

User Manual

EPS ECO 4000 VA to 10000 VA



BEGHELLI S.p.A. - Via Mozzeghine 13-15 - 40053 Valsamoggia Loc. Monteveglio (BO) - Italy



Please strictly adhere to all warnings and operating instructions in this manual. Keep this manual properly and read the following instructions carefully before installing the unit. Do not use this unit until you have carefully read all safety information and operating instructions.

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1. Safety and EMC Instructions

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

1-1. Transport and storage



Please carry the EPS system only in the original packaging to protect them.



EPS should be stored in a ventilated and dry room.

1-2. Preparation



If the EPS system is moved directly from a cold environment to a warm one, condensation can occur. The EPS system must be absolutely dry before it is installed. Please allow at least two hours for the EPS system to acclimatize to the environment.



Do not install the EPS system near water or in wet environments.



Do not install the EPS system exposed to direct sunlight or heating nearby. Do not block the



ventilation holes in the EPS housing.

1-3. Installation



Do not connect appliances or devices to outlets or the output terminal block, which may overload the EPS (e.g., large equipment such as motors).



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



Do not block the vents in the EPS housing. The EPS should be installed in a location with good ventilation. Ensure sufficient space on each side for ventilation.



The EPS has a grounded terminal and in the final system configuration, a ground connection must be made with the battery cabinet external to the EPS.



EPS may only be installed by qualified personnel.



An appropriate disconnect device must be provided in the installation of the system as a short-circuit protection.



A single integrated emergency switching device must be provided in the installation of the system to prevent further supply of the load by the EPS in any mode of operation.



Connect the ground before connecting to the system connection terminals.



Installation and wiring must be done in accordance with laws and regulations on local electrical engineering.

1-4. Connection Warnings

- There is no backfeed protection in the EPS. Please insulate the EPS before working as per "diagram 1". The isolator must be capable of carrying the input current of the EPS.

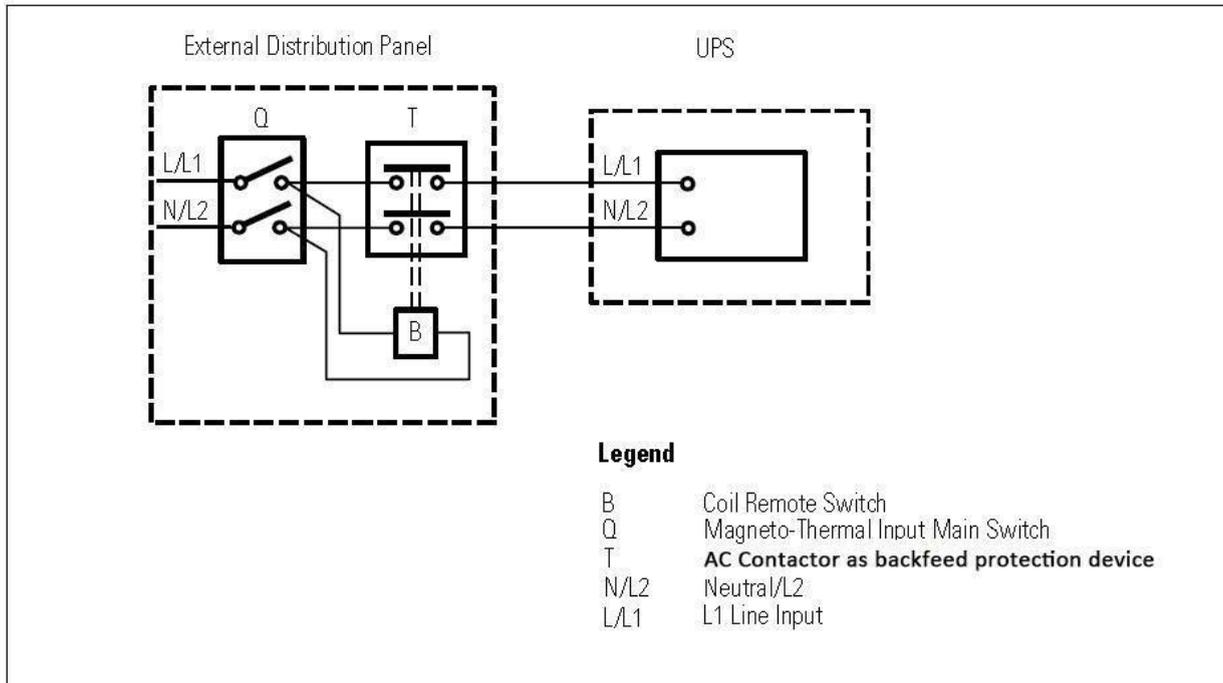


Diagram 1: External wiring for backfeed protection

- This EPS should be connected with the TN grounding system.
- The power supply to this unit must be single-phase in accordance with the data illustrated on the rating plate of the equipment. It must also be properly grounded.
- We do not recommend the use of this equipment in life support applications where it can reasonably be expected that a failure of the equipment could cause the failure of the life support equipment or significantly compromise its safety or effectiveness. Do not use this equipment in the presence of a flammable mixture with air, oxygen, or nitrous oxide.
- Connect the grounding terminal of the EPS power module to a grounding electrode conductor.
- The EPS is connected to a DC power source (battery). The output terminals may be live when the EPS is not connected to an AC supply.

Before working on this circuit

- Insulate the uninterruptible power supply (EPS)
- Then check the voltage between all terminals, including the ground voltage.

 **Risk of voltage backflow**

1-5. Instructions on operation



Do not disconnect the ground wire on the EPS or terminal wiring terminals at any time as this will void the grounding of the EPS system and all connected loads.



The EPS system has its own internal power source (batteries). EPS outlet receptacles or output terminal blocks may be electrically active even if the EPS system is not connected to the mains.



To completely disconnect the EPS system, first press the "OFF" button and then disconnect the mains.



Make sure that no liquid or other objects can enter the EPS



The EPS can be handled by any person with no prior experience.

1-6. Regulations

* Safety	
IEC/EN 62040-1	
EN50171	
*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 4
Low Frequency Signals	
:IEC/EN 61000-2-2	
Caution: This is a product for commercial and industrial applications in the second environment. Installation restrictions or additional measures may be required to avoid disturbances.	

2. Installation and operation

There are several models of EPS with extended autonomy. Please refer to the following table.

Power	Model
4kVA	EPS ECO SE/SA 4kVA
6kVA	EPS ECO SE/SA 6kVA
8kVA	EPS ECO SE/SA 8kVA
10kVA	EPS ECO SE/SA 10kVA

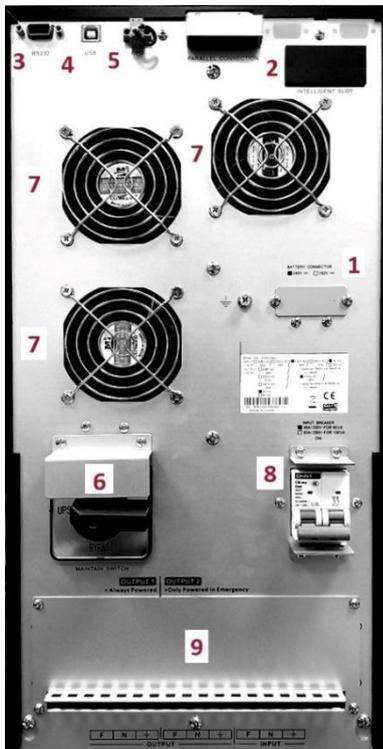
2-1. Opening and inspecting the packaging

Open the package and check its contents. The shipping packaging contains:

- The EPS
- The User Manual
- The Monitoring Software CD
- The USB cable
- The battery cable

NOTE: Before installation, inspect the unit. Make sure that nothing inside the package has been damaged during transport. Do not turn on the unit and notify the carrier and dealer immediately if there is damage or deficiency of any parts. Please keep the original packaging in a safe place for future use.

2-2. Rear View



- 1) External battery connector
- 2) Intelligent slot
- 3) RS-232 communication port
- 4) USB communication port
- 5) Emergency shutdown function connector (EPO connector)
- 6) Bypass maintenance switch
- 7) Cooling fan
- 8) Input Switch
- 9) Input, output and ground terminal block

2-3. Installing the EPS

Installation and wiring must be performed in accordance with local electrical laws/regulations and only by qualified personnel.

1) Ensure that the mains cable and switches in the building are suitable for the EPS rated capacity to avoid the danger of electric shock or fire.

NOTE: Do not use the wall outlet as an input power source for the EPS, as its current rating is generally lower than the maximum input current of the EPS. Otherwise, it may be damaged and burn.

2) Turn off the system's main AC Switch or circuit breaker before installation.

3) Turn off all loads before connecting them to the EPS output.

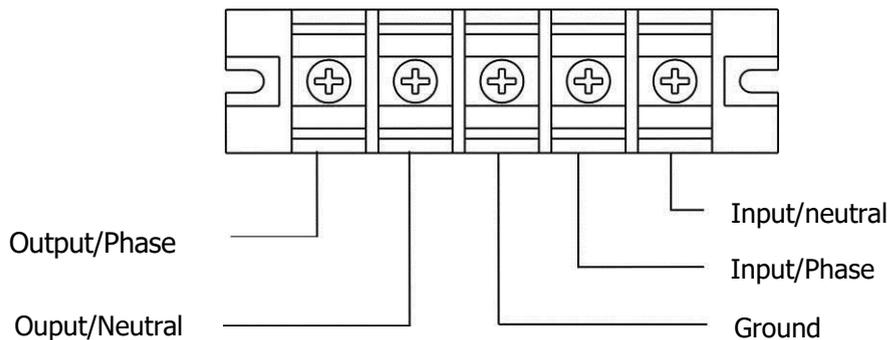
4) Prepare the cables according to the following table:

Model	Wiring Specifications in sq mm (AWG)			
	Entrance	Exit	Battery	Earth
4K	6 (10)	6 (10)	6 (10)	6 (10)
6K	6 (10)	6 (10)	6 (10)	6 (10)
8K	10 (8)	10 (8)	10 (8)	10 (8)
10K	10 (8)	10 (8)	10 (8)	10 (8)

NOTE 1: The cable cross-sections recommended in the table above are to be considered as a minimum value.

NOTE 2: The choice of wire colour should be determined by local electrical laws and regulations.

5) Remove the terminal block cover on the rear panel of the EPS, then connect the wires according to the following terminal block drawing: (Fasten the ground wire first when making the connection and disconnect it last when disconnecting!)



**Terminal block
wiring diagram**

NOTE 1: Make sure the wires are securely connected to the terminals.

NOTE 2: Install a suitable output switch between the EPS and the load, the switch being equipped with leakage current protection function if necessary.

6) Place and secure the terminal block cover on the rear panel of the EPS.

**Attention:**

- Make sure a DC switch or other protective device is installed between the EPS and the external battery. If not, please perform the installation carefully. Open the battery switch before installation.

NOTE: Set the battery cabinet switch to the "OFF" (open) position and then install the battery pack.

- Pay attention to the battery voltage rating marked on the rear panel. If you want to change the battery numbers, be sure to change the setting at the same time. Connecting with incorrect battery voltage may cause permanent damage to the EPS. Make sure the battery voltage is correct.
- Pay attention to the polarity marking on the external terminal block of the battery and make sure that the correct polarity of the battery is connected. Incorrect connection can cause permanent damage to the EPS.
- Make sure the earth protection wiring is correct. The cable current specification, colour, location, connection, and conductance reliability should be carefully checked.
- Make sure the input and output wiring is correct. The cable current specification, colour, location, connection, and conductance reliability should be carefully checked. Make sure the L/N match is correct, not reversed, and not short-circuited.

2-4. Installing the Software

For optimal protection of your PC or computer system, install EPS monitoring software to configure a complete shutdown.

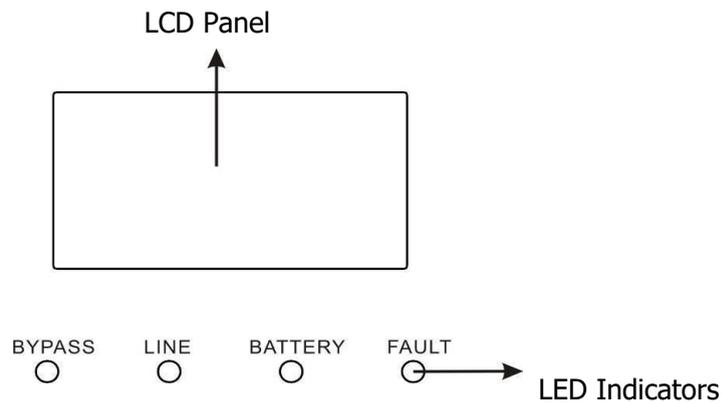
3. Operation

3-1. Button Operation

Button	Work
ON/Enter button	<ul style="list-style-type: none"> ➤ Turn on the EPS: Press and hold the button more than 0.5s to activate the EPS. ➤ Enter key: Press this button to confirm your selection in the settings menu.
OFF/ESC button	<ul style="list-style-type: none"> ➤ Turn off the EPS: Press and hold the button more than 0.5s to turn off the EPS. ➤ Esc key: Press this button to return to the previous menu, in the settings 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 in AC or CVCF mode*. ➤ UP button: Press this button to display the next selection in the settings menu.
Mute/Down button	<ul style="list-style-type: none"> ➤ Silence the alarm: Press and hold the button more than 0.5s to turn off the beep. Please refer to section 3-4-9 for details. ➤ Down key: Press this button to display the previous selection in the settings menu.
Test/Up + Buttons Mute/Down	<ul style="list-style-type: none"> ➤ Press and hold the two buttons at the same time more than 1s to enter/exit the settings menu.

* CVCF mode means converter mode.

3-2. LED Indicators and LCD Panel

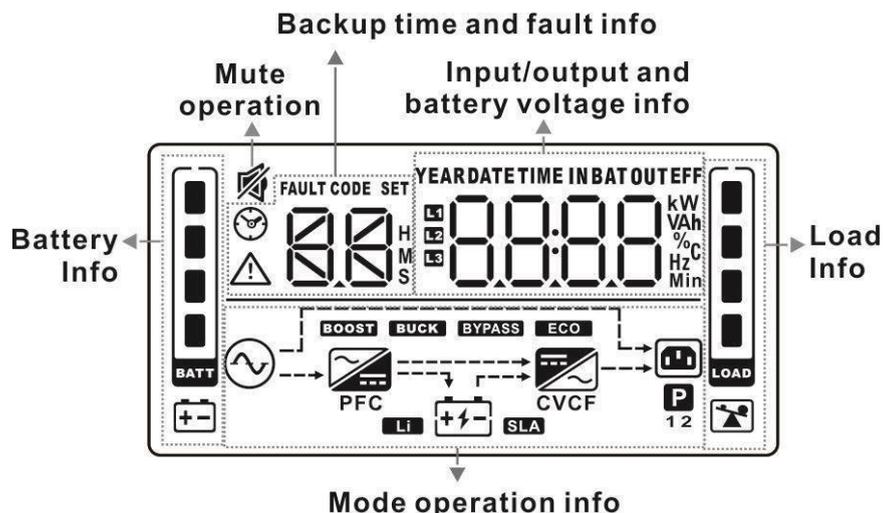


There are 4 LEDs on the front panel to show the working status of the EPS:

Mode \ LED	Bypass	Line	Battery	Alarm
EPS Startup	●	●	●	●
No Output mode	○	○	○	○
Bypass Mode	●	○	○	○
AC mode	○	●	○	○
Battery Mode	○	○	●	○
CVCF Mode	○	●	○	○
Battery Test	●	●	●	○
ECO Mode	●	●	○	○
Alarm	○	○	○	●

Note: ● means LED on, ○ means LED off.

LCD Panel:



Display	Function
About Backup Time	
	Shows the battery discharge time in numbers. H: hours, M: minutes, S: seconds
Fault Information	
	Indicates the occurrence of a warning or fault.
	Indicates the error code. (They are listed in detail in sections 3-9).
Buzzer Off Function	
	Indicates that the audible alarm is turned off.
Output, input, and battery voltage information	
	Shows the output voltage, mains frequency, or battery voltage. Vac: Output Voltage, Vdc: Battery Voltage, Hz: Frequency
Load indication	
	Shows the load level: 0-25%, 26-50%, 51-75%, and 76-100%.
	Indicates overload.
Guidance on operating modes	
	Indicates that the EPS is connected to the mains power supply.
	Indicates battery operation.
	Indicates operation via bypass circuit.
	Indicates that ECO mode is enabled.
	Indicates the operation of the inverter.
	Indicates output operation.
Battery Guidance	
	Shows the battery capacity: 0-25%, 26-50%, 51-75%, and 76-100%.

3-3. Sound Alarm

Description	Buzzer status	Mute
EPS Mode		
Bypass mode	Beep once every 2 minutes	Yes
Battery Mode	Beep once every 4 seconds	
Fault Mode	Continuous beeps	
Notice		
Overload	Beep twice per second	Yes
Other	Beep once every second	
Alarm		
Any	Continuous beeps	Yes

3-4. EPS Operation.

3-4-1. Turn on the EPS on mains power (in AC mode)

- 1) After the power supply has been properly connected, set the battery cabinet switch to the "ON" (closed) position. Then set the input switch to the "ON" (closed) position. At this time the fan is running, a few seconds later, the EPS will run in Bypass mode and feed the loads via the bypass.

Note: When the EPS is in Bypass mode, the output voltage will be fed directly from the mains after the input switch is turned on. In Bypass mode, the load is not protected by EPS. To protect your devices, you need to turn on the EPS. Refer to the next step.

- 2) Press and hold the "ON" button for 0.5s to power on; the EPS will beep.
- 3) A few seconds later, the EPS will enter AC mode. If the mains power is abnormal, the EPS will operate in battery mode without interruption.

Note: When the EPS battery is low, it will automatically shut off in Battery mode. When power is restored, it will automatically restart in AC mode.

3-4-2. Turn on the EPS without mains power (Battery mode)

- 1) Make sure the battery pack switch is in the "ON" (closed) position.
- 2) Press the "ON" button to start the EPS, which will enter power-on mode. After initialization, the EPS will enter "No Output" mode, then press and hold the "ON" button for 0.5s to turn on the EPS, and the buzzer will beep.
- 3) A few seconds later, the EPS will turn on and enter Battery mode.

3-4-3. Connect the devices to the EPS

The loads and power devices should be connected to the EPS output.

- 1) Turn on the EPS first, then turn on the loads/devices one by one and the LCD panel will display the total load level.
- 2) If inductive loads (e.g. a printer) need to be connected, the inrush current must be calculated carefully to see if it meets the characteristics of EPS, as the power consumption of this type of load is very large.
- 3) If the EPS is overloaded, it will beep twice per second.
- 4) If the EPS is overloaded, remove some loads immediately. It is recommended to have a total load connected to the EPS of less than 80% of its rated power capacity, to avoid overloads.

- 5) If the overload time is longer than the time described in the specifications in AC mode, the EPS will automatically switch to Bypass mode. When the overload is removed, the EPS will return to AC mode. If the overload time is longer than the time described in the specifications in Battery mode, the EPS will go into a fault state. In this situation, if bypass is enabled and mains voltage and frequency are within the range of the set values, the EPS will power the load via bypass. If the bypass function is disabled or the input power is not within the acceptable bypass range, the EPS will directly cut off the output.

3-4-4. Charging the Batteries

- 1) After the EPS is connected to the mains and operates in AC mode, the charger will automatically charge the batteries except in Battery mode or during the self-test.
- 2) It is recommended to charge the batteries at least 10 hours before use. Otherwise, the autonomy may be less than the expected one.
- 3) Make sure that the number of batteries, set on the control board (refer to section 3-4-12 for detailed setting), is consistent with the actual connection.

3-4-5. Battery Mode Operation

- 1) When the EPS is in Battery mode, it will beep according to the battery capacity. If the battery capacity is more than 25%, it will beep every 4s; If the battery voltage drops below the alarm level, it will quickly beep (once per second) to remind users that the battery is at a low level, and the EPS will automatically shut down shortly. The user can turn off some non-critical loads to disable the shutdown alarm and extend the backup time. If you can no longer turn off other loads during the shutdown alarm, you should turn off all loads as soon as possible to protect your devices or save data. Otherwise, there is a risk of data loss or load failure.
- 2) In Battery mode, if the sound annoys, users can press the Mute button to disable it.
- 3) The duration time in battery mode depends on the capacity of the external battery.
- 4) The duration time may vary depending on the environment, temperature and type of load.
- 5) When setting the duration time to 16.5 hours (990 minutes in the LCD setting menu 09), after this time, the EPS will automatically turn off to protect the battery. This battery discharge protection can be enabled or disabled through the LCD panel control. (Refer to section 3-7 LCD Setting)

3-4-6. Test the Batteries

- 1) If you need to check the battery status when the EPS is operating in AC, CVCF or ECO mode, you can press the "Test" button to allow the EPS to self-test the battery.
- 2) To keep the system reliable, the EPS can periodically perform battery self-test while the monitoring software is connected.
- 3) Users can also set battery self-test via monitoring software.
- 4) If the EPS is in the battery self-test phase, the LCD display and sound indication will be the same as in Battery mode, except that the battery LED is flashing.

3-4-7. Turn off the EPS with mains power in AC mode

- 1) Turn off the inverter of the EPS by pressing the "OFF" button for at least 0.5s, then it will beep. The EPS will switch to Bypass mode.

NOTE 1: If the EPS has been set to enable bypass output, it will bypass the voltage from the utility supply to the output terminal even if the inverter has been turned off.

NOTE 2: After turning off the EPS, be aware that it operates in Bypass mode and that there is a risk of power failure for connected devices, in case of mains outage.

- 2) In Bypass mode, the EPS output voltage is still present (from the mains). To stop the output, turn off the input switch. A few seconds later, no message appears on the display panel and the EPS is completely turned off.

3-4-8. Turn off the EPS without mains power in Battery mode

- 1) Turn off the EPS by pressing the "OFF" button for at least 0.5s, then it will beep.
- 2) Then the EPS will cut off the output power and no message appears on the display panel.

3-4-9. Turn off audible alarms

- 1) To deactivate the sounds, press the "Mute" button for at least 0.5s. If you press it again after the alarm has been deactivated, it will beep again.
- 2) Some warning alarms cannot be turned off unless the error is corrected. Refer to section 3-3 for details.

3-4-10. Operation in warning state

- 1) When the fault LED flashes and the EPS beeps once per second, it means that there are some problems in the operation of the EPS. The user can get the alert code from the LCD panel. For more information, see the Alert Code Table in Section 3-11 and the Troubleshooting Table in Chapter 4.
- 2) Some warning alarms cannot be turned off unless the error is corrected. Refer to section 3-3 for details.

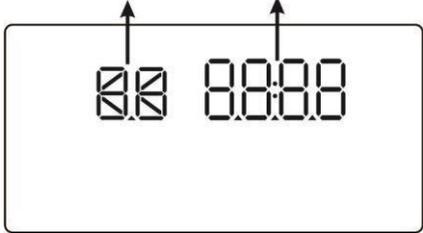
3-4-11. Fault Mode Operation

- 1) When the fault LED lights up and the buzzer beeps continuously, it means that there is a fatal error in the EPS. The user can get the error code from the display panel. For more information, refer to the error code table in section 3-9 and the troubleshooting table in chapter 4.
- 2) Please check the loads, wiring, ventilation, mains power, battery and so on after the fault occurs. Do not attempt to turn the EPS back on until you have troubleshooted. If the problems cannot be resolved, contact your distributor or service personnel immediately.
- 3) In case of unexpected events, immediately cut off the connection to the mains, the external battery and the output to avoid further risks or dangers.

3-5. Meaning of the messages on the LCD display

Abbreviation	Displayed content	Meaning
ENA	EN	Enable
DIS	DIS	Disable
AT	AT	Automatic
BAT	BAT	Battery
NC	NC	Normal mode (not CVCF mode)
CF	CF	CVCF Mode (Converter)
SUB ON	SUB SU	Subtract
ADD AD	ADD AD	Add
OP	OP	Permit
FB	Fb	Not allowed
EP	EP	EPO (Emergency Shutdown)
RES	RES	Reserved
YES	YES	Yes
NO	NO	No
PK	PK	Parallel

3-6. Settings from LCD

<p>Parameter 1 Parameter 2</p> 	<p>There are two parameters to configure the EPS.</p> <p>Parameter 1: It is for program alternatives or setting options. Refer to the table below.</p> <p>Parameter 2 consists of the setting values for each program.</p>
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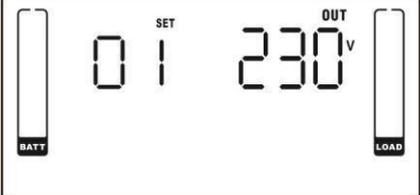
List of programs available for parameter 1:

Code	Description	Bypass/ No output	AC	ECHO	CVCF	Battery	Battery Test
01	Output voltage	Y					
02	Output Frequency	Y					
03	Voltage range for bypass	Y					
04	Frequency range for bypass	Y					
05	Enable/disable ECO mode	Y					
06	Voltage range for ECO mode	Y					
07	Frequency range in ECO mode	Y					
08	Bypass Mode Setting	Y	Y				
09	Setting the battery runtime	Y	Y	Y	Y	Y	Y
10	Reserved	Reserved for the future					
11	Reserved	Reserved for the future					
12	Enabling/disabling the hot standby function	Y	Y	Y	Y	Y	Y
13	Battery voltage regulation	Y	Y	Y	Y	Y	Y
14	Adjusting the charger voltage	Y	Y	Y	Y	Y	Y
15	Inverter voltage regulation		Y		Y	Y	
16	Output voltage calibration		Y		Y	Y	
17	Reserved	Reserved for the future					

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

Note: All parameter settings will only be saved when the EPS will turn off normally with the batteries connected. (Normal turning off the EPS means turning off the input switch in bypass mode).

● **01: Output voltage**

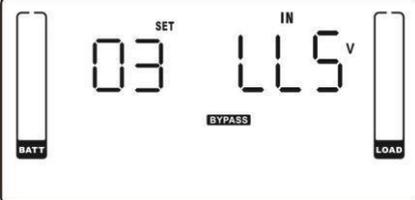
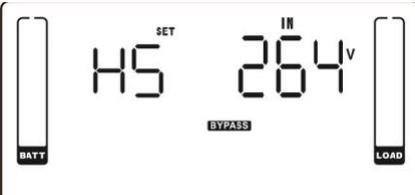
Interface	Setting
	<p>Parameter 2: Output voltage You can choose the following output voltages in parameter 2: 208: The output voltage is 208Vac. 220: The output voltage is 220Vac. 230: the output voltage is 230Vac. 240: The output voltage is 240Vac.</p>

● **02: Output Frequency**

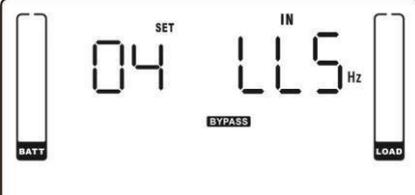
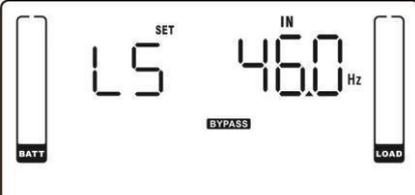
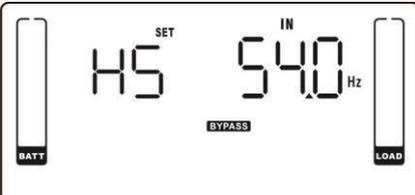
Interface	Setting
<p>60 Hz, CVCF mode</p>  <p>50 Hz, normal mode</p>  <p>At</p> 	<p>Parameter 2: Output Frequency Setting the output frequency. You can choose the following three options in parameter 2: 50.0Hz: The output frequency is set to 50.0Hz. 60.0Hz: The output frequency is set to 60.0Hz. At: If selected, the output frequency will be decided based on the last regular network 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. At is the default setting.</p> <p>Frequency Mode Setting the output frequency in CVCF mode or not in CVCF mode. You can choose the following two options in parameter 2: CF: Setting the EPS to CVCF mode. If selected, the output frequency will be fixed at 50Hz or 60Hz based on the setting in parameter 2. The input frequency could be between 46 Hz and 64 Hz. NC: Setting the EPS to normal mode (not CVCF mode). If selected, the output frequency will sync with the input frequency within 46~54 Hz at 50 Hz or within 56~64 Hz at 60 Hz based on the setting in parameter 2. If 50Hz is selected in parameter 2, the EPS will switch to battery mode when the input frequency is not between 46~54Hz. If 60Hz is selected in parameter 2, the EPS will switch to battery mode when the input frequency is not between 56~64Hz. *If parameter 2 is At, parameter 2 will show the current frequency.</p>

Note: If the EPS is set to CVCF mode, the bypass function will be disabled automatically.

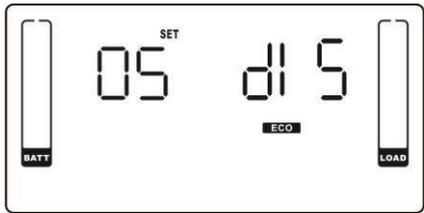
● **03: Bypass voltage range**

Interface	Setting
	<p>Parameters 1 and 2: Setting the acceptable voltage range for bypass mode. You have to set the interval by adjusting the high and low points. When it shows "LLS" in parameter 2, press the "Enter" key, and "LS" will be displayed in parameter 1. You can now set the lowest point in parameter 2 by pressing the "Up" or "Down" key.</p>
	<p>LS: Set the acceptable low voltage for the bypass. The setting range is from 110V to 209V, and the default value is 110V.</p> <p>Press the "Enter" key to confirm the setting value for the low point. Then, it will show HS in parameter 1. Please set the highest point in parameter 2 by pressing the "Up" or "Down" key.</p>
	<p>HS: Set the acceptable high voltage for bypass. The interval setting range from 231V to 276V, and the default value is 264V.</p>

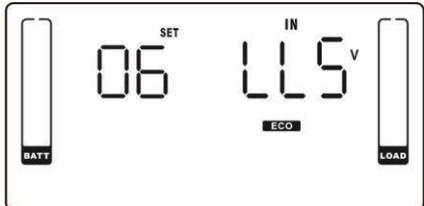
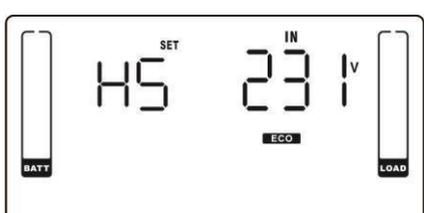
● **04: Bypass Frequency Range**

Interface	Setting
	<p>Parameters 1 and 2: Setting the acceptable frequency range for bypass mode. You have to set the interval by adjusting the high and low points. When it shows "LLS" in parameter 2, press the "Enter" key, and "LS" will be displayed in parameter 1. You can now set the lowest point in parameter 2 by pressing the "Up" or "Down" key.</p>
	<p>LS: Set the acceptable low frequency for bypass. 50 Hz System: The setting range is 46.0 to 49.0 Hz. 60 Hz System: The setting range is 56.0 to 59.0 Hz. The default values are 46.0 Hz and 56.0 Hz.</p> <p>Press the "Enter" key to confirm the setting value for the low point. Then, it will show HS in parameter 1. Please set the highest point in parameter 2 by pressing the "Up" or "Down" key.</p>
	<p>HS: Set the acceptable high frequency for bypass. 50 Hz: The setting range is 51.0 Hz to 54.0 Hz. 60 Hz: The setting range is 61.0 Hz to 64.0 Hz. The default value is 54.0 Hz/64.0 Hz.</p>

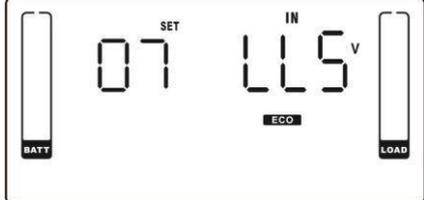
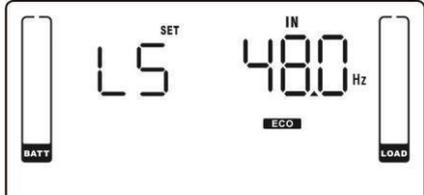
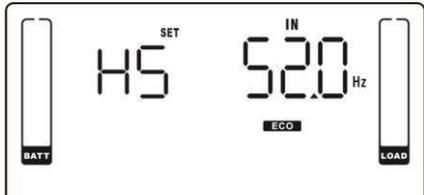
● **05: Enabling/disabling ECO mode**

Interface	Setting
 <p>The LCD display shows '05' under the 'SET' indicator and 'd15' under the 'ECO' indicator. There are 'BATT' and 'LOAD' indicators on the left and right sides respectively.</p>	<p>Parameter 2: Enable or disable the ECO function. You can choose the following two options: DIS: Disables the ECO function ENA: Enable ECO function If the ECO function is disabled, the voltage range and frequency range for ECO mode can still be set, but it doesn't make sense unless the ECO function is enabled.</p>

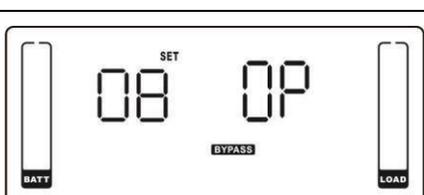
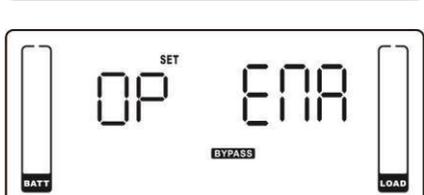
● **06: Voltage range for ECO mode**

Interface	Setting
 <p>The LCD display shows '06' under the 'SET' indicator and 'LLS' under the 'IN' indicator with a 'V' symbol. There are 'BATT' and 'LOAD' indicators on the left and right sides respectively.</p>	<p>Parameters 1 and 2: Setting the acceptable voltage range for ECO mode. You have to set the interval by adjusting the high and low points. When it shows "LLS" in parameter 2, press the "Enter" key, and "LS" will be displayed in parameter 1. You can now set the lowest point in parameter 2 by pressing the "Up" or "Down" key.</p> <p>LS: Low voltage point in ECO mode. The regulation range is from 5% to 10% of the rated voltage.</p> <p>Press the "Enter" key to confirm the setting value for the low point. Then, it will show HS in parameter 1. Please set the highest point in parameter 2 by pressing the "Up" or "Down" key.</p> <p>HS: High voltage point in ECO mode. The regulation range is from 5% to 10% of the rated voltage.</p>
 <p>The LCD display shows 'LS' under the 'SET' indicator and '209' under the 'IN' indicator with a 'V' symbol. There are 'BATT' and 'LOAD' indicators on the left and right sides respectively.</p>	
 <p>The LCD display shows 'HS' under the 'SET' indicator and '231' under the 'IN' indicator with a 'V' symbol. There are 'BATT' and 'LOAD' indicators on the left and right sides respectively.</p>	

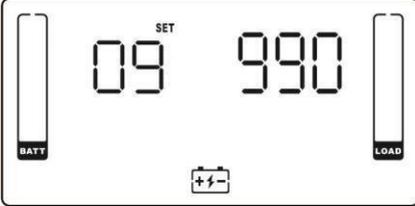
● **07: Frequency range for ECO mode**

Interface	Setting
	<p>Parameters 1 and 2: Setting the acceptable frequency range for ECO mode. You have to set the interval by setting the high and low points. When it shows "LLS" in parameter 2, press the "Enter" key, and "LS" will be displayed in parameter 1. You can now set the lowest point in parameter 2 by pressing the "Up" or "Down" key.</p>
	<p>LS: Set the low frequency 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.</p>
	<p>Press the "Enter" key to confirm the setting value for the low point. Then, it will show HS in parameter 1. Please set the highest point in parameter 2 by pressing the "Up" or "Down" key.</p> <p>HS: Set the high frequency point for ECO mode. 50 Hz: The setting range is 52.0 Hz to 54.0 Hz. 60 Hz: The setting range is 62.0 Hz to 64.0 Hz. The default value is 52.0 Hz/62.0 Hz.</p>

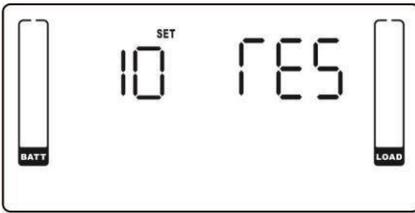
● **08: Setting the Bypass Mode**

Interface	Setting
	<p>After showing "08" in parameter 1, press the "Enter" key first. So, you have the following options to choose in the parameter 1. OP: Bypass allowed. When selected, the EPS will operate in Bypass mode depending on the bypass enabled/disabled setting. Fb: Bypass not allowed. If selected, it is not allowed to run in Bypass mode in any situation.</p>
	<p>After selecting "OP" in parameter 1, you can set the bypass condition in parameter 2. ENA: Bypass enabled. When this option is selected, Bypass mode is activated. DIS: Bypass disabled. When this option is selected, automatic bypass is acceptable, but manual bypass is not allowed. Manual bypass means that users manually operate the Bypass mode. For example, pressing the OFF button in AC mode to switch to bypass mode.</p>

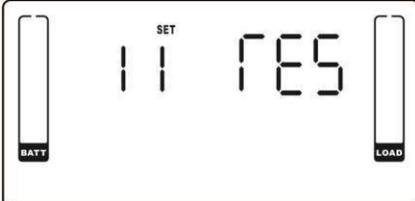
● **09: Setting the battery runtime**

Interface	Setting
	<p>Parameter 2: 000~999: Set the maximum duration time in battery operation from 0 minutes to 999 minutes. The EPS will turn off to protect the battery after the duration time expires. DIS: Disables battery discharge protection, and the backup time will depend on the battery capacity. The default value is "DIS".</p>

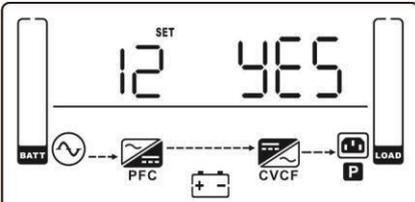
● **10: Reserved**

Interface	Setting
	Reserved

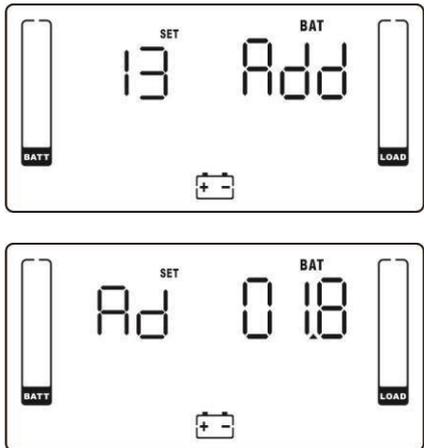
● **11: Reserved**

Interface	Setting
	Reserved

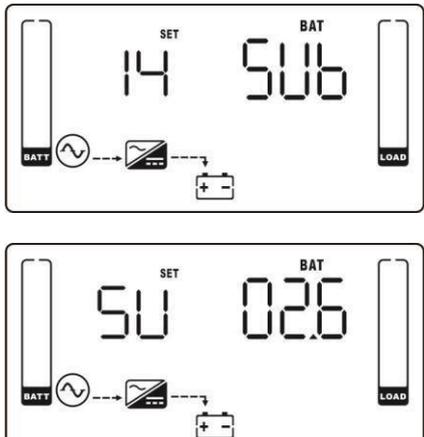
● **12: Enable/disable the hot standby function**

Interface	Setting
	<p>Parameter 2: Enable or disable the Hot Standby feature. You can choose the following two options in parameter 2: YES: The hot standby function is enabled. It means that the EPS is set to accommodate the hot standby function and will restart after AC reset even without battery connected. NO: The hot standby function is disabled. EPS works in normal mode and cannot restart without battery</p>

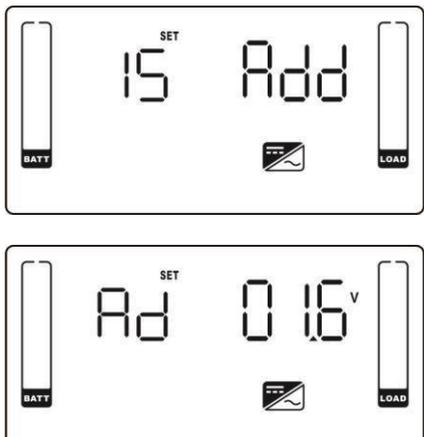
● **13: Battery voltage adjustment**

Interface	Setting
	<p>After showing "13" in parameter 1, press the "Enter" key first. Then, you can choose Ad or UP to adjust the battery voltage in parameter 1 by pressing the "Up" or "Down" key. After pressing the "Enter" key to confirm your selection, you will move to parameter 2 to set the value.</p> <p>Parameter 2: The voltage range is 0V to 5.7V, the default value is 0V.</p>

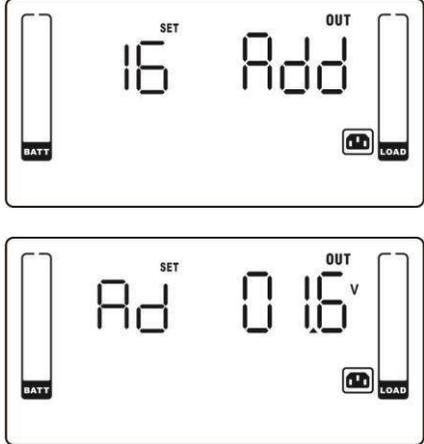
● **14: Adjusting the charger voltage**

Interface	Setting
	<p>After showing "14" in parameter 1, press the "Enter" key first. Then, you can choose Ad or UP to adjust the charger voltage in parameter 1 by pressing the "Up" or "Down" key. After pressing the "Enter" key to confirm your selection, you will move to parameter 2 to set the value.</p> <p>Parameter 2: The voltage range is from 0V to 9.9V, the default value is 0V.</p> <p>NOTE:</p> <ul style="list-style-type: none"> *Before making the voltage adjustment, be sure to disconnect all batteries first to get the precise voltage of the charger. *It is highly recommended to use the default value (0). Any modification must be suitable for the battery specifications.

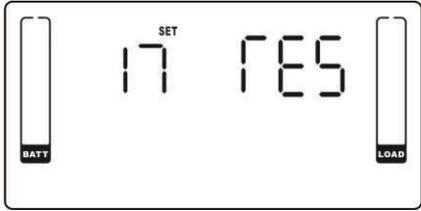
● **15: Inverter voltage regulation**

Interface	Setting
	<p>After showing "15" in parameter 1, press the "Enter" key first. Then, you can choose Ad or UP to adjust the inverter voltage in parameter 1 by pressing the "Up" or "Down" key. After pressing the "Enter" key to confirm your selection, you will move to parameter 2 to set the value.</p> <p>Parameter 2: The voltage range is from 0V to 6.4V, the default value is 0V.</p>

● **16: Output Voltage Calibration**

Interface	Setting
	<p>After showing "16" in parameter 1, press the "Enter" key first. Then, you can choose Ad or UP to adjust the output voltage in parameter 1 by pressing the "Up" or "Down" key. After pressing the "Enter" key to confirm your selection, you will move to parameter 2 to set the value.</p> <p>Parameter 2: The voltage range is from 0V to 6.4V, the default value is 0V.</p>

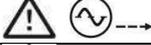
● **17: Reserved**

Interface	Setting
	Reserved

3-7. Fault codes

Failure event	Code error	Icon	Failure event	Code error	Icon
Bus start failure	01	none	Battery SCR short circuited	21	none
Bus over	02	none	Short circuited relay inverter	24	none
Bus under	03	none	Charger short circuited	2nd	none
Bus unbalance	04	none	Can communication fault	31	none
Inverter soft start failure	11	none	Parallel output current unbalance	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		Overload	43	
Negative power fault	1A	none	Battery turn-on failure	6Th	none
Inverter over current	60	none	PFC current failure in battery mode	6B	none
Waveform inverters abnormal	63	none	Bus voltage changes too Fast	6C	none

3-8. Warning Indications

Warning	Icon (flashing)	Alarm
Overload		Beep twice per second
Battery overcharger		Beep every second
EPO circuit trip		Beep every second
Fan Failure/High Temperature		Beep every second
Battery charger fault		Beep every second
Broken I/P fuse		Beep every second
Overload 3 times in 30 minutes		Beep every second
Battery disconnected		Beep every second

3-9 Alert Codes

Alert Code	Warning event	Alert Code	Warning event
01	Battery disconnected	10	IP L1 fuse broken
07	Overload	21	n.a.
08	Low battery	22	n.a.
09	Overload	33	Stuck in bypass after overload 3 times in 30 minutes
0A	Fan failure	3Rd	The maintenance switch cover is open
0B	EPO Activation	3-D	Unstable bypass
0D	Overtemperature	3E	Missing boot loader
0E	Charger failure		

4. Troubleshooting

If your EPS system is not working properly, resolve the issue using the following table.

Symptom	Possible cause	Remedy
No indication and alarm in the front display panel even if the network is normal.	The AC input power is not properly connected.	Check if the input cable is securely connected to the mains.
The  and the code of warning  flashes on the LCD and the alarm beeps every second.	The EPO function is enabled.	Set the circuit to the closed position to disable the EPO function.
The  e  icon flashes on the LCD and the alarm emits a beep every second.	External batteries are connected incorrectly.	Verify if all batteries are well connected.
The  e  icon flashes on the LCD and the alarm beeps twice per second.	The EPS is overloaded.	Remove excess loads from the EPS outlet.
	The EPS it is overload. The loads/devices connected to the EPS are fed directly from the electricity grid via bypass.	Remove excess loads from the EPS outlet.
	After repetitive overloads, the EPS is stuck in Bypass mode. Connected loads/devices are directly powered from the electricity grid.	Remove excess loads from the EPS outlet first. Then turn off the EPS and restart it.
The error code displayed is 43. The icon  lights up on the LCD and the alarm beeps continuously.	EPS becomes overloaded for too long and becomes a failure. Then the EPS shuts off automatically.	Remove excess loads from the EPS outlet and restart it.
The fault code displayed is 14 and The alarm beeps continuously.	The EPS automatically shuts down because a short circuit occurs on the output circuit.	Check the output wiring and whether the connected devices are in a short-circuit state.
The error code displayed is 01, 02, 03, 04, 11, 12, 13, 14,1A, 21, 24, 35, 36, 41, 42, or 43 on the LCD and the alarm continuously beeps.	An internal EPS failure has occurred. There are two possible outcomes: 1. The load is still powered, but directly from the AC power supply via bypass. 2. The load is no longer powered by power.	Contact Beghelli.
Battery runtime is less than rated	Batteries are not fully charged	Charge the batteries for at least 7 hours and then check the capacity. If the problem persists, consult Beghelli.
	Defective batteries	Contact your supplier to replace the battery.
The and icon   flash on the LCD display and the alarm beeps every second.	The fan is blocked or does not work or the EPS temperature is too high.	Check the fans and notify your dealer.

5. Storage, maintenance and disposal

5-1. Storage

Before storing, charge the EPS for at least 7 hours. Store the EPS covered and upright in a cool, dry place. During storage, please recharge the battery according to the following table:

Storage Temperature	Charging frequency	Charging duration
-25°C / 40°C	Every 3 months	1-2 hours
40°C / 45°C	Every 2 months	1-2 hours

5-2. Maintenance



The EPS system operates with dangerous voltages. Repairs may only be performed by qualified maintenance personnel.



Even after the unit has been disconnected from the mains, the components inside the EPS are still connected to the battery packs, therefore potentially dangerous.



Before performing any type of service and/or maintenance, disconnect the batteries and check that no current is present and that no dangerous voltage exists in the terminals of high-capacity capacitors such as BUS capacitors.



Only personnel with adequate training on batteries and with the necessary precautionary measures can replace batteries and supervise operations. Unauthorized persons must keep a safe distance from the batteries.



Check that there is no voltage between the battery terminals and the ground before servicing or repair. In this product, the battery circuit is not isolated from the input voltage. Dangerous voltages can occur between the battery terminals and the ground.



Batteries can cause electric shock and have a high short-circuit current. Please remove wristwatches, rings and other metal personal items, before servicing or repair, and use only tools with insulated grips.



When replacing batteries, install the same number and type of batteries.



Do not attempt to dispose of batteries by burning them. Doing so may cause the battery to explode. Batteries must be disposed of properly according to local regulations.



Do not open or destroy batteries. Leakage of electrolytes can cause injury to the skin and eyes. It can be toxic.



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



Do not disassemble the EPS.

5-3. Disposal

For Electrical/Electronic devices waste (waste from electrical and electronic equipment) there is an obligation not to dispose of it as municipal waste and to carry out separate collection.

Improper use of electrical and electronic equipment can cause pollution of the environment with a fallout of the effects of the substances released directly and/or indirectly on humans.

These effects are not serious in the individual case but can lead to pollution in the case of continuous improper use or disposal.



The symbol on our products identifies the obligation to dispose of the equipment through separate collection and not to consider them as municipal waste.

6. Technical Specifications

MODEL		4K	6K	8K	10K
RATED POWER*		4000 VA	6000 VA	8000 VA	10000 VA
POWER ACCORDING TO EN50171		3200 W	4800W	6400 W	8000 W
INPUT					
Voltage range	Power supply range	110 ~ 300 VAC @ (0 ~ 60%) load 140~300V@(60~80%) Load 176~300Vac@(80~100%) Load			
	Return from low mains	Low limit of mains supply voltage + 10 V			
	Return from high mains	High Limit of Mains Supply Voltage - 10 V			
Frequency range		46Hz ~ 54 Hz @ 50Hz 56Hz ~ 64 Hz @ 60Hz			
Phase		Single-phase grounded			
Power factor		≥ 0.99 at 100% load			
OUTPUT					
Output voltage		208/220/230/240VAC			
AC voltage regulation		± 1%			
Frequency range (synchronized range)		46Hz ~ 54 Hz @ 50Hz 56Hz ~ 64 Hz @ 60Hz			
Frequency range (battery mode)		50 Hz ± 0.1 Hz 60 Hz ± 0.1 Hz			
Overload (P nom.), ta<35 °C		100%~110%: 10 minutes; 110%~130%: 1 minute; >130%: 1 second			
Overload according to EN50171, ta<35 °C		120% for 1h			
Peak Current Ratio		3:1 max.			
Harmonic distortion		≤ 1% @ 100% linear load; ≤ 4 % @ 100% Nonlinear Load			
Transfer time	From mains to battery	0 ms			
	From Inverter to Bypass	0 ms			
	From Inverter to ECO	<10 ms			
EFFICIENCY					
AC Mode		> 94%			
Battery Mode		> 93%			
BATTERY					
Typology		12Vdc and Ah according to the external battery pack			
Quantity		20			
Charging time		Depending on the external battery pack			
Charging current		4 A ± 10% (max.)			
Charging voltage		(Number of batteries * 13.65V) ± 1%			
DIMENSIONS					
Dimensions DxWxH (mm)		369 x 190 x 688		442 x 190 x 688	
Net weight (kg)		13		17	
ENVIRONMENT					
Operating Temperature		0~40°C (battery life will decrease when > 25°C)			
Operating humidity		<95 % non-condensing			
Operating altitude**		<1000m			
Acoustic noise level		Less than 55dB @ 1 meter		Less than 58dB @ 1 meter	
MANAGEMENT					
RS-232 and USB ports		Supports Windows® 2000/2003/XP/Vista/2008/7/8, Linux, Unix and MAC			
Optional SNMP		Power Management from SNMP Manager and Web Browsers			

* Downgrade the power to 60% in CVCF mode and to 90% when the output voltage is regulated to 208 Vac.

** If EPS is installed or used at an altitude above 1000 m, the output power must be reduced by 1% per 100 m.

Product specifications are subject to change without notice.