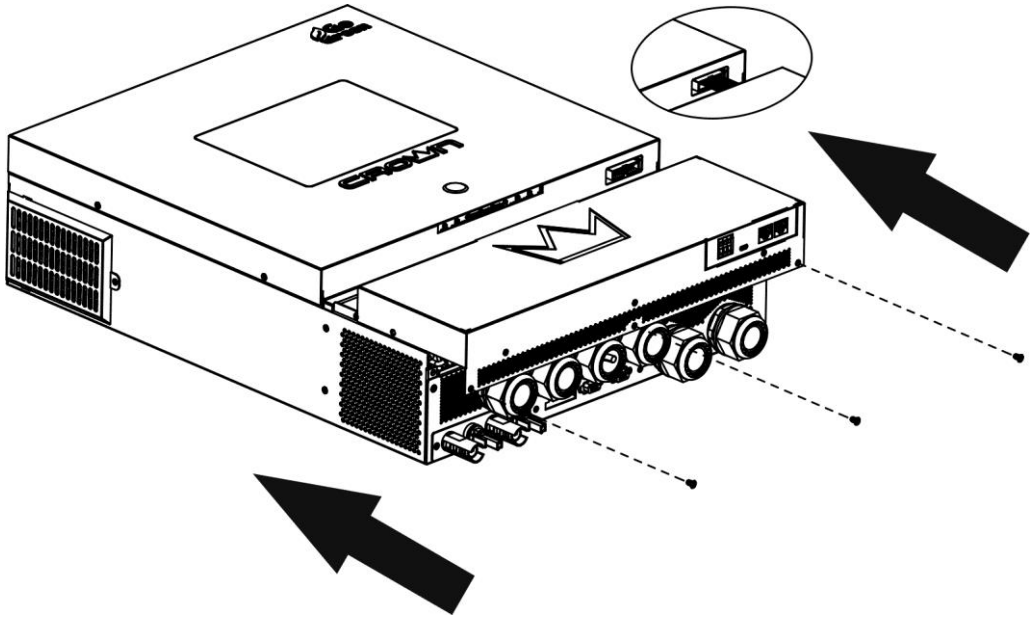
	6pcs in series, 2 strings	6pcs in series, 2 strings	24pcs	6000W
	8pcs in series, 2 strings	8pcs in series, 2 strings	32pcs	8000W
	10pcs in series, 2 strings	10pcs in series, 2 strings	40pcs	10000W
	12pcs in series, 2 strings	12pcs in series, 2 strings	48pcs	12000W

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 1**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	Min in series: 3pcs, per input **Max. in series: 11pcs, per input**			
	3pcs in series	x	3pcs	1665W
	x	3pcs in series	3pcs	1665W
	7pcs in series	x	7pcs	3885W
	x	7pcs in series	7pcs	3885W
	11pcs in series	x	11pcs	6105W
	x	11pcs in series	11pcs	6105W
	7pcs in series	7pcs in series	14pcs	7770W
	11pcs in series	11pcs in series	22pcs	12210W

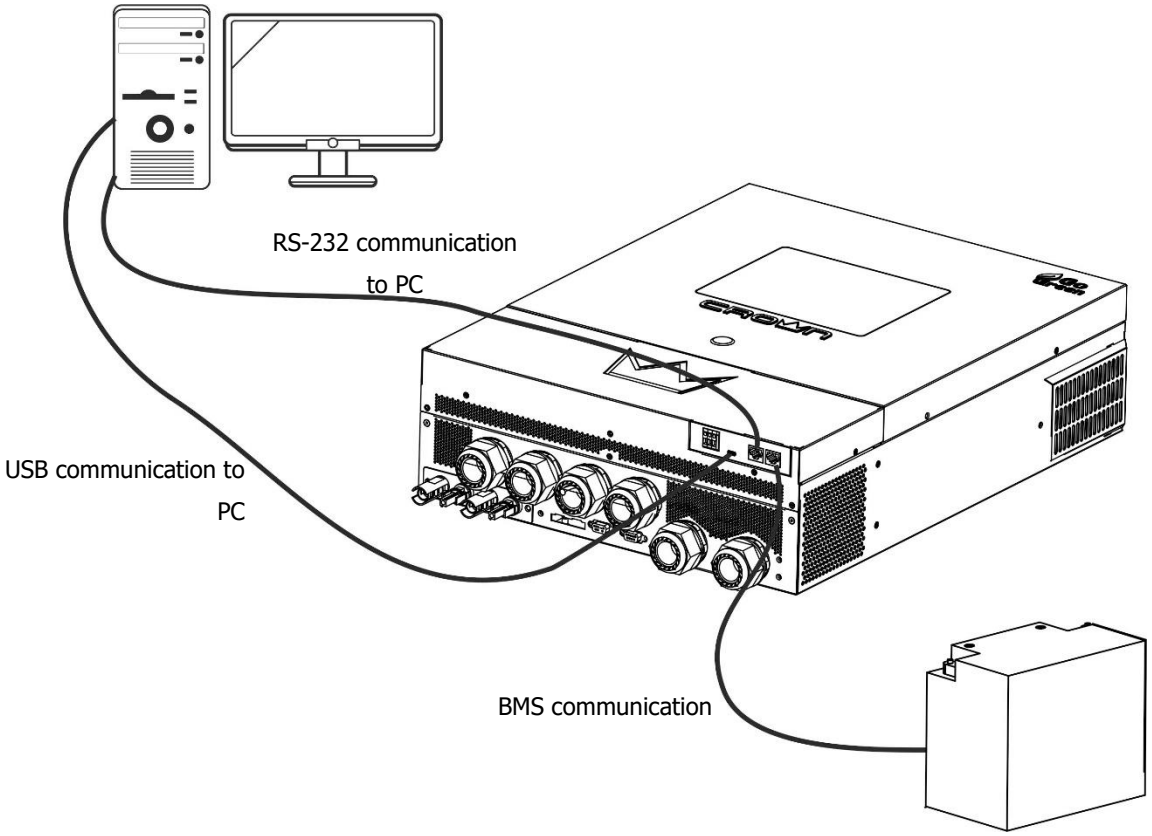
Final Assembly

After connecting all wirings, re-connect three cables and then put bottom cover back by screwing five screws as shown below.



Communication Connection

Follow below chart to connect all communication wiring.

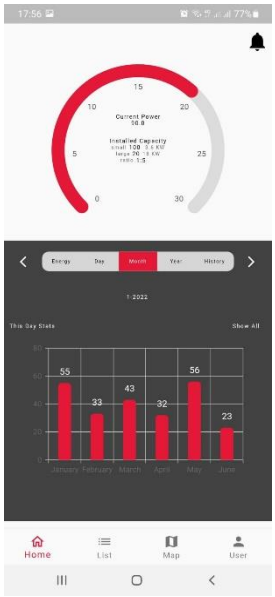


Serial Connection

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

This unit is equipped with a Wi-Fi transmitter. Wi-Fi transmitter can enable wireless communication between off-grid inverters and monitoring platform. Users can access and control the monitored inverter with downloaded APP. 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 refer to Appendix III - The Wi-Fi Operation Guide for details.



BMS Communication Connection

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

Dry Contact Signal

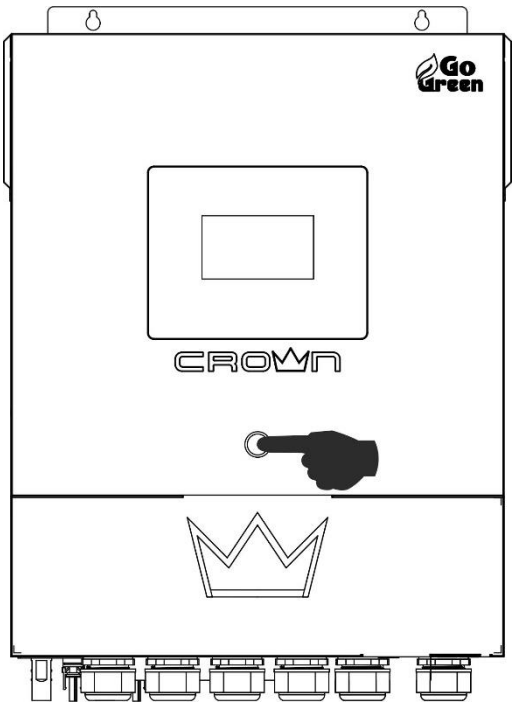
There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition			Dry contact port: 	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Battery power or Solar energy.	Output source priority is set as USB (utility first) or SUB (solar first)	Battery voltage/SOC < Low DC voltage/SOC warning	Open	Close
			Battery voltage/SOC > Setting value in restart charging voltage/SOC or battery charging reaches floating stage	Close	Open
		Output source priority is set as SBU (SBU priority)	Battery voltage/SOC < Setting value in stop discharging voltage/SOC or BMS sends disable discharging status	Open	Close
			Battery voltage/SOC > Setting value in restart charging voltage/SOC or battery charging reaches floating stage	Close	Open

OPERATION

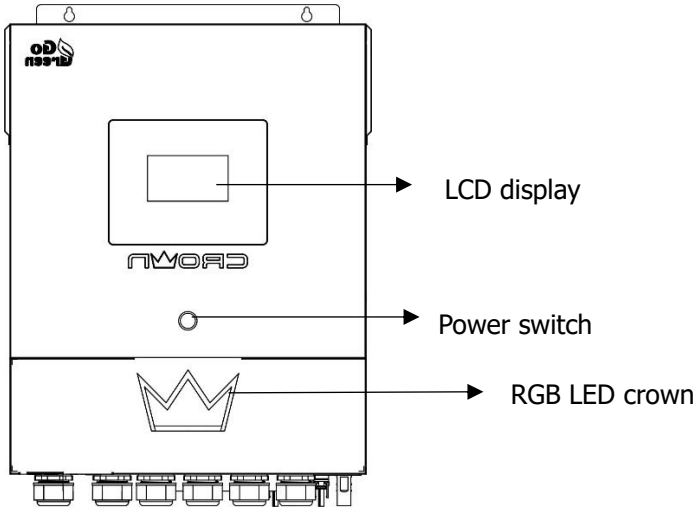
Power ON/OFF

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

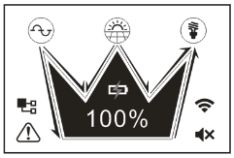


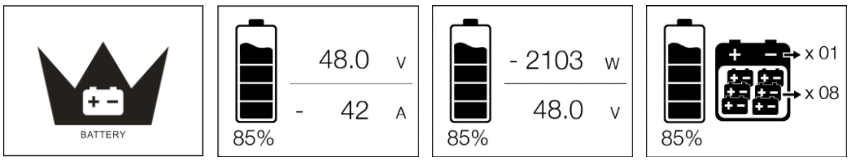
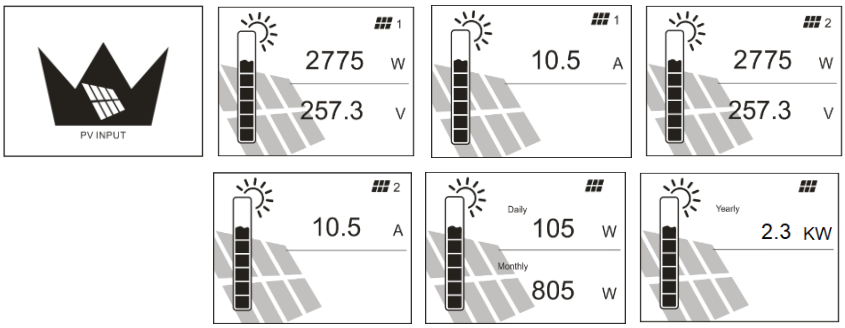
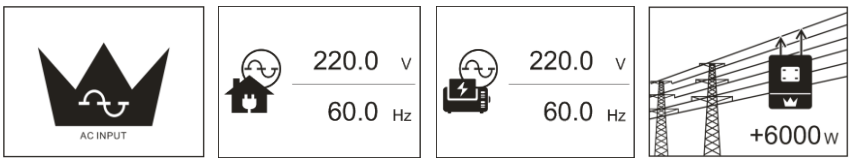
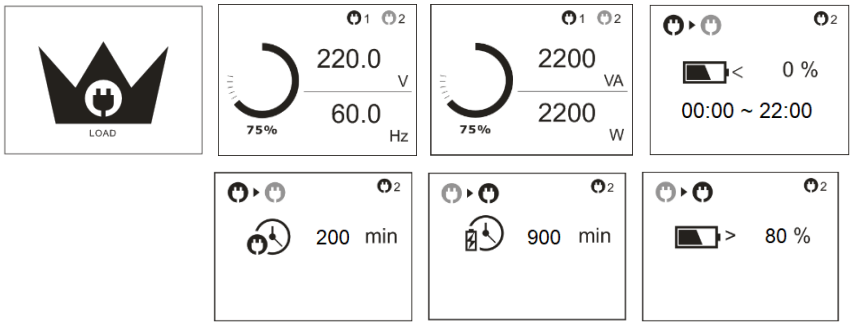
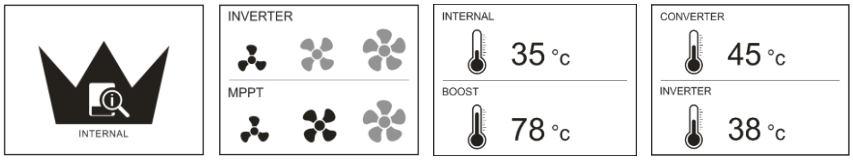
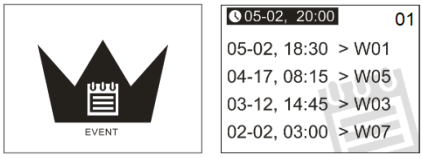
Operation and Display Panel

The operation panel, shown in the chart below, includes four touchable function keys and a colorful LCD display to indicate the operating status, configured critical parameters and all power information.

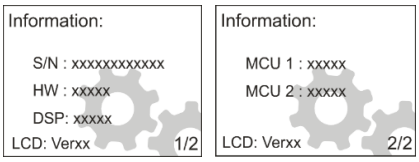


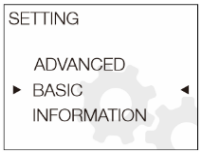
Pages Information

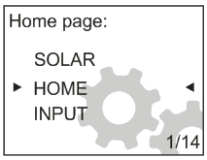
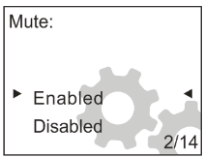
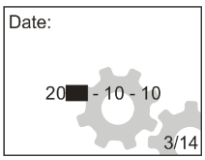
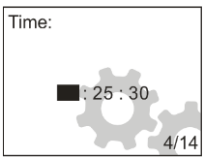
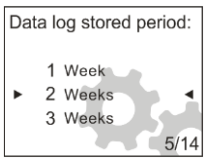
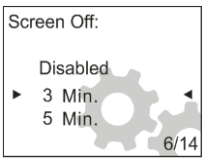
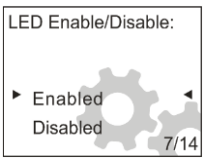
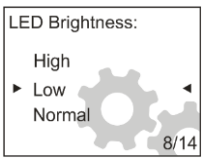
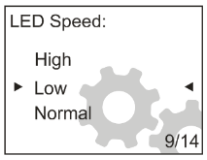
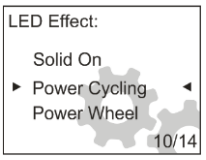
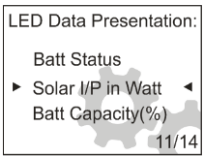
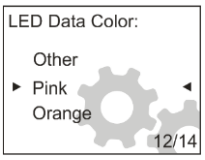
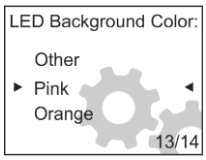
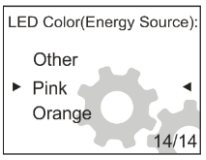
Home page: Indicates the summarized power flow and energy information.	

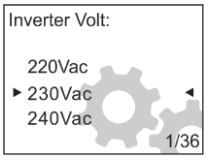
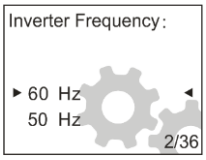
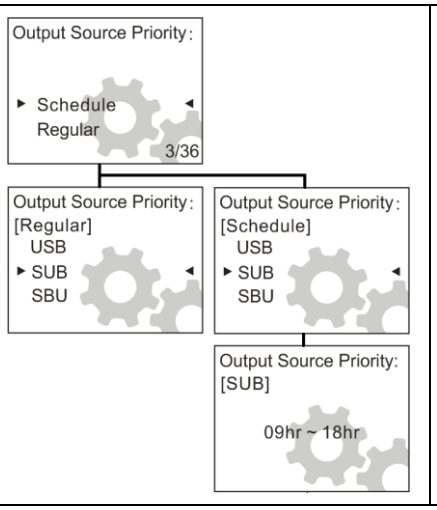
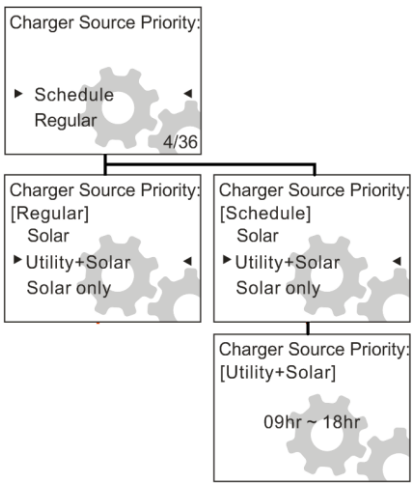
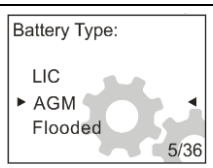
Battery page: Indicates the battery information.	
PV page: Indicates the dual PV information.	
AC input page: Indicates the dual AC input information.	
AC output page: Indicates the AC output information.	
Internal data page: Indicates fan speed and temperature information.	
Logs page: Indicates all event, warning, and fault messages.	

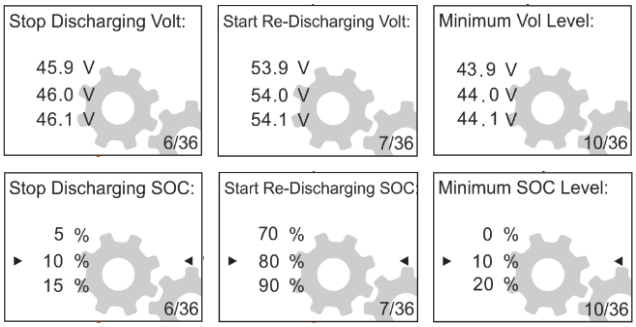
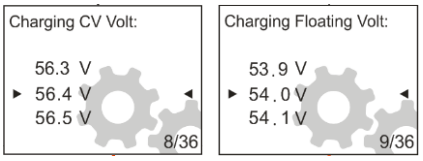
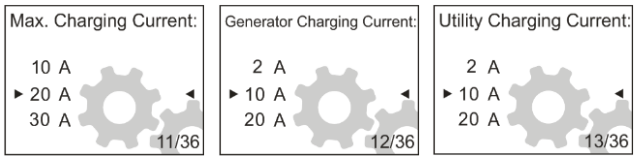
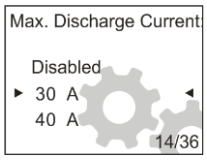
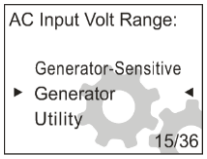
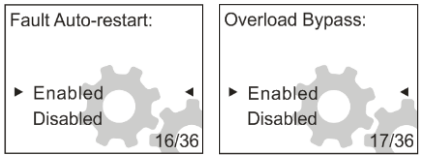
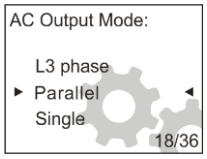
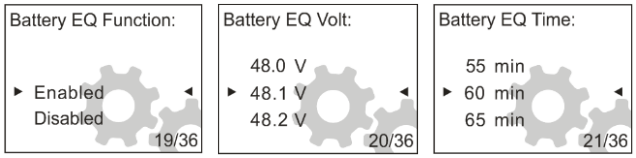
LCD Setting

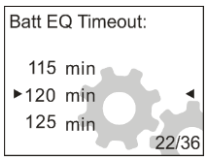
Setting menu: There are three sub-menus: Information, Basic and Advanced.	
Information	
	
Basic	

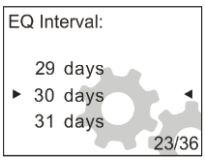


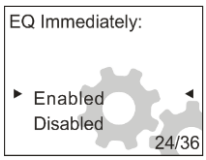
Setup home page	Turn on/off buzzer	Setup date	Setup time
			
Setup log record duration	**Enable screen off timer**	**Enable LED**	**Setup LED brightness**
			
Setup LED speed	**Setup LED effect**	**Setup LED data presentation**	**Setup LED data color**
			
Setup LED background color		**Setup LED color (Energy Source)**	
			

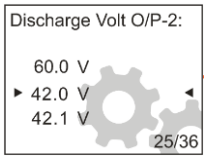
Advanced	
Configure the nominal voltage and frequency Default: 230Vac, 50Hz	 
Configure the output and charger source priority Regular: Priority arranged every day Schedule: Priority arranged during setting hours If setting 00hr – 00hr, the setting will not be activated. Default: Regular	 
Battery Type If "User-Defined" is selected, battery charge voltage and minimum voltage can be set up. If any lithium battery type is selected, maximum charging current, CV and floating voltage will	

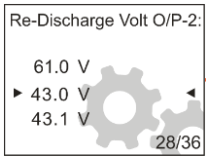
be automatically set up. No need for further setting. Default: AGM	
Configure the stop and restart discharging voltage/SOC and minimum voltage/SOC If any types of lithium battery is selected in battery type, setting value will change to SOC automatically. Default: 46V (Stop discharging Volt), 54V (Start re-discharging Volt), 44V (Minimum Vol Level). Default: 10% (Stop discharging SOC), 80% (Start re-discharging SOC), 0% (Minimum SOC Level)	
Configure the CV and floating voltage Default: 56.4V (Charging CV Volt), 54V (Charging Floating Volt)	
Configure the maximum charging current and limitation while charging from Utility and Generator Default: 60A (Max charging current), 30A (Generator charging current), 30A (AC charging current)	
Configure the max. discharging current Default: Disabled (no limitation)	
Configure the compatibility of AC input source Default: Generator	
Configure fault or overload behaviors Default: Disabled, Disabled	
Configure the compatibility of AC output mode Default: Single	
Configure battery equalization function, voltage, time, timeout, interval, activated immediately Default: Disable (Battery EQ function), 58.4V (Battery EQ Volt), 60	

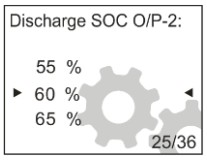
<table>
<tr><td>min (Battery EQ time), 120 min, (Battery EQ timeout), 30 days (EQ interval), Disable (EQ immediately)</td><td>

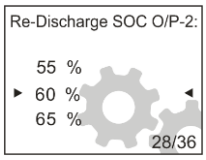


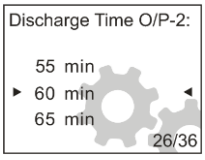

</td></tr>
<tr><td>Configure cut-off voltage point or SOC and restart voltage or SOC on the second output (L2).
If any types of lithium battery is selected in battery type, the setting value will change to SOC automatically.

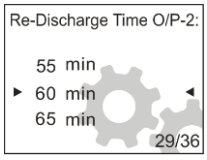
Default: 42V (Discharge volt on the L2 output), 46V (Re-discharging volt on the L2 output)
Default: 0% (Discharge SOC on the L2 output), 20% (Re-discharging SOC on the L2 output)</td><td>

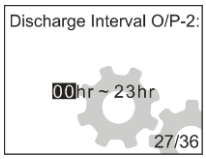
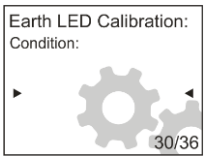
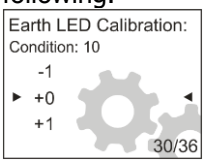
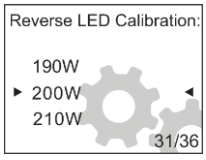





</td></tr>
<tr><td>Configure discharge time to turn off second output (L2). And waiting time to turn on the second output (L2) when the inverter is back to Line Mode or battery is in charging status

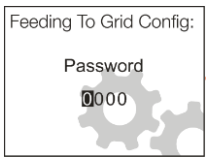
Default: Disable (Discharging Time on the L2 output), 0min (Re-discharging Time on the L2 output)</td><td>

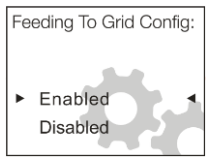

</td></tr>
<tr><td>Configure time interval to turn on the second output (L2)

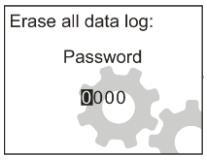
Default: 00hr~23hr</td><td>
</td></tr>
<tr><td rowspan="2">Adjustment parameter for EARTH LED
Default：0</td><td>If unit is not in Line mode, it will show nothing.

</td><td>If unit is in Line mode, it will show following.

</td></tr>
<tr><td colspan="2">If EARTH LED of meter is on, it can be off by adjusting the parameter. If the unit is in Line mode, this program can be set up. Setting range is from -30 to 30. Increment of each click is 1. The condition of program changed automatically.</td></tr>
<tr><td rowspan="2">Adjustment parameter for REVERSE LED
Default：200W</td><td colspan="2">
</td></tr>
<tr><td colspan="2">If REVERSE LED of meter is on, it can be off by adjusting the parameter. If the unit is in Line mode, this program can be set up. Setting range is from 0 to 300. Increment of each click is 10.</td></tr>
</table>

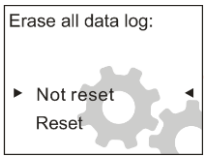
Specific critical operations activate (It's necessary to enter Password **4743** to access)

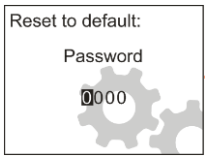
- Feeding to grid configuration
- Reset to factory setting
- Erase all logs
- Export all logs
- Firmware upgrade

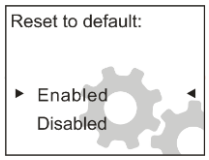


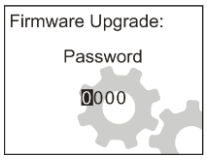


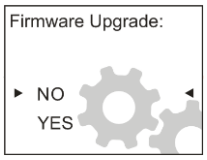


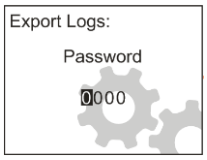






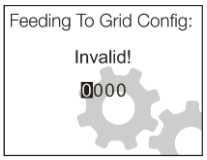


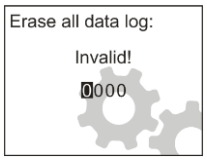


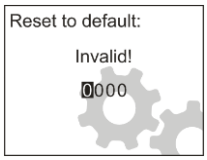


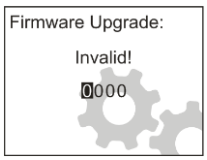


Invalid password, try again











Warning and Fault List

Code Type	Code #	Event	Code Type	Code #	Event
Fault	F01	Fan is locked when inverter is off.	Fault	F53	Inverter soft start failed
Fault	F02	Over temperature	Fault	F55	Over DC voltage in AC output
Fault	F03	Battery voltage is too high	Fault	F57	Current sensor failed
Fault	F04	Battery voltage is too low	Fault	F58	Output voltage is too low
Fault	F05	Output short circuited.	Fault	F60	Backfeed fault
Fault	F06	Output voltage is too high.	Fault	F71	Firmware fault
Fault	F07	Overload time out	Fault	F72	Par-CAN fault
Fault	F08	Bus voltage is too high	Fault	F80	Par-host fault
Fault	F09	Bus soft start failed	Fault	F81	Par-sync fault
Fault	F10	PV over current	Fault	F82	Par-bat fault
Fault	F11	PV over voltage	Fault	F83	Par-grid fault
Fault	F12	DCDC over current	Fault	F84	Par-opa fault
Fault	F13	Battery discharge over current	Fault	F85	Par-set fault
Fault	F51	Over current	Fault	F86	OP Circuit Fault
Fault	F52	Bus voltage is too low			

Warning	W01	Grid not exist	Warning	W11	Comm. Lost
Warning	W02	PV not exist	Warning	W12	Par limited
Warning	W03	Pack not exist	Warning	W13	Ip CB trip
Warning	W04	Weak SoC	Warning	W14	EQ warning
Warning	W05	Weak PV-volt	Warning	W15	MCU comm. lost
Warning	W06	Power de-rate	Warning	W16	Disable CHG& DISCHG
Warning	W07	Heavy load	Warning	W17	Disable CHG
Warning	W08	Temp issue	Warning	W18	Disable DISCHG
Warning	W09	Fan issue	Warning	W19	Force CHG
Warning	W10	BMS lost			

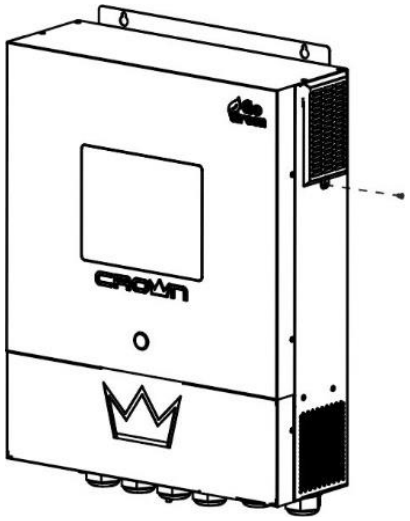
CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

Overview

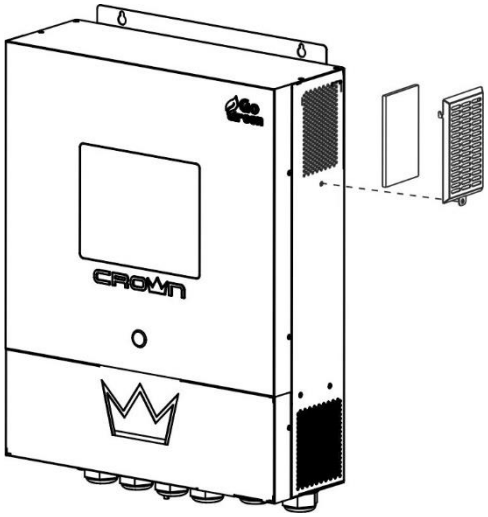
Every inverter is already installed with anti-dusk kit from factory. This kit keeps dusk from your inverter and increases product reliability in harsh environment.

Clearance and Maintenance

Step 1: Please remove the screws on the sides 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.

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.

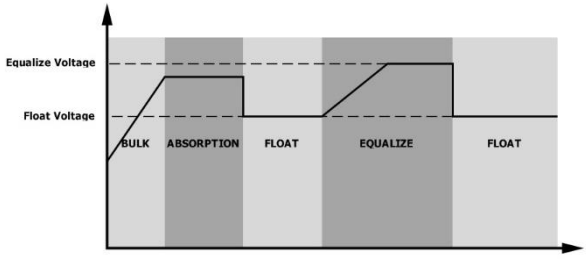
- **How to Apply Equalization Function**

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

1. Setting equalization interval.
2. Active equalization immediately.

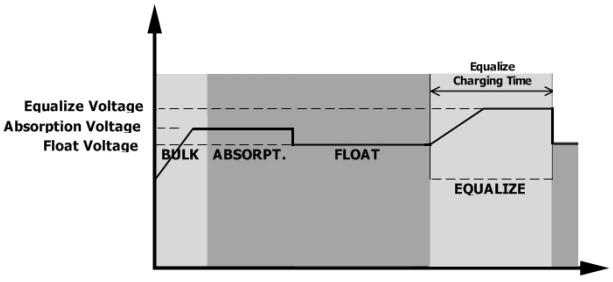
- **When to Equalize**

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.

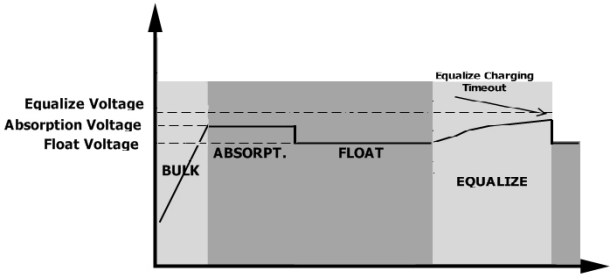


- **Equalize charging time and timeout**

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

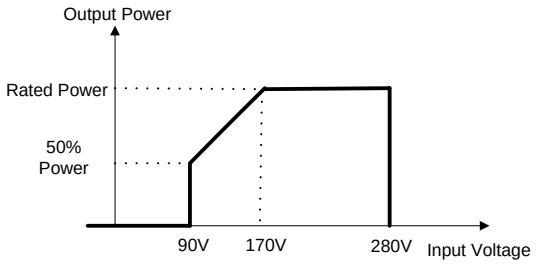
MODEL	8.6KW
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)
High Loss Voltage	280Vac±7V
High Loss Return Voltage	270Vac±7V
Max AC Input Voltage	300Vac
Max AC Input Current	60A
Max 2nd Output Current	60A
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	Line mode: Circuit Breaker (70A) Battery mode: Electronic Circuits
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
Output power de-rating: When AC input voltage under 170V the output power will be de-rated.	

Table 2 Inverter Mode Specifications

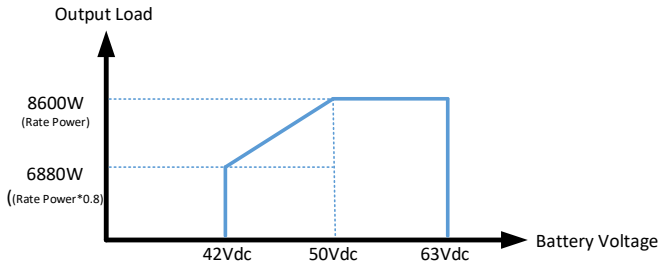
MODEL	8.6KW
Rated Output Power	8600W
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	230Vac±5%
Output Frequency	60Hz or 50Hz
Peak Efficiency	93%
Overload Protection	100ms@≥205% load;5s@≥150% load; 10s@110%~150% load
Surge Capacity	2* rated power for 5 seconds
Nominal DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 46.0Vdc 42.8Vdc 40.4Vdc
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 48.0Vdc 44.8Vdc 42.4Vdc
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 44.0Vdc 40.8Vdc 38.4Vdc
High DC Recovery Voltage	61Vdc
High DC Cut-off Voltage	63Vdc
DC Voltage Accuracy	+/-0.3V@ no load
THDV	<5% for linear load,<10% for non-linear load @ nominal voltage
DC Offset	≦100mV
Power Limitation When battery voltage is lower than 50Vdc, output power will be derated. If connected load is higher than this derated power, the AC output voltage will decrease until the output power reduces to this derated power. The minimum AC output voltage is output voltage setting –10V.	

Table 3 Charge Mode Specifications

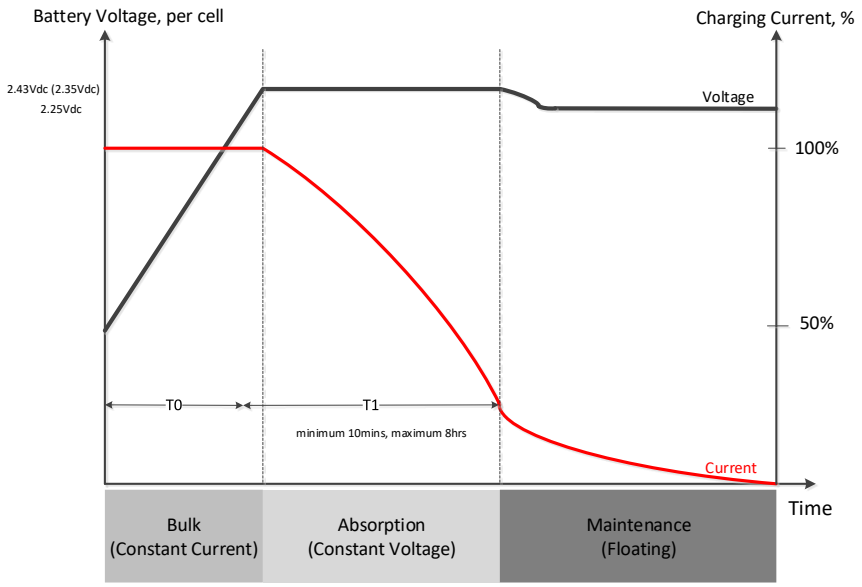
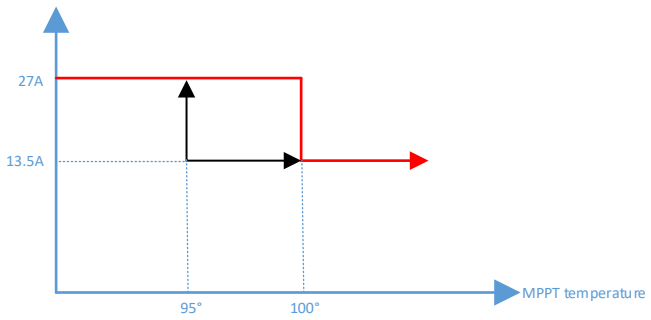
Utility Charging Mode		
MODEL		**8.6KW**
Charging Current (UPS) @ Nominal Input Voltage		150A
Bulk Charging Voltage	**Flooded Battery**	58.4Vdc
	AGM / Gel Battery	56.4Vdc
Floating Charging Voltage		54Vdc
Overcharge Protection		63Vdc
Charging Algorithm		3-Step
Charging Curve		
Solar Input		
MODEL		**8.6KW**
Rated Power		12000W
Max. PV Array Open Circuit Voltage		500Vdc
PV Array MPPT Voltage Range		90Vdc~450Vdc
Max. Input Current		27A x 2(MAX 40A)
Max. Charging Current		150Amp
Start-up Voltage		80V +/- 5Vdc
Power Limitation		

Table 4 General Specifications

MODEL	8.6KW
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	147.4x 432.5 x 553.6
Net Weight, kg	18.4

Table 5 Parallel Specifications

Max parallel numbers	6
Circulation Current under No Load Condition	Max 2A
Power Unbalance Ratio	<5% @ 100% Load
Parallel communication	CAN
Transfer time in parallel mode	Max 50ms
Parallel Kit	YES

Note: Parallel feature will be disabled when only PV power is available.

TROUBLE SHOOTING

Phenomenon and/or Possible cause	What to do
No response while press the main switch.	
No Utility power and PV is applied.	Check whether the DC breaker tripped or has not yet turned on? If problem still exists, please contact the service center to repair it.
No response while pressing the main switch.	
Utility power or PV power exists.	Check whether the AC breaker tripped? Or PV voltage reaches to the operation level? If problem still exists, please contact the service center to repair it.
Output turned off, Buzzer beeps continuously, RED LED solid on	
F01 shows. Fans abnormal stopped during startup sequence	Please contact service center to replace them.
F02 shows.	Configure the PV panels lower than 450V.
F03 shows.	Disconnect the Utility and PV power. Then, re-apply again. If over-voltage alarm still sounds, the internal charger might has some problem. Please contact with service center to repair it.
F05 shows.	Check and verify if there is any load with short circuit condition? Remove the load and restart the unit again. If problem still exists, please contact the service center to repair it.
F14 shows.	Clean the anti-dust filter and keep the unit installed in a well ventilated environment.
F18 shows.	Reduce the applied load and restart the unit again.
F06, F07, F08, F09, F10, F11, F12, F13, F15, F16, F17, F19 or F20 shows.	Please restart the unit again. If problem still exists, please contact the service center to repair it.
F20 shows.	1. Restart the inverter. 2. Check if L/N cables are not connected reversely in all inverters. 3. 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.
F22, F23, or F24 shows.	1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
F25 shows.	1. Make sure all inverters share same groups of batteries together. 2. 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.
F26 shows.	1. Check the utility wiring conncetion and restart the inverter. 2. 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.
F27 shows.	1. Restart the inverter. 2. 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.
F28 shows.	1. Switch off the inverter and check LCD setting AC output mode 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set. For upporting three-phase system, make sure no "PAL" is set on AC output mode setting 3. If the problem remains, please contact your installer.
F29 shows.	1. Check if sharing cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
Output powered but buzzer beeps per second, RED LED flashing	
W07 shows.	Reduce load will release the warning.
W08 shows.	Clean the anti-dust filter and keep the unit installed in a well ventilated environment.
W09 shows.	Fans abnormal stopped during operation. Please contact service center to replace them.
W10 shows.	BMS communication disconnected. Please contact service center to repair it.
Output powered but no buzzer and LED flashing. Only record on log	
W04 shows.	Charge the battery.
W05 shows.	Reduce the load.
W06 shows.	Utility voltage lower to a certain level, the output rating will be limited.
W11 shows.	Internal communication disconnected. Please contact service center to repair it.
W16, W17, W18 or W19 shows.	Check Battery status
WiFi mark is not displayed.	
Unit can't connect to the APP.	Check the Wi-Fi icon available on the LCD then follow the Wi-Fi installation procedure to pair the Wi-Fi module with router and APP.

Appendix I: Parallel function

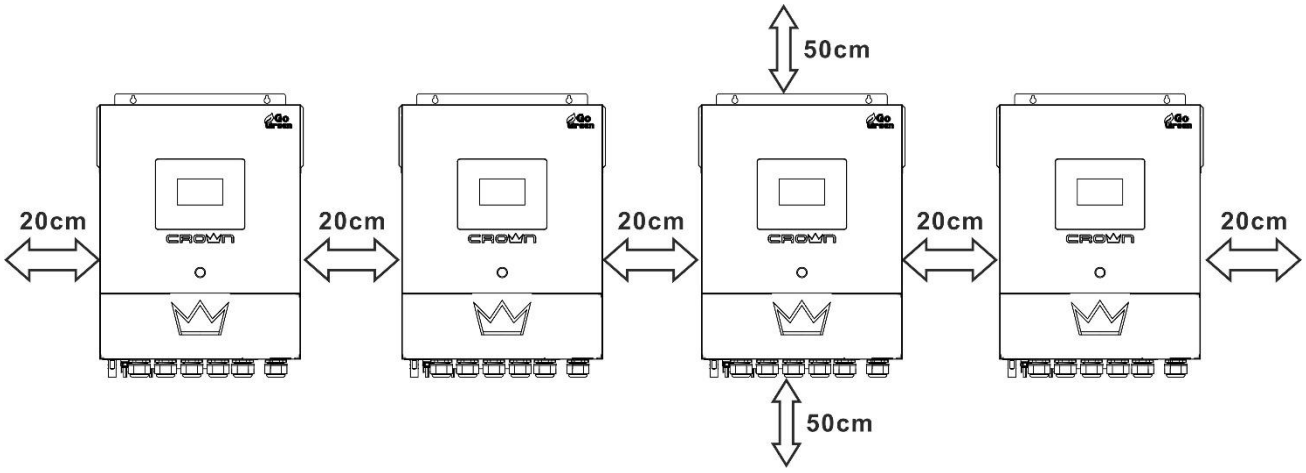
1. Introduction

This inverter can be used in parallel with two different operation modes.

1. Parallel operation in single phase is with up to 6 units. The supported maximum output power is 51.6KW/51.6KVA.
2. Maximum six units work together to support three-phase equipment. Maximum four units support one phase.

2. 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.

3. Wiring Connection

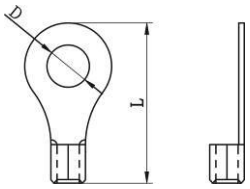
WARNING: It's REQUIRED to connect battery for parallel operation.

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

Model	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
			D (mm)	L (mm)	
8.6KW	1*3/0AWG	85	8.4	54	5 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	AWG no.	Torque
8.6KW	8 AWG	1.4~ 1.6 Nm

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.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
8.6KW	250A/70VDC

*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 with single phase:

Model	2 units	3 units	4 units	5 units	6 units
8.6KW	120A/230VAC	180A/230VAC	240A/230VAC	300A/230VAC	360A/230VAC

Note 1: Also, you can use 60A breaker with only 1 unit and install one breaker at its AC input in each inverter.

Note 2: 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

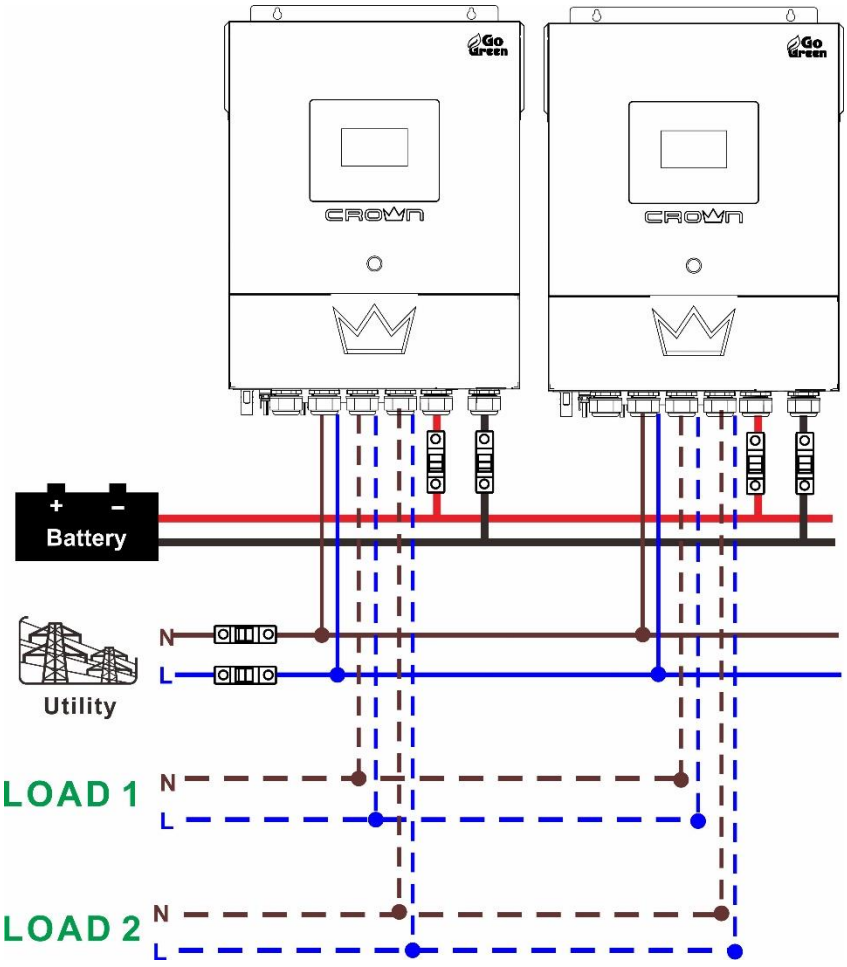
Inverter parallel numbers	2	3	4	5	6
Battery Capacity	200AH	400AH	400AH	600AH	600AH

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

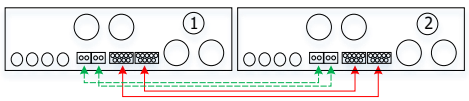
4-1. Parallel Operation in Single phase

Two inverters in parallel:

Power Connection

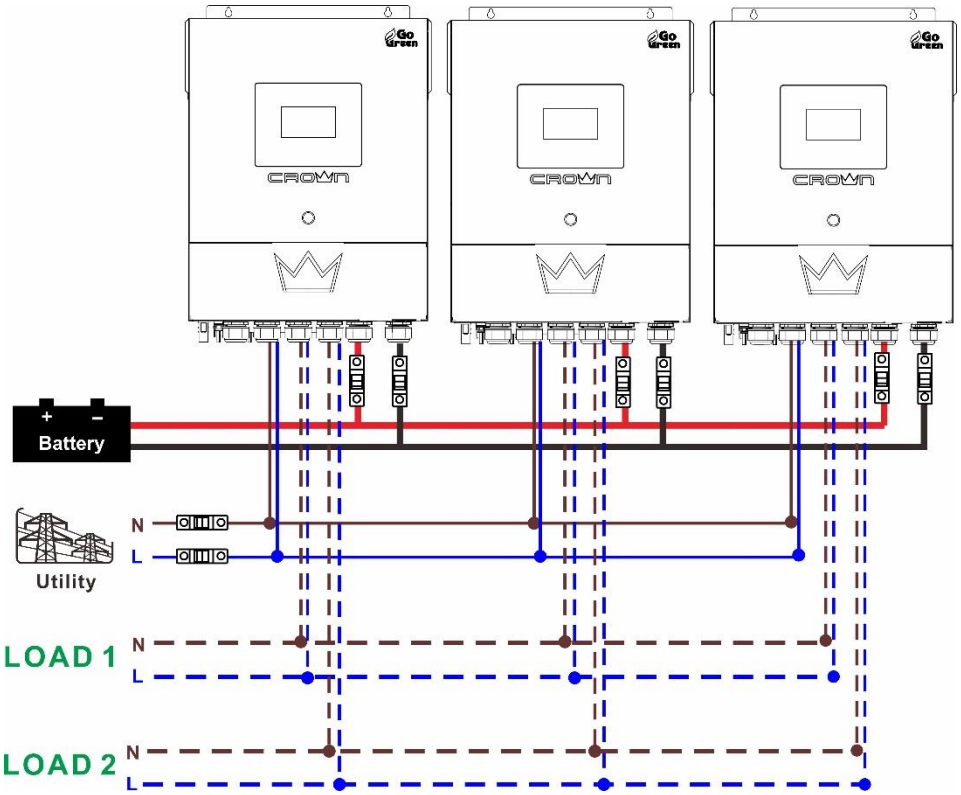


Communication Connection

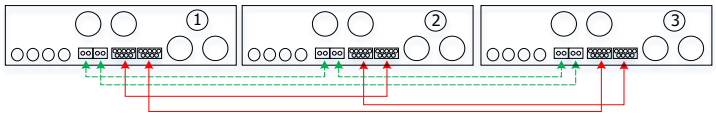


Three inverters in parallel:

Power Connection



Communication Connection

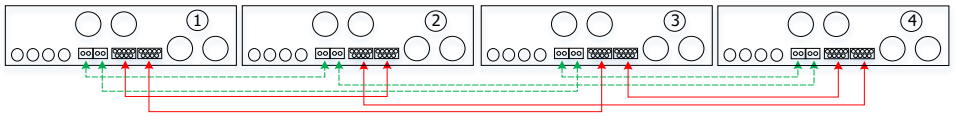


Four inverters in parallel:

Power Connection

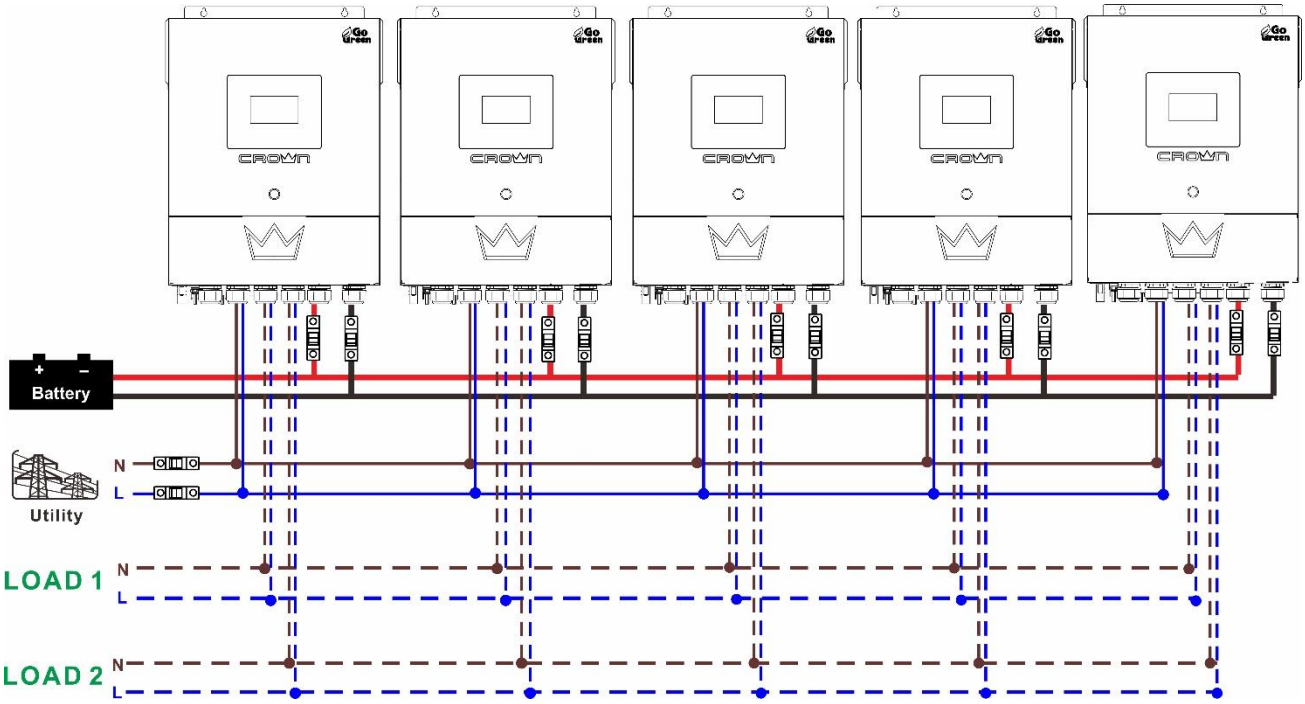


Communication Connection

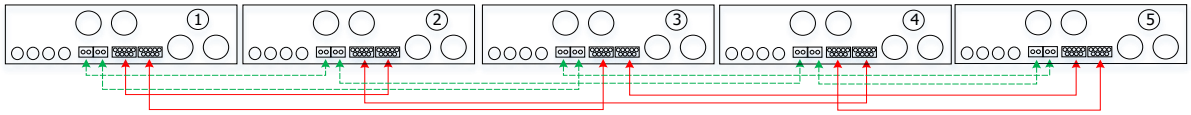


Five inverters in parallel:

Power Connection

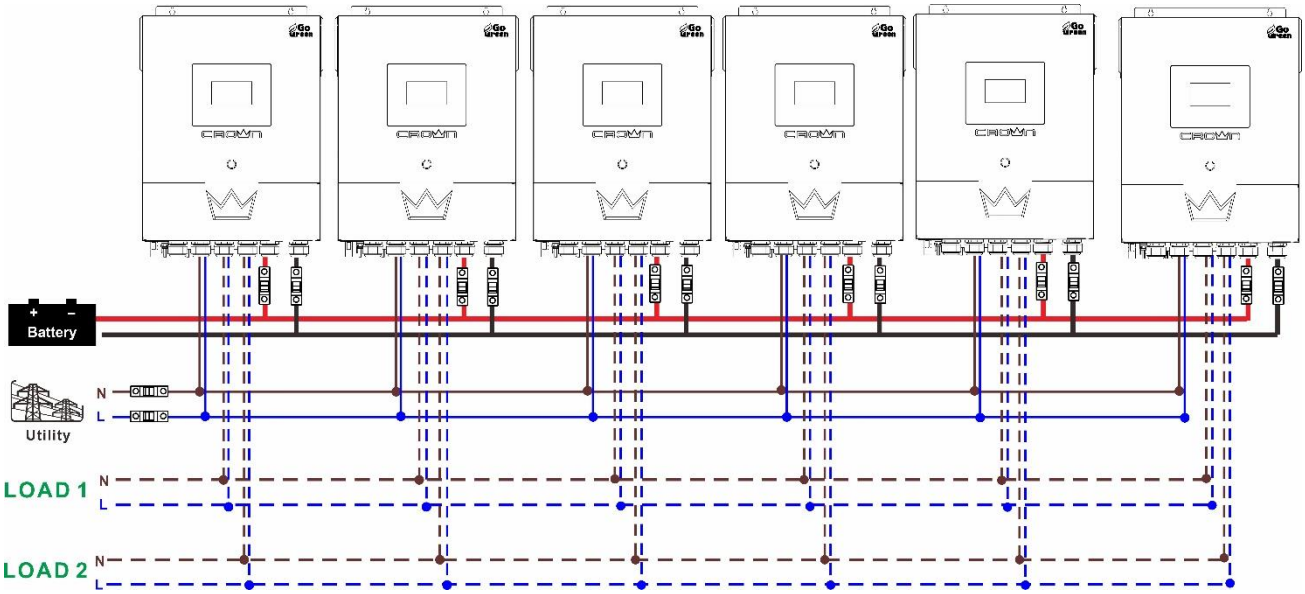


Communication Connection

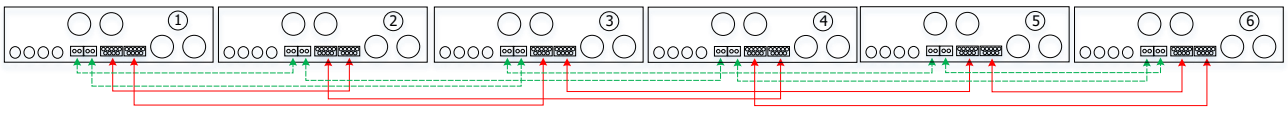


Six inverters in parallel:

Power Connection



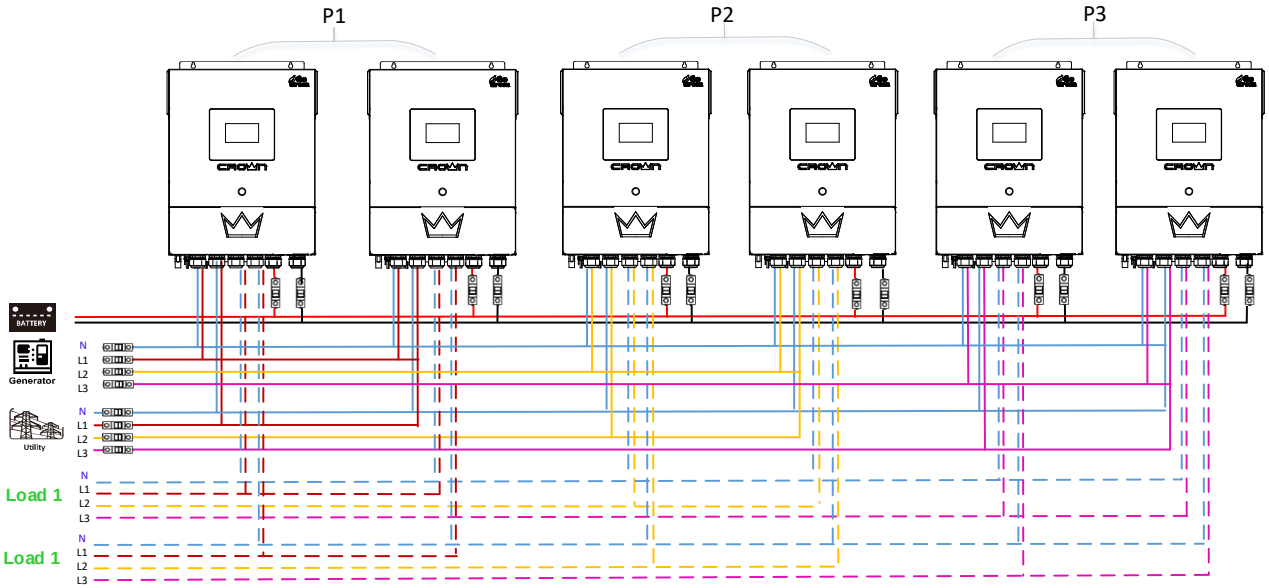
Communication Connection



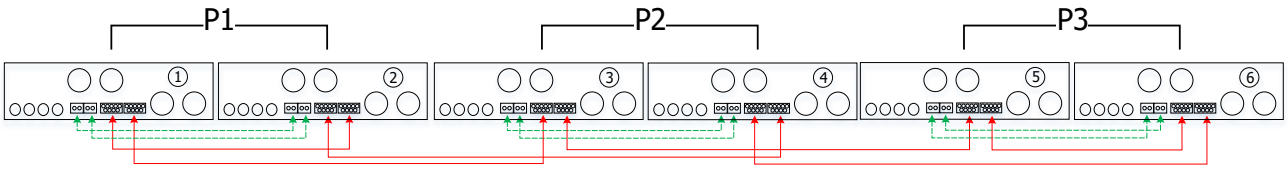
4-2. Support 3-phase equipment

Two inverters in each phase:

Power Connection

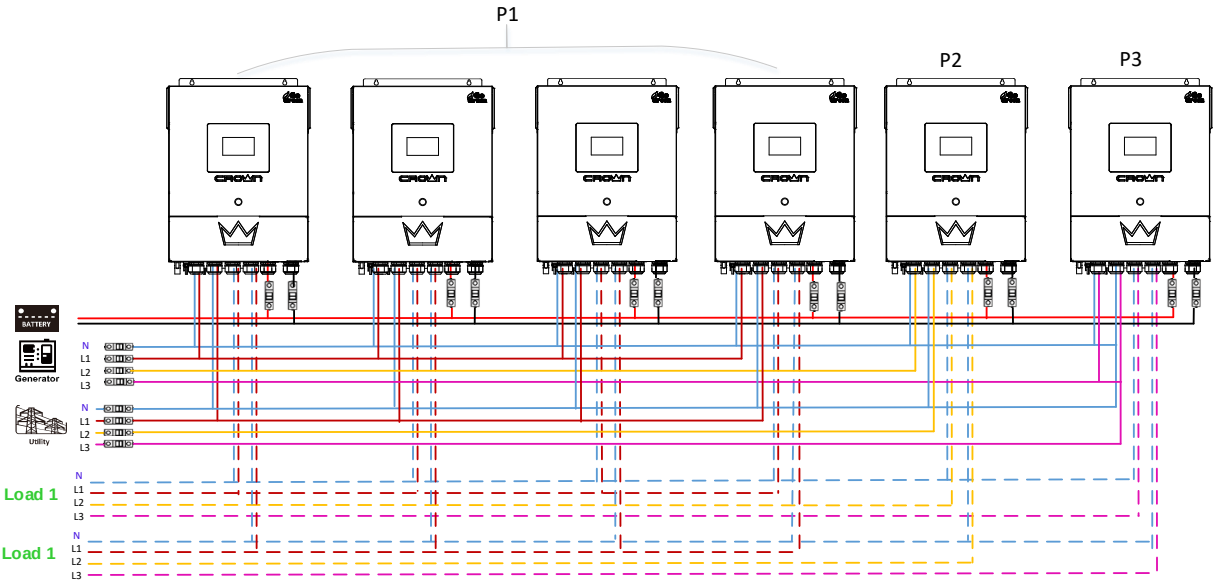


Communication Connection

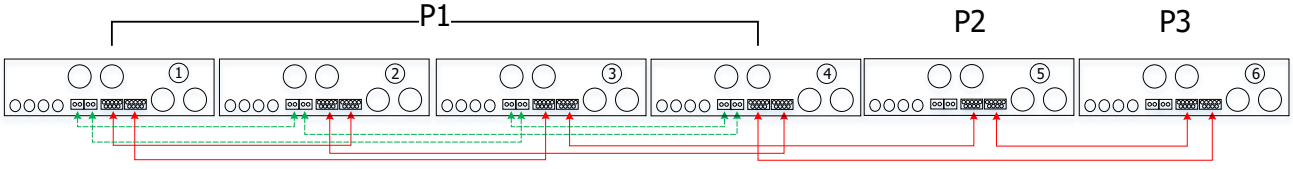


Four inverters in one phase and one inverter for the other two phases:

Power Connection

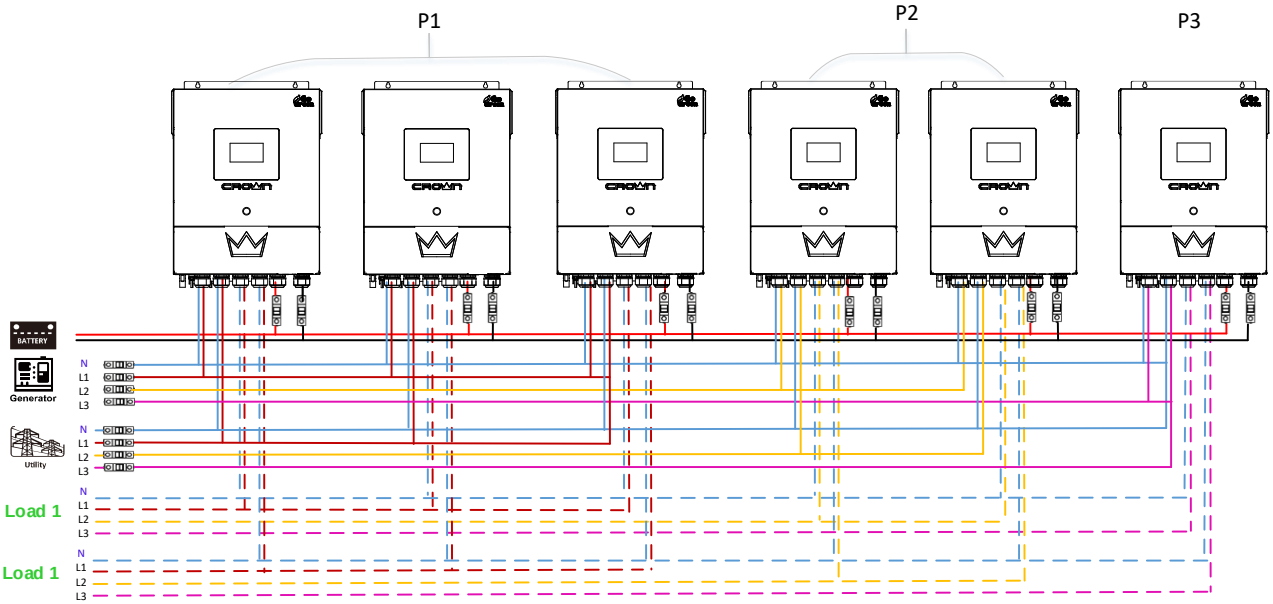


Communication Connection

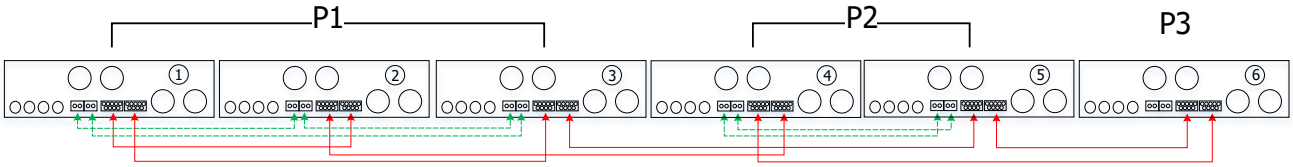


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

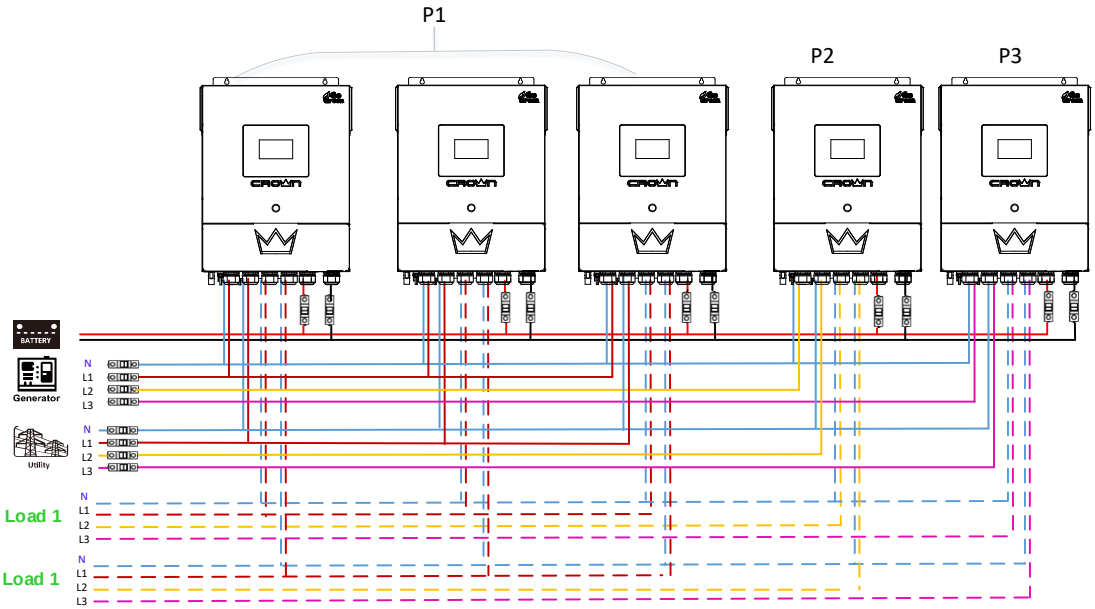


Communication Connection

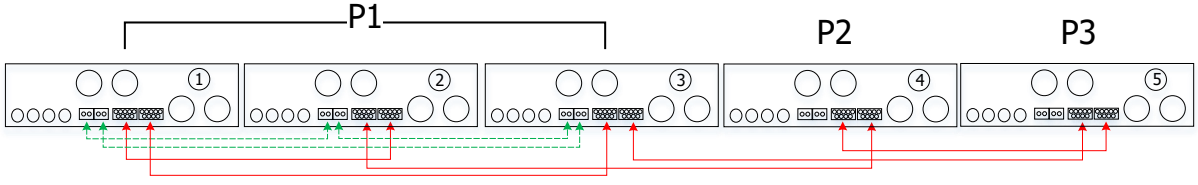


Three inverters in one phase and only one inverter for the remaining two phases:

Power Connection

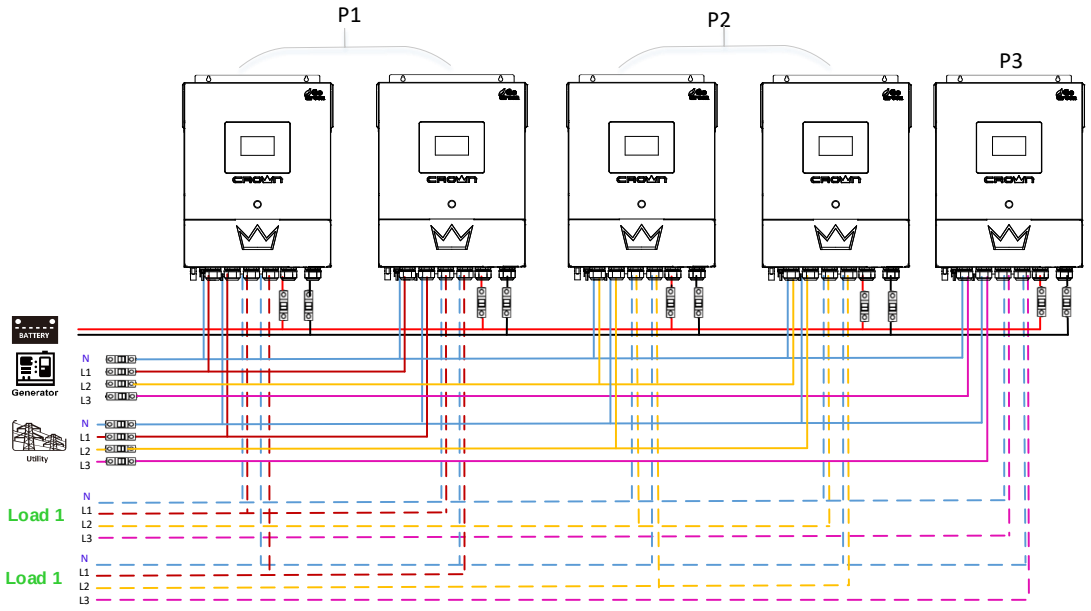


Communication Connection

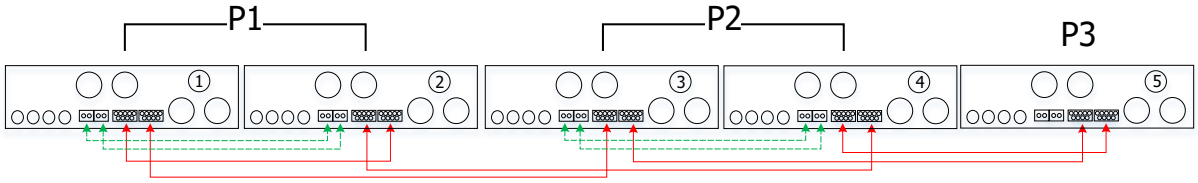


Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

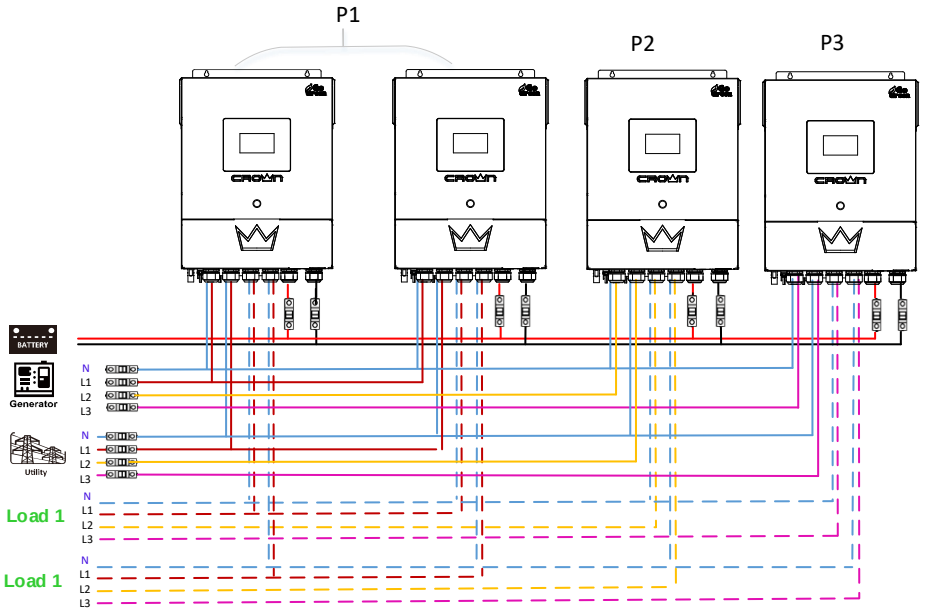


Communication Connection

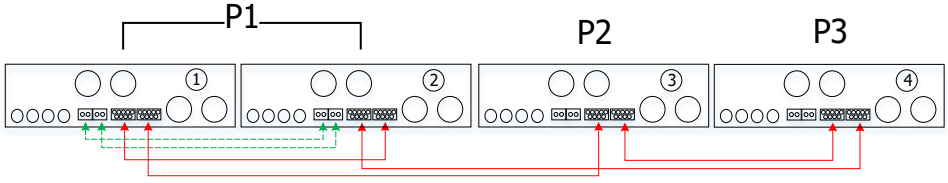


Two inverters in one phase and only one inverter for the remaining phases:

Power Connection

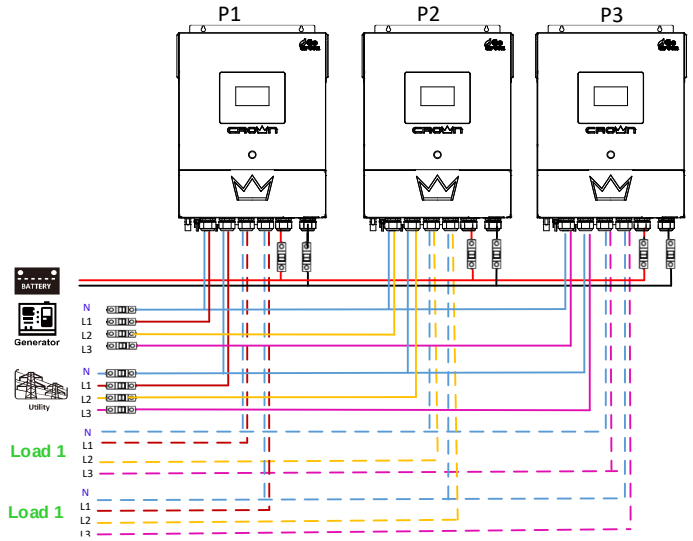


Communication Connection

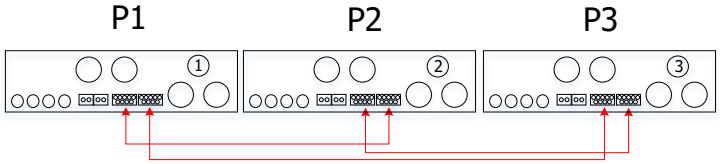


One inverter in each phase:

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.

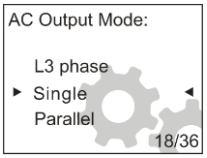
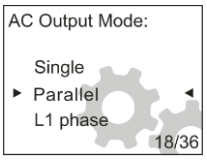
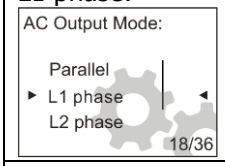
5. PV Connection

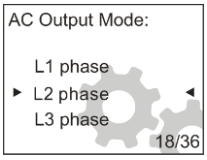
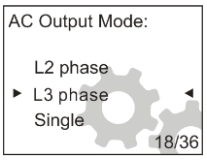
Please refer to user manual of single unit for PV Connection.

CAUTION: Each inverter should connect to PV modules separately.

6. LCD Setting and Display

Setting Program:

<table>
<tr><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td rowspan="4">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.</td><td>Single

</td><td>When the unit is operated alone, please select "Single"</td></tr>
<tr><td>Parallel

</td><td>When the units are used in parallel for single phase application, please select "Parallel". Please refer to 4-1 for detailed information.</td></tr>
<tr><td>L1 phase:

</td><td rowspan="3">When the units are operated in 3-phase application, please choose phase to define each inverter.
It is required to have at least 3 inverters or maximum 6 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 4-2 for detailed information.
Please select "L1 phase" for the inverters connected to L1 phase, "L2 phase" for the inverters connected to L2 phase and "L3 phase" 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.</td></tr>
<tr><td>L2 phase:

</td></tr>
<tr><td>L3 phase:

</td></tr>
</table>

Code Reference:

Code	Description	Icon on
NE	Unidentified unit master or slave	No master and slave icon show on LCD
HS	Master unit	
SL	Slave unit	

7. Commissioning

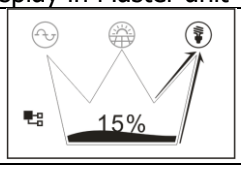
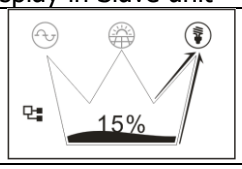
Parallel in single phase

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.

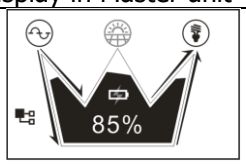
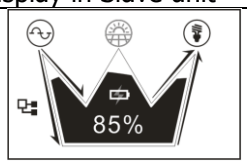
Step 2: Turn on each unit and set "Parallel" in LCD setting of each unit. And then shut down all units.
NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting cannot be programmed.

Step 3: Turn on each unit.

LCD display in Master unit	LCD display in Slave 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 not, it will display fault 82 in following-order inverters. However, these inverters will automatically restart. If detecting AC connection, they will work normally.

LCD display in Master unit	LCD display in Slave unit
	

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

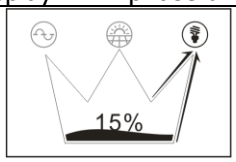
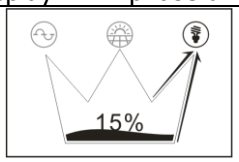
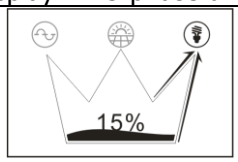
Step 1: Check the following requirements before commissioning:

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

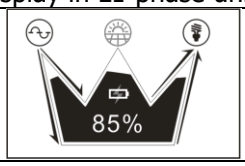
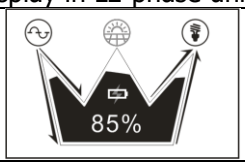
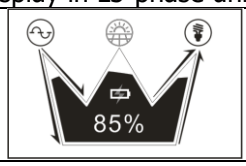
Step 2: Turn on all units and set P1, P2 and P3 sequentially in LCD setting. And then shut down all units.

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

Step 3: Turn on all units sequentially.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

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.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

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.

Appendix II: BMS Communication Installation

1. Introduction

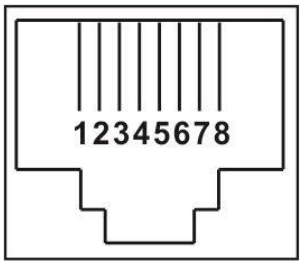
If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

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.

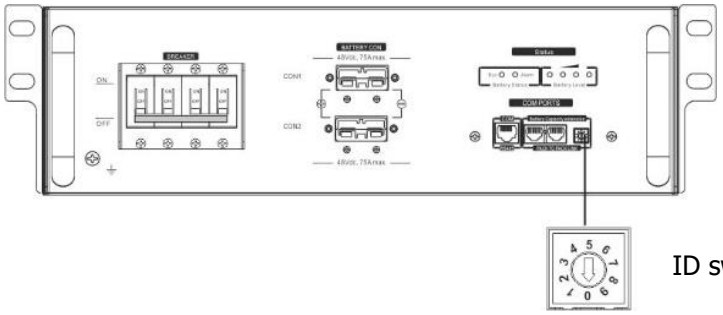
2. Pin Assignment for BMS Communication Port

	Definition
PIN 1	RS232TX
PIN 2	RS232RX
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND

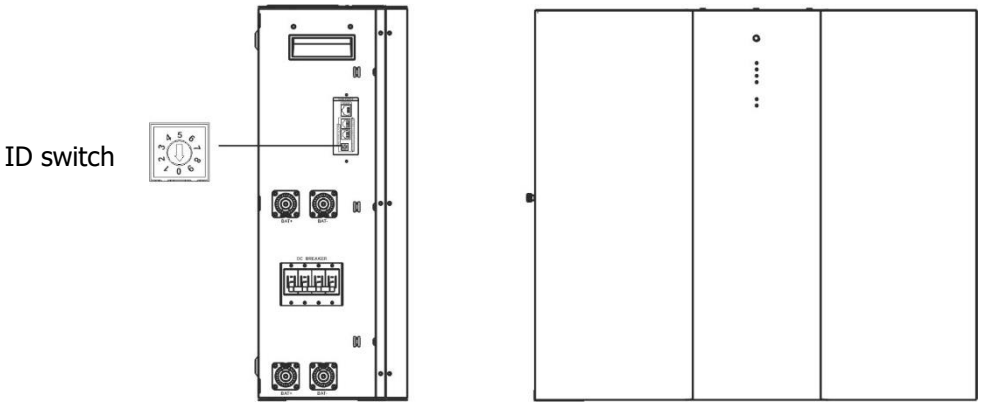


3. Lithium Battery Communication Configuration

LIO-4810-150A

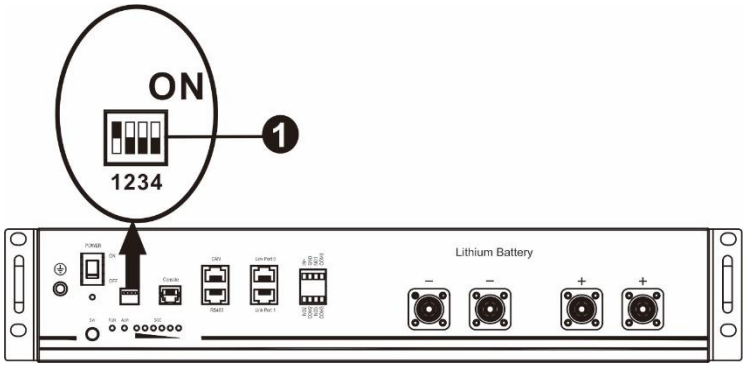


ESS LIO-I 4810



ID Switch indicates the unique ID code for each battery module. It's required to assign a unique ID to each battery module for normal operation. We can set up the ID code for each battery module by rotating the PIN number on the ID switch. From number 0 to 9, the number can be random; no particular order. Maximum 10 battery modules can be operated in parallel.

PYLONTECH



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

Dip 1 is "ON" to represent the baud rate 9600.
Dip 2, 3 and 4 are reserved for battery group address.
Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

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

Dip 1	Dip 2	Dip 3	Dip 4	Group address
1: RS485 baud rate=9600 **Restart to take effect**	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.
	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.
	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.
	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.

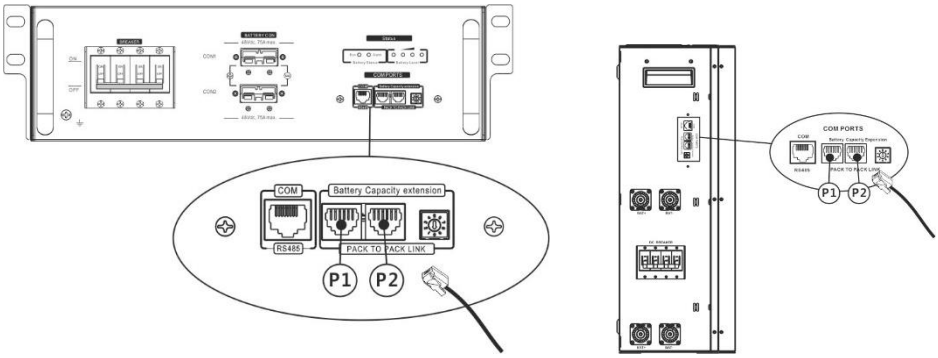
NOTE: The maximum groups of lithium battery is 5 and for maximum number for each group, please check with battery manufacturer.

4. Installation and Operation

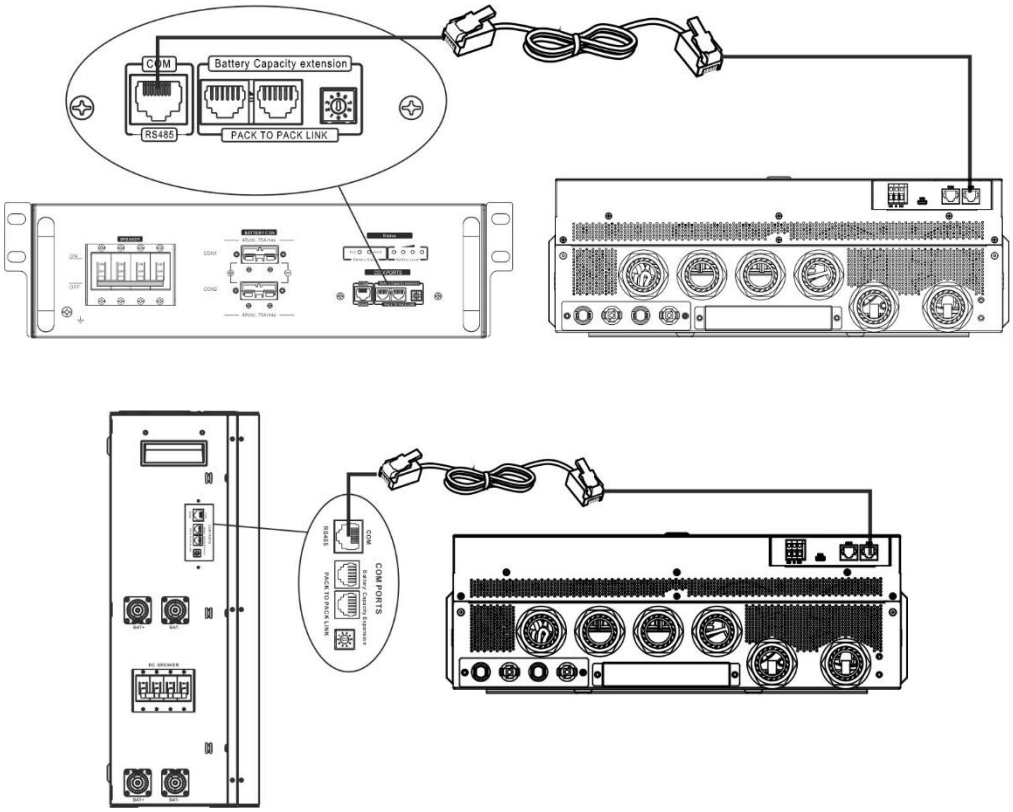
LIO-4810-150A/ESS LIO-I 4810

After ID no. is assigned for each battery module, please set up LCD panel in inverter and install the wiring connection as following steps.

Step 1: Use supplied RJ11 signal cable to connect into the extension port (P1 or P2).



Step 2: Use supplied RJ45 cable (from battery module package) to connect inverter and Lithium battery.

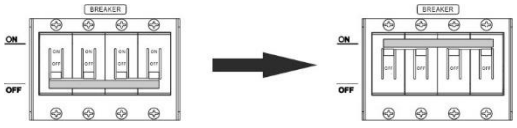


*** For multiple battery connection, please check battery manual for the details.**

Note for parallel system:

1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "LIB" in LCD setting. Others should be "USE".

Step 3: Turn the breaker switch "ON". Now, the battery module is ready for DC output.

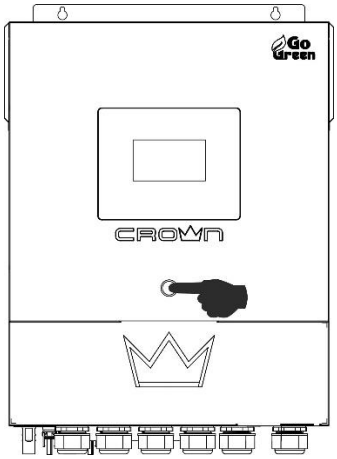


Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.

*If the manual button cannot be approached, just simply turn on the inverter module. The battery module will

be automatically turned on.

Step 5: Turn on the inverter.

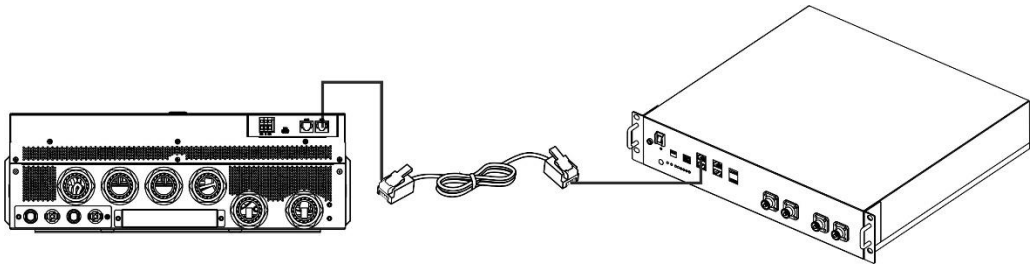


Step 6. Be sure to select battery type as "LIB" in LCD setting.

PYLONTECH

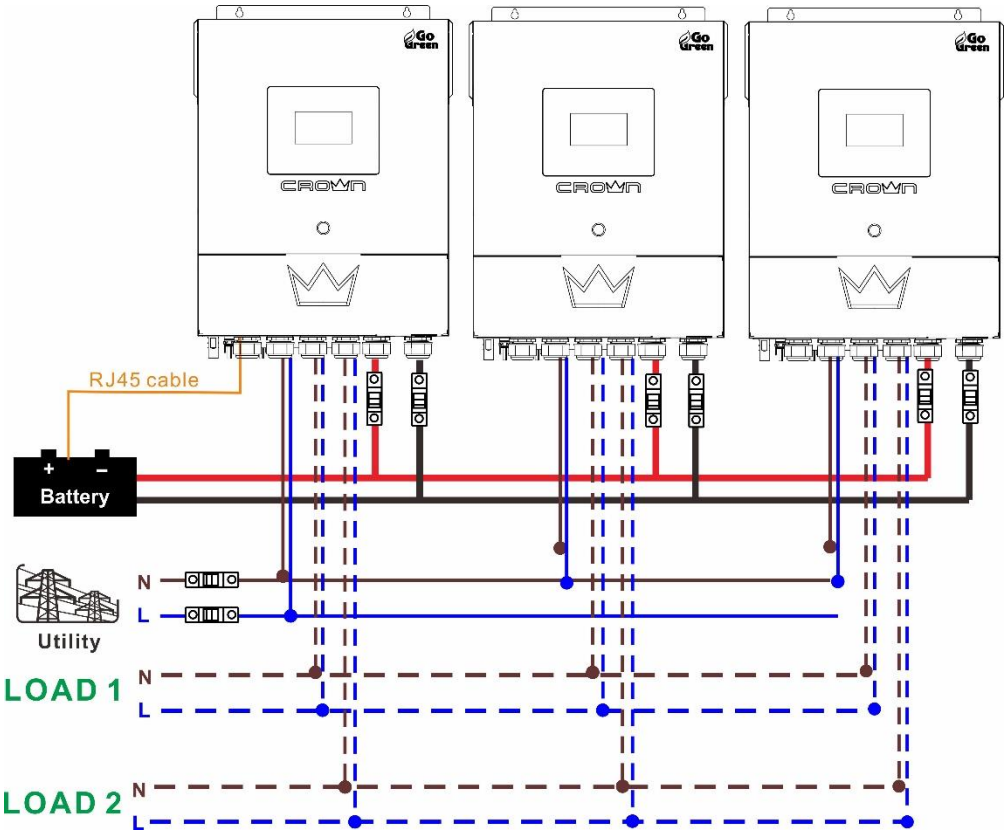
After configuration, please install LCD panel with inverter and Lithium battery with the following steps.

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

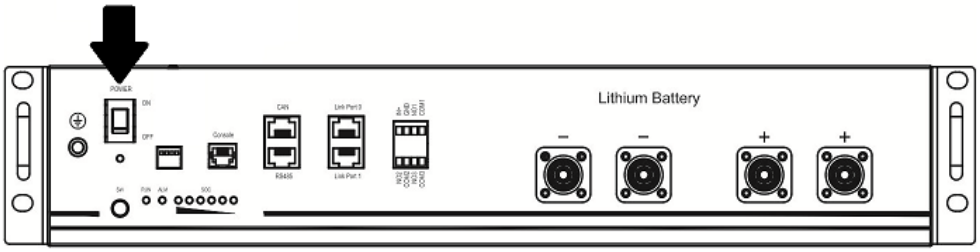


Note for parallel system:

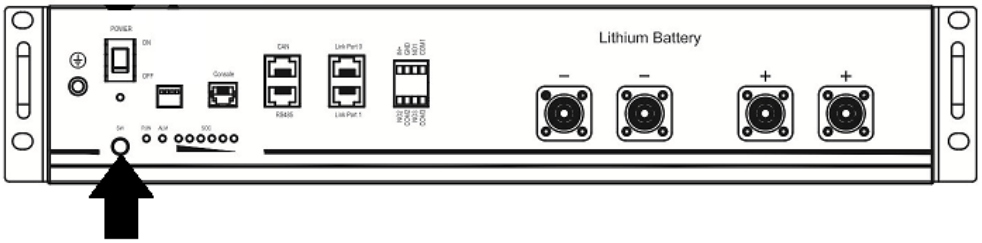
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "PYL" in LCD setting. Others should be "USE".



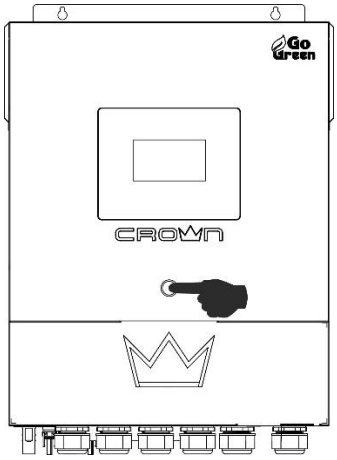
Step 2. Switch on Lithium battery.



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



Step 4. Turn on the inverter.

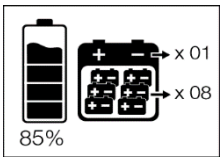


Step 5. Be sure to select battery type as "PYL" in LCD setting.

Active Function

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

4. LCD Display Information

Selectable information	LCD display
Battery pack numbers & Battery group numbers	Battery pack numbers = 8, battery group numbers = 1 

5. Code Reference

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

Code	Description
W10	Communication lost (only available when the battery type is not setting as "AGM", "Flooded" or "User-Defined".) ● 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.
W16	If battery status is not allowed to charge and discharge after the communication between the inverter and battery is successful.
W17	If battery status is not allowed to charge after the communication between the inverter and battery is successful.
W18	If battery status must to be charged after the communication between the inverter and battery is successful.
W19	If battery status is not allowed to discharge after the communication between the inverter and battery is successful.

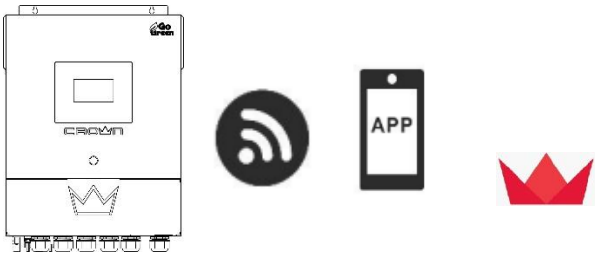
Appendix III: The Wi-Fi Operation Guide

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

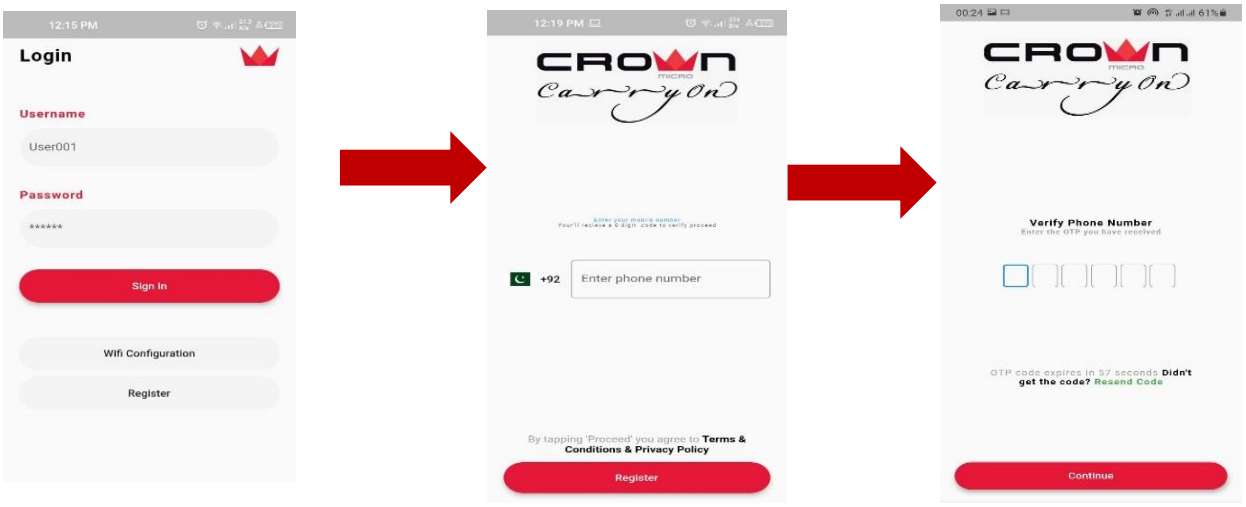
Android system supports Android 5.0 and above

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

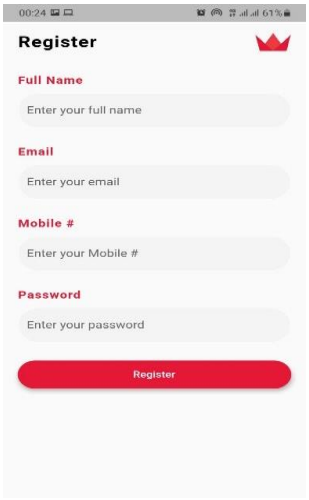
2-2. Initial Setup:

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.

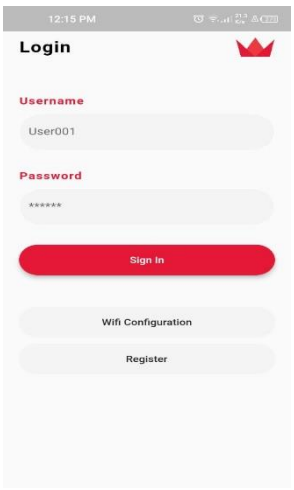


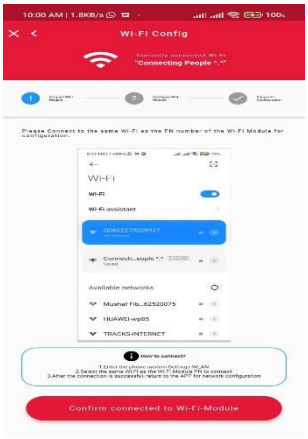
Then Registration window will pop up. Fill in all your Relevant Information and Tap "Register" icon to continue to other settings.



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?

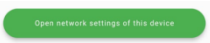
1. Enter the phone system Settings WLAN
2. Select the Same Wi-Fi Module PN to connect
3. After the connection is successful, return to the App for network configuration

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".







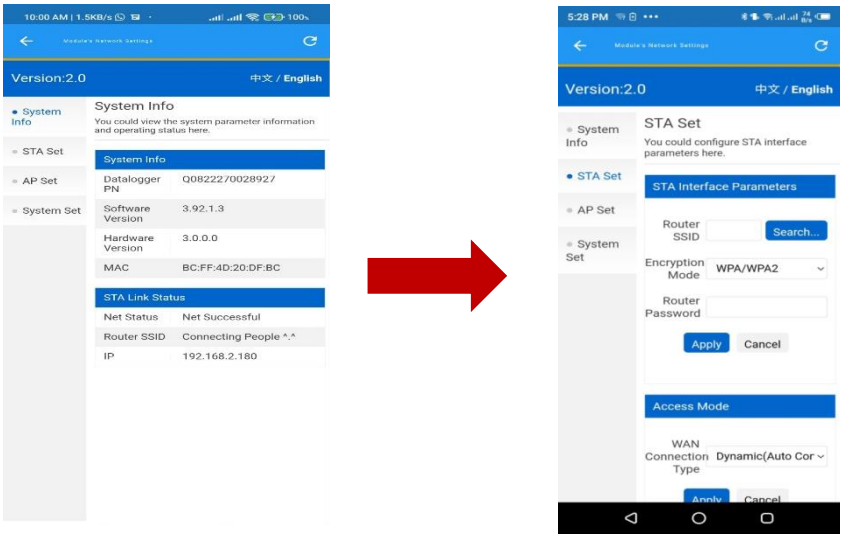
Then Return to "Crown Monitor App" and tap 

button, when Wi-Fi module is connected

successfully.

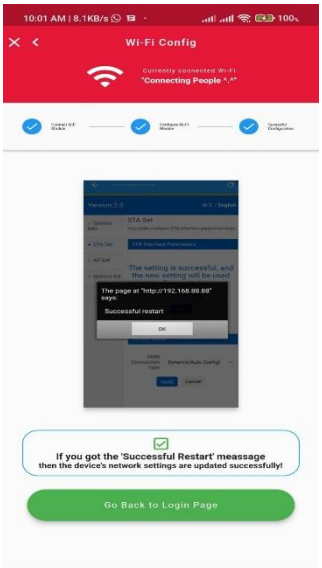
Step 3: Wi-Fi Network Settings:

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



Step 4:

Tap "APPLY" 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.

