Sigineer Power
Pure Sine Wave Inverter/Charger
User's Manual(1.5KW to 6KW)

Version 6.0 (PN:50000-20230227)

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Manufacturer Information

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Please record the Sigineer Power unit's model and serial number in case you need to provide this information in the future. It is much easier to record this information now than try to gather it after the unit has been installed.

Model Number:_____

Serial Number:_____

1 Important Safety Information

Save This Manual! Read this manual before installation, it contains important safety, installation and operating instructions. Keep it in a safe place for future reference.
All wiring must follow the National Electric Code, Provincial or other codes in effect at the time of installation, regardless of suggestions in this manual. All wires should be copper conductors.

1.1 General Safety Precautions

1.1.1 Before installing and using the Sigineer Power Pure Sine Wave Inverter/Charger, read the manual and cautionary markings on the Inverter/Charger enclosure. Be sure to read all instructions and cautionary markings for any equipment attached to this unit. Installers must be certified technicians or electricians.
1.1.2 This product is designed for indoor/compartment installation. Do not expose the inverter/charger to rain, snow, spray, bilge or dust. To reduce the risk of hazard, do not cover or obstruct the ventilation openings. Do not install the inverter/charger 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.
1.1.3 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.
1.1.4 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.
1.1.5 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 capacitors remain charged after all power is disconnected.
1.1.6 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 INVERTER/CHARGER SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES. WE MAKE NO WARRANTY OR REPRESENTATION IN CONNECTION WITH THEIR PRODUCTS FOR SUCH USES. USING THE INVERTER/CHARGER WITH THESE PARTICULAR EQUIPMENTS IS AT YOUR OWN RISK.

1.2 Precautions When Working with Batteries

1.2.1 If battery acid contacts skin or clothing, wash immediately with soap 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 the 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.
1.2.6 Don't install the inverter near batteries, the inverter may heat battery electrolyte and cause corrosive fumes to vent and damage/corrode nearby electronics or metals.

2 Introduction

2.1 General Information

Thank you for purchasing the Sigineer Power Pure Sine Wave Inverter/Charger.
The Sigineer Power Pure Sine Wave Inverter/Charger is a transformer based inverter and battery charger with an unprecedented conversion efficiency of 90%.
Packed with unique features, it is one of the most technically advanced inverter/charger on the market.
It features power factor corrected, sophisticated multi-stage charging control and pure sine wave output with high surge capability to meet the power needs of all sorts of demanding loads without putting the equipment at risk.
The transformers of the whole line have been consistently improved for years to achieve the best balance of conversion efficiency, idle consumption, and maximum THD.
The idle consumption of the Sigineer Power inverter/charger is ultra low, roughly 1.5% of its rated power.
Loaded with full linear loads, the maximum THD of the Sigineer Power is 3% at nominal battery voltage and 10% at low battery voltage alarm point.
These special features make this line compete very well with its high frequency counterparts.
The powerful battery charger of Sigineer Power Inverter/Charger comes with Battery Temperature Sensing for increased charging precision.
The generous 300% surge capacity of 20 seconds makes it possible to support demanding inductive loads.
The Sigineer Power models are available in 120Vac(single phase) and 120/240Vac(split phase), together with a manual 50Hz/60Hz frequency switch, the product line is compatible with all the major utility standards worldwide.
The AC/Battery priority, auto generator start functionality make it ideally suitable to work in either backup power or renewable energy applications.
When customized to Battery priority mode via a DIP switch, the inverter will extract maximum power from external power sources in renewable energy systems and a minimal cycle of battery will be required. With the availability of auto generator start, an electrical generator can be integrated into the system and started when the battery voltage goes low.
With an audible buzzer and an LCD display, the inverter gives the users comprehensive information of the operation status, making it easier for maintenance and troubleshooting.
Thus the Sigineer Power Pure Sine Wave Inverter/Charger is suitable for a myriad of applications including renewable energy systems, utility, truck, RV and emergency vehicles etc.
To get the most out of the power inverter, it must be installed, used and maintained properly. Please read the

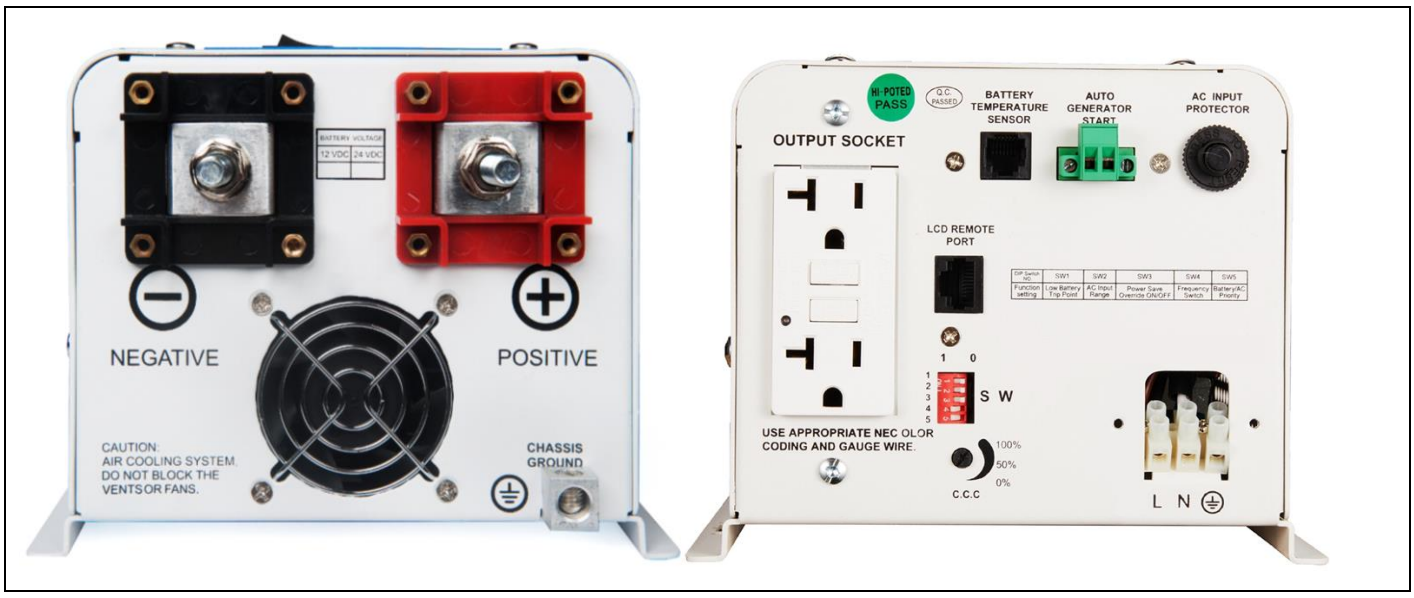
instructions in this manual before installation and operation.

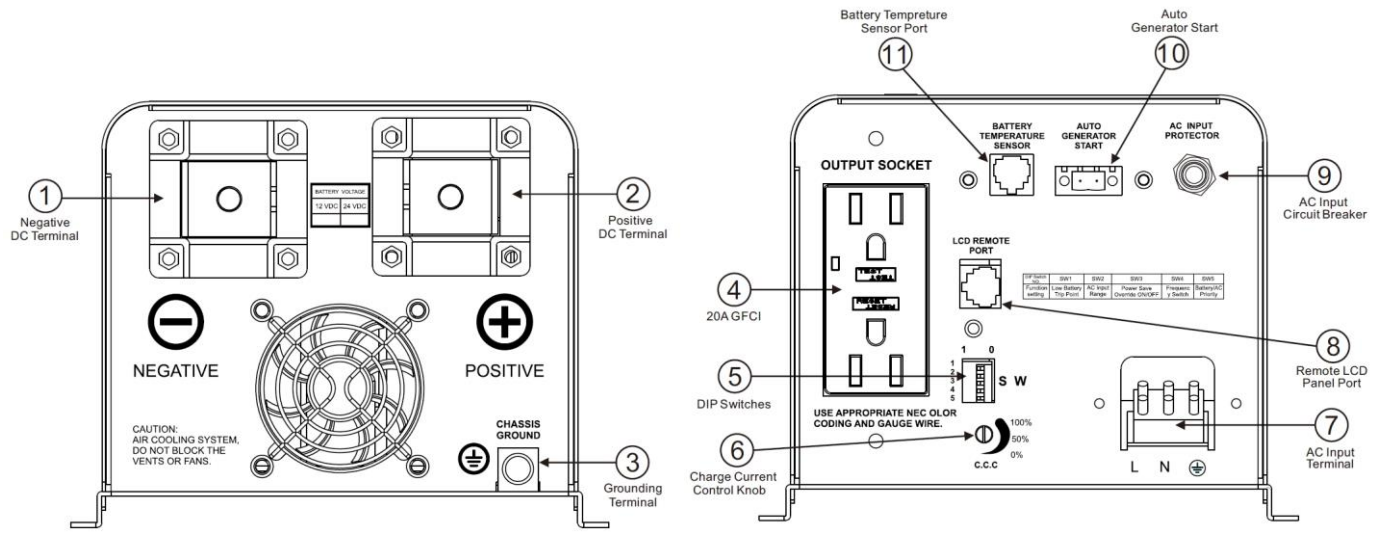
Model #	Nominal Power	DC Input	AC Input	AC Output
PSW71512NC	1500W	12Vdc	120Vac	120Vac
PSW71524NC	1500W	24Vdc	120Vac	120Vac
APC3012NC	3000W	12Vdc	120Vac	120Vac
APC3012D	3000W	12Vdc	240Vac	120/240Vac
APC3024NC	3000W	24Vdc	120Vac	120Vac
APC3024D	3000W	24Vdc	240Vac	120/240Vac
APC3048NC	3000W	48Vdc	120Vac	120Vac
APC3048D	3000W	48Vdc	240Vac	120/240Vac
APC4012NC	4000W	12Vdc	120Vac	120Vac
APC4012D	4000W	12Vdc	240Vac	120/240Vac
APC4024NC	4000W	24Vdc	120Vac	120Vac
APC4024D	4000W	24Vdc	240Vac	120/240Vac
APC4048NC	4000W	48Vdc	120Vac	120Vac
APC4048D	4000W	48Vdc	240Vac	120/240Vac
APC6024D	6000W	24Vdc	240Vac	120/240Vac
APC6048D	6000W	48Vdc	240Vac	120/240Vac

2.2 Application

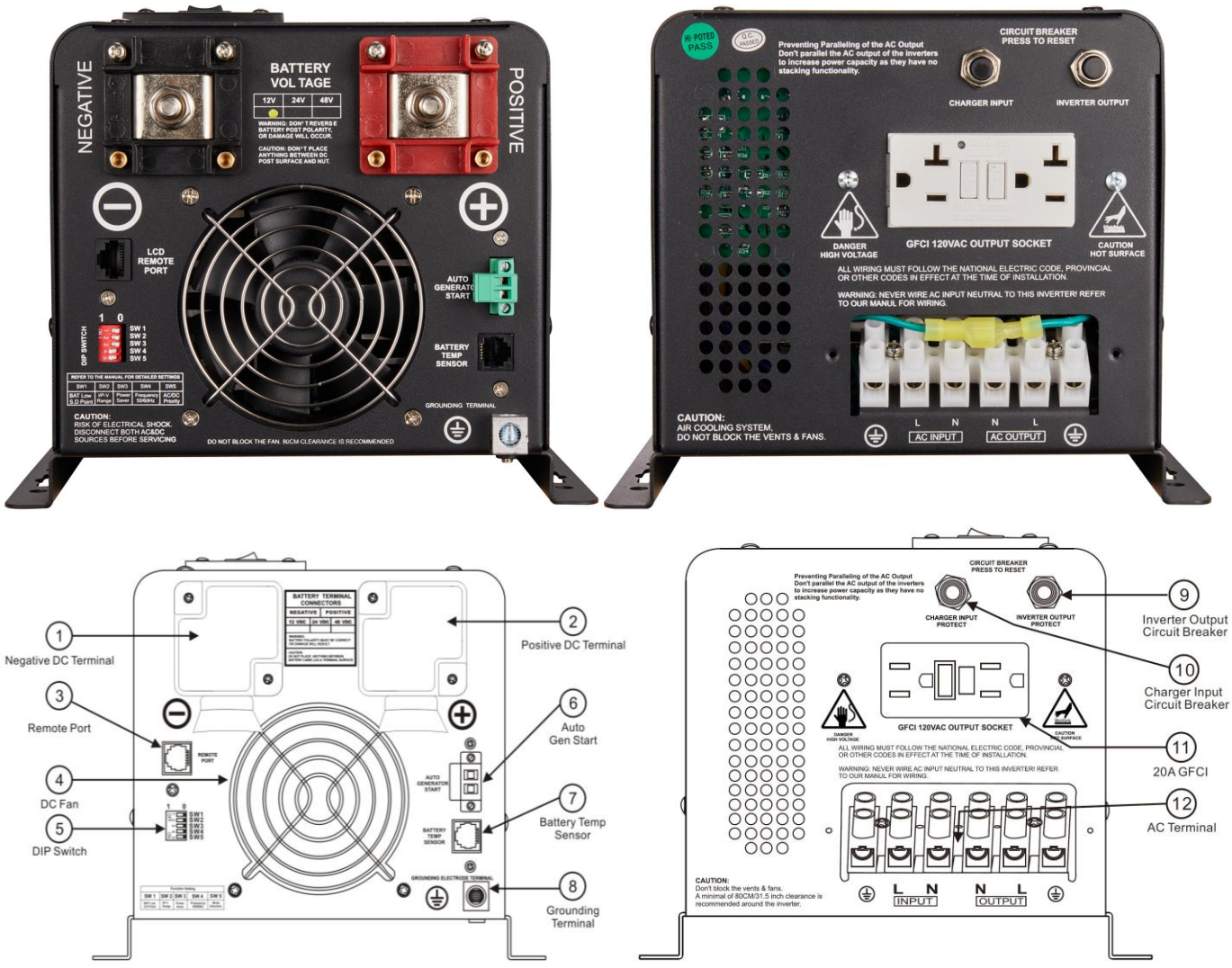
Power tools–circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.
Office equipment – computers, printers, monitors, facsimile machines, scanners.
Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.
Kitchen appliances – 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.

2.3 Mechanical Drawing

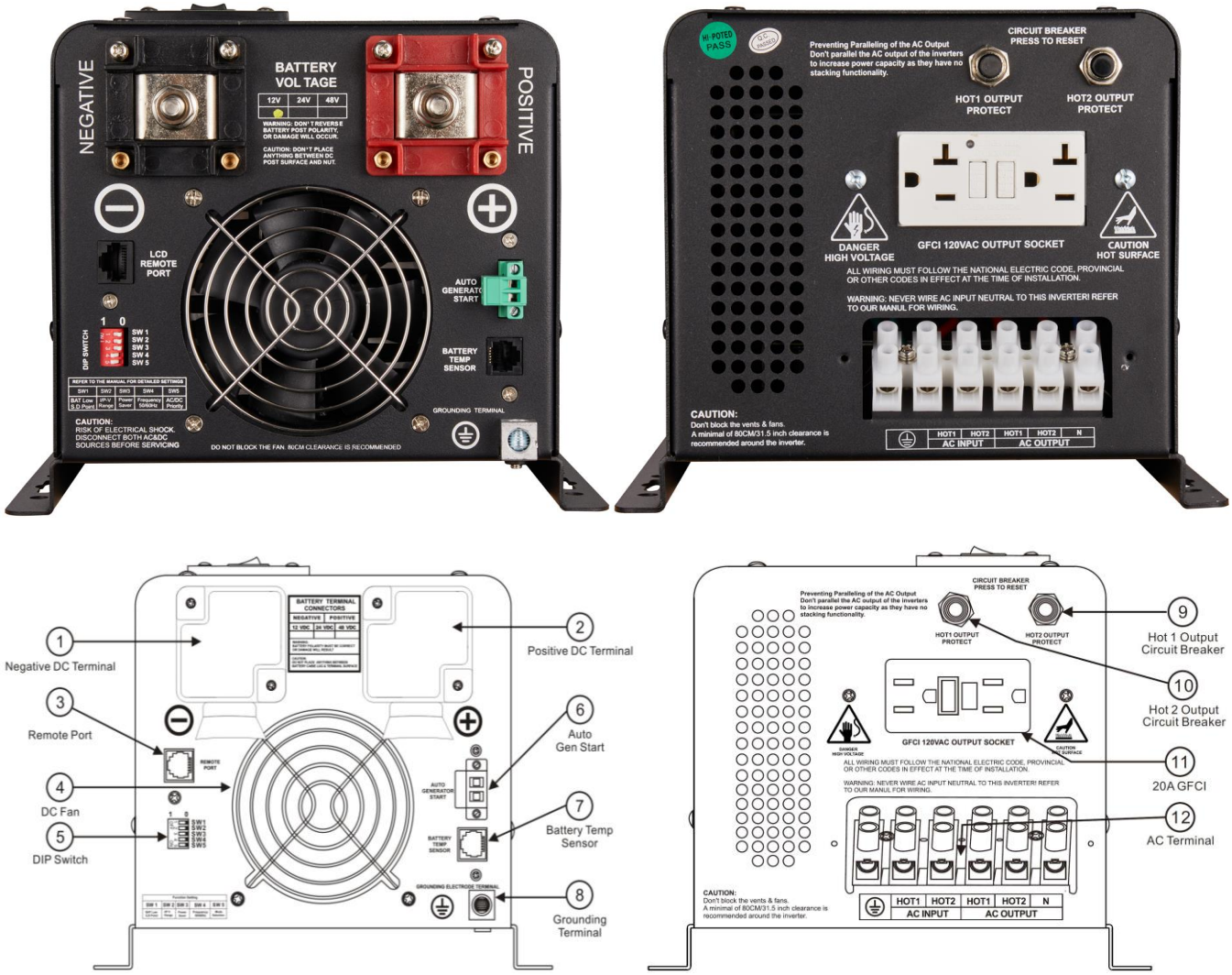




SIDE VIEW OF MODEL # : PSW71512NC / PSW71524NC



SIDE VIEW OF MODEL # :
APC3012NC /APC3024NC /APC3048NC/APC4012NC/APC4024NC/APC4048NC



SIDE VIEW OF MODEL # :
APC3012D /APC3024D/APC3048D/APC4012D/APC4024D/APC4048D/APC6024D/APC6048D

2.4 Features

Auto Generator Start
Battery Temperature Sensing for increased charging precision
Lithium Battery(0Vdc) Wakeup
Automatic Neutral to Ground Bonding for 120Vac models
Maximum THD: 3% at nominal battery voltage
Maximum 90% conversion efficiency
Powerful 4-stage power factor corrected battery charger, settable from 0%-100%
High surge output capability, 300% peak load for 20 seconds
Fully isolated AC output from battery input
Ultra low quiescent current, low power 'Power Saver Mode' to conserve energy
Battery type selector for 8 types of batteries and de-sulphation for completely drained batteries
10 ms transfer time from AC to battery for the continuous load operation
Optional remote control with LCD display
15 sec DC to AC transfer delay, improved protection for generator driven loads
Thermally controlled variable speed fan for more efficient cooling
Extensive protections against various harsh situations

2.5 Electrical Performance

2.5.1 Invert

Topology

The Sigineer Power pure sine wave inverter/charger is built according to the following topology.
Invert: Full Bridge Topology.
Charge: Isolated Boost Topology
When operating in invert mode, the direct current (DC) that enters the inverter from the batteries is filtered by a large input capacitor and switched “On” and “Off” by the Metal Oxide Silicon Field Effect Transistors (MOSFET) at a rate of 50 Hz or 60Hz, and directed into the transformer which steps the voltage up to 230 or 120 volts. The unit has a 16bit, 4.9MHZ microprocessor to control the output voltage and frequency as the DC input voltage and/or output load varies.
Because of high efficiency MOSFETs and the heavy transformers, it outputs PURE SINE WAVE AC with an average THD of 7% (min 3%, max 10% under full linear loads) depending on the load connected and battery voltage.
The peak invert efficiency of Sigineer Power is 90%.

Overload Capacity

The Sigineer Power inverter/charger has different overload capacities, 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.

Soft Start in Inverter Mode

The inverter is engineered with a “Soft Start” feature.
When the inverter is turned on, the output voltage gradually ramps up from 0VAC to rated voltage in about 1.2 sec. This effectively reduces otherwise very high starting inrush current drawn by AC loads such as Switched Mode Power Supplies and inductive loads. This will result in lower motor inrush current, which means less impact on the loads and inverter.

Caution:

After the inverter is switched on, it takes a finite time for it to self diagnose and get ready to deliver full power. Hence, always switch on the load(s) after a few seconds of switching on the inverter. Avoid switching on the inverter with the load already switched on. This may prematurely trigger the overload protection. When a load is switched on, it may require an initial higher power surge to start. Hence, if multiple loads are being powered, they should be switched on one by one so that the inverter is not overloaded by the higher starting surge if all the loads are switched on at once.

2.5.2 AC Charger

The Sigineer Power pure sine wave inverter/charger 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, Sigineer Power pure sine wave inverter/charger is able to output max charge current as long as input AC voltage is in the range of 164-253VAC for 240Vac models (95-127VAC for 120V models), and AC frequency is in the

range of 48-54Hz for 50Hz (58-64Hz for 60Hz).

The Sigineer Power pure sine wave inverter/charger has a very rapid charge current available, and the max charge current can be adjusted from 0%-100% via a liner switch on the DC side of the inverter. This will be helpful if this powerful charger apply charging on a small capacity battery bank.

Choosing "0" in the battery type selector will disable charging function.

There are three main charging 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 charger start until the battery charger reaches 0.3V below the boost voltage, then take this time as T0 and T0×10 = T1.

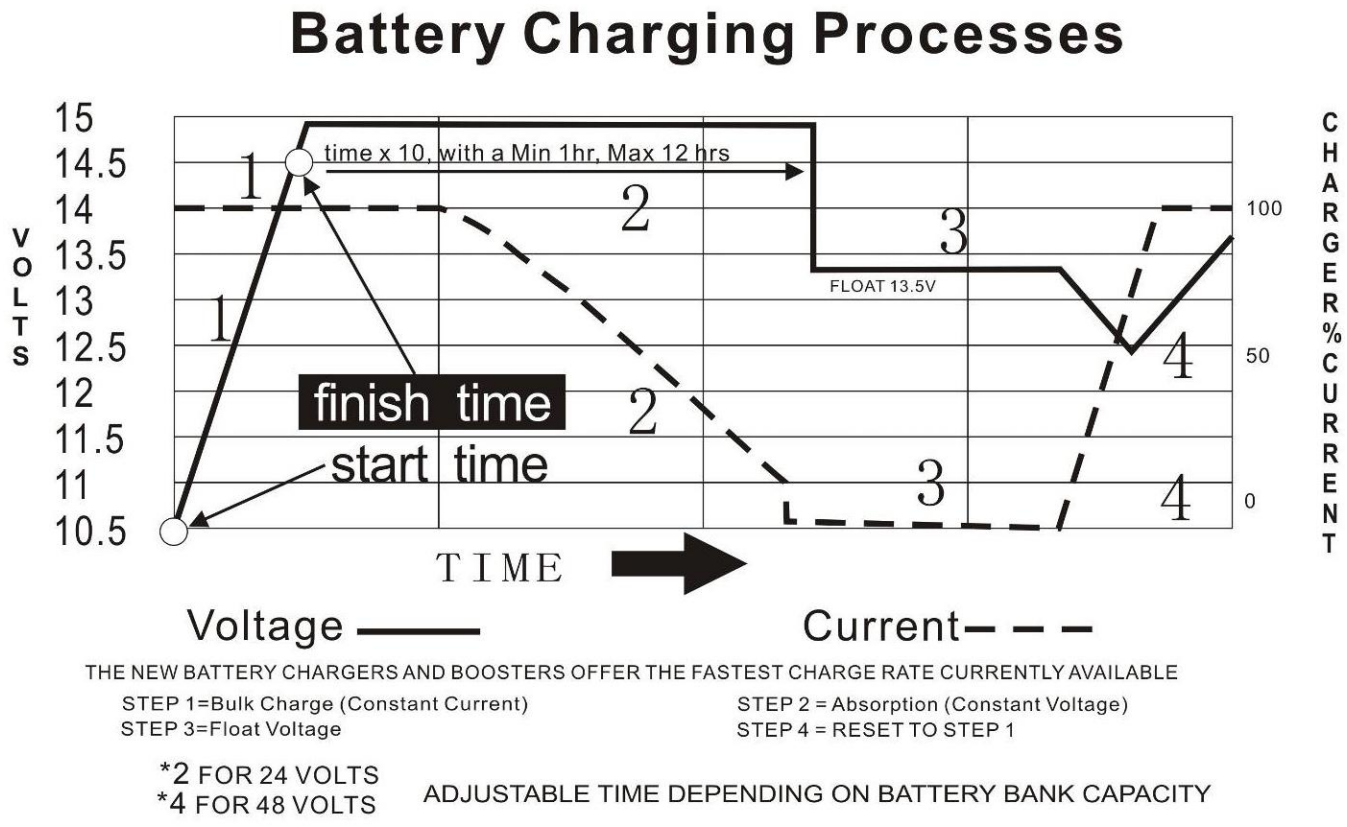
Absorb Charging: This is the second charging stage and begins after the absorb voltage has been reached. Absorb Charging provides the batteries with a constant voltage and reduces the DC charging current in order to maintain the absorb voltage setting.

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 float 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.



Battery Type Selector	Description	Boost Charge(C.V)	Float Charge	Boost Charge(C.V)	Float Charge	Boost Charge(C.V)	Float Charge
		For 12Vdc Models		For 24Vdc Models		For 48Vdc Models	
0	Charger Off						
1	Gel USA	14	13.7	28	27.4	56	54.8
2	AGM 1	14.1	13.4	28.2	26.8	56.4	53.6
3	AGM 2	14.6	13.7	29.2	27.4	58.4	54.8
4	Sealed lead acid	14.4	13.6	28.8	27.2	57.6	54.4
5	Gel EURO	14.4	13.8	28.8	27.6	57.6	55.2
6	Open lead acid	14.8	13.3	29.6	26.6	59.2	53.2
7	Calcium	15.1	13.6	30.2	27.2	60.4	54.4
8	De sulphation (4 hours)	15.5	15.5	31	31	62	62
9	Lithium Battery	Customized	Customized	Customized	Customized	Customized	Customized

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 if the batteries have been left discharged so low that they will not accept a charge. As the saying goes, desperate diseases must have desperate remedies. This cycle is a very high voltage charge cycle especially designed to try to break down the sulphated crust that is preventing the plates from taking a charge and thus allow the plates to clean up and accept a charge once again.

Warning!

The de-sulphation charging should not be carried out on batteries with good conditions.

For Sigineer Power's model of APC6024D and APC6048D Inverter chargers, the battery type selector position of "9" is customized with special charging algorithm for lithium battery modules from Tesla Model S.

The algorithm has only Bulk Charging (Constant Current) to charge the battery, when the battery is charged to high voltage alarm, the charger will shut off and inverter goes to battery mode.

Model #	APC6024D	APC6048D
Low Battery Cut Off	18V	36V
Low Battery Voltage Alarm/ Charger Activation	23.5V	47V
High Battery Voltage Alarm/ Charger Cut Off	25.25V	50.5V
High Battery Cut Off	25.5V	51V

Warning: The output of these units will be de-rated by about 10% when the battery voltage drops below the nominal cut off of 20V and 40V.

For other models, the battery type selector position of “9” is customized with special charging algorithm for Sigineer Power lithium battery packs

Model #	PSW71512NC APC3012NC APC3012D APC4012NC APC4012D	PSW71524NC APC3024NC APC3024D APC4024NC APC4024D	APC3048NC APC3048D APC4048NC APC4048D
Constant Voltage Charge	13.6V	27.2V	54.4V
Floating Charging	N/A	N/A	N/A
Low Battery Alarm	12V/12.5V	24V/25V	48V/50V
Low Battery Cutoff	11.5V/12V	23V/24V	46V/48V

Note: The battery type selector of “0” will disable the charger when the battery voltage is over 11.25Vdc for 12V models, 22.5V for 24V models, 45V for 48V models.

Charging depleted batteries

Unlike some other competing inverters that need a qualified DC voltage to activate its charger, the Sigineer Power pure sine wave inverter/charger allows start up and power bypass with depleted batteries.
As long as qualified AC power inputs, these inverters will charge batteries even when the battery voltage is 0 volt. This is a great feature to wake up lithium battereis.

Charging current for each model

Model #	Battery Voltage	Charging Current	Model #	Battery Voltage	Charging Current
PSW71512NC	12 Vdc	45± 5 Amp	PSW71524NC	24 Vdc	15± 5 Amp
APC3012NC	12 Vdc	90± 5 Amp	APC4012NC	12 Vdc	115± 5 Amp
APC3012D	12 Vdc	80± 5 Amp	APC4012D	12 Vdc	115± 5 Amp
APC3024NC	24 Vdc	35± 5 Amp	APC4024NC	24 Vdc	40± 5 Amp
APC3024D	24 Vdc	40± 5 Amp	APC4024D	24 Vdc	55± 5 Amp
APC3048NC	48 Vdc	25± 5 Amp	APC4048NC	48 Vdc	35± 5 Amp
APC3048D	48 Vdc	25± 5 Amp	APC4048D	48 Vdc	35± 5 Amp
APC5024D	24 Vdc	60± 5 Amp	APC6024D	24 Vdc	75± 5 Amp
APC5048D	48 Vdc	40± 5 Amp	APC6048D	48 Vdc	55± 5 Amp

The charging capacity will go to peak in around 3 seconds, this may probably 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.

Changing max charging current

The battery type selector position of "0" will disable battery charger when battery voltage is over 11.25Vdc for 12Vdc models, 22.5V for 24V models, 45V for 48V model.
If the battery voltage is below this level, the inverter will force the charging when AC input is qualified.

The "Charge Current Control" knob will enable the user to control the max charging current from 15% to maximum.

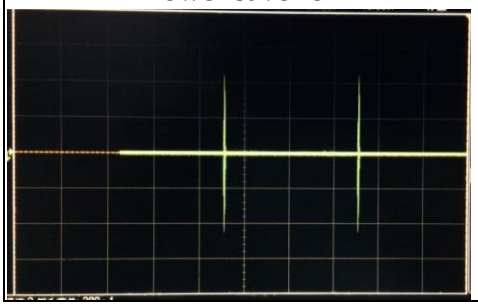
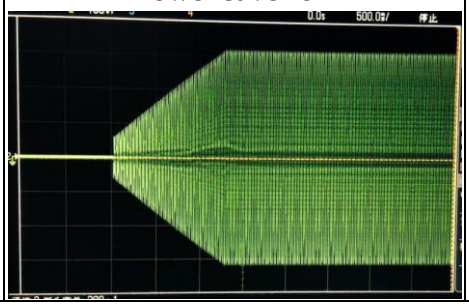
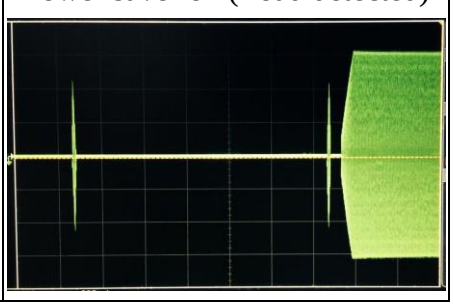
Caution	**Please use a small jeweler's style flat-head screwdriver to turn the charge current control switch gently to avoid breakage due to over-turning.** **To guarantee the best performance of AC charger when the AC input is from a generator, the standby generator should be of at least 150% higher capacity than the inverter.** **Warning! Operation with an under-rated generator or generator with unqualified wave form may cause premature failure which is not under warranty.**

2.5.3 Transfer

While in the Standby Mode, the AC input of the inverter is continually monitored. Whenever AC power falls out of the trip voltages, the inverter automatically transfers back to the Invert Mode with minimum interruption to your appliances.
The transfer from Standby mode to Inverter mode occurs in approximately 6 milliseconds, with the worst case of 10 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 hold them up as devices like computers can generally tolerate a max power loss of 20ms.
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 switch when input utility is unstable.

2.5.4 Power Saver

There are two different working statuses for SIGINEER POWER inverter: "Power On" and "Power Off".
When power switch is in "Unit Off" position, the inverter is powered off.
When power switch is turned to either "Power Saver Auto" or "Power Saver Off", the inverter is powered on.
Power saver function is dedicated to conserve battery power when AC power is not or little required by the loads.
In this mode, the inverter pulses the AC output looking for an AC load (i.e., electrical appliance). 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) being detected, the inverter will 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 in every 3 seconds. This power sensing can be customized to "Unit off charging" via the SW3 on DIP switch.

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

Note: The minimum power of a load to take inverter out of sleep mode (Power Saver On) is 50 Watts. For split phase models, the power threshold of sleep mode is 50W between Hot1 and Neutral and 200W between Hot 1 and Hot 2. There is no load detection between Hot2 and Neutral.

The whole Sigineer Power inverter line is designed with extraordinarily low idle power consumption which is approximately 2.5% of its rated power.

Sigineer Power Inverter/Charger Idle Power Consumption(in Watts)

Model	Power Saver Off	Power Saver Auto	
	Idle(Max)	3Secs(Max)	Unit Off Charging
1.5KW	35W	9W	3W
2KW	59W	10.0W	
3KW	75W	15.0W	
4KW	110W	20.0W	
5KW	130W	25.0W	
6KW	150W	25.0W	

For more detailed technical information, please contact us at info@sigineer.com.

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 function should be deactivated.

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.

Note: For split phase models, the power saver functionality is only available on Hot 1.

2.5.5 Protections

The Sigineer Power inverter/charger is equipped with extensive protections against various harsh situations/faults.

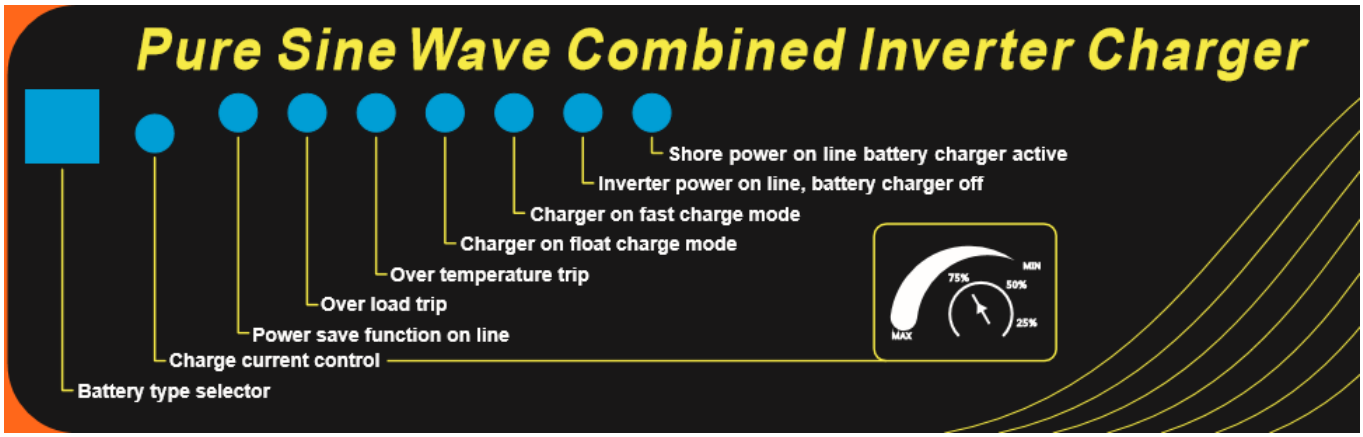
These protections include:

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 battery voltage trip point can be customized from defaulted value of 10VDC to 10.5VDC through the SW1 on the DIP switch.
The inverter will go to over tempreture protection when the heat sink temperature is ≥105ºC(221℉), and will go to Fault (shutdown Output) after 30 seconds. After tempreture drops to 90ºC(194℉), the switch has to be reset to activate the inverter.
The Sigineer Power Inverter is with back feeding protection which avoids presenting an AC voltage on the AC input terminal in Invert mode.
After the cause for fault is cleared, the inverter has to be reset to resume working.

2.5.6 LED Indicator



SHORE POWER ON	GREEN LED lighting on “Line Mode”
INVERTER ON	GREEN LED lighting on “Inv Mode”
FAST CHARGE	Yellow LED lighting on “Fast CHG”
FLOAT CHARGE	GREEN LED lighting on “Float CHG”
OVER TEMP TRIP	RED LED lighting on “Over Temp”
OVER LOAD TRIP	RED LED lighting on “Over Load”
POWER SAVER ON	GREEN LED lighting on “Power Saver on”

Please refer to ‘Indicator and Buzzer’ for the detailed information.

2.5.7 LCD Remote Control

Apart from the switch panel on the front of the inverter, an extra LCD remote control panel connected to the RJ45 port at the DC side of the inverter through a standard CAT-7 cable can also control the operation of the inverter remotely.
If an extra LCD remote control panel is connected to the inverter via “remote control port”, together with the power switch panel on the inverter case, the two panels will be connected and operated in parallel.

Whichever first switches from “Unit 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 suggested length between the switch panel and inverter is 10 meters.

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

LCD remote control panel(optional).

Note:
When the inverter is in Battery Priority mode, “AC: abnormal” will also be displayed when the inverter finishes a complete charging circle and switches to inverter mode.
“AC: abnormal” only means the inverter doesn’t accept AC input or there is no AC input, it doesn’t mean the inverter is abnormal.
In AC mode, the LCD will not display the status of AC load.

2.5.8 Audible Alarm

The inverter also gives audible alarms when the following situations occur.

Battery Voltage Low	Inverter green LED Lighting, and the buzzer beep 0.5s every 5s.
Battery Voltage High	Inverter green LED Lighting, and the buzzer beep 0.5s every 1s, and Fault after 60s.
Invert Mode Over-Load	(1)110%<load<125%(±10%), No audible alarm in 14 minutes, Beeps 0.5s every 1s in 15th minute and Fault after 15 minutes; (2)125% <load<150%(±10%), Beeps 0.5s every 1s and Fault after 60s; (3)Load>150%(±10%), Beeps 0.5s every 1s and Fault after 20s;
Over Temperature	Heat sink temp. ≥105ºC(221℉), Over temp red LED Lighting, beeps 0.5s every 1s;

2.5.9 FAN Operation

For Sigineer Power 1500W-6000W models, there is one multiple controlled DC fan.
The DC fan is designed to operate according to the following logic:

Condition	Enter Condition	Leave condition	Speed
HEAT SINK TEMPERATURE	T ≤ 60℃(140℉)	T > 65℃(149℉)	OFF
	65℃(149℉)≤ T < 85 ℃(185℉)	T ≤ 60℃(140℉) or T ≥ 85℃(185℉)	50%
	T > 85℃(185℉)	T ≤ 80℃(176℉)	100%
CHARGER CURRENT	I ≤ 15%	I ≥ 20%	OFF
	20%< I ≤ 50%Max	I≤ 15% or I > 50%Max	50%
	I > 50%Max	I ≤ 40%Max	100%
LOAD Percentage (INV MODE)	Load < 30%	Load ≥ 30%	OFF
	30% ≤ Load < 50%	Load ≤ 20% or 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.
Fan noise level <60db at a distance of 1m.
The transformer is rated at 180 degrees Celsius, special attention should be paid to the hot inverter box around it. Don't touch it.

2.5.10 DIP Switches

On the DC end of inverter, there are five DIP switches which enable users to customize the performance of the device.

Switch #	Switch Function	Position: 0	Position: 1
SW1	Low Battery Trip Point	10/20/40VDC	10.5/21/42VDC
SW2(240Vac)	AC Input Range	176-242Vac±4%	160-264Vac(40Hz+)±4%
SW2(120Vac)	AC Input Range	100-135Vac±4%	90-135Vac(40Hz+)±4%
SW3	Power Save Override ON/OFF	Inverter Off	Power Saver On(3 sec)
SW4	Frequency Switch	50Hz	60Hz
SW5	Battery/AC Priority	AC Priority	Battery Priority

SW1:Low Battery Trip Point
Deep discharge of the lead acid battery leads to high losses in capacity and early aging. In different applications a different low voltage disconnection level is preferred. For example, for solar applications, user may intend to have less DOD to prolong the battery life cycle. While for mobile applications users may intend to have more DOD to reduce battery capacity and on board weight.
For 12VDC models, the inverter Low Battery Trip Point is selectable at 10.0/10.5VDC.
For 24VDC models, the inverter Low Battery Trip Point is selectable at 20/21VDC.
For 48VDC models, the inverter Low Battery Trip Point is selectable at 40/42VDC.

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 176-242VAC for 120/240Vac split phase models (100-135V for 120Vac models) 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 160-264VAC for 120/240Vac split phase models (90-135V for 120Vac models), this helps to power loads with the most AC input power without frequent switches to the battery bank.
In order to make the inverter accept dirty power from a generator, when the SW2 is switched to position "1", the inverter will bypass an AC input with a wider voltage and frequency (40Hz plus for 50Hz/60Hz). Accordingly, the AC charger will also work in a wider voltage and frequency range (43Hz plus for 50Hz/60Hz).
This will avoid frequent switches between battery and generator. But some sensitive loads will suffer from the low quality power.
The pros and cons should be clearly realized.

SW3: Power Save Override ON/OFF

Under the Battery Priority Mode (SW5 in position "1"), the inverter can be switched between two modes: Power Saver Mode (SW3 in position "1") and Unit Off Charging Mode (SW3 in position "0"). The power Switch should be in "Power saver on" position all the time for using these functions.
In Power Saver Mode, the inverter is initially in standby mode and sends a pulse to detect the presence of a load every 3 seconds. Each pulse lasts for 250ms. The inverter will remain in standby mode until a load has been detected. Then it will wake up from standby mode and start to invert electricity from the battery bank to supply the load. As this function is under Battery Priority, the inverter will always prefer to invert electricity from battery first even there is a qualified AC input present. Only when the battery voltage is lower than the low voltage alarm point, will the inverter switch to AC input power to charge the battery and supply the load at the same time.
This Power Saver Mode can be changed to Unit Off Charging mode via SW3 by switching it to "0" position (SW5 still in "1").
"Unit Off Charging" will enable the inverter charger to charge batteries as much as possible while without discharging them.
In "Unit Off Charging" mode, the inverter will stay in standby mode without sensing loads. It won't output any power even if a load is turned on, and only stay idle in this mode when there is no AC input.
When a qualified AC input is present, it will start charging the battery and transfer power to loads.
This feature is ideally suitable for applications where energy conservation for batteries is required.
Charging will be activated once qualified AC exists, while discharging is disabled.
The inverter only consumes as little as 3 watts in "Unit Off Charging" mode.

SW4: Output Frequency

The output frequency of the inverter can be set at either 50Hz or 60Hz by SW4 which make the inverter charger an international models for most electricity systems.

SW5: AC/Battery Priority

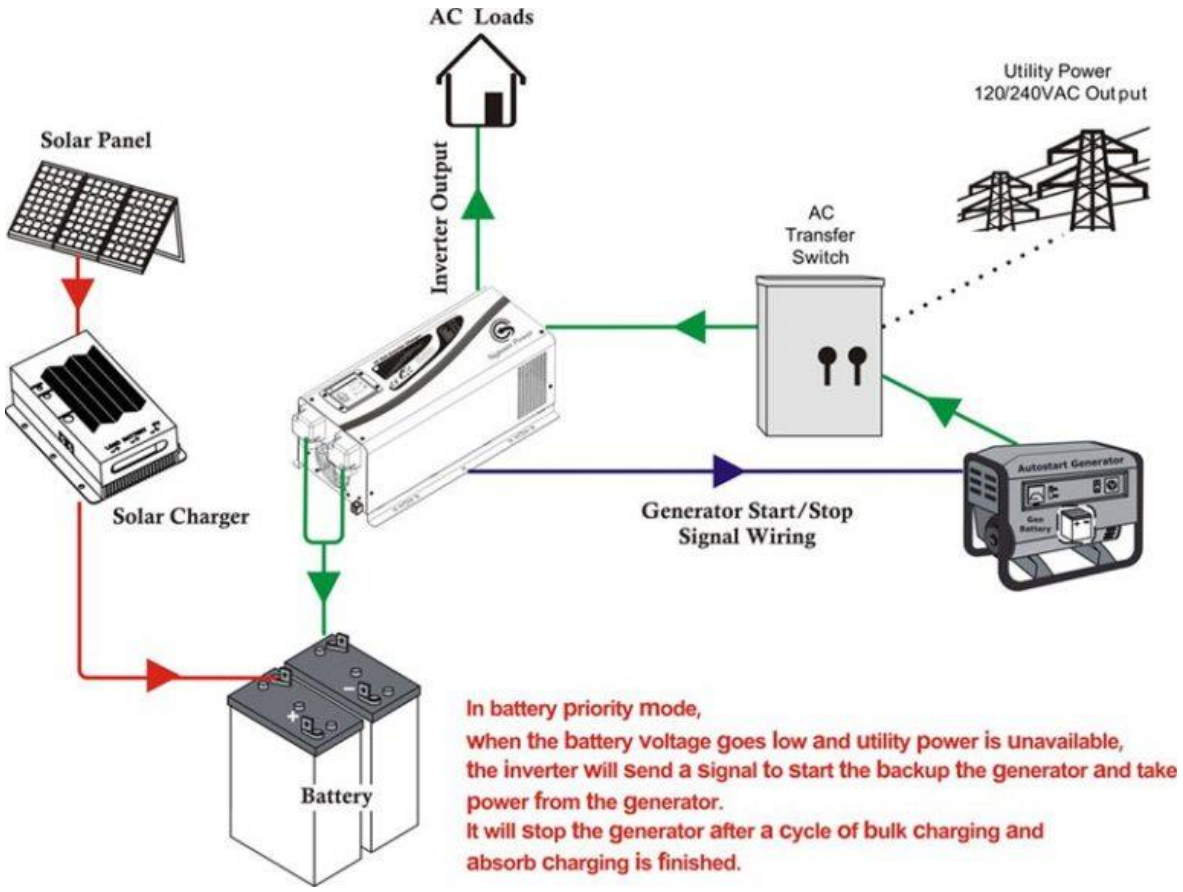
The Sigineer Power inverter chargers are designed with AC/Battery priority switch (DIP switch #5).
Switch the battery priority selector to Position "0" for AC priority mode, Position"1" for battery priority mode. In AC priority mode, when AC input is present, the battery will be charged first, and the inverter will transfer the input AC to power the load. Only when the AC input is stable for a continuous period of 15 days will the inverter start a battery inverting cycle to protect the battery. After one normal charging cycle is completed, ac power bypass will be restored.
When you choose battery priority, the inverter will invert from battery despite the AC input.
When the battery voltage reaches the low voltage alarm point higher than "**Low Battery Trip Point**" (the gap between low battery alarm and cut off is 0.5Vdc for 12Vdc, 1Vdc for 24Vdc, 2V for 48Vdc), the inverter will transfer to AC input, charge battery, and switch back to battery when the battery is fully charged. This function is mainly for wind/solar systems using utility power or generator as back up.

The AC/Battery Priority function can be activated by sliding the switch even when the inverter is in operation.

Note: In battery priority mode, when qualified AC inputs for the first time and the battery voltage is below 12.5Vdc (12.5Vdc for 12Vdc, 25Vdc for 24Vdc, 51Vdc for 48Vdc), the inverter will first carry out a cycle of bulk charging and absorb charging, the inverter will not go into float charging mode. Choosing the battery type selector to "0" will disable the built-in battery charger while still allow transfer through. When battery charger is disabled, if the battery is charged by external DC power to 13.5Vdc (13.5Vdc for 12Vdc, 27Vdc for 24Vdc, 54Vdc for 48Vdc), the inverter will go to battery priority mode again.

2.5.11 Auto Generator Start

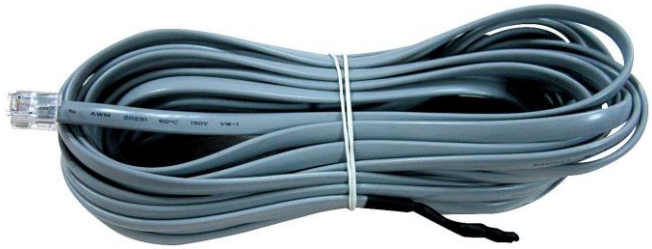
The inverter can start up generator when battery voltage goes low.
When the inverter goes to low battery alarm, it will send a signal to start a generator and turn the generator off after battery charging is finished.
The auto gen start feature will only work with generators which have automatic starting capability. The generator must have start and stop controls [i.e., an electric starter and electric choke (for gasoline units)], and the safety sensors to be able to start and stop automatically.
There is an open/close relay (constant open) that will close and short circuit the positive and negative cables from a generator start control. The input DC voltage can vary, but the max current the relay can carry is 16Amp.
The Auto Generator Start terminal pins are not polarized.
In addition, these two pins can also be used as dry contacts to send out "Low Battery Voltage" signal to an external alarm device.
This AGS relay can also carry AC voltage within its capacity.
This inverter will skip the float charging when it is set at battery priority mode, so that the generator will no longer be kept running to maintain a small charge on the batteries.



2.5.12 Battery Temperature Sensing

Applying the proper charge voltage is critical for achieving optimum battery performance and longevity. The ideal charge voltage required by batteries changes with battery temperature.
The battery temperature sensor allows the charge controller to continuously adjust charge voltage based on actual battery temperature.
Temperature compensation of charge voltage assures that the battery receives the proper charge voltage as battery temperature varies.
The entire line are compatible with Battery Temperature Sensing for increased charging precision.
It sends precise information to the charger, which automatically adjusts voltage to help ensure full battery charge depending on the ambient temperature of your battery installation.
When the battery tempreture is over 40℃(104℉), it will reduce the charging voltage by 0.1Vdc with every degree of temperature rise.
We recommend that you install Battery Temperature Sensors on all banks to protect your batteries and to provide optimal charging of each bank.
The battery temperature sensor mounts on the side of a battery or any other location where the precise temperature of battery can be detected such as battery mounting racks.
The following table describes approximately how much the voltage may vary depending on the temperature of the batteries.

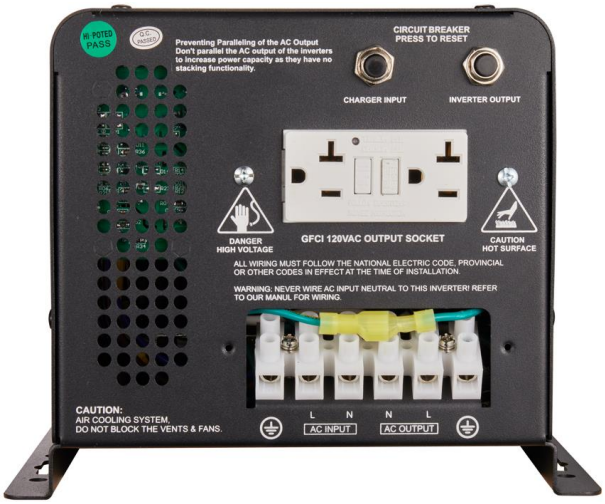
Inverter Condition	Temperature on BTS	Charger Operation
Charger Mode	BTS ≥ 50℃(122℉)	Automatically turns off charger
	BTS ≤ 40℃(104℉)	Automatically turns on charger
Inverter Mode	40℃(104℉) ≤ BTS ≤ 50℃(122℉)	Increases the low voltage shut down point by 0.5Vdc
	BTS ≥ 50℃(122℉)	Over Temp Fault

A Battery Temperature Sensor has been provided as an optional accessory, it should be bought separately. It comes with 32.8’/10m cable.	

Important: If the battery temperature is allowed to fall to extremely cold temperatures, the inverter with a BTS may not be able to properly recharge cold batteries due to maximum voltage limits of the inverter. Ensure the batteries are protected from extreme temperatures.
For more detailed technical information, please contact us at info@sigineer.com .

2.5.13 GFCI Outlet

For Sigineer Power 1500W to 6000W 120Vac single phase and 120/240Vac split phase models, there is a GFCI (ground-fault circuit interrupter) outlet in the vicinity of the AC terminal block.

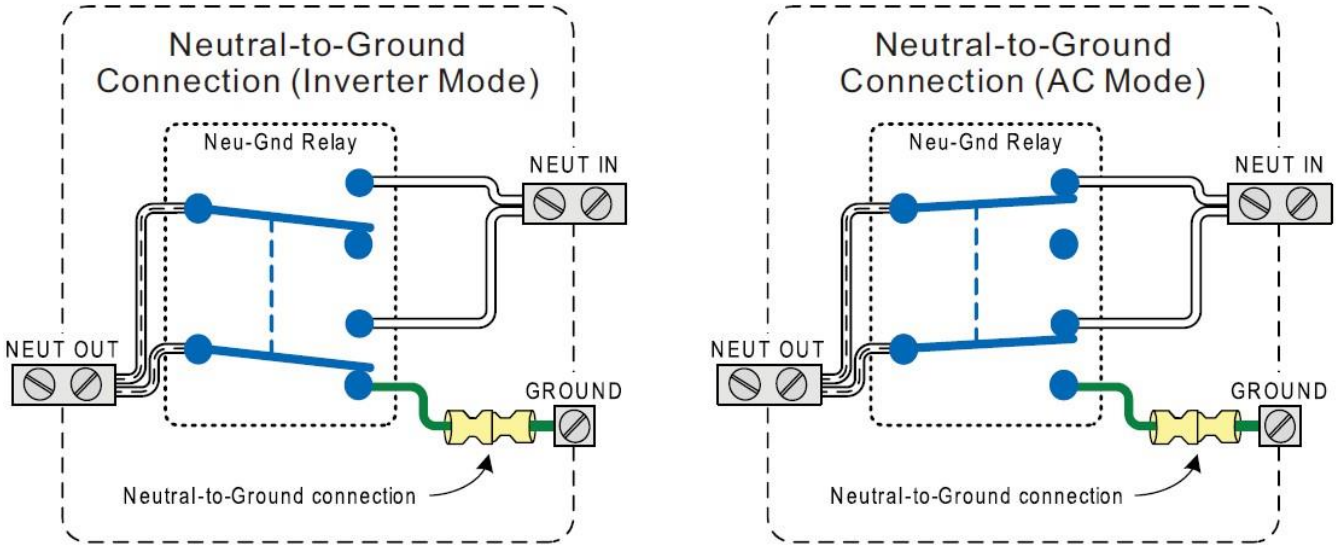


The GFCI is an electrical safety device that quickly breaks an electrical circuit with leakage current to ground. It is to protect equipment and to reduce the risk of serious harm from an ongoing electric shock.
This GFCI is wired in parallel with the AC terminal block and they can output a maximum of nominal power.
For the 120/240Vac split phase models, the GFCI is installed on the Hot 1 line.
The GFCI amperage rating is 20A for all models.
The GFCI has no overload protection.

2.5.14 Automatic Neutral-to-Ground Bonding

The automatic neutral-to-ground bonding feature uses an internal relay that automatically connects the AC neutral output to the vehicle/boat's safety ground ("bonding" it) in Inverter Mode and disconnects it ("un-bonding" it) when they have connected to a qualified external AC source.

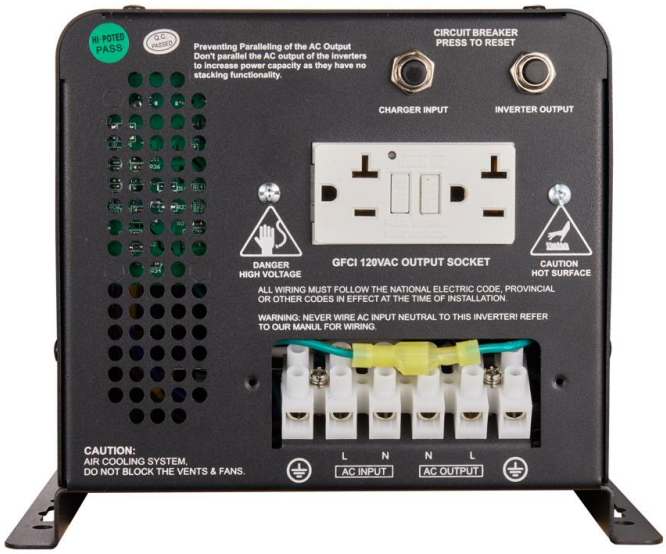
The inverters with model # of APC3012NC/APC3024NC/APC3048NC are equipped with automatic neutral-to-ground switching.



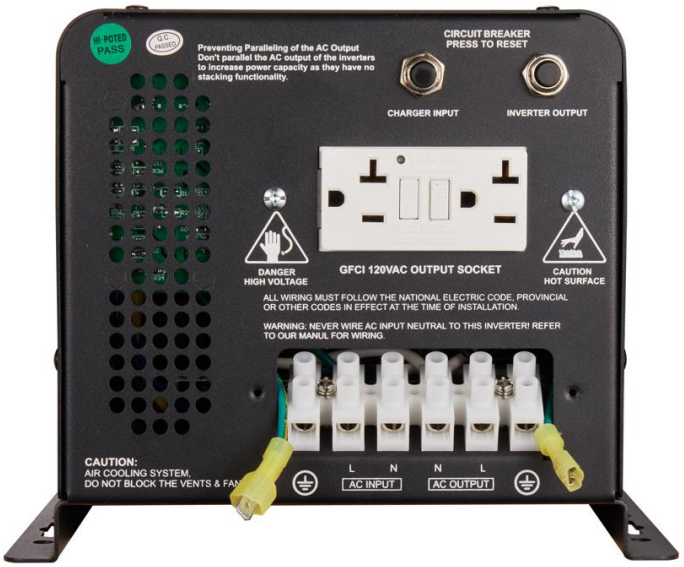
This design avoids two neutral-to-ground connections from existing at the same time, thereby preventing an electrical shock hazard between the vehicle/boat's neutral and the external AC source's neutral.

Disabling the Automatic Neutral-to-Ground Connection
In some installations, this feature must be disabled.

To accommodate these situations, the automatic Neutral-to-Ground Connection system can be deactivated, so it will not bond the neutral in any mode of operation.
If you are not sure whether you must disable this feature, please refer to your local code requirements or contact us at info@sigineer.com for details.
There is a section of green wire with the insulated connector at the left side of the AC terminal block. This insulated connector connects the neutral and ground inside the inverter while inverting.
Pull the two ends of the insulated connector apart to separate the green wire; this will prevent the neutral and ground from connecting inside this inverter.
If possible, use electrical tape to insulate the disconnected ends, move the two ends away from each other and push back out of the way. Typically when connecting to a house panel (after disconnecting city power from it) , you would disconnect this connection as a house panel already has the neutral to ground bond. Typically in a standalone system or in a vehicle, you would want to keep this connection.



Automatic Neutral-Ground Bonding Activated

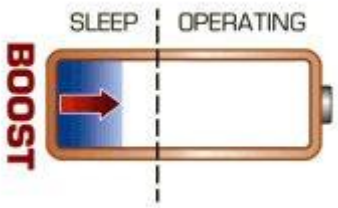


Automatic Neutral-Ground Bonding Deactivated

NOTE: The PSW71512NC and PSW1524NC inverter chargers are built with automatic neutral to ground bonding without cable connectors on the AC terminal block, this feature can't be deactivated.

2.5.15 Lithium Battery Wakeup

Lithium-ion battery will enter sleep mode when it is overdischarged. When the protection circuit is triggered, the voltage could drop to 0Vdc.
Such batteries are assumed useless to most competing inverter chargers which require a minimal DC voltage to power on.
This makes it possible for a charger to charge ordinarily.



The whole line of Sigineer Power inverters will use AC input power to wake up overdischarged lithium battery by a boost circuitry.
When they detect a 0V battery, the charger will output a small current to awaken the lithium batteries.

Once the lithium battery voltage is charged back to normal or over nomnal voltage, the charger will proceed with the preset charging settings.

2.5.16 Other Features

Low Battery Voltage Recovery Start

After low battery voltage shut off (10V for 12V model or 20V for 24V model or 40V for 48V model), the inverter is able to restore to work after the battery voltage recovers to 13.5V/27V/54V(with power switch still in "On" position). This function helps to save the users extra labor to reactivate the inverter when the low battery voltage returns to acceptable range in renewable energy systems.

For the models with Tesla model S module algorithms in position 9, the recover voltage is 23.5V for 24V, 47V for 48V models.

WARNING

Never leave the loads unattended, some loads (like a Heater) may cause accidents in such cases.

It is better to shut everything off after low voltage trip than to leave your load in the risk of fire. Nobody wants to return home, finding house surrounded by fire trucks and naughty neighborhood kids toasting hot dogs against his house.

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 withstand corrosion from the salty air, they are not splash proof.

3 Installation

3.1 Location

Follow all the local regulations to install the inverter.

Please install the equipment in a location of Dry, Clean, Cool with good ventilation.

Working temperature: －10℃ to 40℃(14℉to 104℉)

Storage temperature: －20℃ to 70℃(-4℉to 158℉)

Relative Humidity: 0% to 95%，non-condensing

Cooling: Forced air

Warning! Operation in a condensing environment will invalid warranty.

3.2 DC Wiring Recommendation

The battery terminal bolt size is M8.

It is suggested the battery bank be kept as close as possible to the inverter. The following table is a suggested wiring option for DC cable with length from 1 meter to 5 meters.

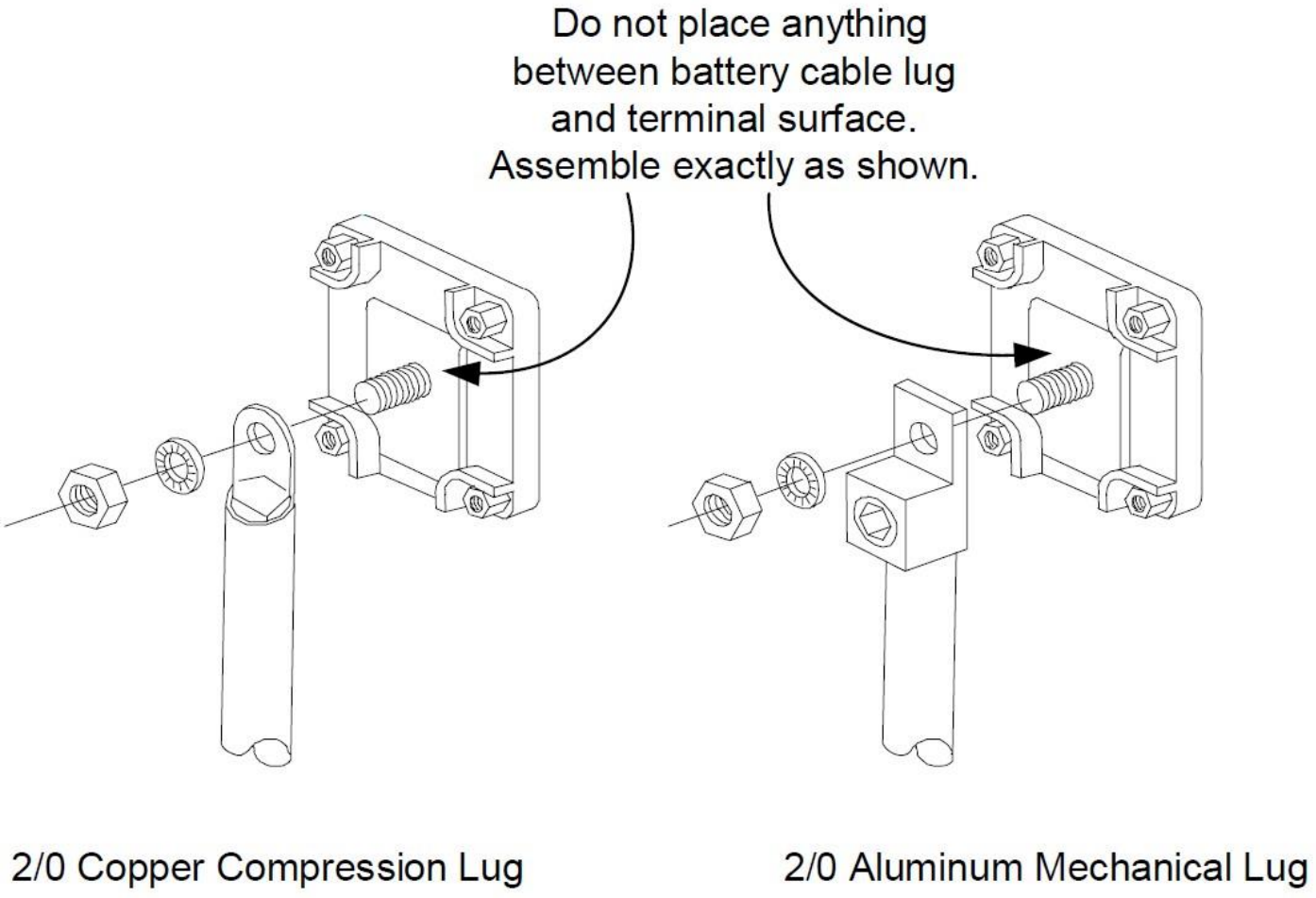
Model Watt	Battery Voltage	Minimum Wire Gage		Model Watt	Battery Voltage	Minimum Wire Gage	
		0~1.0m	1.0~5.0m			0~1.0m	1.0~5.0m
1.5KW	12 Vdc	30mm²	40mm²	4KW	12 Vdc	120mm²	150mm²
1.5KW	24 Vdc	15mm²	20mm²	4KW	24 Vdc	60mm²	75mm²

3KW	12 Vdc	90mm²	120mm²	4KW	48 Vdc	30mm²	45mm²
3KW	24 Vdc	45mm²	60mm²	5KW	24 Vdc	75mm²	95mm²
3KW	48 Vdc	25mm²	30mm²	5KW	48 Vdc	40mm²	50mm²
6KW	24 Vdc	90mm²	120mm²	6KW	48 Vdc	45mm²	60mm²

Please follow the above minimum wire size requirement.
One cable is always best, but if there is a problem obtaining for example 100mm²cable, use 2*50mm²or 3*35mm² instead, 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.

Battery cables must have crimped (or preferably, soldered and crimped) copper compression lugs unless aluminum mechanical lugs are used. Soldered connections alone are not acceptable. High quality, UL-listed battery cables are available .These cables are color-coded with pressure crimped, sealed ring terminals.

Battery terminal must be clean to reduce the resistance between the DC terminal and cable connection. A buildup of dirt or oxidation may eventually lead to the cable terminal overheating during periods of high current draw. Use a stiff wire brush and remove all dirt and corrosion from the battery terminals and cables.



Reducing RF interference

To reduce the effect of radiated interference, twist the DC cables. To further reduce RF interference, shield the cables with sheathing /copper foil / braiding.

Taping battery cables together to reduce inductance

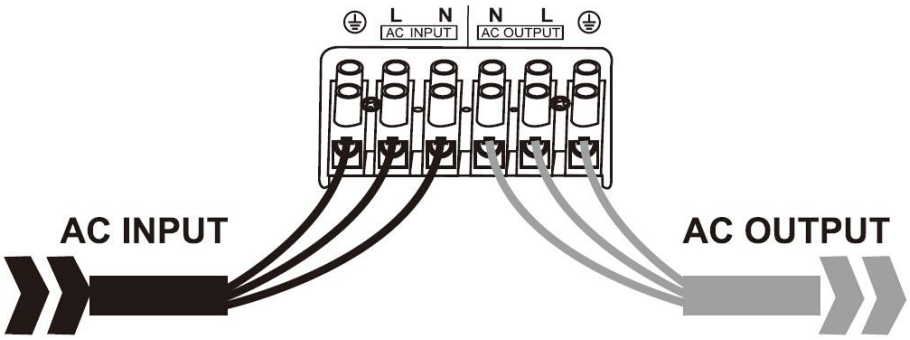
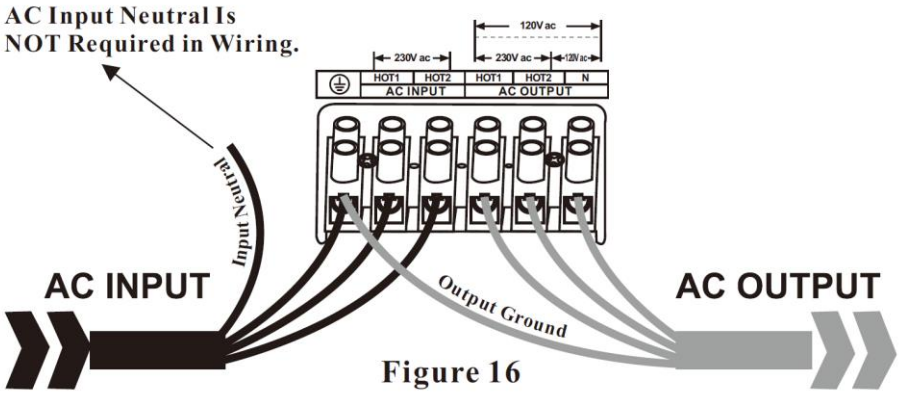
Do not keep the battery cables far apart. In case it is not convenient to twist the cables, keep them taped together to reduce their inductance. Reduced inductance of the battery cables helps to reduce induced voltages. This reduces ripple in the battery cables and improves performance and efficiency.

	The torque rating range for DC terminal is 12.5NM-20.5NM(9.25-15.19 pound-foot), and

WARNING	the suggested torque rating is 17NM(12.6 pound-foot). Over torquing may cause the bolt to break.
	Equipment Damage The inverter is not reverse polarity protected. Reversing the battery polarity on the DC input connections will cause permanent damage to the inverter which is not covered under warranty. Always check polarity before making connections to the inverter.
	The inverter contains capacitors that may produce a spark when first connected to battery. Do not mount in a confined a battery or gas compartment.
	Ensure the inverter is off before disconnecting the battery cables, and that AC power is disconnected from the inverter input.

3.3 AC Wiring Recommendation

We recommend using 10 to 5Awg wire to connect to the AC terminal block.
When in AC mode the AC input power will support both the loads and AC charger, a thicker wire gauge for AC Input is required. Please consult a qualified electrician about the specific wire gauge required in terms of wire material and inverter power.
There are 3 different ways of connecting to the terminal block depending on the model. Contact our tech support if you are not sure about how to wire any part of your inverter. Send email to info@sigineer.com.

Wiring Option 1 120V single phase Input: Hot line+Neutral+Ground Output: Hot line+Neutral+Ground For Model # PSW71512NC/PSW71524NC/APC3012NC/APC3024NC/APC3048NC/APC4012NC/APC4024NC/APC4048NC	 Figure 15
Wiring Option 2 120/240V split phase Input: Hot line+ Hot line +Ground Output: Hot line+ Hot line +Neutral For Model # APC3012D/APC3024D/APC3048D/APC4012D/APC4024D/APC4048D/APC6024D/APC6048D	 Figure 16

Wiring Option 3

120/240V split phase
Input: Hot line+ Hot line +Ground
Output: Hot line +Neutral

Remark: In this case, each output hotline can only carry a max of half the rated capacity.

For Model #
APC3012D/APC3024D/APC3048D/
APC4012D/APC4024D/APC4048D/
APC6024D/APC6048D

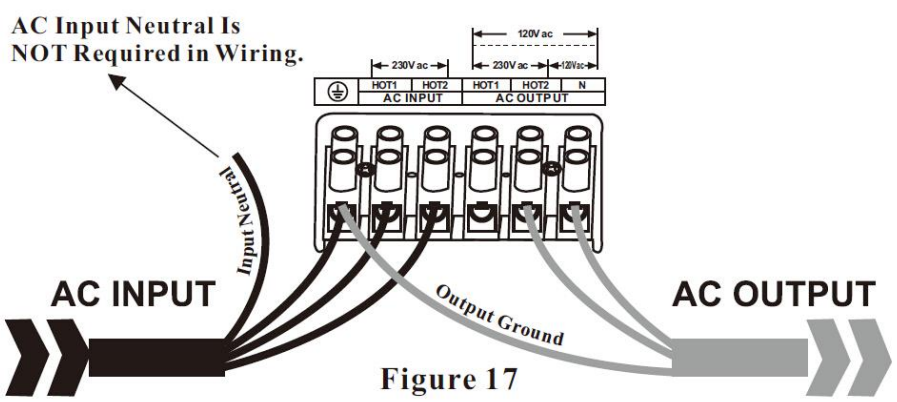


Figure 17

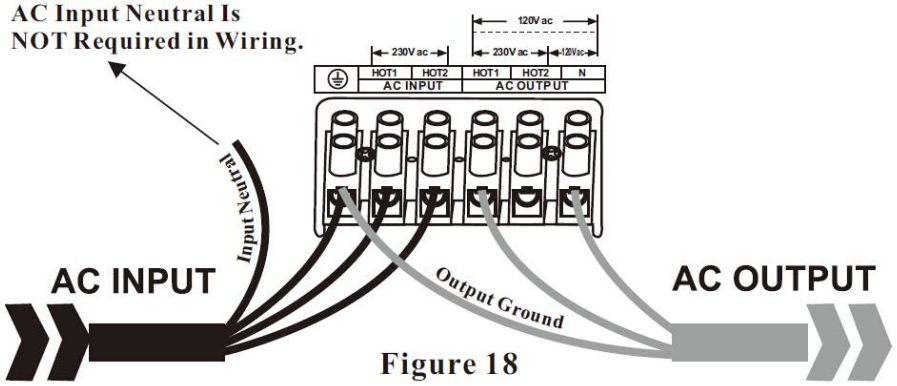


Figure 18

Caution:

Wiring Option 2 and Wiring Option 3 are only allowed for split phase models.
Please wire all the other models according to Wiring Option 1.

WARNING	**For split phase models, AC input neutral is not required in wiring. Never Connect Input Neutral to Ground or to Output Neutral. Otherwise damage will occur which is not covered under warranty.** **The output voltage of this unit must never be connected in its input AC terminal, otherwise, overload or damage may occur.** **Always switch on the inverter before plugging in any appliance.** **Damages caused by AC wiring mistakes are not covered under warranty.**

Note:
As the two split phase hot lines are 180 degrees out of phase with each other, the inverter is only able to output full power at 240Vac.
Users can only get 50% nominal power from each one of the 120Vac hot lines of the split phase inverter.
The biggest 120V single load the inverter can drive is 50% of its nominal power.

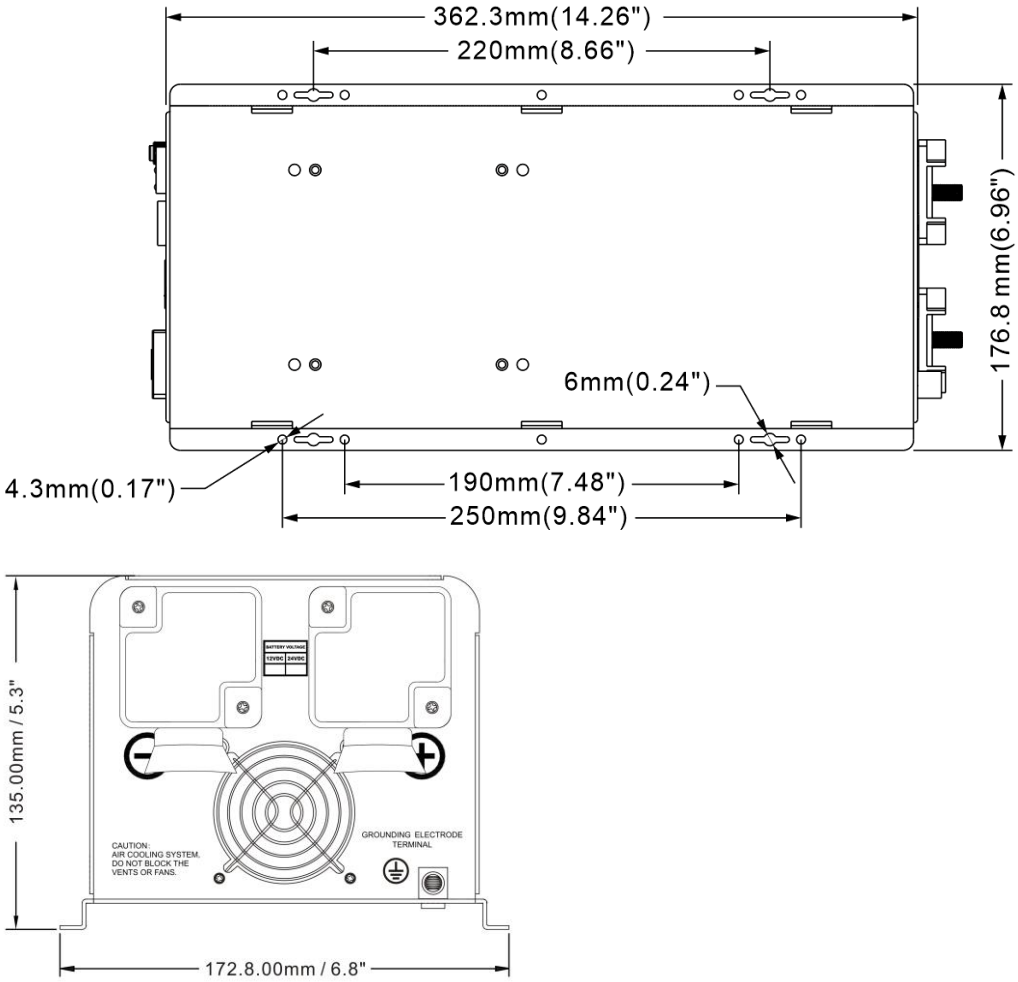
Preventing Paralleling of the AC Output

The AC output of the unit should never be connected to the utility power / generator.
Such a connection may result in parallel operation of the different power sources and AC power from the utility / generator will be fed back into the unit which will instantly damage the inverter and may also pose a fire and safety hazard.

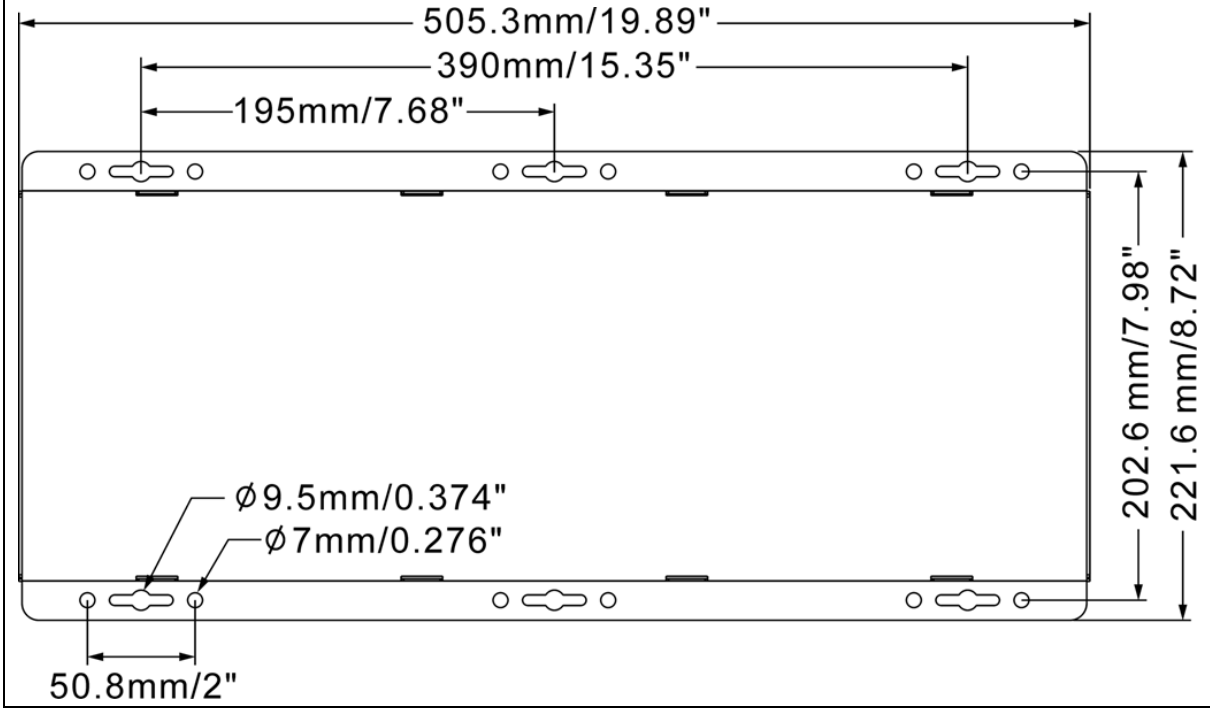
3.4 Grounding

Connect an AWG 8 gauge or greater copper wire between the grounding terminal on the inverter and the earth grounding system or the vehicle chassis.

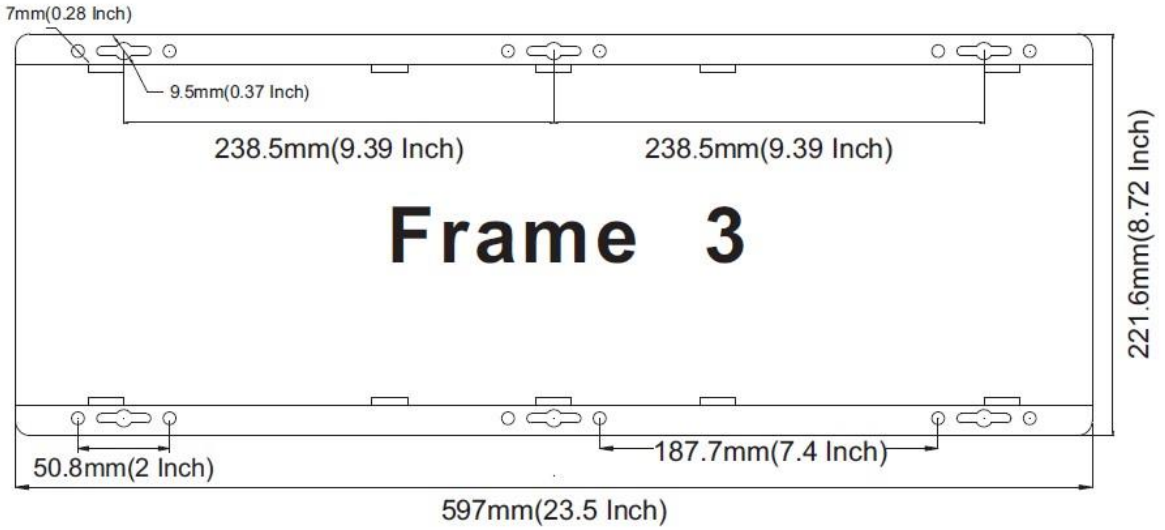
3.5 Mounting Flange



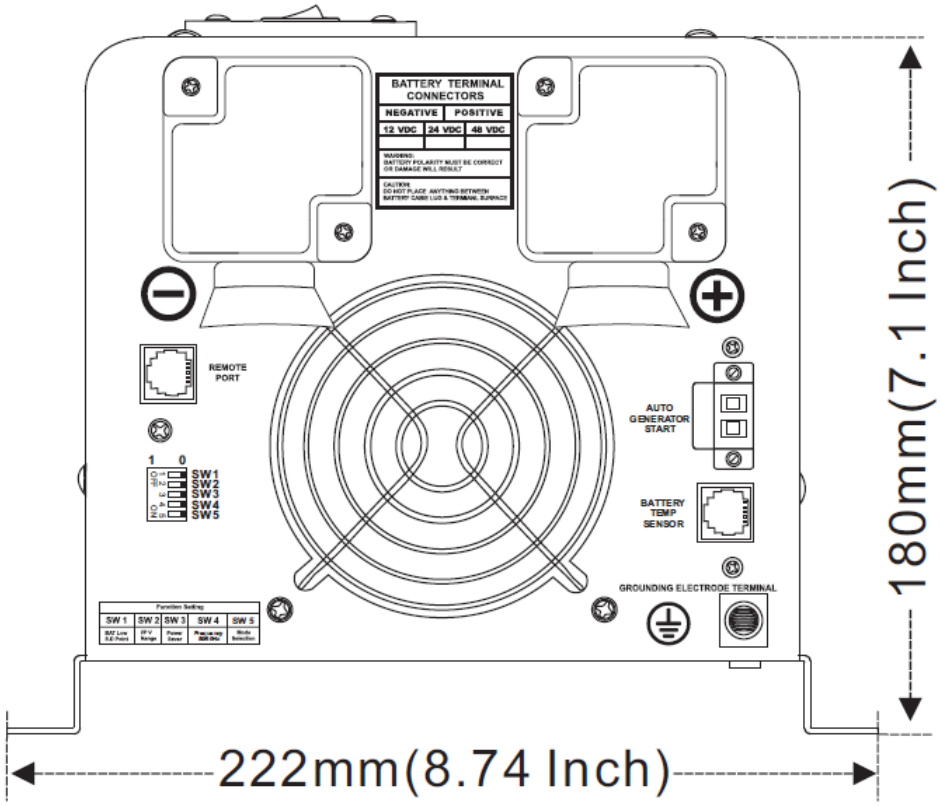
Model #:
PSW71512NC
PSW71524NC



Model #:
APC3012NC
APC3024NC
APC3048NC
APC4024NC
APC4048NC
APC3012D/
APC3024D/
APC3048D/
APC4024D
APC4048D



Model #:
APC4012NC
APC4012D/
APC6024D/
APC6048D



Side View
Model #:
APC3012NC
APC3024NC
APC3048NC
APC4012NC
APC4024NC
APC4048NC
APC3012D/
APC3024D/
APC3048D/
APC4012D/
APC4024D
APC4048D
APC6024D/
APC6048D

4 Maintenance & Troubleshooting

This troubleshooting guide contains information about how to troubleshoot possible error conditions while using the SIGINEER POWER Pure Sine Wave 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 Switch			
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

Symptom	Possible Cause(s)	Recommended Solution(s)
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.
Inverter overload indicator on	Excessive AC output load or AC output short Defective inverter	Check AC output loads and wiring
Inverter high temperature indicator on	Excessive ambient temperature or AC output load	Check AC output loads, increase ventilation, derate the inverter if ambient temperature is excessive.
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*	Applying 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 frequency from 20KHz to, say, maybe 15KHz (it varies according to different loads). This way, the frequency of noise falls exactly into the range (200Hz-20KHz) that human ear can sense.

The most common load of such kind is hair drier.
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.
This noise may also be generated the moment a load is detected in the power saver mode.
Reducing the load power or using an inverter with bigger capacity will normally solve this problem.
The noise won't do any harm to the inverter or the loads.

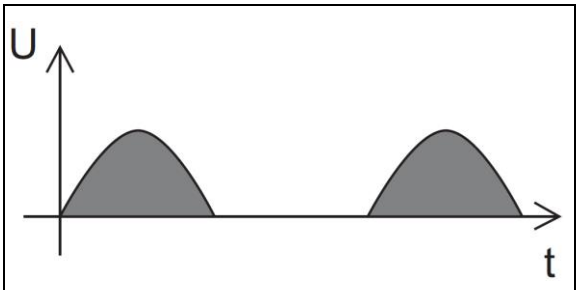


Figure 1
Half Cycle Load Waveform

5 Warranty

We warrant this product against defects in materials and workmanship for a period of one year from the date of purchase and will repair or replace any defective Sigineer Power Inverter when directly returned, postage prepaid, to manufacturer. This warranty will be considered void if the unit has suffered any obvious physical damage or alteration either internally or externally and does not cover damage arising from improper use such as plugging the unit into an unsuitable power sources, attempting to operate products with excessive power consumption requirements, reverse polarity, or use in unsuitable climates.
WARRANTY DOES NOT INCLUDE LABOR, TRAVEL CHARGES, OR ANY OTHER COSTS INCURRED FOR REPAIR, REMOVAL, INSTALLATION, SERVICING, DIAGNOSING OR HANDLING OF EITHER DEFECTIVE PARTS OR REPLACEMENT PARTS. THE WARRANTOR ASSUMES NO LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.
LOSS OR DAMAGE: Loss or damage in transit is the responsibility of the carrier. Any claim should be filed with the delivering transport company. Invoice, Bill of Lading and Delivery receipt with damage noted therein must accompany any claims for freight damage. Claims for shortage and lost shipments must be made in writing to the shipper within 3 days of the receipt of shipment. Claims not reported within this time frame will not be honored.

This warranty does not apply to and we will not be responsible for any defect in or damage to:
a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment; violations of the warnings in the manual will invalid the warranty.
b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the product specifications including high input voltage from generators and lightning strikes;
c) the product if repairs have been done to it other than by us or its authorized service centers;

Appendix 1 : Sigineer Power 1500W Inverter/Charger Spec Sheet

Electrical Specifications			
	Model #	PSW71512NC	PSW71524NC
Inverter Output	Continuous Output Power	1500W	1500W
	Surge Rating(20s)	4500W	4500W
	Output Waveform	Pure Sine wave/Same as input(Bypass mode)	
	Nominal Efficiency	90%(Peak)	
	Line Mode Efficiency	>95%	
	Power Factor	0.9-1.0	
	Nominal Output Voltage RMS	120Vac	
	Output Voltage Regulation	±5% RMS	
	Output Frequency	50/60Hz ± 0.3Hz	
	Short Circuit Protection	Yes, Current Limit Function (Fault after 1sec)	
	Typical transfer Time	10ms(Max)	
	THD	Pure Sine, less than 5% THD Typical	
DC Input	Nominal Input Voltage	12Vdc	24Vdc
	Minimum Start Voltage	0Vdc	0Vdc
	Low Battery Alarm	10.5/11.0/12/12.5Vdc	21/22/24/25Vdc
	Low Battery Trip	10/10.5/11.5/12 Vdc	20/21/23/24Vdc
	High Voltage Alarm & Fault	16.0Vdc	32Vdc
	High DC Input Recovery	15.5Vdc	31Vdc
	Low Battery Voltage Recover	13.0Vdc	26Vdc
	Idle Consumption-Search Mode	< 25 W when Power Saver On	
AC Charge	Input Voltage Range	Narrow: 100~135VAC/ 194-243Vac	
		Wide: 90~135VAC / 164V-263Vac	
	Input Frequency Range	Narrow: 47-55±0.3Hz for 50Hz, 57-65±0.3Hz for 60Hz	
		Wide:43±0.3Hz plus for 50Hz/60Hz	
	Output Voltage	Depends on battery type	
	Charger Breaker Rating(120Vac)	10A	10A
	Max Charge Rate	55A	25A
	Over Charge Protection Shutdown	15.7V for 12Vdc, 31.4V for 24Vdc	
	Charge Voltage for 12V Models	Boost Charge(C.V)	Float Charge
	Gel U.S.A	1	13.7
	A.G.M 1	14.1	13.4
	Lithium Ion ($LiFeP0_4$)	14.6	13.7
	Sealed Lead Acid	14.4	13.6
	Gel Euro	14.4	13.8
	Open Lead Acid	14.8	13.3
	Calcium	15.1	13.6

	De-sulphation	15.5 for 4hrs	
	Note	For PSW71524NC, the value is 2 times of above figures.	
	Input Voltage Waveform	Sine wave (Grid or Generator)	
	Nominal Voltage	120Vac/230Vac	
	Low Voltage Trip	80Vac/154Vac±4%	
	Low Voltage re engage	90Vac/164Vac±4%	
	High Voltage Trip	140Vac/253Vac±4%	
	High Voltage re engage	135Vac/243Vac±4%	
	Max Input AC Voltage	150Vac/270VAC	
	Nominal Input Frequency	50Hz or 60Hz (Auto detect)	
	Low Frequency Trip	Narrow: 47±0.3Hz for 50Hz, 57±0.3Hz for 60Hz	
		Wide:40±0.3Hz for 50Hz/60Hz	
	Low Frequency re-engage	Narrow: 48±0.3Hz for 50Hz, 58±0.3Hz for 60Hz	
		Wide:45±0.3Hz for 50Hz/60Hz	
	High Frequency Trip	Narrow: 55±0.3Hz for 50Hz, 65±0.3Hz for 60Hz	
		Wide: No up limit for 50Hz/60Hz	
	High Frequency re-engage	Narrow: 54±0.3Hz for 50Hz, 64±0.3Hz for 60Hz	
		Wide: No up limit for 50Hz/60Hz	
Mechanical Specification	Mounting	Wall mount	
	Inverter Dimensions(L*W*H)	362x173x135mm	362x173x135mm
		14.3x6.8x5.3"	14.3x6.8x5.3"
	Inverter Weight	12.5KG/27.3lb	12.5KG/27.3lb
	Shipping Dimensions(L*W*H)	475x230x205mm	475x230x205mm
		18.7x9x8"	18.7x9x8"
	Shipping Weight	14KG/31lb	14KG/31lb
	Display	Status LED	
	Standard Warranty	1 Year	

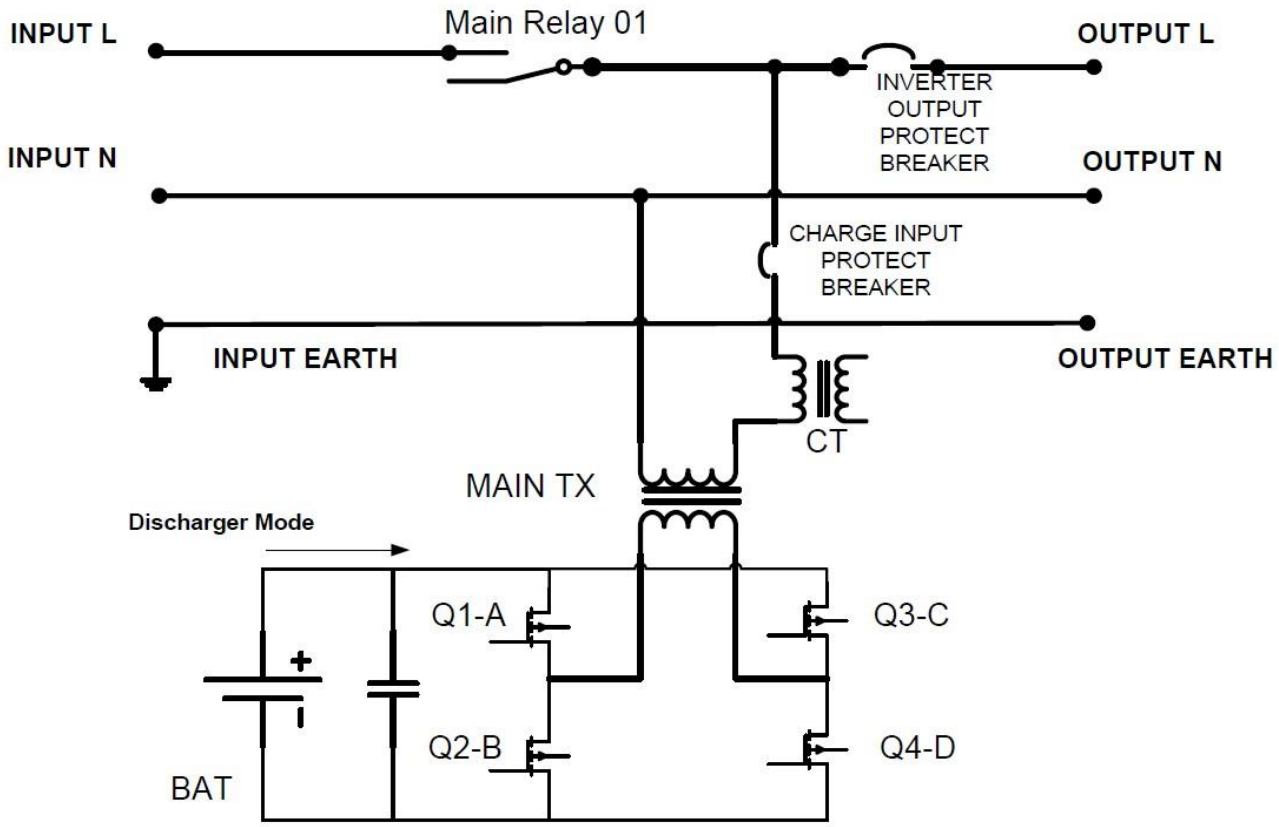
Appendix 2 : Sigineer Power 2000W-6000W Inverter/Charger Spec Sheet

Electrical Specifications						
	Model	2KW	3KW	4KW	5KW	6KW
Inverter Output	Continuous Output Power	2000W	3000W	4000W	5000W	6000W
	Surge Rating(20s)	6000W	9000W	12000W	15000W	18000W
	Capable of Starting Electric Motor	2HP	3HP	4HP	5HP	6HP
	Output Waveform	Pure Sine wave/Same as input(Bypass mode)				
	Peak Efficiency	88%				
	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	50/60Hz ± 0.3Hz				
	Short Circuit Protection	Yes, Current Limit Function (Fault after 1sec)				
	Typical transfer Time	10ms(Max)				
	THD	< 10%				
DC Input	Nominal Input Voltage	12.0Vdc				
		(*2 for 24Vdc, *4 for 48Vdc)				
	Minimum Start Voltage	10.0Vdc				
	Low Battery Alarm	10.5Vdc / 11.0Vdc				
	Low Battery Trip	10.0Vdc / 10.5Vdc				
	High Voltage Alarm & Fault	16.0Vdc				
	High DC Input Recovery	15.5Vdc				
	Low Battery voltage recover	13.0Vdc				
	Sleep Mode Threshold	> 25 W when Power Saver On				
Charge	Input Voltage Range	Narrow: 100~135VAC / 194~243VAC;				
		Wide: 90~135VAC / 164~260VAC;				
	Input Frequency Range	Narrow: 47-55±0.3Hz for 50Hz, 57-65±0.3Hz for 60Hz				
		Wide:43±0.3Hz plus for 50Hz/60Hz				
	Output Voltage	Depends on battery type				
	Charger Breaker Rating(230Vac)	10A	20A	20A	30A	30A
	Charger Breaker Rating(120Vac)	20A	30A	40A	N/A	N/A
	Max Charge Rate	See specific charge rates in “AC Charger” section				
	Over Charge Protection Shutdown	15.7V for 12Vdc (*2 for 24Vdc, *4 for 48Vdc)				
	Battery type	Fast Charge/ Float Charge				
	Gel U.S.A	14/13.7				
	A.G.M 1	14.1/13.4				
	A.G.M 2	14.6/13.7				
	Sealed Lead Acid	14.4/13.6				
	Gel Euro	14.413.8				

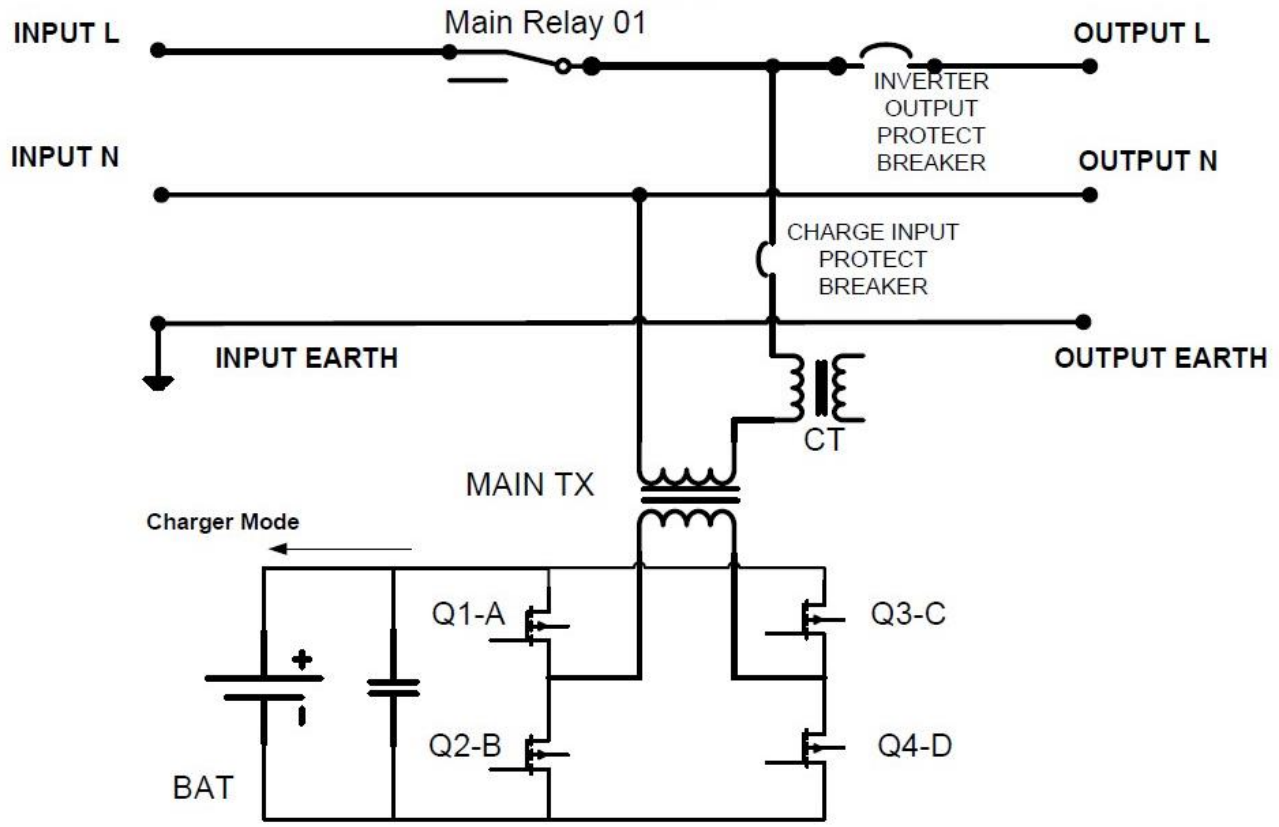
	Open Lead Acid	14.8/13.3				
	Calcium	15.1/13.6				
	De-sulphation	15.5 for 4hrs				
	Remote Control	Yes. Optional				
Bypass & Protection	Input Voltage Waveform	Sine wave (Grid or Generator)				
	Nominal Voltage	120Vac			240Vac	
	Low Voltage Trip	80V/90V±4%			184V/154V±4%	
	Low Voltage re engage	90V/100V±4%			194V/164V±4%	
	High Voltage Trip	140V±4%			253V±4%	
	High Voltage re engage	135V±4%			243V±4%	
	Max Input AC Voltage	150VAC			270VAC	
	Nominal Input Frequency	50Hz or 60Hz (Auto detect)				
	Low Frequency Trip	Narrow: 47±0.3Hz for 50Hz, 57±0.3Hz for 60Hz				
		Wide:40±0.3Hz for 50Hz/60Hz				
	Low Frequency Reengage	Narrow: 48±0.3Hz for 50Hz, 58±0.3Hz for 60Hz				
		Wide:45±0.3Hz for 50Hz/60Hz				
	High Frequency Trip	Narrow: 55±0.3Hz for 50Hz, 65±0.3Hz for 60Hz				
		Wide: No up limit for 50Hz/60Hz				
	High Frequency reengage	Narrow: 54±0.3Hz for 50Hz, 64±0.3Hz for 60Hz				
		Wide: No up limit for 50Hz/60Hz				
	Output Short circuit protection	Circuit breaker				
	Bypass breaker rating (230Vac)	20A	30A	30A	40A	40A
	Bypass breaker rating (120Vac)	30A	40A	50A	N/A	N/A
Mechanical Specification	Mounting	Wall/Ground mount				
	Inverter Dimensions(L*W*H)	505*218*179mm		597*218*179mm		
		19.7*8.5*7”		23.5*8.5*7”		
	Inverter Weight	20KG	24KG	32KG	32KG	35KG
		44.1 lbs	52.91 lbs	70.4lbs	70.4 lbs	77 lbs
	Shipping Dimensions(L*W*H)	700*360*350mm		800*360*350mm		
		27.3*14.25*13.75”		30.5*14.25*13.75”		
	Shipping Weight	22KG	26.4KG	35KG	35KG	38KG
		48.51 lbs	58 lbs	77 lbs	77 lbs	83.6 lbs
	Display	Status LEDs				
	Standard Warranty	1 Year				

Appendix 3: Circuitry Scheme

Circuitry scheme for Inverter Mode



Circuitry scheme for AC Mode



SAVE THIS MANUAL!

READ THIS MANUAL BEFORE INSTALLATION, IT CONTAINS IMPORTANT SAFETY, INSTALLATION AND OPERATING INSTRUCTIONS. KEEP IT IN A SAFE PLACE FOR FUTURE REFERENCE.

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