SR Series

1KW Pure Sine Wave Power Inverter

User's Manual

CE   FC

Contents

8. Appendices…………………………………………………………………………………..

1. Important Safety Instructions

> **WARNING!**
> SAVE THESE INSTRUCTIONS – This manual contains important instructions that should be followed during installation and maintenance of the inverter.

1-1. General Safety Precautions

1-1-1. 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.

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

1-1-3. Depending on the use, the AC output of the inverter may require user installed breaker or fusing. For telecom use, a GFCI has not been provided. The inverter incorporates standard AC short circuit protection.

1-1-4. The following precautions should be taken when working on the inverter:

▌Remove watches, rings, or other metal objects.

▌Use tools with insulated handles.

▌Wear rubber gloves and boots.

1-2. Other Safety Notes

1-2-1. Upon receipt, examine the shipment box for damage. Notify the carrier immediately before opening, if damage is evident.

1-2-2. Do not operate near water or in excessive humidity.

1-2-3. Do not open or disassemble the inverter, warranty may be voided.

1-2-4. The DC side connections should be firm and tight

1-2-5. Grounding: Reliable grounding of rack-mounted equipment should be maintained.

1-2-6. 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.

1-2-7.   Install the inverter in a well-ventilated area. Do not block the front air vents, or the rear air exhausts of the unit.

1-2-8.   Wiring: Adequate input power must be supplied to the inverter for proper use; correct wiring sizes must be ensured.

1-2-9.   Mount the inverter such that the fan axis is horizontal

1-2-10. Do not operate the inverter close to combustible gas or open fire.

1-2-11. Do not operate appliances that may feed power back into the Inverter.

1-2-12. Temperature: The inverter should be operated in an ambient temperature range of 0℃ to 50 ℃ or else the output efficiency may be affected. Air flow to the inverter must not be restricted

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:

▌ The inverter is equipped with a self diagnosis microprocessor that is able to identify and show all failure messages on the LED/LCD display with associated visual/audio alarm(s).

▌ 1U height x 19" width x 13.6" depth, 19" rack mountable.

▌ Pure sine wave output (THD < 3%) to operate higher-end electronic equipment.

▌ Built in 12A rated transfer switch.

▌ Speeds up transfer time as a result of synchronized operation with the AC source at all times that allows the transfer to be interruption-free for sensitive equipment.

▌ Intelligent software for power management

▌ Hard-wire and Dual AC outlets connection model option.

▌ Loading and temperature controlled cooling fan.

▌ Fan aging, failure, disconnection and blockage alarm.

▌ Selectable Bypass/Inverter modes

▌ Local and remote management and control.

▌ RS-232 communication.

▌ Dry contact terminal.

▌ Efficiency >90%. (Full linear load at 220 VAC Output)

▌ Advanced Protection Features:

      Input over/under voltage protection.
      Internal over temperature protection.
      Input reverse polarity protection (Fuse).
      Output overload protection.
      Output short circuit protection
      AC input short circuit protection: Breaker (6 Amp or 12 Amp)

2-2. Block Diagram
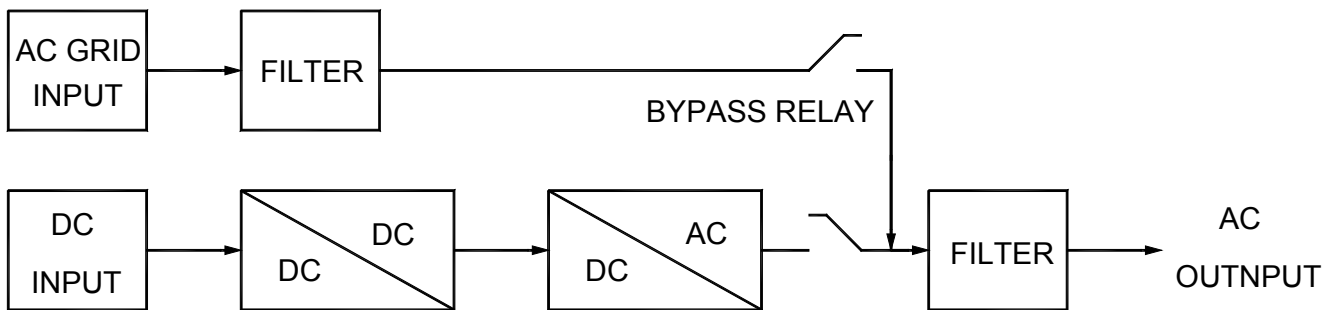
The inverter features IGBT technology which minimizes weight and dimension while enhancing output short circuit reliability and overload capacity.

AC output voltage is provided in one of the two following modes:
    1). From DC to AC Inverter Mode: (On-line Mode)
    2). From AC Input Bypass Mode: (Off-line Mode)

Either mode is front panel programmable.
In the first option, **Off-line mode**, AC output power will be supplied through the AC bypass mode in its normal operation. Upon AC input failure, output power will be diverted through the DC to AC Inverter Mode. Once AC mains are restored, the unit will revert from the Inverter Mode to the Bypass Mode.

In the second option, **On-line mode**, AC output power will be provided directly by the inverter from the DC source. Should the DC source or inverter fail, the system will transfer its output power through the bypass mode. Once the DC power source is restored, the system will revert to the inverter mode.

2-3. Electrical Performance

| Electrical	Specification	Model No.			
	Item	SR1000-124	SR1000-148	SR1000-224	SR1000-248
Input Characteristics	Voltage	24 VDC	48 VDC	24 VDC	48 VDC
	Input Over-Voltage Protection	30~34 VDC (User-selectable)	60~68 VDC (User-selectable)	30~34 VDC (User-selectable)	60~68 VDC (User-selectable)
	Input Under-Voltage Protection	18~22 VDC (User-selectable)	36~44 VDC (User-selectable)	18~22 VDC (User-selectable)	36~44 VDC (User-selectable)
	No Load Current	0.68 A	0.44 A	0.6 A	0.35 A
Output Characteristics	Continuous Output Power	1000 W			
	Maximum output Power (3 Min)	1150 W			
	Surge Power	2000 W			
	Frequency	50 / 60 Hz +/- 0.05 %			
	Output Voltage	97~123 VAC(User-selectable)		194~246 VAC(User-selectable)	
	Efficiency (Full Load)	87%	88%	90%	91%
	Short-Circuit Protection	Yes , Ipk			
	Output Waveform	Pure Sine Wave (THD < 3%)			
Signal and Control	LCD Panel	2 Lines LCD Panel with keypad for navigation			
	LED Indicator	Red/Orange/Green LED			
	Dry Contact Terminal	By a relay			
	Remote Control Terminal	Controls the inverter ON / OFF operation			
Protection	Input Protection	Over/Under Voltage, Reverse Polarity (Internal Fuse)			
	AC Output Protection	Short-Circuit, Overload			
	AC Input Protection	12 Amp Circuit Breaker		6 Amp Circuit Breaker	
	Temperature protection	Shutdown (Internal temperature≧65℃)			
Transfer Relay	Relay Specification	12 Amp / 250 VAC			
	Bypass Relay	On Line/Off Line (Haphazard, Normal, Exact) selectable			
	Switching Time	From AC bypass mode (Off-line Mode) : ≦9mS			
		From DC to AC inverter mode (On-line Mode):≦7mS			
Operating Temperature	Full Load	0℃ ~ 50℃			
	Storage	-30℃~70℃			
Fan Operation and Indication	Failure Indication	Buzzer alarm and dry contact			
	Switches On when:	Temperature ≧55℃ or Load≧30%			
	Switches Off When:	Temperature ≦45℃ and Load≦20%			
Mechanical Specifications	Size (W X H X D)	19”x1.71”x13.6”(482.6mmX43.5mmX345mm)			
	Weight	5.8 Kgs (12.7 Lbs)			
Safety and EMI / EMC	Safety Standards	Meets UL60950		Meets EN60950-1	

			EN55022: 1998+A1: 2000+A2: 2003 Class B
EMC Standards	FCC Class B		EN55024: 1997+A1: 2001+a2: 2003
			EN61000-3-2: 2006 Class A
			EN61000-3-3: 1995+A1: 2001

Note: The specifications are subject to change without notice.

2-4. Mechanical Drawings
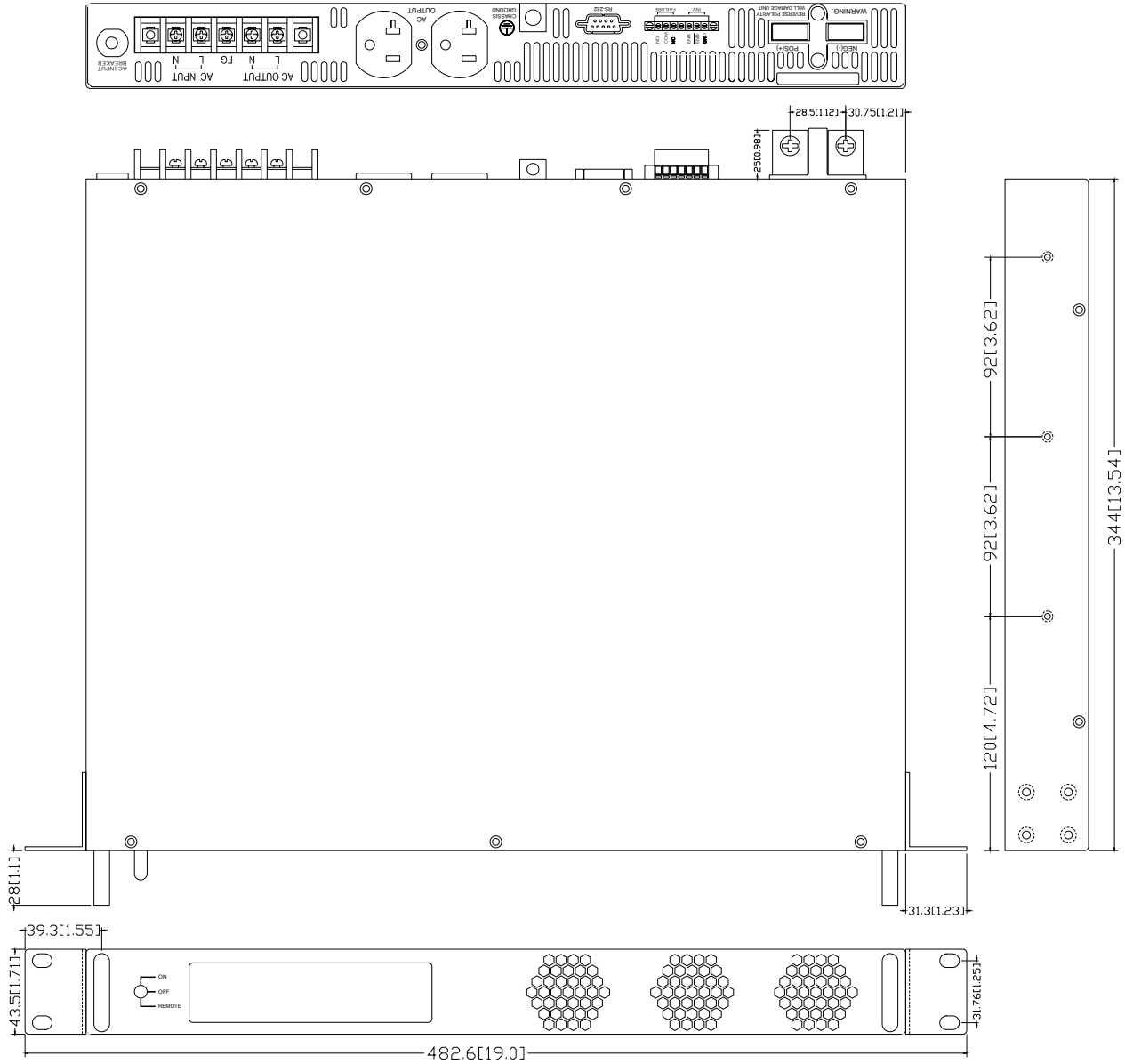
SR Series Inverter Ordering Information

Model Number	Input Voltage	Output Voltage Nominal	Output Voltage Range	Frequency Range
SR1000-124	24 VDC	110 VAC	100~120 VAC	47~63 Hz
SR1000-224	24 VDC	230 VAC	200~240 VAC	47~63 Hz
SR1000-148	48 VDC	110 VAC	100~120 VAC	47~63 Hz
SR1000-248	48 VDC	230 VAC	200~240 VAC	47~63 Hz

3. Installation and Maintenance

3-1. Rear Panel

REAR PANEL VIEW
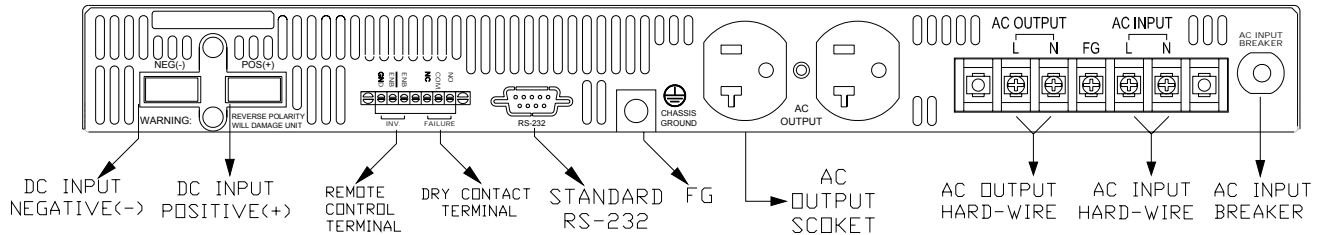
3-1-1. AC Input Breaker:

↑ Correct spelling of socket

The AC input circuit breaker protects the unit from overload. When an overload condition occurs, the circuit breaker trips and disconnects the AC grid power input. To reset it, push the circuit breaker button. The cause of tripping should be ascertained and corrected before the unit is reset .

3-1-2. Hard-wire Installation (AC wiring connections):

▌AC input and AC output terminal
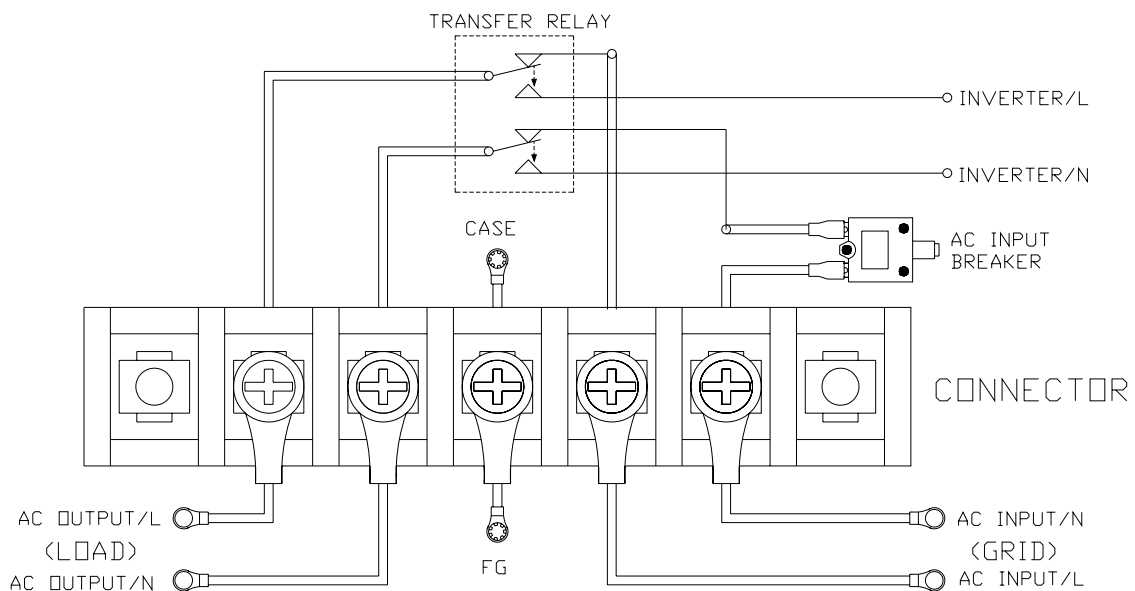
▌Connect AC output and AC input wiring to the Inverter terminals.
  Please use the following information as your reference:

Terminal		Wire color	Wire length / gauge
AC OUTPUT	**Line (L)**	**Black (120 VAC), Brown (230 VAC)**	**Within 16 feet / AWG#**
	Neutral (N)	**White (120 VAC), Blue (230 VAC)**	
AC INPUT	**Line (L)**	**Black (120 VAC), Brown (230 VAC)**	**14~16**
	Neutral (N)	**White (120 VAC), Blue (230 VAC)**	**26~32 feet / AWG#**
Chassis Ground or FG		**Green / Yellow or Bare copper**	**12~14**

Note. Please double check and review all the connections to ensure that the wires are connected to the correct terminals and that the connections are tight.

3-1-3. AC output socket:
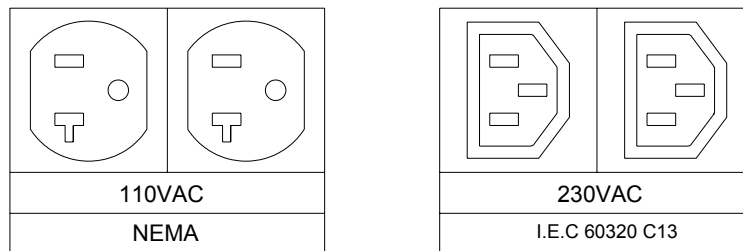
3-1-4**.** Chassis Ground: Must be connected to earth ground prior to making any other connections to the equipment.

3-1-5**.** RS-232: Serial port for monitoring and control through computer interface

3-1-6**.** Remote control and Dry contact terminal:

```
┌─────────────────────────────┐  ┌─────────────────────────────┐
│  REMOTE CONTROL TERMINAL    │  │  DRY CONTACT TERMINAL       │
```

GND	ENB	ENB		**NC**	COM.	NO		RELAY

GROUND

ENABLE -

ENABLE+

Normally Colsed

Common

Normally Open
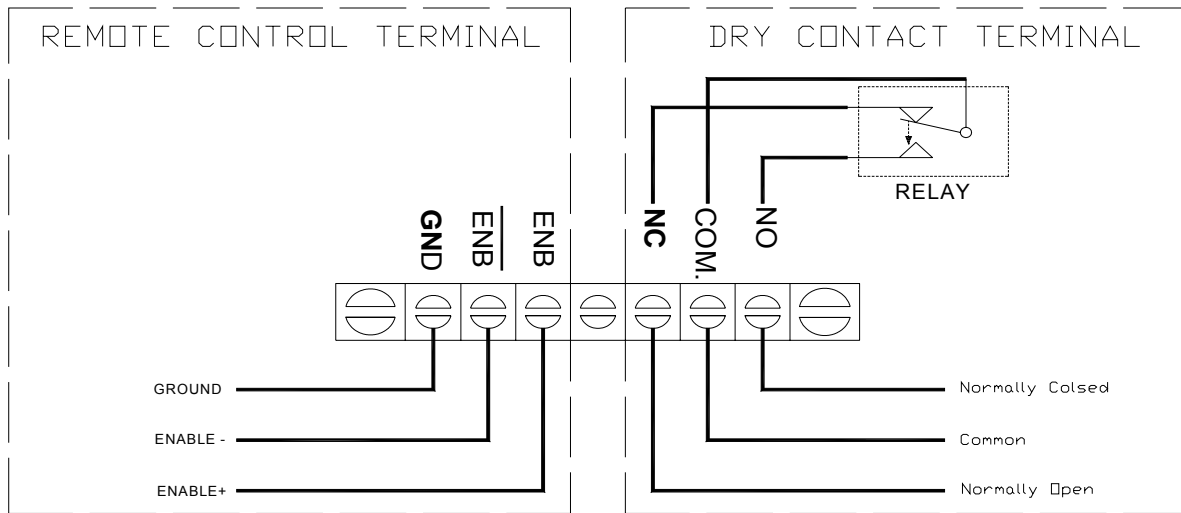
▌Remote Control Terminals:

1). Before installing the inverter, ensure that the main switch is "OFF".
2). Before using the remote function, ensure that the main switch is pressed towards "REMOTE".
3). Ensure that the remote contacts are off.
4). Use 20 ~ 24 #AWG wire to connect the remote control terminals.
5). Remote control ON/OFF inverter setup status:

ENB   ON:INV.→ON   ENB   HI:INV.→ON (TR ON)
                 OFF:INV.→OFF   TR   LOW:INV.→OFF(TR OFF)
GND   GND

BAT+
BAT-   ON:INV.→ON   ON:INV.→ON
                  OFF:INV.→OFF   OFF:INV.→OFF
ENB   ENB   + DC
                                 GND   - POWER
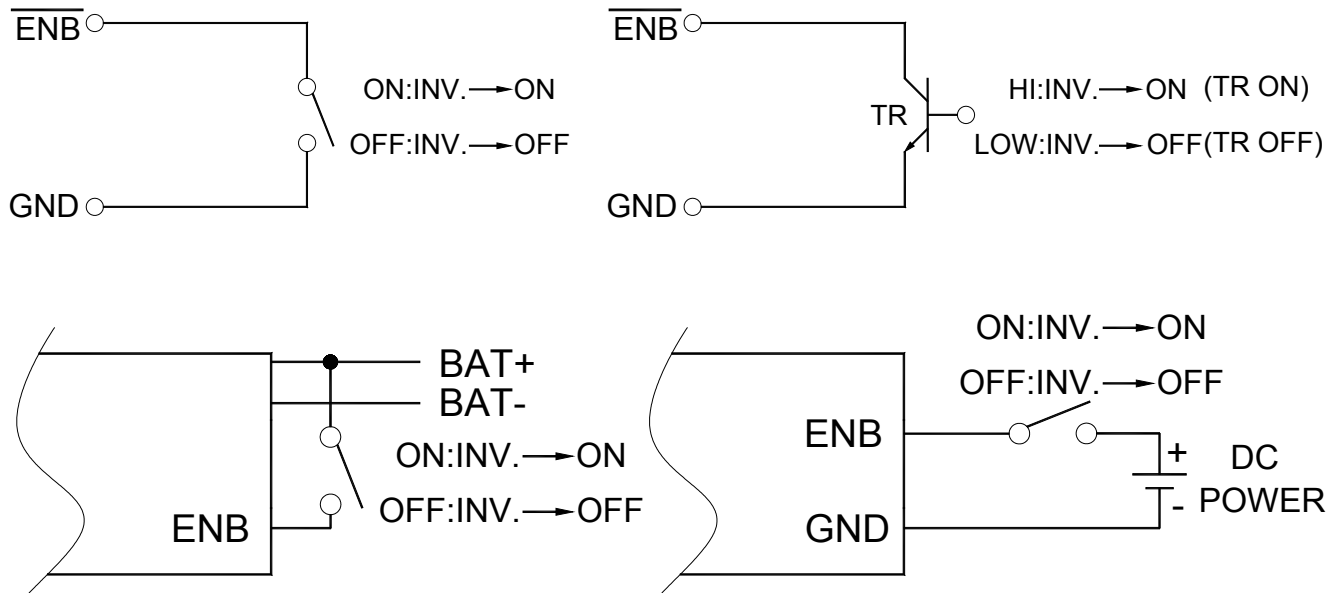
NOTE: At one time, only one remote function should be used to control the inverter. The maximum voltage value is the same as input DC voltage.

▌Dry Contact Terminals:

Dry contact terminals may be connected to a Form C relay for "FAULT" indication. When "FAULT" occurs, the relay switches.

NOTE: Fault conditions include Input under/over voltage, Output Short Circuit, Over Temperature, Over-load and Fan Failure.

Specifications of the Relay

Maximum Voltage	Load	Contact Rating		Number of operations	Operating/Storage Temperature
		N.O.	N.C.		
240 VAC	Resistive	16 A	━	100,000	
240 VAC	Resistive	━	8 A	━	
30 VDC	Resistive	16 A	━	━	-30℃~70℃
30 VDC	Resistive	━	8 A	━	

Dry Contact Terminal	RELAY
COM.	Common contact
N.C.	Normally closed contact.
N.O.	Normally open contact.

3-1-7**.** DC Input Connection:

Follow the instructions to connect the battery cables to the DC input terminals of the inverter. The cables should be as short as possible (less than 6 feet / 1.8 meters ideally) so that they can handle the required current in accordance with the Electrical Codes and Regulations. The size of the cable should be thick enough to limit the voltage drop to less than 2% when carrying the maximum input current to prevent frequent low-input voltage warnings and shutdown. UVP (Under Voltage Protection) warning may result if there is excessive voltage drop across the DC cables between the batteries and the inverter. Increasing your DC cable size will help improve the situation.

Batteries are capable of providing very large currents in case of short circuit. In case there is a short circuit in the cable run between the batteries and the input terminals of the inverter, it will result in overheating / melting of the cables and consequent risk of fire and injury. To prevent possibility of this hazard, use Very Fast Acting DC Fuse in line with the positive cable. The fuse should be as close to the positive battery terminal as possible. Use Bussmann ANN series fuses (will also require Fuse Block 4164) or equivalent

The following sizes of cables and fuses are recommended for up to 6 ft. distance between the batteries and the inverter. (Applies to both 120 VAC and 230 VAC versions):

Model No	Wire AWG	Inline Fuse
SR1000-124 / 224	# 4	80 A
SR1000-148 / 248	# 6	40 A

▌Connect DC input terminals to 24V / 48V battery or other DC power source.

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

> ⚠️ **WARNING!**
> Make sure that all the DC connections are tight (torque to 9 – 10 ft-lbs, 11.7 – 13 Nm). Loose connections could result in overheating and can be a potential hazard.

M8 SCREW

NEGATIVE-

PVC WIRE
(AWG#4 - #6)

RING TERMINAL

PVC WIRE
(AWG#4 - #6)

RING TERMINAL
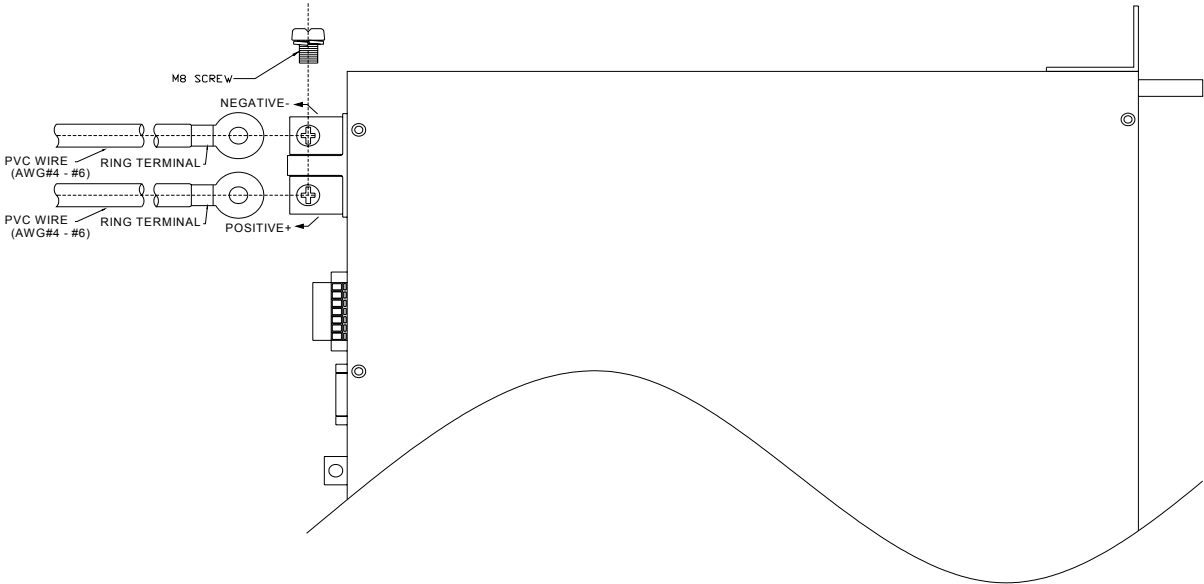
POSITIVE+

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.

NEGATIVE-

POSITIVE+

INLINE FUSE

BATTERY
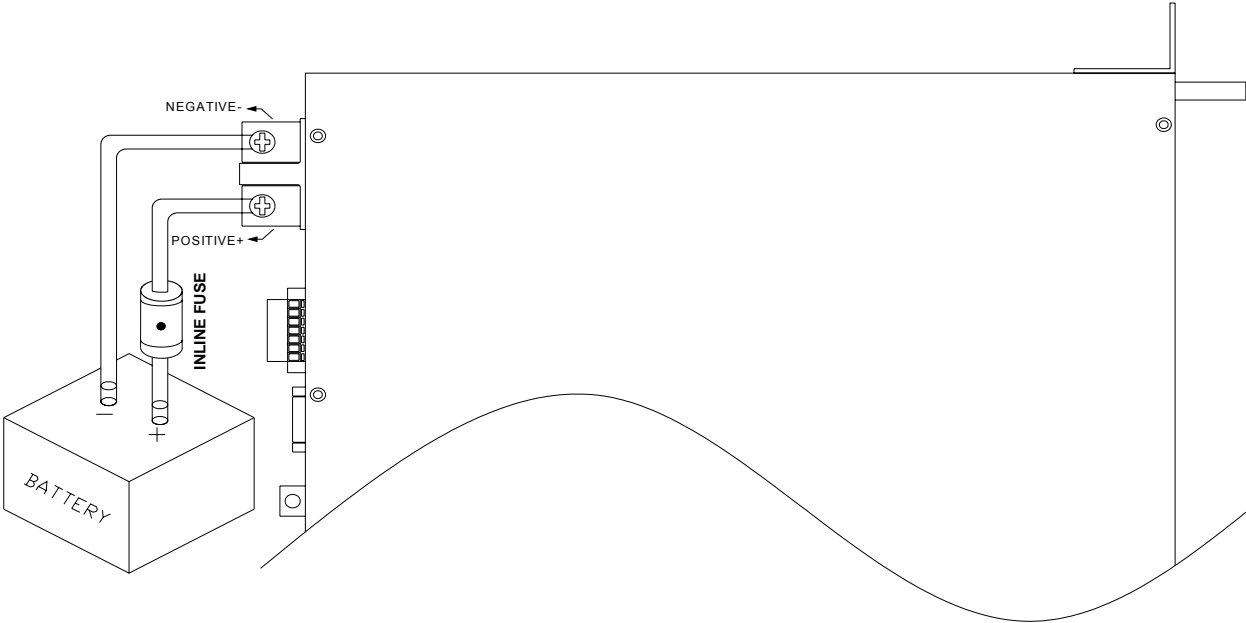
3-2. Front Panel

FRONT PANEL VIEW
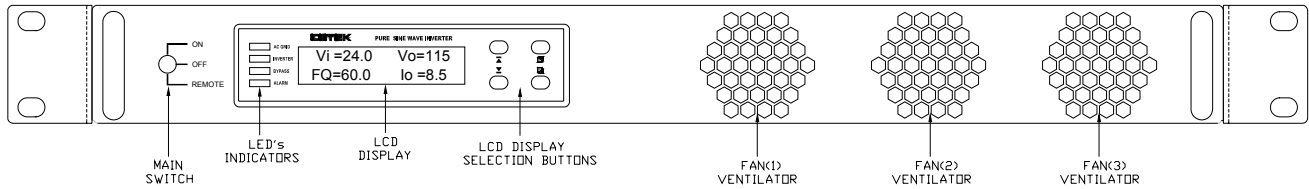
3-2-1**.** Main Switch: These are buttons for turning on, turning off and remote.

3-2-2. LED's Indicators: See details in Section 5-1.

3-2-3. LCD Display Selection Buttons:

Data pertaining to the DC input voltage, AC output voltage, AC output frequency, AC output current, etc. and system status can be shown sequentially on the LCD display by pressing these buttons. Please refer to chapter 5 for more information.

3-2-4. FAN ventilation grille (1)~(3) : The fans behind the ventilation grilles provide cooling. **DOT NOT** obstruct these vents!

3-3. Maintenance

3-3-1. Make sure that the fan vents are not blocked.

3-3-2. Use a vacuum cleaner to remove any dust from the fan area.

3-3-3. When cleaning the case or front panel, use a soft, dry cloth, only. If the case or front panel is very dirty, use a neutral, non-abrasive detergent. Do not use alcohol or ammonia based solutions.

3-3-4. Regular service and relocation of the inverter should be performed by a qualified service technician.

3-3-5. Avoid spilling liquid on the inverter.

4. Operation:

4-1. Connecting the input power

Before making the DC input side connections, the main switch must be "OFF".

4-2. Connecting the loads

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

▌Should the total load exceed the rated capacity of the inverter, remove the

non-critical loads until the rated total has been reached.

4-3. Inverter Operation

▎Set the power switch to the "ON" position. The buzzer will sound
"beep beep".The inverter will carry out self-diagnosis and the LED's
will change colors. At the same time the LCD will display "SR-1000
INVERTER INITIALIATION..".
Finally, the buzzer will sound another "beep" and the "INVERTER" and
status LED's will turn "Green" . The LCD Display will
display "Vi, Vo, FQ, Io". The inverter will start operating normally.

▎Set the power switch to the "OFF" position. The inverter stops and all
the lights that are on will go off.

4-4. Protections Features

Model	DC Input (VDC)					Over Temperature Protection			
	Over Voltage		Under Voltage Alarm	Under Voltage		INTERIOR		HEAT SINK	
	Shut-down	Restart		Shut-down	Restart	Shut-down	Restart	Shut-down	Restart
24 V	30.1~34.1	28~32	19~23	18.1~22.1	23~27	65℃	45℃	105℃	75℃
48 V	60.1~68.1	56~64	38~46	36.1~44.1	46~54				

5. Front LCD Panel – Display & Setup

5-1. LCD Panel Indications

5-1-1. Set the Power Switch to the "ON" position. The inverter starts working
normally. The inverter will be operating in normal condition when either
of the following messages are displayed on the LCD screen:

LED's INDICATORS   LCD DISPLAY   LCD DISPLAY SELECTION BUTTONS
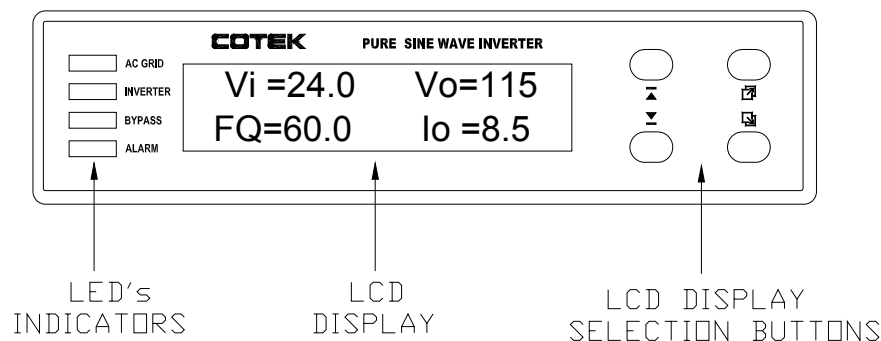
5-1-2. **LED Indications:**

▌**AC GRID**:   Displays AC input status.

AC Input	LED Status
AC input and DC-AC inverter output are NOT synchronous	**ORANGE**
AC input and DC-AC Inverter output are synchronous	**GREEN**
AC input OFF	**OFF**

Note. Synchronous means that the grid AC input frequency and DC-AC inverter output frequency or phase are the same (See details in Section 5-3-3).

▌**INVERTER**:   Displays DC-AC inverter status.

DC-AC Inverter	LED Status
Power OK	**GREEN**
Power not good	**RED**

▌**BYPASS**:   Displays Transfer Switch status.

BYPASS	LED Status	AC OUTPUT (LOAD)
From DC-AC inverter (On-line Mode)	ORANGE	AC INPUT
	OFF	DC-AC Inverter
From AC input bypass (Off-line Mode)	GREEN	AC INPUT
	OFF	DC-AC Inverter

▌**ALARM**:   Displays status of the Failure Alarm

ALARM	LED Status
Over/Under Alarm /FAN Alarm	ORANGE
Set alarm in the inverter to operate normally	OFF

NOTE. For instructions on setting the alarm, see details in Section 5-3.

5-1-3. **LCD Display Selection Buttons:**

▌Function of Various Keys :

Function <Up>: You can use the "up" button to scroll through the menus.

Function <Down>: You can use the "Down" button to scroll through the menus.

Function <Page Up>: You can use the "Page Up" button to scroll through the menus.

Function <Page Down>: You can use the "Page Down" button to scroll through the menus.

Function <Enter Setup Menu>: Press the button longer than 2 seconds. The inverter will change to "Setup Menu Mode" which appears on the LCD screen for the user to set functions.

Function <Enter>: Confirms a selection or value.

5-1-4. **LCD Display:** Displays inverter's operational status.

5-2. Startup Sequence and Standby Status

5-2-1. Set the power switch to "ON" to power up the inverter. The display shows "SR-1000 INVERTER INITIALIATION", then checks the inverter.
Status flow is as follows:

```
              OFF  ◇ POWER SWITCH ◇  ON
               │                      │
               ▼                      ▼
        ┌────────────┐        ┌──────────────────┐
        │            │        │ SR-1000 INVERTER │
        │            │        │ INITIALIATION .. │
        └────────────┘        └──────────────────┘
                                      │
                                      ▼
     FAILURE  ◇ CHECK INVERTER ◇  ALARM
```

FAILURE	OK	ALARM
Vi =XX.X UVP Shutdown		Vi =XX.X Vo=XXX FQ=XX.X Io =X.X
OR		*1Sec* 交換顯示

Vi =XX.X
   OVP   Shutdown
	Vi =XX.X Vo=XXX
	 FQ=XX.X Io =X.X
		Alert:
		    Undervoltage!!

OR		*OR*

Vi =XX.X
   OTP   Shutdown
		Alert:
		    Overload!!

OR		*OR*

Vi =XX.X
   OLP   Shutdown
		Alert:
		    Fan Failure!!
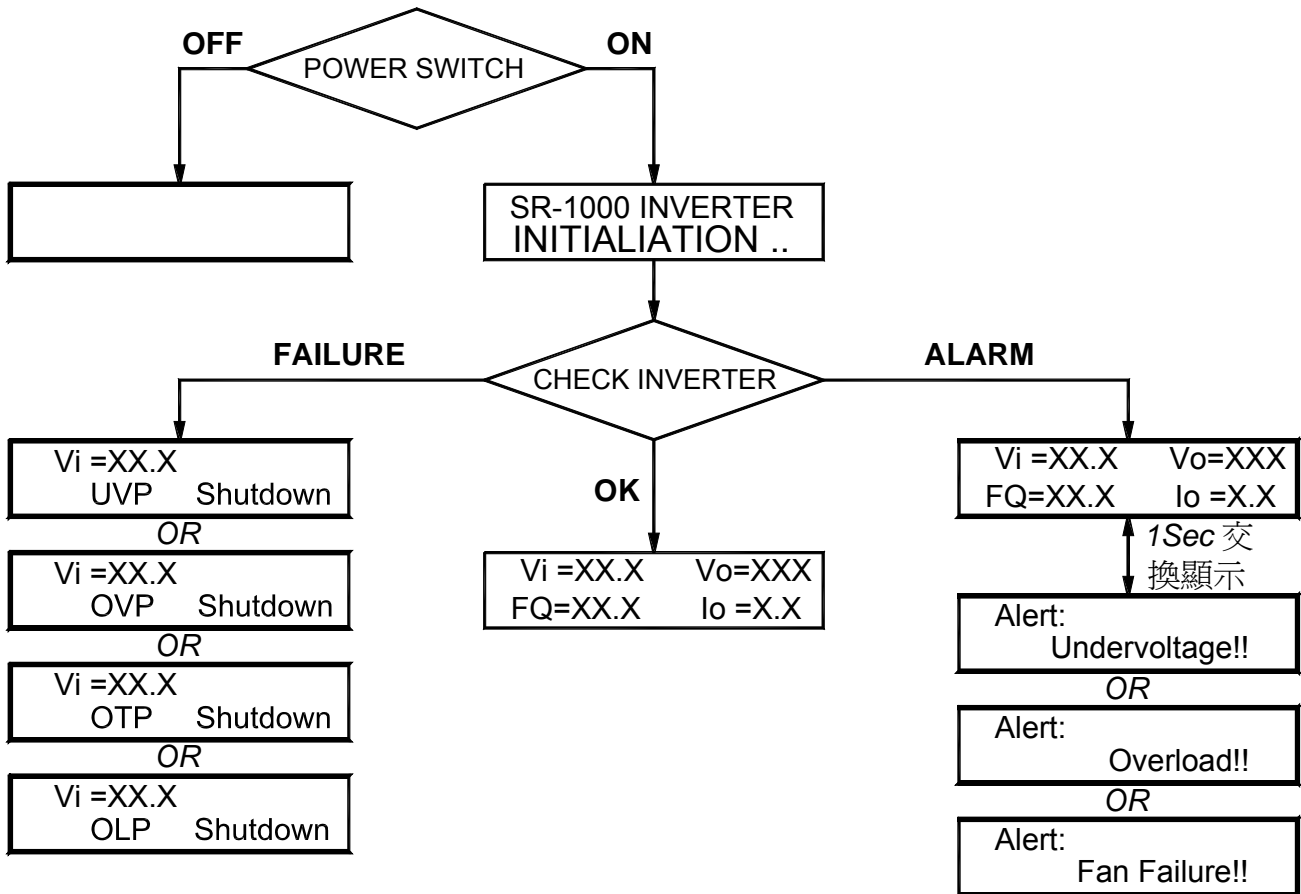
5-3. Setup Menu - Operation and Instructions

Entering Setup Menu:

Press ⬭ Button longer than 2 seconds. The inverter enters the Setup Menus consisting of three layers: (1)Select Menu Heading, (2)Select Menu Item (Function Code), (3) Set Value:

Main Menu:

Vi =XX.X	Vo=XXX
FQ=XX.X	Io =X.X

Select Menu:

Select Menu: User interface	Select Menu: I/P Parameter	Select Menu: O/P Parameter	Select Menu: RST to default

Function Code:

0	1	2	3	4	6	7	8	9	10	11	12	13	14	15

Select Item:

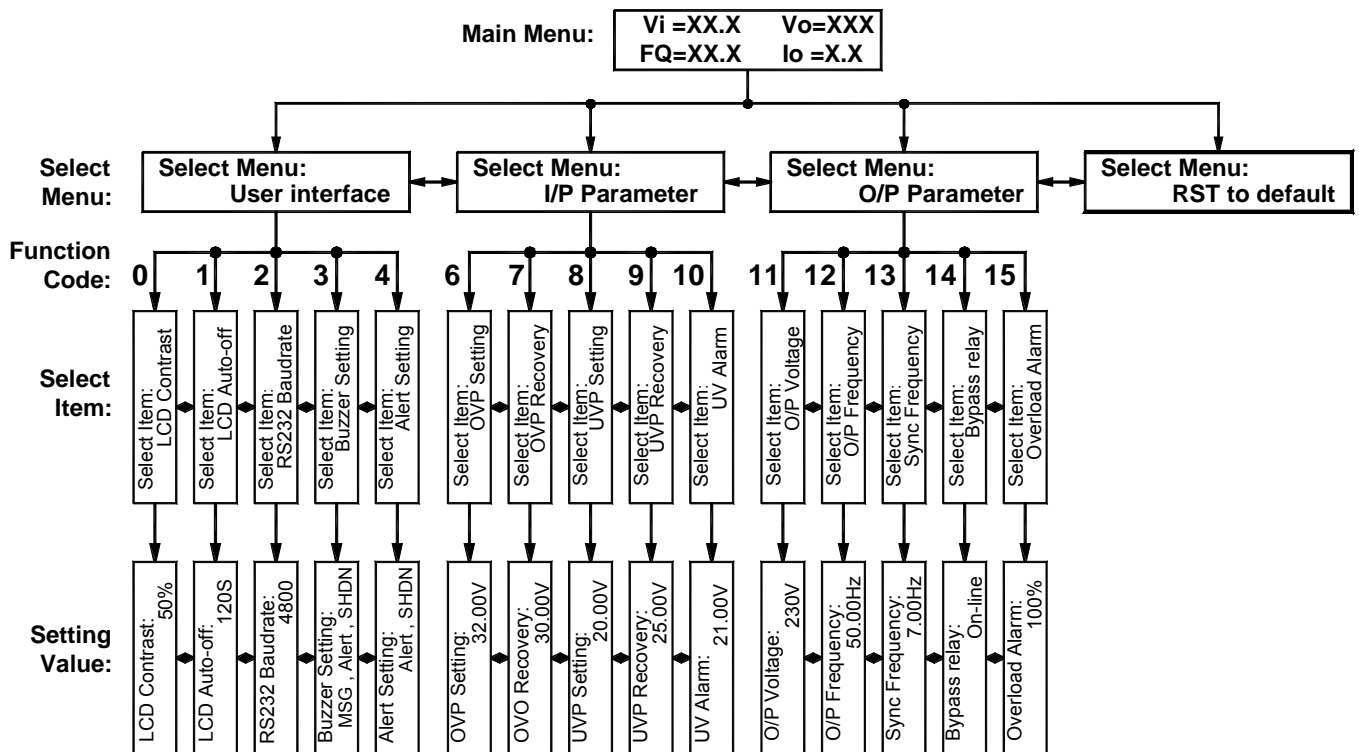| Select Item: LCD Contrast	Select Item: LCD Auto-off	Select Item: RS232 Baudrate	Select Item: Buzzer Setting	Select Item: Alert Setting	Select Item: OVP Setting	Select Item: OVP Recovery	Select Item: UVP Setting	Select Item: UVP Recovery	Select Item: UV Alarm	Select Item: O/P Voltage	Select Item: O/P Frequency	Select Item: Sync Frequency	Select Item: Bypass relay	Select Item: Overload Alarm

Setting Value:

LCD Contrast: 50%	LCD Auto-off: 120S	RS232 Baudrate: 4800	Buzzer Setting: MSG, Alert, SHDN	Alert Setting: Alert, SHDN	OVP Setting: 32.00V	OVO Recovery: 30.00V	UVP Setting: 20.00V	UVP Recovery: 25.00V	UV Alarm: 21.00V	O/P Voltage: 230V	O/P Frequency: 50.00Hz	Sync Frequency: 7.00Hz	Bypass relay: On-line	Overload Alarm: 100%

5-3-1. **User interface (Select Menu):**

0). **LCD Contrast**: Sets LCD screen contrast.

Default=50%

Setting Range= 0%~100%

1). **LCD Auto-off**: Sets LCD auto off timer.

Default=120 seconds.

Setting Range= Disable~250 seconds.

2). **RS232 Baud-rate**: Sets standard RS-232 Baud-rate.

Default=4800

Setting Range= 1200/2400/4800/9600/19200

3). **Buzzer Setting**: Sets the internal buzzer sound ON/OFF.

When setting, the LCD screen displays
Buzzer "ON", Buzzer "OFF".

Default=MSG, Alert, SHDN

Setting Range= Disable / Shutdown / Alert
/ Alert, SHDN / Message
/ Message, SHDN / Message, Alert
/ MSG, Alert, SHDN

MENU	STATUS	BUZZER
Message	Power ON or Push Keypad	ON
Alert	FAN Fail or UV Alarm or Overload Alarm	ON
Shutdown	OVP or UVP or OLP or OTP	ON
Disable	Any	OFF

4). **Alert Setup**: When alert occurs, the internal Dry Contact Relay will

open/close. (See details in Section 3-1-6)

Default = Alert, SHDN

Setting Range = Disable / Shutdown / Alert / Alert, SHDN

MENU	STATUS	RELAY
Alert	FAN Fail or UV Alarm or Overload Alarm	ON
Shutdown	OVP or UVP or OLP or OTP	ON
Disable	Any	OFF

5-3-2. **I/P Parameter (Select Menu):**

6). **OVP Setting**: Sets the Over Voltage Protection (OVP) and shutdown.

Default = 32 VDC for 24 V Model, 64 VDC for 48 V Model

Model	SETTING VALUE RANGE
24 V	30 VDC ~ 34 VDC
48 V	60 VDC ~68 VDC

7). **OVP Recovery**: When the DC input voltage is higher than the OVP setting, the inverter shuts-down. Once the input voltage falls below the set OVP value, the inverter will automatically restart.

Default = 30 VDC for 24 V Model, 60 VDC for 48 V Model

Model	SETTING VALUE RANGE
24 V	28 VDC ~ 32 VDC
48 V	56 VDC ~ 64 VDC

8). **UVP Setting**: Setting the inverter's Under-Voltage Protection (UVP) and

Shutdown.

Default = 20 VDC for 24 V Model, 40 VDC for 48 V Model

Model	SETTING VALUE RANGE
24 V	18 VDC ~22 VDC
48 V	36 VDC ~ 44 VDC

9). **UVP Recovery**: When the DC input voltage is below the set UVP value

the inverter shuts-down. Once the input voltage rises

above the set UVP value, the inverter will automatically

restart.

Default=25 VDC for 24 V Model, 50 VDC for 48 V Model

Model	SETTING VALUE RANGE
24 V	23 VDC ~ 27 VDC
48 V	46 VDC ~ 54 VDC

10). **UV Alarm**: Sets Under Voltage (UV) alarm. When the input voltage is

lower than the set value, the unit will sound "beep" to remind

that the unit is going to shutdown. At the meantime, the contact

in the internal Dry Contact Relay will open / close (See details

in Section 3-1-6).

Default = 21 VDC for 24 V Model, 42 VDC for 48 V Model

Model	SETTING VALUE RANGE
24 V	19 VDC ~ 23 VDC
48 V	38 VDC ~ 46 VDC

NOTE. The value of 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.

5-3-3. **O/P Parameters:**

11). **O/P Voltage**: Sets the inverter output voltage.

Default = 110 VAC for 110 V Model, 230 VAC for 220 V Model

Model	SETTING VALUE RANGE
110 V	97 VAC ~ 123 VAC
220 V	194 VAC ~ 246 VAC

12). **O/P Frequency**: Sets the inverter output frequency.

Default = 60Hz for 110 V Model, 50Hz for 220 V Model.

Model	SETTING VALUE RANGE
110 V	47 Hz ~ 63 Hz
220 V	47 Hz ~ 63 Hz

13). **Sync Frequency**: Sets the AC output synchronous frequency.

Example: DC to AC inverter = 230 VAC / 50Hz

User setting Value = 7Hz

When the AC input (GRID) "Frequency" is within the

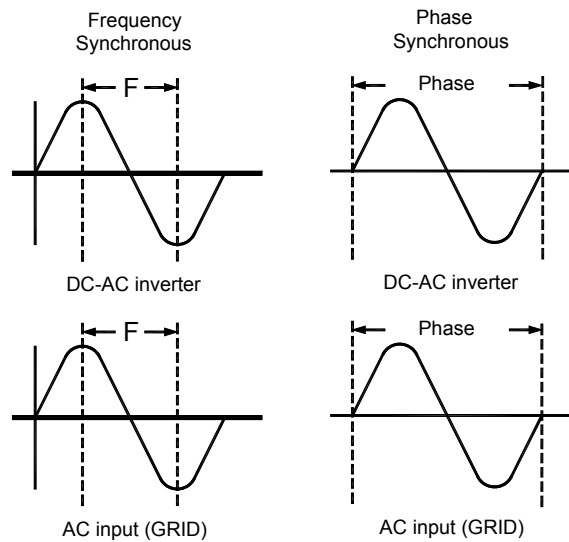range of 43 Hz~57 Hz, the internal transfer relay will

operate normally . When the "Frequency" of the incoming grid power is less than 43 Hz. or more than 58 Hz., the internal transfer relay will de-energize (See details in Section 2-2)

Default = 0.1Hz ~ 7Hz.

Model	SETTING VALUE RANGE
110 V	0.1 Hz ~7 Hz
230 V	0.1 Hz ~ 7 Hz

14). **Bypass Relay**: The setup is provided in one of the following two ways: On line Mode or Off Line Mode (Exact, Normal, Haphazard)

Default = Normal (Off line).

MODE	MENU	Transfer Relay Switching Feature
OFF LINE (See details in Section 5-3)	Exact	The transfer relay will switch "ON" or "OFF" based on conformance to the Sync Frequency window that has been set (Function Code 13)
	Normal	The transfer relay will be "ON" if AC input (Grid) power is available. The DC-AC inverter will remain synchronized with the incoming AC power (Grid). The relay will NOT switch off if the grid frequency is beyond the range set under Sync Frequency window (Function Code 13)
	Haphazard	The transfer relay will switch "ON" or "OFF". Conformance to phase and frequency synchronization will not be considered
ON LINE	---------	(See details in Section 5-3)

Frequency
Synchronous

Phase
Synchronous

|← F →|

|← Phase →|

DC-AC inverter

DC-AC inverter

|← F →|

|← Phase →|

AC input (GRID)

AC input (GRID)

15). **Overload Alarm**: Sets the overload alarm. When the output power is higher than the set value, the unit will sound "beep" to remind that the unit is going to shutdown. At the same time, the internal Dry Contact Relay will open/close (See details in Section 3-1-6).
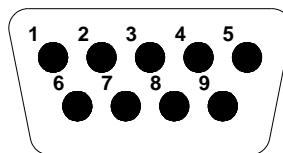**Default** = 100%
Setting range = 50%~110%

6. RS-232 Communication and Operation

6-1. Operation of RS-232 Serial Port:
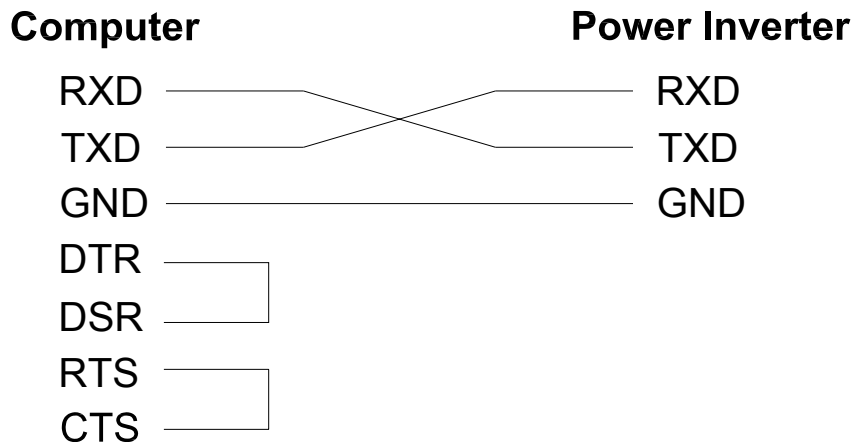
6-1-1. This unit uses a standard 9-Pole D connector and three of the RS232 signal lines:

Signal description	PIN
N.C	1
RXD	2
TXD	3
DTR	4
GND	5
DSR	6
RTS	7
CTS	8
N.C	9

6-1-2. The connection between this unit and the computer is as follows:

Computer   **Power Inverter**

RXD ⟍⟋ RXD
TXD ⟋⟍ TXD
GND ———————— GND
DTR ⎤
DSR ⎦
RTS ⎤
CTS ⎦

6-1-3. The RS232 interface of this unit employs ASCII code to implement the
asynchronous serial transmission control.
The byte structure is START-BIP – 8 BIT DATA-STOP BIT.
Baud rate: 1200/2400/4800/9600/19200 (See details in Section 5-3-1).

6-1-4. Coupled with PC software application port. Operation is as detailed in
Section 6-2.

6-2. Interface Commands:
The buffer size used for the RS232 port is 12-byte. This unit will ignore all bytes
more than this value. During transmission, this unit will indicate it is ready to
receive data from computer by this DTR line. A computer has to check the DTR
line before sending any information to this unit. This unit is normally always
ready to receive data while operating. When a LF character (ASCII code 0AH)
is received, this unit would finish the receiving by clearing the DTR status and
begin to interpret the received information. The unit would execute the received
command (AND/OR data) if it is correct. Irrespective of whether the command is
accepted or not, the unit will always send back a response signal to the
computer and set DTR to ready for receiving more incoming information.

6-2-1. The Baud-rate of the RS232 interface can be set with the help of the Setup

Menu (See details in Section 5-3-1).
Note. You have to reset the unit after adjustment to activate the new setting.

6-3. Example of the RS232 Operation:

6-3-1. RS232 command:

Command format:

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

The system would interpret and execute the command only after these two characters are received.

After the unit execute the command, it would send a response string to the computer.

The response string is as follows:

= > CR LF: Command executed successfully

? > CR LF: Command error, not accepted

! > CR LF: Command correct but execution error (e.g. parameters out of range).

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

6-3-2. Command format:

This unit supports the following command format.

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

1). Command to switch the Power ON/OFF:

Format: Power <value>

Example: A space (ASCII code 20H) is needed between Power and **<value>.**

<value> can be one of the following.

"0": Power off

"1": Power on

2). Command to query the Output Frequency:

Format: FRQ?

After "Enter", the unit's "Output Frequency" appears on the PC screen.

3). Command to query the Output Voltage

Format: VOL?

After "Enter", the unit's "Output Voltage" appears on the PC screen.

4). Command to query the Output Current
    Format: AMP?
    After "Enter", the unit's "Output Current" appears on the PC
    screen.
5). Command to query the Input Battery Voltage:
    Format: BAT?
    After "Enter", the unit's "Input Voltage" appears on the PC screen.

6-3-3. Command for accessing Setup Menus and adjusting values:
    1). Selecting the Setup Menus with the help of Function Codes:
        Format: FUNC <Function Code>
        After "Enter", the Setup Menu for the Function Code will be called.
        The **<Function Code>** = 0~17, as follows:

<Function Code>	Setup Menu	<Function Code>	Setup Menu
0	LCD Contrast	9	UVP Recovery
1	LCD Auto-off	10	UV Alarm
2	RS232 Baud-rate	11	O/P Voltage
3	Buzzer Setting	12	O/P Frequency
4	Alert Setting	13	Sync Frequency
5	NOT USED	14	Bypass Relay
6	OVP Setting	15	Overload Alarm
7	OVP Recovery	16	NOT USED
8	UVP Setting	17	NOT USED

2). Command to query the Functions No:
    Format: FUNC?
    After "Enter", the unit's "Function Code" appears on the PC screen.

3). Command to query the set value of the Function:
    Format: SETT?
    After "Enter", the existing set value of the function appears on the
    PC screen.
4). Command to set or adjust the value of the Function:
    Format: SETT <value>
    After "Enter", the new value of the Function is set
    Choose the **<value>** of the function as follows:

FUNC 0: LCD Contrast

Setup Menu	SETT <value>
LCD Contrast	0~100

FUNC 1: LCD Auto-off

Setup Menu	SETT \<value\>
LCD Auto-off	Disable~250

FUNC 2: RS232 Baud rate

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

FUNC 3: Buzzer Setting

Setup Menu	SETT \<value\>	Buzzer (Beep sound)
Buzzer Setting	0	Disable
	1	Shutdown
	2	Alert
	3	Alert , SHDN
	4	Message
	5	Message , SHDN
	6	Message , Alert
	7	Msg , Alert , SHDN

FUNC 4: Alert Setting

Setup Menu	SETT \<value\>	Alert
Alert Setting	0	Disable
	1	Shutdown
	2	Alert
	3	Alert , SHDW

FUNC 6: OVP Setting

Setup Menu	SETT \<value\>	Model
OVP Setting	30~34	SR1000-124
		SR1000-224
	60~68	SR1000-148
		SR1000-248

FUNC 7: OVP Recovery

Setup Menu	SETT <value>	Model
OVP Recovery	28~32	SR1000-124
		SR1000-224
	56~64	SR1000-148
		SR1000-248

FUNC 8: UVP Setting

Setup Menu	SETT <value>	Model
UVP Setting	18~22	SR1000-124
		SR1000-224
	36~44	SR1000-148
		SR1000-248

FUNC 9: UVP Recovery

Setup Menu	SETT <value>	Model
UVP Recovery	23~27	SR1000-124
		SR1000-224
	46~54	SR1000-148
		SR1000-248

FUNC 10: UV Alarm

Setup Menu	SETT <value>	Model
UV Alert	19~23	SR1000-124
		SR1000-224
	38~46	SR1000-148
		SR1000-248

FUNC 11: O/P Voltage

Setup Menu	SETT <value>	Model
O/P Voltage	97~123	SR1000-124
		SR1000-148
	194~246	SR1000-224
		SR1000-248

FUNC 12: O/P Frequency

Setup Menu	SETT <value>
O/P Frequency	47~63

FUNC 13: Sync Frequency

Setup Menu	SETT <value>
Sync Frequency	0.1~7

FUNC 14: Bypass Relay

Setup Menu	SETT <value>	MODE
Bypass Relay	0	ON LINE
	1	Haphazard(OFF LINE)
	2	Normal(OFF LINE)
	3	Exact(OFF LINE)

FUNC 15: Overload Alarm

Setup Menu	SETT <value>
Overload Alarm	50~110

7. Information

7-1. Troubleshooting

> **WARNING**
> Do not open or disassemble the SR series Inverter.
> Attempting to service the unit may cause risk of
> electrical shock or fire.

Problems and Symptoms	Possible Cause	Solutions
No AC Power "Output"		
a. LCD Panel Display "OLP Shutdown".	Short circuit ,wiring error . over loading.	Check AC wiring for short circuit . Reduce load.
b. LCD Panel Display "OVP Shutdown"	Over input voltage (OVP)	Check input voltage Reduce input voltage
c. LCD Panel Display "UVP Shutdown"	Low input voltage. (UVP)	Recharge battery. Check connections and cables.
d. LCD Panel Display "OTP shutdown"	Thermal shutdown. (OTP)	Improve ventilation. Make sure ventilation grilles / slots of the inverter are not obstructed. Lower ambient temperature.

7-2. Warranty

We guarantee this product against defects in materials and workmanship for a period of 24 months from the date of purchase and will repair or replace any defective power inverters if you directly returned them to us with postage paid.
Please note that Cotek is only responsible for ensuring our products are operational before delivering. 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.

8. Appendices

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