

USER'S MANUAL

KNIGHT ONLINE SERIES

UPS

220V

1000 (L) / 2000 (L) / 3000 (L)

Uninterruptible Power Supply System

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1. Safety Warning

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

1-1. Transportation

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

1-2. Preparation

- Condensation may occur if the UPS system is moved directly from cold to warm environment. The UPS system must be absolutely dry before being installed. Please allow at least two hours for the UPS system to acclimate the environment.
- Do not install the UPS system near water or in moist environments.
- Do not install the UPS system where it would be exposed to direct sunlight or near heater.
- Do not block ventilation holes in the UPS housing.

1-3. Installation

- Do not connect appliances or devices which would overload the UPS system (e.g. laser printers) to the UPS output sockets.
- Place cables in such a way that no one can step on or trip over them.
- Do not connect domestic appliances such as hair dryers to UPS output sockets.
- The UPS can be operated by any individuals with no previous experience.
- Connect the UPS system only to an earthed shockproof outlet which must be easily accessible and close to the UPS system.
- Please use only VDE-tested, CE-marked mains cable (e.g. the mains cable of your computer) to connect the UPS system to the building wiring outlet (shockproof outlet).
- Please use only VDE-tested, CE-marked power cables to connect the loads to the UPS system.
- When installing the equipment, it should ensure that the sum of the leakage current of the UPS and the connected devices does not exceed 3.5mA.

1-4. Operation

- Do not disconnect the mains cable on the UPS system or the building wiring outlet (shockproof socket outlet) during operations since this would cancel the protective earthing of the UPS system and of all connected loads.
- The UPS system features its own, internal current source (batteries). The UPS output sockets or output terminals block may be electrically live even if the UPS system is not connected to the building wiring outlet.
- In order to fully disconnect the UPS system, first press the OFF/Enter button to disconnect the mains.
- Prevent no fluids or other foreign objects from inside of the UPS system.

1-5. Maintenance, service and faults

- The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.
- **Caution** - risk of electric shock. Even after the unit is disconnected from the mains (building wiring outlet), components inside the UPS system are still connected to the battery and electrically live and dangerous.
- Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitor such as BUS-capacitors.
- Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.

Caution - risk of electric shock. The battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground. Before touching, please verify that no voltage is present!

- Batteries may cause electric shock and have a high short-circuit current. Please take the precautionary measures specified below and any other measures necessary when working with batteries:
 - remove wristwatches, rings and other metal objects
 - use only tools with insulated grips and handles.
- When changing batteries, install the same number and same type of batteries.
- Do not attempt to dispose of batteries by burning them. This could cause battery explosion.
- Do not open or destroy batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.
- Please replace the fuse only with the same type and amperage in order to avoid fire hazards.
- Do not dismantle the UPS system.

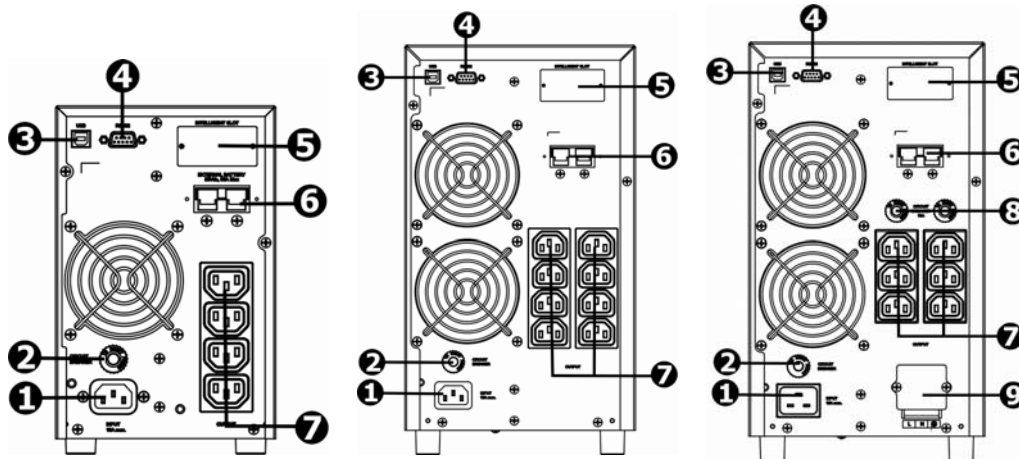
2. Installation and set up

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. Please keep the original package in a safe place for future use.

NOTE: There are two different types of online UPS: standard and long-run models. Please refer to the following model table.

Model	Type	Model	Type
1K	Standard	1KL	Long-time
2K		2KL	
3K		3KL	

2-1. Rear panel view



1K (L) IEC

2K (L) IEC

3K(L) IEC

1. AC input
2. Input circuit breaker
3. USB communication port
4. RS-232 communication port
5. SNMP intelligent slot
6. External battery connection (only available for L model)
7. Output receptacles
8. Output circuit breaker
9. Output terminal

2-2. Setup the UPS

Step 1: UPS input connection

Plug the UPS into a two-pole, three-wire, grounded receptacle only. Avoid using extension cords.

- For 200/208/220/230/240VAC models: The power cord is supplied in the UPS package.
- For 100/110/115/120/127VAC models: The power cord is attached to the UPS. The input plug is a NEMA 5-15P for 1K and 1KL models, NEMA 5-20P for 2K and 2KL models.

Note: For Low voltage models. Check if the site wiring fault indicator lights up in LCD panel. It will be illuminated when the UPS is plugged into an improperly wired utility power outlet (Refer to Troubleshooting section). Please also install a circuit breaker (40A) between the mains and AC input in 3K model for safety operation.

Step 2: UPS output connection

- For socket-type outputs, simply connect devices to the outlets.
- For terminal-type input or outputs, please follow below steps for the wiring configuration:
 - a) Remove the small cover of the terminal block
 - b) Suggest using AWG14 or 2.1mm² power cords. Suggest using AWG12-10 or 3.3mm²-5.3mm² power cords for NEMA type.
 - c) Upon completion of the wiring configuration, please check whether the wires are securely affixed.
 - d) Put the small cover back to the rear panel.

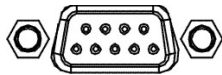
Step 3: Communication connection

Communication port:

USB port



RS-232 port



Intelligent slot



To allow for unattended UPS shutdown/start-up and status monitoring, connect the communication cable one end to the USB/RS-232 port and the other to the communication port of your PC. With the monitoring software installed, you can schedule UPS shutdown/start-up and monitor UPS status through PC.

The UPS is equipped with intelligent slot perfect for either SNMP or AS400 card. When installing either SNMP or AS400 card in the UPS, it will provide advanced communication and monitoring options.

PS. USB port and RS-232 port can't work at the same time.

Step 4: Turn on the UPS

Press the ON/Mute button on the front panel for two seconds to power on the UPS.

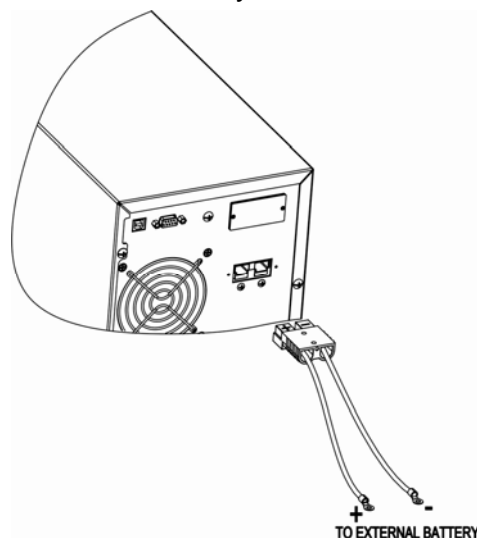
Note: The battery charges fully during the first five hours of normal operation. Do not expect full battery run capability during this initial charge period.

Step 5: Install software

For optimal computer system protection, install UPS monitoring software to fully configure UPS shutdown. Please insert the provided CD into CD-ROM to install the monitoring software.

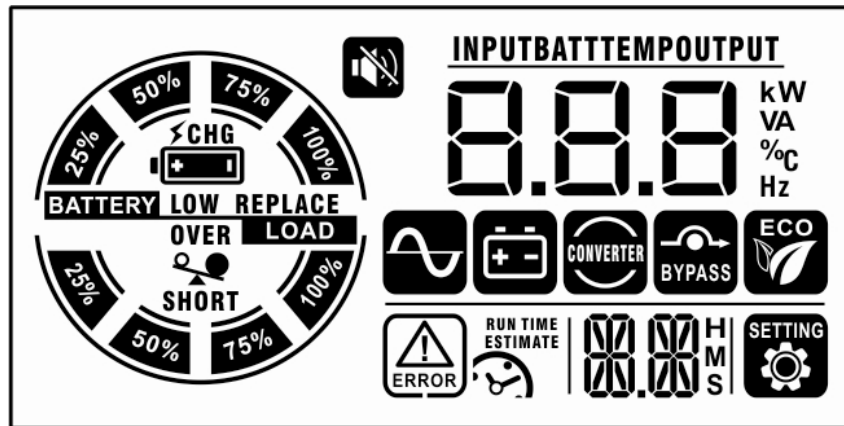
Step 6: External battery connection (for long-time models only)

Follow the right chart to make external battery connection.





















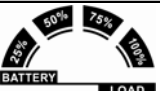


3. Operations

3-1. LCD panel



3-2. Button operation

Button	Function
OFF/Enter Button	<ul style="list-style-type: none"> ➤ Turn off the UPS: Press and hold this button at least 2 seconds to turn off the UPS in battery mode. UPS will be in standby mode under power normal or transfer to Bypass mode if the Bypass enable setting by pressing this button. ➤ Confirm selection key: Press this button to confirm selection in UPS setting mode.
ON/Mute Button	<ul style="list-style-type: none"> ➤ Turn on the UPS: Press and hold ON/Mute button for at least 2 seconds to turn on the UPS. ➤ Mute the alarm: When the UPS is on battery mode, press and hold this button for at least 5 seconds to disable or enable the alarm system. But it's not applied to the situations when warnings or errors occur. ➤ Up key: Press this button to display previous selection in UPS setting mode. ➤ Switch to UPS self-test mode: Press and hold ON/Mute button for 5 seconds to enter UPS self-testing while in AC mode, ECO mode, or converter mode.
ON/Mute + Select Button	<ul style="list-style-type: none"> ➤ Switch to bypass mode: When the main power is normal, press ON/Mute and Select buttons simultaneously for 5 seconds. Then UPS will enter to bypass mode. This action will be ineffective when the input voltage is out of acceptable range.
Select Button	<ul style="list-style-type: none"> ➤ Switch LCD message: Press this button to change the LCD message for input voltage, input frequency, battery voltage, output voltage and output frequency. It will return back to default display when pausing for 60 seconds. ➤ Setting mode: Press and hold this button for 5 seconds to enter UPS setting mode when UPS is in standby mode or bypass mode. ➤ Down key: Press this button to display next selection in UPS setting mode.

Display	Function
Estimated or running time setting and information	
	Remaining backup time.
	Running time.
	Remaining backup / Running time in numbers. H: hour, M: minute, S: Second
Warning and Fault information	
	Warning occurred.
	Fault occurred.
	Codes for warning and fault.
Setting operation	
	Indicates that the setting occurs.
Mute operation	
	UPS alarm is disabled.
UPS information	
	Indicates the input and output voltage, frequency, battery voltage, load information, and internal temperature. V: input/output voltage/ battery voltage, Hz: frequency, %: load level, °C: temperature, KW: active power, KVA: apparent power, A: output current,
Mode operation information	
	ONLINE mode.
	BATTERY mode.
	CONVERTER mode.
	BYPASS mode.
	ECO mode.
	UPS is charging battery.
Load information	
	Load level under 0-25%, 26-50%, 51-75%, and 76-100%.
	Overload.
	Outlets with output voltage.
SHORT	Load or UPS output with "short circuit."
Battery information	
	Battery level under 0-25%, 26-50%, 51-75%, and 76-100%.
	Charger is working.
	Indicates battery.
REPLACE	Battery replacement necessary.
LOW	Low battery voltage.

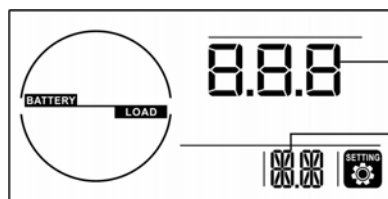
3-3. Audible Alarm

Battery Mode	Beeping every 4 seconds
Bypass Mode	Beeping every 10 seconds
Low Battery	Beeping every second
Overload	Beeping twice every second
Fault	Continuously sounding

3-4. LCD display wordings index

Display content	Abbreviation	Meaning
ENA	ENA	Enable
DIS	DIS	Disable
ESC	ESC	Escape
LLS	LLS	Low loss
HLS	HLS	High loss
TP	TP	Temperature
CH	CH	Charger
BF	BF	Battery fault
FU	FU	Bypass frequency unstable
EE	EE	EEPROM error

3-5. UPS Setting



Parameter 2

Parameter 1

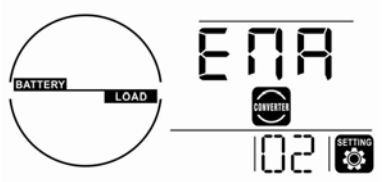
Two parameters to set up the UPS:

Parameter 1: For program alternatives.
Parameter 2: Option setting or values for each program.

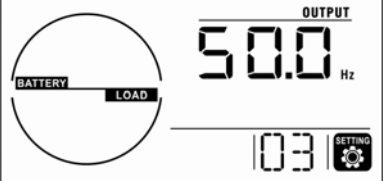
➤ 01: Output voltage setting

Interface	Setting
	<p>For 200/208/220/230/240 VAC models, O/P may be chosen as the following:</p> <p>200: output voltage is 200Vac 208: output voltage is 208Vac 220: output voltage is 220Vac 230: output voltage is 230Vac (Default) 240: output voltage is 240Vac</p> <p>For 100/110/115/120/127 VAC models, O/P may be chosen as the following:</p> <p>100: output voltage is 100Vac 110: output voltage is 110Vac 115: output voltage is 115Vac 120: output voltage is 120Vac (Default) 127: output voltage is 127Vac</p>

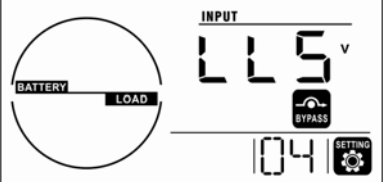
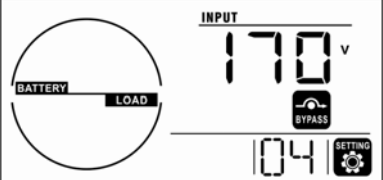
➤ **02: Converter mode enable/disable**

Interface	Setting
	<p>ENA: converter mode enable DIS: converter mode disable (Default)</p>

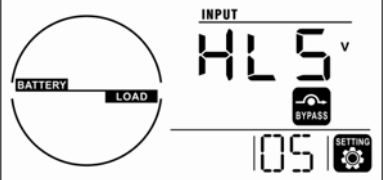
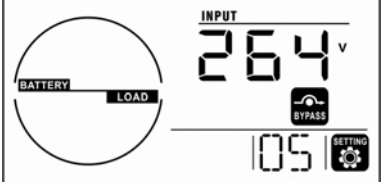
➤ **03: Output frequency setting**

Interface	Setting
	<p>Output frequency can be chosen as the following: 50: output frequency 50Hz 60: output frequency 60Hz</p>

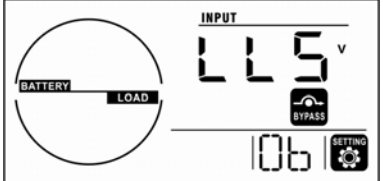
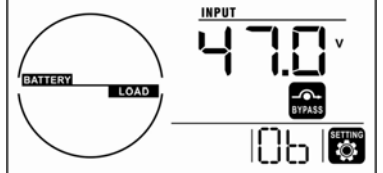
➤ **04: Acceptable low voltage setting in Bypass mode**

Interface	Setting
	<p>Press <u>Down key</u> or <u>Up key</u> to set the acceptable bypass low voltage point(LLS):</p> <p>For 200/208/220/230/240 VAC models: 170-220: low voltage setting point from 170Vac to 220Vac (Default: 170Vac)</p> <p>For 100/110/115/120/127 VAC models: 85-115: low voltage setting point from 85Vac to 115Vac (Default: 85Vac)</p>
	

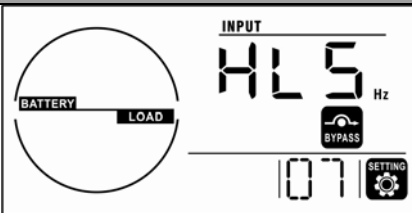
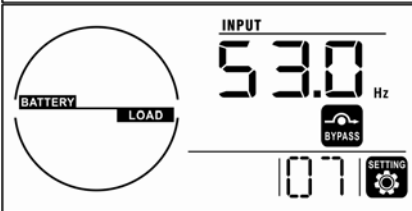
➤ **05: Acceptable high voltage setting in Bypass mode**

Interface	Setting
	<p>Press <u>Down key</u> or <u>Up key</u> to set the acceptable high voltage point (HLS) in bypass mode:</p> <p>For 200/208/220/230/240 VAC models: 230-264: high voltage setting point from 230Vac to 264Vac (Default: 264Vac)</p> <p>For 100/110/115/120/127 VAC models: 120-140: high voltage setting point from 120Vac to 140Vac (Default: 132Vac)</p>
	

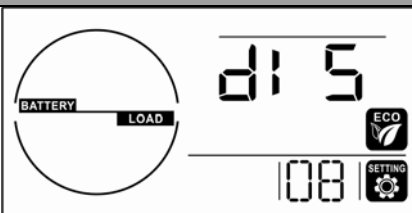
➤ **06: Acceptable low frequency setting in Bypass/ECO mode**

Interface	Setting
	<p>Press the <u>Down key</u> or <u>Up key</u> to set the acceptable low frequency point (LLS) in bypass/ECO mode:</p> <p>For 50Hz output frequency models: 45-49Hz: low frequency setting point from 45Hz to 49HZ (Default: 47.0Hz)</p> <p>For 60Hz output frequency models: 55-59Hz: low frequency setting point from 55Hz to 59Hz (Default: 57.0Hz)</p>
	

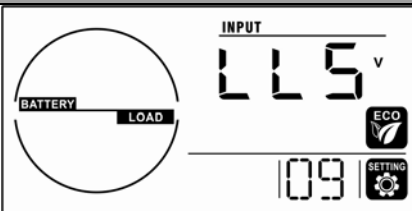
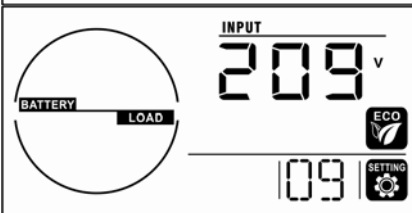
➤ **07: Acceptable high frequency setting in Bypass/ECO mode**

Interface	Setting
	<p>Press the <u>Down key</u> or <u>Up key</u> to set acceptable high frequency point (HLS) in bypass/ECO mode:</p> <p>For 50Hz output frequency models: 51-55Hz: setting the frequency low loss point from 51Hz to 55Hz (Default: 53.0Hz)</p>
	<p>For 60Hz output frequency models: 61-65Hz: setting the frequency low loss point from 61Hz to 65Hz (Default: 63.0Hz)</p>

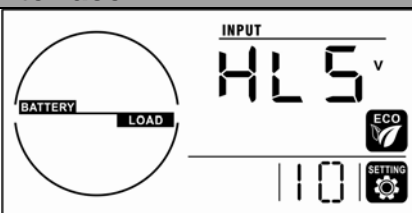
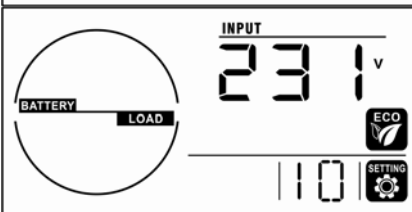
➤ **08: ECO mode enable/disable**

Interface	Setting
	<p>ENA: ECO mode enable DIS: ECO mode disable (Default)</p>

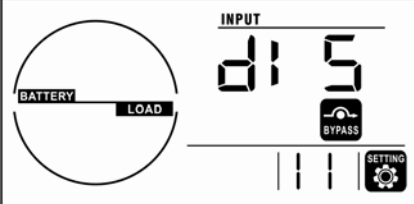
➤ **09: Acceptable low voltage setting in ECO mode**

Interface	Setting
	<p>Press the <u>Down key</u> or <u>Up key</u> to set acceptable low voltage point (LLS) in ECO mode:</p> <p>For 200/208/220/230/240 VAC models, setting range is from -7V to -24V of the nominal voltage. (Default: -12V)</p>
	<p>For 100/110/115/120/127 VAC models, setting range is from -3V to -12V of the nominal voltage. (Default: -6V)</p>

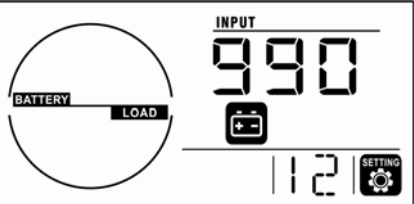
➤ **10: Acceptable high voltage setting in ECO mode**

Interface	Setting
	<p>Press the <u>Down key</u> or <u>Up key</u> to set acceptable high voltage point (HLS) in ECO mode:</p> <p>For 200/208/220/230/240 VAC models, setting range is from +7V to +24V of the nominal voltage. (Default: +12V)</p>
	<p>For 100/110/115/120/127 VAC models, setting range is from +3V to +12V of the nominal voltage. (Default: +6V)</p>

➤ 11: Bypass enable/disable when UPS is off

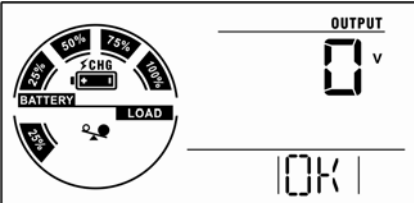
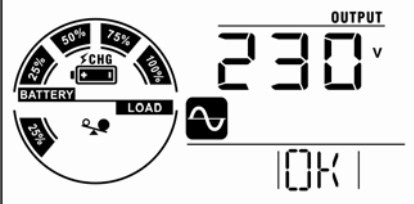
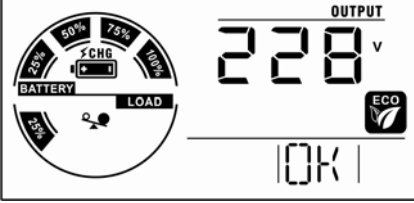
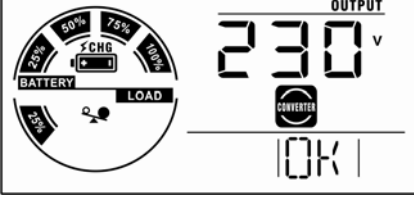
Interface	Setting
 <p>The LCD display shows 'INPUT' at the top, 'd15' in the center, and 'BYPASS' with a bypass icon at the bottom. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	<p>ENA: Bypass mode is enabled when UPS is off DIS: Bypass mode is disabled when UPS is off (Default)</p>

➤ 12: Autonomy limitation setting

Interface	Setting
 <p>The LCD display shows 'INPUT' at the top, '990' in the center, and '112' at the bottom. A battery icon is shown below the '990'. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	<p>0-999: backup time setting in minutes from 0-999 for output outlets under battery mode. 0: while setting as 「0」, backup time will be on 10 seconds. 999: while setting as 「999」, backup time setting will be disabled. (Default)</p>

➤ 00: Exit setting

3-6. Operating Mode Description














LCD display	Operating mode	Description
 <p>The LCD display shows 'OUTPUT' at the top, '0' in the center, and '10K1' at the bottom. A battery icon is shown below the '0'. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	Standby mode	UPS power off and no output supply power, but still can charge battery.
 <p>The LCD display shows 'OUTPUT' at the top, '230' in the center, and '10K1' at the bottom. An AC icon is shown below the '230'. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	Online mode	Input voltage within an acceptable range, UPS provide pure and stable AC power to output, charge the battery under online mode also.
 <p>The LCD display shows 'OUTPUT' at the top, '228' in the center, and '10K1' at the bottom. An ECO icon is shown below the '228'. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	ECO mode	<u>Energy saving mode:</u> Input voltage within voltage regulation range, UPS will bypass voltage to output for energy saving.
 <p>The LCD display shows 'OUTPUT' at the top, '230' in the center, and '10K1' at the bottom. A converter icon is shown below the '230'. A circular gauge on the left shows 'BATTERY' and 'LOAD' levels.</p>	Converter mode	Input frequency within 40Hz -70Hz, UPS can be set at a constant output frequency, 50Hz - 60Hz. UPS still charge battery under this mode.

	<p>Battery mode</p>	<p>Input voltage is beyond the acceptable range or power failure and alarm is sounding every 4 second, UPS will backup power from battery.</p>
	<p>Battery test mode</p>	<p>UPS will turn off charger, check if battery and DC/DC are normal.</p>
	<p>Bypass mode</p>	<p>Input voltage within acceptable range but UPS is overload, UPS will enter bypass mode or bypass mode can be set up by the front panel. Alarm is sounding every 10 second.</p>
	<p>Fault mode</p>	<p>While a fault has occurred, the ERROR icon and the fault code will be displayed.</p>

3-7. Faults Reference Code






Fault event	Fault code	Icon
Bus start fails	01	X
Bus over	02	X
Bus under	03	X
Bus unbalance	04	X
Bus short-circuited	05	X
Inverter soft start fails	11	X
Inverter voltage is high	12	X
Inverter voltage is low	13	X
Inverter output short-circuited	14	SHORT
Battery voltage is too high	27	X
Battery voltage is too low	28	X
Over temperature	41	X
Over load	43	OVER

3-8. Warning indicator

Icon (flashing)	Warning	Alarm
 LOW	Low Battery	Sounding every second
 OVER	Overload	Sounding twice every second
  REPLACE	Battery is not connected or Battery Replace	Sounding every second
 	Over Charge	Sounding every second
 TP	Over temperature	Sounding every second
 CH	Charger failure	Sounding every second
 bF	Battery fault	Sounding every second
 	Out of bypass voltage range	Sounding every second
 FU	Bypass frequency unstable	Sounding every second
 EE	EEPROM error	Sounding every second

4. Troubleshooting

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

Symptom	Possible cause	Remedy
No indication and alarm even the main is normal.	AC input power is not Connected well.	Check if input power cord firmly connected to the mains.
	AC input is connected to the UPS output.	Plug AC input power cord to AC input correctly.
The icon  and  REPLACE flashing on LCD display and alarm is sounding every second.	External or internal battery is incorrectly connected.	Check if all batteries are connected well.
Fault code is shown as 27 and alarm is continuously sounding.	Battery voltage is too high or the charger is fault.	Contact your dealer.
Fault code is shown as 28 and alarm is continuously sounding.	Battery voltage is too low or the charger is fault.	Contact your dealer.
The icon  and  OVER is flashing on LCD display and alarm is sounding twice every second.	UPS overload	Remove excess loads from UPS output.
	UPS is overloaded. Devices connected to the UPS are fed directly by the electrical network via the Bypass.	Remove excess loads from UPS output.
	After repetitive overloads, the UPS is locked in the Bypass mode. Connected devices are fed directly by the mains.	Remove excess loads from UPS output first. Then shut down the UPS then restart it.
Fault code is shown as 43 and  OVER is lighting on LCD display and alarm is continuously sounding.	UPS shut down automatically because of overload at the UPS output.	Remove excess loads from UPS output and restart it.
Fault code is shown as 14 and the icon SHORT is lighting on LCD display and alarm is continuously sounding.	UPS shut down automatically because of short circuit occurs on the UPS output.	Check output wiring and if the connected devices are in short circuit status.
Fault code are shown on the LCD display as 01, 02, 03, 04, 11, 12, 13, 41 with alarm sounding continuously.	UPS internal fault occurred. Two possible results below, 1. The load is still supplied, but directly from AC power via bypass. 2. The load is no longer supplied by power.	Contact with your dealer
Battery backup time is shorter than nominal value	Batteries are not fully charged	Charge the batteries for 5 hours at least then check capacity. If the problem still existed, consult with your dealer.
	Batteries defect	Contact with your dealer to replace the battery.
Fault code is shown as 05 on LCD display. At the same time, alarm is continuously sounding and output is cut off	UPS internal fault occurred and BUS is short circuit. UPS internal fault has	Consult with dealer. If UPS power on again before repair, the DC/DC mosfet will damage.

5. Storage and Maintenance

Operation

This UPS system contains no user-serviceable parts.

If the battery service life (3~5 years at 25°C ambient temperature) has been exceeded, the batteries must be replaced.

In this case, please contact your dealer.



Be sure to deliver the spent battery to a recycling facility or ship it to your dealer in the replacement battery packing material.

Storage

Before storing, charge the UPS 5 hours.

Store the UPS covered and upright in a cool, dry location.

During storage, recharge the battery in accordance with the following table:

Storage Temperature	Recharge Frequency	Charging Duration
-25°C - 40°C	Every 3 months	1-2 hours
40°C - 45°C	Every 2 months	1-2 hours

6. Specifications

MODEL		KO-1000 / KO-1000L	KO-2000 / KO-2000L	KO-3000 / KO-3000L
Input	Capacity	1KVA / 800KW	2KVA / 1.6KW	3KVA / 2.4KW
	Phase	Single Phase with ground		
	Nominal Voltage	200/208/220/230/240 VAC		
	Voltage Range	160VAC ~ 300VAC (100% Load)		
	Frequency	40 Hz ~ 70 Hz		
	Power Factor	≥ 0.99		
Output	Voltage Range	200/208/220/230/240 VAC		
	Frequency	Line Mode: 47 Hz ~ 53Hz or 57Hz ~ 63Hz. Battery Mode: 50Hz or 60Hz ±0.2Hz		
	Wave Form	Pure Sinewave		
	Harmonic Distortion	≤ 3% THD (Linear Load) ≤ 6% THD (Non-Linear Load)	≤ 4% THD (Linear Load) ≤ 7% THD (Non-Linear Load)	
	Overload Capacity (Line Mode)	100%~110%:10 mins; 110%~130%:1 min; >130%: 1 sec		
	Overload Capacity (Battery Mode)	100%~110%:30 sec; 110%~130%:10 sec; >130%: 1 sec		
	Auto Retransfer	After Overload Recover 100% Load		
Battery	Type	Maintenance Free Sealed Lead-Acid Battery		
	DC Voltage	36V	72V	72V
	Capacity	12V / 7.0Ah x 3 pcs	12V / 7.0Ah x 6 pcs	12V / 9.0Ah x 6 pcs
	Built-In Charger	1 A		
	Charger (Optional)	1A / 2A / 4A / 6A		
	Recharger Time	4 hours recover to 90% capacity		
	Battery Handle	Fully recharge UPS after complete discharge or every three months when stored		
Bypass	Automatic	Overload or UPS Failure		
	Transfer Time	0 ms (<4ms Line Mode to Bypass)		
Display	LCD	UPS status, Load level, Battery level, Input/Output voltage, Discharge timer, and Fault conditions		
Audible Alarm	Battery Mode	Beep every 4 seconds		
	Battery Low	Beep every second		
	Overload	Beep twice every second		
	Fault	Beep continuously		
Output	Sockets	IEC 320 x 4 PCS	IEC 320 x 8 PCS	IEC 320 x 6 PCS & Terminal
Interface	Smart RS-232 & USB	Supports Windows® 2000/2003/XP/Vista/2008, Windows® 7, Linux, Unix, and MAC		
	SNMP Card (Optional)	Power management from SNMP manager and web browser		
Network	Surge Protection	N/A		
Environment	Temperature	0°C ~ 40°C ; 32°F ~104°F		
	Humidity	20-90 % RH Non-condensing		
	Acoustic Noise	Less than 45dBA at 1mt		
Net Weight	W/O Battery (Kgs)	5.5	11	11.9
	With Battery (Kgs)	12.7	24.9	27.6
Dimensions	Standard (W x H x D) mm	145*220*397	190*318*419	190*318*419
	Long (W x H x D) mm	145*220*397	190*318*419	190*318*419

* Derate capacity to 60% of capacity in Frequency converter mode and to 80% when the output voltage is adjusted to 208VAC.