INVERTER USER MANUAL

Solar power frequency off-grid inverter control machine

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1. Important safety information

WARNING!

This manual contains important instructions for all inverter/charger models, which should be followed during the installation and maintenance of the inverter.

1.1 General Safety Precautions

1-1-1.Do not expose the Inverter to rain, snow, spray, bilge or dust. To reduce risk of hazard, do not cover or obstruct the ventilation openings. Do not install the Inverter in a zero-clearance compartment. Overheating may result. Allow at least 30CM(11.81 inches) of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit. A minimum air flow of 145CFM is required.
1-1-2. To avoid a risk of fire and electronic shock. Make sure that existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the Inverter with damaged or substandard wiring.
1-1-3. This equipment contains components which can produce arcs or sparks. To prevent fire or explosion do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, or joints, fittings, or other connection between components of the fuel system.
See Warranty for instructions on obtaining service.
1-1-4. Do not dis-assemble the Inverter/Charger. It contains no user serviceable parts. Attempting to service the Inverter/Charger yourself may result in a risk of electrical shock or fire. Internal cHacitors remain charged after all power is disconnected.
1-1-5. To reduce the risk of electrical shock, disconnect both AC and DC power from the Inverter/Charger before attempting any maintenance or cleaning. Turning off controls will not reduce this risk
CAUTION: Equipment damage
The output side of the inverter's AC wiring should at no time be connected to public power or a generator. This condition is far worse than a short circuit. If the unit survives this condition, it will shut down until corrections are made.
Installation should ensure that the inverter's AC output is, at no time, connected to its AC input.
Warning: Limitations On Use
SPECIFICALLY, PLEASE NOTE THAT THE HC/HP SERIES INVERTER/CHARGER SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES.

1.2 Precautions When Working with Batteries

1-2-1. If battery acid contacts skin or clothing, wash immediately with soH and water. If acid enters eye, immediately flood eye with running cold water for at least 20 minutes and get medical attention immediately.
1-2-2. Never smoke or allow a spark or flame in vicinity of battery or engine.
1-2-3. Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery of other electrical part may cause an explosion.
1-2-4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery produces a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

1-2-5. To reduce the risk of injury, charge only rechargeable batteries such as deep-cycle lead acid, lead antimony, lead calcium gel cell, absorbed mat, NiCad/NiFe or Lithium battery. Other types of batteries may burst, causing personal injury and damage.

2. Introduction

2.1 General Information

This Series Pure Sine Wave Inverter is a combination of an inverter, battery charger and AC auto-transfer switch into one complete system with a peak conversion efficiency of 88%.
It is packed with unique features and it is one of the most advanced inverter/chargers in the market today.
It features power factor corrected, sophisticated multi-stage charging and pure sine wave output with unprecedentedly high surge cHability to meet demanding power needs of inductive loads without endangering the equipment.

For the regular model, when utility AC power cuts off(or falls out of acceptable range), the transfer relay is de-energized and the load is automatically transferred to the Inverter output. Once the qualified AC utility is restored, the relay is energized and the load is automatically reconnected to AC utility.
The This Series Inverter is equipped with a powerful charger of up to110Amps (depending on model).
The overload cHacity is 300% of continuous output for up to 20 seconds to reliably support tools and equipment longer

Another important feature is that the inverter can be easily customized to Battery priority via a DIP switch, this helps to extract maximum power from battery in renewable energy systems.
Thus, the Pure Sine Wave Inverter is suitable for Renewable energy system,Utility, RV, Marin and Emergency Hpliances.

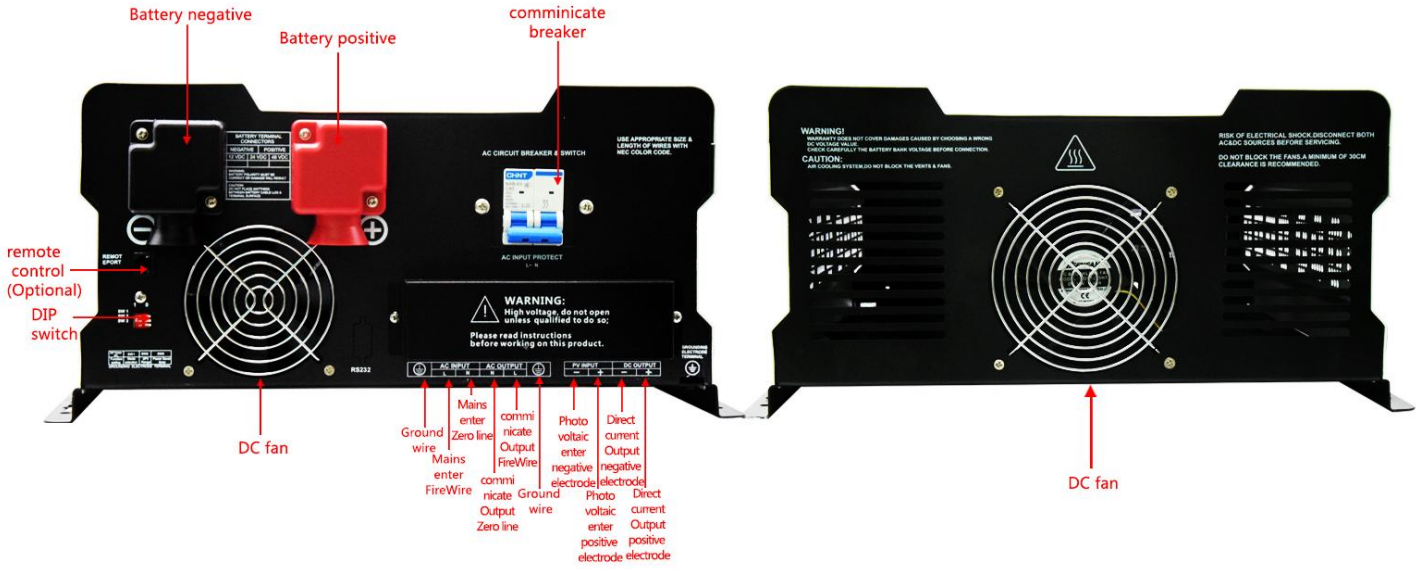
To get the most out of the power inverter, it must be installed, used and maintained properly. Please read the instructions in this manual before installing and operating.

2.2 application

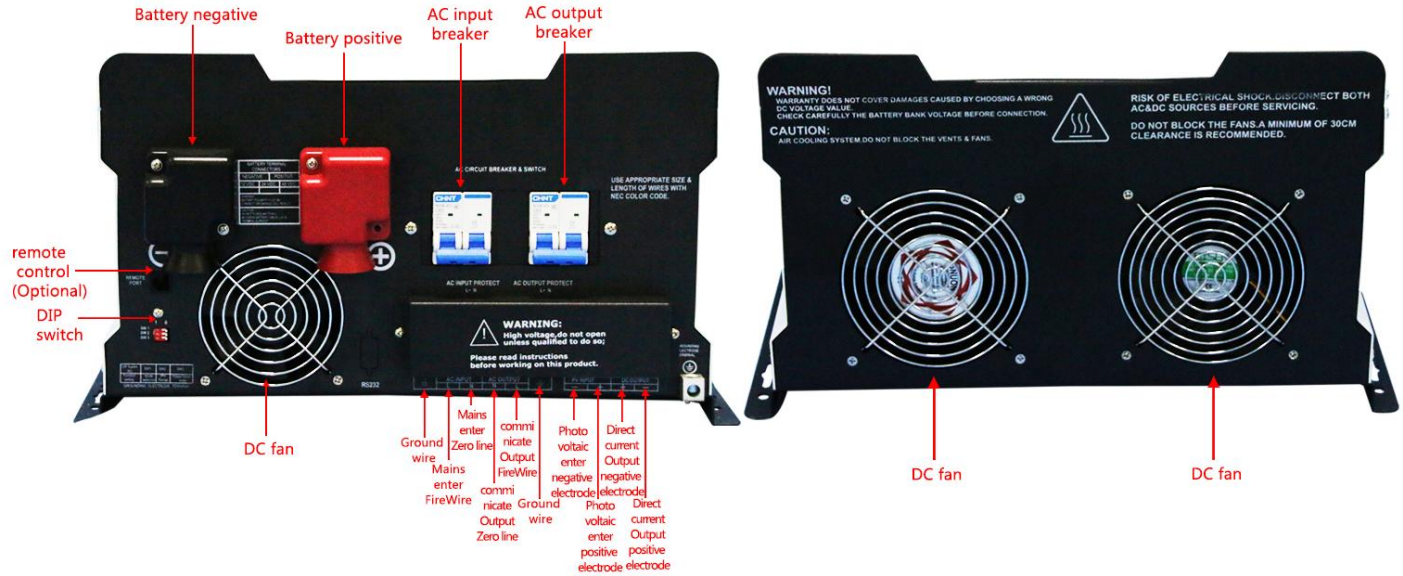
Power tools–circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.
Office equipment – computers, printers, monitors, facsimile machines, scanners.
Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.
Kitchen Hpliances – coffee makers, blenders, ice markers, toasters.
Industrial equipment – metal halide lamp, high – pressure sodium lamp.
Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment.

2.3 Product Structure

1-3KW Operation diagram



4-12KW Operation diagram



2.4 feature

1. The overload capacity can be as high as 300% of the rated power (for 2 seconds)
2. "Energy-saving mode" with low no-load current and low loss can save energy to the utmost extent
3. Three-stage intelligent charging management system with power factor function
4. 8 battery types are available, plus battery activation function
5. The maximum charging current can reach 90A, which can be set to 0%-100%
6. The maximum conversion time is 10ms to ensure continuous uninterrupted power
7. Intelligent remote control
8. When the AC power is restored, the power will be delayed for 5 seconds
9. Low battery voltage start and bypass function
10. Bypass capacity of 30A/40A
11. Smart fan control logic
12. Able to deal with all kinds of bad situations
13. Support dual voltage output
14. 12VDC self-recovery start function specially designed for renewable energy systems

2.5 Electrical performance

2.5.1 Inverter

Topology

The This inverter/charger is built according to the following topology.
Inverter: Full Bridge Topology.
AC Charger: Isolate Boost Topology
Because of high efficiency Mosfets and 16bit, 4.9MHz microprocessor and heavy transformers, it outputs PURE SINE WAVE AC with an average THD of 10% (Min5%, Max 15%) depending of load connected and battery voltage.
The peak efficiency is 88%.

Overload CHacity

The HC/HP/This series inverters have different overload cHacities, making it ideal to handle demanding loads.
1 For 110%<Load<125%(±10%), no audible alarm in 14 minutes, beeps 0.5s every 1s in the 15th minute, and Fault(Turn off) after the 15th minute.
2 For 125%<Load<150%(±10%), beeps 0.5s every 1s and Fault(Turn off) after the 1 minute.
3 For 300%≧Load>150%(±10%), beeps 0.5s every 1s and Fault(Turn off) after 20s.

2.5.2 AC charger

Series is equipped with an active PFC (Power Factor Corrected) multistage battery charger. The PFC feature is used to control the amount of power used to charge the batteries in order to obtain a power factor as close

as possible to 1.
Unlike other inverters whose max charging current decreases according to the input AC voltage, charger is able to output max current as long as input AC voltage is in the range of 164-243VAC (95-127VAC for 120V model), and AC freq is in the range of 48-54Hz(58-64Hz for 60Hz model).
The inverter is with a strong charging current of 120Amp (for 4KW,12V), and the max charge current can be adjusted from 0%-100% via a liner switch at the right of the battery type selector. This will be helpful if you are using our powerful charger on a small cHacity battery bank. Fortunately, the liner switch can effectively reduce the max charging current to 20% of its peak.
Choosing “0” in the battery type selector will disable charging function.

There are mainly 3 stages:
Bulk Charging: This is the initial stage of charging. While Bulk Charging, the charger supplies the battery with controlled constant current. The charger will remain in Bulk charge until the Absorption charge voltage (determined by the Battery Type selection) is achieved.
Software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time asT0 and T0×2 = T1.
Absorb Charging: This is the second charging stage and begins after the absorb voltage has been reached. Absorb Charging provides the batteries with a constant voltage and reduces the DC charging current in order to maintain the absorb voltage setting.
In this period, the inverter will start a T1 timer; the charger will keep the boost voltage in Boost CV mode until the T1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
Float Charging: The third charging stage occurs at the end of the Absorb Charging time. While Float charging, the charge voltage is reduced to the fl oat charge voltage (determined by the Battery Type selection*). In this stage, the batteries are kept fully charged and ready if needed by the inverter.
If the A/C is reconnected or the battery voltage drops below 12Vdc/24Vdc/48Vdc, the charger will reset the cycle above.
If the charge maintains the float state for 10 days, the charger will deliberately reset the cycle to protect the battery.

Table 2.5.1 Battery Charging Processes

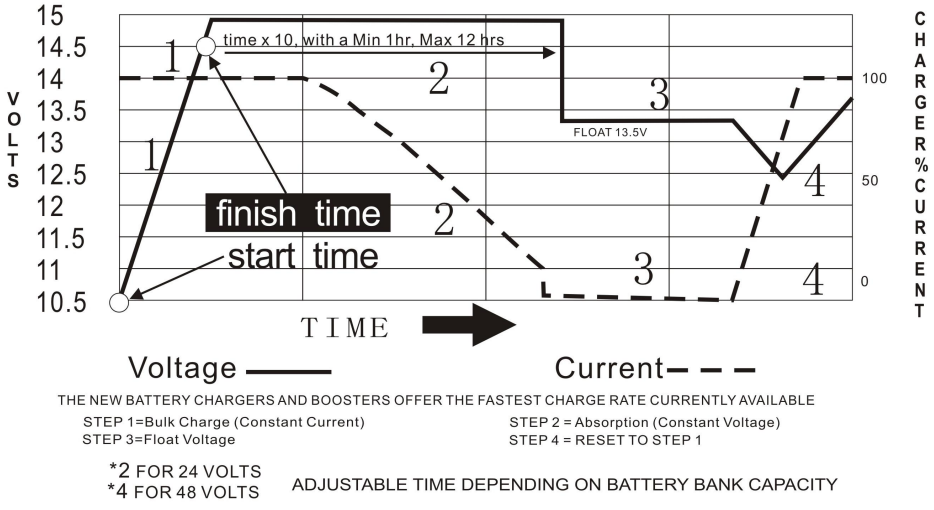


Table 2.5.2 Battery Type Selector

Switch Setting	Description	Fast Mode / VDC	Float Mode / VDC
0	Charger Off		
1	Gel USA	14.0	13.7
2	AGM 1	14.1	13.4
3	LiFePO4	14.6	13.7
4	Sealed Lead Acid	14.4	13.6
5	Gel EURO	14.4	13.8
6	Open Lead Acid	14.8	13.3
7	Calcium	15.1	13.6
8	De-sulphation	15.5 (4 Hours then Off)	

For 12Vdc Mode Series (*2 for 24Vdc Mode ; *4 for 48Vdc Mode)

De-sulphation

The de-sulphation cycle on switch position 8 is marked in red because this is a very dangerous setting if you do not know what you are doing. Before ever attempting to use this cycle you must clearly understand what it does and when and how you would use it.

What causes sulphation? This can occur with infrequent use of the batteries(nor), or if the batteries have been left discharged so low that they will not accept a charge. This cycle is a very high voltage charge cycle designed to try to break down the sulphated crust that is preventing the plates taking a charge and thus allow the plates to clean up and so accept charge once again.

Charging depleted batteries

The inverter allows start up and through power with depleted batteries.

For 12VDC model, after the battery voltage goes below 10V, if the switch is still (and always) kept in "ON" position, the inverter is always connected with battery, and the battery voltage does not drop below 2V, the inverter will be able to charge the battery once qualified AC inputs are present.

Before the battery voltage goes below 9VDC, the charging can be activated when the switch is turned to “Off”, then to “ON”.

When the voltage goes below 9VDC, and you accidently turn the switch to OFF or disconnect the inverter from battery, the inverter will not be able to charge the battery once again, because the CPU loses memory during this process.

Tabel 2.5.3 AC Charging Current for model

Model Watt	Battery Voltage	AC Charger Current Max	Model Watt	Battery Voltage	AC Charger Current Max
1.000 ~ 1.500	12 Vdc	45 ± 5 Amp	2.000	12 Vdc	70 ± 5 Amp
	24 Vdc	25 ± 5 Amp		24 Vdc	35 ± 5 Amp
	48 Vdc	15 ± 5 Amp		48 Vdc	20 ± 5 Amp
3.000	12 Vdc	90 ± 5 Amp	4.000	12 Vdc	120 ± 5 Amp
	24 Vdc	50 ± 5 Amp		24 Vdc	65 ± 5 Amp
	48 Vdc	30 ± 5 Amp		48 Vdc	40 ± 5 Amp
5.000	24 Vdc	80 ± 5 Amp	6.000	24 Vdc	90 ± 5 Amp
	48 Vdc	50 ± 5 Amp		48 Vdc	60 ± 5 Amp
8.00	24Vdc	100 ± 5 Amp	10.000	48Vdc	80 ± 5 Amp
	48Vdc	65 ± 5 Amp	12.000	48Vdc	100 ± 5 Amp

充电容

The charging capacity will go to peak in around 3 seconds. This may cause a generator to drop frequency, making inverter transfer to battery mode.

It is suggested to gradually put charging load on the generator by switching the charging switch from min to max, together with the 15s switch delay, our inverter gives the generator enough time to spin up. This will depend on the size of the generator and rate of charge.

2.5.3 Transfer

While in the Standby Mode, the AC input is continually monitored. Whenever AC power falls below the VAC Trip voltage (154 VAC, default setting for 230VAC,90VAC for 120VAC), the inverter automatically transfers back to the Invert Mode with minimum interruption to your Hpliances - as long as the inverter is turned on. The transfer from Standby mode to Inverter mode occurs in Hproximately 8 milliseconds. And it is the same time from Inverter mode to Standby mode.

Though it is not designed as a computer UPS system, this transfer time is usually fast enough to keep your equipment powered up.

There is a 15-second delay from the time the inverter senses that continuously qualified AC is present at the input terminals to when the transfer is made. This delay is built in to provide time for a generator to spin-up to a stable voltage and avoid relay chattering. The inverter will not transfer to generator until it has locked onto the generator's output. This delay is also designed to avoid frequent switching when input utility is unstable.

2.5.4 Automatic frequency adjustment

The inverter is with Auto Frequency adjust function.

The factory default configuration for 220/230/240VAC inverter is 50Hz, and 60Hz for 100/110/120VAC inverter. While the output freq can be easily changed once a qualified freq is Hplied to the inverter.

If you want to get 60Hz from a 50Hz inverter, just input 60Hz power, and the inverter will automatically adjust the output freq to 60Hz and vice versa.

2.5.5 solar power charger

Listed are the specifications for solar charger.

Table 2.3 Electrical Specification @ 25℃

Rated Voltage	12Vdc	24Vdc	48Vdc
Rated charge current	30-100Amp		30-100Amp
Input voltage range	18～150Vdc@12V	35～150Vdc@24V	60～150Vdc@48V
Max. PV open circuit array voltage	150Vdc		
Typical idle consumption	At idle < 10mA		
Bulk charge	14.6Vdc	29.2Vdc	58.4Vdc
Floating charge	13.4Vdc	26.8Vdc	53.6Vdc
Equalization charge	14.0Vdc	28.0Vdc	58.0Vdc
Over charge disconnect	14.8Vdc	29.6Vdc	59.2Vdc
Over charge recovery	13.6Vdc	27.2Vdc	54.4Vdc
Over discharge disconnect	10.8Vdc	21.6Vdc	43.2Vdc
Over discharge reconnect	12.3Vdc	24.6Vdc	49.6Vdc
Temperature compensation	-13.2mV/℃	-26.4mV/℃	-52.8mV/℃
Lead acid battery settings	Adjustable		
NiCad battery settings	Adjustable		
Low voltage reconnect	12.0-14.0Vdc	24.0-28.0Vdc	48.0-56.0Vdc
Low voltage disconnect	10.5-12.5Vdc	21.0-25.0Vdc	42.0-50.0Vdc
Ambient temperature	0-40℃ (Full load) 40-60℃ (De-rating)		
Altitude	Operating 5000m, Non-Operating 16000m		
Protection class	IP21		
Battery temperature sensor①	BTS Optional remote battery temperature sensor for increased charging precision		
Terminal size (fine/single wire)	#8 AWG		

NOTE:

① The optional battery temperature sensor automatically adjusts the charging process of the controller according to the type of battery that is selected by user through battery type selector. With the battery temperature sensor installed, the controller will increase or decrease the battery charging voltage depending on the temperature of the battery to optimize the charge to the battery and maintain optional performance of the battery.

Maximum Power Point Tracking (MPPT) Function

Maximum Power Point Tracking, frequently referred to as MPPT, is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are cHable of. The PV-seeker Charge controller is a microprocessor-based system designed to implement the MPPT.

And it can increase charge current up to 30% or more compared to traditional charge controllers (see figure 1).

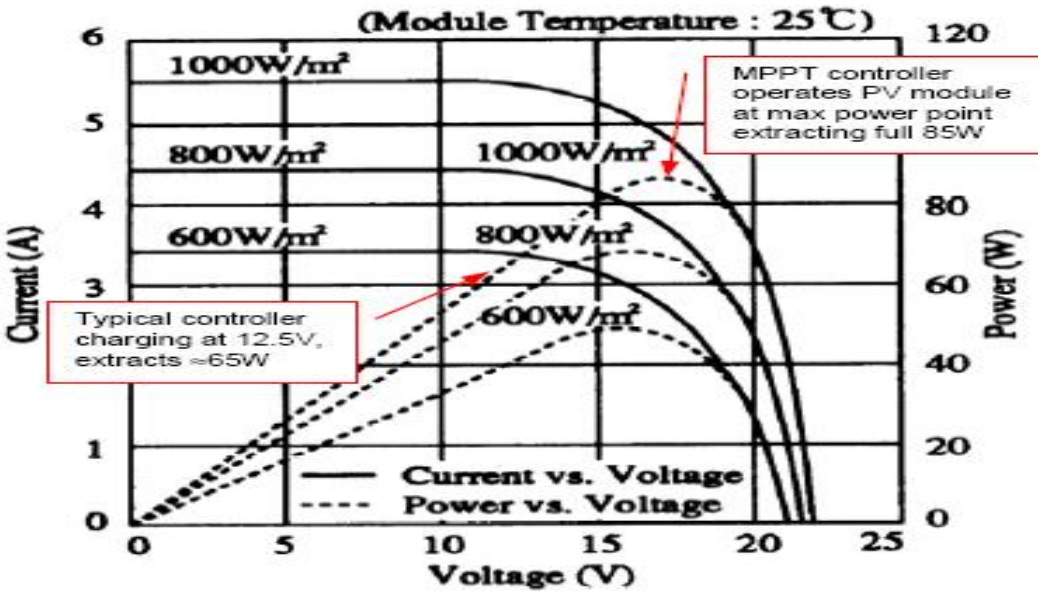


Figure 1 Current, Power vs. Voltage Characteristics

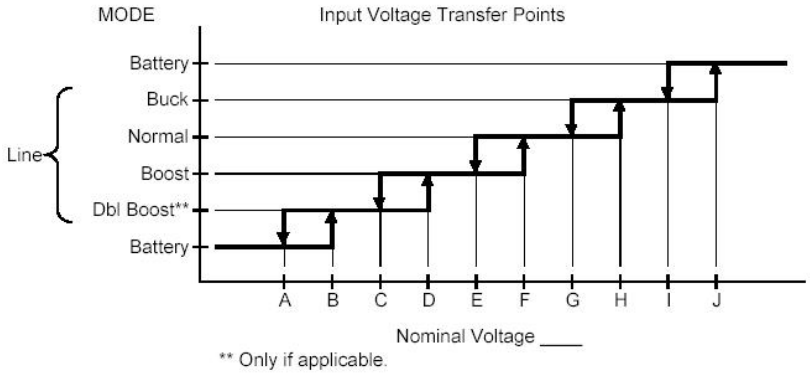
The Charge controller built in is with 12/24V battery voltage auto detecting function.
For 12VDC inverter, the output voltage of solar charger will be accordingly 12VDC, and the qualified DC input volt range is 15v-150VDC.
For 24VDC inverter, the output voltage of solar charger will be accordingly 24VDC, and the qualified DC input volt range is 30v-150VDC.
If the voltage falls out of this range, the charger will not work properly. Special attention should be paid to this when configuring the solar array.

2.5.6 Automatic voltage regulation

The automatic voltage regulation function is for full series of Pure Sine Wave Inverter/ Charger except Instead of simply bypassing the input AC to power the loads, the inverter stabilizes the input AC voltage to a range of 230V/120V±10%.
Connected with batteries, the inverter will function as a UPS with max transfer time of 10 ms.
With all the unique features our inverter provides, it will bring you long-term trouble free operation beyond your expectation.

Function Introduction

Table 2.5.5 Input Voltage Transfer Points



(Optional)	this Series					
	(NA/JPN)			(INTL)		
Acceptable Input Voltage Range (Vac)	**0-160**			**0-300**		
Nominal Input Voltages (Vac)	**100**	**110**	**120**	**220**	**230**	**240**
(A) Line low loss N/W (On battery)	75/65	84/72	92/78	168/143	176/150	183/156
(B) Line Low comeback N/W (On Boost)	80/70	89/77	97/83	178/153	186/160	193/166
(C) Line 2nd boost threshold (On Boost)	**	**	**	**	**	**
(D) Line 2nd boost comeback (On Normal)	**	**	**	**	**	**
(E) Line 1st boost threshold (On Boost)	90	99	108	198	207	216
(F) Line 1st boost comeback (On Normal)	93	103	112	205	215	225
(G) Line buck comeback (On Normal)	106	118	128	235	246	256
(H) Line buck threshold (On Buck)	110	121	132	242	253	264
(I) Line high comeback (On Buck)	115	127	139	253	266	278
(J) Line high loss (On Battery)	120	132	144	263	276	288

2.5.7 Power saving mode

There are 3 different working status for this inverter: “Power Saver Auto” 、“Power Saver Off” and “Power Off”.

When power switch is in “Unit Off” position, the inverter is powered off.

When power switch is turned to either of “Power Saver Auto” or “Power Saver Off”, the inverter is powered on.

Power saver function is designed to conserve battery power when AC power is not or rarely required by the loads.

In this mode, the inverter pulses the AC output looking for an AC load (i.e., electrical Hpliance). Whenever an AC load (greater than 25 watts) is turned on, the inverter recognizes the need for power and automatically starts inverting and output goes to full voltage. When there is no load (or less than 25 watts) detected, the inverter automatically goes back into search mode to minimize energy consumption from the battery bank.

In “Power saver on” mode, the inverter will draw power mainly in sensing moments, thus the idle consumption is significantly reduced.

The inverter is factory defaulted to detect load for 250ms every 30 seconds. This cycle can be customized to 3 seconds turn SW3 on the DIP switch.

Power saver on	Power saver off	Power saver on (Load detected)

Note: The minimum power of load to take inverter out of sleep mode (Power Saver On) is 25 Watts.

When in the search sense mode, the green power LED will blink and the inverter will make a ticking sound. At full output voltage, the green power LED will light steadily and the inverter will make a steady humming sound. When the inverter is used as an “uninterruptible” power supply the search sense mode or “Power Saver On” function should be defeated.

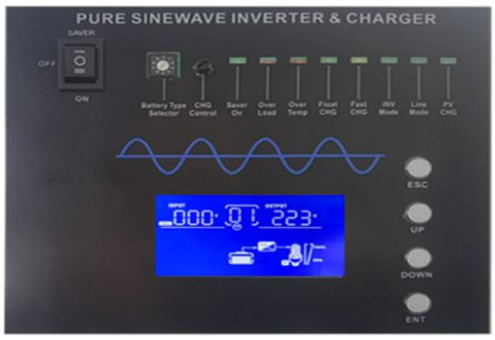
Exceptions
Some devices when scanned by the load sensor cannot be detected. Small fluorescent lights are the most common example. (Try altering the plug polarity by turning the plug over.) Some computers and sophisticated electronics have power supplies that do not present a load until line voltage is available. When this occurs, each unit waits for the other to begin. To drive these loads either a small companion load must be used to bring the inverter out of its search mode, or the inverter may be programmed to remain at full output voltage.

2.5.8 Protect

The This series inverter is equipped with extensive protections against various harsh situations/faults.
These protections include:
AC Input over voltage protection/AC Input low voltage protection
Low battery alarm/High battery alarm
Over temperature protection/Over load protection
Short Circuit protection (1s after fault)
Back feeding protection

When Over temperature /Over load occur, after the fault is cleared, the master switch has to be reset to restart the inverter.
The Low batter voltage trip point can be customized from defaulted value 10VDC to 10.5VDC thru the SW1 on DIP switch.
The inverter will go to Over temp protection when heat sink temp. ≥105ºC, and go to Fault (shutdown Output) after 30 seconds. The switch has to be reset to activate the inverter.
The Inverter has back feeding protection which avoids presenting an AC voltage on the AC input terminal in Invert mode.
After the reason for fault is cleared, the inverter has to be reset to start working.

2.5.9 Control panel (optional)



Front panel settings And function description

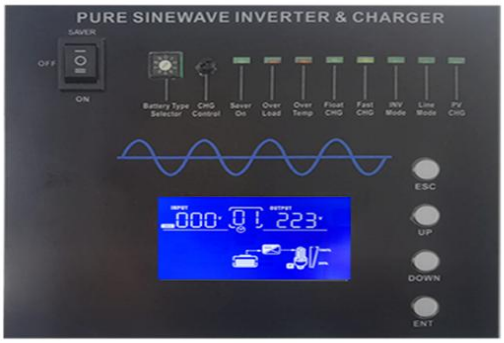
Function keys	model	describe
ESC	Display mode	Short press to exit
	Operation mode	Long press for 2-3 seconds to exit <parameter setting>
UP	Display mode	Short press to show up
	Operation mode	Short press to add <+>
DOWN	Display mode	Short press to show down
	Operation mode	Short press to decrease<->
ENT	Display mode	Select display
	Operation mode	Long press for 23 seconds to confirm <Save parameters>

Hart from the switch panel on the front of the inverter an extra switch panel connected to the RJ11 port at the DC side of the inverter thru a standard telephone cable can also control the operation of the inverter.
If an extra switch panel is connected to the inverter via “remote control port”, together with the panel on the inverter case, the two panels will be connected and operated in parallel.
Whichever first switches from “Off” to “Power saver off” or “Power saver on”, it will power the inverter on.
If the commands from the two panels conflict, the inverter will accept command according to the following priority:
Power saver on> Power saver off> Power off
Only when both panels are turned to “Unit Off” position will the inverter be powered off.
The Max length of the cable is 10 meters.

WARNING

Never cut the telephone cable when the cable is attached to inverter and battery is connected to the inverter. Even if the inverter is turned off. It will damage the remote PCB inside if the cable is short circuited during cutting.

2.5.10 LED indicator and LCD



PV CHARGE	GREEN LED lit in PV Mode
SHORE POWER ON	GREEN LED lit in AC Mode
INVERTER ON	GREEN LED lit in Inverter Mode
FAST CHARGE	Yellow LED lit in Fast Charging Mode
FLOAT CHARGE	GREEN LED lit in Float Charging Mode
OVER TEMP TRIP	RED LED lit in Over Temperature
OVER LOAD TRIP	RED LED lit in Over Load
POWER SAVER ON	GREEN LED lit in Power Saver Mode (Power Saver Load ≦25W)

Table 2.5.8 Liquid Crystal Display

Audible alarm:

Low battery voltage alarm	The green LED of the inverter lights up, and the buzzer beeps for 0.5 seconds every 5 seconds
High battery voltage alarm	The green LED of the inverter lights up, the buzzer beeps for 1 second every 5 seconds, and the fault is displayed after 60 seconds
Overload in inverter mode	(1) When 110%<load<125%(± 10%), the first 14 minutes are normal, and the buzzer will beep for 0.5 seconds per second from the 15th minute, and the fault will be displayed after 15 minutes
Over temperature	(2) 125% <load <150% (± 10%), the buzzer beeps for 0.5 seconds per second, and the fault will be displayed after 60 seconds.

2.5.11 Fan running

For 1-3KW, a multi-control DC fan starts to work according to the following logic.
For 4-12KW, there are two multi-control DC fans and one AC fan. The working mode of DC fan is the same as that of 1-3KW,
The AC fan works when the inverter has an AC output. So when the inverter is in power saving mode,
The AC fan will respond to the pulses emitted by the inverter in the power-saving mode from time to time.
It is controlled by the following logic on the DC terminal side (refer to Table 2.5.9)：

Table 2.5.9 Fan operation

Condition	Enter condition	Leave condition	Speed
HEAT SINK TEMPERATURE	T ≤ 60℃	T > 65℃	OFF
	65℃≤ T <85 ℃	T ≤ 60℃ / T ≥ 85℃	50%
	T > 85℃	T ≤ 80℃	100%
CHARGER CURRENT	I ≤ 15%	I ≥ 20%	OFF
	20%< I ≤ 50%	I ≤ 15% / I ≥ 50%	50%
	I > 50%	I ≤ 40%	100%
LOAD% (INV MODE)	Load < 30%	Load ≥ 30%	OFF
	30% ≤ Load < 50%	Load ≤ 20% / Load ≥ 50%	50%
	Load ≥ 50%	Load ≤ 40%	100%

Allow at least 30CM of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit.
Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.

- Speed to be controlled in a smooth manner as a function of internal temperature and/or current.
- Fan should not start/stop suddenly.
- Fan should run at minimum speed needed to cool unit.
- Fan noise level target <60db at a distance of 1m.

Table 2.5.10 DIP switch function setting

Serial number	Features	Position: 0	Location: 1
SW1	Battery/AC priority mode	Utility first	Battery priority
SW2	AC input range	184-253VAC	154-264VAC (40Hz+)
SW3	Load sensing cycle	30 seconds	5 seconds

SW1:Solar/AC Priority:
Our inverter is designed with AC priority by default. This means, when AC input is present, the battery will be charged first, and the inverter will transfer the input AC to power the load. Only when the AC input is stable for a continuous period of 15 days, the inverter will start a battery inverting cycle to protect the battery. After 1 cycle normal charging and ac through put will be restored.
The AC Priority and Battery Priority switch is SW4. When you choose battery priority, the inverter will inverting from battery despite the AC input. Only when the battery voltage is reaches low voltage alarm point(10.5V for 12V), the inverter transfers to AC Input, charges battery, and switches back to battery when battery is charged full. This function is mainly for wind/solar systems taking utility power as back up.

SW2:AC Input Range:
There are different acceptable AC input ranges for different kinds of loads.
For some relatively sensitive electronic devices, a narrow input range of 184-253VAC (100-135V for 120VAC model) is required to protect them.
While for some resistive loads which work in a wide voltage range, the input AC range can be customized to 154-264VAC (90-135V for 120VAC model), this helps to power loads with the most AC input power without frequent switches to the battery bank.

SW3:Power Saver Auto Setting :
The inverter is factory defaulted to detect load for 250ms in every 5 seconds. This cycle can be customized to 3 seconds through the SW3 on the DIP switch.

2.5.12 Other features

Battery voltage recover start
After low battery voltage shut off (10V for 12V model/20V for 24V model/40V for 48V model), the inverter is able to restore operation after the battery voltage recovers to 12Vdc/24Vdc/48Vdc (with power switch still in the “On” position). This function helps to save the users extra labor to reactivate the inverter when the low battery voltage returns to an acceptable range in the renewable energy systems. The built in battery charger will automatically reactivate as soon as city/generator ac has been stable for 15 seconds.

 **WARNING**
Never leave the loads unattended, some loads (like a Heater) may cause accident in such cases.
It is better to shut everything down after low voltage trip than to leave your load on, due to the risk of fire.

Conformal Coating
The entire line of inverters have been processed with a conformal coating on the PCB, making it water, rust, and dust resistant.
While these units are designed to witthistand corrosion from the salty air, they are not splash proof.

3.Install

3.1 Location

Follow all the local regulations to install the inverter.
Please install the equipment in a location that is Dry, Clean, Cool and that has good ventilation.
Working temperature: ‐10℃‐40℃
Storage temperature: ‐40‐70℃
Relative Humidity: 0%‐95%，non-condensing
Cooling: Forced air

3.2 DC Wiring recommendation

It is suggested the battery bank be kept as close as possible to the inverter. The following able is a suggested wiring option for 1 meter DC cable.
Please find the following minimum wire size. In case of DC cable longer than 1m, please increase the cross section of cable to reduce the loss.

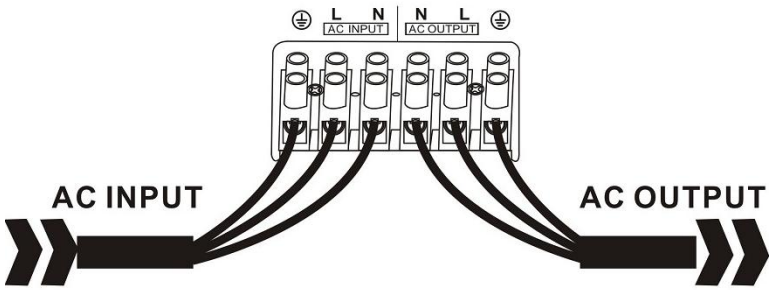
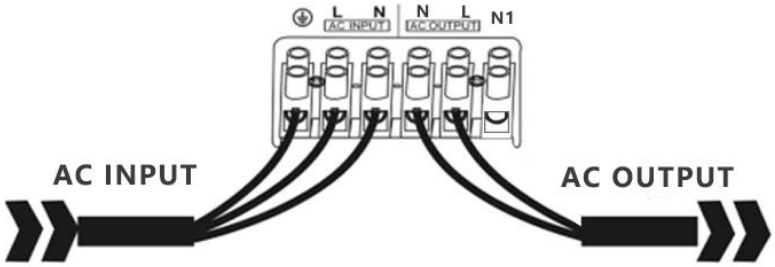
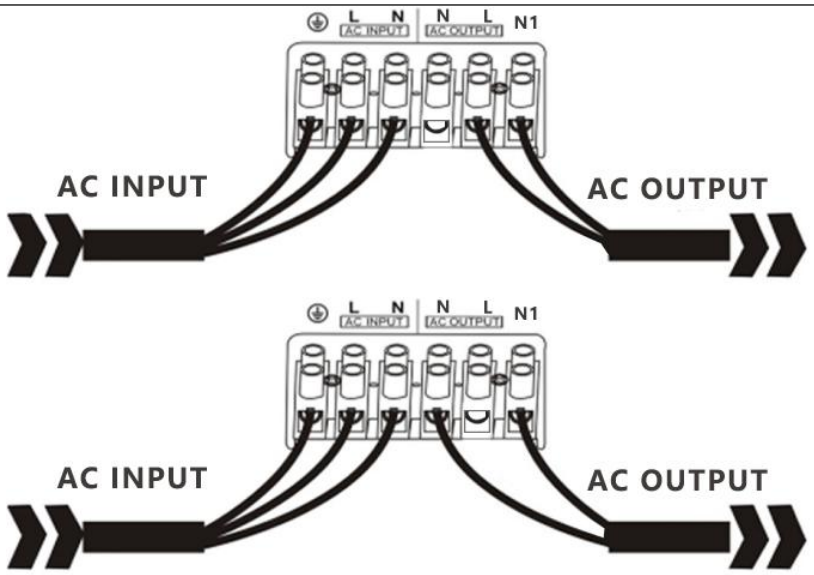
Model Watt	Battery Voltage	Wire Gage /Min		Model Watt	Battery Voltage	Wire Gage /Min	
		0~1.0m	1.0~5.0m			0~1.0m	1.0~5.0m
1.000 ~ 1.500	12 Vdc	30mm²	40mm²	2.000	12 Vdc	60mm²	75mm²
	24 Vdc	15mm²	20mm²		24 Vdc	30mm²	45mm²
	48 Vdc	10mm²	15mm²		48 Vdc	15mm²	25mm²
3.000	12 Vdc	90mm²	120mm²	4.000	12 Vdc	120mm²	150mm²
	24 Vdc	45mm²	60mm²		24 Vdc	60mm²	75mm²
	48 Vdc	25mm²	30mm²		48 Vdc	30mm²	40mm²
5.000	24 Vdc	75mm²	95mm²	6.000	24 Vdc	90mm²	120mm²
	48 Vdc	40mm²	50mm²		48 Vdc	45mm²	60mm²
8.000	24 Vdc	120mm²	150mm²	10.000	48 Vdc	75mm²	95mm²
	48 Vdc	60mm²	75mm²	12.000	48 Vdc	90mm²	120mm²

Please note that if there is a problem obtaining for example 90mm² cable, use 2*50mm² or 3*35mm² .
One cable is always best , but cable is simply copper and all you require is the copper, so it does not matter if it is one cable or 10 cables as long as the square area adds up. Performance of any product can be improved by thicker cable and shorter runs, so if in doubt round up and keep the length as short as possible.

3.3 AC Wiring

We recommend using 10-5Awg wire to connect to the ac terminal block.

There are 3 different ways of connecting to the terminal block depending on the model. All the wirings are CE compliant, Call our tech support if you are not sure about how to wire any part of your inverter.

Wiring Option 1 230V single phase Input: ground wire + live wire + zero wire Output: zero line + live line + ground line	
Wiring Option 2 230V split phase Input: ground wire + live wire + zero wire Output: zero line + live line	
Wiring Option 3 230V split phase Input: ground wire + live wire + zero wire Output: Live + neutral (N1) (115V) Zero line (n) + zero line (N1) (115V) Note: in this case, each output hot wire can only bear the rated power at most Half of.	

WARNING

The output voltage of this unit must never be connected in its input AC terminal, overload or damage may result.

Always switch on the inverter before plugging in any Hpliance.

4.Troubleshooting Guide

Troubleshooting contains information about how to troubleshoot possible error conditions while using the Inverter & Charger.

The following chart is designed to help you quickly pinpoint the most common inverter failures.

Indicator and Buzzer

		Indicator on top cover							LED on Remote Swi			
Status	**Item**	SHORE POWER ON	INVERTER ON	FAST CHG	FLOAT CHG	OVER TEMP TRIP	OVER LOAD TRIP	POWER SAVER ON	BATT CHG	INVERTER	Alarm	Buzzer
Line Mode	CC	√	×	√	×	×	×	×	√	×	×	×
	CV	√	×	√, blink	×	×	×	×	√	×	×	×
	Float	√	×	×	√	×	×	×	√	×	×	×
	Standby	√	×	×	×	×	×	×	×	×	×	×
Inverter Mode	Inverter On	×	√	×	×	×	×	×	×	√	×	×
	Power Saver	×	×	×	×	×	×	√	×	×	×	×
Inverter Mode	Battery Low	×	√	×	×	×	×	×	×	√	√	Beep 0.5s every 5s
	Battery High	×	√	×	×	×	×	×	×	√	√	Beep 0.5s every 1s
	Overload On Invert Mode	×	√	×	×	×	√	×	×	√	√	Refer to “Audible alarm”
	Over-Temp On Invert Mode	×	√	×	×	√	×	×	×	√	√	Beep 0.5s every 1s
	Over-Temp On Line Mode	√	×	√	×	√	×	×	√	×	√	Beep 0.5s every 1s
	Over Charge	√	×	√	×	×	×	×	√	×	√	Beep 0.5s every 1s
Fault Mode	Fan Lock	×	×	×	×	×	×	×	×	×	×	Beep continuous
	Battery High	×	√	×	×	×	×	×	×	√	×	Beep continuous
	Inverter Mode Overload	×	×	×	×	×	√	×	×	×	×	Beep continuous
	Output Short	×	×	×	×	×	√	×	×	×	√	Beep continuous
	Over-Temp	×	×	×	×	√	×	×	×	×	×	Beep continuous
	Over Charge	×	×	√	×	×	×	×	√	×	×	Beep continuous
	Back Feed Short	×	×	×	×	×	×	×	×	×	×	Beep continuous

Indicator and Buzzer

		LED Indicators on top cover								LEDs on Remote Switch			
Status	**Item**	POWER SAVER	OVER LOAD	OVER TEMP	UNIT ALARM	FLOAT CHG	FAST CHD	INVERTER MODE	LINE MODE	BATT CHG	INVERTER	Alarm	Buzzer
		1	2	3	4	5	6	7	8	1	2	3	

Line Mode	CC						√		√	√			
	CV						√, Flash		√	√			
	Float					√			√	√			
	Standby								√				
Inverter Mode	Inverter On							√			√		
	Power Saver	√											
Inverter Mode	Battery Low				√			√			√	√	Beep 0.5s every 5s
	Battery High				√			√			√	√	Beep 0.5s every 1s
	Overload On Invert Mode		√		√			√			√	√	Refer to "Audible alarm"
	Over-Temp On Invert Mode			√	√			√			√	√	Beep 0.5s every 1s
	Over-Temp On Line Mode			√	√		√		√	√		√	Beep 0.5s every 1s
	Over Charge				√		√		√	√		√	Beep 0.5s every 1s
Fault Mode	Fan Lock												Beep continuous
	Battery High							√			√		Beep continuous
	Inverter Mode Overload		√										Beep continuous
	Output Short												Beep continuous
	Over-Temp			√									Beep continuous
	Over Charge						√			√			Beep continuous
	Back Feed Short												Beep continuous

Symptom	Possible Cause	Recommended Solution
Inverter will not turn on during initial power up.	Batteries are not connected, loose battery-side connections. Low battery voltage.	Check the batteries and cable connections. Check DC fuse and breaker. Charge the battery.
No AC output voltage and no indicator lights ON.	Inverter has been manually transitioned to OFF mode.	Press the switch to Power saver on or Power saver off position.

AC output voltage is low and the inverter turns loads OFF in a short time.	Low battery.	Check the condition of the batteries and recharge if possible.
Charger is inoperative and unit will not accept AC.	AC voltage has dropped out-of-tolerance	Check the AC voltage for proper voltage and frequency.
Charger is supplying a lower charge rate.	Charger controls are improperly set. Low AC input voltage. Loose battery or AC input connections.	Refer to the section on adjusting the “Charger Rate”. Source qualified AC power.. Check all DC /AC connections.
Charger turns OFF while charging from a generator.	High AC input voltages from the generator.	Load the generator down with a heavy load. Turn the generator output voltage down.
Sensitive loads turn off temporarily when transferring between grid and inverting.	Inverter's Low voltage trip voltage may be too low to sustain certain loads.	Choose narrow AC voltage in the DIP switch, or Install a UPS if possible.
Noise from Transformer/case*	Hplying specific loads such as hair drier	Remove the loads

***The reason for the noise from transformer and/or case**

When in inverter mode and the transformer and/or case of the inverter sometimes may vibrate and make noise.

The noise may come from transformer.

According to the characteristics of our inverter, there is one type of load which will most likely to cause rattles of transformer, that is a half-wave load, load that uses only a half cycle of the power(see figure 1). This trends to cause imbalance of magnetic field of transformer, reducing its rated working freq from 20KHz to, say, maybe 15KHz (it varies according to different loads). This way, the freq of noise falls exactly into the range (200Hz-20KHz) that human ear can sense.

The most common load of such kind is hair drier.

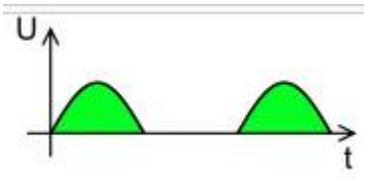


Figure 1

If the noise comes from case.

Normally when loaded with inductive loads, the magnetic field generated by transformer keeps attracting or releasing the steel case at a specific freq, this may also cause noise.

Reducing the load power or using an inverter with bigger cHacity will normally solve this problem.

The noise will not do any harm to the inverter or the loads.

5.Warranty

We offer a 2year limited warranty.
The following cases are not covered under warranty.
1 DC polarity reverse.
The inverter is designed without DC polarity reverse protection. A polarity reverse may severely damage the inverter.
2 Wrong AC wiring
3 Operating in a wet environment.
4 Operating with an undersized generator or generator with unqualified wave form.

5.1 Wiring requirements

Try to put the battery as close as possible to the inverter. The following are the configuration requirements for a 2-meter battery cable.

Inverter power	battery voltage	Wire diameter	Number of shares
1KW	12V	AWG 8	3
1KW	24V	AWG 8	2
1.5KW	12V	AWG 8	3
1.5KW	24V	AWG 8	2
2KW	12V	AWG 8	5
2KW	24V	AWG 8	3
2KW	48V	AWG 8	2
3KW	12V	AWG 8	7
3KW	24V	AWG 8	4
3KW	48V	AWG 8	2
4KW	24V	AWG 8	5
4KW	48V	AWG 8	2
5KW	24V	AWG 8	6
5KW	48V	AWG 8	3
6KW	24V	AWG 8	7
6KW	48V	AWG 8	4
7KW	48V	AWG8	4
8KW	48V	AWG8	6
10KW	48V	AWG8	7
12KW	48V	AWG8	7

6.Product parameter

※The specifications in this manual are subject to change without notice。

Electrical Specifications										
	Model	1KW	2KW	3KW	4KW	5KW	6KW	8KW	10KW	12KW
Inverter Output	Continuous Output Power	1000W	2000W	3000W	4000W	5000W	6000W	8000W	10000W	12000W
	Surge Rating(20ms)	3KW	6KW	9KW	12KW	15KW	18KW	24KW	30KW	36KW
	Output Waveform	Pure Sine wave/Same as input(Bypass Mode)								
	Nominal Efficiency	>88%(Peak)								
	Line Mode Efficiency	>95%								
	Power Factor	0.9-1.0								
	Nominal Output Voltage rms	100-110-120Vac / 220-230-240Vac								
	Output Voltage Regulation	±10% RMS								
	Output Frequency	50Hz ± 0.3Hz/60Hz ± 0.3Hz								
	Short Circuit Protection	Yes(1sec after fault)								
	Typical transfer Time	10ms(Max)								
	THD	< 10%								
DC Input	Nominal Input Voltage	12.0Vdc / 24.0Vdc / 48.0Vdc			24.0Vdc / 48.0Vdc			48.0Vdc		
	Minimum Start Voltage	10.0Vdc / 10.5Vdc for 12Vdc Mode			*2 for 24Vdc, *4 for 48Vdc;					
	Low Battery Alarm	10.5Vdc / 11.0Vdc for 12Vdc Mode								
	Low Battery	10.0Vdc / 10.5Vdc for								

	Trip	12Vdc Mode							
	High Voltage Alarm	16.0Vdc for 12Vdc Mode							
	Low Battery voltage recover	15.5Vdc for 12Vdc Mode							
	Idle Consumption-Search Mode	< 25 W when Power Saver On.(Refer to Table)							
Charger	Output Voltage	Depends on battery type (Refer to Table 2.5.2)							
	Charger Breaker Rating	10A	20A	30A	40A	40A	40A	50A	80A	80A
	Max Charge Power Rate	1/3 Rating Power (Refer to Table 2.5.3)							
	Battery Initial Voltage for Start	10-15.7Vdc for 12Vdc Mode	*2 for 24Vdc, *4 for 48Vdc;						
	Over Charge Protection S.D.	15.7Vdc for 12Vdc Mode							
BTS	Battery Temperature Sensor (Optional)	Yes(Refer to the table) Variances in Charging Voltage & S.D Voltage Base on the Battery Temperature.							
Bypass & Protection	Input Voltage Waveform	Sine wave (Grid or Generator)							
	Nominal Voltage	100-110-120Vac / 220-230-240Vac							
	Max Input AC Voltage	150VAC For 120Vac LV Mode；300VAC For 230Vac HV Mode；							
	Nominal Input Frequency	50Hz or 60Hz							
	Low Freq Trip	47±0.3Hz for 50Hz, 57±0.3Hz for 60Hz							
	High Freq Trip	55±0.3Hz for 50Hz, 65±0.3Hz for 60Hz							

	Overload protection (SMPS load)	Circuit Breaker								
	Output Short circuit protection	Circuit Breaker								
	Bypass breaker rating	10A	20A	30A	40A	40A	40A	50A	80A	80A
	Transfer switch rating	30Amp for UL & TUV			40Amp for UL				80Amp for UL	
	Bypass without battery connected	Yes (Optional)								
	Max bypass current	30Amp			40Amp				80Amp	
Mechanical Specifications	Mounting	Wall Mount								
	Inverter Dimensions(L*W*H)	340*420*200mm	425*375*200mm		560*420*235mm			655*490*240mm		
	Inverter housing size (L*W*H)	415*440*300mm	500*495*300mm		660*470*310mm			720*470*290mm		
	Inverter Weight(Solar Chg)KG	16	20	26.5	31.5	33.5	37.5	56.5	58.5	61.5
	Shipping Weight(Solar Chg)KG	19	22	29.5	38	40	44	63.5	66	68.5
	Display	Status LEDs / Status LEDs+LCD								
	Standard Warranty	2 Years （Optional）								

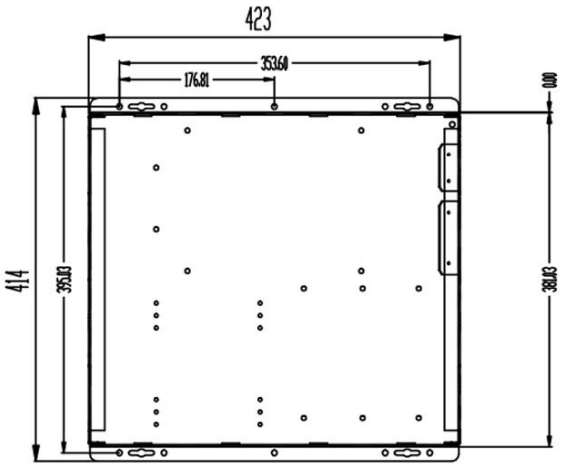
※ MPPT solar charging controller parameters

(combined with the inverter listed above, it can be built-in or external - Controller power current option)

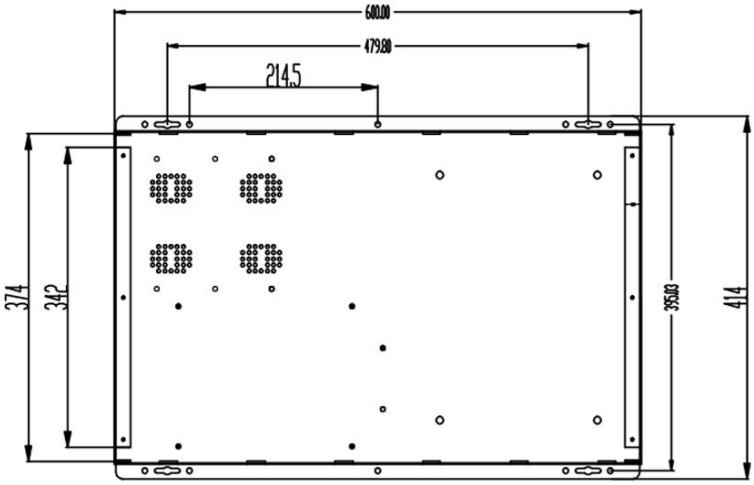
Model: MPPT		30A	40A	50A	60A	80A	100A
Charging Mode	MPPTAutomatic maximum power point tracking						
Charging Method	Three stages: constant current (MPPT), balanced charge, floating charge						
System Type	12V-24V-48V/48V	Automatic identification / manual setting					
System voltage range	12V System	DC9V-DC15V					
	24V System	DC18V-DC30V					
	48V System	DC36V-DC60V					
Soft start time	12V/24V/48V	W10s					
Dynamic response recovery time	12V/24V/48V	W500us					
Static power	12V/24V/48V	W2W					
Efficeny	12V/24V/48V	>9 6. 5%					
PV module utilization	12V/24V/48V	W99. 97%					
Input Features							
MPPT working Voltage	12V	DC18V-DC150V					
	24V	DC34V-DC150V					
	48V	DC65V-DC150V					
Input low voltage protection point	12V	DC16V					
	24V	DC30V					
	48V	DC60V					
low voltage input recovery	12V	DC18V					
	24V	DC34V					
	48V	DC65V					
Max PV input Voltage	12V/24V/48V	DC170V					
Over voltage protection	12V/24V/48V	DC175V					
Over voltage input recovery	12V/24V/48V	DC170V					
MAX solar input power	12V System	420W	570W	700W	900W	1140W	1400W
	24V System	840W	1130W	1400W	1700W	2260W	2600W
	48V System	1650W	2270W	2800W	3400W	4540W	5600W
Output Features	Same as battery voltage						
Battery Type(The default isislead-acid)maintenance-free battery)	12V/24V/48V	Lead-acid maintenance-free batteries, gel batteries, liquid batteries, lithium batteries (You can also customize to charge other types of batteries)					

Floating voltage (Lead-acid batteries) (can be set by user)	12V	13. 8V					
	24V	27. 60V					
	48V	55. 20V					
Charging voltage (Lead-acid batteries) (can be set by user)	12V	14. 5V					
	24V	29V					
	48V	58V					
Rated Current	12V/24V/48V	30A	40A	50A	60A	80A	100A
Current limit protection	12V/24V/48V	32A	42A	52A	62A	82A	102A
Temperature Coefficient	12V/24V/48V	±0. 02%/℃					
Automatic temperature	12V/24V/48V	14. 2V-（maximum temperature-25℃） *0.3					
Output voltage regulation	12V/24V/48V ^±1.5%						
LCD displaying LCD display instructions for details							
LED displaying Charging indication' DC output switch status indication							
PC Upper computer（Communication PORT） Rs485（optional）							
Protections							
Input low voltage	See input characteristics						
Input high voltage	See input characteristics						
Input polarity reverse	With reverse polarity protection						
Output polarity reverse	With reverse polarity protection						
Short circuit protection	Enter the protection state after 5 trial startups, and resume from startup						
Temperature protection	85 degrees						
Temperature rise	Reduce power output above 80"C						
Other Data							
Noise	W50dB						
Cooling way	Forced air cooling, the fan speed is adjusted by temperature, when the internal temperature is low, the fan runs slowly or stops; when the controller stops working, the fan stops running；						
element	Imported materials, in line with EU standards. The rated temperature of the electrolytic cell for all temperature selections is not less than 105℃						
odor	Does not produce peculiar smell and harmful smell						
Environment	Meets 2002/95/EC; no cadmium, hydride and fluoride						
Machine size	Length*width*height（mm）	190*168*95		245*190*95		320*235*130	
Package dimensions	Length*width*height（mm）	245*230*145		285*270*140		320*260.5*130	
net weight	Kilogram（KG）	2.5		3.5		7.5	
Gross weight	Kilogram（KG）	3		4		8	

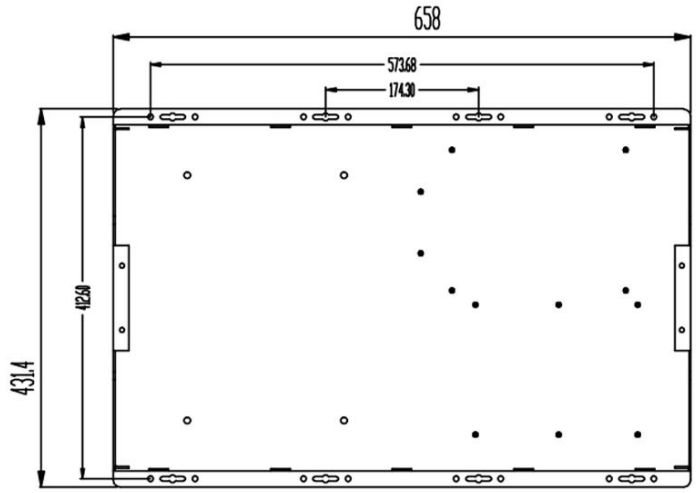
7.Base installation



1-3KW base



4-6KW base



8-12KW base