

User Manual

EN

4,8 kVA AC Converters 6,0 kVA AC Converters

Rev. 1.0-12.07.24					
-------------------	--	--	--	--	--



Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

Table of Contents

1. SAFETY AND EMC INSTRUCTIONS	3
1-1. TRANSPORTATION AND STORAGE	
1-2. PREPARATION	
1-3. INSTALLATION	
1-4. OPERATION.....	
1-5. STANDARDS	
2. INSTALLATION AND OPERATION	5
2-1. UNPACKING AND INSPECTION.....	
2-2. REAR PANEL VIEW.....	
2-3. CONVERTER INSTALLATION.....	
3. OPERATIONS	8
3-1. BUTTON OPERATION.....	
3-2. LED INDICATORS AND LCD PANEL	
3-3. AUDIBLE ALARM	
3-4. CONVERTER OPERATION.....	
3-6. ABBREVIATION MEANING IN LCD DISPLAY	
3-7. LCD SETTING	
3-8. OPERATING MODE/STATUS DESCRIPTION	
3-9. FAULT CODE.....	
3-10. WARNING INDICATOR.....	
4. TROUBLE SHOOTING	16
5. STORAGE AND MAINTENANCE	17
5-1. STORAGE.....	
5-2. MAINTENANCE.....	

1. Safety and EMC instructions

Please read carefully the following user manual and the safety instructions before installing the unit or using the unit!

1-1. Transportation and Storage



Please transport the UPS system only in the original package to protect against shock and impact.



The UPS must be stored in the room where it is ventilated and dry.

1-2. Preparation



Condensation may occur if the UPS system is moved directly from cold to warm environment. The UPS system must be absolutely dry before being installed. Please allow at least two hours for the UPS system to acclimate the environment.



Do not install the CONVERTER system near water or in moist environments.



Do not install the CONVERTER system where it would be exposed to direct sunlight or nearby heater.



Do not block ventilation holes in the CONVERTER housing.

1-3. Installation



Do not connect appliances or devices which would overload the CONVERTER (e.g. big motor-type equipment) to the CONVERTER output sockets or terminal.



Place cables in such a way that no one can step on or trip over them.



Do not block air vents in the housing of CONVERTER. The CONVERTER must be installed in a location with good ventilation. Ensure enough space on each side for ventilation.



CONVERTER has provided earthed terminal, in the final installed system configuration, equipotential earth bonding to the external CONVERTER battery cabinets.



The CONVERTER can be installed only by qualified maintenance personnel.



An appropriate disconnect device as short-circuit backup protection should be provided in the building wiring installation.



An integral single emergency switching device which prevents further supply to the load by the CONVERTER in any mode of operation should be provided in the building wiring installation.



Connect the earth before connecting to the building wiring terminal.



Installation and Wiring must be performed in accordance with the local electrical laws and regulations.

1-4. Operation



Do not disconnect the earth conductor cable on the CONVERTER or the building wiring terminals in any time since this would cancel the protective earth of the CONVERTER system and of all connected loads.



The CONVERTER system features its own, internal current source (batteries). The CONVERTER output sockets or output terminal blocks may be electrically live even if the CONVERTER system is not connected to the building wiring outlet.



In order to fully disconnect the CONVERTER system, first press the “OFF” button and then disconnect the mains.



Ensure that no liquid or other foreign objects can enter into the CONVERTER system.



The CONVERTER can be operated by any individuals with no previous experience.

1-5. Standards

* Safety	
IEC/EN 62040-1-1	
* EMI	
Conducted Emission.....:IEC/EN 62040-2	Category C3
Radiated Emission.....:IEC/EN 62040-2	Category C3
*EMS	
ESD.....:IEC/EN 61000-4-2	Level 4
RS..... :IEC/EN 61000-4-3	Level 3
EFT..... :IEC/EN 61000-4-4	Level 4
SURGE..... :IEC/EN 61000-4-5	Level 4
CS..... :IEC/EN 61000-4-6	Level 3
Power-frequency Magnetic field..... :IEC/EN 61000-4-8	Level 3
Low Frequency Signals.....:IEC/EN 61000-2-2	
Warning: This is a product for commercial and industrial application in the second environment-installation restrictions or additional measures may be needed to prevent disturbances.	

2. Installation and Operation

2-1. Unpacking and Inspection

Unpack the package and check the package contents. The shipping package contains:

- One CONVERTER
- One user manual
- One monitoring software CD
- One RS-232 cable (option)
- One USB cable
- One EPO plug

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged during transportation. Do not turn on the unit and notify the carrier and dealer immediately if there is any damage or lacking of some parts. Please keep the original package in a safe place for future use.

2-2. Rear Panel View

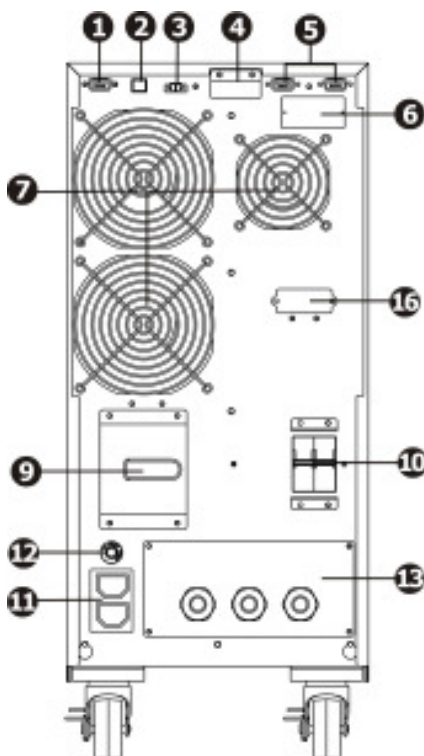


Diagram 1: Rear Panel Overlook

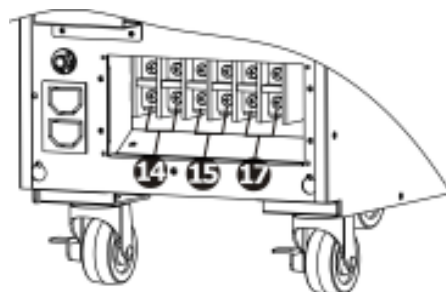


Diagram 2: Input/Output Terminal

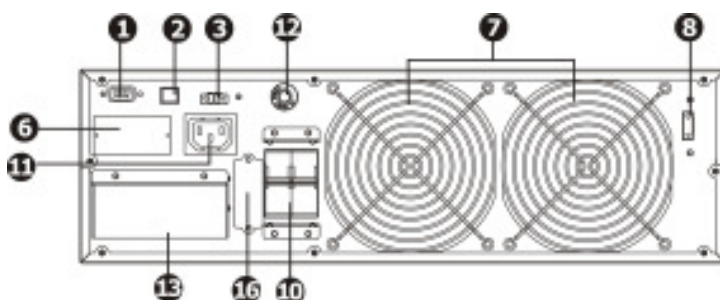


Diagram 3: rear panel



Diagram 4: Input/output terminal

1. RS-232 communication port
2. USB communication port
3. Emergency power off function connector (EPO connector)
4. not available
5. not available
6. Intelligent slot
7. Cooling fan
8. not usable in converter configuration
9. not usable in converter configuration
10. Input circuit breaker
11. Output receptacles: connect to mission-critical loads
12. Output circuit breaker for receptacles
13. Input/Output terminal (Refer to Diagram 2 for the details)
14. Output terminal: connect to mission-critical loads
15. Programmable output terminal: connect to non-critical loads
16. not available
17. Utility input terminal
18. Grounding terminal
19. not available

2-3. CONVERTER Installation

Installation and wiring must be performed in accordance with the local electric laws/regulations and execute the following instructions by professional personnel.

- 1) Make sure the mains wire and breakers in the building are enough for the rated capacity of CONVERTER to avoid the hazards of electric shock or fire.

NOTE: Do not use the wall receptacle as the input power source for the CONVERTER, as its rated current is less than the CONVERTER's maximum input current. Otherwise the receptacle may be burned and destroyed.

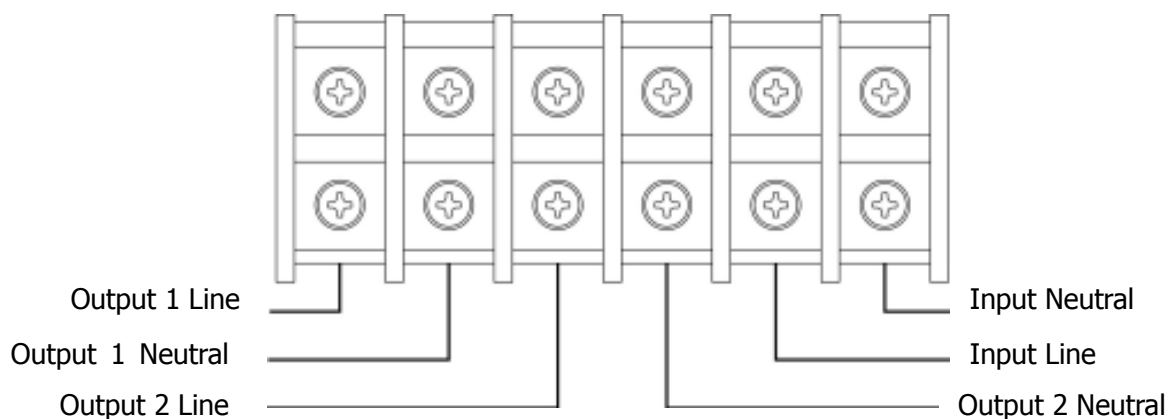
- 2) Switch off the mains switch in the building before installation.
- 3) Turn off all the connected devices before connecting to the CONVERTER and then switch off the internal output breaker.
- 4) Prepare wires based on the following table:

Model	Wiring spec (AWG)		
	Input	Output	Ground
4,8 kVA	10	10	10
6,0 kVA	8	8	8

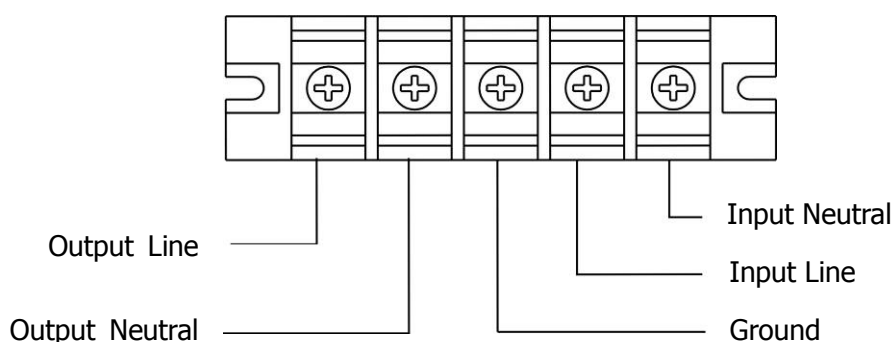
NOTE 1: The cable for 4,8 kVA should be able to withstand over 40A current. The cable for 6 kVA should be able to withstand over 63A current

NOTE 2: The selections for color of wires should be followed by the local electrical laws and regulations.

5) Remove the terminal block cover on the rear panel of CONVERTER. Then connect the wires according to the following terminal block diagrams: (Connect the earth wire first when making wire connection. Disconnect the earth wire last when making wire disconnection!)



Terminal Block wiring diagram of Tower units



Terminal Block wiring diagram for Rack units


NOTE 1: Make sure that the wires are connected tightly with the terminals.

NOTE 2: There are two kinds of outputs: output terminal/outlets and programmable terminal. Please connect non-critical devices to the programmable terminal and critical devices to the output terminal/outlets. During power failure, you may extend the backup time to critical devices by setting shorter backup time for non-critical devices.

NOTE 3: The internal output breaker is used to cut off the output, but we suggest you to install an external output breaker between the output terminal and the load. This breaker should be installed in an easy access area which will allow you to cut off the output immediately in an emergency. And the breaker should be equipped with leakage current protection if necessary.

6) Insert the EPO plug into the EPO slot on the rear panel.

7) Put the terminal block cover back to the rear panel of the CONVERTER.

 **Warning:** (Only for standard model)

- Make sure the CONVERTER is not turned on before installation. The CONVERTER should not be turned on during wiring connection.
- Do not try to modify the standard model to the long-run model. Particularly, do not try to connect the standard internal battery to the external battery. The battery type and voltage may be different. If you connect them together, it maybe causes the hazard of electric shock or fire!

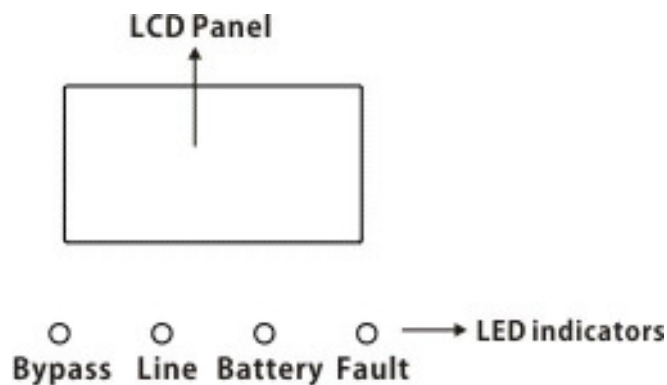
3. Operations

3-1. Button Operation

Button	Function
ON/Enter Button	<ul style="list-style-type: none"> ➤ Turn on the CONVERTER: Press and hold the button more than 0.5s to turn on the CONVERTER. ➤ Enter Key: Press this button to confirm the selection in setting menu.
OFF/ESC Button	<ul style="list-style-type: none"> ➤ Turn off the CONVERTER: Press and hold the button more than 0.5s to turn off the CONVERTER. ➤ Esc key: Press this button to return to last menu in setting menu.
Test/Up Button	<ul style="list-style-type: none"> ➤ Battery test: Press and hold the button more than 0.5s to test the battery while in AC mode, or CVCF mode. ➤ UP key: Press this button to display next selection in setting menu.
Mute/Down Button	<ul style="list-style-type: none"> ➤ Mute the alarm: Press and hold the button more than 0.5s to mute the buzzer. Please refer to section 3-4-9 for details. ➤ Down key: Press this button to display previous selection in setting menu.
Test/Up + Mute/Down Button	<ul style="list-style-type: none"> ➤ Press and hold the two buttons simultaneous more than 1s to enter/escape the setting menu.

* CVCF mode means converter mode.

3-2. LED Indicators and LCD Panel



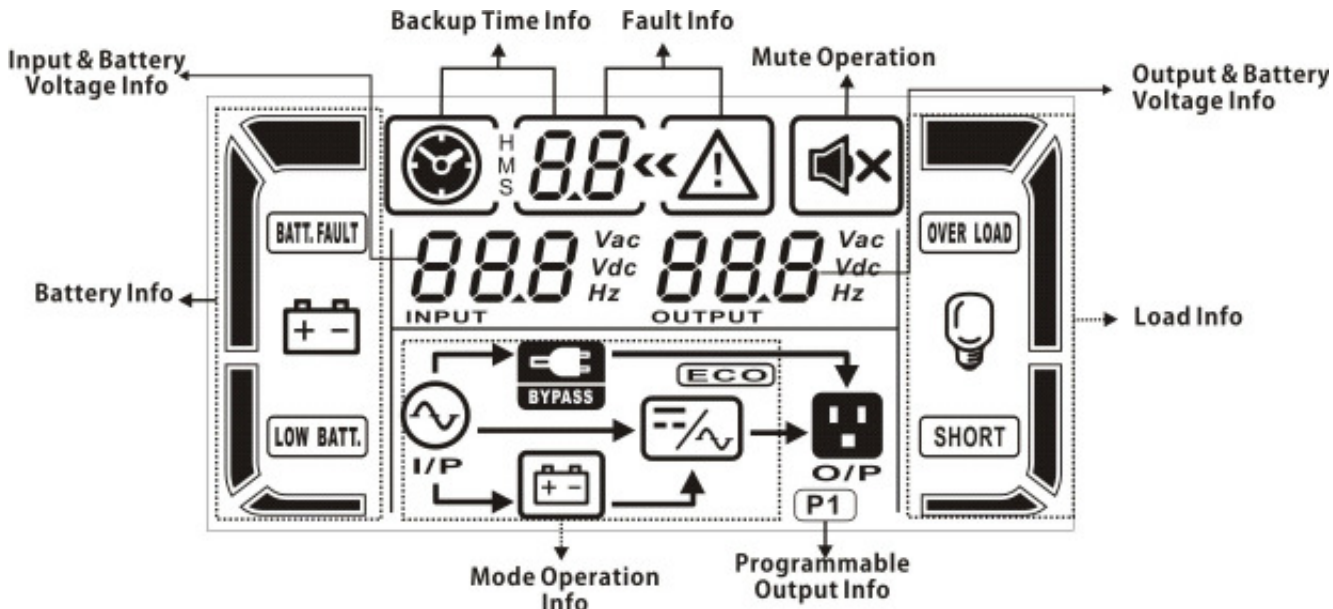
LED Indicators:

There are 4 LEDs on front panel to show the CONVERTER working status:

Mode \ LED	Bypass	Line	Battery	Fault
CONVERTER Startup	●	●	●	●
Bypass mode	○	○	○	○
AC mode	○	●	○	○
Battery mode	○	○	○	○
CVCF mode	○	●	○	○
Battery Test	○	○	○	○
ECO mode	○	○	○	○
Fault	○	○	○	●

Note: ● means LED is lighting, and ○ means LED is faded.

LCD Panel:



Display	Function
Fault information	
	Indicates that the warning and fault occurs.
	Indicates the fault codes, and the codes are listed in details in section 3-9.
Mute operation	
	Indicates that the CONVERTER alarm is disabled.
Output voltage information	
	Indicates the Inverter output voltage, frequency or DC circuit voltage. Vac: inverter output voltage, Vdc: DC circuit voltage, Hz: frequency
Load information	
	Indicates the load level by 0-25%, 26-50%, 51-75%, and 76-100%.
	Indicates overload.
	Indicates the load or the output is short.
Programmable output information	
	Indicates that the programmable outputs are working.
Mode operation information	
	Indicates the CONVERTER connects to the mains.
	Indicates the Inverter circuit is working.
	Indicates the output is working.
Input voltage information	
	Indicates the regulator input voltage or frequency or inside DC circuit voltage. Vac: regulator Input voltage, Vdc: inside DC circuit voltage, Hz: input frequency

3-3. Audible Alarm

Description	Buzzer status	Muted
CONVERTER status		
Fault mode	Beeping continuously	
Warning		
Overload	Beeping twice every second	No
Over charge		
Fan failure/Over temperature		
IP fuse broken		
Overload 3 times in 30min		
EPO status		
Cover of maintain switch is open		
Fault		
Bus start failure	Beeping continuously	Yes
Bus over		
Bus under		
Bus unbalance		
Bus short circuited		
Inverter soft start failure		
High Inverter voltage		
Low Inverter voltage		
Inverter output short circuited		
Negative power fault		
Inverter relay short circuited		
Over temperature		
CPU communication failure		
Overload		

3-4. CONVERTER Operation

1. Turn on the CONVERTER with utility power supply (in AC mode)

- 1) After power supply is connected correctly, When setting input breaker at “ON” position, the fan will start running. Then, set the internal output breaker at “ON” position.
- 2) Press and hold the “ON” button for 0.5s to turn on the CONVERTER and the buzzer will beep once.
- 3) A few seconds later, the CONVERTER will enter to AC mode

2. Connect devices to CONVERTER

After the CONVERTER is turned on, you can connect devices to the CONVERTER.

- 1) Turn on the CONVERTER first and then switch on the devices one by one, the LCD panel will display total load level.
- 2) If it is necessary to connect the inductive loads such as a printer, the in-rush current should be calculated carefully to see if it meets the capacity of the CONVERTER, because the power consumption of this kind of loads is too big.
- 3) If the CONVERTER is overload, the buzzer will beep twice every second.
- 4) When the CONVERTER is overload, please remove some loads immediately. It is recommended to have the total loads connected to the CONVERTER less than 80% of its nominal power capacity to prevent overload for system safety.
- 5) If the overload time is over acceptable time listed in spec at AC mode, the CONVERTER will automatically transfer to Bypass mode. After the overload is removed, it will return to AC mode. If the overload time is over acceptable time listed in spec at Battery mode, the CONVERTER will become fault status.

3. Turn off the CONVERTER with utility power supply in AC mode

- 1) Turn off the inverter of the CONVERTER by pressing “OFF” button for at least 0.5s, and then the buzzer will beep once. The CONVERTER will turn into Bypass mode.

NOTE 1: If the CONVERTER has been set to enable the bypass output, it will bypass voltage from utility power to output sockets and terminal even though you have turned off the CONVERTER (inverter).

NOTE 2: After turning off the CONVERTER, please be aware that the CONVERTER is working at Bypass mode and there is risk of power loss for connected devices.

- 2) In Bypass mode, output voltage of the CONVERTER is still present. In order to cut off the output, switch off the internal output breaker and input breaker. A few seconds later, there is no display shown on the display panel and CONVERTER is complete off.

4. Mute the buzzer

- 1) To mute the buzzer, please press the “Mute” button for at least 0.5s. If you press it again after the buzzer is muted, the buzzer will beep again.
- 2) Some warning alarms can't be muted unless the error is fixed. Please refer to section 3-3 for the details.

5. Operation in warning status

- 1) When Fault LED flashes and the buzzer beeps once every second, it means that there are some problems for CONVERTER operation. Users can get the fault code from LCD panel. Please check the trouble shooting table in chapter 4 for details.
- 2) Some warning alarms can't be muted unless the error is fixed. Please refer to section 3-3 for the details.

6. Operation in Fault mode

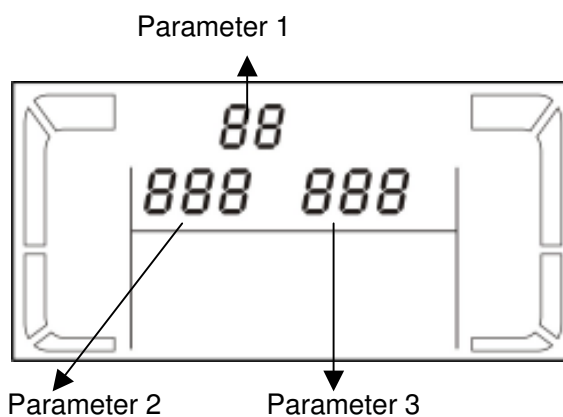
- 1) When Fault LED illuminates and the buzzer beeps continuously, it means that there is a fatal error in the CONVERTER. Users can get the fault code from display panel. Please check the trouble shooting table in chapter 4 for details.
- 2) Please check the loads, wiring, ventilation, utility, battery and so on after the fault occurs. Don't try to turn on the CONVERTER again before solving the problems. If the problems can't be fixed, please contact the distributor or service people immediately.
- 3) For emergency case, please cut off the connection from utility, external battery, and output immediately to avoid more risk or danger.

3-6. Abbreviation Meaning in LCD Display

Abbreviation	Display content	Meaning
ENA	ENa	Enable
DIS	DI S	Disable
ATO	AtO	Auto
BAT	bAt	Battery
NCF	nCF	Normal mode (not CVCF mode)
CF	CF	CVCF mode
SUB	SUb	Subtract
ADD	AdD	Add
ON	ON	On
OFF	OFF	Off
FBD	Fbd	Not allowed
OPN	OPN	Allow
RES	RES	Reserved

3-7. LCD Setting

There are three parameters to set up the CONVERTER. Refer to following diagram.



Parameter 1: It's for program alternatives. There are 15 programs to set up. Refer to below table.

Parameter 2 and parameter 3 are the setting options or values for each program.


15 programs available list for parameter 1:

Code	Description	Bypass	AC	ECO	CVCF	Battery	Battery Test
01	Output voltage						
02	Output frequency						
03	Voltage range for bypass						
04	Frequency range for bypass						
05	ECO mode enable/disable						
06	Voltage range for ECO mode						
07	ECO mode frequency range setting						
08	Bypass mode setting						
09	Battery backup time setting						
10	Programmable output setting		Y				
11	Shutdown point for programmable output		Y				
12	Hot standby function enable/disable						
13	Battery voltage adjustment						
14	Charger voltage adjustment						
15	Output voltage adjustment						


*Y means that this program can be set in this mode.

**Programmable output setting is not supported by Rack models.


● **01: Output voltage**

Interface	Setting
	Parameter 3: Output voltage only factory settings


● **02: Output frequency**

Interface	Setting
<p>60 Hz, CVCF mode</p>  <p>50 Hz, Normal mode</p> <p>ATO</p>	Parameter 2: Output Frequency only factory settings Parameter 3: Frequency mode only factory settings


- 03: Voltage range for bypass

Interface	Setting
 <p>The LCD display shows '03<<' at the top. Below it, the voltage range '176 Vac' to '264 Vac' is displayed. A small 'ECO' logo is visible at the bottom of the display area.</p>	only factory settings


- 04: Frequency range for bypass

Interface	Setting
 <p>The LCD display shows '04<<' at the top. Below it, the frequency range '46.8 Hz' to '53.8 Hz' is displayed. A small 'ECO' logo is visible at the bottom of the display area.</p>	only factory settings


- 05: ECO mode enable/disable

Interface	Setting
 <p>The LCD display shows '05<<' at the top. Below it, the text 'DIS' is displayed. A small 'ECO' logo is visible at the bottom of the display area.</p>	only factory settings


- 06: Voltage range for ECO mode

Interface	Setting
 <p>The LCD display shows '06<<' at the top. Below it, the voltage range '209 Vac' to '231 Vac' is displayed. A small 'ECO' logo is visible at the bottom of the display area.</p>	only factory settings





- 07: Frequency range for ECO mode

Interface	Setting
 <p>The LCD display shows '07<<' at the top. Below it, the frequency range '48.0 Hz' to '52.0 Hz' is displayed. A small 'ECO' logo is visible at the bottom of the display area.</p>	only factory settings

● 15: Output voltage adjustment

Interface	Setting
	only factory setting

3-8. Operating Mode/Status Description

Operating mode/status		
CVCF mode	Description	When input frequency is within 46 to 64Hz, the CONVERTER can be set at a constant output frequency, 50 Hz or 60 Hz. The CONVERTER will still charge battery under this mode.
	LCD display	 
Fault status	Description	When CONVERTER has fault happened, it will display fault messages in LCD panel.
	LCD display	 

3-9. Fault Code

Fault event	Fault code	Icon	Fault event	Fault code	Icon
Bus start failure	01	None	Negative power fault	1A	None
Bus over	02	None	internal DC circuit	21	None
Bus under	03	None	Inverter relay short circuited	24	None
Bus unbalance	04	None	internal DC circuit	28	BATT.FAULT
Bus short circuited	05	None	Parallel communication failure	35	None
Inverter soft start failure	11	None		36	None
High Inverter voltage	12	None	Over temperature	41	None
Low Inverter voltage	13	None	CPU communication failure	42	None
Inverter output short circuited	14	SHORT	Overload	43	OVER LOAD

3-10. Warning Indicator

Warning	Icon (flashing)	Alarm
Battery low		Beeping every second
Overload		Beeping twice every second
Over charge		Beeping every second
EPO enable		Beeping every second
Fan failure/Over temperature		Beeping every second
Charger failure		Beeping every second
I/P fuse broken		Beeping every second
Overload 3 times in 30min		Beeping every second

4. Trouble Shooting

If the CONVERTER system does not operate correctly, please solve the problem by using the table below.

Symptom	Possible cause	Remedy
No indication and alarm in the front display panel even though the mains is normal.	The AC input power is not connected well.	Check if input cable firmly connected to the mains.
The icon and the warning code <i>EP</i> flash on LCD display and alarm beeps every second.	EPO function is enabled.	Set the circuit in closed position to disable EPO function.
The icon and flash on LCD display and alarm beeps twice every second.	CONVERTER is overload.	Remove excess loads from CONVERTER output.
Fault code is shown as 43. The icon lights on LCD display and alarm beeps continuously.	CONVERTER is overload too long and becomes fault. Then CONVERTER shut down automatically.	Remove excess loads from CONVERTER output and restart it.
Fault code is shown as 14, the icon lights on LCD display, and alarm beeps continuously.	The CONVERTER shut down automatically because short circuit occurs on the CONVERTER output.	Check output wiring and if connected devices are in short circuit status.
Fault code is shown as 1, 2, 3, 4, 5, 11, 12, 13, 1A, 21, 24, 35, 36, 41 or 42 on LCD display and alarm beeps continuously.	A CONVERTER internal fault has occurred. There are two possible results The load is no longer supplied by power.	Contact your dealer
The icon and flash on LCD display and alarm beeps every second.	Fan is locked or not working; or the CONVERTER temperature is too high.	Check fans and notify dealer.

5. Storage and Maintenance

5-1. Storage

Storage Temperature
-25°C - 40°C

5-2. Maintenance



The CONVERTER system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.



Even after the unit is disconnected from the mains, components inside the CONVERTER system are still connected to the battery packs which are potentially dangerous.



Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitor such as BUS-capacitors.



Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.



Please replace the fuse only with the same type and amperage in order to avoid fire hazards.



Do not disassemble the CONVERTER system.