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COTEK SP-4000-148

COTEK SP-4000-148 Pure Sine Wave Inverter User Manual

Model: SP-4000-148

1. INTRODUCTION

The COTEK SP-4000-148 is a high-frequency pure sine wave inverter designed to convert 48VDC battery power into 120VAC household electricity. This inverter delivers a continuous output of 4000W, making it suitable for various applications requiring stable and clean AC power. Its robust design and advanced features ensure reliable performance and protection for your connected devices.

Key Features:

- Pure sine wave output for sensitive electronics.
- Power ON / OFF remote control capability (Green Terminal).
- Input & output fully isolated for enhanced safety.
- Temperature & load controlled cooling fan.
- User-friendly interface with 3-color LED status indicators.
- Output frequency (50/60 Hz) selectable via DIP switch.
- Output voltage selectable via DIP switch.
- Power saving mode adjustable via variable resistor.
- Comprehensive input protections: Reverse Polarity (Fuse), Under Voltage, Over Voltage.
- Extensive output protections: Short Circuit, Overload, Over Temperature.
- Type 1 Indoor Aluminum Enclosure.
- E13 / UL / CE / FCC approved.

2. SAFETY INFORMATION

Read all instructions and warnings carefully before installing or operating the inverter. Failure to follow these instructions may result in electric shock, fire, serious injury, or death.

General Safety Precautions:

- **Electrical Hazard:** This inverter produces high voltage AC power. Treat the output terminals with the same respect as any utility AC outlet.
- **Qualified Personnel:** Installation and servicing should only be performed by qualified personnel.
- **Ventilation:** Ensure adequate ventilation around the inverter. Do not block ventilation openings. Overheating can

cause damage or fire.

- **Environment:** Do not expose the inverter to rain, snow, spray, or any liquids. Do not operate in areas with flammable fumes or gases.
- **Grounding:** The inverter must be properly grounded. Refer to the installation section for grounding instructions.
- **Battery Safety:** Work near lead-acid batteries is dangerous. Batteries can generate explosive gases. Ensure proper ventilation and wear eye protection.
- **DC Input:** Connect the DC input cables with correct polarity. Reverse polarity will blow the internal fuse and void the warranty.
- **Overload:** Do not exceed the inverter's rated output power. Overloading can damage the inverter and connected appliances.
- **Maintenance:** Before performing any maintenance or cleaning, disconnect all power sources (DC and AC).

3. PRODUCT OVERVIEW

The COTEC SP-4000-148 inverter features a robust aluminum enclosure and clearly labeled connection points for ease of installation and operation. Familiarize yourself with the components before proceeding with installation.



Figure 3.1: Overall view of the COTEC SP-4000-148 Pure Sine Wave Inverter. This image shows the blue aluminum casing and the grey end caps with ventilation slots.

Front Panel (AC Output Side):



Figure 3.2: Front panel of the inverter. This view highlights the AC output terminal, the remote control terminal (green), LED status indicators, DIP switches, and the main power switch.

- **AC Output Terminal:** Hardwire connection for 120VAC output.
- **Remote Control Terminal (Green):** For connecting an optional remote ON/OFF switch.
- **LED Status Indicators:** Provide visual feedback on inverter status (Power, Fault, Overload).
- **DIP Switches:** Used to select output frequency (50/60 Hz) and output voltage.
- **Power Saving Mode Resistor:** Adjustable resistor for fine-tuning power saving mode.
- **Main Power Switch:** Controls the inverter's power.

Rear Panel (DC Input Side):

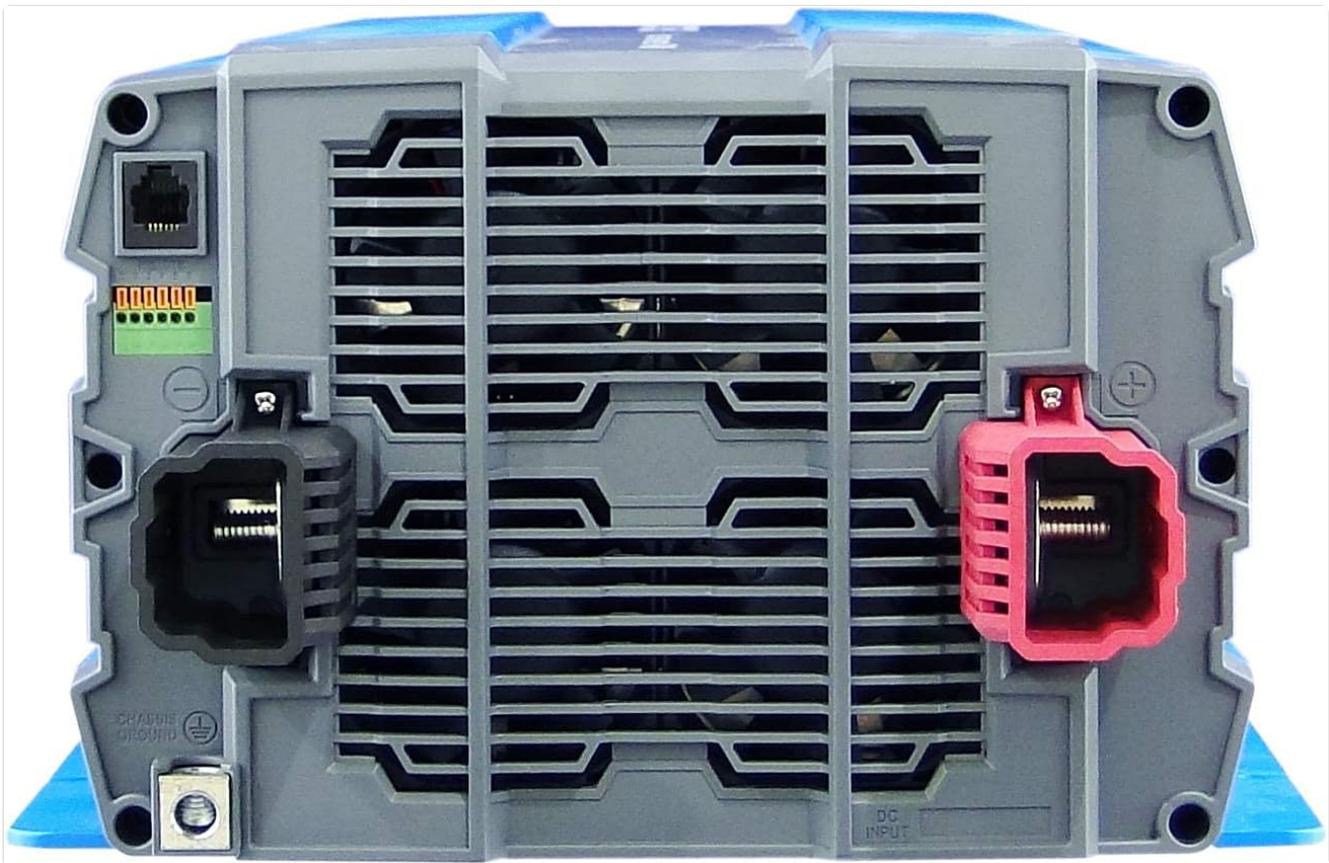


Figure 3.3: Rear panel of the inverter. This view shows the DC input terminals (red for positive, black for negative) and the chassis ground connection point.

- **DC Input Terminals:** Heavy-duty terminals for connecting to the 48VDC battery bank. Ensure correct polarity (Red for Positive, Black for Negative).
- **Chassis Ground Terminal:** For connecting the inverter to an earth ground.
- **Cooling Fan Vents:** Ensure these vents are not obstructed for proper heat dissipation.

4. INSTALLATION

Proper installation is crucial for the safe and efficient operation of your inverter. Follow these steps carefully.

4.1 Mounting the Inverter

- Choose a dry, well-ventilated location away from direct sunlight, heat sources, and moisture.
- Mount the inverter on a non-combustible surface.
- Ensure there is at least 6 inches (15 cm) of clear space around all sides of the inverter for proper airflow.
- Use appropriate fasteners to secure the inverter firmly to the mounting surface.

4.2 DC Input Connection

WARNING: Ensure the battery bank is disconnected or isolated before making any connections. Use appropriately sized cables and fuses/breakers.

1. Connect the positive (+) DC cable (typically red) from your 48VDC battery bank to the red positive (+) terminal on the inverter's rear panel.
2. Connect the negative (-) DC cable (typically black) from your 48VDC battery bank to the black negative (-) terminal on the inverter's rear panel.
3. Ensure all DC connections are tight and secure to prevent loose connections and arcing.

4. Install an external DC fuse or circuit breaker between the battery bank and the inverter's positive terminal, as close to the battery as possible. Consult the specifications for appropriate fuse sizing.

4.3 AC Output Connection

The SP-4000-148 uses a hardwire AC output connection.

1. Ensure the inverter is OFF and all DC power is disconnected.
2. Connect your AC load wiring to the designated AC output terminal block on the front panel.
3. Follow all local electrical codes for AC wiring.
4. Ensure all AC connections are secure.

4.4 Grounding

The inverter chassis must be properly grounded.

1. Connect a ground wire from the chassis ground terminal on the inverter's rear panel to a reliable earth ground point.
2. Ensure the ground connection is secure and meets all local electrical codes.

4.5 Remote Control Connection (Optional)

If using an optional remote control, connect it to the green terminal block on the front panel according to the remote control's instructions.

5. OPERATION

Once the inverter is properly installed and all connections are secure, you can begin operation.

5.1 Powering On/Off

1. Ensure all DC and AC connections are correct and secure.
2. If an external DC breaker is installed, ensure it is closed (ON).
3. Flip the main power switch on the inverter's front panel to the 'ON' position.
4. The LED indicators will illuminate, and the cooling fan may briefly activate.
5. To power off, flip the main power switch to the 'OFF' position.

5.2 LED Status Indicators

The inverter features 3-color LED indicators to display its operational status:

- **Green LED:** Indicates normal operation.
- **Yellow LED:** Indicates a warning or abnormal condition (e.g., low battery, minor overload). Refer to troubleshooting.
- **Red LED:** Indicates a fault or critical error (e.g., severe overload, over-temperature, short circuit). The inverter will typically shut down. Refer to troubleshooting.

5.3 DIP Switch Settings

The DIP switches on the front panel allow configuration of output frequency and voltage. Refer to the detailed specifications or the label on the inverter for specific switch positions for desired settings.

- **Output Frequency:** Select between 50 Hz or 60 Hz.
- **Output Voltage:** Select desired AC output voltage (e.g., 100V, 110V, 115V, 120V).

NOTE: Always power off the inverter before changing DIP switch settings.

5.4 Power Saving Mode

The power saving mode can be adjusted via the variable resistor on the front panel. This mode reduces standby power consumption when no load or a very light load is detected. Adjust the resistor to set the threshold for entering/exiting power saving mode.

6. MAINTENANCE

Regular maintenance ensures the longevity and optimal performance of your inverter.

- **Cleaning:** Periodically clean the exterior of the inverter with a dry, soft cloth. Ensure ventilation openings are free from dust and debris. Do not use liquid cleaners.
- **Connection Checks:** Annually inspect all DC and AC connections for tightness. Loose connections can cause overheating and damage.
- **Battery Maintenance:** Follow the battery manufacturer's recommendations for maintenance, including checking electrolyte levels (for flooded batteries) and terminal cleanliness.
- **Environment:** Ensure the operating environment remains within the specified temperature and humidity ranges.

7. TROUBLESHOOTING

This section provides solutions to common issues you might encounter with your inverter.

Problem	Possible Cause	Solution
Inverter does not turn on (No LEDs)	No DC input power; Blown DC fuse/breaker; Loose DC connections; Reverse polarity.	Check battery voltage; Check external DC fuse/breaker; Verify DC connections are tight and correct polarity.
Red LED illuminates, inverter shuts down	Overload; Short circuit on AC output; Over-temperature; Input over/under voltage.	Reduce AC load; Check AC wiring for short circuits; Allow inverter to cool down; Verify battery voltage is within operating range.
Yellow LED illuminates, intermittent operation	Minor overload; Low battery voltage warning; High temperature warning.	Reduce AC load; Recharge batteries; Ensure adequate ventilation.
No AC output, Green LED is on	AC output wiring issue; Faulty AC appliance.	Check AC output connections; Test with a different AC appliance.
Cooling fan runs constantly or loudly	High ambient temperature; Heavy load; Obstructed vents.	Ensure proper ventilation; Reduce load if possible; Clean vents.

8. SPECIFICATIONS

The following table details the technical specifications for the COTEC SP-4000-148 Pure Sine Wave Inverter.

Features:

- Pure sine wave output
- Power ON / OFF remote control (Green Terminal)
- Remote controller CR-8 / CR-16 (optional)
- Input & Output fully isolation
- Temperature & Load controlled cooling fan
- Built in advance microprocessor to provide friendly interface
- Output frequency 50 / 60 Hz selectable by DIP switch
- Output voltage DIP switch selectable
- Adjustable power saving mode by variable resistor
- 3-color LED status indicators
- Input protection: Reverse Polarity (Fuse) / Under Voltage / Over Voltage
- Output protection: Short Circuit / Overload / Over Temperature
- E-13 / UL / CE / FCC approved



MODEL		SP-4000-124	SP-4000-148	SP-4000-224	SP-4000-248
Output	AC Voltage	100 / 110 / 115 / 120VAC		200 / 220 / 230 / 240VAC	
	AC Regulation	±5%		±3%	
	Rated Power	4000VA			
	Surge Power (1 Sec)	<8000VA			
	Maximum Output Power (1 Min)	>4000VA~4600VA (100%~115%)			
	Output Waveform	Pure Sine Wave (THD<5%@Normal Load NOTE1)		Pure Sine Wave (THD<3%@Normal Load NOTE2)	
	Frequency	50 / 60 Hz ±0.5%			
Input	DC Voltage	24VDC	48VDC	24VDC	48VDC
	Voltage Range	21.0 ~ 33.0VDC	42.0 ~ 66.0VDC	21.0 ~ 33.0VDC	42.0 ~ 66.0VDC
	NO Load Current	≤2.0A@24VDC	≤1.0A@48VDC	≤2.0A@24VDC	≤1.0A@48VDC
	Power Saving Mode	<0.2A@24VDC	<0.1A@48VDC	<0.2A@24VDC	<0.1A@48VDC
	Efficiency (Max.)	91%	91%	90%	91%
Protection	Input Under - Voltage Protection	21.0 ±0.5VDC	42.0 ±1.0VDC	21.0 ±0.5VDC	42.0 ±1.0VDC
	Input Under - Voltage Alarm	22.0 ±0.5VDC	44.0 ±1.0VDC	22.0 ±0.5VDC	44.0 ±1.0VDC
	Input Under - Voltage Recovery	25.0 ±0.5VDC	50.0 ±1.0VDC	25.0 ±0.5VDC	50.0 ±1.0VDC
	Input Over - Voltage Protection	33.0 ±0.5VDC	66.0 ±1.0VDC	33.0 ±0.5VDC	66.0 ±1.0VDC
	Input Over - Voltage Recovery	29.0 ±0.5VDC	58.0 ±1.0VDC	29.0 ±0.5VDC	58.0 ±1.0VDC
	Output Overload	Shutdown output voltage, restart to recover			
	Output Short	Shutdown output voltage, restart to recover			
	Over Temperature	Heat sink temperature over 80°C ±5°C, shutdown output voltage, recover automatically after heat sink temperature goes down to 60°C ±5°C			
Environment	DC Input Reverse Polarity	By fuse			
	Operating Temp.	-20°C ~ +40°C			
	Storage Temp.	-30°C ~ +70°C			
Safety & EMC	Storage Temp. & Humidity	10 ~ 95% RH			
	Safety Standards	Certified UL 458	---	Certified EN 60950-1	
	EMC Standards	Certified FCC class A		Certified EN 55022; EN 55024 EN 61000-3-2, -3-3 EN 61000-4-2, 3, 4, 5, 6, 8, 11	
	E-mark	---		Certified CISPR 25 ISO 11452-2; ISO 7637-2	
Control & Signal	Remote Control (Optional)	CR-8 / CR-16			
	LED Indicator	Input voltage level, output load level and faulty status			
	Dry Contact Terminal	By relay			
	Remote Control Terminal	6-port green terminal			
Others	Dimension (W x H x D)	255x158x462 mm / 10.04x6.22x18.19 inch			
	Packing	10kg; 2pcs / 21.00kg / 3.05CUFT			
	Cooling	Temperature & load controlled cooling fan			
	Application	Home and office appliances, portable power equipment, vehicle, yacht and off-grid Solar power systems ...etc.			
Socket Type					

Note1 - Normal Condition: Vin=12.5V / 25V / 50V Vo=100 / 110 / 115 / 120 VAC 80% Full load (PF=1.0)
 Note2 - Normal Condition: Vin=12.5V / 25V / 50V Vo=200 / 220 / 230 / 240 VAC 80% Full load (PF=1.0)

Figure 8.1: Detailed technical specifications for the COTEK SP-4000 series, including input, output, protection, and environmental parameters.

Specification	Value
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Specification	Value
Brand	COTEK
Model Name	SP Series
Wattage	4000 watts
Input Voltage	48 Volts DC
Output Power	4000 Watts
Output Frequency	60 Hz (Selectable)
Total Power Outlets	1 (Hardwire)
Standby Power Shutoff	High Efficiency (Adjustable)
Enclosure Type	Type 1 Indoor Aluminum Enclosure
Approvals	E13 / UL / CE / FCC
UPC	648152674771
Mfr Part Number	SP-4000-148

Mechanical Drawings:

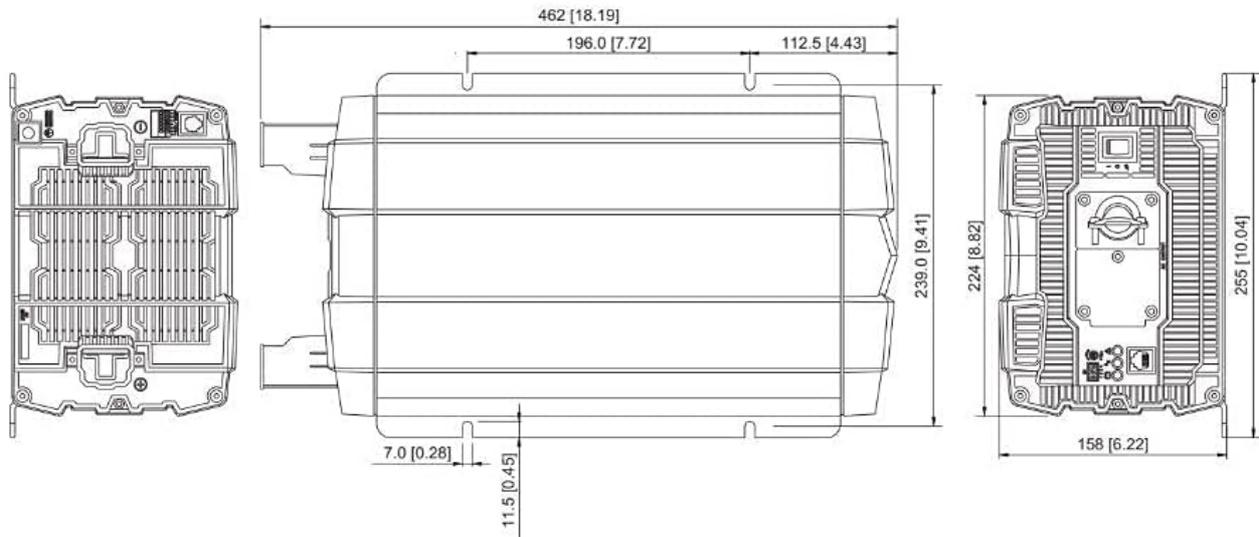
Mechanical Drawings:

Figure 8.2: Mechanical drawings providing dimensions for the COTEK SP-4000 series inverter, useful for installation planning.

9. WARRANTY AND SUPPORT

COTEK products are manufactured to high-quality standards. This product is covered by a manufacturer's warranty against defects in materials and workmanship. Please refer to the warranty card included with your product or visit the official COTEK website for detailed warranty terms and conditions.

Customer Support:

For technical assistance, troubleshooting, or warranty claims, please contact COTEK customer support through their official channels. Have your product model number (SP-4000-148) and purchase information ready when contacting support.

- **Website:** www.cotek.com.tw (Example, please verify official website)
- **Email:** support@cotek.com (Example)
- **Phone:** +1-XXX-XXX-XXXX (Example)