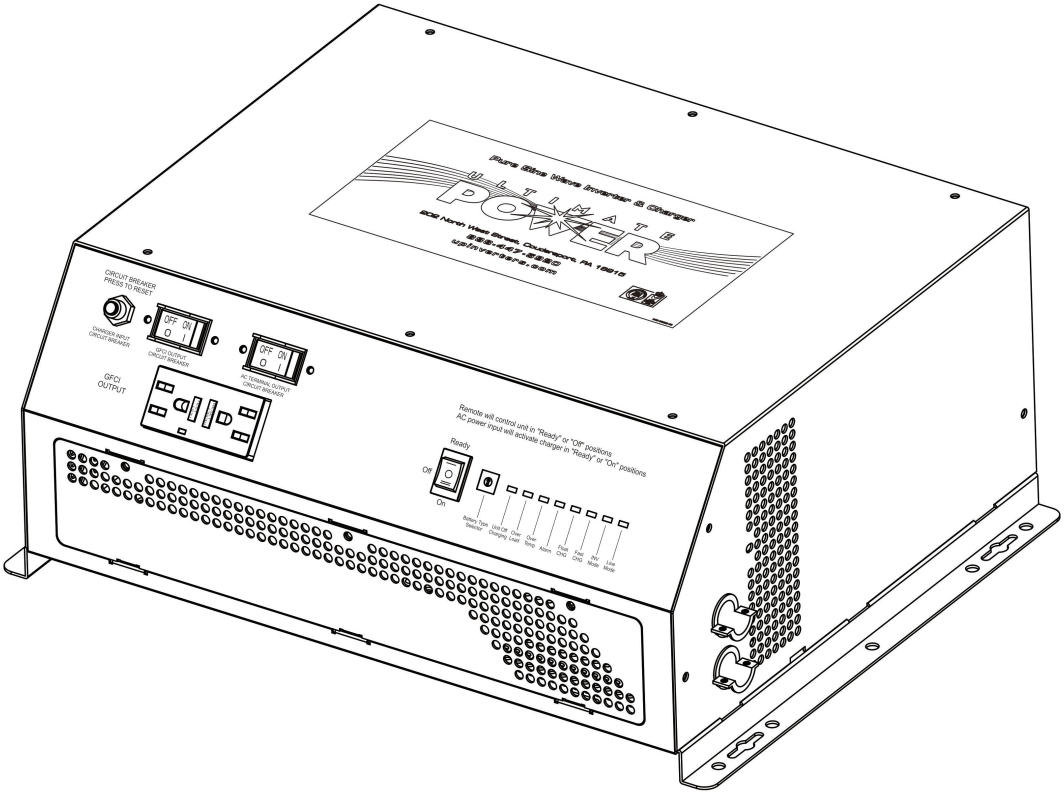
SD Series

Pure Sine Wave Inverter & Charger

User Manual

Models: UP12/1000SD, UP12/1500SD,

UP12/2000SD, UP12/3000SD, UP12/4000SD



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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 SD Series 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 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 one inch 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 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, and NiCad/NiFe or Lithium battery. Other types of batteries may burst, causing personal injury and damage.

2 Introduction

2.1 General Information

SD 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 85%.
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 capability to meet demanding power needs of inductive loads without endangering the equipment.

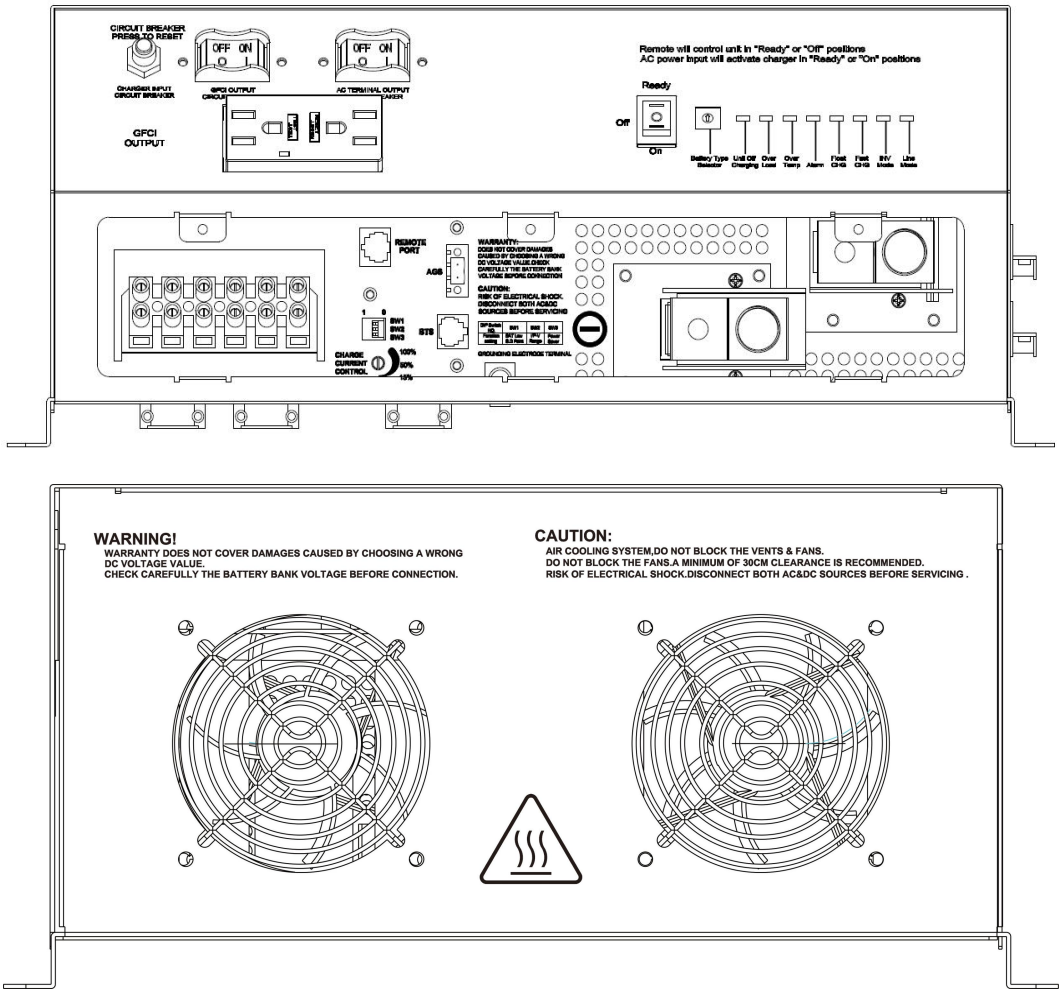
When the utility AC power cuts off or falls out of acceptable range, the transfer relay is de-energized and the load is automatically transferred to the Inverter output. Once the qualified AC utility is restored, the relay is energized and the load is automatically reconnected to AC utility
The SD Series Inverter is equipped with a powerful charger of up to 110Amps (for 4KW one).
The overload capacity is 300% of continuous output for up to 20 seconds to reliably support tools

and equipment longer

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 Mechanical Drawing

Models: UP12/1000SD, UP12/1500SD, UP12/2000SD, UP12/3000SD, UP12/4000SD



Inverter physical description

1. DC input Openings Positive (+) & Negative (-): Allows the DC input
2. RJ45 Remote Panel Port: Connects to the remote control panel through the flat grey extension cable
3. DC Cooling Fan
4. Bonding Lug: Connects to the ground system (vehicle chassis or earth ground)
5. Circuit Breaker: Protects the inverter's internal circuitry from shorted AC loads or overload situations
6. GFCI

7. Field Wiring Compartment: Provides access to the AC input and output hardwire leads and the 12Vdc remote switch

2.3 Features

2.3.1 High overload ability up to 300% rated power (20 sec)
2.3.2 Low quiescent current, low power “Power Saving Mode” to conserve energy
2.3.3 4-step intelligent battery charging, PFC (Power Factor Correction) for charger
2.3.4 8 pre set battery type selector plus De-sulfation for totally flat batteries
2.3.5 Powerful charge rate up to 130Amp, selectable from 0%-100%
2.3.6 10ms typical transfer time between battery and AC, guarantees power continuity
2.3.7 Smart remote control
2.3.8 15s delay before transfer when AC resumes, extra protection for loads when used with generator
2.3.9 Allows start up and through power with depleted batteries
2.3.10 30A through current ability
2.3.11 Multiple speed controlled cooling fan
2.3.12 Extensive protections against various harsh situations

3 Electrical Performances

3.1 Invert

Topology
The SD inverter/charger is built according to the following topology.
Invert: Full Bridge Topology.
Charge: 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 7% (min 3%, max 10%) depending of load connected and battery voltage.
The peak efficiency of SD Series is 85%.

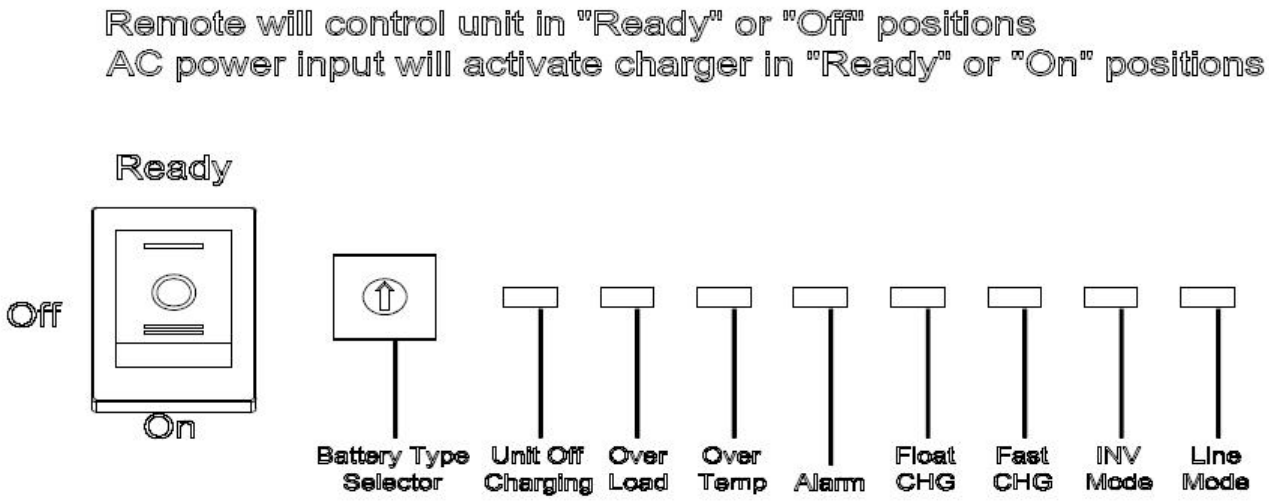
Overload Capacity
The SD Series inverters have different overload capacities, making it ideal to handle demanding loads.
For 110%<Load<125% (±10%), no audible alarm in 14 minutes, beeps 0.5s every 1s in the 15th minute, and Fault(Turn off) after the 15th minute
For 125%<Load<150% (±10%), beeps 0.5s every 1s and Fault (Turn off) after the 1 minute
For 300%≧Load>150% (±10%), beeps 0.5s every 1s and Fault (Turn off) after 20s.

Caution:

After the inverter is switched on, it takes a finite time for it to self-diagnoses 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 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.

3.2 AC Charger

SD 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, SD Series charger is able to output max current as long as input AC voltage is in the range of 95-127VAC, and AC freq is in the range of 58-64Hz. The SD Series inverter possesses a strong charging current of 110Amp (for 4KW 12Vdc model), and the max charge current can be adjusted from 0%-100% via a liner switch to the right of the battery type selector. This will be helpful if you are using our powerful charger on a small capacity battery bank.
Choosing "0" in the battery type selector will disable charging function.
Inverter Status Panel (on top of the inverter)

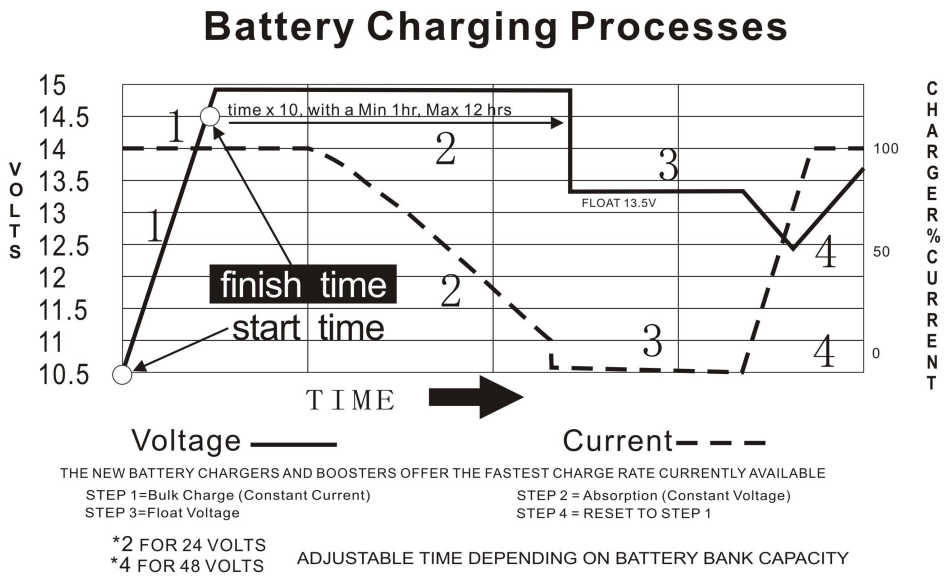


There are 3 main charging processes:

Bulk Charging:

Absorb Charging:

Float Charging:



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, 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 from taking a charge and thus allow the plates to clean up and accept a charge once again.

Battery type selector			
Switch Settings	Description	Boost / Vdc	Float / Vdc
0	Charger Off		
1	Gel USA	14.0	13.7
2	AGM 1	14.1	13.4
3	LiFePO**4**	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)	
9	Not used		

Charging depleted batteries

The SD Series 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 doesn't drop below 2V, the inverter will be able to charge the battery once qualified AC inputs.

Before the battery voltage going below 9VDC, the charging can 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 lose memory during this process.
Start up without battery function can be customized upon request.

Model	Charging Current
UP12/1000SD	20+/-5A
UP12/1500SD	35+/-5A
UP12/2000SD	50+/-5A
UP12/3000SD	100+/-5A
UP12/4000SD	110+/-5A

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.

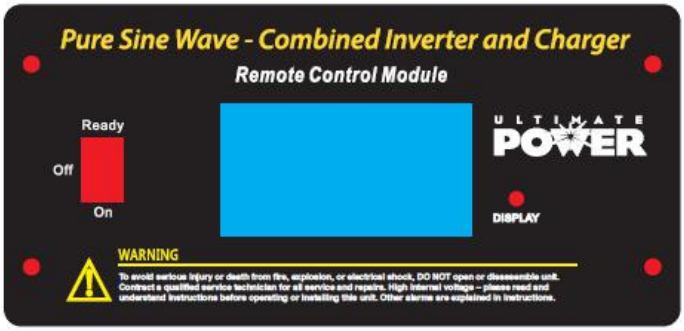
3.3 AC Transfer

While in the Standby Mode, the AC input is continually monitored. Whenever AC power falls below the VAC Trip voltage (90 VAC, default setting), the inverter automatically transfers back to the Invert Mode with minimum interruption to your appliances - as long as the inverter is turned on. The transfer from Standby mode to Inverter mode occurs in approximately 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.
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.

3.4 Auto Frequency Adjust

The inverter is designed with Auto Frequency adjust function.
The factory default configuration is 60Hz for the SD series inverter
While the output freq can be easily changed once a qualified freq is applied 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.
NOTE: The inverter will output factory set freq after it restarts.

3.5 Power Switch



There are three different working statuses for SD inverter: “On”, “Off” and “Ready”.
When power switch is in “Off” position, the inverter is powered off.
When power switch is turned to “ON”, the inverter is powered on.
When power switch is turned to “Ready”, the inverter will charge the battery when there is qualified AC input. If there is no AC power input, the inverter waits for 12Vdc remote start signal to go into inverter mode. Once the 12Vdc remote start is activated, the inverter powers on. When the 12Vdc remote start is de-activated, the inverter goes to “Ready” mode again.

SD Series Idle Power Consumption			
Model Type	**On Mode**		**Ready Mode**
	Idle Power	**Quiescent Current**	
UP12/1000SD	15W	1.2A	8W
UP12/1500SD	24W	2A	8W
UP12/2000SD	30W	2.2A	15W
UP12/3000SD	45W	3.8A	15W
UP12/4000SD	60W	5A	15W

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 defeated.

3.6 Protections

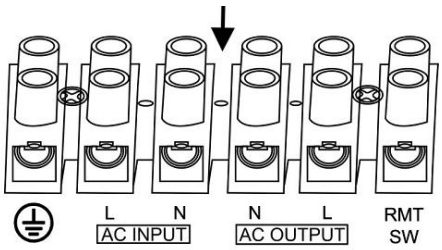
The SD Series inverter is equipped with extensive protections against various harsh situations/faults. These protections include:
AC Input over voltage protection/AC Input low voltage protection
Low battery alarm/High battery alarm
Over temperature protection/Over load protection
Short Circuit protection (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 inverter will go to over temp protection when the heat sinks temp. ≥105ºC (221℉), and will go to Fault (shutdown Output) after 30 seconds. The switch has to be reset to activate the inverter. The SD Series Inverter is with 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.

3.7 Remote Control

Apart from the switch panel on the front of the inverter, an extra switch panel connected to the RJ45 port at the DC side of the inverter through 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.



The Inverter can also be switch on/off through the "RMT SW" pin in the right of AC terminal.

They inverter will be powered on once a +12Vdc (acceptable range 10-16Vdc) source is connected to the PIN, and powered off when the +12Vdc source is disconnected (if the switch panel is in "Ready" position).

The 12Vdc remote start is with the same priority as "ON".

Only when both panels and 12Vdc remote control are turned to "Unit Off" position, will the inverter be powered off.

WARNING

Never cut the telephone 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.

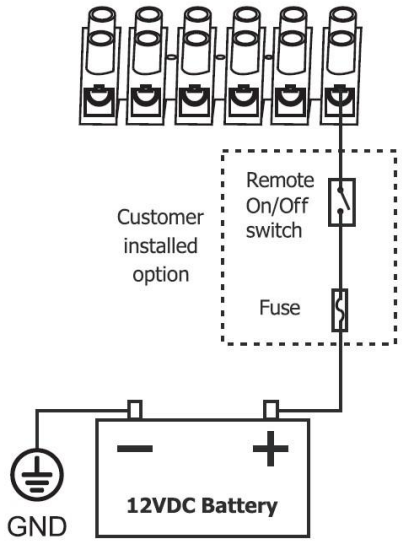
12Vdc Remote Control Wiring Diagram

WARNING

The rated current of remote control terminal is 0.5Amp, over current may damage the inverter. Thus it must be protected with an appropriate DC fuse; the suggested value is 1 Amp.

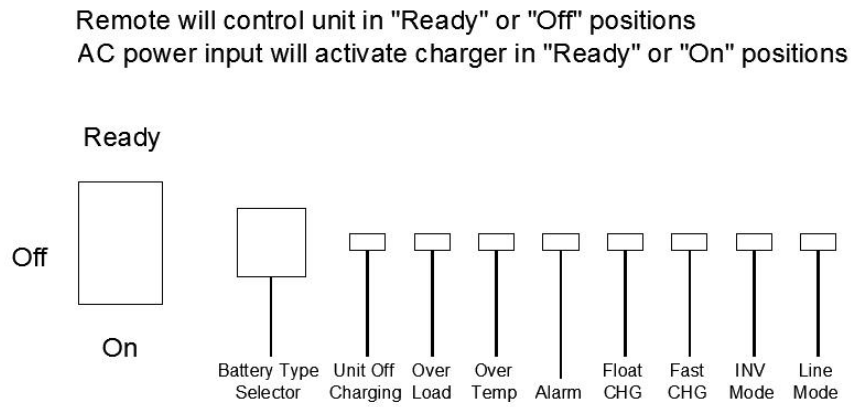
WARNING

Connecting this wire to chassis ground will cause damage not covered under warranty!



The remote switch should be single pole, single throw with at least a 1 Amp rating. The wire used should be at least 18ga

3.8 LED Indicator



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

3.9 Audible Alarm

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;

3.10 FAN Operation

For 1-3KW models, there is one multiple controlled DC fan.
For 4 model, there are two DC fans..
The DC fans are 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

3.11 DIP SWITCHES & BTS

On the DC end of inverter, there are 3 DIP switches which enable users to customize the performance of the device to suit the specific configuration.

Switch NO	Switch Function	Position: 0	Position: 1
SW1	Low Battery Trip Volt	10.0VDC	10.5VDC
		*2 for 24VDC, *4 for 48VDC	
SW2(230V)	AC Input Range	184-253VAC	154-264VAC(40Hz+)
SW2(120V)	AC Input Range	100-135VAC	90-135VAC(40Hz+)
SW3	Power Saver & Unit Off Charging	Unit Off charging	Power Saver

Low Battery Trip Volt:
Deep discharge of the lead acid battery leads to high losses in capacity and early aging. In different applications, different low voltage disconnection level is preferred. For example, for solar application, user intended to have less DOD to prolong the battery cycle life. While for mobile application, users intend to have more DOD to reduce battery capacity and on board weight.

For 12VDC model, the Low Battery Trip Volt is set at 10.0VDC by default. It can be customized to 10.5VDC using SW1, this is to prevent batteries from over-discharging while there is only a small load applied on the inverter.
*2 for 24VDC, *4 for 48VDC

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 154-253VAC (90-135V for 120VAC model), 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 higher voltage(164-264Vac for 230Vac model) and wider frequency (40Hz plus for 50Hz/60Hz). Accordingly, the AC charger will also work in a higher voltage(174-254Vac for 230Vac model) wider freq 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.

Power Saver & Unit Off Charging:
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")
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 or a qualified AC input is present. The inverter will not perform any function and only stay idle in this mode, unless the battery voltage is low. Then it will start charging the battery. This feature is ideally suitable for applications where energy conservation is required. Charging will only be activated when required.

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 equipped 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 voltage 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

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 .

3.12 Auto Generator Start

The inverter can start up a generator when battery voltage goes low.
When the inverter goes to low battery alarm, it can 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 that will 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.

4 Installation

4.1 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: －20℃ to 50℃ (-4℉ 122℉)
Storage temperature: －40℃ to 70℃ (-40℉ 158℉)
Relative Humidity: 0%to 95%，non-condensing
Cooling: Forced air

4.2 DC Wiring

It is suggested the battery bank be kept as close as possible to the inverter. The following table is a suggested wiring option for 1 meter (3ft.) DC cable.

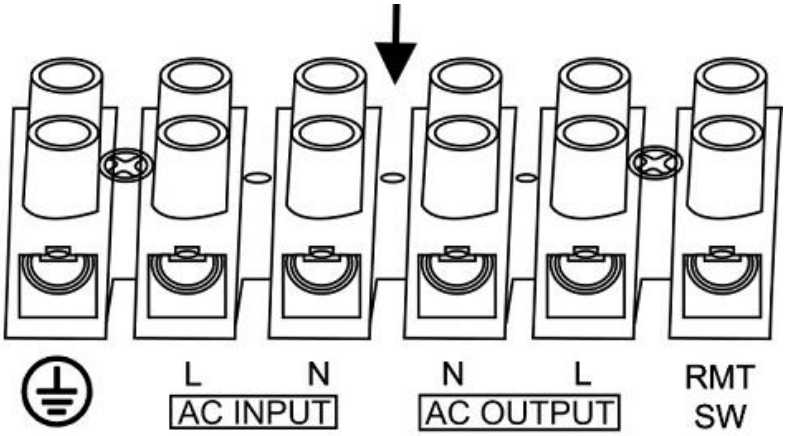
Rate Current	DC Cable	Model
200Amp Max	2AWG	UP12/1000SD & UP12/1500SD
300Amp Max	1/0AWG	UP12/2000SD
400Amp Max	3/0AWG	UP12/3000SD & UP12/4000SD

Please find the following minimum wire size. In case of DC cable longer than 1m (3ft.) please increase the cross section of cable to reduce the loss.

WARNING	The torque rating range for DC terminal is 12.5NM-205NM (9.25-15.19 pound-foot), and the suggested torque rating is 17NM (12.6 pound-foot). Over torqueing may cause the bolt to break.
	In the event of reverse polarity the unit could be totally destroyed which is not covered under warranty.
	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.

4.3 AC Wiring

We recommend using 10 to 5Awg wire to connect to the ac terminal block.
When in AC mode the AC input power will supply both the loads and AC charger, a thicker wire gauge for AC Input is required.
The wirings are UL458 compliant, please consult a qualified electrician or call our tech support if you are not sure about how to wire any part of your inverter.

Wiring Option 120V single phase Input: Hot line + Neutral + Common Ground Output: Hot line + Neutral + Common Ground	

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 appliance.

WARNING

The installer must use AC wires rated at least 75℃/167℉.

4.4 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.

5 Troubleshooting Guide

Troubleshooting contains information about how to troubleshoot possible error conditions while using the SD 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	INVER-TER 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	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 grids and inverting.	Inverter's Low voltage trip voltage may be too low to sustain certain loads.	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). 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 20 KHz to, say, maybe 15 KHz (it varies according to different loads). This way, the freq of noise falls exactly into the range (200Hz - 20 KHz) that human ear can sense.

The most common load of such kind is hair dryer.

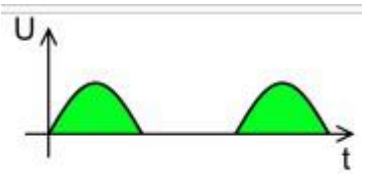


Figure 1

The noise won't do any harm to the inverter or the loads.

6 Limited Warranty Plan

Ultimate Power extends the following warranty to the original purchaser of those goods subject to the qualification indicated:

1) Ultimate Power warrants to the original purchaser for use that the goods or any component thereof manufactured by Ultimate Power will be free from defects in workmanship from date of purchase, provided that such goods are installed, maintained and used in accordance with manufacturer's written instructions. See product specification sheet(s) for warranty period.

2) Components not manufactured by Ultimate Power, but used within the assembly provided by Ultimate Power, are subject to the warranty period as specified by the individual manufacture of said component, provided such goods are installed, maintained and used in accordance with Ultimate Power and the manufacture's written instructions.

3) Ultimate Power s sole liability and the purchaser's sole remedy for the failure of goods under this limited warranty and for any and all claims arising out of the purchase and use of the goods shall be limited to the repair or replacement of goods that do not conform to the warranty.

Ultimate Powers advanced replacement policy: If an Ultimate Power employee and or an authorized distributor's service technician deems that a problem exist with an Ultimate Power manufactured product, then Ultimate Power will ship a replacement part to match the defective product. Ultimate Power will pay the ground service shipping cost to the customer and provide a return shipping label for its return. Customer must put the damaged product in the box the replacement product came in and ship back to Ultimate Power. If Ultimate Power does not receive the defective product within 30 days or the product is damaged from improperly packaged product for return shipping and if the product is found not to have any problem the customer will be charged for the replacement product at the original purchase price.

The following cases are not covered under warranty:

1. DC polarity is reverse: the inverter is designed without DC polarity reverse protection. A polarity reverse may severely damage the inverter

2. Wrong AC wiring

3. Operation in a condensing environment

4. Operating with an undersized generator or generator with unqualified wave form

5. Unauthorized entry attempts to repair or make adjustments to contents without consent

Appendix 1

SD Series Inverter&Charger

Electrical Specifications

	Model	UP12/1000SD	UP12/1500SD	UP12/2000SD	UP12/3000SD	UP12/4000SD
Inverter Output	Continuous Output Power	1000W	1500W	2000W	3000W	4000W
	Continuous Output voltage	8.5A	12.5A	16.8A	25.2A	33.6A
	Surge Rating(20s)	3000W	4500W	6000W	9000W	12000W
	Capable of Starting Electric Motor	1HP	1.5HP	2HP	3HP	3HP
	Output Waveform	Pure Sine wave/Same as input(Bypass mode)				
	Nominal Efficiency	85%(Peak)	85%(Peak)	85%(Peak)	83%(Peak)	83%(Peak)
	Line Mode Efficiency	>95%				
	Power Factor	0.9-1.0				
	Nominal Output Voltage rms	120VAC				
	Output Voltage Regulation	±10% rms				
	Output Frequency	60Hz ± 0.3Hz				
	Short Circuit Protection	Yes, Current Limit Function (fault after 1s)				
	Max THD under full load	7%	7%	7%	20%	20%
	Typical transfer Time	10ms(Max)				
DC Input	Nominal Input Voltage	12V				
	Minimum Start Voltage	10V				
	Low Battery Alarm	10.5V				
	Low Battery Trip	10V				
	High Voltage Alarm & Fault	16V				
	High DC Input Recovery	15.5V				
	Low Battery voltage recover	13V				
	Minium load-Search Mode	25 W when Power Saver On				
Charge	Input Voltage Range	100-135VAC				
	Input AC Current	6.5A	9.6A	13.6A	19.2A	25.6A
	Output Voltage	Depends on battery type				
	Charger Breaker Rating	10A	20A	20A	30A	40A
	Max Charge Rate	20Amp	35Amp	50Amp	100Amp	110Amp
	Battery Initial Voltage for Start Up	10V-15.7V for 12V				
	Over Charge Protection Shutdown	15.7V for 12V				
	Charger curve(4 stage constant current)Battery types 4 step digital controlled progressive charge					
	Battery type	Fast V		Float V		
	Gel U.S.A	14		13.7		
	A.G.M 1	14.1		13.4		
	LiFePO4	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				
	Remote Control	Yes. Optional				
Bypass & Protection	Input Voltage Waveform	Sine wave (Grid or Generator)				
	Nominal Voltage	120VAC				
	Low Voltage Trip	90V±4%				
	Low Voltage re engage	100V±4%				
	High Voltage Trip	140V±4%				
	High Voltage re engage	135V±4%				
	Max Input AC Voltage	150VAC				
	Nominal Input Frequency	60Hz				
	Low Freq Trip	57±0.3Hz for 60Hz				
	Low Freq re engage	58±0.3Hz for 60Hz				
	High Freq Trip	65±0.3Hz for 60Hz				
	High Freq re engage	64±0.3Hz for 60Hz				
	Overload protection	Circuit breaker				
	Output Short circuit protection	Circuit breaker				
	Charge depleted battery	Yes				
	Breaker Rating for AC terminal	10A	15A	20A	30A	40A
	Breaker Rating for GFCI	10A	15A	15A	15A	15A
Other	Operating temp	-20 to 50℃/-4 to 122℉				
Mechanical Specifications						
	Mounting	Wall / Ground mount				
	Inverter Dimensions(W*D*H)	410*340*180mm (16.1 x 13.4 x 7")			410*400*180mm(16.1 x15.7x 7")	
	Inverter Weight	22KG	24(44lbs)	27KG	27KG	32KG
	Shipping Dimensions(W*D*H)					
	Shipping Weight	24KG	26 (49lbs)	29KG	29KG	34KG
	Display	Status LEDs and External LCD				
	Standard Warranty	1 Year				
Note: *Not CUL Listed						

Notes