COTEK

SPT Series User's Manual

EN
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SPT1200/2000/3000
PURE SINE WAVE INVERTER

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EN

1. Safety Instructions

1-1. General Safety Precautions

Warning! Before using the Inverter, read the safety instructions.

- Do not expose the inverter to rain, snow, spray or dust. To reduce the risk of fire hazard, do not cover or obstruct the ventilation openings and do not install the inverter in a zero-clearance compartment.
- To avoid the risk of fire and electric shock, make sure that the existing wiring is in good electrical condition, and the wire size is not undersized.
- This equipment contains components which can produce arcs or sparks. To prevent fire or explosion do not install in compartment containing batteries or flammable materials or in location 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.
- Depending on the user scenario, the AC output of the inverter may require user installed breaker or fuse. In AC output hardwire application, AC socket will not been provided. The inverter incorporates standard AC short circuit protection.
- An over current protection at the time of installation shall be provided by others for the AC output circuit.
- The following precautions should be taken when working on the inverter:
  Step 1 Remove watches, rings, or other metal objects
  Step 2 Use tools with insulated handles
  Step 3 Wear rubber gloves and boots

1-2. Other Safety Notes

- Upon receipt, examine the carton box for damage. If you have found any damage on the carton box please notify the company you purchased this unit from.
- Do not operate near water or in excessive humidity.
- Do not open or disassemble the inverter, and warranty may be voided.
- The DC side connections should be firm and tight.
- Grounding: Reliable grounding should be maintained.
- Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery or on the other electrical part may cause an explosion.
- Install the inverter in a well-ventilated area. Do not block the front air vents, or the rear air exhausts of the unit.
- Wiring: Adequate input power must be supplied to the inverter for proper use; correct wiring sizes must be ensured.
- Mount the inverter such that the fan axis is horizontal.
- Do not operate the inverter close to combustible gas or open fire.
- Do not operate appliances that may feed power back into the inverter.
- Temperature: The inverter should be operated in an ambient temperature range of -20℃ to 40℃ otherwise the output efficiency may be affected. Air flow to the inverter must not be blocked.

2. Functional Characteristics Introduction

2-1. System

The unit is a highly reliable DC-AC inverter system, designed with advanced power electronic and microprocessor technology offering the following features:

- Pure sine wave output waveform O/P voltage : THD ≤ 3 %
- Built-in AC power and inverter automatic transfer switch
- Energy-saving mode can be set
- Flexible output frequency and voltage settings
- 2-second double power output
- Loading and temperature controlled cooling fan
- CR-8 / CR-22 remote management and control
- RS-485(Modbus) communication
- Dry contact terminal
- Advanced Protection Features
  - Input over/under voltage protection
  - Internal over temperature protection
  - Input reverse polarity protection
  - Output overload protection
  - Output short circuit protection

2-2. Block Diagram

2-3. Electrical Specification

2-3-1. SPT Series Specification

Electrical	Item	SPT-1200-112	SPT-1200-124
	Rated Power	**1200VA**	
Input	Rated input voltage	12.5 VDC	25.0 VDC
	DC input operation range	10.0~16.5±0.3VDC	20.0~33.0±0.3VDC
	Input over voltage protection	> 16.5 ± 0.3 VDC	> 33.0 ± 0.3 VDC
	Input over voltage warning	> 15.5 ± 0.3 VDC	> 31.0 ± 0.3 VDC
	Input under voltage protection	< 10.0 ± 0.3 VDC	< 20.0 ± 0.3 VDC
	Input under voltage warning	< 11.0 ± 0.3 VDC	< 22.0 ± 0.3 VDC
	Input under voltage restart	<12.5 ± 0.3 VDC	<25.0 ± 0.3 VDC
	Input over voltage restart	>13.5 ± 0.3 VDC	>27.0 ± 0.3 VDC
	Input Current (No load)	≤ 1.8 A @12.5VDC	≤ 0.9 A @ 25.0VDC
	Input Current (Max)	133A @10.5VDC	65A @ 21.0VDC
	Power Saving mode	< 0.1 A @12.5VDC	< 0.1 A @ 25.0VDC
	Dark current @ Off mode	<100uA	
Output	Overload (Max. 1 min.)	1201~1440VA	
	Peak Power (Max. 3 sec.)	1441~2400VA	
	Peak Power (Max. 2 sec.)	>2400VA	
	Frequency	50/60 Hz ± 0.3 Hz (User-selectable)	
	Output Voltage	100 / 110 / 115 / 120 Vac ±3% (Non UL version), Only 120 Vac ±3% (UL version)	
	Max. Efficiency	91%	92%
	Output Waveform	Pure Sine Wave	
	Total Harmonic Distortion (THD)	< 3% (Bat. 12.5V / 25.0V @120Vac, resistive load)	
AC input (Bypass mode)	Nominal Voltage / Frequency	120 VAC, 60Hz (User-selectable)	
	Input Voltage Range	70-150Vac	
	Input Frequency Range	50Hz:47 ~ 53 Hz / 60Hz:57 ~ 63 Hz	

	AC Input current	24A
Transfer switch	Transfer relay rating	40A continuous
	Transfer Time	≤ 20mS
Protection	DC Input Protection	OCP(fuse), Reverse Polarity(mosfet), OVP, UVP
	AC Output Protection	Short-Circuit, Overload
	AC Input Protection	30A Breaker (Automatically Reset)
	Temperature protection	Enable by heatsink temperature > 95°C
Signal and Control	Remote Control Panel (Optional)	CR-22/ CR-8
	Communication port	RJ45 x 2
	Dry Terminal	ENB+, ENB-, GND, COM, N/C, N/O
Operating Temperature Range	Full Load	-20°C ~ 40°C
	Power de-rating	41°C ~ 60°C
	Storage	-40 ~ 70°C
	Operating Humidity Range	0 ~ 95% RH, non-condensing
	Cooling	Temperature & Load Controlled Cooling Fan
Mechanical Specification	Dimension W x H x D (mm)	227 x 86 x 332
	Net Weight (kg)	3.4
Safety and EMS	Safety Standards	Certified UL458
	EMC Standards	Certified FCC Class B

Table 1. SPT-1200 Specification.

Electrical	Item	SPT-2000-112	SPT-2000-124
	Rated Power	**2000VA**	
Input	Rated input voltage	12.5 VDC	25.0 VDC
	DC input operation range	10.0~16.5±0.3VDC	20.0~33.0±0.3VDC
	Input over voltage protection	> 16.5 ± 0.3 VDC	> 33.0 ± 0.3 VDC
	Input over voltage warning	> 15.5 ± 0.3 VDC	> 31.0 ± 0.3 VDC
	Input under voltage protection	< 10.0 ± 0.3 VDC	< 20.0 ± 0.3 VDC
	Input under voltage warning	< 11.0 ± 0.3 VDC	< 22.0 ± 0.3 VDC
	Input under voltage restart	<12.5 ± 0.3 VDC	<25.0 ± 0.3 VDC
	Input over voltage restart	>13.5 ± 0.3 VDC	>27.0 ± 0.3 VDC
	Input Current (No load)	≤ 2.0 A @12.5VDC	≤ 1.0 A @ 25.0VDC
	Input Current (Max)	220A @10.5VDC	107A @ 21.0VDC
	Power Saving mode	< 0.1 A @12.5VDC	< 0.1 A @ 25.0VDC
	Dark current @ Off mode	<100uA	
Output	Overload (Max. 1 min.)	2001~2400VA	
	Peak Power (Max. 3 sec.)	2401~4000VA	
	Peak Power (Max. 2 sec.)	>4000VA	
	Frequency	50/60 Hz ± 0.3 Hz (User-selectable)	
	Output Voltage	100 / 110 / 115 / 120 Vac ±3% (Non UL version), Only 120 Vac ±3% (UL version)	
	Max. Efficiency	91%	92%
	Output Waveform	Pure Sine Wave	
	Total Harmonic Distortion (THD)	< 3% (Bat. 12.5V / 25.0V @120Vac, resistive load)	
AC input (Bypass mode)	Nominal Voltage / Frequency	120 VAC, 60Hz (User-selectable)	
	Input Voltage Range	70-150Vac	
	Input Frequency Range	50Hz:47 ~ 53 Hz / 60Hz:57 ~ 63 Hz	
	AC Input current	24A	
Transfer	Transfer relay rating	40A continuous	

switch	Transfer Time	≤ 20mS
Protection	DC Input Protection	OCP(fuse), Reverse Polarity(mosfet), OVP, UVP
	AC Output Protection	Short-Circuit, Overload
	AC Input Protection	30A Breaker (Automatically Reset)
	Temperature protection	Enable by heatsink temperature > 95°C
Signal and Control	Remote Control Panel (Optional)	CR-22/ CR-8
	Communication port	RJ45 x 2
	Dry Terminal	ENB+, ENB-, GND, COM, N/C, N/O
Operating Temperature Range	Full Load	-20°C ~ 40°C
	Power de-rating	41°C ~ 60°C
	Storage	-40 ~ 70°C
	Operating Humidity Range	0 ~ 95% RH, non-condensing
	Cooling	Temperature & Load Controlled Cooling Fan
Mechanical Specification	Dimension W x H x D (mm)	253 x 86 x 366
	Net Weight (kg)	4.4
Safety and EMS	Safety Standards	Certified UL458
	EMC Standards	Certified FCC Class B

Table 2. SPT-2000 Specification.

Electrical	Item	SPT-3000-112	SPT-3000-124
	Rated Power	**3000VA**	
Input	Rated input voltage	12.5 VDC	25.0 VDC
	DC input operation range	10.0~16.5±0.3VDC	20.0~33.0±0.3VDC
	Input over voltage protection	> 16.5 ± 0.3 VDC	> 33.0 ± 0.3 VDC
	Input over voltage warning	> 15.5 ± 0.3 VDC	> 31.0 ± 0.3 VDC
	Input under voltage protection	< 10.0 ± 0.3 VDC	< 20.0 ± 0.3 VDC
	Input under voltage warning	< 11.0 ± 0.3 VDC	< 22.0 ± 0.3 VDC
	Input under voltage restart	<12.5 ± 0.3 VDC	<25.0 ± 0.3 VDC
	Input over voltage restart	>13.5 ± 0.3 VDC	>27.0 ± 0.3 VDC
	Input Current (No load)	≤ 2.8 A @12.5VDC	≤ 1.4 A @ 25.0VDC
	Input Current (Max)	330A @10.5VDC	161A @ 21.0VDC
	Power Saving mode	< 0.1 A @12.5VDC	< 0.1 A @ 25.0VDC
	Dark current @ Off mode	<100uA	
Output	Overload (Max. 1 min.)	3001~3600VA	
	Peak Power (Max. 3 sec.)	3601~6000VA	
	Peak Power (Max. 2 sec.)	>6000VA	
	Frequency	50/60 Hz ± 0.3 Hz (User-selectable)	
	Output Voltage	100 / 110 / 115 / 120 Vac ±3% (Non UL version), Only 120 Vac ±3% (UL version)	
	Max. Efficiency	91%	92%
	Output Waveform	Pure Sine Wave	
	Total Harmonic Distortion (THD)	< 3% (Bat. 12.5V / 25.0V @120Vac, resistive load)	
AC input (Bypass mode)	Nominal Voltage / Frequency	120 VAC, 60Hz (User-selectable)	
	Input Voltage Range	70-150Vac	
	Input Frequency Range	50Hz:47 ~ 53 Hz / 60Hz:57 ~ 63 Hz	
	AC Input current	24A	
Transfer	Transfer relay rating	40A continuous	

switch	Transfer Time	≤ 20mS
Protection	DC Input Protection	OCP(fuse), Reverse Polarity(mosfet), OVP, UVP
	AC Output Protection	Short-Circuit, Overload
	AC Input Protection	30A Breaker (Automatically Reset)
	Temperature protection	Enable by heatsink temperature > 95°C
Signal and Control	Remote Control Panel (Optional)	CR-22/ CR-8
	Communication port	RJ45 x 2
	Dry Terminal	ENB+, ENB-, GND, COM, N/C, N/O
Operating Temperature Range	Full Load	-20°C ~ 40°C
	Power de-rating	41°C ~ 60°C
	Storage	-40 ~ 70°C
	Operating Humidity Range	0 ~ 95% RH, non-condensing
	Cooling	Temperature & Load Controlled Cooling Fan
Mechanical Specification	Dimension W x H x D (mm)	290 x 102 x 408
	Net Weight (kg)	6.5
Safety and EMS	Safety Standards	Certified UL458
	EMC Standards	Certified FCC Class A

Table 3. SPT-3000 Specification.

2-3-2. Voltage & temperature performance

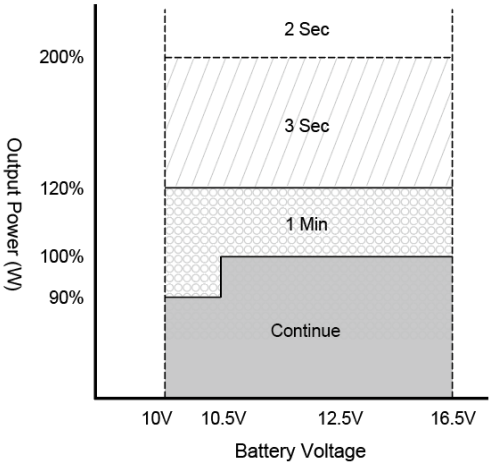


Figure 1. SPT1200/2000/3000
Output power vs. Battery Voltage

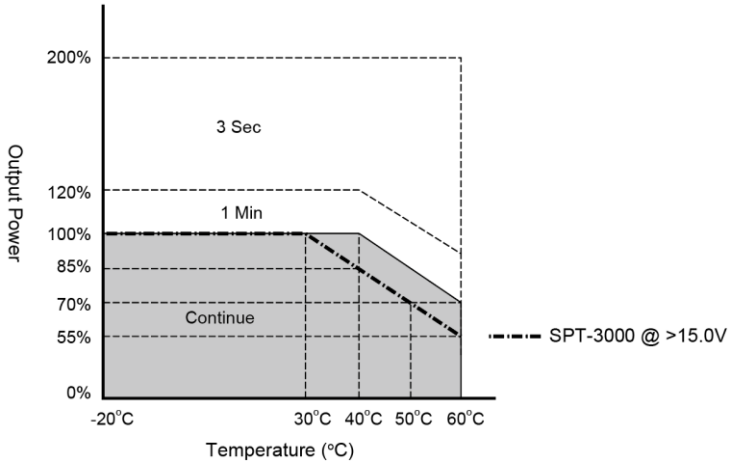


Figure 2. SPT1200/2000/3000
Output power vs. temperature

2-4. Mechanical Drawings

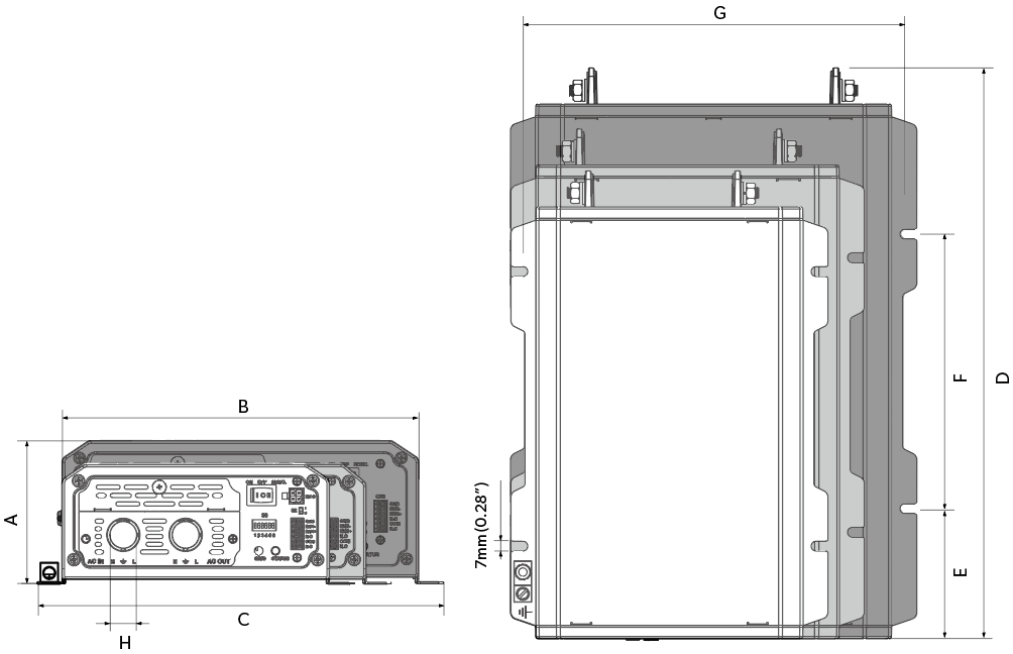


Figure 3. SPT series drawing

Model	SPT-1200	SPT-2000	SPT-3000
A	86mm (3.37”)	86mm (3.37')	102mm (4.02”)
B	191mm (7.52”)	217mm (8.54”)	254.6mm (10.02”)
C	226.4mm (8.91”)	253mm (9.96”)	290mm (11.42”)
D	332mm (13.07')	366mm (14.41”)	408mm (16.06”)
E	66mm (2.6”)	76mm (2.99”)	92.8mm (3.65”)
F	196mm (7.72”)	196mm (7.72”)	196mm (7.72”)
G	209.5mm (8.25”)	235.5mm (9.27”)	273mm (10.75”)
H	18.8mm (0.74”)	18.8mm (0.74”)	24mm (0.94”)

Table 4. SPT Series Dimension

3. Installation and Maintenance

3-1. AC Output Side (Front Panel) Introduction

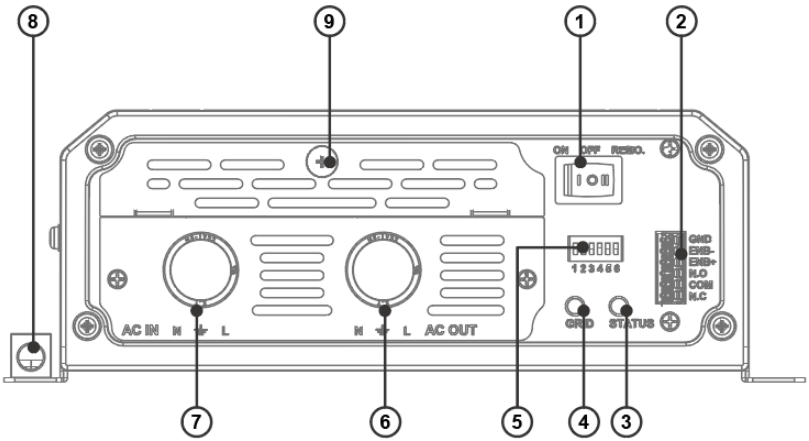


Figure 4. SPT-1200/2000/3000 AC output panel view

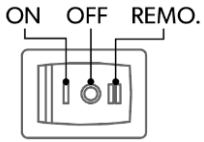
Model	SPT-1200 / 2000 / 3000
1	Main Switch (refer to 3-1-1)
2	Remote Black Terminal (ENB+- & Dry contact) (refer to 3-1-2)
3	Unit Status LED (refer to 3-1-3)
4	AC Power Only Status LED (refer to 3-1-3)
5	Function Switch (6-Port) (refer to 3-1-4)
6	AC-OUT Terminal
7	AC-IN Terminal
8	Ground Lug
9	Panel Screw

Table 5. SPT Series AC output side introduction

Note：When the main switch is switched to REMO mode, only the CR-8, CR-22, or Black Terminal (ENB+ or ENB-) can be used .

3-1-1. Main Switch

Set the main switch to the “ON”. The inverter will turn on and the Unit Status LED on. Set the main switch to the “OFF” The inverter stops and the status LED off. Set to “REMOTE” if you wish to use remote/dry contact to power on/off



3-1-2. Remote Black Terminal

Item	Description
1	Ground (GND)
2	Enable- (ENB-)
3	Enable+ (ENB+)
4	Dry contact (Normal Open)
5	Common
6	Dry contact (Normal Closed)

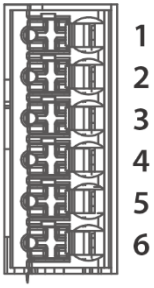


Table 6. S2-Black Terminal introduction

Note： Use 20 ~ 24 #AWG wire to connect the black terminals

Stripping Length : 8~9mm

3-1-2-1 Dry contact terminal definition

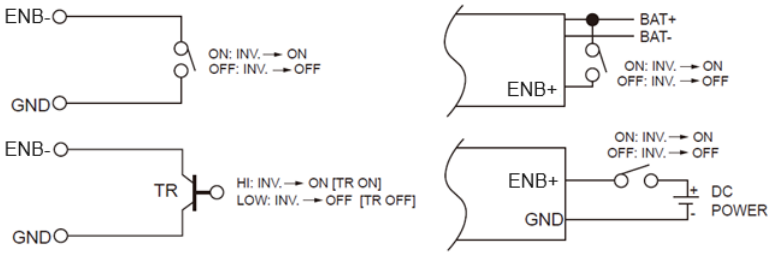


Figure 5. Dry contact terminal definition

Maximum Voltage	Load	Contact Rating		Number of operations	Operating/Storage Temperature
		N.O	N.C		
125 VAC	Resistive	0.5 A	---	100,000	-40℃~85℃
125 VAC	Resistive	---	0.5 A	---	
30 VDC	Resistive	2 A	---	100,000	
30 VDC	Resistive	---	2A	---	

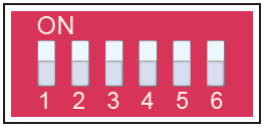
Table 7. Specifications of the Relay

3-1-3. Unit Status LED & AC Power Only LED Status

Unit Status LED	LED Signal	Status
Solid Green		Inverter mode
Slow Blink Green		Bypass mode
Slow Blink Orange		Bat. Over Voltage Alarm
Fast Blink Orange		Bat. Under Voltage Alarm
Intermittent Blink Red		Over Temperature Protection
Intermittent Blink Red		Bat. OVP Shut down
Intermittent Blink Red		Bat. UVP Shut down
Fast Blink Red		Over Load Protection
Solid Red		Hardware fault
AC Power Only LED	**LED Signal**	**Status**
Solid Blue		Grid In

Table 8. Unit Status LED Indicator

3-1-4. Function Switch



Default

Figure 5. DIP switch ON/OFF position

Dip Switch	Function
S1	Output Frequency Selection (refer to 3-1-4-1)
S2	Output voltage Selection (refer to 3-1-4-2)
S3	
S4	Power Saving Enable Selection (refer to 3-1-4-3)
S5	Power Saving Threshold Selection (refer to 3-1-4-4)
S6	Power Saving Time Out Selection (refer to 3-1-4-5)

Table 9. DIP Switch Definition

3-1-4-1. Output Frequency selection (S1)

Output Frequency	S1
50Hz	ON
60Hz	OFF

Table 10. DIP Switch definition: output Frequency selection

3-1-4-2. Output voltage selection (S2&S3)

Output voltage	S2	S3
100V	ON	ON
110V	ON	OFF
115V	OFF	ON
120V	OFF	OFF

Table 11. DIP Switch definition: output voltage selection

3-1-4-3. Power Saving Enable selection (S4)

Power Saving Function	S4
Power saving enable	ON
Power saving disable	OFF

Table 12. DIP Switch definition: Power Saving Enable selection

3-1-4-4. Power Saving Threshold selection (S5)

Threshold Voltage	S5
45W	ON
5W	OFF

Table 13. DIP Switch definition: Power Saving Threshold ***selection***

3-1-4-5. Power saving trigger time selection (S6)

Power saving trigger time	S6
10 mins	ON
Disable Time out	OFF

Table 14. DIP Switch definition: Power Saving Time Out selection

3-2. DC Input Side (Rear Panel) Introduction

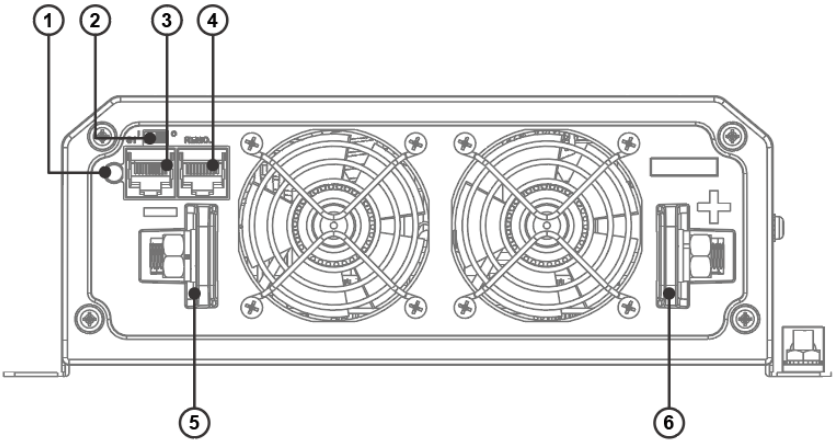


Figure 6. SPT-1200/2000/3000

Model	SPT-1200	SPT-2000	SPT-3000
1	Battery Power in Reverse Status LED (refer to 3-2-1)		
2	RS485 Terminator Switch (refer to 3-2-2)		
3	Remote Port (RJ45) (refer to 3-2-3)		
4	Remote Port (RJ45) (refer to 3-2-3)		
5	Batt- Input Terminal (Recommended torque value: 65-70 kgf.cm [6.4-6.9 N.m])		
6	Batt+ Input Terminal (Recommended torque value: 65-70 kgf.cm [6.4-6.9 N.m])		

Table15. SPT Series DC input side introduction

3-2-1. Battery Power in Reverse Status LED Status

Battery Power in Reverse Status LED	LED Signal	Status
Solid Red		DC Reverse

Table16. DC Reverse Status LED Status

3-2-2. RS485 Terminator Switch (for Default OFF)

For the last connected, please slide the switch to the ON position for activating the terminating resistor.

3-2-3. Pin Definition for Remote Port (RJ-45)

Pin Number	Signal Description	
1	Reserved	N/A
2	Reserved	N/A
3	Reserved	N/A
4	485B	RS485 B signal
5	485A	RS485 A signal
6	RMT	Remote controller panel (positive)
7	12VP	Internal power for remote controller
8	GND	The same polarity as the battery **negative** side

Table17. Pin define for Remote Port

3-3. Mounting Instruction

3-5-1. Wall Mount

Step 1. Use the screws to mount the Drip shield and the product on the wall.

Step 2. Please make sure the bulkhead size requires at least 3 inches clearance each side of the inverter.

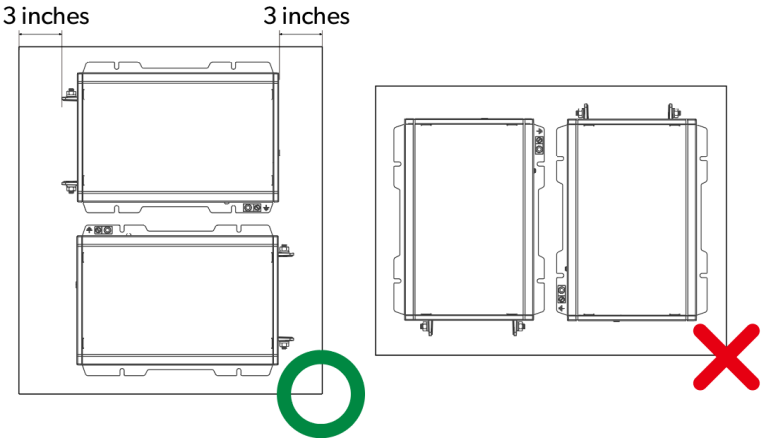


Figure 7 : Wall mount

3-5-2. Ceiling Mount (For Vehicle and Marine)

Use the screws to mount the product on the wall, and the product mounting requirement is as follow:

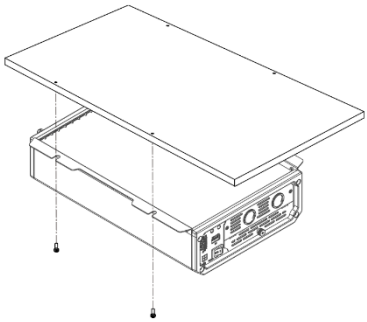
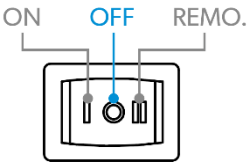


Figure 8 : Ceiling mount

4. Installation

4-1. Connection the DC cable

Before making the DC input side connections, the main switch must be at “OFF”.



Connect DC input terminals to 12V battery or other DC power source [+] is positive, [-] is negative. Reverse polarity connection can let DC Reverse Status LED on.

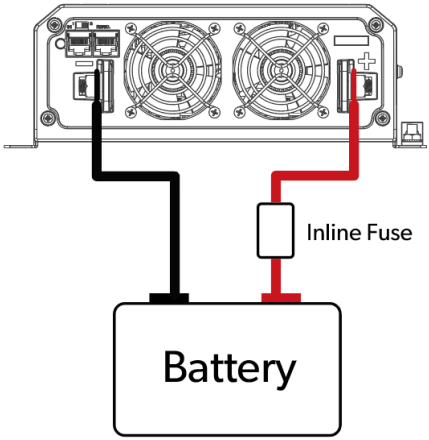


Figure 9. DC cable connection

4-2 . DC in wire AWG/INLINE fuse

Model	Wire AWG	Inline fuse
SPT-1200-112/124	#1 / #6	≥300A / ≥150A
SPT-2000-112/124	#1/0 / #4	≥500A / ≥250A
SPT-3000-112/124	#4/0 / #1/0	≥700A / ≥350A

Table18. DC in wire AWG/INLINE fuse

Warning! The recommended inline fuse should be installed as close to the battery positive terminal as possible failure to use a fuse on the “+” cable running between the inverter and battery may cause damage to the cable / inverter and will void warranty.

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

4-3. Hardwire Installation

Step 1. Remove the three screws of AC wiring compartment and pull it out with care.

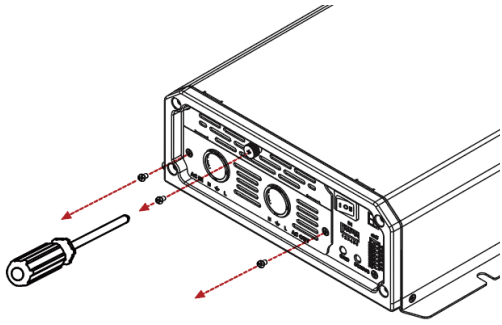


Figure 10. Remove the three screws

Step 2. Pull the line through the snap bushing of the AC wiring compartment cover then follow below picture operation.

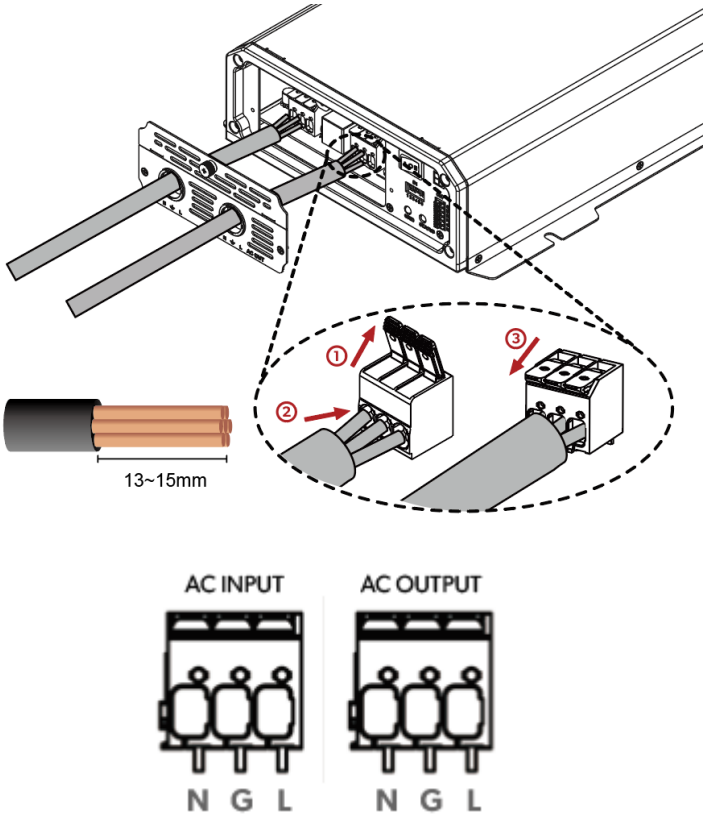


Figure 11. AC wiring

4-4. Connecting the loads

Calculate the total power consumption of the output load. Make sure that the total power consumption does not exceed the rated power.

If the total power consumption over the rated power of the inverter, remove

the non-critical: loads until the total power consumption is below the rated power.

Appliance	Typical Wattage	Appliance	Typical Wattage
13" Color TV	50	3/8 Power Drill	500
19" Color TV	100	Icemaker	200
VCR	50	Coffee Maker	1000
Lamp	100	3cu' Refrigerator	150
Blender	300	20cu' Refrigerator	750
Laptop Computer	50	Compact Microwave	750
Curling Iron	50	Full Size Microwave	1500

Table19. Typical Power Consumption

*Numerous electric motors exhibit momentary starting demands that surpass their operational ratings. Start-up wattage, when applicable, is specified. It's important to note that individual appliances may exhibit variations in performance based on their style and brand.

4-4-1. Nutural Grounding

For safety and compliance with electrical standards, it's best to have all electrical installations done by certified technicians in line with local codes.

When the unit is in operation with its internal inversion mechanism on, the "L" and "N" terminals of the AC output become isolated from the metal chassis. So, if the chassis is grounded, the "N" terminal isn't, and it's not a true Neutral. Touching it could give you a shock, as it carries a voltage almost half of what's in the AC output.

But when the unit is drawing power from the AC input source, the grounding status of the "N" terminal matches that of the input source. So, if the source is from the utility, the "N" terminal is a true Neutral, usually grounded and safe to touch.

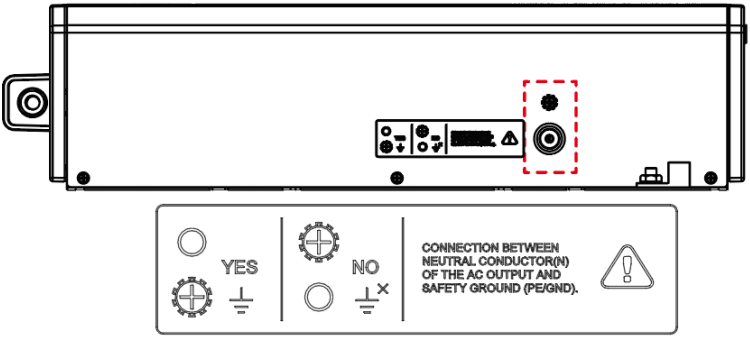
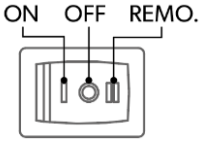


Figure 12. Nutural Grounding

4-5. Switch ON Inverter



If you choose to control the Power On/Off via the dry contact or the remote unit, please make the power switch at “REMO” position.
For the dry contact information, please refer to 3-1-4-1

4-6. Protection Mechanism

Model	Over Voltage (DC)		Under Voltage Alarm	Under Voltage	
	Shutdown	Restart		Shutdown	Restart
12V	>16.5V ± 0.3V	<13.5V± 0.3V	11V ± 0.3V	10V ± 0.3V	>12.5V± 0.3V

Table 20. Protection Mechanism

Model	Over temperature protection	
	Shutdown	Restart
12V	95℃	60℃

Table 21. Over Temperature Protection Mechanism

5. RS- 485 Communication and Operation

5-1. RS-485 Port

RS-485 Port : Serial port monitoring and control through computer interface.

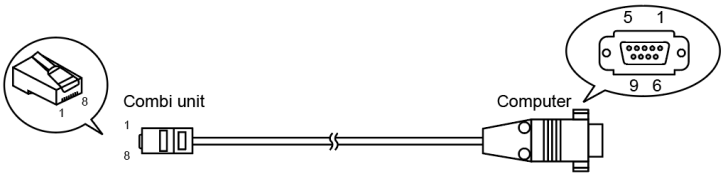


Figure 13. RS-485 cable

RJ45		COM port	
PIN Number	**Description**	**PIN Number**	**Description**
1	Not used	1	Not used
2	Not used	2	RXD
3	Not used	3	TXD
4	485B	4	Not used
5	485A	5	GND
6	RMT	6	Not used
7	12VP	7	Not used
8	GND	8	Not used
		9	Not used

Table 22. RS-485 interface definition

5-2. RS-485 Port Operating

The following steps show the connection among inverter and computer.

Step 1 Connect the RS-485 port to the SPT series unit on the rear panel

Step 2 Run the computer communication program

Step 3 Set the transmission protocol
Byte structure: START-BIP – 8 BIT DATA-STOP BIT
Baud rate: 9600bps

Step 4 Select the COM port and start the operation

5-3.RS-485 Command

5-3-1. RS-485 command format

This device uses the MODBUS communication protocol. Control commands are sent using hexadecimal characters, and the commands must include the following: Slave ID, Function code, Starting address, Quantity of Coils, and CRC checksum.

The Slave ID of this device is 11H

For Example:

Correctly querying the BUVP value：

Slave ID	Function	Starting address		Quantity of Coils		CRC	
11	03	00	10	00	01	87	5F

SPT Response：

Slave ID	Function	Byte Quantity	Quantity of Coils		CRC	
11	03	02	06	72	FA	02

Correctly setting the BUVP value:

Slave ID	Function	Starting address		Quantity of Coils		CRC	
11	06	00	10	06	72	09	1A

SPT Response：

Slave ID	Function	Starting address		Quantity of Coils		CRC	
11	06	00	10	06	72	09	1A

Incorrectly setting the BUVP value：

Slave ID	Function	Starting address		Quantity of Coils		CRC	
11	06	00	10	06	73	C8	DA

SPT Response：

Slave ID	Function	Exception Code	CRC	
11	86	04	42	66

5-3-1-1:Exception Codes

Code	Name	Description
01	Illegal function	Unsupported Function Code
02	Llegal data address	Disallowed starting address or output quantity
03	Illegal data value	Disallowed read/write value
04	Slave device failure	Device read or write failure, possibly exceeding limit values

5-3-2. RS-485 function list

The following table shows the useful command to operate SPT series.

Function	**Command address and description**
Turn ON / OFF SPT series	Function:05 Address: 0x0000 SET 00 00:Power OFF SET FF 00:Power ON
Query the SPT series input grid	Function:04 Address: 0x0003
Query the SPT series Inverter voltage	Function:04 Address: 0x0000
Query the SPT series Inverter current	Function:04 Address: 0x0001
Query the SPT series Inverter power	Function:04 Address: 0x0002
Query the SPT series grid(AC-IN) Voltage	Function:04 Address: 0x0003
Query the SPT series battery voltage	Function:04 Address: 0x0009
Query the SPT series mosfet temperture	Function:04 Address: 0x000A
Query the SPT series Error signals	Function:04 Address: 0x000B
Query the SPT series Warn signals	Function:04 Address: 0x000C
Query the SPT series status	Function:02 Address: **Address** / **Description** 0x0000 BUVP 0x0001 BOVP 0x0002 OLPL 0x0003 OLPM 0x0004 OLPH

<table>
<tr><th>Function</th><th>Command address and description</th></tr>
<tr><td></td><td>
<table>
<tr><td>0x0007</td><td>OTP</td></tr>
<tr><td>0x000A</td><td>Bempty</td></tr>
<tr><td>0x0010</td><td>BUVW</td></tr>
<tr><td>0x0011</td><td>BOVW</td></tr>
</table>
✱ Status definition refer to Table 24. Status definition
</td></tr>
<tr><td>Query the Function Setup Value with the help of Function Codes</td><td>Function:03
Address:
<table>
<tr><th>Function address</th><th>Setting Menu</th></tr>
<tr><td>0x0010</td><td>OVP setting</td></tr>
<tr><td>0x0011</td><td>OVP Recovery</td></tr>
<tr><td>0x0012</td><td>UVP Setting</td></tr>
<tr><td>0x0013</td><td>UVP Recovery</td></tr>
<tr><td>0x0014</td><td>Warning Voltage</td></tr>
<tr><td>0x0015</td><td>Retry time</td></tr>
<tr><td>0x0016</td><td>saving enable</td></tr>
<tr><td>0x0017</td><td>saving power</td></tr>
<tr><td>0x0018</td><td>Saving time out</td></tr>
</table>
</td></tr>
<tr><td>Setup the Function Value with the help of Function Codes</td><td>Function:06
Address:
<table>
<tr><th>Function address</th><th>Setting Menu</th></tr>
<tr><td>0x0010</td><td>OVP setting</td></tr>
<tr><td>0x0011</td><td>OVP Recovery</td></tr>
<tr><td>0x0012</td><td>UVP Setting</td></tr>
<tr><td>0x0013</td><td>UVP Recovery</td></tr>
<tr><td>0x0014</td><td>Warning Voltage</td></tr>
<tr><td>0x0015</td><td>Retry time</td></tr>
<tr><td>0x0016</td><td>saving enable</td></tr>
<tr><td>0x0017</td><td>saving power</td></tr>
<tr><td>0x0018</td><td>Saving time out</td></tr>
</table>
</td></tr>
</table>

Table 23. RS-485 function list

SPT-1200/2000/3000 Status Definition

Description	address	Definition
BUVP Protection	0x0000	BUVP: Battery Under Voltage Protection
BOVP Protection	0x0001	BOVP: Battery Over Voltage Protection
OLPL Protection	0x0002	OLPL: Over Load Protection Low (101~120%)
OLPM Protection	0x0003	OLPM: Over Load Protection Middle (121~200%)
OLPH Protection	0x0004	OLPH: Over Load Protection High (>200%)
OTP Protection	0x0007	OTP: Over Temperature Protection by Component
Bempty Protection	0x000A	Bempty: Battery empty Protection
BUVW	0x0010	BUVW: Battery Under Voltage Warning
BOVW	0x0011	BOVW: Battery Over Voltage Warning

Table 24. SPT-1200/2000/3000 Status Definition

5-3-2-1. Function:06, Address 0x0010 : OVP setting

SETT <value>	Default	Description
05 DC – 06 72 <1500 – 1650>	06 72 <1650>	16.50V=1650*0.01V

****SET 05H DCH : 15.00V, SET 06H 0EH:15.50V, SET 06H 40H:16.00V , SET 06H 72H:16.50V***

Table 25. OVP setting

5-3-2-2. Function:06, Address 0x0011 : OVP Recovery

SETT <value>	Default	Description
00 00 – 01 2C <0 – 300>	01 2C <300>	13.50V = 16.50V – 3.00V

****SET 00H 00H: 0.00V, SET 00H 96H:1.50V , SET 01H 2CH:3.00V***

Table 26. OVP recovery

5-3-2-3. Function:06, Address 0x0012 :UVP setting

SETT <value>	Default	Description
03 E8 – 04 7E <1000 – 1150>	03 E8 <1000>	10.00V=1000*0.01V

****SET 03H E8H: 10.00V, SET 04H 1AH: 10.50V , SET 04H 4CH:11.00V, SET 04H 7EH:11.50V,***

Table 27. UVP setting

5-3-2-4. Function:06, Address 0x0013 : UVP Recovery

SETT <value>	Default	Description
00 00 – 01 2C <0 – 300>	00 FA <250>	12.50V = 10.00V + 2.50V

SET 00H 00H: 0.00V, SET 00H 96H:1.50V , SET 01H 2CH:3.00V,

Table 28. UVP recovery

5-3-2-5. Function:06, Address 0x0014 : Warning Voltage

SETT <value>	Default	Description
00 00 – 00 64 <0 – 200>	00 64 <100>	11.00V = 10.00V + 1.00V

SET 00H 00H: 0.00V, SET 00H 64H:1.00V , SET 00H C8H:2.00V,

Table 29. Warning Voltage

5-3-2-6. Function:06, Address 0x0015 : Retry time

SETT <value>	Default
00 00 – 00 0F <0 – 15>	00 03 <3>

SET 00H 00H: 0, SET 00H 09H:9 , SET 00H 0FH:15

Table 30. *Retry time*

5-3-2-7. Function:06, Address 0x0016 : saving enable

SETT <value>	Default
00 00 – 00 01 <0 – 1>	00 00 <0>

SET 00H 01H : Saving on ; SET 00H 00H : Saving off

Table 31. saving enable

5-3-2-8. Function:06, Address 0x0017 : saving power

SETT <value>	Default
00 01 – 00 09 <1 – 9>	00 01 <1>

**** SET 00H 01H : 5W , SET 00H 04H : 20W, SET 00H 07H : 35W, SET 00H 09H : 45W***

Table 32. saving power

5-3-2-9. Function:06, Address 0x0018 : Saving time out

SETT <value>	Default
00 00 – 00 0A <0 – 10>	00 00 <0>

**** SET 00H 00H: OFF, SET 00H 03H : 3min. , SET 00H 06H : 6min., SET 00H 09H : 9min., SET 00H 0AH : 10min.***

Table 33. Saving time out

6. Trouble Shooting

Status LED	Buzzer states	Status	Solution
Slow Blink Orange	N/A	Over Voltage Alarm	Check DC input voltage.
Fast Blink Orange	N/A	Under Voltage Alarm	1.Check DC input voltage. 2.Check DC input connection and wring cable.
Intermittent Blink Red	one short beeping per 1.6sec.	Over Temperature Protection	1. Improve ventilation. Make sure ventilation openings in inverter are not obstructed. 2. Reduce ambient temperature.
Intermittent Blink Red	N/A	OVP Shut down	1.Check DC input voltage and Reduce DC input voltage
Intermittent Blink Red	two short beepings per 1.6sec.	UVP Shut down	1. Check DC input voltage. Increase DC input voltage. 2. Check DC input connection and wring cable. 3. Recharge battery.
Fast Blink Red	one short beeping per 0.7sec.	Over Load Protection	1.Reduce load in case of restart failed. 2. Re-start the unit manually.
Solid Red	N/A	Hardware fault	1.Contact local service center
DC Reverse Status LED	**Buzzer states**	**Status**	**Solution**
Solid Red	N/A	DC Reverse	1.Check DC+ /DC- cable connection (refer 4.1)

Table 34. Trouble Shooting

7. Information

7-1. Warning

Warning! Do not open or disassemble the Inverter. Attempting to do so may cause risk of electrical shock or fire.

7-2. Warranty

We guarantee this product against defects in materials and workmanship for a period of 24 months from the date of purchase. In case you need to repair or replace any defective power inverters, please contact COTEK local distributor.

This warranty will be considered void if the unit has been misused, altered, or accidentally damaged. COTEK is not liable for anything that occurs as a result of the user's fault.

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