Qoltec®

OPERATING INSTRUCTIONS

3-phase 20 kVA UPS emergency power supply

Model: 52288

INTRODUCTION

Thank you for choosing our UPS. We are confident that this product will meet your expectations. This manual contains instructions for installing and using the product, including important safety instructions for proper operation and installation. If you have any questions after reading this manual, please contact our Customer Service Department.

ABOUT THIS MANUAL

This manual describes the installation, operation and troubleshooting of this device.
Please read all the information in this manual carefully before installing and operating the device.

ABOUT THE PRODUCT

The 3-phase 20kVA / 20kW UPS emergency power supply is an advanced device that will provide you with a continuous power supply with the highest stability and a pure sine wave. It offers excellent performance with a power factor of 1.0 on both the input and output. The power supply is equipped with an easily accessible EPO (Emergency Power Off) module, which allows you to completely cut off the power supply with a single button in emergencies such as fire or flooding. It switches off both the battery and mains power supply, which is essential for safety.

SAFETY AND EMC COMPLIANCE INSTRUCTIONS

Important: *Before installing or using the device, carefully read and follow all instructions in this manual. Failure to follow these instructions may result in injury, damage to the device or malfunction.*

Safety Instructions

1. General safety rules:
    - Ensure that the device is used only for its intended purpose as described in the manual.
    - Do not attempt to disassemble, repair or modify the device yourself. If repairs are necessary, contact qualified service personnel.
    - Protect the device from water, moisture and extreme temperatures to avoid damage or dangerous situations. The UPS system must be stored in a room that is well ventilated and dry. Avoid storing the device in areas exposed to moisture, extreme temperatures or other adverse conditions.

2. Installation location:
    - Do not install the UPS system near water or in damp rooms.
    - Do not install the UPS system in areas exposed to direct sunlight or near heaters.
    - Do not cover the ventilation openings in the UPS enclosure.
3. UPS load
    - Do not connect devices that could overload the UPS (e.g., devices with large motors) to the UPS output sockets or terminals.
4. Cable routing: Arrange the cables so that no one can step on or trip over them.
5. Ventilation: Do not cover the ventilation openings in the UPS enclosure. The UPS system must be installed in a well-ventilated location. Ensure sufficient space on all sides for proper air circulation.
6. Grounding: The UPS system is equipped with a grounding terminal. In the final installation configuration, ensure equipotential bonding with external UPS battery cabinets.

    Installer qualifications: The UPS system may only be installed by qualified service personnel.

7. Electrical protection: A suitable disconnect device must be provided in the building installation as protection against short circuits. A single emergency switch must be provided in the building installation to prevent the UPS from continuing to supply power to the load in any operating mode.
8. Connection sequence: Connect the earth first, then the building installation terminals.

Note: Installation and wiring must be carried out in accordance with local electrical regulations and standards. There is no standard reverse surge protection inside, so isolate the UPS according to this diagram before working. The isolating device must be capable of carrying the UPS input current.

Figure 1

- This UPS should be connected to a TN earthing system.
- The power supply to this unit must be three-phase, as specified on the unit's rating plate. It must also be properly earthed.
- This unit is not recommended for use in life-support applications where its failure could cause life-support equipment to fail or significantly affect its safety and effectiveness. Do not use this unit in the presence of a flammable anaesthetic mixture with air, oxygen or nitrous oxide.
- Connect the ground terminal of the UPS power module to the ground wire.

- The UPS is connected to a DC power source (battery). The output terminals may remain live even when the UPS is not connected to AC power.

Before working with this circuit:

- Isolate the uninterruptible power supply (UPS).
- Then check for dangerous voltage between all terminals, including the protective earth (PE) wire.

Operation

- Do not disconnect the protective earth (PE) conductor from the UPS or from the building installation terminals at any time, as this will result in the loss of earth protection for both the UPS system and all connected equipment.
- The UPS system has its own internal power source (batteries). The UPS output sockets or output terminal blocks may remain live even when the UPS is not connected to the building's electrical system.
- To completely disconnect the UPS system, first press the "OFF" button and then disconnect the mains power supply.
- Ensure that no liquids or other foreign objects enter the UPS system.
- The UPS can be operated by persons without prior experience.

Standards

Safety	IEC/EN 62040-1
EMI	
Conducted emission	IEC/EN 62040-2 | Category C3
Radiated emissions	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
Mains frequency Magnetic field	IEC/EN 61000-4-8 | Level 4
Low-frequency signals	IEC/EN 61000-2-2

Warning: This product is intended for commercial and industrial applications. In a Class 2 environment, installation restrictions or additional measures may be required to prevent interference.

PACKAGE CONTENTS

Unpack the package and check its contents. The kit includes:

- UPS
- User manual
- Software CD
- RS232 cable
- USB cable

NOTE: Inspect the device before installation. Ensure that nothing has been damaged during transport. Do not switch on the device and immediately notify the carrier and seller if you notice any damage or missing items in the package.

DEVICE DESIGN

Figure 2

1. RS 232 communication port
2. USB communication port
3. Emergency power off (EPO) connector
4. Power sharing port (available only in parallel model)
5. Parallel port (available only in parallel model)
6. Smart slot
7. External battery connector (available only on long backup time model)
8. Input circuit breaker
9. Input/output terminal
10. Service bypass switch
11. Output ground terminal
12. Output terminal: connect to mission-critical equipment
13. Input terminal
14. Input ground terminal

WIRING PROCEDURE

1. Installation and wiring must be carried out in accordance with local electrical codes/regulations and by qualified personnel.
2. Ensure that the power cables and circuit breakers in the building are suitable for the rated power of the UPS to avoid the risk of electric shock or fire.

CAUTION: Do not use a wall socket as the input power source for the UPS, as its rated current is less than the maximum input current of the UPS. Otherwise, the socket may overheat and become damaged.

3. Turn off the main switch in the building before installation.
4. Switch off all connected devices before connecting them to the UPS.
5. Prepare the cables according to the table below:

Model	AWG				
	Ph Input	Phase Output	Neutral	Battery	Ground
52288	8	8	6	No	6

NOTE: The cable for the 10K/10KL model should be able to handle currents above 40A. It is recommended to use AWG 10 or thicker wire for the phase and AWG 8 or thicker wire for the neutral wire to ensure safety and efficiency.

NOTE: The cable for the 15K/15KL model should be able to handle currents above 63A. It is recommended to use AWG 8 or thicker wire for the phase and AWG 6 or thicker wire for the neutral wire to ensure safety and efficiency.

NOTE: The cable for the 20K/20KL model should be able to handle currents above 63A. It is recommended to use AWG 8 or thicker wire for the phase and AWG 6 or thicker wire for the neutral wire to ensure safety and efficiency.

NOTE: The choice of wire colours should comply with local electrical codes and regulations.

6. Remove the terminal block cover on the rear panel of the UPS. Then connect the wires according to the following terminal diagrams: (When connecting wires,

connect the protective wire first, and when disconnecting, disconnect the protective wire first!

Figure 3

*For dual-input units

If there are two separate inputs, connect the power input and bypass input accordingly; if there is only one common input, connect the power input and bypass input.

NOTE: Ensure that the wires are securely connected to the terminals.

NOTE: Install a circuit breaker on the output between the output terminal and the load, and the circuit breaker should be equipped with leakage current protection if necessary.

Replace the terminal block cover on the rear panel of the UPS.

Warning: (Standard model only)

Ensure that the UPS is not switched on before installation. The UPS should not be switched on while connecting the cables.

Do not attempt to modify the standard model to a long runtime model. In particular, do not attempt to connect the internal battery of the standard model to an external battery. The battery type and voltage may differ. Connecting them together may result in electric shock or fire! Warning: (Long runtime model only)

Ensure that a direct current (DC) switch or other protective device is installed between the UPS and the external battery. If not, install it carefully. Turn off the battery switch before installation.

NOTE: Set the battery switch to the "OFF" position, then install the battery pack.

Carefully check the battery voltage marking on the rear panel. If you wish to change the number of batteries, ensure that you change the settings simultaneously. Connecting to the wrong battery voltage may cause permanent damage to the UPS. Ensure that the battery voltage is correct.

Pay special attention to the polarity marking on the external battery terminal block and ensure that the correct battery polarity is connected. Incorrect connection may cause permanent damage to the UPS.

Ensure that the ground protection wiring is correct. The current rating of the wire, colour, position, connection and conductivity reliability should be carefully checked.

Ensure that the power input and output wiring is correct. The current rating of the cable, colour, position, connection and conductivity reliability should be carefully checked. Ensure that the L/N side is correct, not reversed or short-circuited.

INSTALLING THE UPS IN A PARALLEL SYSTEM

If the UPS is intended for single operation only, you can skip this section and proceed to the next one.

1. Install and wire the UPS.
2. Connect the output cables of each UPS to the output switch.
3. Connect all output switches to the main output switch. This main output switch will be directly connected to the loads.
4. Each UPS is connected to an independent set of batteries.

NOTE: A parallel system cannot share a single battery. Doing so will cause permanent system failure. Refer to the wiring diagram below:

Figure 4

SOFTWARE INSTALLATION

To ensure optimal protection for your computer system, install UPS monitoring software to fully configure UPS shutdown.

OPERATIONS

1. Button operation

BUTTON	**FUNCTION**
ON/Enter button	Turn on the UPS: Press and hold the button for more than 0.5 seconds to turn on the UPS. Enter: Press this button to confirm your selection in the settings menu.
OFF/ESC button	Switch off the UPS: Press and hold the button for more than 0.5 seconds to switch off the UPS. Esc: Press this button to return to the last menu in the settings menu.
Test/Up button	Battery test: Press and hold the button for more than 0.5 seconds to test the battery in AC mode and CVCF* mode.

	UP: Press this button to display the next selection in the settings menu.
Mute/Down button	Silence alarm: Press and hold the button for more than 0.5 seconds to silence the buzzer. For details, refer to section 3-4-9. Down: Press this button to display the previous selection in the settings menu.
Test/Up + Mute/Down button	Press and hold both buttons simultaneously for more than 1 second to enter/exit the settings menu.

* CVCF stands for constant voltage and constant frequency

LED INDICATORS

Figure 5

There are 4 LEDs on the front panel that show the UPS operating status:

	Bypass	Line	Battery	Fault
UPS on	•	•	•	•
No output mode	°	°	°	°
Bypass mode	•	°	°	°
AC mode	°	•	°	°
Battery mode	°	°	•	°
CVCF mode	°	•	°	°
Battery test	•	•	•	°
ECO mode	•	•	°	°
Error	°	°	°	•

Note: ● indicates that the LED is lit ○ indicates that the LED is dim.

LCD PANEL

Figure 6

DISPLAY	**FUNCTION**

Backup time information	
Figure 7	Indicates the battery discharge time in numbers H: hours, M: minutes, S: seconds
Fault information	
Figure 8	Indicates that a warning and fault have occurred.
Figure 9	Indicates fault codes, and the codes are listed in detail in sections 3-9.
Silencing operation	
Figure 10	Indicates that the UPS alarm is disabled.
Output and battery voltage information	
Figure 11	
Load information	
Figure 12	Indicates load levels of 0–25%, 26–50%, 51–75% and 76–100%.
Figure 13	Indicates overload.
Figure 14	Indicates that the load or output is short.
Mode operation information	
Figure 15	Indicates that the UPS is connected to the mains.
Figure 16	Indicates that the battery is functioning.
Figure 17	Indicates that the bypass circuit is operational.
Figure 18	Indicates that ECO mode is enabled.
Figure 19	Indicates that the inverter circuit is working.
Figure 20	Indicates that the output is functioning.
Battery information	
Figure 21	Indicates battery capacity at 0-25%, 26-50%, 51-75% and 76-100%.
Figure 22	Indicates that the battery is not connected.
Figure 23	Indicates low battery charge and low battery charge.
Input and battery voltage information	

Indicates input data	
Figure 24	Indicates input voltage or frequency or battery voltage. Vac: input voltage, Vdc: battery voltage, Hz: input frequency

AUDIBLE ALARM

DESCRIPTION	BUZZER STATUS	MUTED
UPS status		
Bypass mode	Audible signal once every 2 seconds	YES
Bypass mode	Audible signal once every 4 seconds	
Error mode	Continuous audible signal	
Warning		
Overload	Audible signal twice per second	NO
Other	Audible signal once per second	
Error		
All	Continuous beep	YES

SINGLE UPS OPERATION

1. Switch on the UPS with mains power (in AC mode).

After connecting the power supply correctly, set the battery switch to the ON position (this option is only available for models with a long backup time). Then set the line input switch to the ON position (for dual input units, also set the bypass input switch to the ON position). At this point, the fan will start running and the UPS will enter the power-up and initialisation mode. After a few seconds, the UPS will enter bypass mode and begin supplying power to the loads through the bypass.

NOTE: When the UPS is in bypass mode, the output voltage will come directly from the mains supply when the input switch is turned on. In bypass mode, the load is not protected by the UPS. To protect valuable equipment, you should turn on the UPS according to the next step.

Press and hold the "ON" button for 0.5 seconds to turn on the UPS, and the buzzer will beep once. After a few seconds, the UPS will enter AC mode. If the mains power supply is faulty, the UPS will enter battery mode without interruption.

NOTE: When the UPS battery is depleted, it will automatically enter the battery shutdown state. When mains power is restored, the UPS will automatically restart in AC mode.

2. Starting the UPS without mains power (in battery mode)

Ensure that the battery switch is set to the ON position (only available for long backup time models). Press the "ON" button to start the UPS power supply. The UPS will enter the start-up mode. After initialisation, the UPS will enter a no-exit mode, then press and hold the "ON" button for 0.5 seconds to turn on the UPS, and the buzzer will emit a single beep.

After a few seconds, the UPS will be switched on and will enter Battery mode.

CONNECTING DEVICES TO THE UPS

After switching on the UPS, you can connect devices to the UPS. First switch on the UPS, then switch on the devices one by one. The LCD panel will display the total load level.

1. If it is necessary to connect inductive loads, such as a printer, carefully calculate the starting current to ensure that it is within the UPS capacity, as the power consumption of these devices is too high.
2. If the UPS is overloaded, the buzzer will emit two beeps per second. In the event of a UPS overload, immediately remove some of the loads. It is recommended that the total load connected to the UPS be less than 80% of its rated power to prevent overload and ensure system safety. If the overload time exceeds the allowable time specified in the AC mode specification, the UPS will automatically switch to bypass mode. Once the overload is removed, the UPS will return to AC mode. If the overload time exceeds the allowable time specified in the Battery mode specification, the UPS will go into failure mode. In this case, if the bypass function is enabled, the UPS will supply power to the load through the bypass. If the bypass function is disabled or the input power is not within the acceptable bypass range, the UPS will cut off the output directly.

CHARGE THE BATTERIES

1) When the UPS is connected to the mains power supply, the charger will automatically charge the batteries, except in battery mode or during battery self-test.

2) It is recommended to charge the batteries for at least 10 hours before use. Otherwise, the backup time may be shorter than expected.

OPERATING IN BATTERY MODE

1) When the UPS is in battery mode, the buzzer will sound depending on the battery capacity. If the battery capacity is greater than 25%, the buzzer will sound once every 4 seconds; If the battery voltage drops to the alarm level, the buzzer will emit a rapid beep (once per second) to remind users that the battery charge level is low and the UPS will soon shut down automatically. Users can turn off some non-critical loads to disable the shutdown alarm and extend the backup time. If there is no need to protect the equipment or save data. Otherwise, there is a risk of data loss or charging failure.

2) In battery mode, if the buzzer sound is annoying, users can press the mute button to turn off the buzzer.

3) The backup time of the long-life model depends on the capacity of the external battery.

4) The backup time may vary depending on the ambient temperature and load type.

5) When the backup time is set to 16.5 hours (default value from the LCD panel), after 16.5 hours of discharge, the UPS will automatically shut down to protect the battery. This battery discharge protection can be enabled or disabled via the LCD control panel (see section 3.7 LCD Settings).

TEST THE BATTERIES

1) If you want to check the battery status while the UPS is operating in AC/CVCF mode, you can press the Test button, but the tone will allow the UPS to perform a battery self-test.

2) Users can also set the battery self-test using the monitoring software.

TURN OFF THE UPS FROM THE MAINS POWER SUPPLY IN AC MODE

1) Turn off the UPS inverter by pressing the "OFF" button for at least 0.5 seconds, and the buzzer will emit a single beep. The UPS will switch to bypass mode.

NOTE: If the UPS has been set to enable bypass output, it will bypass the mains voltage to the output terminal even if you have switched off the UPS (inverter).

NOTE: After switching off the UPS, please note that the UPS is operating in bypass mode and there is a risk of power loss to connected devices.

2) In bypass mode, the UPS output voltage is still present. To cut off the output, switch off the line input switch (for dual input units, also switch off the bypass line switch). A few seconds later, no display appears on the display panel and the UPS is completely switched off.

TURN OFF THE UPS WITHOUT MAINS POWER IN BATTERY MODE

1) Switch off the UPS by pressing the "OFF" button for at least 0.5 seconds, and the buzzer will emit a single beep.

2) The UPS will then cut off the output power and no display will appear on the display panel.

MUTE THE BUZZER

1) To mute the buzzer, press the "Mute" button for at least 0.5 seconds. If you press it again after muting the buzzer, the buzzer will sound again.

2) Some warning alarms cannot be silenced unless the fault is rectified.

OPERATING IN WARNING MODE

1) When the fault LED is lit and the buzzer sounds once per second, it indicates that there are some problems with the UPS operation. Users can obtain the warning indicator from the LCD panel. Refer to the troubleshooting table in Chapter 4 for details.

2) Some warning alarms cannot be silenced unless the fault is rectified.

FAULT MODE OPERATION

1) When the fault LED lights up and the buzzer emits a continuous beep, it means that a critical fault has occurred in the UPS. Users can obtain the error code from the display panel. For details, refer to the troubleshooting table.

2) When a fault occurs, check the loads, wiring, ventilation, utilities, battery, and so on. Do not attempt to restart the UPS before troubleshooting. If the problems cannot be fixed, contact a service technician immediately.

3) In an emergency, immediately disconnect the mains, external battery, and output to avoid further risk or danger.

BATTERY NUMBER CHANGE OPERATION

1) This operation is only available to professional or qualified technicians.

2) Switch off the UPS. If the load cannot be disconnected, remove the service bypass switch cover on the rear panel and first turn the maintenance switch to the "BPS" position.

3) Turn off the line input switch (for dual input units, also turn off the bypass input switch) and turn off the battery switch (only available for long-run models).

4) Remove the cabinet cover and disconnect the battery cable for the standard model. Modify the JS3 jumper on the control board to set the battery numbers according to the table below.

5) Carefully modify the battery for the setting number. When finished, place the cover back switch on the battery switch for the long-run model.

6) Turn on the line input switch (for the dual input unit, also turn on the bypass input switch), and the UPS will enter bypass mode. If the UPS is in maintenance bypass mode, set the maintenance switch to the "UPS" position, then turn on the UPS.

PARALLEL OPERATION

Initial start-up of the parallel system. First of all, ensure that all UPS units are parallel and have the same configuration

1) Switch each UPS to AC mode accordingly. Then measure the inverter output voltage of each phase for each UPS to check that the inverter voltage difference between the actual output and the setting value is less than 1.5 V (typically 1 V) using a multimeter. If the difference is greater than 1.5 V, calibrate the voltage by configuring the inverter voltage. Voltage adjustment See Programs 15, 16, and 17 on the LCD display. If the voltage difference remains greater than 1.5 V after calibration.

2) Calibrate the output voltage measurement by configuring the output voltage calibration. See Programs 18, 19 and 20 on the LCD settings to ensure that the difference between the actual output voltage and the UPS detected value is less than 1 V.

3) Switch off each UPS. Then follow the wiring procedure.

4) Remove the cover of the parallel current port on the UPS, connect each UPS one by one using the parallel and current sharing cables, and then screw the cover back on.

5) Switch on the parallel system in AC mode.

a) Turn on the line input switch of each UPS (for dual input, also turn on the bypass input switch).

After all UPS units have entered bypass mode, measure the output voltage between two UPS units for the same phase to ensure that the phase sequence is correct. If the two

voltage differences are close to zero, it means that all connections are correct. Otherwise, check that the cables are connected correctly.

b) Turn on the output switch of each UPS.

c) Connect each UPS in turn. After a while, the UPS units will enter AC mode synchronously, and then the parallel system will be completed.

6) Switch on the parallel system in battery mode

a) Turn on the battery switch (only available on the long-run model) and the output switch of each UPS.

NOTE: It is not permitted to share a single battery set for long-run UPS units in a parallel system. Each UPS unit should be connected to its own battery.

b) Switch on any UPS. A few seconds later, the UPS will switch to battery mode

c) Then switch on another UPS. A few seconds later, the UPS will switch to battery mode and add to the parallel system.

d) If you have a third UPS, follow the same procedure as in point c). The parallel system is now complete.

If you require more detailed information, please contact your supplier or service centre for parallel operation instructions.

ADDING A NEW UNIT TO THE PARALLEL SYSTEM

You cannot add a new unit to a parallel system while the entire system is running. You must disconnect the load and shut down the system.

Ensure that all UPS units are parallel models and complete the wiring. Install the new parallel system according to the previous instructions.

REMOVING A UNIT FROM THE PARALLEL SYSTEM

There are two methods for removing a unit from a parallel system:

First method: Press the "OFF" button twice, holding it down for at least 0.5 seconds each time. The UPS will go into bypass mode or no-output mode. Switch off the output switch of the unit and then switch off its input switch. Once the unit is completely turned off, you can turn off the battery switch (for long-running models), disconnect the parallel cables and power sharing cables. Then remove the unit from the parallel system.

Second method: If the bypass is incorrect, the UPS cannot be removed without interrupting the power supply. First, disconnect the load and switch off the entire system. Ensure that bypass mode is enabled on each UPS, then switch off the operating system. All UPSs will switch to bypass mode. Next, remove all service bypass covers and set the service switches from the "UPS" position to "BPS". Turn off all input circuit breakers and battery circuit breakers in the parallel system. Turn off the output circuit breaker and disconnect the parallel cables and power sharing cables of the unit you want to remove. Then remove the unit from the parallel system. Turn on the input switch of the remaining UPS – the system will switch to bypass mode. Set the service switches back from "BPS" to "UPS" and reinstall the service bypass covers.

Switch on the remaining UPS as described above. Warning: (For parallel systems only)

- Before switching on the parallel system to activate the inverter, ensure that the service switches of all units are in the same position.
- When the parallel system is switched on and operating via the inverter, do not switch the service switch of any unit.

ABBREVIATIONS AND THEIR MEANINGS ON THE LCD DISPLAY

ABBREVIATION	**MEANING**
ENA	ACTIVE
DIS	INACTIVE
ATO	AUTO
BAT	BATTERY
NCF	NORMAL MODE
CF	CVCF MODE
SUB	SUBTRACT
ADD	ADD
ON	TURN ON
OFF	TURN OFF
FBD	NOT PERMITTED
OPN	ALLOWED
RES	RESERVED
N.L	LOSS OF NEUTRAL LINE

CHE	CHECK
OP.V	OUTPUT VOLTAGE
PAR	PARALLEL, 001 Denotes the first UPS in a parallel system
AN	THE FIRST PHASE
BN	THE SECOND PHASE
CN	THE THIRD PHASE
AB	THE FIRST LINE
BC	THE SECOND LINE – Second line
CA	THE THIRD LINE – Third line

LCD DISPLAY SETTINGS

Figure 25

There are three parameters to configure for the UPS. Refer to the diagram below.

Parameter 1: Concerns programme alternatives. Refer to the tables below for the programmes to be configured.

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

Note: Select the "Up" or "Down" button to change programmes or parameters.

List of available programmes for parameter 1:

CODE	**DESCRIPTION**	**Bypass mode and no output mode**	**AC mode**	**ECO mode**	**CVCF mode**	**Battery mode**	**Battery test**
01	Output voltage	Y*					
02	Output frequency	Y					
03	Voltage range in bypass mode						
04	Frequency range in bypass mode						
05	ECO mode available/unavailable						

06	Voltage range for ECO mode						
07	Frequency range for ECO mode						
08	Bypass mode setting		Y				
09	Maximum battery discharge time		Y	Y	Y	Y	Y
10	Reserved	Reserved for future options					
11	Reserved	reserved for future options					
12	Detection of neutral wire loss	Y	Y	Y	Y	Y	Y
13	Battery voltage calibration		Y	Y	Y	Y	Y
14			Y	Y	Y	Y	Y
15			Y		Y	Y	Y
16			Y		Y	Y	
17			Y		Y	Y	
18			Y		Y	Y	
19			Y		Y	Y	
20			Y		Y	Y	

*Y indicates that this programme can be set in this mode.

Note: All parameter settings will only be saved if the UPS is switched off normally with the internal or external battery connected. (Normal UPS shutdown means switching off the input switch in bypass/no output mode).

01: Output voltage

Interface	**Setting**
Figure 26	**Parameter 3: Output voltage** The following output voltages can be selected in parameter 3: 208: Represents an output voltage of 208Vac 220: Represents an output voltage of 220Vac 230: Represents an output voltage of 230Vac 240: Represents an output voltage of 240Vac
02: Output frequency	
Figure 27	**Parameter 2: Output frequency**

	Setting the output frequency. The following three options can be selected in parameter 2: 50.0 Hz: The output frequency is set to 50.0 Hz. 60.0 Hz: The output frequency is set to 60.0 Hz. ATO: If this option is selected, the output frequency is determined according to the latest normal utility frequency. If it is between 46 Hz and 54 Hz, the output frequency will be 50.0 Hz. If it is between 56 Hz and 64 Hz, the output frequency will be 60.0 Hz. ATO is the default setting. **Parameter 3: Frequency Mode** Set the output frequency to CVCF mode or non-CVCF mode. The following two options can be selected in parameter 3: CF: Set the UPS to CVCF mode. If selected, the output frequency will be set to 50 Hz or 60 Hz according to the setting in parameter 2. The input frequency can range from 46 Hz to 64 Hz. NCF: Setting the UPS to normal mode (not CVCF mode). If this option is selected, the output frequency will be synchronised with the input frequency in the range of 46 ~ 54 Hz at 50 Hz or in the range of 56 ~ 64 Hz at 60 Hz, according to the setting in parameter 2. If 50 Hz is selected in parameter 2, the UPS will switch to battery mode when the input frequency is not within the range of 46~54 Hz. If 60 Hz is selected in parameter 2, the UPS will switch to battery mode when the input frequency is not within the range of 56~64 Hz. *If parameter 2 is ATO, parameter 3 will show the current frequency.

Note: For a single unit, it will have a bypass output for a few seconds after the unit is turned on. Therefore, to avoid damage to connected devices, it is strongly recommended to add an additional output relay board f or CVCF application.

03: Voltage range for bypass

Interface	Setting
Figure 28	**Parameter 2:** Set the allowable low voltage for bypass. The setting range is 110 V to 209 V, and the default value is 110 V. **Parameter 3:** Set the acceptable high voltage for bypass. The setting range is 231 V to 276 V, and the default value is 264 V.

04: Frequency range for bypass

Interface	Setting
Figure 29	**Parameter 2:** Set the permissible low frequency for bypass. 50 Hz system: The setting range is from 46.0 Hz to 49.0 Hz. 60 Hz system: The setting range is from 56.0 Hz to 59.0 Hz. The default value is 46.0 Hz/56.0 Hz. Parameter 3: Set the acceptable high frequency for bypass. 50 Hz: The setting range is from 51.0 Hz to 54.0 Hz. 60 Hz: The setting range is from 61.0 Hz to 64.0 Hz. The default value is 54.0 Hz/64.0 Hz.

05: Enable/disable ECO mode

Interface	Setting
Figure 30	**Parameter 3:** Enable or disable the ECO function.

	You can choose from the following two options: DIS: disable the ECO function ENA: enable the ECO function If the ECO function is disabled, you can still set the voltage range and frequency range for ECO mode, but this has no effect unless the ECO function is enabled.

06: Voltage range for ECO mode

Interface	**Setting**
Figure 31	**Parameter 2:** Low voltage point in ECO mode. The setting range is from -5% to -10% of the rated voltage. Parameter 3: High voltage point in ECO mode. The setting range is from 5% to 10% of the rated voltage.

07: Frequency range for ECO mode

Interface	**Setting**
Figure 32	**Parameter 2:** Set the low voltage point for ECO mode. 50 Hz system: The setting range is from 46.0 Hz to 48.0 Hz. 60 Hz system: The setting range is from 56.0 Hz to 58.0 Hz. The default value is 48.0 Hz/58.0 Hz. **Parameter 3:** Set the high voltage point for ECO mode. 50 Hz: The setting range is from 52.0 Hz to 54.0 Hz. 60 Hz: The setting range is from 62.0 Hz to 64.0 Hz. The default value is 52.0 Hz/62.0 Hz.

08: Bypass mode setting

Interface	**Setting**
Figure 33	**Parameter 2**

	OPN: Bypass permitted. When this option is selected, the UPS will operate in bypass mode depending on the bypass enabled/disabled setting. **FBD:** Bypass not permitted. When this option is selected, bypass mode cannot be activated under any circumstances. **Parameter 3:** **ENA:** Bypass enabled. When this option is selected, bypass mode is activated. **DIS:** Bypass disabled. When this option is selected, automatic bypass is permitted, but manual bypass is not allowed. Manual bypass means that users manually operate the UPS in bypass mode. For example, pressing the OFF button in AC mode to switch to bypass mode.

09: Setting the maximum battery discharge time

Interface	**Setting**
Figure 34	**Parameter 3:** **000 ~ 999 :** Set the maximum discharge time from 0 minutes to 999 minutes. The UPS will shut down to protect the battery if the discharge time is reached before the battery is charged. The default value is 990 minutes **DIS:** Disable battery discharge protection, and the backup time will depend on the battery capacity.

10: Reserved

Interface	**Setting**
Figure 35	**Reserved for future options.**

11: Reserved

Interface	Setting
Figure 36	**Reserved for future options.**

12: Neutral loss detection

Interface	Setting
Figure 37	**Parameter 2:** **N.L:** Indicates neutral loss detection function. **Parameter 3:** **DIS:** Disable the neutral loss detection function. The UPS will not detect neutral loss. **ATO:** The UPS will automatically detect whether the neutral wire has been lost or not. If a neutral loss is detected, an alarm will be generated and, if the UPS is switched on, it will switch to battery mode. Once the neutral wire is restored and detected, the alarm will automatically be silenced and the UPS will automatically return to normal mode. **CHE:** The UPS will automatically detect the loss of the neutral element. If a neutral wire loss is detected, an alarm will be generated and, if the UPS is switched on, it will switch to battery mode. Once the neutral wire is restored, the alarm will NOT be automatically silenced and the UPS will NOT automatically return to normal mode. Here, you must silence the alarm and manually return the UPS to normal mode manually. The operation is as follows: first, enter this menu and press "Enter" to make " " "CHE" start flashing. Second, press "Enter" again to activate neutral wire detection (check). If the neutral wire is detected, the alarm will be silenced and the UPS will return to normal mode. If the neutral wire is not detected, the UPS will continue to alarm and remain in its latest state until the neutral wire is properly detected during the next manual check operation. CHE is the

	default setting.

13: Battery Voltage Calibration

Interface	Setting
Illustration 38	**Parameter 2:** Select the "Add" or "Remove" function to adjust the battery voltage to the actual value**.** **Parameter 3:** The voltage range is from 0V to 9.9V, and the default value is 0V.

14: Charger voltage adjustment

Interface	Setting
Illustration 39	**Parameter 2:** You can select Add or Remove to adjust the charger voltage. **Parameter 3:** the voltage range is from 0 V to 9.9 V, and the default value is 0 V. **NOTE:** *Before adjusting the voltage, first disconnect all batteries to obtain the accurate charger voltage. ***** Any modification should comply with the battery specifications.

15: Inverter voltage adjustment A

Interface	Setting
Illustration 40	**Parameter 2:** You can select Add or Sub to adjust the voltage of inverter A. **Parameter 3:** the voltage range is from 0 V to 9.9 V, and the default value is 0 V.

16: Inverter B voltage adjustment

Interface	Setting
Figure 41	**Parameter 2**: You can select Add or Sub to adjust the voltage of inverter B*. **Parameter 3:** the voltage range is from 0 V to

	9.9 V, and the default value is 0 V. *Displays the number 1 under or to represent the voltage of inverter B.

17: Inverter C voltage adjustment

Interface	Setting
Figure 42	**Parameter 2:** you can select **Add or Sub** to adjust the voltage of inverter C*. **Parameter 3:** the voltage range is from 0 V to 9.9 V, the default value is 0 V. * Displays the number 2 under or representing the inverter C voltage.

18: Calibration of output voltage A

Interface	Setting
Figure 43	**Parameter 2:** always shows OP. V as the output voltage. **Parameter 3:** shows the internal measurement value of output voltage A and can be calibrated by pressing up or down according to the measurement from an external voltage meter. The calibration result will take effect after pressing **Enter**. The calibration range is limited to +/-9V. This function is typically used for parallel operation.

19: Calibration of output voltage B

Interface	Setting
Figure 44	**Parameter 2**: always shows OP. V as the output voltage*. **Parameter 3**: shows the internal value of the output voltage B measurement and can be calibrated by pressing up or down according

	to the measurement from an external voltage meter. The calibration result will take effect after pressing Enter. The calibration range is limited to +/-9V. This function is typically used for parallel operation. *It will display the number 1 under to represent the output B voltage.

20: Calibration of output voltage C

Interface	**Setting**
Figure 45	**Parameter 2:** always shows OP. V as the output voltage. **Parameter 3**: shows the internal value of the output voltage C measurement and can be calibrated **by pressing up or down** according to the measurement from an external voltage meter. The calibration result will take effect after pressing **Enter**. The calibration range is limited to +/-9V. This function is typically used for parallel operation. *It will display the number 2 under "OP.V" to represent the C output.

The table below shows the LCD display for operating modes and status.

1. If the UPS is operating normally, it will show seven screens in sequence representing the 3-phase input voltages (An, bn, Cn), 3 line input voltages (Ab, bC, CA) and frequency alternately.
2. If parallel UPS systems are successfully configured, another screen will be displayed with "PAR" in parameter 2 and the assigned number in parameter 3, as shown in the parallel screen diagram below. The main UPS will be assigned "001" by default, and

the slave UPSs will be assigned "002" or "003". The assigned numbers can be changed dynamically during operation;

Figure 46

Operating mode/status			
UPS power supply enabled	Description	When the UPS is switched on, it will enter this mode for a few seconds during processor and system initialisation.	
	LCD	Figure 47	
No output mode	Description	When the voltage/frequency bypass is outside the acceptable range or the bypass is disabled (or prohibited), the UPS will enter no output mode when the UPS is turned on or off. This means that the UPS has no output. The alarm emits an audible signal every two minutes.	
	LCD	Figure 48	Figure 49
		Figure 50	Figure 51
		Illustration 52	Illustration 53
		Illustration 54	
AC mode	Description	When the input voltage is within the acceptable range, the UPS will provide clean and stable AC output power. The UPS will also charge the battery with AC power.	
	LCD	Figure 55	Figure 56
		Figure 57	Figure 58
		Illustration 59	Illustration 60
		Illustration 61	
ECO mode	Description	When the input voltage is within the voltage regulation range and ECO mode is enabled, the UPS will bypass the output voltage to save energy.	
	LCD	Figure 62	Figure 63
		Figure 64	Figure 65
		Illustration 66	Illustration 67
		Illustration 68	
CVCF mode	Description	When the output frequency is set to "CF", the inverter will output a constant frequency of 50 Hz or 60 Hz. In this mode, the UPS will not have a bypass output, but will continue to charge the battery.	
	LCD	Figure 69	Figure 70

		Figure 71	Figure 72
		Illustration 73	Illustration 74
		Illustration 75	
Battery mode	Description	When the input voltage/frequency exceeds the acceptable range or there is a power failure, the UPS will maintain power from the battery and the alarm will sound every 4 seconds.	
	LCD	Figure 76	Figure 77
		Figure 78	Figure 79
		Illustration 80	Illustration 81
		Illustration 82	
Bypass mode	Description	When the input voltage is within the acceptable range and bypass is enabled, the UPS will switch off and enter bypass mode. The alarm will sound every two minutes.	
	LCD	Figure 83	Figure 84
		Figure 85	Figure 86
		Illustration 87	Illustration 88
		Illustration 89	
Battery test	Description	When the UPS is in AC or CVCF mode, press the Test key for more than 0.5 seconds. The UPS will then emit a single beep and start up. The line between the I/P and inverter icons will flash to remind users. This operation is used to check the battery status.	
	LCD	Figure 90	Figure 91
		Figure 92	Illustration 93
		Illustration 94	Illustration 95
		Illustration 96	
Warning	Description	If the UPS experiences any errors (but is still operating normally), another screen will be displayed showing the warning situation. On the warning screen, the icon will flash and up to 3 error codes may appear, with each code representing one error. The meaning of the code can be found in the warning code table.	
	LCD	Figure 97	
Error status	Description	When the UPS fails, the inverter will be locked and no error code will be displayed on the screen, and the ! icon will light up. The meaning of the code can be found in the fault code table.	
	LCD	Figure 98	Figure 99

		Figure 100	

ERROR CODE	FAULT EVENT	ICON	ERROR CODE	FAULT EVENT	ICON
01	Bus startup error.	NONE	1A	Negative power error in inverter A.	NONE
02	Bus voltage exceeded.		1B	Negative power error in inverter B.	
03	Bus voltage too low.		1C	Negative power error in inverter C.	
04	Busbar imbalance.		21	Battery SCR short circuit.	
06	Transducer overloaded.		24	Inverter short-circuit relay.	
11	Inverter soft start function error		29	Battery fuse damaged in battery mode.	
12	High inverter voltage		31	Communication error in parallel system.	NONE
13	Low inverter voltage		36	Output current imbalance in parallel system.	
14	Inverter output A (between phase and neutral) short-circuited	Short circuit	41	Over temperature	
15	Inverter output B (between phase and neutral) shorted		42	DSP communication error.	
16	Inverter output C (between phase and neutral) shorted.		43	Overload	Overloads
17	Inverter output A-B (between line and neutral) shorted		46	Incorrect UPS settings.	NONE
18	Inverter output B-C (between line and neutral) shorted		47	MCU communication error	
19	Inverter output C-A (between lines) shorted		48	Two versions of DSP software are incompatible.	
			49	Input and output phases	

				are incompatible.	

WARNING INDICATOR

Warning	**Icon ()**	**Alarm**
Low battery level	Figure 101	Audible signal every second
Overcharged	Illustration 102	2 Beeps every second
Battery not connected	Figure 103	Audible signal every second
Overcharge	Figure 104	Audible signal every second
EPO activation	Figure 105	Audible signal every second
Fan failure/overheating	Figure 106	Audible signal every second
Charger failure	Figure 107	Audible signal every second
Damaged I/P fuse	Figure 108	Audible signal every second
Overload 3 times in 30 minutes	Figure 109	Audible signal every second

WARNING CODE

WARNING	**WARNING EVENT**	**CODE**	**WARNING EVENT**
01	Battery not connected	10	The IP L1 fuse is damaged*.
02	Loss of IP neutrality	11	IP L2 fuse is damaged*.
04	Incorrect IP phase	12	The IP L3 fuse is damaged*.
05	Bypass phase incorrect	21	Parallel systems behave differently depending on line conditions.
07	Overload	22	Bypass situations differ in parallel systems.
08	Low battery	33	Locked in bypass mode after three overloads within 30 minutes.
09	Overcharging	34	Transducer current imbalance.
0A	Fan error	35	The battery fuse is damaged.
0B	EPO unavailable	3A	The service switch cover is open.
0D	Excessive temperature	3C	The power supply network is extremely unbalanced.

0E	Charger failure	3D	Bypass unstable

TROUBLESHOOTING

If the UPS system is not functioning correctly, troubleshoot the problem using the table below.

Symptom	Possible cause	Solutions
No indication or alarm on the front display panel, even though the mains is connected.	The AC input power supply is not properly connected.	Check that the input cable is securely connected to the mains power supply.
The "!" icon and "EP" warning code flash on the LCD display, and the alarm beeps every second.	The EPO function is active. At this point, the EPO switch is in the OFF position or the jumper is open.	Set the circuit to the closed position to disable the EPO function.
The icon and LED flash on the LCD display and the alarm beeps every second.	The external or internal battery is connected incorrectly.	Check that all batteries are connected correctly.
Icon and flashlight on The LCD display and alarm emit two beeps every second.	The UPS is overloaded.	Remove excess loads from the UPS (output).
	The UPS is overloaded. Devices connected to the UPS are powered directly by the mains.	Removing excess loads from the UPS (output).
	After repeated overloads, the UPS is locked in bypass mode ( ). Connected devices are powered directly from the mains.	Remove excess loads from the UPS output first. Then switch off the UPS and restart it.
The error code is displayed as 43. The icon on the LCD display lights up and an audible alarm	The UPS was overloaded for too long and failed. The UPS then shut down	Remove excessive loads from the UPS output and restart it.

signals a continuous notification.	automatically.	
The error code is displayed as 14, the icon on the LCD display is lit, and the audible alarm signals a continuous notification.	The UPS has shut down automatically due to a short circuit on the UPS output.	Check the output wiring and ensure that the connected devices are not short-circuited.
Other error codes appear on the LCD display and the audible alarm signals a continuous notification.	An internal UPS error has occurred.	Contact service
The battery backup time is shorter than the nominal value.	The batteries are not fully charged.	Charge the batteries for at least 7 hours, then check their capacity. If the problem persists, consult the service department.
The icon flashes on the LCD display and an audible alarm sounds every second.	The batteries are faulty.	Replace the batteries.
Warning code 02 is displayed, the icon flashes on the LCD display and an audible alarm sounds every second.	The neutral input cable is disconnected.	Check and correct the neutral input cable connection. If the connection is correct and the alarm is still displayed, refer to the LCD settings section to enter the neutral loss check menu to verify that parameter 3 is "CHE". If so, first press the 'Enter' key to make 'CHE' flash, then press the 'Enter' key again to clear the alarm on the UPS . If the warning persists, check the L2 and L3 input fuses.
	The L2 or L3 input fuse is faulty.	Replace the fuse.

SPECIFICATIONS

MODEL	**52288**
CAPACITY	**20,000VA**

INPUT			
Voltage range		Low voltage loss	110 VAC (phase-neutral) ± 3% at 50% load 176 VAC (phase-neutral) ± 3% at 100% load
		Low voltage recovery	Low voltage loss + 10 V
		High voltage loss	300 VAC (phase-neutral) ± 3% at 50% load 276 VAC (phase-neutral) ± 3% at 100% load
		High voltage recovery	High voltage loss - 10 V
Frequency range		46Hz ~ 54 Hz @ 50Hz system 56Hz ~ 64 Hz @ 60Hz system	
Phase		Three-phase with neutral wire (3-phase + N)	
Power factor		≥ 0.99 at 100% load	
OUTPUT			
Phase		Three-phase with neutral wire (3-phase + N)	
Output voltage		208/220/230/240VAC(Ph-N)	
AC voltage regulation		± 1%	
Frequency range (Synchronisation range)		46Hz ~ 54 Hz @ 50Hz system 56Hz ~ 64 Hz @ 60Hz system	
Overload	AC mode	100%~110%: 10 minutes 110%~130%: 1 min >130%: 1 sec	
	Battery mode	100%~110%: 30 sec 110%~130%: 10 sec >130% : 1 sec	
Current peak factor (CCR)		3:1 max	
Harmonic distortion		≦ 2% at 100% linear load; ≦ 5% at 100% non-linear load	
Switching time	Power switchover: Mains <-> Battery	0ms	
	Inverter <-> Bypass	0 ms (When phase lock fails, there is a <4 ms interruption during switching from inverter to	

		bypass).		
	Inverter <-> ECO	<10 ms		
Efficiency				
AC mode		>90.5%	>91.5%	>91.5%
Battery mode		>87%	>88%	>88%
Battery				
Type		12V/9Ah		
Number (not included)		12Vx16		
Charging time		9 hours to recover 90% capacity		
Charging current		1.0 A ± 10%		
Charging voltage		13.65 V DC * number of batteries ± 1%		
Dimensions		592 x 250 x 826		
Environment				
Operating temperature		0 ~ 40°C (battery life is reduced at temperatures > 25°C)		
Operating humidity		<95% non-condensing		
Operating altitude		<1000m		
Noise level		Less than 65 dB @ 1 metre		
Communication		Windows® 2000/2003/XP/Vista/2008/7/8, Linux, Unix, and MAC		
SNMP		Power management via SNMP manager and web browser		

MAINTENANCE

1. Keep the power supply clean by using a soft, dry cloth to remove dust and dirt. Do not use chemicals.
2. Regularly check power cables and connectors for damage such as abrasions, cracks, or loose connections.
3. Ensure that the ventilation openings are clean and unobstructed to ensure proper cooling.
4. Avoid contact with water or other liquids to prevent electrical damage.

DISPOSAL

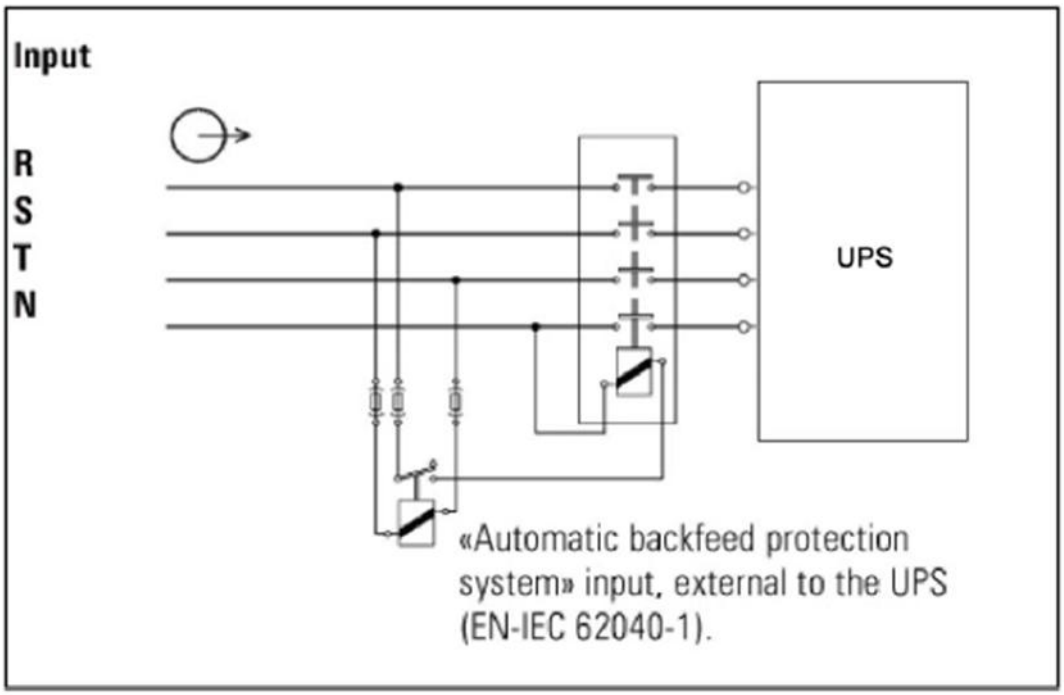
This product is subject to the Waste Electrical and Electronic Equipment (WEEE) regulations. Take it to an electronic waste collection point that ensures safe recycling in accordance with GPSR standards. Check where your nearest electronic waste collection

points are located. If you have any questions about disposal, contact the manufacturer or an authorised service centre.

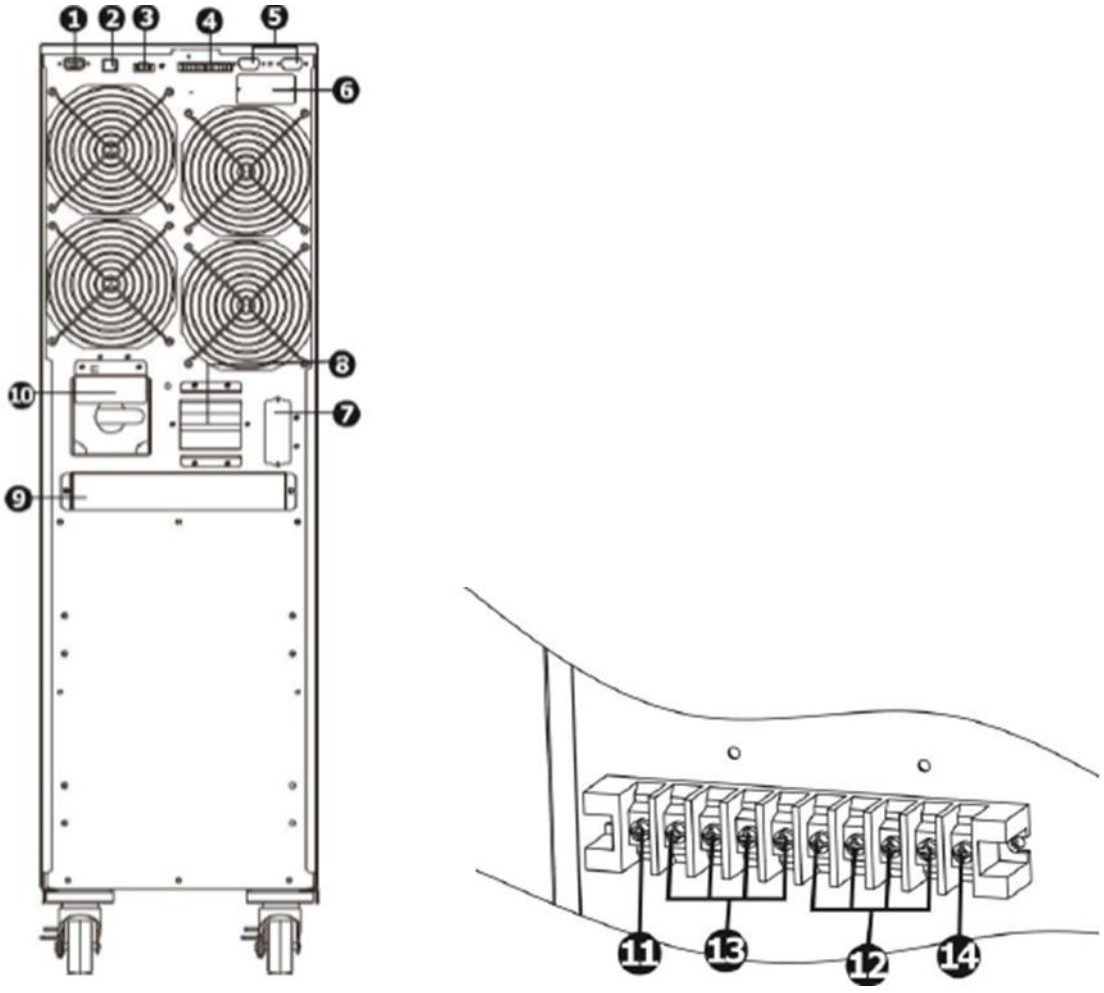
WARRANTY AND SERVICE INFORMATION

The product is covered by a 24-month manufacturer's warranty, calculated from the date of purchase. The warranty covers all material and manufacturing defects. Please contact our service department in case of any problems with the device to ensure fast and professional service. The warranty does not cover damage resulting from misuse, falls, mechanical damage, unauthorised repairs or attempts at disassembly.

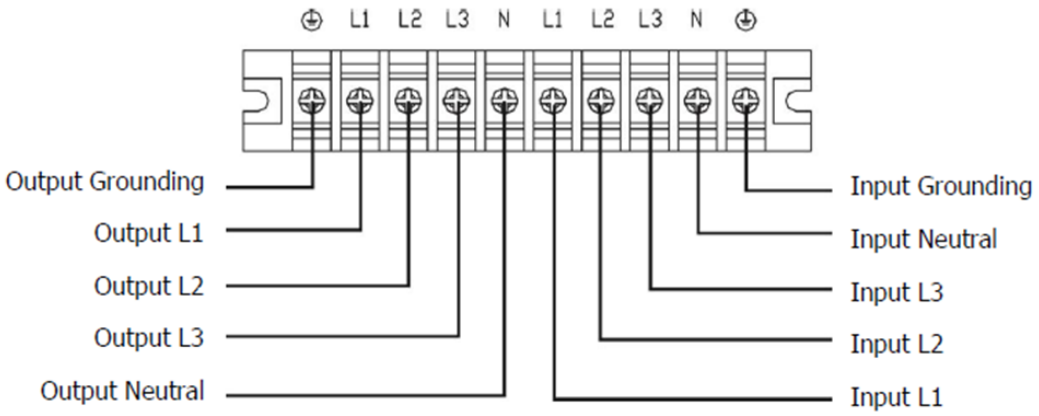
1


Input
R
S
T
N
UPS
«Automatic backfeed protection system» input, external to the UPS (EN-IEC 62040-1).

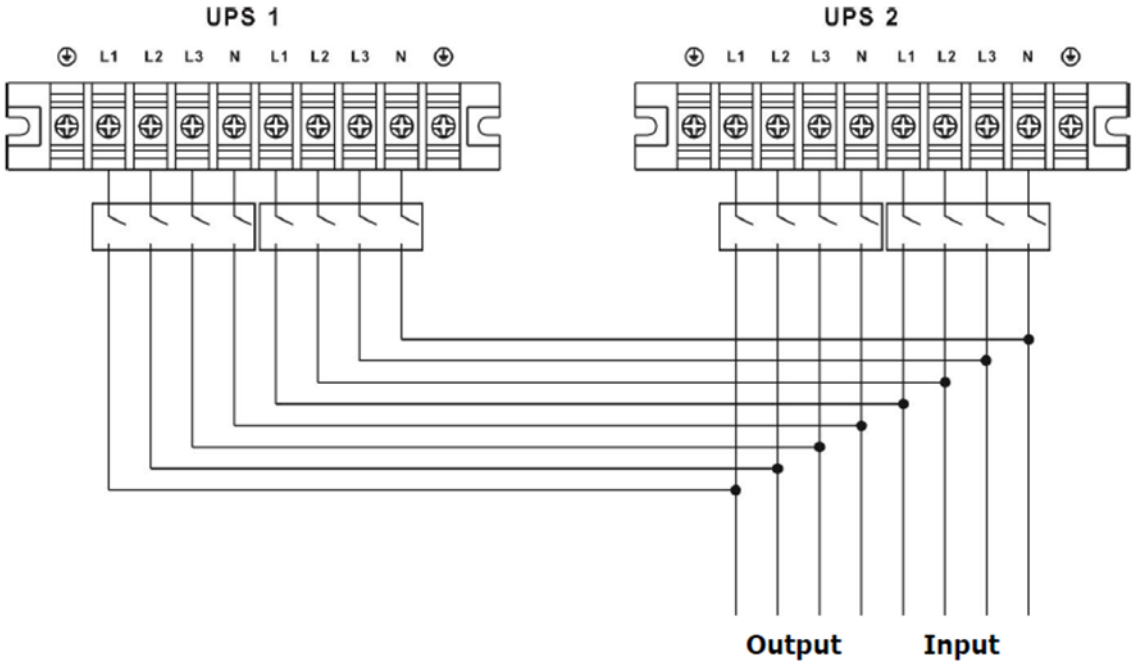
2


1
2
3
4
5
6
8
10
7
9
11
13
12
14

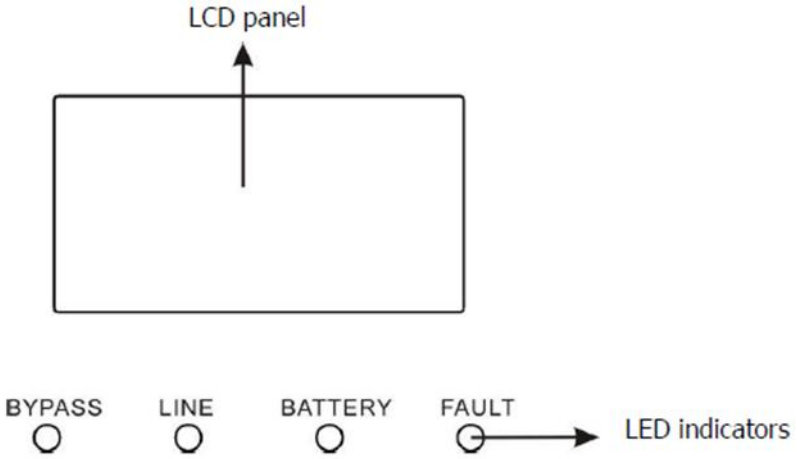
3


L1 L2 L3 N L1 L2 L3 N
Output Grounding
Output L1
Output L2
Output L3
Output Neutral
Input Grounding
Input Neutral
Input L3
Input L2
Input L1

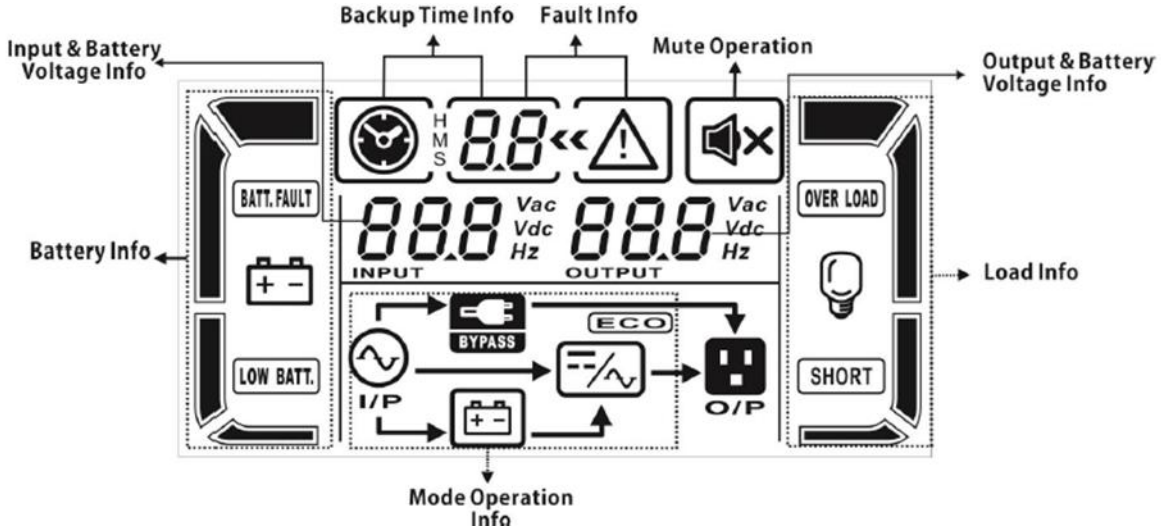
4


UPS 1
UPS 2
L1 L2 L3 N L1 L2 L3 N
Output
Input

5


LCD panel
BYPASS
LINE
BATTERY
FAULT
LED indicators

6


Backup Time Info
Fault Info
Mute Operation
Input & Battery Voltage Info
Output & Battery Voltage Info
Battery Info
Load Info
Mode Operation Info
BATT. FAULT
LOW BATT.
OVER LOAD
SHORT
INPUT
OUTPUT
Vac
Vdc
Hz
BYPASS
ECO
I/P
O/P
H
M
S

7


H
M
S

8

9

10

11

12

13

14

15

16

17

18

19

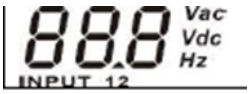
20

21

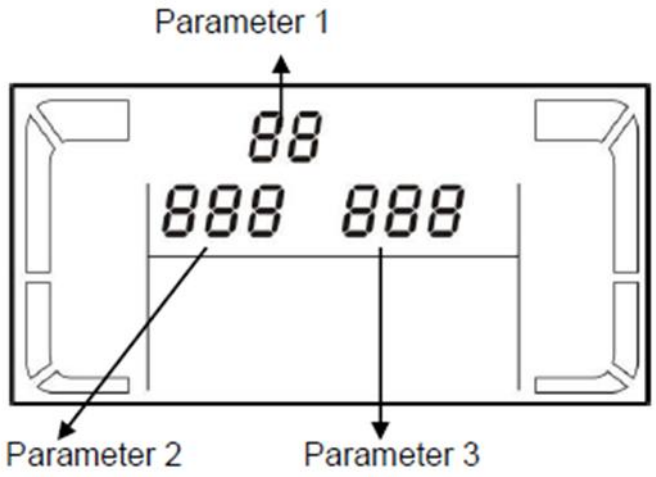
22

23

24



25



26

27

60 Hz, CVCF mode

50 Hz, Normal mode

ATO

28

29

30


05«
dl 5
ECO

31


06«
209 Vac 231 Vac
ECO

32


07«
48.0 Hz 52.0 Hz
ECO

33


08«
OPN ENA
BYPASS

34

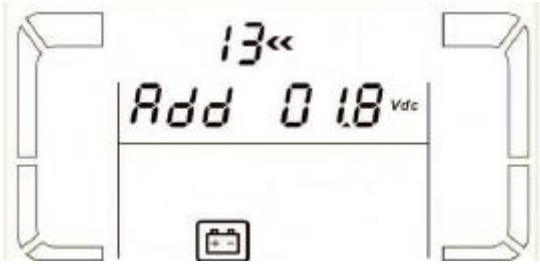

09«
990

35

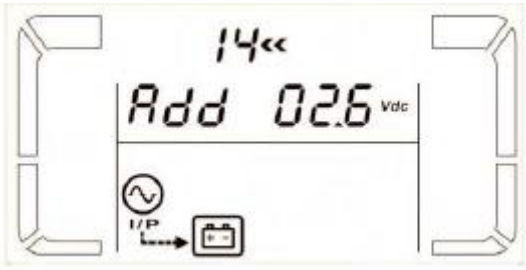
36

37

38



39


14«
Add 02.6 Vdc
I/P

40


15«
Add 01.6 Vac

41


16«
Add 01.6 Vac

42


17«
Add 01.6 Vac

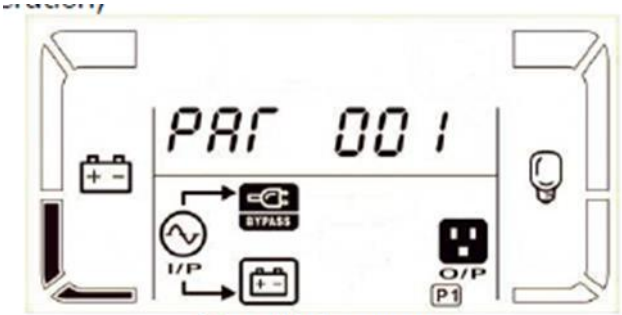
43


18«
OPU 229 Vac
O/P

44

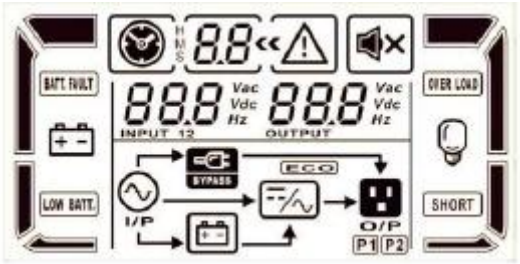
45

46



Parallel screen

47



48


AN
218 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

49


bN
218 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

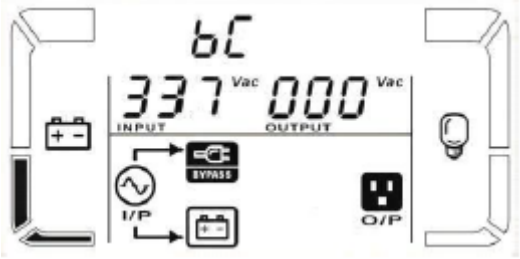
50


CN
218 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

51


Ab
337 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

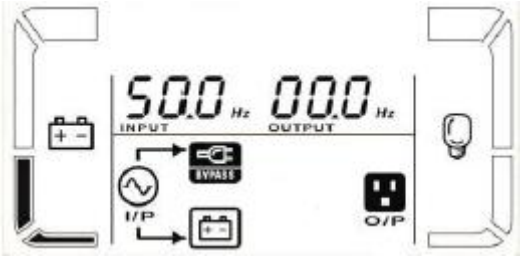
52


bC
337 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

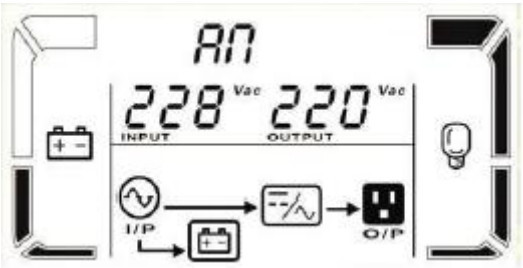
53


CA
337 Vac
INPUT
000 Vac
OUTPUT
BYPASS
I/P
O/P

54


50.0 Hz
INPUT
00.0 Hz
OUTPUT
BYPASS
I/P
O/P

55


AN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

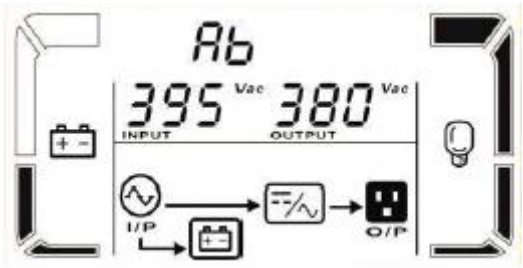
56


bN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

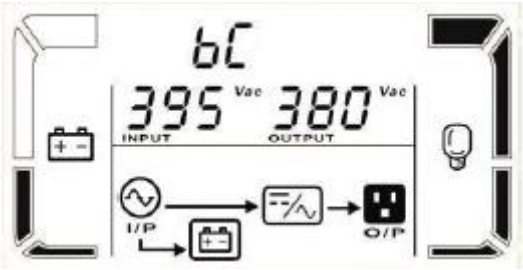
57


CN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

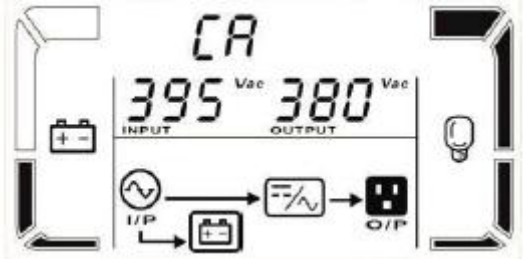
58


Ab
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

59


bC
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

60


CA
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

61


50.0 Hz
INPUT
50.0 Hz
OUTPUT
I/P
O/P

62


AN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

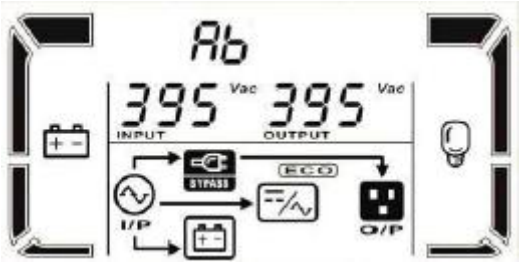
63


bN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

64


CN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

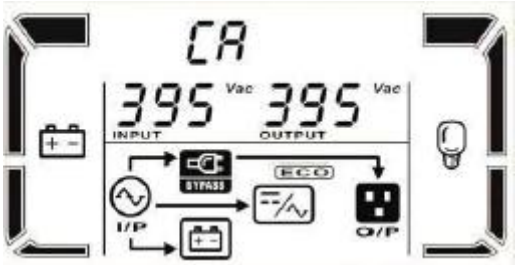
65


Ab
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

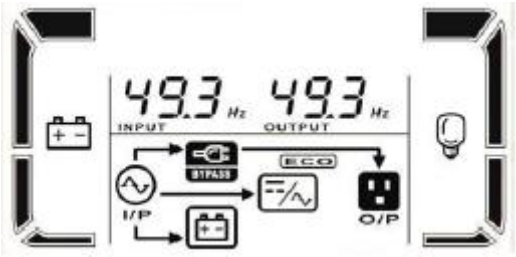
66


bC
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

67


CA
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
ECO
I/P
O/P

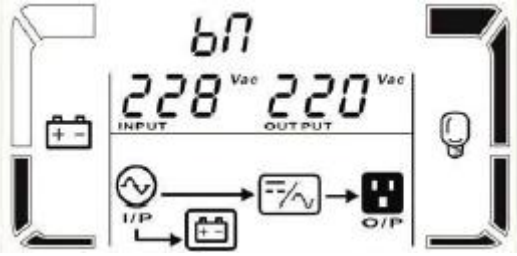
68


49.3 Hz
INPUT
49.3 Hz
OUTPUT
ECO
BYPASS
I/P
O/P

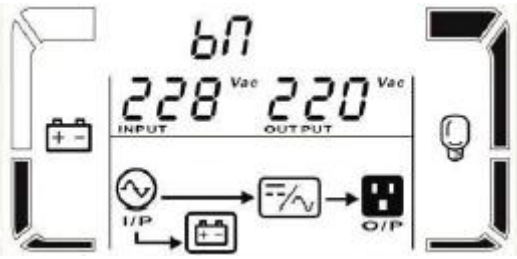
69


AN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

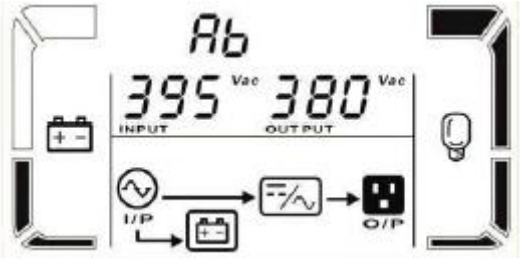
70


bN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

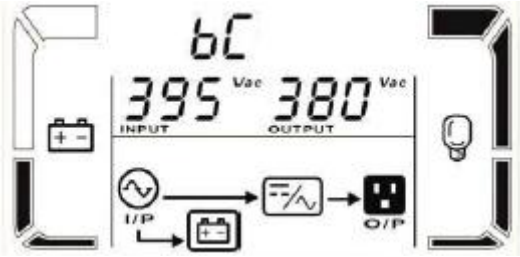
71


bN
228 Vac
INPUT
220 Vac
OUTPUT
I/P
O/P

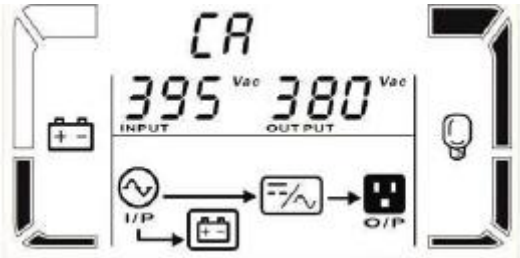
72


Ab
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

73


bC
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

74


CA
395 Vac
INPUT
380 Vac
OUTPUT
I/P
O/P

75


CF
62.3 Hz
INPUT
50.0 Hz
OUTPUT
I/P
O/P

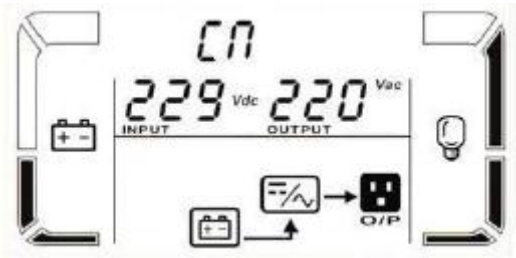
76


AN
229 Vdc
INPUT
220 Vac
OUTPUT
O/P

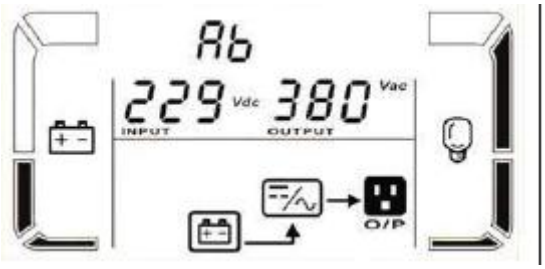
77


bN
229 Vdc 220 Vac
INPUT
OUTPUT
O/P

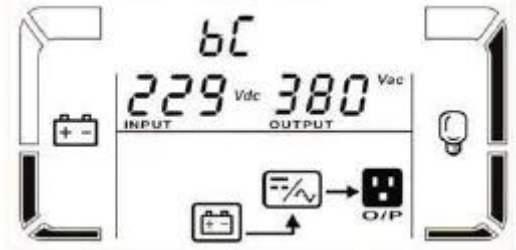
78


CN
229 Vdc 220 Vac
INPUT
OUTPUT
O/P

79


Ab
229 Vdc 380 Vac
INPUT
OUTPUT
O/P

80


bC
229 Vdc 380 Vac
INPUT
OUTPUT
O/P

81


CA
229 Vdc
INPUT
380 Vac
OUTPUT
O/P

82


9.8
229 Vdc
INPUT
50.0 Hz
OUTPUT
O/P

83


AN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
I/P
O/P

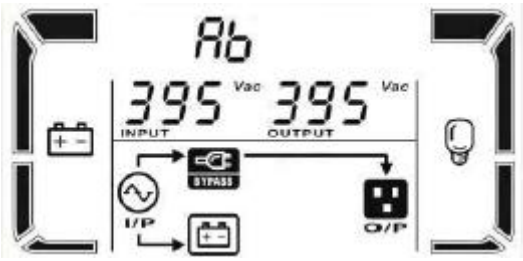
84


bN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
I/P
O/P

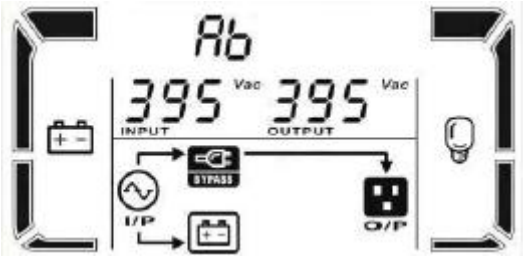
85


CN
228 Vac
INPUT
228 Vac
OUTPUT
BYPASS
I/P
O/P

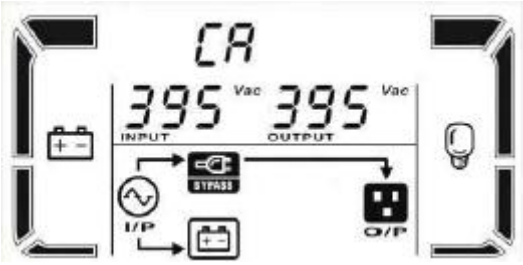
86


Ab
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
I/P
O/P

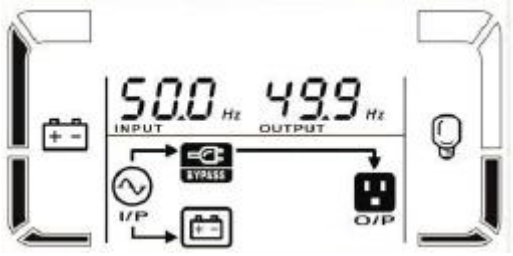
87


Ab
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
I/P
O/P

88


CA
395 Vac
INPUT
395 Vac
OUTPUT
BYPASS
I/P
O/P

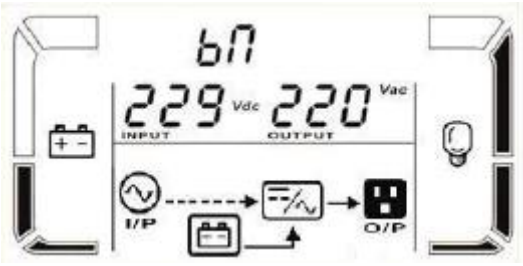
89


50.0 Hz
INPUT
49.9 Hz
OUTPUT
BYPASS
I/P
O/P

90


AN
229 Vdc
INPUT
220 Vac
OUTPUT
I/P
O/P

91


bN
229 Vdc 220 Vac
INPUT OUTPUT
I/P
O/P

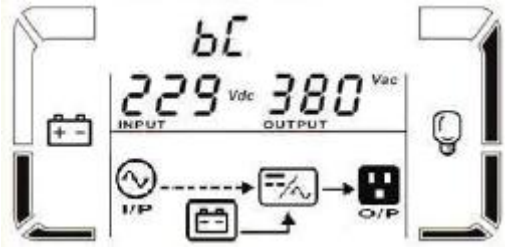
92


CN
229 Vdc 220 Vac
INPUT OUTPUT
I/P
O/P

93


Ab
229 Vdc 380 Vac
INPUT OUTPUT
I/P
O/P

94

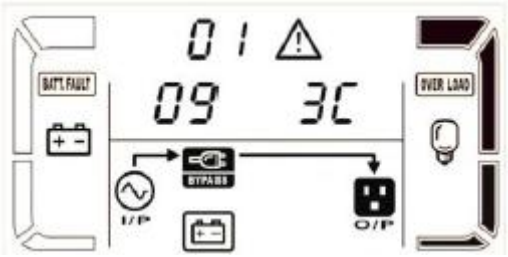

bC
229 Vdc 380 Vac
INPUT OUTPUT
I/P
O/P

95


CA
229 Vdc 380 Vac
INPUT OUTPUT
I/P
O/P

96

97

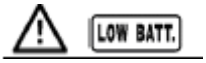


98

99

100

101

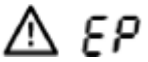


102

103

104

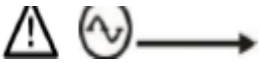
105



106

107

108



109