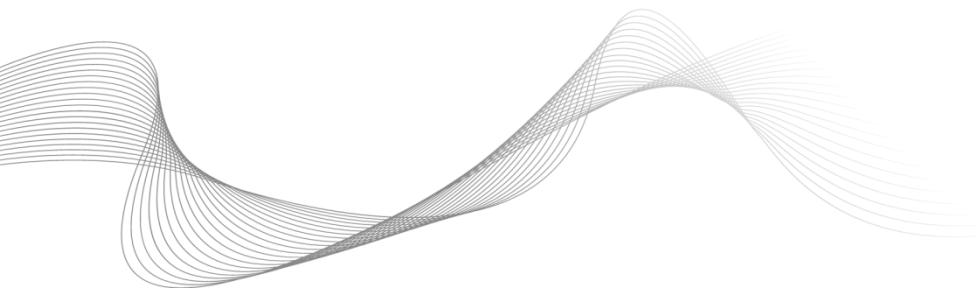


# COTEK



## ***SR-1600 Plus User's Manual***

*Telecom / Datacom*

*PURE SINE WAVE INVERTER*

## **Legal Provisions**

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# 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 compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, or joints, fittings, or other connection between components of the fuel system.
- 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 be provided. The inverter incorporates standard AC short circuit protection.
- 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. Notify the carrier immediately, before opening, if damage is evident.
- Do not operate near water or in excessive humidity.
- Do not open or disassemble the inverter, as 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 -25°C to 40 °C otherwise the output efficiency may be affected. Air flow to the inverter must not be blocked.

## 2. Functional Characteristics Introduction

### 2-1. System

The SR-1600 Plus is a highly reliable, modular design DC-AC inverter system, designed with advanced power electronic and microprocessor technology offering the following features :

- Simple setting and scalable system capacity supports up to 32 pcs (51.2KW)
- Support 1 $\phi$  and 3 $\phi$  : suitable for commercial and industrial applications
- Seamless switch between AC and DC source
- Build-in input and output full isolation
- Wide AC input range 150~265V (230V system), 75~132V (120V system)
- High efficiency (~95%)
- Power factor  $\geq 0.99$
- Advanced Protection Features
  - Input reverse, under-voltage, over voltage protection
  - Output protection : short circuit, over load, over temperature, over voltage protection
- Operating mode
  - AC mode (Default) : The AC utility power is the main source, DC power is the second source, PFC>0.99, Max. efficiency 95%. When the AC utility abnormal, the switching time is 0 second.
  - AC Ratio mode : At the same time AC and DC input, the percentage of AC and DC load can be assigned to 100%, if set AC is 70%, then the remaining 30% gap made up by DC.
  - DC mode : DC power is the main source, and AC utility is the second source, THD<3%, Max. efficiency is 91%. The switching time between AC and DC power is 0 second.

## 2-2. Electrical Specification

| Electrical       | Specification                                                                 | Model No.                                                            |                  |                                                                       |                  |
|------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------|-----------------------------------------------------------------------|------------------|
|                  | Item                                                                          | SR-1600 Plus-124                                                     | SR-1600 Plus-148 | SR-1600 Plus-224                                                      | SR-1600 Plus-248 |
| AC Input         | Nominal Voltage                                                               | 120VAC                                                               |                  | 230VAC                                                                |                  |
|                  | Voltage Range                                                                 | 75~132VAC ± 3%                                                       |                  | 150~265VAC ± 2%                                                       |                  |
|                  | Power Factor                                                                  | > 0.99 @ rating power                                                |                  |                                                                       |                  |
|                  | Frequency                                                                     | 50 / 60 Hz                                                           |                  |                                                                       |                  |
|                  | Synchronization Range                                                         | 47~53 Hz, 57~63 Hz                                                   |                  |                                                                       |                  |
| DC Input         | Nominal Voltage (Voltage range)                                               | 24VDC                                                                | 48VDC            | 24VDC                                                                 | 48VDC            |
|                  | Voltage Range                                                                 | 18~34VDC ± 3%                                                        | 36~68VDC ± 3%    | 18~34VDC ± 3%                                                         | 36~68VDC ± 3%    |
|                  | Nominal Current                                                               | 56A                                                                  | 37A              | 56A                                                                   | 37A              |
|                  | Max. Input Current (15 sec.)                                                  | 90A                                                                  | 60A              | 90A                                                                   | 60A              |
| AC Output        | Rating Power                                                                  | 1200W/1600VA                                                         | 1600W/1600VA     | 1200W/1600VA                                                          | 1600W/1600VA     |
|                  | Overload Capacity                                                             | 105%~150% rated power (15 seconds)                                   |                  |                                                                       |                  |
|                  | Nominal Voltage                                                               | 120VAC                                                               |                  | 230VAC                                                                |                  |
|                  | Output Voltage Range                                                          | 100~120VAC ± 3%                                                      |                  | 200~240VAC ± 2%                                                       |                  |
|                  | Max. Efficiency(AC)                                                           | 94%                                                                  |                  | 95%                                                                   |                  |
|                  | Max. Efficiency(DC)                                                           | 89%                                                                  | 90%              | 90%                                                                   | 91%              |
|                  | Frequency                                                                     | 50 / 60Hz                                                            |                  |                                                                       |                  |
|                  | THD                                                                           | < 3% (Above 80% Resistive Load)                                      |                  |                                                                       |                  |
|                  | Turn ON Delay                                                                 | < 10 seconds                                                         |                  |                                                                       |                  |
|                  | Crest Factor at Nominal Power<br>With short circuit management and protection | DC mode: 3 times nominal current<br>AC mode: 6 times nominal current |                  | DC mode: 3 times nominal current<br>AC mode: 10 times nominal current |                  |
| Control & Signal | Indicator                                                                     | LED                                                                  |                  |                                                                       |                  |
|                  | Advanced Control                                                              | RS-485 control module                                                |                  |                                                                       |                  |
|                  | Failure Indicator                                                             | Buzzer alarm                                                         |                  |                                                                       |                  |
| Protection       | DC Input                                                                      | Over Voltage / Under Voltage / Reverse Polarity                      |                  |                                                                       |                  |
|                  | AC Input                                                                      | Over Voltage / Under Voltage / Over Current                          |                  |                                                                       |                  |
|                  | Output                                                                        | Short Circuit / Overload / Over Temperature                          |                  |                                                                       |                  |
| Transfer         | Inverter to Utility AC                                                        | 0 second                                                             |                  |                                                                       |                  |

| Electrical   | Specification          | Model No.                                            |                  |                                                                                                                              |                  |
|--------------|------------------------|------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------|------------------|
|              | Item                   | SR-1600 Plus-124                                     | SR-1600 Plus-148 | SR-1600 Plus-224                                                                                                             | SR-1600 Plus-248 |
| Performance  | Utility AC to Inverter | 0 second                                             |                  |                                                                                                                              |                  |
| Environment  | Operating Temp.        | -25°C ~ 40°C; refer to SR-1600 power de-rating curve |                  |                                                                                                                              |                  |
|              | Storage Temp.          | -40°C ~ 70°C                                         |                  |                                                                                                                              |                  |
|              | Relative Humidity      | 95%, non-condensing                                  |                  |                                                                                                                              |                  |
|              | Vibration              | BS EN 61373                                          |                  |                                                                                                                              |                  |
| Safety & EMC | Safety standards       | Meet UL 60950-1                                      |                  | Certificated EN 60950-1                                                                                                      |                  |
|              | EMC standard           | Certificated FCC Class B                             |                  | Certificated EN55022 Class B;<br>EN 61204-3; EN55024;<br>EN 61000-3-2, -3-3, -6-1, -6-3;<br>IEC 61000-4-2, 3, 4, 5, 6, 8, 11 |                  |
| Others       | Dimension-Module       | 105x83x410 mm / 4.13x3.27x16.14 inch                 |                  |                                                                                                                              |                  |
|              | Dimension-Shelf        | 446x85x509mm / 17.56x3.35x20.04 inch                 |                  |                                                                                                                              |                  |
|              | Weight (net)           | Module : 3.8kg; 4pcs / Shelf : 6.5kg; 1pcs           |                  |                                                                                                                              |                  |

Table 1. SR-1600 Plus specification

## 2-3. Mechanical Drawings

### 2-3-1. SR-1600 Plus Single Module

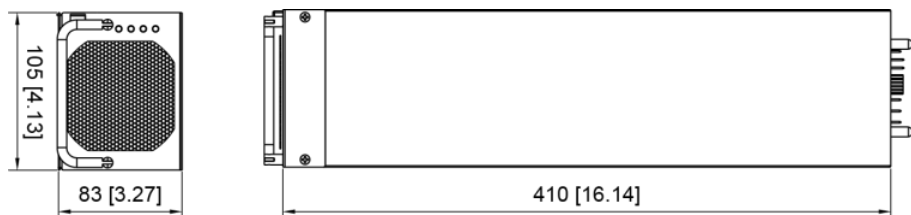


Figure 1. SR-1600 Plus mechanical drawing-single module

2-3-2. SR-1600 Plus Rack (19" 2U)

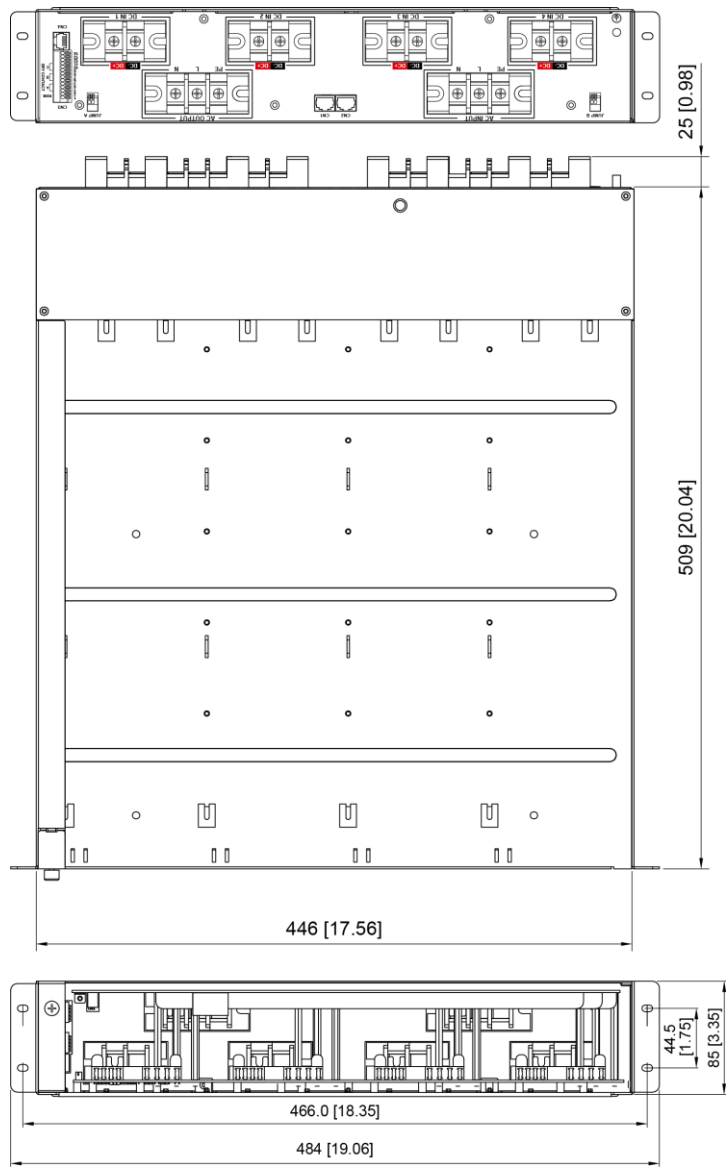


Figure 2. SR-1600 Plus mechanical drawing-rack

## 2-4. SR-1600 Plus De-rating Curve

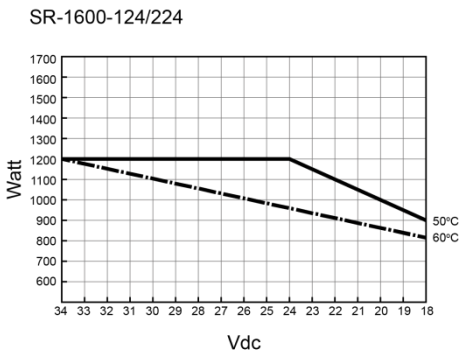


Figure 3. SR-1600 Plus de-rating curve: SR-1600 Plus-124/224

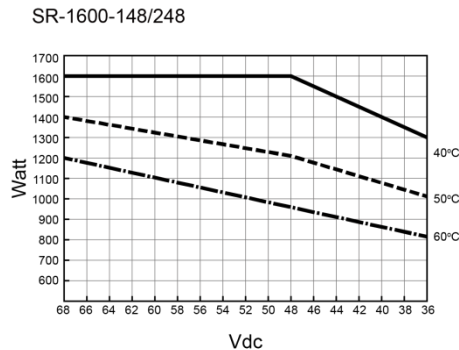


Figure 4. SR-1600 Plus de-rating curve: SR-1600 Plus-148/248

## 2-5. Protection Mechanism

| Type    | Over Voltage |          |          | Under Voltage |         |        |
|---------|--------------|----------|----------|---------------|---------|--------|
|         | Shutdown     | Restart  | Alarm    | Shutdown      | Restart | Alarm  |
| 110 Vac | 132.5±3%     | 127.5±3% | 127.5±3% | 75±3%         | 90±3%   | 90±3%  |
| 230 Vac | 265±3%       | 255±3%   | 255±3%   | 150±3%        | 180±3%  | 180±3% |
| 24 Vdc  | 34±0.5       | 28±0.5   | 33±0.5   | 18±0.5        | 25±0.5  | 21±0.5 |
| 48 Vdc  | 68±1         | 56±1     | 66±1     | 36±1          | 50±1    | 42±1   |

Table 2. SR-1600 Plus protection mechanism

3. Installation and Maintenance

3-1. Introduction

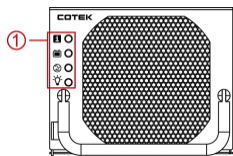


Figure 5. SR-1600 Plus module front panel view

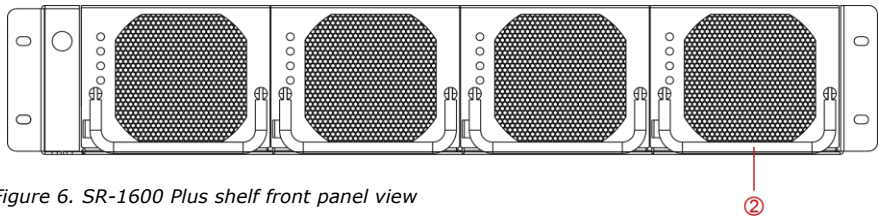


Figure 6. SR-1600 Plus shelf front panel view

| Description     |                   |
|-----------------|-------------------|
| ① LED indicator | ② Inverter handle |

Table 3. SR-1600 Plus description

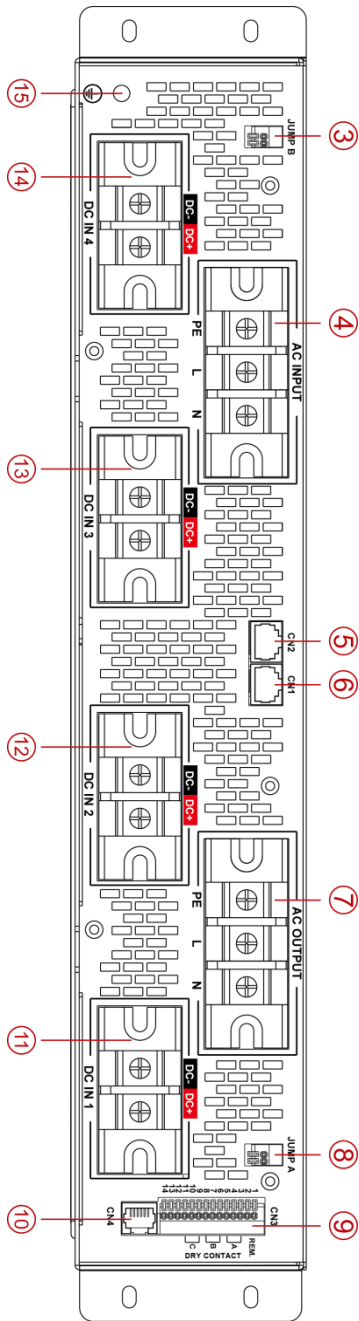


Figure 7. SR-1600 plus shelf rear panel

| Description |                              |   |                       |
|-------------|------------------------------|---|-----------------------|
| ③           | Jumper B (terminal resistor) | ⑩ | RS-485                |
| ④           | AC input terminal            | ⑪ | DC input (Battery) #1 |
| ⑤           | Parallel connection port CN2 | ⑫ | DC input (Battery) #2 |
| ⑥           | Parallel connection port CN1 | ⑬ | DC input (Battery) #3 |
| ⑦           | AC output terminal (load)    | ⑭ | DC input (Battery) #4 |
| ⑧           | Jumper A (terminal resistor) | ⑮ | Chassis ground        |
| ⑨           | CN3 Dry contact and remote   |   |                       |

Table 4. SR-1600 plus description

3-1-1. LED Indicator ①

| Icon                                                                              | Description                 | Icon                                                                              | Description              |
|-----------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------|--------------------------|
|  | System status LED indicator |  | AC input power indicator |
|  | DC battery power indicator  |  | Load indicator           |

Example: SR-1600 Plus-248 Type

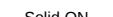
| Status | LED Indicator                                                                                                |  |  |  |  |
|--------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Green  | Off                                                                                                          |                                                                                   |                                                                                   |                                                                                   | No output                                                                         |
|        | <br>Solid ON                | Power by AC (Grid)                                                                | Normal (48~66V)                                                                   | Voltage & Frequency OK                                                            | Load 0~60%                                                                        |
|        | <br>Fast Blinking           | Power by AC & DC (Grid & Battery)                                                 |                                                                                   |                                                                                   |                                                                                   |
|        | <br>Slow Blinking           | Startup                                                                           |                                                                                   | Frequency synchronization                                                         |                                                                                   |
| Orange | <br>Solid ON                | Power by DC (Battery)                                                             | Battery Low voltage (42~48V)                                                      | Grid AC low Voltage (< 200V)                                                      | Load 60~105%                                                                      |
|        | <br>Fast Blinking           |                                                                                   | Battery High voltage alarm ( Default > 66V )                                      | Grid AC high voltage alarm (>255V)                                                | Over load alarm (>105%)                                                           |
|        | <br>Slow Blinking           | Remote off                                                                        | Battery Low voltage alarm ( Default < 42V )                                       | Grid AC low voltage alarm (< 180V)                                                |                                                                                   |
| Red    | <br>Solid ON                | Module failure                                                                    |                                                                                   |                                                                                   | Over load /Short protection                                                       |
|        | <br>Fast Blinking          | Different system output voltage                                                   | Battery over voltage (Default >68V)                                               | Over voltage (Default >265V)                                                      |                                                                                   |
|        | <br>Slow Blinking         | Different system frequency (50/60Hz)                                              | Battery under voltage (Default <36V)                                              | Under voltage (Default <150V)                                                     |                                                                                   |
|        | <br>Intermittent Blinking | Temp. protection                                                                  |                                                                                   | Abnormal Frequency                                                                |                                                                                   |
|        | <br>Intermittent Blinking | Fan failure                                                                       |                                                                                   |                                                                                   |                                                                                   |

Table 5. LED indicator

3-1-2. Green Terminal Introduction ③⑧⑨

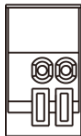
There are three green terminals at the rear side, please refer to following figure :

| Terminal                   | Description                                |
|----------------------------|--------------------------------------------|
| Jumper A & B               | Single shelf / Parallel connection setting |
| CN3 Dry contact and remote | Remote setting, and dry contacts           |

Table 7. SR-1600 Plus green terminal introduction

3-1-2-1. Jumper A & B ③⑧

JUMP



1 2 Figure 8. Jumper A & B

| Pin | Function          | Wiring                     | Status description                                                                                                                    |
|-----|-------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Terminal Resistor | Pin#1 and Pin#2 short/open | <b>Short :</b><br>1. Signal shelf setting <sup>*Note</sup><br>2. Parallel connection setting at first and last shelf (terminal shelf) |
| 2   |                   |                            | <b>Open :</b><br>Parallel connection : non-terminal shelf (Refer to 3-2-2.)                                                           |

Table 8. SR-1600 Plus jumper A & B status description

\* Note : Jumper A pin1 & pin2 must be shorted and Jumper B pin1 & pin2 must be shorted.

### 3-1-2-2. Dry contact and remote ⑨

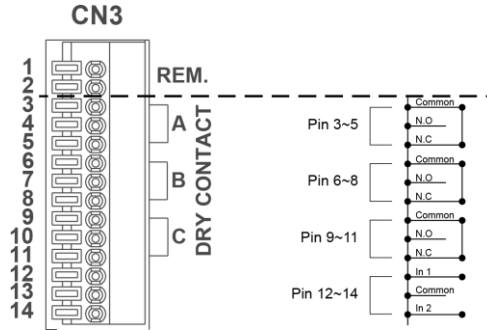


Figure 9. CN3 dry contact pin assignment

| Pin       | Function                                                            | Wiring                                                                | Status Description                                                             |
|-----------|---------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Pin 1~2   | Remote ON/OFF                                                       | Pin#1 and pin #2 short/open                                           | Open : Normal output<br>Short : Stop output                                    |
| Pin 3~5   | Major alarm                                                         | Switching power<br>60W<br>Rating 2A at<br>30VDC wire size<br>20~24AWG | Normal : N.C-Common short<br>Action : N.O-Common short<br>(Refer to Figure 9.) |
| Pin 6~8   | Minor alarm                                                         |                                                                       |                                                                                |
| Pin 9~11  | Selectable extra alarm to go with Major or minor alarm by RS485/LCM |                                                                       |                                                                                |
| Pin 12~13 | Digital signal input for Major alarm                                | Signal voltage : 5V<br>wire size<br>20~24AWG                          | High : +5V Action<br>Low : 0V Normal                                           |
| Pin 13~14 | Digital signal input for Minor alarm                                |                                                                       |                                                                                |

Table 9. SR-1600 Plus CN3 status description

| Alarm       | Description                    | Possible Cause                                           |
|-------------|--------------------------------|----------------------------------------------------------|
| Major alarm | Over system capacity           | The system over the rated capacity                       |
|             | CN1/CN2 communication abnormal | Connect not very well                                    |
|             | Parameters error               | Plug in the different type product                       |
|             | Main source failure            | AC source failure                                        |
|             | Digital input abnormal         | Pin 12~13 voltage keep high                              |
| Minor alarm | Lost redundancy                | Remove the redundancy module or redundant module failure |
|             | Second source failure          | Battery voltage abnormal                                 |
|             | Others alarm                   | Refer to alarm LED indicator (refer to page 10)          |

Table 10. Alarm list for dry contact

### 3-1-2-3. Single Shelf Setting

1. Please short the Jumper A pin#1 and pin#2.
2. Please short the Jumper B pin#1 and pin#2.

### 3-1-3. AC Input / Output Terminal ④ ⑦

#### 3-1-3-1. AC Input Terminal ④

SR-1600 Plus provides the AC utility input terminal at the rear side, and user can connect the AC cable at L / N / PE. The SR-1600 Plus support the AC input side internal parallel connection.

#### 3-1-3-2. AC Output Terminal ⑦

The AC output terminal at the rear side of the SR-1600 Plus. User can connect the L / N / PE.

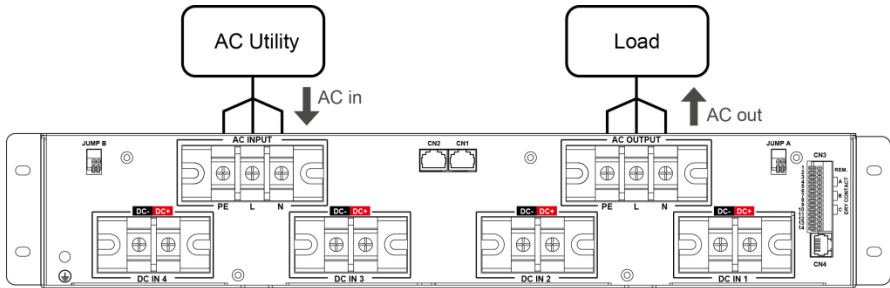


Figure 10. AC terminal connection

#### 3-1-3-3. Cabling

| Interface |             | Wire Color   | Wire AWG                                                                         |
|-----------|-------------|--------------|----------------------------------------------------------------------------------|
| AC Input  | Line (L)    | Black        | Breaker suggestion<br>200-240Vac : 50A/Shelf/8AWG<br>100-120Vac : 80A/Shelf/6AWG |
|           | Neutral (N) | White        |                                                                                  |
| AC Output | Line (L)    | Black        |                                                                                  |
|           | Neutral (N) | White        |                                                                                  |
| Ground    |             | Green-Yellow | 6 ~16AWG                                                                         |

Table 11. AC cabling definition

#### 3-1-4. Parallel Connection Port ⑤ ⑥

In case the user needs more than 1 shelf, please use the CN1 and CN2 port to connect multi-shelves. Ensure that user sets the terminal resistor first (please refer to section 3-2).

Please use RJ-45 cable for connection. To have better performance, we

suggest the cable length is less than 100cm.

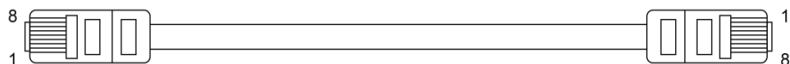


Figure 11. RJ-45 cable

| #Pin | CN 1     | CN 2     |
|------|----------|----------|
| 1    | CAN_H    | CAN_H    |
| 2    | CAN_L    | CAN_L    |
| 3    | Reserved | Reserved |
| 4    | Reserved | Reserved |
| 5    | Reserved | Reserved |
| 6    | Reserved | Reserved |
| 7    | GND      | GND      |
| 8    | 5V       | 5V       |

Table 12. RJ-45 pin assignment

### 3-1-5. Battery Cabling ⑪⑫⑬⑭

Connect the 24V/48V battery [+] / [-] to the SR-1600 Plus [DC+] / [DC-]  
 There are three battery input sets (DC+, DC-) on the SR-1600 Plus rear side, and every set is independent. In case the user needs parallel connection, please do the parallel wiring outside the SR-1600 Plus (please refer to following wiring figure).

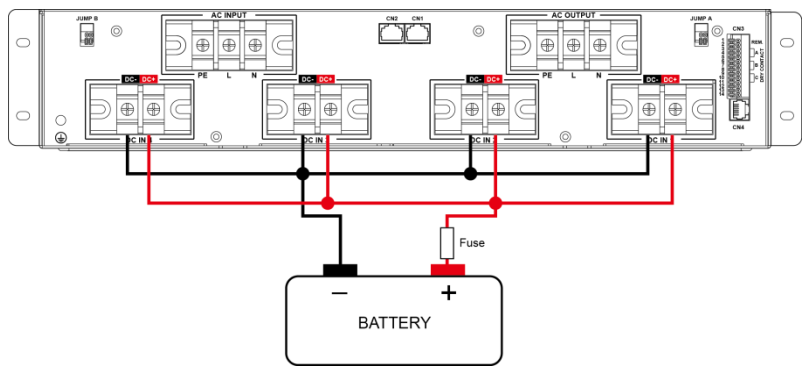


Figure 12. SR-1600 Plus battery cabling

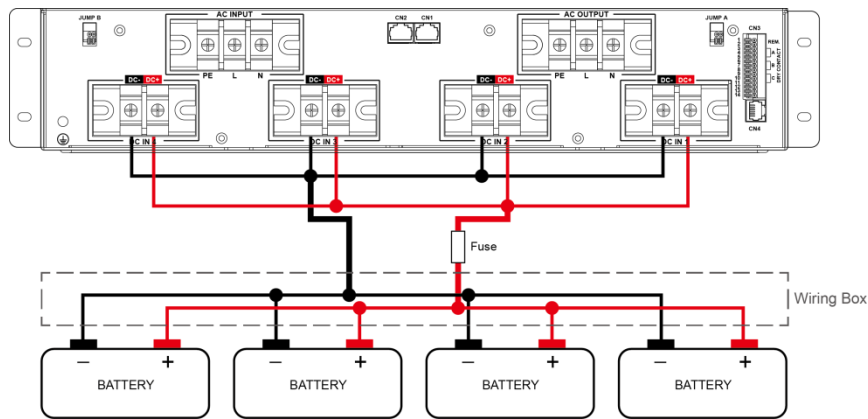


Figure 13. SR-1600 Plus battery cabling (multi battery I)

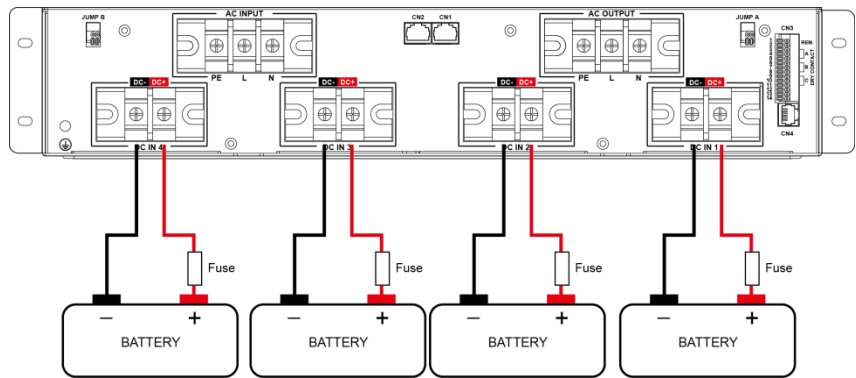


Figure 14. SR-1600 Plus battery cabling (multi battery II)

Please refer to the suggested battery cable size.

| Models                     | AWG | Cable diameter / per module | Fuse(slow) / per rack | Fuse(slow) / per module |
|----------------------------|-----|-----------------------------|-----------------------|-------------------------|
| SR-1600 Plus<br>-124 / 224 | #6  | 4 mm                        | 400A                  | 100A                    |
| SR-1600 Plus<br>-148 / 248 | #8  | 3.1 mm                      | 300A                  | 75A                     |

Table 13. Cable and fuse size

3-1-6. Chassis Ground ⑮

To prevent the electric shock, please make sure the chassis ground is connected.



**Warning!** High current needs grounding.

3-1-7. Installation Space Requirement

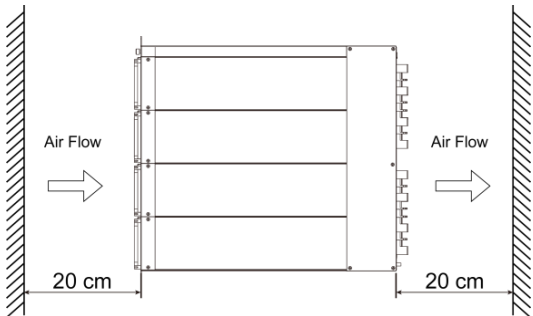
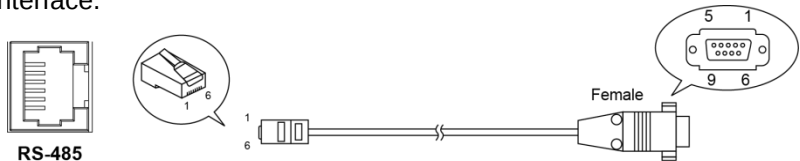


Figure 15. SR-1600 Plus installation space requirement

Please keep 20 cm clear space for air flow at front and rear side of SR-1600 Plus.

3-1-8. RS-485 Port ⑩

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



| SR Series <i>Figure 16. RS-485</i> |                    | RS-485 Transfer RS-232 (HC-05) |
|------------------------------------|--------------------|--------------------------------|
| PIN Num.                           | RS-485 Description | D-SUB PIN Num.                 |
| N/1                                |                    |                                |
| 1/2                                | Not used           | Not used                       |
| 2/3                                | 485A               | 2                              |
| 3/4                                | 485B               | 1                              |
| 4/5                                | Not used           | Not used                       |
| 5/6                                | GND                | GND (Optional)                 |
| 6/7                                | Not used           | Not used                       |
| N/8                                |                    |                                |

Table 14. RS-485 cable size

### 3-1-8-1. RS-485 Command

Command format :

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

After the system executes the command unit, it sends an answer character to the PC. Under normal communication status, the answer characters are as following:

= > : The command was executed successfully

? > : Command error, not accepted

! > : Command is correct, but the implementation of the error  
(such as parameters out of range)

\* If the instructions are sent, do not respond to the above three symbols as an end, Please check if the PC port settings / communication line is abnormal or not.

### 3-1-8-2. RS-485 Command Format

| Command         | Function                 | Command         | Function                    |
|-----------------|--------------------------|-----------------|-----------------------------|
| <b>POWER 1</b>  | Power on                 | <b>VINV?</b>    | Show voltage of SR          |
| <b>POWER 0</b>  | Power off                | <b>IINV?</b>    | Show current of SR          |
| <b>*RST</b>     | Recovery default setting | <b>VGRID?</b>   | Show voltage of grid        |
| <b>FRQ?</b>     | Show frequency of SR     | <b>VBAT?</b>    | Show voltage of battery     |
| <b>PINV?</b>    | Show power of SR         | <b>IGRID?</b>   | Show AC input current of SR |
| <b>IBATO?</b>   | **Show DC input current  | <b>IBATI?</b>   | **Show total charge current |
| <b>LOAD?</b>    | Show total power         | <b>PAUN?</b>    | Show Parallel quantity      |
| <b>QUERY 0?</b> | AC situation             | <b>QUERY 1?</b> | Load and battery condition  |
| <b>QUERY 2?</b> | Error condition          | <b>*IDN?</b>    | Factory serial number       |

Table 15. RS-485 command table

\*\*Only applicable on SRC-2500

### 3-1-8-3. Command for Accessing Setup Menus and Adjusting Values

| <Function Code> | Setting Menu    | <Function Code> | Setting Menu              |
|-----------------|-----------------|-----------------|---------------------------|
| FUNC0           | DC_OVP Setting  | FUNC10          | Dry contact setting       |
| FUNC1           | DC_OVP Recovery | FUNC11          | *Charging voltage setting |
| FUNC2           | DC_UVP Setting  | FUNC12          | *Charging current setting |
| FUNC3           | DC_UVP Recovery | FUNC13          | Assign DC to AC ratio     |
| FUNC4           | DC_UV Alarm     |                 |                           |
| FUNC5           | O/P Voltage     |                 |                           |
| FUNC6           | RS-485 Baudrate |                 |                           |
| FUNC7           | O/P Frequency   |                 |                           |
| FUNC8           | Sync Frequency  |                 |                           |
| FUNC9           | Mode Priority   |                 |                           |

Table 16. RS-485 command table

\*Only Available for SRC-2500

Example of setting:

1. Change 50Hz to 60Hz Output Frequency Operation:  
Command: FUNC 7
2. Query the currently set parameters: Instructions: SETT? Type  
The display will show the frequency and answer characters:  
50  
=>
3. Change setting parameters: Command: SETT <value> Type the  
value you want to change,  
Since this example changes the output frequency to 60, the  
instruction is built for SETT 60, The display will show:  
=>  
The delegate completes correctly

### 3-1-8-4. Setting Interface

1. OVP Setting **<FUNC0>** : Set the Over Voltage Protection (OVP) and shutdown.

Default = 34 VDC @ 24V Model. 68 VDC @ 48V Model

| Model | Setting value range |
|-------|---------------------|
| 24V   | 30 VDC ~ 34 VDC     |
| 48V   | 60 VDC ~ 68 VDC     |

Table 17. OVP setting <FUNC0>

2. OVP Recovery **<FUNC1>** : When the DC input voltage is higher than the OVP setting, the SR series shutdown; once the input voltage falls below the set OVP value, the SR series will automatically restart.

Default = 28 VDC @ 24V Model. 56 VDC @ 48V Model

| Model | Setting value range |
|-------|---------------------|
| 24V   | 26 VDC ~ 30 VDC     |
| 48V   | 52 VDC ~ 60 VDC     |

Table 18. OVP recovery <FUNC1>

3. UVP Setting **<FUNC2>** : Setting Under Voltage Protection (UVP) and shutdown on the inverter operation.

Default= 18 VDC @ 24V Model. 36VDC @ 48V Model

| Model | Setting value range |
|-------|---------------------|
| 24V   | 18 VDC ~ 25 VDC     |
| 48V   | 36 VDC ~ 50 VDC     |

Table 19. UVP setting <FUNC2>

4. UVP Recovery **<FUNC3>** : When the DC input voltage is below the set UVP value, the SR series shutdown; once the input voltage rises above the set UVP value, the SR series will automatically restart.

Default= 25 VDC @ 24V Model. 50VDC @ 48V Model

| Model | Setting value range |
|-------|---------------------|
| 24V   | 23 VDC ~ 27 VDC     |
| 48V   | 46 VDC ~ 54 VDC     |

Table 20. UVP recovery <FUNC3>

5. UV Alarm **<FUNC4>** : Setting Under Voltage (UV) alarm. When the

input voltage is lower than the set value, the SR series will sound a “beep” to remind you that the unit is going to shutdown.

Default= 21 VDC @ 24 V Model. 42 VDC @ 48 V Model

| Model | Setting value range |
|-------|---------------------|
| 24V   | 19 VDC ~ 26 VDC     |
| 48V   | 38 VDC ~ 52 VDC     |

Table 21. 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 shutdown without any audible warning.

6. O/P Voltage <FUNC5> : Setting the SR series output voltage on the inverter operation.

1xx = 100V, 110V, 115V or 120V ; 2xx = 200V, 220V, 230V or 240V.

| Model | Setting value range |
|-------|---------------------|
| 1XX   | 97 VAC ~ 127 VAC    |
| 2XX   | 194 VAC ~ 254 VAC   |

Table 22. O/P voltage <FUNC5>

7. RS-485 Baud rate <FUNC6> :

Default setting : 4800

| Setting Menu        | SETT<value> |
|---------------------|-------------|
| RS-485<br>Baud rate | 0 1200      |
|                     | 1 2400      |
|                     | 2 4800      |
|                     | 3 9600      |
|                     | 4 19200     |

Table 23. RS-485 baud rate <FUNC6>

8. O/P Frequency **<FUNC7>**: Setting the SR series output frequency on the inverter operation.

1xx = 100V, 110V, 115V or 120V ; 2xx = 200V, 220V, 230V or 240V.

| Model | Setting value range |
|-------|---------------------|
| 1XX   | 50 Hz or 60 Hz      |
| 2XX   | 50 Hz or 60 Hz      |

Table 24. O/P frequency <FUNC7>

9. Sync Frequency **<FUNC8>** : Setting SR series output frequency tolerance range on the inverter operation.

1xx = 100V, 110V, 115V, 120V ; 2xx = 200V, 220V, 230V or 240V.

| Model | Setting value range |
|-------|---------------------|
| 1XX   | 0 Hz ~ 3 Hz         |
| 2XX   | 0 Hz ~ 3 Hz         |

Table 25. Sync frequency <FUNC8>

10. Mode Priority **<FUNC9>** : Default =1, AC Mode is the 1<sup>st</sup> priority source.

**DC Mode** : DC is the 1<sup>st</sup> priority source, and the AC power is the 2<sup>nd</sup> priority source.

**AC Mode** : AC is the 1<sup>st</sup> priority source, and the DC power is the 2<sup>nd</sup> priority source.

| Mode Priority | SETT<value> |
|---------------|-------------|
| DC Mode       | 0           |
| AC Mode       | 1           |

Table 26. Mode priority <FUNC9>

11. Dry contact C setting **<FUNC10>** : Default =1, Setting range = 0~2, default=1.

| Setting Menu          | SETT<value> |                                    |
|-----------------------|-------------|------------------------------------|
| Dry contact C setting | 0           | Disable                            |
|                       | 1           | Follow dry contact A (major alarm) |
|                       | 2           | Follow dry contact B (minor alarm) |

Table 27. Dry contact setting <FUNC10>

## 12.\*Charging voltage setting &lt;FUNC11&gt; : Default =54 VDC

| Model | Setting value range |
|-------|---------------------|
| 48V   | 52 VDC ~ 58 VDC     |

Table 28. Charging voltage setting &lt;FUNC11&gt;

## 13.\*Charging current setting &lt;FUNC12&gt; : Default =0 A

| Model | Setting value range |
|-------|---------------------|
| 48V   | 0A~25A              |

Table 29. Charging current setting &lt;FUNC12&gt;

\*Only Available for SRC-2500

## 14. Assign DC and AC ratio &lt;FUNC13&gt; : Setting range = 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 Default= 100 (Disable)

| Setting Menu | SETT<value> | Description              |
|--------------|-------------|--------------------------|
| AC Ratio     | 10          | AC load 10%, DC load 90% |
|              | 20          | AC load 20%, DC load 80% |
|              | 30          | AC load 30%, DC load 70% |
|              | 40          | AC load 40%, DC load 60% |
|              | 50          | AC load 50%, DC load 50% |
|              | 60          | AC load 60%, DC load 40% |
|              | 70          | AC load 70%, DC load 30% |
|              | 80          | AC load 80%, DC load 20% |
|              | 90          | AC load 90%, DC load 10% |
|              | 100         | Disable                  |

Table 30. Charging current setting &lt;FUNC13&gt;



Note :

The AC input power must be higher than 300W after assigning DC and AC ratio.

3-2. Parallel Connection

3-2-1. Multi-shelves Installation

There are two parallel connection methods for the SR-1600 Plus system capacity expansion: Setting jumper and use COTEK iC-Hub.

3-2-2. Parallel Connection with Jumper Setting

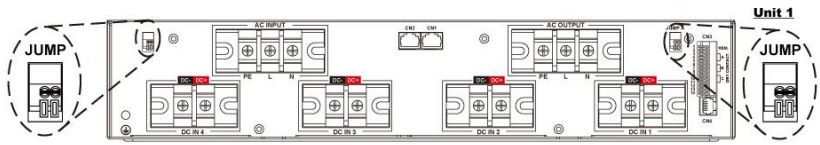


Figure 17-1. Parallel connection via jumper setting

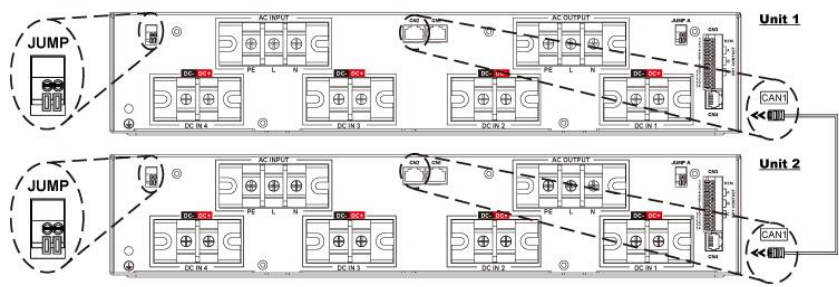


Figure 17-2. Parallel connection via jumper setting

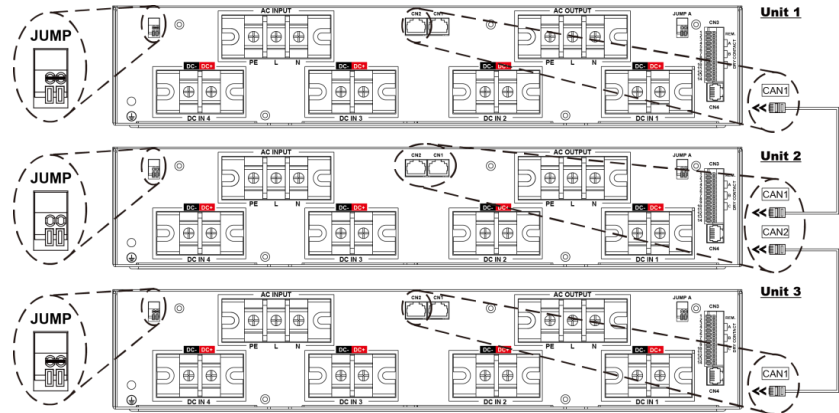


Figure 17-3. Parallel connection via jumper setting

Green terminal JUMP connection :

| Parallel connect | Unit 1    | Unit 2        | Unit 3    |
|------------------|-----------|---------------|-----------|
| JUMP             | Connected | Not connected | Connected |

※ Take 3 units for example, only the first and the last unit need to connect jumper.

3-2-3. Parallel Connection with COTEK iC-Hub

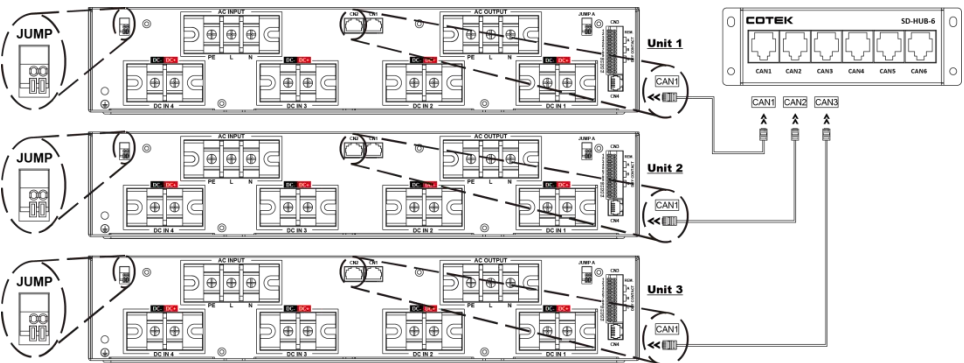


Figure 18. Parallel connection via COTEK iC-Hub

Green terminal JUMP connection :

| Parallel connect | Unit 1        | Unit 2        | Unit 3        |
|------------------|---------------|---------------|---------------|
| JUMP             | Not connected | Not connected | Not connected |

※ Take 3 units for example, no need to connect the jumper.

3-3. Maintenance

3-3-1. Inverter Module Replacement

3-3-1-1. Remove the inverter module

Step 1 : Pull up the SR-1600 Plus handle

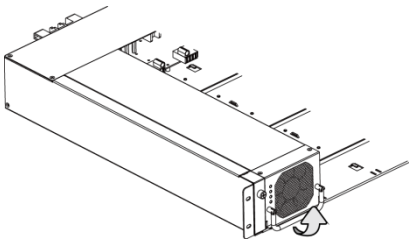


Figure 19. Remove the inverter module: step 1

Step 2 : Remove the SR-1600 Plus out of the shelf

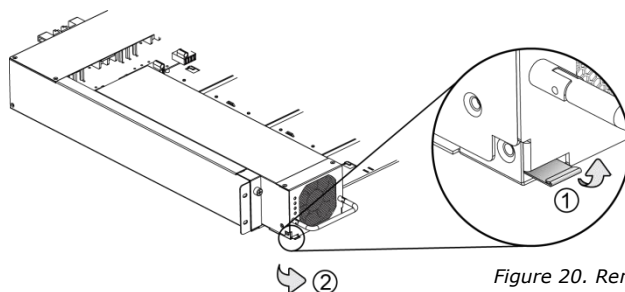


Figure 20. Remove the inverter module: step 2

### 3-3-1-2. Insert the inverter module

Step 1 : Insert the SR-1600 Plus into the shelf slot

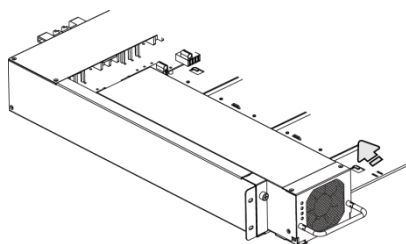


Figure 21. Insert the inverter module: step 1

Step 2 : Make sure the handle at down position

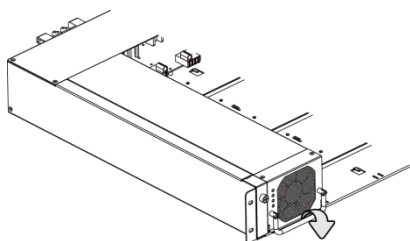


Figure 22. Insert the inverter module: step 2

### 3-3-2. Fan Module Replacement



**Warning!** Please contact technical person to replace fan module.

Step 1 : Please follow the 3-3-1-1. to remove the SR-1600 Plus module out of shelf.

Step 2 : Use the screw driver to remove the 4 screws on the fan module (top side 2 pcs, rear side 2 pcs), and user can remove the fan module.

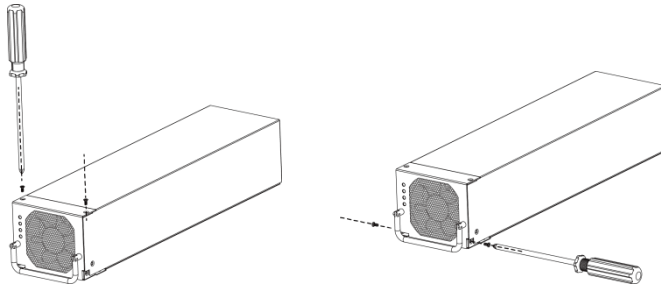


Figure 23. Fan module replacement: step 2

Step 3 : Remove 4 screws and power cord on fan

Step 4 : Replace the new fan and fix 4 screws and power cord on new fan

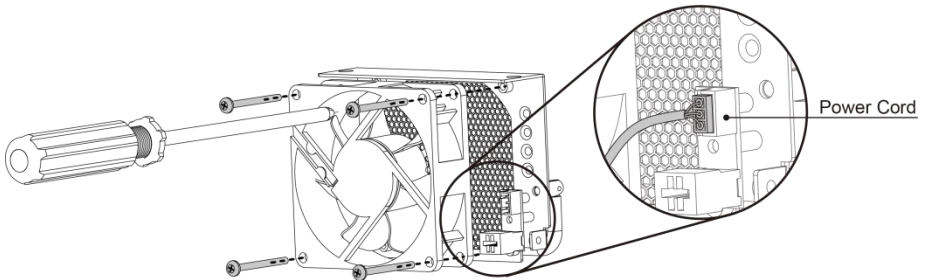


Figure 24. Fan module replacement: step 4

Step 5 : Connect the fan module into the front side of inverter and make sure PCB pin plugged into the slot

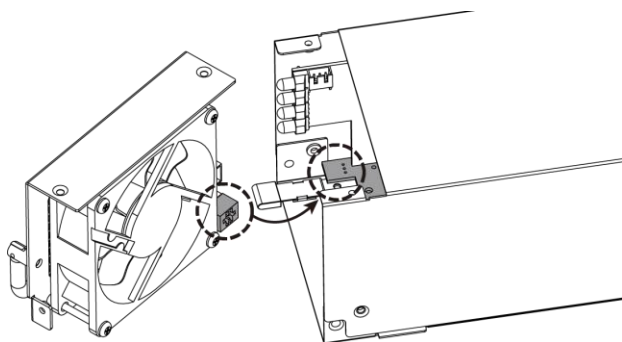


Figure 25. Fan module replacement: step 5

Step 6 : Use the screw driver to fix 4 screws on fan module.

Step 7 : Follow 3-3-1-2 to insert the inverter module.



Note :

1. Please make sure the fan power cable is connected well.
2. Suggest to clean the dust of the fan guard (every 3 months), to keep fan operating longer.

The following data shows the fan specification (power cable 50mm)

| Item                        | Specification / Condition                                                                |
|-----------------------------|------------------------------------------------------------------------------------------|
| Rated Voltage               | 12 VDC                                                                                   |
| Rated Current               | 285mA / Max. 328mA                                                                       |
| Rated Power Consumption     | 3.4 Watts / Max. 3.94 Watts                                                              |
| Operating Voltage Range     | 6~13.8 VDC                                                                               |
| Starting Voltage            | 6 VDC ( 25 deg. C Power On/Off )                                                         |
| Operating Temperature Range | -10 to +70 deg. C                                                                        |
| Storage Temperature Range   | -40 to + 70deg. C                                                                        |
| Rated Speed                 | 4500 RPM $\pm$ 10% at rated voltage                                                      |
| Air Flow                    | 57 CFM                                                                                   |
| Static Pressure             | 0.35 Inch H <sub>2</sub> O                                                               |
| Acoustic Noise              | 46 dB(A)                                                                                 |
| Insulation Class            | UL Class A                                                                               |
| Insulation Resistance       | 10M ohm at 500 VDC between internal stator and lead wire(+)                              |
| Dielectric Strength         | Applied AC 500V for one minute or AC 600V for 2 seconds between housing and lead wire(+) |
| Life Expectancy             | 70,000 hours at 40 deg. C, 65% humidity, 90% CL.                                         |
| Protection                  | Automatic Restart*                                                                       |

\*In a situation where the fan is locked by an external force while the electricity is on, an increase in coil temperature will be prevented by temporarily turning off the electrical power to the motor. The fan will automatically restart when the locked rotor condition is released.

Table 31. SR-1600 Plus fan specification



**Caution!** Using fans that do not meet above specification will void warranty.

4. Trouble shooting

| LED status                                                                          |                                              | Possible Description                             | Solution                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | LED red intermittent blinking<br>— . . — . . | Fan failure                                      | <ol style="list-style-type: none"><li>1. Make sure the fan is not stuck</li><li>2. Replace the fan</li></ol>                                                                                                                                          |
|    | LED red intermittent blinking<br>— — — —     | Over temperature protection (OTP)                | <ol style="list-style-type: none"><li>1. Make sure the installation space</li><li>2. Check the fan and clean the fan filter</li><li>3. Reduce the environment temperature</li><li>4. Reduce the load</li></ol>                                        |
|    | LED red fast blinking<br>• • • • •           | Different output voltage module in the same rack | <ol style="list-style-type: none"><li>1. Confirm system output voltage</li><li>2. Remove abnormal module</li><li>3. Confirm module type</li></ol>                                                                                                     |
|    | LED red slow blinking<br>— — —               | Module frequency mismatch                        | <ol style="list-style-type: none"><li>1. Confirm system frequency</li><li>2. Use RS-485 to set the frequency</li></ol>                                                                                                                                |
|    | LED red fast blinking<br>• • • • •           | Input over voltage protection (OVP)              | <ol style="list-style-type: none"><li>1. Check input voltage</li><li>2. Reduce the input voltage</li></ol>                                                                                                                                            |
|    | LED red slow blinking<br>— — —               | Input under voltage protection (UVP)             | <ol style="list-style-type: none"><li>1. Battery deep discharge: please charge the battery</li><li>2. Please check the battery connection<ol style="list-style-type: none"><li>A. Cable diameter</li><li>B. Tighten the connector</li></ol></li></ol> |
|  | LED red intermittent blinking<br>— — — —     | AC frequency not synchronization                 | <ol style="list-style-type: none"><li>1. Check the AC source frequency</li><li>2. Check the SR-1600 Plus frequency setting</li></ol>                                                                                                                  |
|  | LED red slow blinking<br>— — —               | Under AC voltage                                 | Check the AC source voltage                                                                                                                                                                                                                           |
|  | LED red fast blinking<br>• • • • •           | Over AC voltage                                  | Check the AC source voltage                                                                                                                                                                                                                           |
|  | LED red solid on<br>—————                    | Short / Over load                                | <ol style="list-style-type: none"><li>1. Check the connection and make sure the cable is not short</li><li>2. Reduce the load</li></ol>                                                                                                               |

Table 32. Trouble shooting

## 5. Warranty



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

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.

## 6. Appendix

### 6-1. UART ASCII code Communication Description :

<INTR> --> Integer.

<ECHO> --> Echo data from Inverter, Integer, Hex code or Real numbers.

END Code ( ENTER ) = 0x0d ( CR ) + 0x0a ( LF )

### 6-2. Baud rate/Parity/Data length/Stop bit :

Default 9600/N/8/1

### 6-3. COMMAND

A. AC Status Query :

"QURY 0?" + 0x0d + 0x0a

<ECHO1> + <ECHO2> + 0x0d + 0x0a

<ECHO1> = xH = abcdB

<ECHO2> = yH = efghB

Bit a Frequency phase OK flag

Bit b AC/DC mode status flag ( 0 : DC mode 1 : AC mode )

Bit c Reserve

Bit d MCU POWER fault flag

Bit e Occur Soft Reset flag

Bit f Inverter Damage flag

Bit g AC Grid Voltage OK flag

Bit h Reserve

\* Example: Reply to C2 (1100 0010) is AC frequency with normal frequency voltage

B. LOAD & BATTERY Level Query :

"QURY 1?" + 0x0d + 0x0a

<ECHO1> + <ECHO2> + 0x0d + 0x0a

<ECHO1> = xH = Load Level : B=110%~119%、A=100%~109%、...、  
5=50%~59%、...、0=0%~9%

<ECHO2> = yH = battery Level : ((Battery Voltage/n) - 10.3)/0.36  
(12V system n=1 ; 24V system n=2 ; 48V system n=4)

\* Example: Response 56, the load is 5 = 50% ~ 59%; battery is n = 6  
after about 49.8V

C. Inverter Status Query :

"QURY 2?" + 0x0d + 0x0a

<ECHO1> + <ECHO2> + 0x0d + 0x0a

<ECHO1> = xH = abcdB

<ECHO2> = yH = efghB

Bit a OLA occur flag

Bit b OVA occur flag

Bit c UVA occur flag

Bit d OTP occur flag

Bit e Reserve

Bit f OLP occur flag

Bit g OVP occur flag

Bit h UVP occur flag

\* Example: Reply 20 (0010 0000) is UVA

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