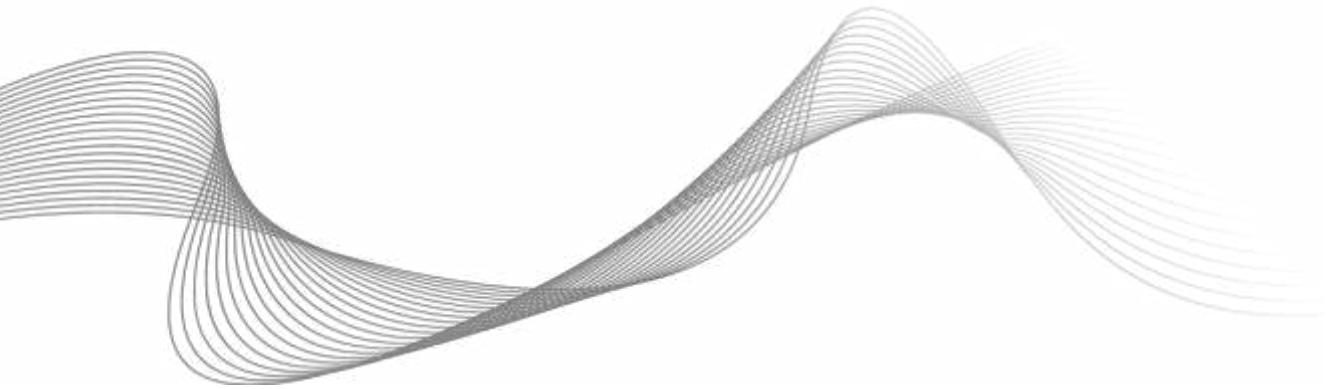
COTEK



SD Series User's Manual

SD1500 / SD2500 / SD3500

PURE SINE WAVE INVERTER

Legal Provisions

Table of Content

1.Important Safety Information

WARNING!
Before using the inverter, read and save the safety instructions.

1-1. General Safety Precautions

1-1-1. Do not expose the Inverter to rain, snow, spray, bilge or dust.
To reduce risk of hazard, do not cover or obstruct the ventilation openings. Do not install the inverter in a zero-clearance compartment. Overheating may take place.

1-1-2. To avoid a risk of fire and electric shock, please make sure that existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the Inverter with damaged or substandard wiring.

1-1-3. This equipment contains components which can produce arcs or sparks.
To prevent fire or explosion do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, joints, fittings, or other connection between components of the fuel system.

1-1-4. An over current protection at the time of installation shall be provided by others for the AC output circuit.

1-1-5. Additional breakers suitable for 20 A branch circuit protection shall be provided for the GFCI receptacles.

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 wash eyes 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 or 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 similar item to metal causing a severe burn.

1-3. Installation

The power inverter should be installed in a location that meets the following requirements：

Dry – Do not allow water to drip or splash on the inverter.

Cool – Ambient air temperature should be between -20℃ and 50℃, but he cooler the better.

Safety – Do not install batteries in the compartment or other areas here flammable fumes existence such as fuel storage areas or engine compartments.

Ventilated – Allow at least one feet of clearance around the Inverter for air flow. Ensure the ventilation shafts on the rear and bottom of the unit are not obstructed.

Dust-free – Do not install the Inverter in dusty environments here dust, wood particles or other filings/shavings are present. The dust can be pulled into the unit when the cooling fan is in operation.

Close to batteries – Avoid excessive cable lengths but do not install the inverter in the same compartment as batteries.

Use the recommended wire lengths and sizes (refer to section 4.DC wiring connections).

Do not mount the inverter where it is exposed to the gases produced by the battery. These gases are very corrosive and prolonged exposure will damage the inverter.

WARNING!

Shock Hazard. Before proceeding further, carefully check that the inverter is **NOT** connected to any batteries, and that all wiring is disconnected from any electrical sources . Do not connect the output terminals of the inverter to an incoming AC source.

2. Functional Characteristics

2-1. General Information

SD-series is new generation power inverter equipped with N+1 parallel power function , 3-phase capability, and AC transfer switch. SD series is suitable for RV, Marine and Emergency appliances.

Features

- Parallel redundancy design for power expansion
- Multiple industrial applications that create 1Φ3W / 3Φ4W power systems
- User-friendly remote control
- Automatic master mechanism to eliminate single point failure and optimize reliability
- Built-in ATS and AC circuit breaker
- Optional STS module, transfer time is less than 4ms.
- RS-232 communication
- Input & output fully isolation
- Output voltage / power saving mode is selectable by DIP switch and remote control (CR-10)
- Input Protection：Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection
- Output Protection：Short Circuit / Overload / Over Temperature / Over Voltage Protection

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

2-2. Application

2-2-1. Power tools–circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.

2-2-2. Office equipment – computers, printers, monitors, facsimile machines, scanners.

2-2-3. Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.

2-2-4. Kitchen appliances – coffee makers, blenders, ice markers, toasters.

2-2-5. Industrial equipment – metal halide lamp, high pressure sodium lamp.

2-2-6. Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment.

2-2-7. Vehicle, yacht and off-grid solar power systems.

2-3. Electrical Performance

2-3-1. SD1500 Specification

MODEL	SD1500-112	SD1500-124	SD1500-148	SD1500-212	SD1500-224	SD1500-248
Output						
Rating Power	1500W (de-rating after 40°C, refer to de-rating curve)					
Peak Power (3Sec.)	1800W					
Surge Power (<0.2Sec.)	2400W					
Waveform	Pure Sine Wave					
Efficiency (Max.)	88%	89%	90%	88%	88%	90%
Output Voltage (@rated VDC)	100 / 110 / 115 / 120VAC ± 3%			200 / 220 / 230 / 240VAC ± 3%		
Output Frequency	50 / 60Hz ± 0.1%					
Total Harmonic Distortion (THD)	< 3% @ under condition： greater than 1.15 times of the rated VDC, 110V / linear load)			< 3% @ under condition： greater than 1.15 times of the rated VDC, 230V / linear load)		
DC Input						
DC Voltage	12VDC	24VDC	48VDC	12VDC	24VDC	48VDC
Voltage Range	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC
No load Power Consumption	@12VDC	@24VDC	@48VDC	@12VDC	@24VDC	@48VDC
On Mode @ Save Mode	0.9A	0.35A	0.3A	1.1A	0.7A	0.4A
On Mode @ No Load Mode	< 2.4A	< 1.2A	< 0.6A	< 3.3A	< 1.6A	< 0.8A
Fuse	40Ax6	20Ax6	15Ax4	40Ax6	20Ax6	15Ax4
AC Input						
AC Range	100 / 110 / 115 / 120VAC ± 12.5%			200 / 220 / 230 / 240VAC ± 12.5%		
Frequency Selectable	50 / 60 Hz					
Synchronous Frequency	47～57 / 53～63 Hz					
Circuit Breaker	20A			10A		
Transfer Switch①	Standard ATS：Inverter to utility AC：< 5ms.; Utility AC to inverter：< 10ms.					
Protection						
BAT.Low Alarm ± 3%	10.5VDC	21.0VDC	42.0VDC	10.5VDC	21.0VDC	42.0VDC
BAT.Low Shut-down ± 3%	10.0VDC	20.0VDC	40.0VDC	10.0VDC	20.0VDC	40.0VDC
BAT.Low Restart ± 3%	12.5VDC	25.0VDC	50.0VDC	12.5VDC	25.0VDC	50.0VDC
BAT.High Alarm ± 3%	15.5VDC	31.0VDC	62.0VDC	15.5VDC	31.0VDC	62.0VDC
BAT.High Shut-down ± 3%	16.0VDC	32.0VDC	64.0VDC	16.0VDC	32.0VDC	64.0VDC
BAT.High Restart ± 3%	15.0VDC	30.0VDC	60.0VDC	15.0VDC	30.0VDC	60.0VDC
Input Protection	Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection / AC over current (Breaker)					
Output Protection	Short Circuit / Overload / Over Temperature / Over Voltage Protection					
Environment						

MODEL	SD1500-112	SD1500-124	SD1500-148	SD1500-212	SD1500-224	SD1500-248
Working Temp.	-20～+60°C; refer SD1500 power de-rating curve					
Storage Temp.	-40～+70°C					
Relative Humidity	Max. 90%, non-condensing					
Safety & EMC						
Safety Standards	Certified UL 458 (UL only for hardwire)		----	Certified EN 62368-1		
EMC Standards	Certified FCC Class B			Certified EN55032, EN55024		
E-Mark	----			Certified CISPR 25; ISO 7637-2		
Control & Signal						
LED Indicator	Input voltage level, faulty status					
Remote Control	CR-6, CR-8 and CR-10					
Others						
Dimension (WxHxD)	283x128x351 mm / 11.14x5.04x13.82 inch					
Weight	5.5 kg					
Cooling	Load & Thermal control fan					
Communication Port	RS-232 (RJ-11 type connector), Ethernet (Optional)					

Note

The specifications are subject to change without prior notice. All the test environments are conducted under the rated power operation conditions.

① Please refer to P.9 Transfer-Time Table.

2-3-2. SD2500 Specification

MODEL	SD2500-112	SD2500-124	SD2500-148	SD2500-212	SD2500-224	SD2500-248
Output						
Rating Power	2500W (de-rating after 40°C, refer to de-rating curve)					
Peak Power (3Sec.)	3000W					
Surge Power (<0.2Sec.)	4000W					
Waveform	Pure Sine Wave					
Efficiency (Max.)	88%	89%	90%	88%	88%	90%
Output Voltage (@rated VDC)	100 / 110 / 115 / 120VAC ± 3%			200 / 220 / 230 / 240VAC ± 3%		
Output Frequency	50 / 60Hz ± 0.1%					
Total Harmonic Distortion (THD)	< 3% @ under condition： greater than 1.15 times of the rated VDC, 110V / linear load)			< 3% @ under condition： greater than 1.15 times of the rated VDC, 230V / linear load)		
DC Input						
DC Voltage	12VDC	24VDC	48VDC	12VDC	24VDC	48VDC
Voltage Range	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC
No load Power Consumption	@12VDC	@24VDC	@48VDC	@12VDC	@24VDC	@48VDC
On Mode @ Save Mode	0.9A	0.35A	0.3A	1.1A	0.7A	0.4A
On Mode @ No Load Mode	< 2.9A	< 1.4A	< 0.8A	< 3.6A	< 1.8A	< 1A
Fuse	40Ax9	20Ax9	15Ax6	40Ax9	20Ax9	15Ax6
AC Input						
AC Range	100 / 110 / 115 / 120VAC ± 12.5%			200 / 220 / 230 / 240VAC ± 12.5%		
Frequency Selectable	50 / 60 Hz					
Synchronous Frequency	47～57 / 53～63 Hz					
Circuit Breaker	35A			20A		
Transfer Switch①	Standard ATS：Inverter to utility AC：8~10ms.; Utility AC to inverter：16~50ms.					
	Optional STS module：Single < 4ms; N+1 & 1P3W & 3P4W < 6ms					
Protection						
BAT.Low Alarm ± 3%	10.5VDC	21.0VDC	42.0VDC	10.5VDC	21.0VDC	42.0VDC
BAT.Low Shut-down ± 3%	10.0VDC	20.0VDC	40.0VDC	10.0VDC	20.0VDC	40.0VDC
BAT.Low Restart ± 3%	12.5VDC	25.0VDC	50.0VDC	12.5VDC	25.0VDC	50.0VDC
BAT.High Alarm ± 3%	15.5VDC	31.0VDC	62.0VDC	15.5VDC	31.0VDC	62.0VDC
BAT.High Shut-down ± 3%	16.0VDC	32.0VDC	64.0VDC	16.0VDC	32.0VDC	64.0VDC
BAT.High Restart ± 3%	15.0VDC	30.0VDC	60.0VDC	15.0VDC	30.0VDC	60.0VDC
Input Protection	Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection / AC over current (Breaker)					
Output Protection	Short Circuit / Overload / Over Temperature / Over Voltage Protection					

MODEL	SD2500-112	SD2500-124	SD2500-148	SD2500-212	SD2500-224	SD2500-248
Environment						
Working Temp.	-20～+60°C; refer SD2500 power de-rating curve					
Storage Temp.	-40～+70°C					
Relative Humidity	Max. 90%, non-condensing					
Safety & EMC						
Safety Standards	Certified UL 458 (UL only for hardwire)		----	Certified EN60950-1		
EMC Standards	Certified FCC Class B			②Certified EN 55014-1, EN 55014-2; EN 61000-3-2, -3-3; EN61204-3; EN 61000-6-1, -6-2, -6-3, -6-4 IEC 61000-4-2, 3, 4, 5, 6, 11		
E-Mark	----			Certified CISPR 25; ISO 7637-2		
Control & Signal						
LED Indicator	Input voltage level, faulty status					
Remote Control	CR-6, CR-8 and CR-10					
Others						
Dimension (WxHxD)	283x128x436 mm / 11.14x5.04x17.17 inch					
Weight	8 kg					
Cooling	Load & Thermal control fan					
Communication Port	RS-232 (RJ-11 type connector), Ethernet (Optional)					

Note

The specifications are subject to change without prior notice. All the test environments are conducted under the rated power operation conditions.

① Please refer to P.10 Transfer-Time Table.

② EN 55014-1, EN 55014-2 Class B: output cable less than 2 meters.

2-3-3. SD3500 Specification

MODEL	SD3500-112	SD3500-124	SD3500-148	SD3500-212	SD3500-224	SD3500-248
Output						
Rating Power	3500W (de-rating after 35°C, refer to de-rating curve for 12V) (de-rating after 40°C, refer to de-rating curve for 24V and 48V)					
Peak Power (3Sec.)	4500W					
Surge Power (<0.2Sec.)	6000W					
Waveform	Pure Sine Wave					
Efficiency (Max.)	90%	90%	91%	90%	91%	91%
Output Voltage (@rated VDC)	100 / 110 / 115 / 120VAC ± 3%			100 / 110 / 115 / 120VAC ± 3%		
Output Frequency	50 / 60Hz ± 0.1%					
Total Harmonic Distortion (THD)	< 3% @ under condition： greater than 1.15 times of the rated VDC, 110V / linear load)			< 3% @ under condition： greater than 1.15 times of the rated VDC, 110V / linear load)		
DC Input						
DC Voltage	12VDC	24VDC	48VDC	12VDC	24VDC	48VDC
Voltage Range	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC
No load Power Consumption	@12VDC	@24VDC	@48VDC	@12VDC	@24VDC	@48VDC
On Mode @ Save Mode	1.4A	0.5A	0.5A	1.4A	0.5A	0.5A
On Mode @ No Load Mode	< 2.9A	< 1.4A	< 0.8A	< 3.6A	< 1.8A	< 1A
Fuse	40Ax12	20Ax12	20Ax6	40Ax12	20Ax12	20Ax6
AC Input						
AC Range	100 / 110 / 115 / 120VAC ± 12.5%			200 / 220 / 230 / 240VAC ± 12.5%		
Frequency Selectable	50 / 60 Hz					
Synchronous Frequency	47～57 / 53～63 Hz					
Circuit Breaker	35A			20A		
Transfer Switch①	Standard ATS：Inverter to utility AC：8~10ms.; Utility AC to inverter：16~50ms.					
	Optional STS module：Single < 4ms; N+1 & 1P3W & 3P4W < 6ms					
Protection						
BAT.Low Alarm ± 3%	10.5VDC	21.0VDC	42.0VDC	10.5VDC	21.0VDC	42.0VDC
BAT.Low Shut-down ± 3%	10.0VDC	20.0VDC	40.0VDC	10.0VDC	20.0VDC	40.0VDC
BAT.Low Restart ± 3%	12.5VDC	25.0VDC	50.0VDC	12.5VDC	25.0VDC	50.0VDC
BAT.High Alarm ± 3%	15.5VDC	31.0VDC	62.0VDC	15.5VDC	31.0VDC	62.0VDC
BAT.High Shut-down ± 3%	16.0VDC	32.0VDC	64.0VDC	16.0VDC	32.0VDC	64.0VDC
BAT.High Restart ± 3%	15.0VDC	30.0VDC	60.0VDC	15.0VDC	30.0VDC	60.0VDC
Input Protection	Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection / AC over current (Breaker)					
Output Protection	Short Circuit / Overload / Over Temperature / Over Voltage Protection					

MODEL	SD3500-112	SD3500-124	SD3500-148	SD3500-212	SD3500-224	SD3500-248
Environment						
Working Temp.	-20～+60°C; refer SD3500 power de-rating curve					
Storage Temp.	-40～+70°C					
Relative Humidity	Max. 90%, non-condensing					
Safety & EMC						
Safety Standards	Certified UL 458 (UL only for hardwire)		----	Certified EN60950-1		
EMC Standards	Certified FCC Class B			②Certified EN 55014-1, EN 55014-2; EN 61000-3-2, -3-3; EN61204-3; EN 61000-6-1, -6-2, -6-3, -6-4 IEC 61000-4-2, 3, 4, 5, 6, 11		
E-Mark	----			Certified CISPR 25; ISO 7637-2		
Control & Signal						
LED Indicator	Input voltage level, faulty status					
Remote Control	CR-6, CR-8 and CR-10					
Others						
Dimension (WxHxD)	283x128x496 mm / 11.14x5.04x19.53 inch					
Weight	10 kg					
Cooling	Load & Thermal control fan					
Communication Port	RS-232 (RJ-11 type connector), Ethernet (Optional)					

Note

The specifications are subject to change without prior notice. All the test environments are conducted under the rated power operation conditions.

① Please refer to P.10 Transfer-Time Table.

② EN 55014-1, EN 55014-2 Class B: output cable less than 2 meters.

De-rating Curve

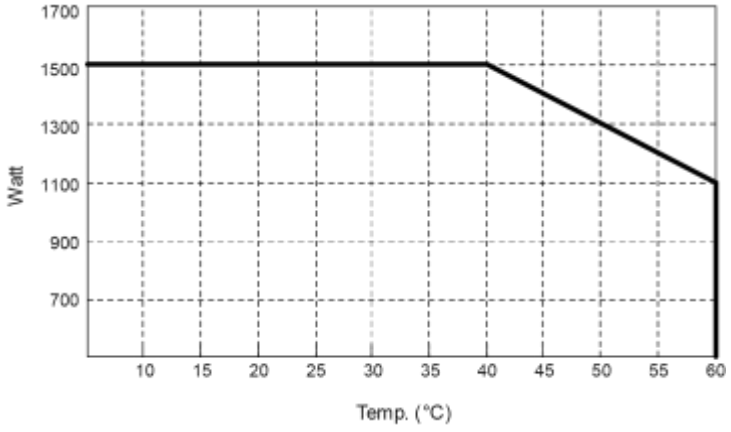


Figure 1. SD1500 de-rating curve

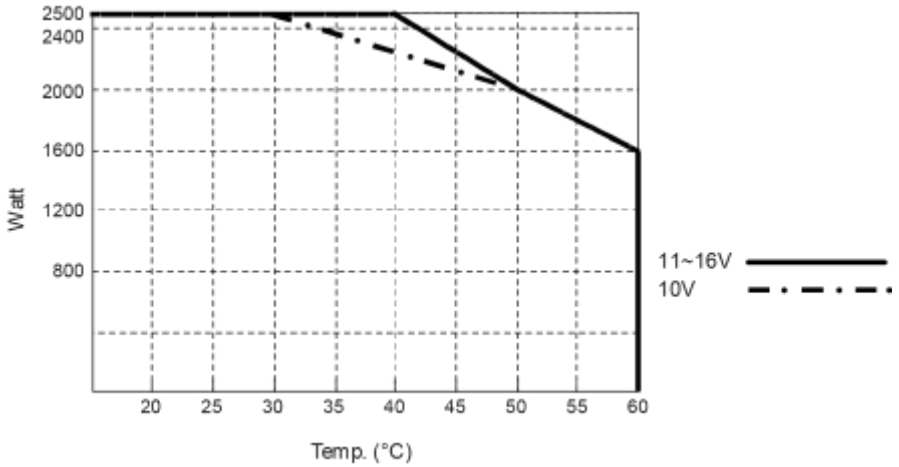


Figure 2. SD2500 de-rating curve

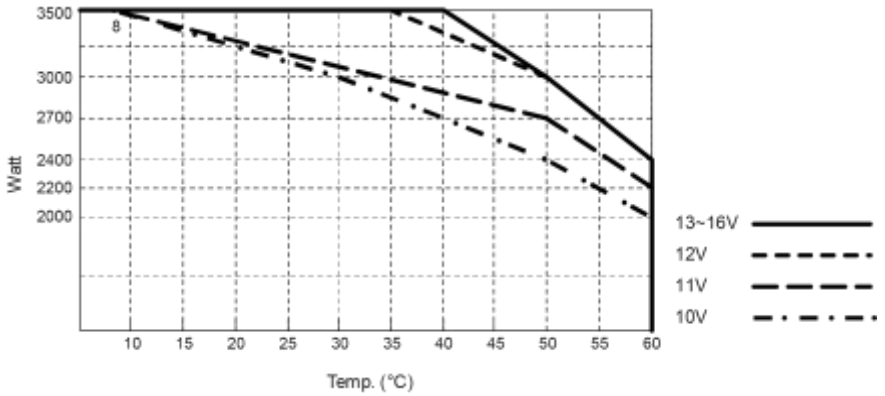


Figure 3. SD3500 de-rating curve

Transfer-Time Table		
Mode / Transfer Switch	**ATS**	***STS**
Haphazard	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.	Frequency is synchronized: < 4ms.; Frequency is not synchronized: Inverter to utility AC: < 4ms.; Utility AC to inverter: 16~50ms.
Normal	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~25ms.	< 4ms
Exacting	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.	Inverter to utility AC: < 4ms.; Utility AC to inverter: 16~50ms.
Online	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~25ms.	< 4ms

*** Only applicable on SD2500 / SD3500**

Table 1. SD series transfer-time

2-4. Mechanical Drawings

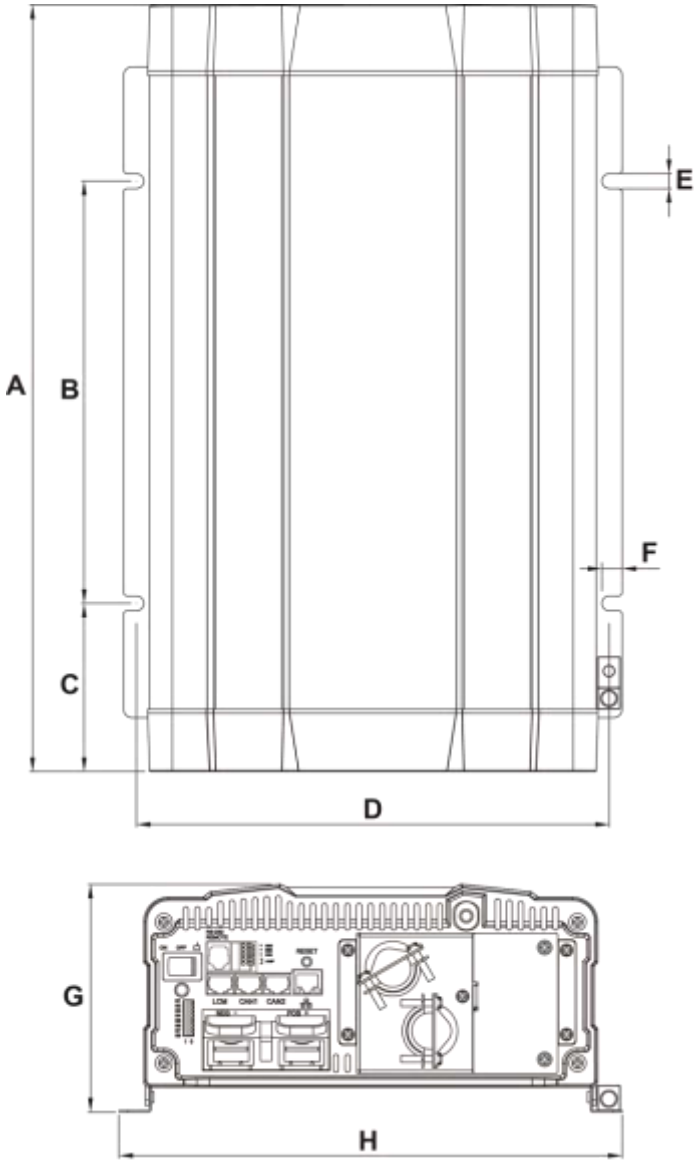
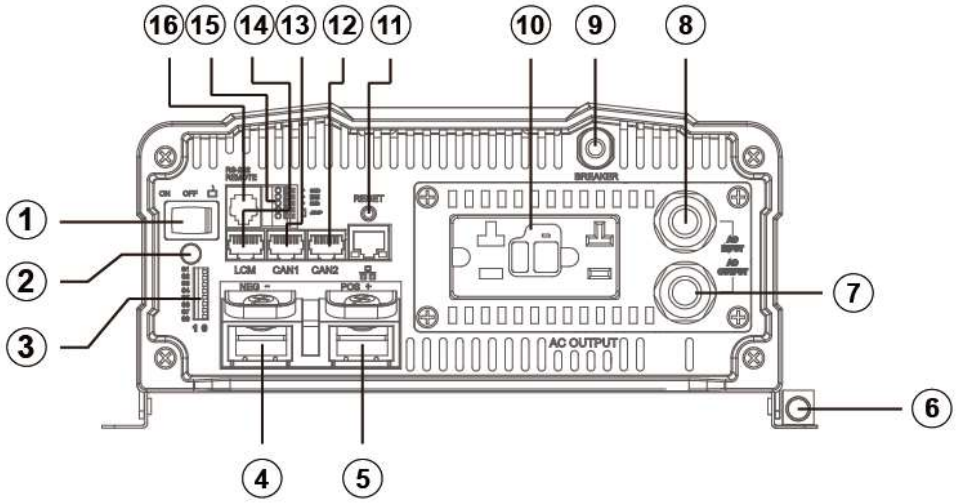


Figure 4. SD series mechanical drawings

Model	**A** (mm)	**B** (mm)	**C** (mm)	**D** (mm)	**E** (mm)	**F** (mm)	**G** (mm)	**H** (mm)
SD1500	351	160	93.1	268.6	8.5	11.5	128	283
SD2500	436	240.0	95.6	268.6	8.5	11.5	128	283
SD3500	496	240.0	125.6	268.6	8.5	11.5	128	283

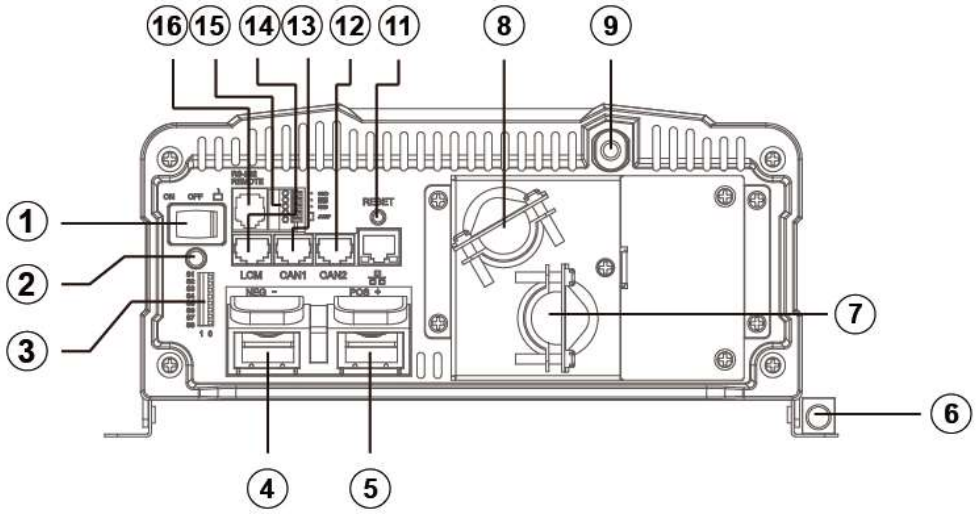
Table 2. SD series dimension

3.Introduction



【Version 1】General Model

Figure 5. SD general model front panel



【Version 2】UL Model

Figure 6. SD UL model front panel

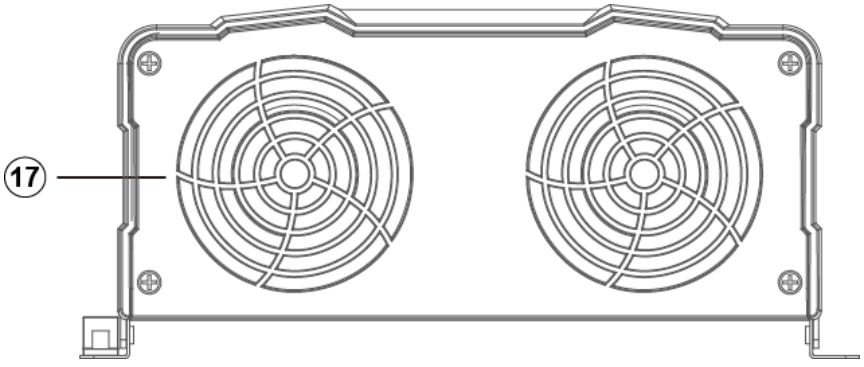


Figure 7. SD series rear panel

Front Panel / Rear Panel			
1	Power ON/OFF/REMOTE (Main) switch	10	AC output socket
2	Status LED	11	Reset Button
3	Dip Switch (S1~S8)	12	CAN2 Port (only to be used in parallel mode)
4	DC Input -	13	CAN1 Port (only to be used in parallel mode)
5	DC Input +	14	LCM Port (Connection for LCD remote control panel)
6	Chassis Ground	15	Green terminal (Remote and Parallel select)
7	AC Output	16	Remote / RS-232 port
8	By-pass AC Input	17	FAN
9	AC input circuit breaker		

Table 3. SD front panel / rear panel introduction

3-1. Power ON / OFF / REMOTE (Main) switch

A. Before installing the inverter, please ensure the main switch is in the OFF position.

B. Before using the remote unit, please ensure the main switch is in the REMOTE position.

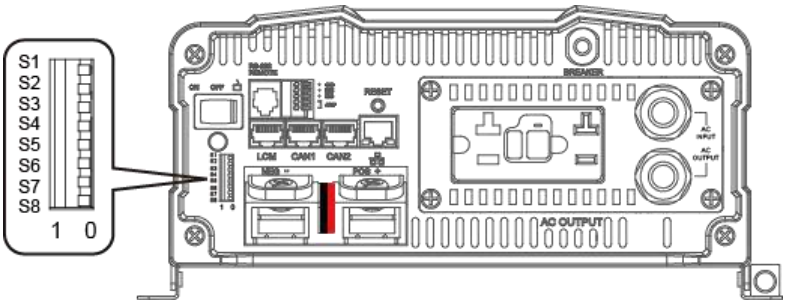
C. Main switch ON / OFF will not control AC Grid input, therefore for any maintenances please remove the AC Grid connection to prevent damage of SD series, then turn off the Main switch to OFF position for maintenance service.

3-2. LED Indicator

Green LED	LED Signal	Status
Solid		Power OK
Slow Blink		Power Saving
Intermittent Blink		Bypass
Orange LED	**LED Signal**	**Status**
Fast Blink		OVP
Slow Blink		UVP
Red LED	**LED Signal**	**Status**
Intermittent Blink		OTP
Fast Blink		OVP- Shut-down
Slow Blink		UVP- Shut-down
Solid		OLP
Intermittent Blink		Fan Failure
Intermittent Blink		Component Failure

Table 4. SD LED indicator

3-3. DIP Switch (S1~S8) Assignment



1=ON/0=OFF

Figure 8. DIP switch (S1~S8)

PIN#	PIN Assignment
1	AC output voltage setting
2	AC output voltage setting
3	AC output frequency setting
4	To set-up 3 Phase output or Energy-saving level
5	To set-up 3 Phase output or Energy-saving level
6	To set-up 3 Phase output or Energy-saving level
7	To set-up DIP Switch S4~S6 for power saving or 3 Phase output
8	To set-up function parameters adjustment via LCM port or DIP switch

Table 5. DIP switch (S1~S8) PIN assignment

3-3-1. DIP switch set-up

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
0	0	X	X	X	X	X	X	AC output voltage：100VAC/200VAC
1	0	X	X	X	X	X	X	AC output voltage：110VAC/220VAC
0	1	X	X	X	X	X	X	AC output voltage：115VAC/230VAC
1	1	X	X	X	X	X	X	AC output voltage：120VAC/240VAC
X	X	0	X	X	X	X	X	AC output frequency：50Hz
X	X	1	X	X	X	X	X	AC output frequency：60Hz
X	X	X	X	X	X	0	X	Power saving mode setting (S4~S6); No master-slave in parallel
X	X	X	X	X	X	1	X	3 Phase output setting (S4~S6)
X	X	X	X	X	X	X	0	Adjust function parameters via LCM port
X	X	X	X	X	X	X	1	Adjust function parameters via DIP switch

1=ON / 0=OFF

Table 6. DIP switch set-up

3-3-2. Power Saving Mode

Power Saving Mode is adjustable and set by the Dip Switches,S4, S5 and S6 on the front panel. Example SD2500：Saving set 2%, the load is below 50W 10 sec. will into saving mode, more than 150W or more leave saving mode.

A. Power device enter the saving mode

The rate power x setting % = the threshold enter the power saving model

In case the load less than threshold value 5 seconds, the power device will enter the saving mode.

B. Power device leaving saving mode(re-start)

Restart threshold = rate power x setting % x 2~3

In case the power over the restart threshold, the power device will re-start and provide the AC power.

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
X	X	X	0	0	0	0	X	Power saving DISABLE
X	X	X	1	1	0	0	X	Go in power saving mode when output load is under 4% of rating power
X	X	X	0	0	1	0	X	Go in power saving mode when output load is under 5% of rating power
X	X	X	1	0	1	0	X	Go in power saving mode when output load is under 6% of rating power
X	X	X	0	1	1	0	X	Go in power saving mode when output load is under 7% of rating power
X	X	X	1	1	1	0	X	Go in power saving mode when output load is under 8% of rating power

1=ON / 0=OFF

Table 7. Power saving mode set-up

3-3-3. S4~S6 Set-up for parallel application

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
X	X	X	0	0	0	1	X	Master (0°); "R" Phase to be used for 1Ø3W output in series connection(Master) or 3Ø4W output connection("R" Phase)
X	X	X	0	0	1	1	X	Slave (0°) with current sharing to be used in parallel connection only
X	X	X	0	1	1	1	X	Slave (180°), to be used for 1Ø3W output in series connection(L-NN-L)
X	X	X	1	0	0	1	X	Slave (-120°), "S" Phase to support "S" Phase be(-120°) in 3Ø4W output connection
X	X	X	1	0	1	1	X	Slave (120°), "T" Phase to support "T" Phase be(120°) in 3Ø4W output connection
X	X	X	1	1	1	1	X	Disable parallel function

1=ON / 0=OFF

Table 8. Parallel application set-up

3-3-4. Parameter select: “S8” select SD’s parameter setting by dip switch or LCM port

Set Value	S8
LCM port	0
DIP switch	1

1=ON / 0=OFF

Table 9. Parameter select

3-4. DC Input - (please refer to DC wiring connections on P.20)

3-5. DC Input + (please refer to DC wiring connections on P.20)

3-6.Chassis Ground：Connect the wire # 8 AWG to vehicle chassis

WARNING!
Operating the inverter without a proper ground connection may cause electrical safety hazard.

3-7. AC Output (Please refer to hard wiring installation on P.21)

3-8. By-pass AC input (please refer to hard wiring installation on P.21)

3-9. AC input circuit breaker

The AC input circuit breaker protects the model from overload. When an overload condition exists, the circuit breaker stops supplying output AC grid power. To reset it, push the circuit breaker switch then the model will be back in normal operation. The source fault should be corrected before you reset it.

3-10. AC output socket (please refer to 4-2-3. on P.24)

3-11. Reset Button (only to be used for Ethernet interface)

The Reset Button is to be used to resume the IP address to factory default value：

IP：192.168.100.181

Subnet Mask：255.255.255.0

3-12. CAN1 and CAN2 Port (only to be used in parallel mode)

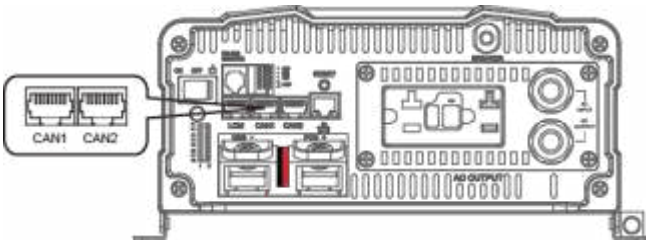


Figure 9. CAN1 and CAN2 port

1. Before using parallel mode, you need to ensure the green terminal's parallel jump status is set to ON.
2. Use the RJ-45 line (RJ-45 network cable：parallel connection) to link one of the SD Series CAN1 (CAN2) port to the other CAN1 (CAN2) port.

PIN#	LCM port	CAN1 port	CAN2 port
1	CANH	CAN_H	CAN_H
2	CANL	CAN_L	CAN_L
3	P1	Reserved	Reserved
4	VCC-	Reserved	Reserved
5	VCC+	Reserved	Reserved
6	DIS	Reserved	Reserved
7	5VS-	RND	RND
8	5VS+	Reserved	Reserved

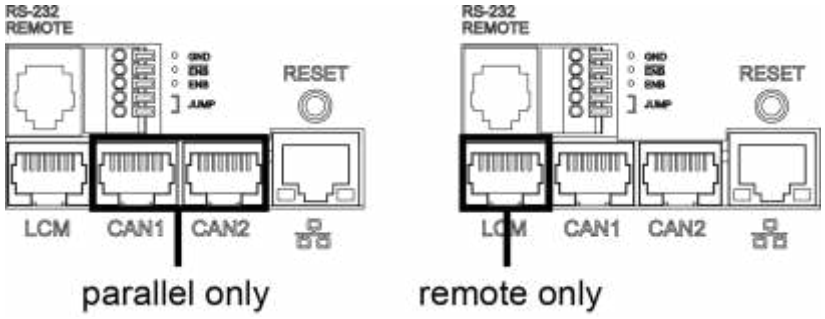
Table 10. LCM, CAN1, CAN2 port：PIN number and signal description

WARNING!

LCM port is for remote control connection only.

Please make sure the connection is correct. (CAN cable to CAN1 / CAN2 port , Remote cable to LCM port)

If CAN cable is connected to LCM port, or vice versa, the inverter will be damaged.



3-13. LCM Port

Connection for LCD remote control panel, you can set and display the SD-series operation status.

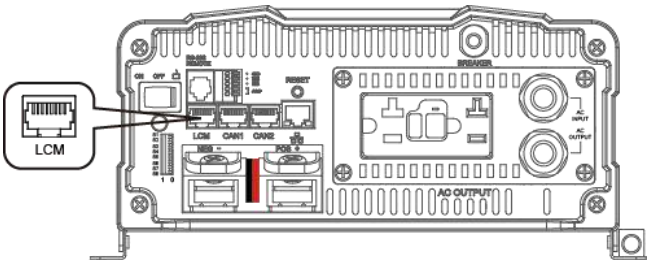


Figure 10. LCM port

Figure 11. LCM cable

LCD Remote Control Panel		SD Series
PIN Num.	**Signal Description**	**PIN Num.**
1	CANH	1
2	CANL	2
3	PON	3
4	VCC-	4
5	VCC+	5
6	DIS	6
7	5VS-	7
8	5VS+	8

Table 11. PIN number and signal description for LCD remote control

Note

The cables should be as short as possible (less than 32.8 feet / 10 meters) so that they can handle the signal.

3-14. Green terminal (Remote and Parallel select)

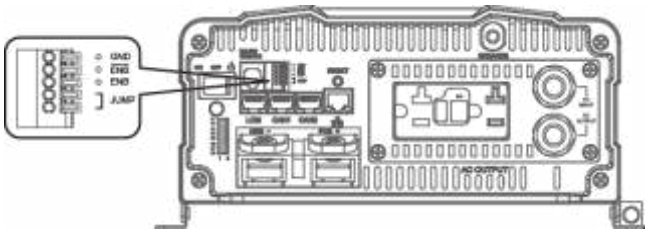


Figure 12. Green terminal

PIN #	PIN Assignment
1	GND
2	-ENB
3	ENB
4	Parallel Jump
5	Parallel Jump

Table 12. Green terminal PIN assignment

3-14-1. Parallel Jump Function (please refer to section 5 for further detailed info.)

1. Before installing the inverter, you need to ensure the main switch is in the OFF position.
2. Use 20 ~ 24 #AWG wire to connect the parallel jump terminal.

3-14-2. Remote Control Function

1. Before installing the inverter, please ensure that the main switch is in the OFF position.
2. Before using the remote control terminal, please ensure the main switch is in the REMOTE position.
3. Use 20 ~ 24 #AWG wire to connect the remote control terminal.
4. Remote control ON/OFF inverter setup status.

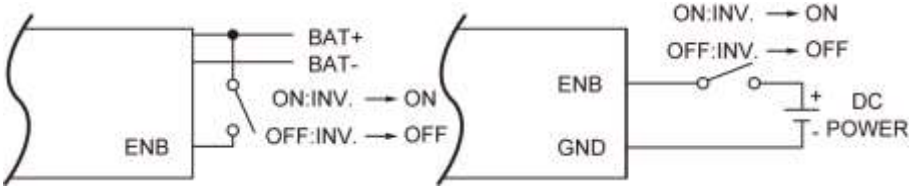


Figure 13. Remote control function setting

Note

The above 4 methods can be used to turn ON/OFF.

3-15. RS-232 Port

RS-232 Port：Serial port monitoring and control through computer's interface.

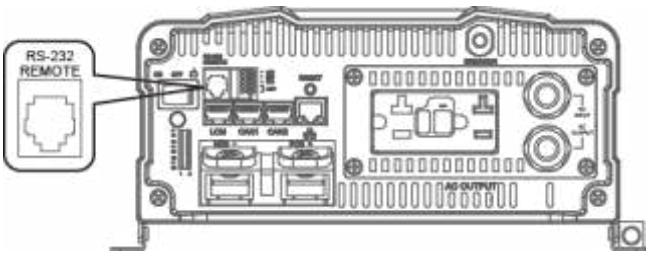


Figure 14. RS-232 port

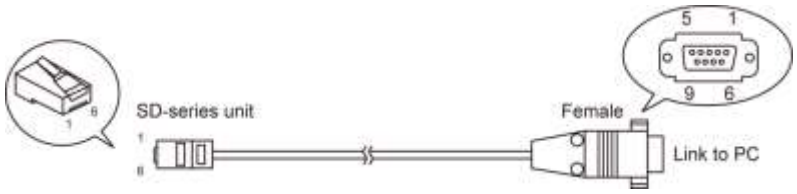


Figure 15. RS-232 cable

SD Series		Computer	
PIN Num.	**Signal Description**	**PIN Num.**	**Signal Description**
1	Not used	1	Not used
2	GND	5	GND
3	RXD	3	TXD
4	TXD	2	RXD
5	Not used		Not used
6	Not used		Not used

Table 13. The connection between SD series and computer

The connection between this SD-series and the computer is as follows：

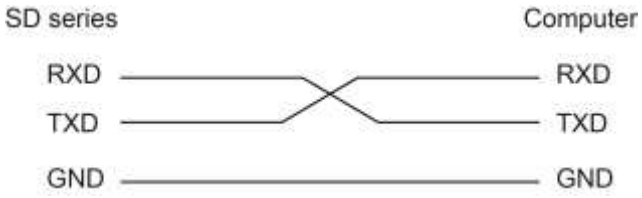


Figure 16.
The connection between SD series and computer

3-16. Fan Ventilation

The rear panel must keep the distance at least 1 inch from any surrounding items.

3-17. Protections Features

Model	DC Input (VDC)					
	Over Voltage		Over Voltage	Under Voltage		Under Voltage
	Shut-down	Restart	Alarm*	Shut-down	Restart	Alarm
12V	16 ± 0.25	15 ± 0.25	15.5 ± 0.25	10 ± 0.25	12.5 ± 0.25	10.5 ± 0.25
24V	32 ± 0.5	30 ± 0.5	31 ± 0.5	20 ± 0.5	25 ± 0.5	21 ± 0.5
48V	64 ± 1	60 ± 1	62 ± 1	40 ± 1	50 ± 1	42 ± 1

*OVA only LED prompt, no beeper alarm.

Table 14. Protections Features

4. DC Wiring Connections

Follow the instructions to connect the battery cables to the DC input terminals of the Inverter. The cable should be as short as possible (less than 6 feet / 1.8 meters ideally) so that it can handle the required current in accordance with the electrical codes or application regulations. Inappropriate length of cables will reduce the inverter performance such as poor surge capability, frequent low-input voltage warnings, and shut-down. When under voltage protect condition, please check the cable size and specification (length and diameter should conform to manual requirements) between battery and SD model.

The longer or the narrower the cable is, the more the voltage drops. Increasing your DC cable diameter will help to improve the situation.

The following are recommended cable diameter for the best performance of the inverter. (Applies to both 120V and 230V versions)

Model No.	Wire AWG	Inline Fuse
SD1500-112 / 212	# 0	250 A
SD1500-124 / 224	# 1	175A
SD1500-148 / 248	# 4	90A
SD2500-112 / 212	# 3/0	350 A
SD2500-124 / 224	# 1	175 A
SD2500-148 / 248	# 4	90A
SD3500-112 / 212	# 4/0	500 A
SD3500-124 / 224	# 0	250 A
SD3500-148 / 248	# 2	125 A
SD2500-112 / 212	# 3/0	350 A

Table 15. SD series wiring cable diameter and inline fuse

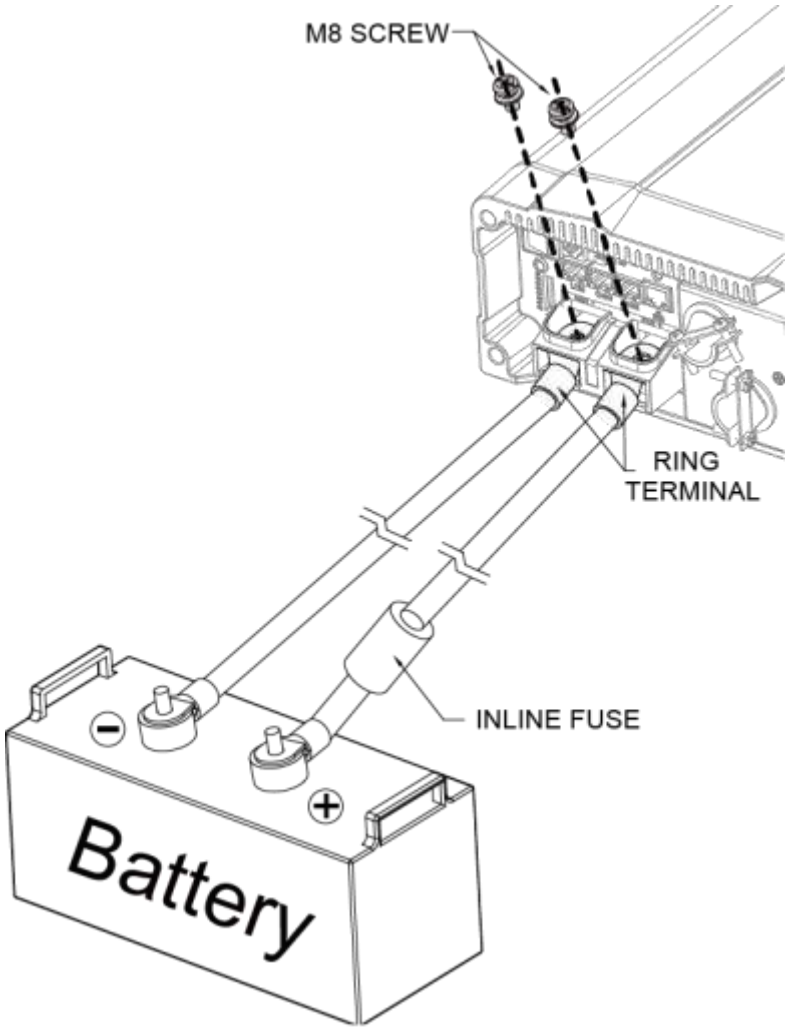
Connect the cables to the power input terminals on the front panel of the inverter. The red terminal is positive (+) and black terminal is negative (-).

Insert the cables into the terminals and tighten the screw to clamp the wires securely.

WARNING!

1. Make sure all the DC connections are tight (torque to 11 ft-lbs, 15 Nm Max.). Loose connections could overheat and result in a potential hazard.
2. The installation of a fuse must be on the positive cable. Failure to place a fuse on “+” cables running between the inverter and battery may cause damage to the inverter and will void warranty.

Also, only use high quality copper wire and keep the cable length short - maximum of 3 - 6 feet.



Do not place anything between battery cable lug and terminal surface. Assemble exactly as shown.

Figure 17. Battery cabling

WARNING!
During the first installation, a small spark is a normal phenomenon because the internal capacitors charging. Do not be concerned.

4-1. DC Input Terminals

Connect DC input terminals to 12V / 24V / 48V battery or other power sources.

[+] represents positive, [-] represents negative. Reverse polarity connection can blow the internal fuse and may damage the inverter permanently.

Model	DC Input Voltage	
	Minimum	Maximum
12V	10V	16V
24V	20V	32V
48V	40V	64V

Table 16. SD series DC input voltage range

4-2. Hard-wire Installation

4-2-1. SD series provides the flexibility of hard-wire connection, and this function will make external control panel wiring easier.

【Version 1】General model

Step 1.

Remove the four screws of AC wiring compartment and pull it out with care.

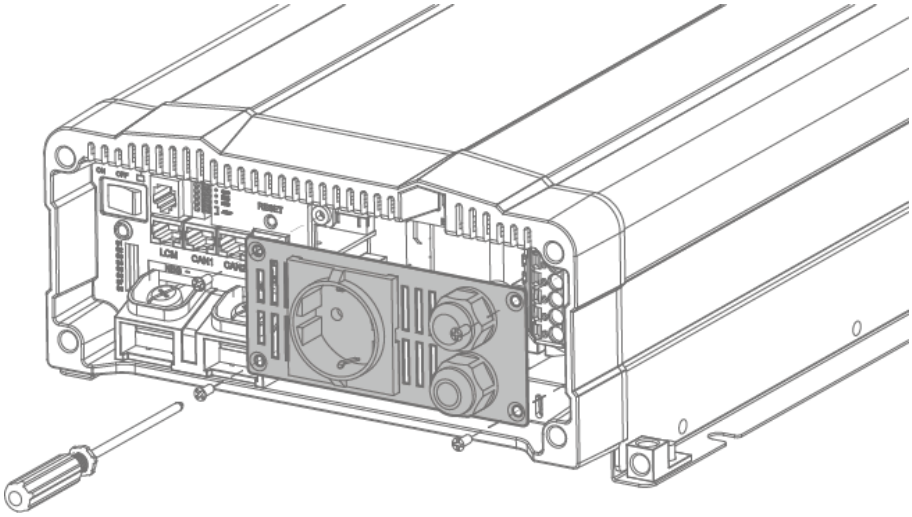


Figure 18. General model setting—Step 1

Step 2.

Pull the line through the snap bushing of the AC wiring compartment cover then follow below picture operation.

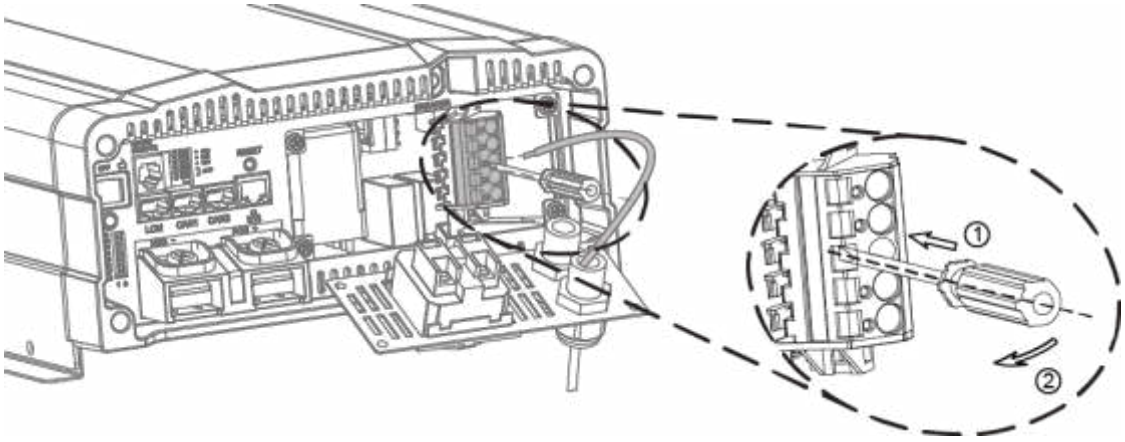


Figure 19. General model setting—Step 2

100VAC~120VAC / 200VAC~240VAC System

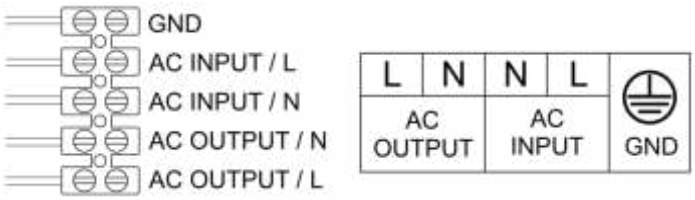


Figure 20. General model setting—AC wiring

Note

The only difference between 110V and 220V is within the AC Input breaker L or N and thus will not affect the wiring configuration.

Note

In case that user wants to install the earth-leakage circuit breaker, COTEK recommend time delay type. The major specification of the circuit breaker is as following：

Earth-leakage current：100mA, 300mA, 500mA

Time：0.45 second, 1 second, 2 seconds

Recommend model：NV50-SN, Time delay type of Shihin Electric

【Version 2】UL model

Step 1.

Use the screwdriver to remove the cover.

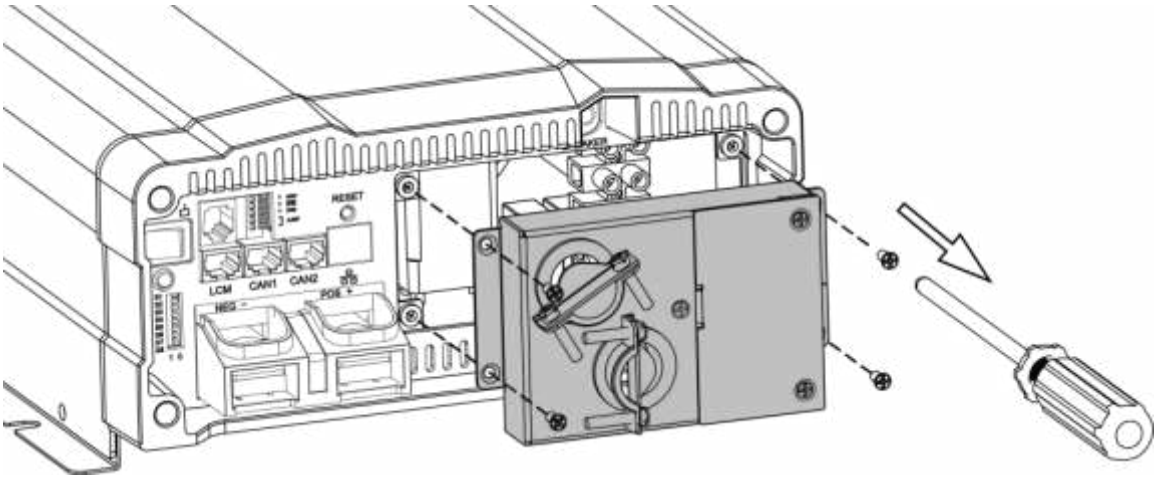


Figure 21. UL model setting—Step 1

Step 2.

AC cable pass through the ring. Wire the AC cable on the terminal.

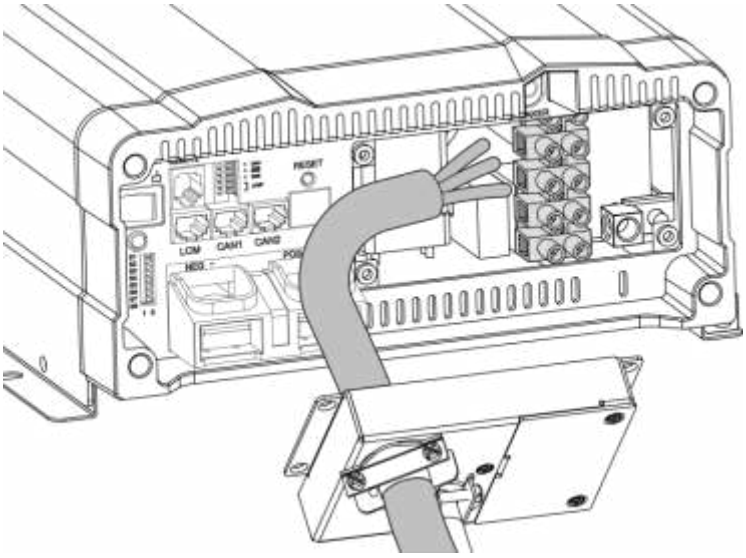


Figure 22. UL model setting—Step 2

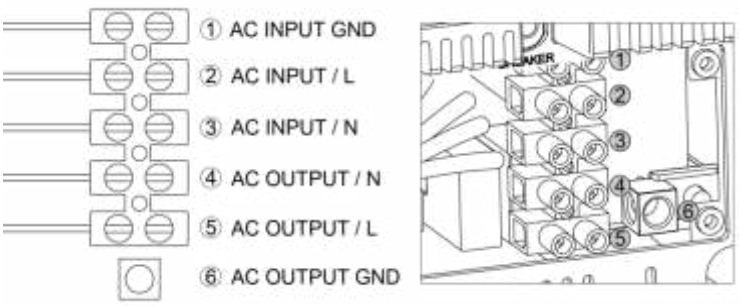


Figure 23. UL model setting—AC wiring

Step 3.

Use the screwdriver to fix the cover.

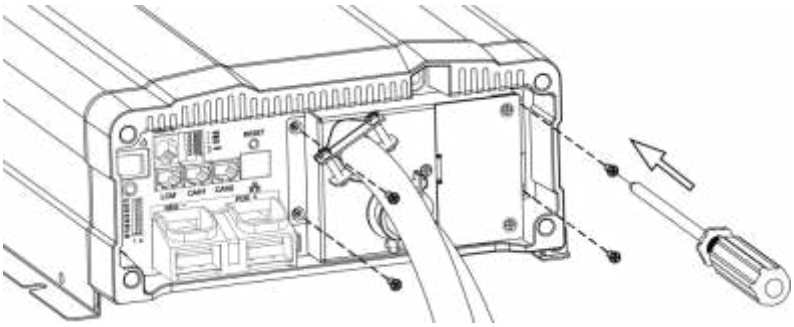


Figure 24. UL model setting—Step 3

4-2-2. Connect AC output and AC input wiring to the SD series terminals.
Please take the following information as your reference.

Terminal		Wire Color	Wire Length / Gauge
AC OUTPUT	Line (L)	Black	Within 16 feet / AWG# 200-240VAC：12AWG 100-120VAC：8AWG
	Neutral (N)	White	
AC INPUT	Line (L)	Brown	
	Neutral (N)	Blue	
Ground		Green / Yellow or Bare copper	26~32 feet / AWG#10~12

Table 17. Wire Color / Wire Length / Wire Gauge

4-2-3. Neutral Grounding Connection Setting

The default setting is option A: NO ONNECTION BETWEEN NEUTRAL CONDUCTOR (N) OF THE AC OUTPUT AND SAFETY GROUND (PE/GND)

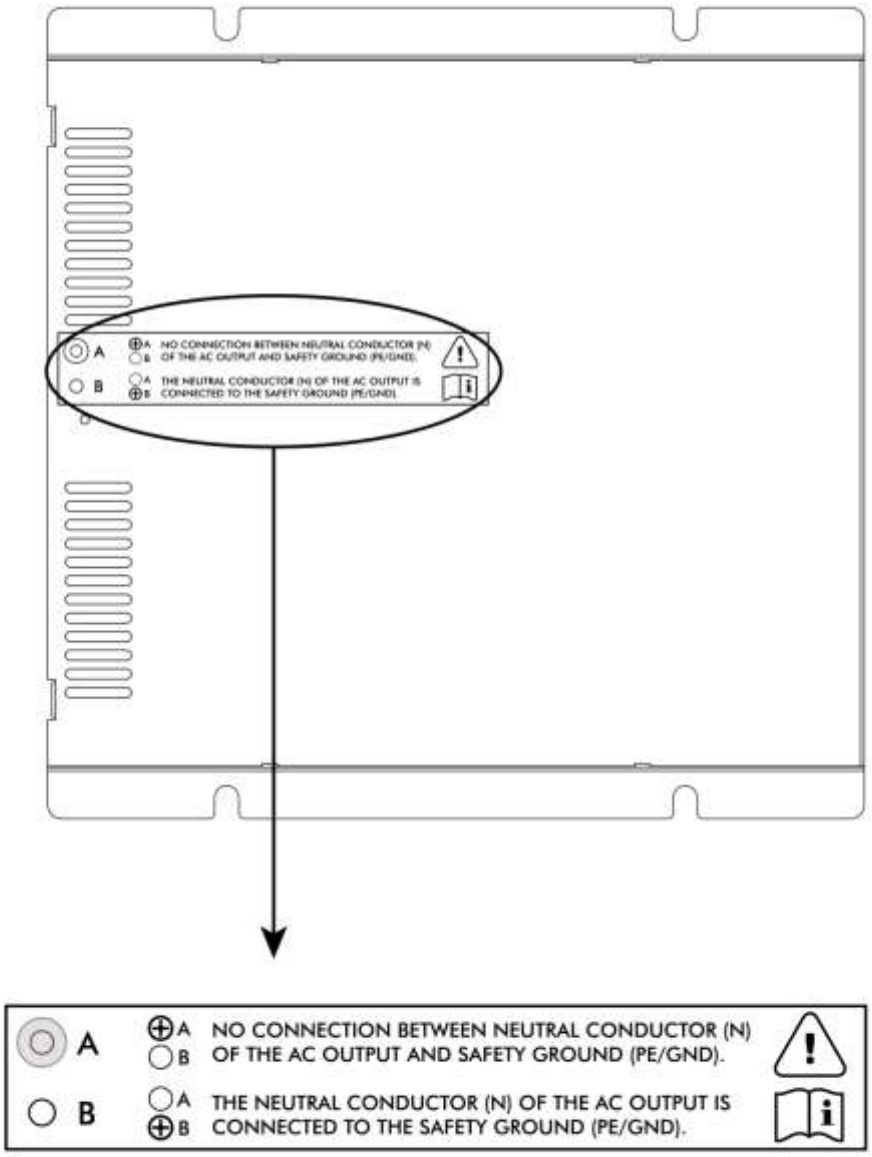


Figure 25. SD1500 Options

CAUTION!

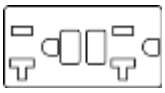
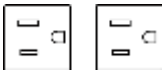
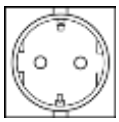
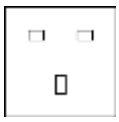
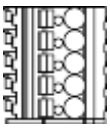
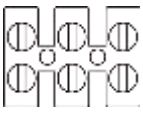
It is advised that all the electrical installation should conform to the local electrical codes and should be carried out by a certified technician.

When the unit is feeding the internally inverted voltage, the current carrying conductors connected to the “L” and “N” terminals of the AC output will be isolated from the metal chassis of the inverter. Hence, during this condition, when the metal

chassis of the inverter is connected to the earth ground, the “N” terminal of the AC output will not be grounded (bonded) to the earth ground. Under this condition, the “N” terminal of the AC output will not be a Neutral in the true sense. Do not touch this terminal as it will be at an elevated voltage (almost half the value the AC output voltage) with respect to the metal chassis / earth ground and may produce an electrical shock when touched!

When the unit is transferring power from the AC input source, the grounding condition of the “N” terminal of the AC output will be the same as the condition of the “N” terminal of the AC input source. If the AC input source is the power supplied from the utility, the “N” terminal would be a Neutral in the true sense. It will normally be bonded to the earth ground and will read almost 0 V with respect to the earth ground. In this case, touching this terminal will not be a shock hazard.

4-2-4. For AC output and terminals of the SD series, you can use both the front wiring terminal and outlet, as they are connected in parallel.

Type	Number of outlet	Voltage (VAC)	Total Current (A)
GFCI 	2	125	20
NEMA 	2	125	15
Europe 	1	250	16
Australia / New Zealand 	1	250	15
U.K. 	1	250	13
Wiring Terminal 	1	100~250	35
①UL458 	1	120	35
②Universal 	1	100~250	16

① UL458 only support 112 and 124 model.

② Only CE (200-240V Type) and FCC (100-120V Type) standard approve.

Table 18. AC input socket / Wiring terminal

Note

In case the load current over the outlet rated current, please use the hared wire terminal next to the outlets.

Note

Recommend GFCI connector：

- HUBBELL INC WIRING DEVICE DIV, Type GF20 and GFRST20. Rated 125V, 20A
- COOPER WIRING DEVICES, Type VGF20 and SGF20. Rated 125V, 20A
- LEVITON MFG CO INC, Type 7899-W and GFNT2. Rated 125V, 20A
- PASS & SEYMOUR INC, Type 2097. Rated 125V, 20A

WARNING!

When using full power, it is recommended to use the wiring terminal.

5. Parallel Mode

5-1. Prepare for Parallel Usage

1. Before setting, you need to ensure that the main switch is ”OFF”.
2. Before using the parallel function, you need to set the parallel jump of the green terminal the status of which must be “ON”, if the between in another SD is set to ”OFF” which is termination resistors.

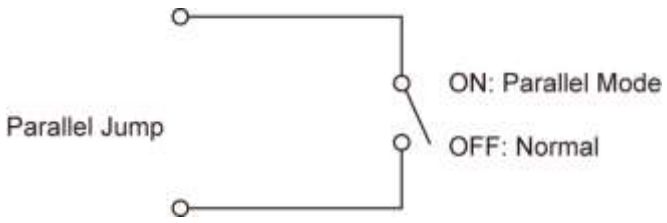


Figure 26. Parallel jump setting

Example：If three SD inverters are paralleled, setup green terminal.

Parallel	Unit 1	Unit 2	Unit 3
Type	Slave #1	Master	Slave #2
Parallel Jump	ON	OFF*	ON

*If you parallel N units, the first (unit 1) and the last unit (unit N) must set parallel jumper in ON position.

Table 19. Jumper setting for parallel usage

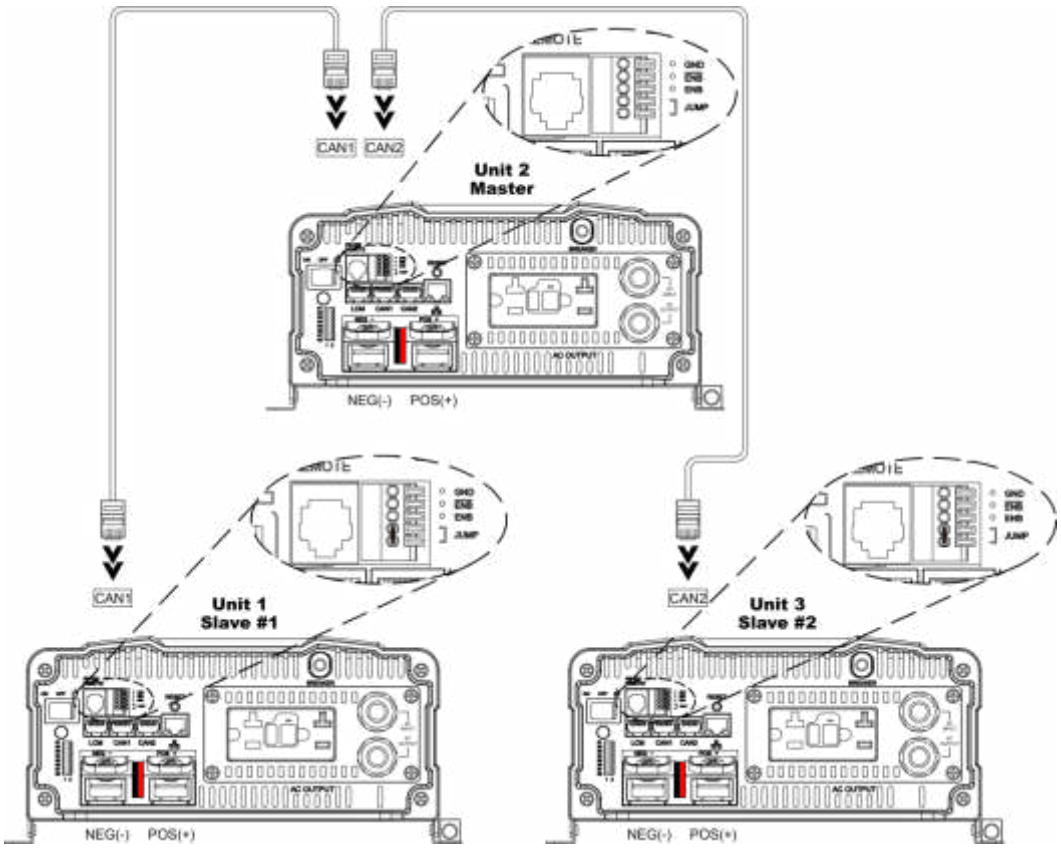


Figure 27. Sample—three SD inverters are paralleled

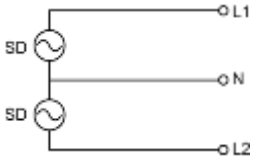
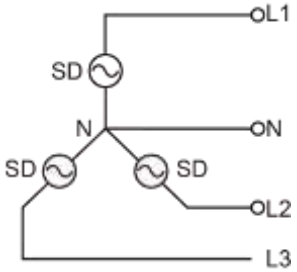
Note
Please select one unit to be Master unit.
Use the cables to connect Master and Slave units.
The CAN1 and CAN2 port connection please refer to Figure 25.

Note
The simple method to determine the terminal resistor：No need to set the terminal resistor when CAN1 and CAN2 port have wiring.

Note
SD series can be used for N+1 (N≦14) redundancy and the ability of enlarge the capacity (Users can install maximum 15 units of inverters together in parallel in order to provide the power expansion).

3. Before using the parallel function, you need to set voltage and frequency of all units' DIP switches to the same selection (refer to section 3-3).
4. Check RJ-45 line connects already.
5. SD series based on master-slave architecture and support auto master function. User only set one SD parameters and other SDs will follow the master SD setting.

5-2. Industry Applications

Type	1Φ2W	1Φ3W	3Φ4W
Drawing		 The SD series create 1Φ3W power system, L1-L2 Voltage is L1-N double.	
Example	**Example：** SD2500-124 set output 100V / 50Hz The L-N：100V / 50Hz	**Example：** SD2500-124 set output 100V / 50Hz The L1-N：100V / 50Hz	**Example：** SD2500-124 set output 100V / 50Hz The phase voltage is 100V / 50Hz (L1-N, L2-N, L3-N) The line voltage：L1-L2, L1-L3, L2-L3 ~ 173V/50Hz

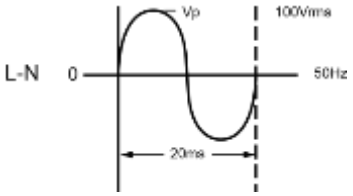
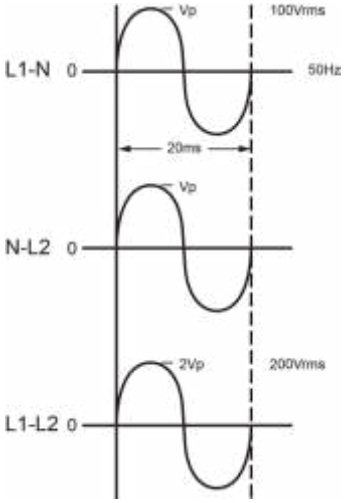
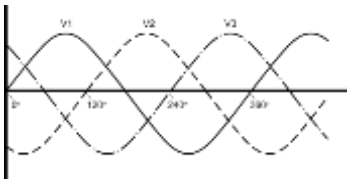
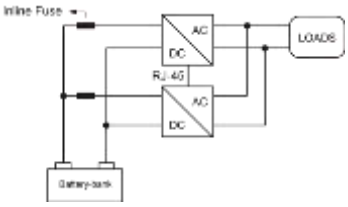
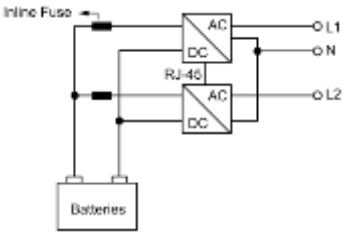
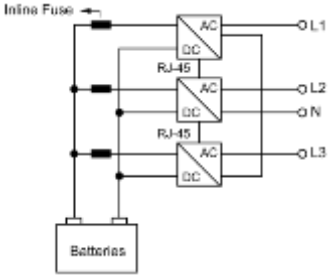
Type	1Φ2W	1Φ3W	3Φ4W
Waveform			
Battery Set up			
Warning	Transfer Switch STS module：Single < 4ms; N+1 & 1P3W & 3P4W < 6ms	Do not support N+1 operation, maximum of two SD inverters, THD < 4%	Do not support N+1 operation, maximum of three SD inverters, THD < 4% **∗DIP switch (S7) must be set to "1" ∗**
DIP Switch Setting	Refer to 5-2-1. / 5-2-2.	Refer to 5-2-3.	Refer to 5-2-4.
Wiring Diagram	Refer to Figure 32. / Figure 33.	Refer to Figure 34.	Refer to Figure 35.

Table 20. Parallel industry applications

5-2-1. 1Φ2W Switch Table

	Master	Slave 0°
S4	0	0
S5	0	0
S6	0	1
S7	1	1
S8	1	1

Table 21. 1Φ2W switch table

5-2-2. 1Φ2W Switch Table — Auto Master

	Auto Master
S4	0
S5	0
S6	0
S7	0
S8	1

Table 22. 1Φ2W switch table — auto master

5-2-3. 1Φ3W Switch Table

	Master	Slave 180°
S4	0	0
S5	0	1
S6	0	1
S7	1	1
S8	1	1

Table 23. 1Φ3W switch table

5-2-4. 3Φ4W Switch Table

	L1 Master	L2 -120° Slave	L2 +120° Slave
S4	0	1	1
S5	0	0	0
S6	0	0	1
S7	1	1	1
S8	1	1	1

Table 24. 3Φ4W switch table

5-3. Wiring for Parallel Usage

5-3-1. Connection method

1. AC OUTPUT connector setup：Line link to Line; Neutral link to Neutral.
2. AC INPUT connector setup：Line link to Line; Neutral link to Neutral.
3. Battery connector setup：POS+ link to POS+; NEG - link to NEG –

5-3-2. Connection Diagram

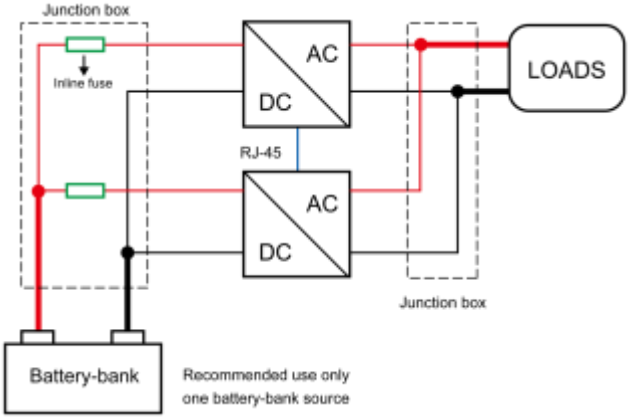


Figure 28. Connection Diagram_1

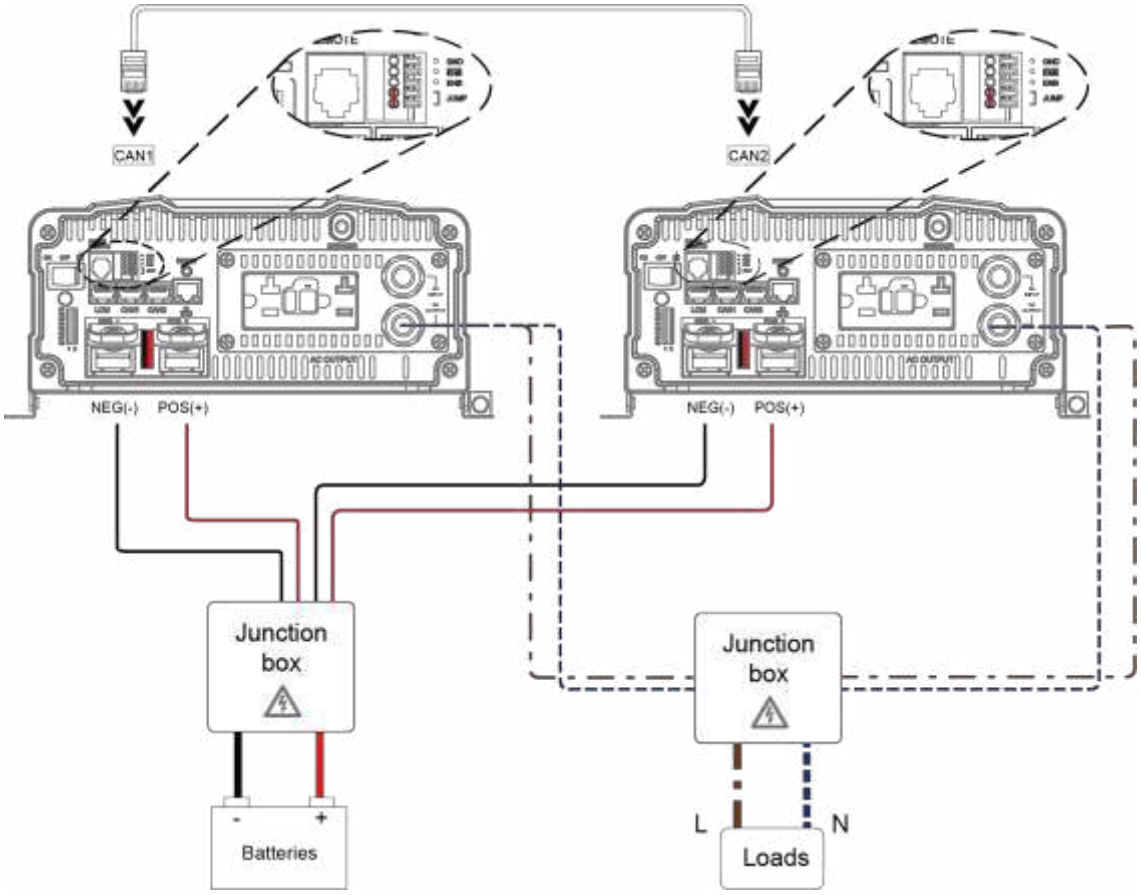


Figure 29. Connection Diagram_2

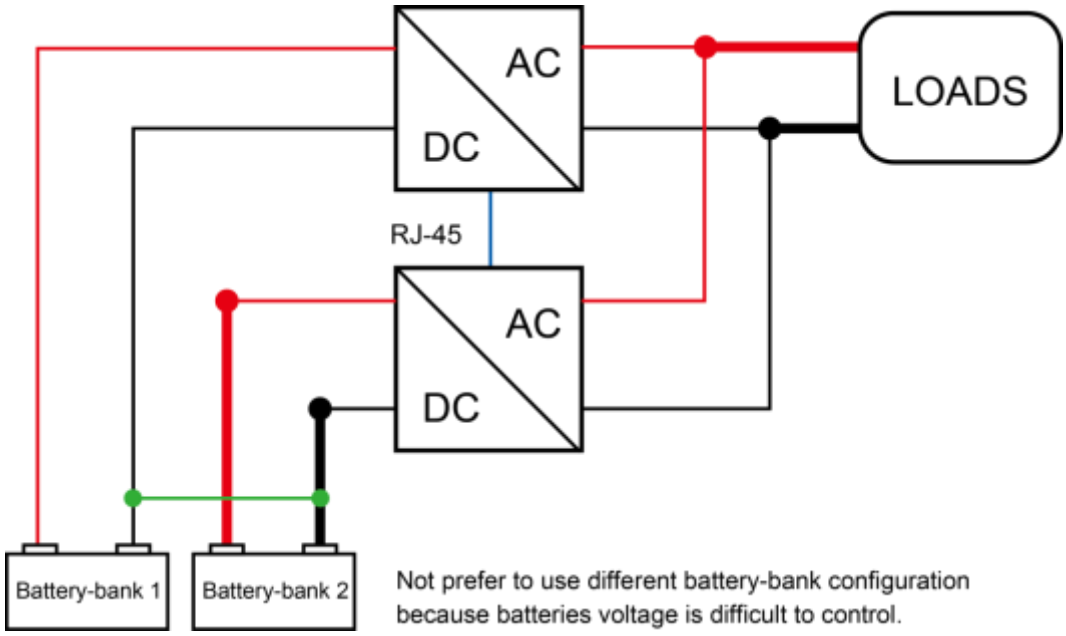


Figure 30. Connection Diagram_3

5-4. AC Wiring Diagram

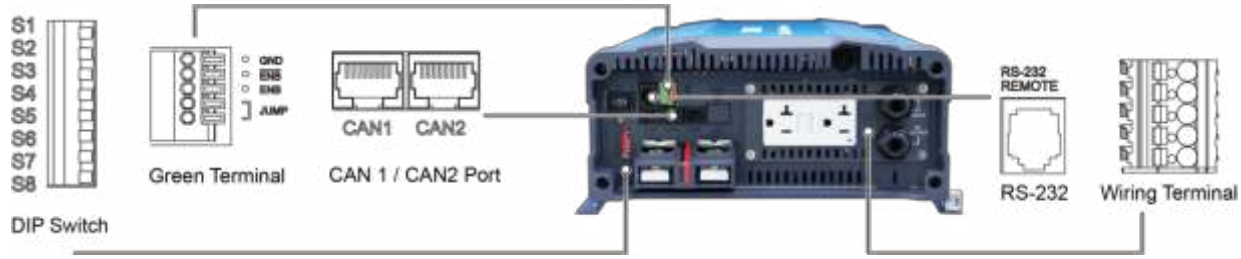


Figure 31. SD series front panel introduction

【1Φ2W — Wiring Diagram】

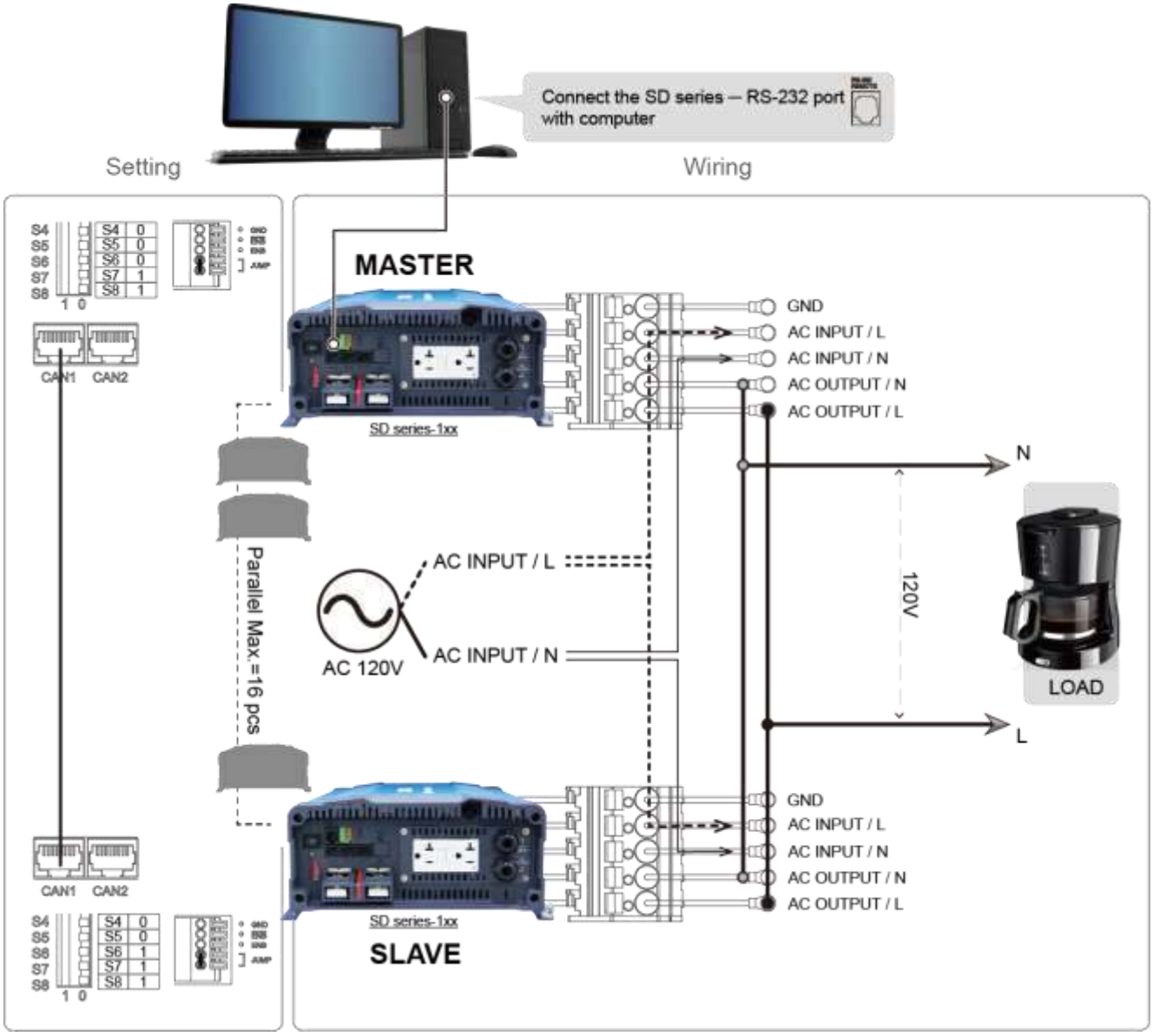


Figure 32. 1Φ2W parallel AC wiring diagram

【1Φ2W Auto Master — Wiring Diagram】

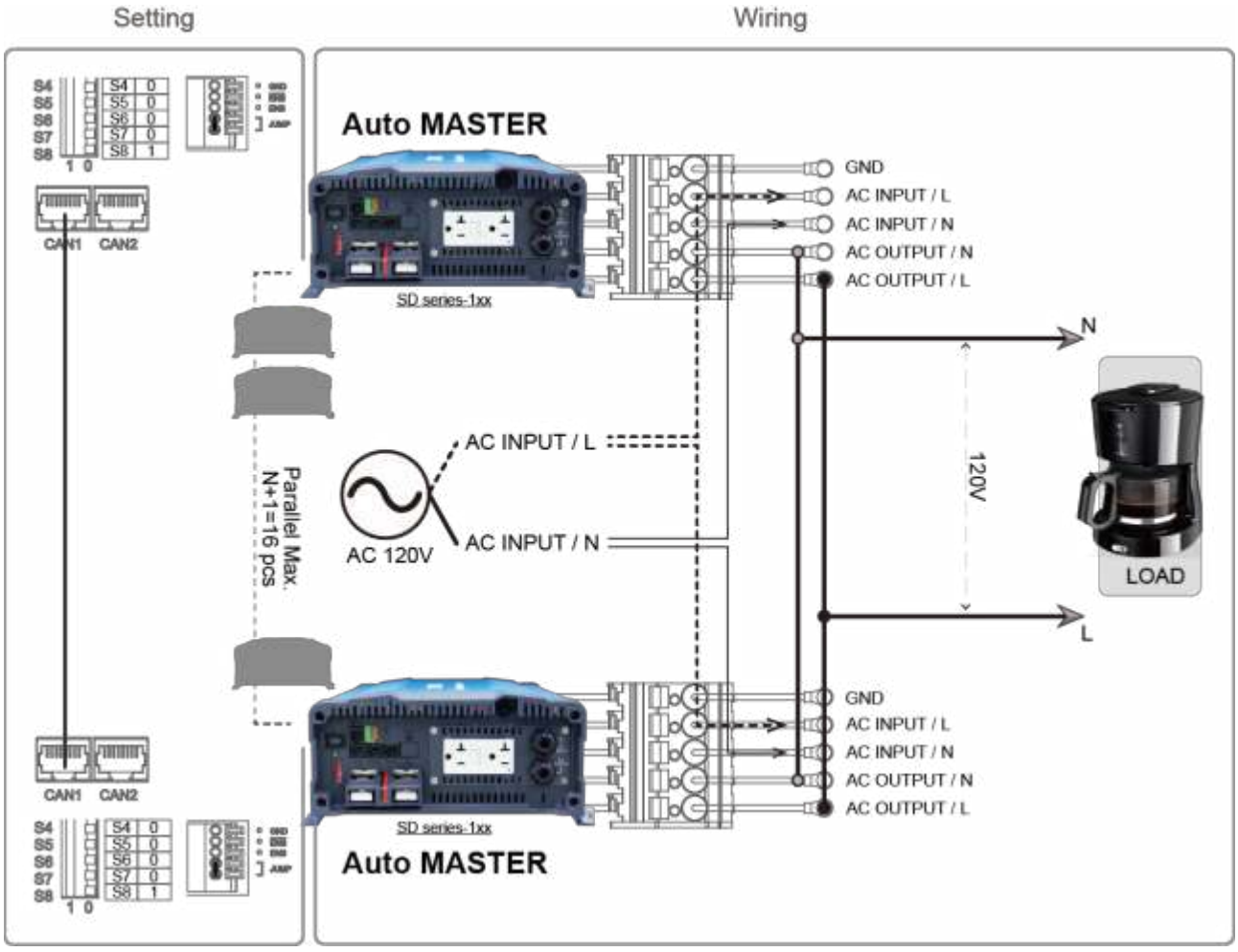


Figure 33. 1Φ2W parallel AC wiring diagram — auto master

Note

Auto master can be operated under 1Φ2W mode.

Under 1Φ2W auto master mode, please set up the inverter by Ethernet or Remote control CR-10.

Note

1Φ2W system parallel Max. N+1=16

Note

If you parallel N units, the first (unit 1) and the last unit (unit N) must set parallel jumper in ON position.

【1Φ3W — Wiring Diagram】

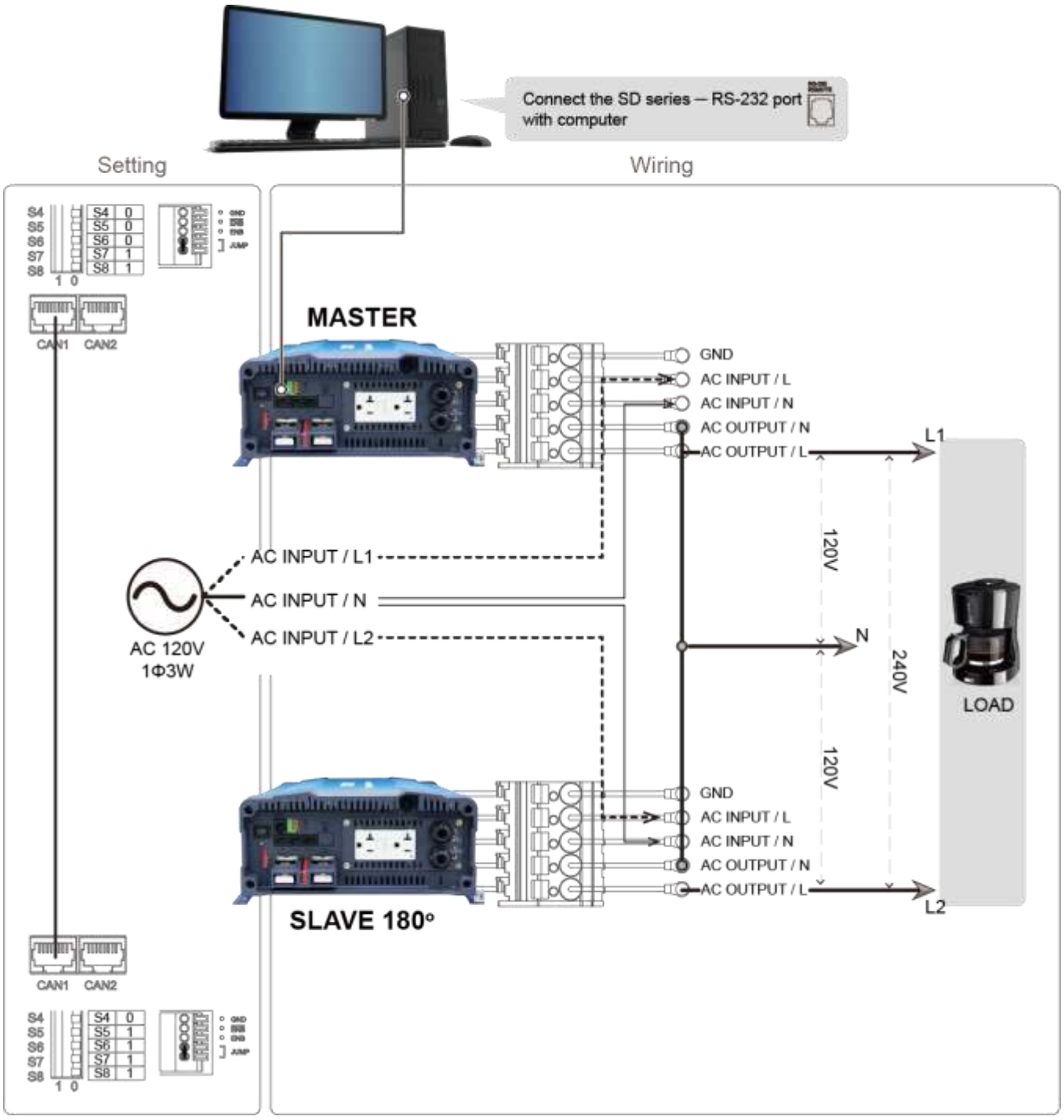


Figure 34. 1Φ3W parallel AC wiring diagram

【3Φ4W — Wiring Diagram】

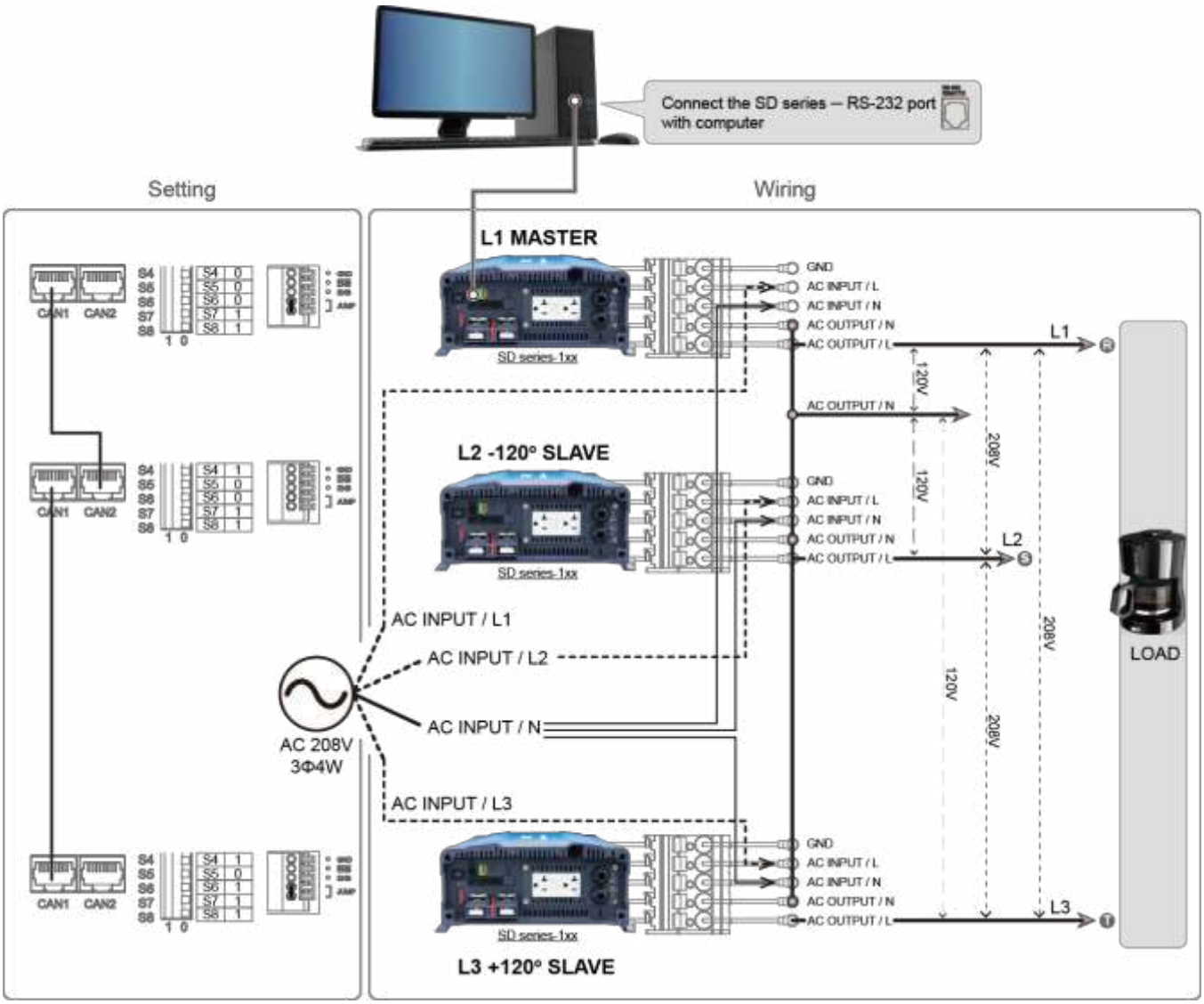


Figure 35. 3Φ4W parallel AC wiring diagram

Model	Connection / Output VAC	100V	110V	115V	120V	200V	220V	230V	240V
SD2500	L1-to-L2	173	191	199	208	346	381	398	416
	L2-to-L3	173	191	199	208	346	381	398	416
	L3-to-L1	173	191	199	208	346	381	398	416
	L1-to-N	100	110	115	120	200	220	230	240
	L2-to-N	100	110	115	120	200	220	230	240
	L3-to-N	100	110	115	120	200	220	230	240
SD3500	L1-to-L2	173	191	199	208	346	381	398	416
	L2-to-L3	173	191	199	208	346	381	398	416
	L3-to-L1	173	191	199	208	346	381	398	416
	L1-to-N	100	110	115	120	200	220	230	240
	L2-to-N	100	110	115	120	200	220	230	240
	L3-to-N	100	110	115	120	200	220	230	240

Table 25. Connection & output VAC under 3Φ4W

5-5. Remote command for the parallel connection

There are two ways for parallel connection remote setting：1. RS-232, 2. CAN-Bus. The RS-232 communication protocol not support broadcast function. In case of the remote control use the RS-232 port, please follow the setting steps for the SD setting.

RS-232 remote communication setting：

1. Select one SD to be the Master and follow the setting：

Scenario	S1	S2	S3	S4	S5	S6	S7	S8
Master	X	X	X	0	0	0	1	X

Table 26. RS-232 remote communication setting

2. Please make sure the RS-232 communication cable connect to Master unit.

WARNING!
There is only one master in the system.

5-6. Remove Parallel Connection

1. Turn off the power.
2. Remove the RJ-45 cable (parallel connection signal cable).
3. Remove the AC parallel connection cable.
4. Remove the DC parallel connection cable.

6. RS-232 Command

6-1. RS-232 command introduction

6-1-1. RS-232 command：

Command format：

This unit uses high-level language commands with a CR (0DH) and LF (0AH) as the end of the command.

The system would interpret and execute the command only after these two characters are received. After the unit execute the command, it would send a response string to the computer. The response string is as follows：

= > CR LF：Command executed successfully ? > CR LF：Command error, not accepted ! > CR LF：Command correct but execution error (e.g. parameters out of range).

If the command needs any information from the unit, the unit would send the information back to the computer (with CR and LF) and then send the response string to the computer.

6-1-2. RS-232 Command format：

This unit supports the following command format.

There should always be a CR (0DH) and a LF (0AH) appended to the command while sending commands to this unit.

Command	Function	Command	Function
POWER 1	To enable power output	**VINV?**	Show voltage of SD
POWER 0	To stop power output	**IINV?**	Show current of SD
***RST**	Recovery default setting	**VGRID?**	Show voltage of grid
FRQ?	Show frequency value	**VBAT?**	Show voltage of battery
PINV?	Show power output		

Table 27. RS-232 command table

Note：

Under parallel connection (more than 1 unit), RS232 command will only take effect when RS232 cable is connected to Master unit. The connection please refer to Figure25.

6-1-3. Command for accessing Setup Menus and adjusting values：

<Function Code>	Setting Menu	<Function Code>	Setting Menu
FUNC0	OVP Setting	**FUNC10**	Shut-down retry
FUNC1	OVP Recovery	**FUNC11**	Saving Level
FUNC2	UVP Setting	**FUNC12**	Saving Interval
FUNC3	UVP Recovery	**FUNC13**	Bypass Relay
FUNC4	UV Alarm	**FUNC14**	LCD Contrast
FUNC5	O/P Voltage	**FUNC15**	LCD Auto-off
FUNC6	RS-232 Baud rate	**FUNC16**	Buzzer Setting
FUNC7	O/P Frequency	**FUNC17**	Alert Setting
FUNC8	Sync Frequency	**FUNC18**	Language
FUNC9	Overload Alarm		

Table 28. Command for accessing setup menus and adjusting values

1. Select the Setup Menus with the help of Function Codes：
   Format：FUNC <Function Code>
   After “Enter”, the Setup Menu for the Function Code will be called.
   The <Function Code>= 0~18
2. Command to query the Functions No：
   Format：FUNC?
   After “Enter”, the unit’s “Function Code” appears on the PC screen.
3. Command to query the set value of the Function：
   Format：SETT?
   After “Enter”, the existing set value of the function appears on the PC screen.
4. Command to set or adjust the value of the Function：
   Format：SETT <value>
   After “Enter”, the new value of the Function is set Choose the <value> of the function.

6-1-4. Setting interface

1. OVP Setting **<FUNC0>**：Set the Over Voltage Protection (OVP) and shutdown.
   Default = 16 VDC @ 12V Model, 32 VDC @ 24V Model, 64 VDC @ 48V Model

Model	Setting value range
12 V	15 VDC ~ 16 VDC
24 V	30 VDC ~ 32 VDC
48 V	60 VDC ~ 64 VDC

Table 29. OVP Setting <FUNC0>

2. OVP Recovery **<FUNC1>**：When the DC input voltage is higher than the OVP setting, the SD-series shuts-down; once the input voltage falls below the set OVP value, the SD-series will automatically restart.
Default = 15 VDC @ 12V Model, 30 VDC @ 24V Model, 60 VDC @ 48V Model

Model	Setting value range
12 V	13 VDC ~ 15 VDC
24 V	26 VDC ~ 30 VDC
48 V	52 VDC ~ 60 VDC

Table 30. OVP Recovery <FUNC1>

3. UVP Setting **<FUNC2>**：Setting Under Voltage Protection (UVP) and Shut-down on the inverter operation.
Default = 10 VDC@ 12V Model, 20 VDC @ 24V Model, 40VDC @ 48V Model

Model	Setting value range
12 V	10.0 VDC ~ 12.5 VDC
24 V	20.0 VDC ~ 25.0 VDC
48 V	40.0 VDC ~ 50.0 VDC

Table 31. UVP Setting <FUNC2>

4. UVP Recovery **<FUNC3>**：When the DC input voltage is below the set UVP value, the SD-series shuts-down; Once the input voltage rises above the set UVP value, the SD-series will automatically restart.
Default = 12.5VDC @ 12V Model, 25 VDC @ 24V Model, 50VDC @ 48V Model

Model	Setting value range
12 V	11.5 VDC ~ 13.5 VDC
24 V	23.0 VDC ~ 27.0 VDC
48 V	46.0 VDC ~ 54.0 VDC

Table 32. UVP Recovery <FUNC3>

5. UV Alarm **<FUNC4>**：Setting Under Voltage (UV) alarm. When the input voltage is lower than the set value, the SD-series will sound a “beep” to remind you that the unit is going to shut-down.
Default = 10.5 VDC @ 12 V Model, 21 VDC @ 24 V Model, 42 VDC @ 48 V Model

Model	Setting value range
12 V	10.5 VDC ~ 13.0 VDC
24 V	21.0 VDC ~ 26.0 VDC
48 V	42.0 VDC ~ 52.0 VDC

Table 33. UV Alarm <FUNC4>

Note

The value of the voltage set for the “UV Alarm” should be equal to or higher than the value set for “UVP” or else the unit will shut-down without any audible warning.

6. O/P Voltage **<FUNC5>**：Setting the SD-series output voltage on the inverter operation.
   Default = 110 VAC @ 110 V Model, 230 VAC @ 230 V Model

Model	Setting value range
110 V	97 VAC ~ 123 VAC
230 V	194 VAC ~ 246 VAC

Table 34. O/P Voltage <FUNC5>

7. RS-232 Baud rate **<FUNC6>**：
   Default setting：4800

Setting Menu	SETT<value>	
RS-232 Baud rate	0	1200
	1	2400
	2	4800
	3	9600
	4	19200

Table 35. RS-232 Baud rate <FUNC6>

8. O/P Frequency **<FUNC7>**：Setting the SD-series output frequency on the inverter operation.
   Default = 60 Hz @ 110 V Model, 50 Hz @ 230 V Model.

Model	Setting value range
110 V	47 Hz ~ 63 Hz
230 V	47 Hz ~ 63 Hz

Table 36. O/P Frequency <FUNC7>

9. Sync Frequency **<FUNC8>**：If a generator is distorted. The output waveform (too low frequency) is used as AC source, the allowed frequency window for the incoming AC power can be enlarged.
   Example1：
   AC input = 230 VAC / 50Hz, User setting Value= 7Hz
   When the SD-series “Output frequency” is within The Range of 43 Hz~57 Hz, the internal transfer relay will close. When the output frequency is less than 43 Hz or more than 57 Hz, the internal transfer relay will still open.

Example2：

When user setting value= Disable, the SD-series “Output frequency” is within the range of 47 Hz~63 Hz, the internal transfer relay will close.
Default= 7Hz

Model	Setting value range
110 V	0 ~ 7 Hz
230 V	0 ~ 7 Hz

Table 37. Sync Frequency <FUNC8>

10. Overload Alarm **<FUNC9>**：Set the overload alarm. When the SD-series output power is higher than the set value, the SD-series will sound a “beep” to remind you that the unit is going to shut-down. At the same time, the internal Dry Contact Relay will open/close.
    Default = 104%
    Setting range = 50%~110%

11. Shut-down retry **<FUNC10>**：When SD-series is shut-down under OVP, UVP, Overload or short circuit conditions, the inverter will automatically try to restart according to below：

Protection type	Retry default	Setting value Range
• OLP • Short-circuit protection	5 times after protection	0~15 times
• OVP • UVP	Auto-recovery continuously	N/A

Table 38. Shut-down retry <FUNC10>

12. Saving Level **<FUNC11>**：Setting the SD-series to power saving to reduce consumption from the batteries.
    Default = 0
    Setting range = 0 ~ 7

Setting Value	Status
0	Default
1	2%
2	3%
3	4%
4	5%
5	6%
6	7%
7	8%

Table 39. Saving Level <FUNC11>

13. Saving Interval **<FUNC12>**：When SD-series inverter enters power saving mode, it will detect AC Load periodically.
    Default = 2.0 Seconds
    Setting range = 1.0S ~ 2.0S
    If the AC Load is 3 times higher than Saving Level, inverter will recover and output normally to AC Load.

14. Bypass Relay **<FUNC13>**：The setup is provided in one of the following two ways.
    On-line Mode or Off-line Mode (Exacting, Normal, Haphazard).
    Default = Normal (Off line).

Model	SETT <value>	Transfer Relay Switching Feature
Haphazard	0	The transfer relay will switch “ON” or “OFF”. Conformance to, phase and frequency synchronization will not be considered.
Normal	1	The transfer relay will be “ON” if AC input (Grid) power is available. The DC-AC inverter will remain synchronized and Phase with the incoming AC power (Grid). The relay will NOT switch off if the grid frequency is beyond the range set under Sync Frequency window.
Exacting	2	The transfer relay will switch “ON” or “OFF” based on conformance to, the Phase and Sync Frequency.
On-line	3	Always supplied by battery until which has run down (UVP) then switch to grid.

Table 40. Bypass Relay <FUNC13>

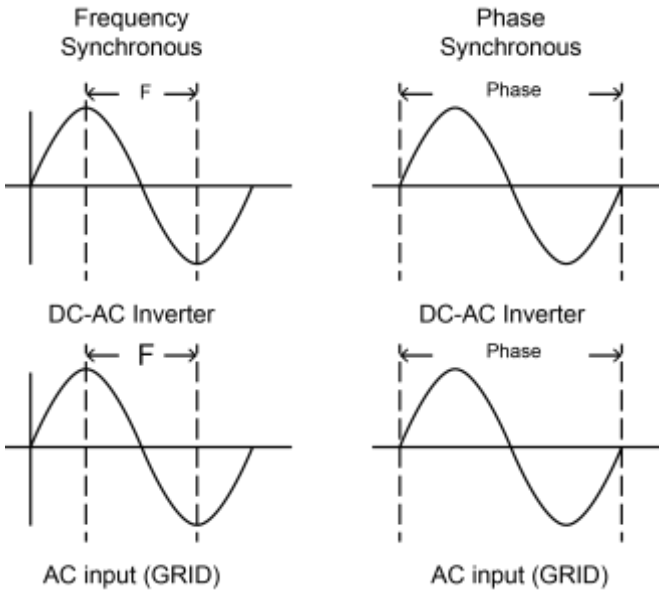


Figure 36. Frequency and phase synchronous

Transfer-Time Table		
Mode Transfer Switch	**ATS**	**STS**
Haphazard	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.	Frequency is synchronized: < 4ms.; Frequency is not synchronized: Inverter to utility AC: < 4ms.; Utility AC to inverter: 16~50ms.
Normal	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~25ms.	< 4ms
Exacting	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.	Inverter to utility AC: < 4ms.; Utility AC to inverter: 16~50ms.
Online	Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~25ms.	< 4ms

Table 41. SD series transfer time

15. LCD contrast **<FUNC14>**：Sets the LCD screen contrast.
    Default = 50%
    Setting range = 0% ~ 100%

Setting Menu	Status <value>
LCD Contrast	0 ~ 100

Table 42. LCD contrast <FUNC14>

16. LCD Auto-off **<FUNC15>**：Sets the LCD screen backlight auto off timer.
    Default = 120 seconds
    Setting range = 0 ~ 120 seconds.

Setting Menu	Status <value>
LCD Auto-off	0 ~ 120

Table 43. LCD Auto-off <FUNC15>

17. Buzzer setting **<FUNC16>**：Set the LCD remote control for the buzzer sound
    Default = MSG, Alert, SHDN
    Setting range = 0~7

Setting Menu	SETT <value>	Buzzer (Beep sound)
Buzzer Setting	0	Disable
	1	SHDN
	2	Alert
	3	Alert , SHDN
	4	MSG
	5	MSG , SHDN
	6	MSG , Alert
	7	MSG , Alert , SHDN

Table 44. Buzzer setting <FUNC16>

18. Alert Setting **<FUNC17>**：When alert occurs, the internal dry contact relay will open/close.
    Default = Alert, SHDN
    Setting range = 0~3

Setting Menu	SETT (RS-232)	Alert (LCD)
Buzzer Setting	0	Disable
	1	SHDN
	2	Alert
	3	Alert , SHDN

Table 45. Alert Setting <FUNC17>

19. Language **<FUNC18>**：The SD-series have different languages available and are selectable.
    Default = English
    Setting：English / Italian / Spanish / French / German

Model	Setting value
English	0
Italian	1
Spanish	2
French	3
German	4

Table 46. Language <FUNC18>

7. Troubleshooting

Problems and Symptoms	Possible Cause	Solutions
A. Power status red light is blinking fast.	Over input voltage. (OVP)	Check input voltage. Reduce input voltage.
B. Power status red light is Blinking slowly.	Low input voltage. (UVP)	Recharge battery. Check connections and cables.
C. Power status red light is blinking Intermittently.	Thermal shut-down. (OTP)	Improve ventilation. Make sure ventilation, shafts of the inverter are not obstructed. Lower ambient temperature.
D. Power status is solid red	Short circuit. Wiring error. Over Loading (OLP)	Check AC wiring for short circuit. Reduce load.

Table 47. SD series Troubleshooting

8. Warranty

We guarantee this product against defects in materials and workmanship for a period of 24 months from the date of purchase. Please contact with your local COTEK authorized distributor for RMA (Return material Authorization) service. Please note that COTEK will ensure our products are operational before delivery and the warranty service is offered to the unit which has defect caused under normal use, in the judgment of COTEK's technician. The warranty is null and void under the following circumstances：

(a) If the unit has been damaged through abuse, misuse, negligence (such as bumping, wetting), fault voltage supply, air/water pollution accidents and natural calamities.

(b) If the serial number has been altered, effaced or removed.

COTEK

No. 33, Sec. 2, Renhe Rd., Daxi Dist., Taoyuan City 33548, Taiwan
Phone：+886-3-3891999 FAX：+886-3-3802333
http：// www.cotek.com.tw

2017.08._A2