

# User & Operations Manual

## Sentinel RT

### True-Online UPS System

1000 VA - 1500 VA - 2000 VA - 3000 VA



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## **INTRODUCTION**

Congratulations on purchasing a **UPS Sentinel RT** product and welcome to **Riello UPS!** To use the support service offered by **Riello UPS**, visit the site **www.riello-ups.com**.

Our Company is a specialist in the design, development and manufacturing of uninterruptible power supplies (UPS).

The UPS described in this manual is a high-quality product which has been carefully designed and built in order to guarantee the highest levels of performance.

This device can be installed by anyone on the condition that they have **READ THIS INSTALLATION AND USER MANUAL CAREFULLY.**

**The UPS and the Battery Box generate DANGEROUS internal electrical voltages. All maintenance operations must be carried out by suitably qualified operators.**

This manual contains detailed instructions for using and installing the UPS and any additional Battery boxes. **For information on how to use and maximize the performance of your device, please retain the CD containing this manual and read it carefully before operating the equipment.**

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## **ENVIRONMENTAL PROTECTION**

In the development of its products, the company devotes abundant resources to analyzing the environmental aspects. All our products pursue the objectives defined in the environmental management system developed by the company in compliance with applicable standards.

No hazardous materials such as CFCs, HCFCs or asbestos are used in this product.

When evaluating packaging, the choice of material has been made favoring recyclable materials. For correct disposal, please identify the type of material of which the packaging is made and separate it according to the table below. Dispose of all material in compliance with applicable standards of the country in which the product is used.

<b>DESCRIPTION</b>	<b>MATERIAL</b>
Box	Cardboard
Packaging corner	Laminated Polyethylene Foam
Protective bag	Polyethylene
Accessories bag	Polyethylene

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## **DISPOSING OF THE PRODUCT**

The UPS and the Battery Box contain electronic PCBs and batteries which are considered TOXIC and HAZARDOUS waste. When the product reaches the end of its operating life, dispose of it in accordance with applicable local legislation. Correct product disposal contributes to respect the environment and personal health.

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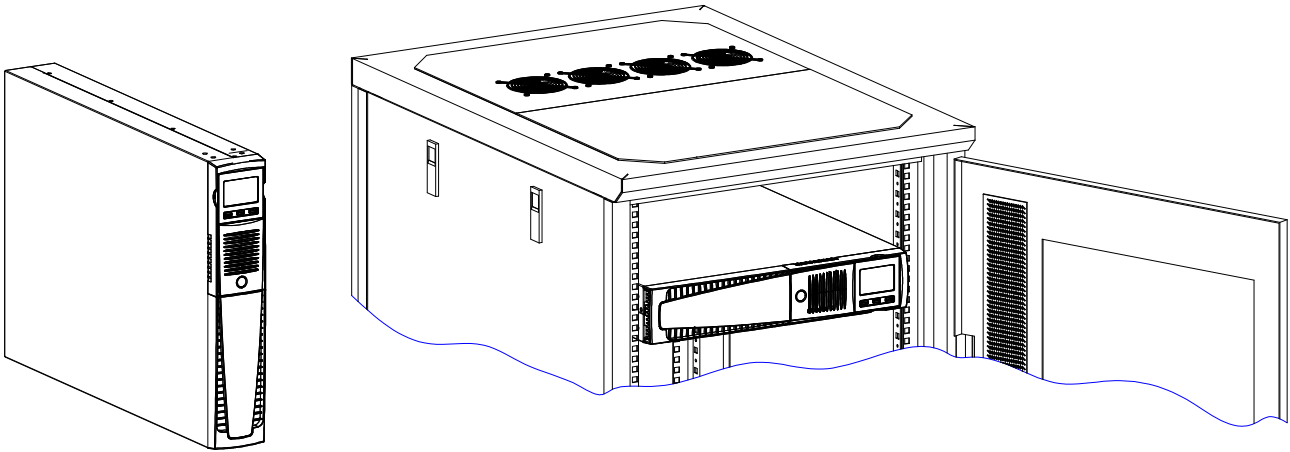
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## PRESENTATION

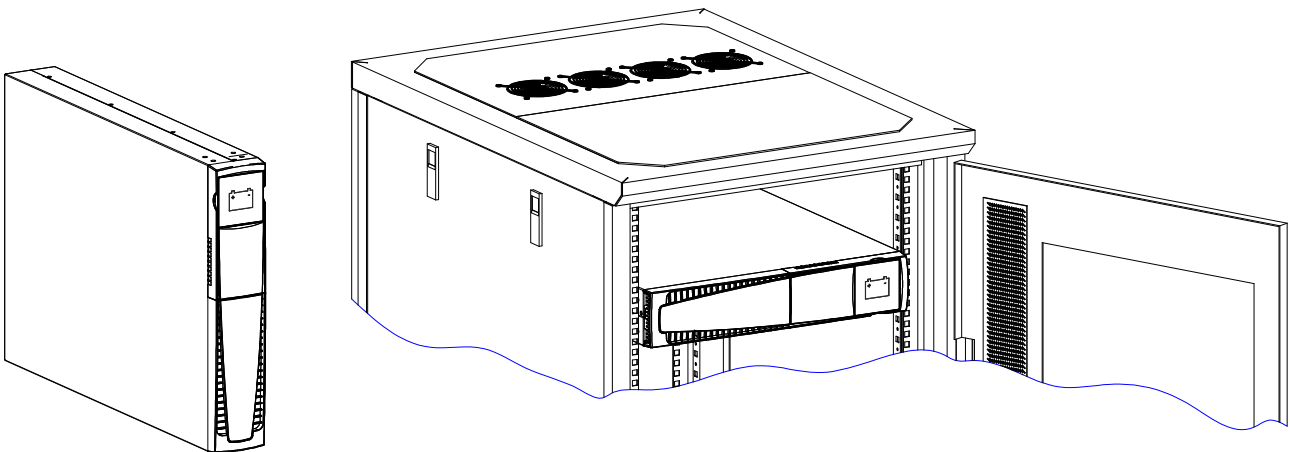
**SENTINEL RT** uses ON-LINE double conversion technology, resulting in the highest levels of reliability and maximum protection for critical loads such as servers, IT applications and Voice/Data.

This family of UPS was designed with versatility in mind, allowing for installation in both tower and rack positions. The (following) figure below shows how the product can be installed in the two different positions:



The UPS is also equipped with a dedicated battery pack that allows for easy battery replacement (hot swap) in complete safety thanks to the protected connection system.

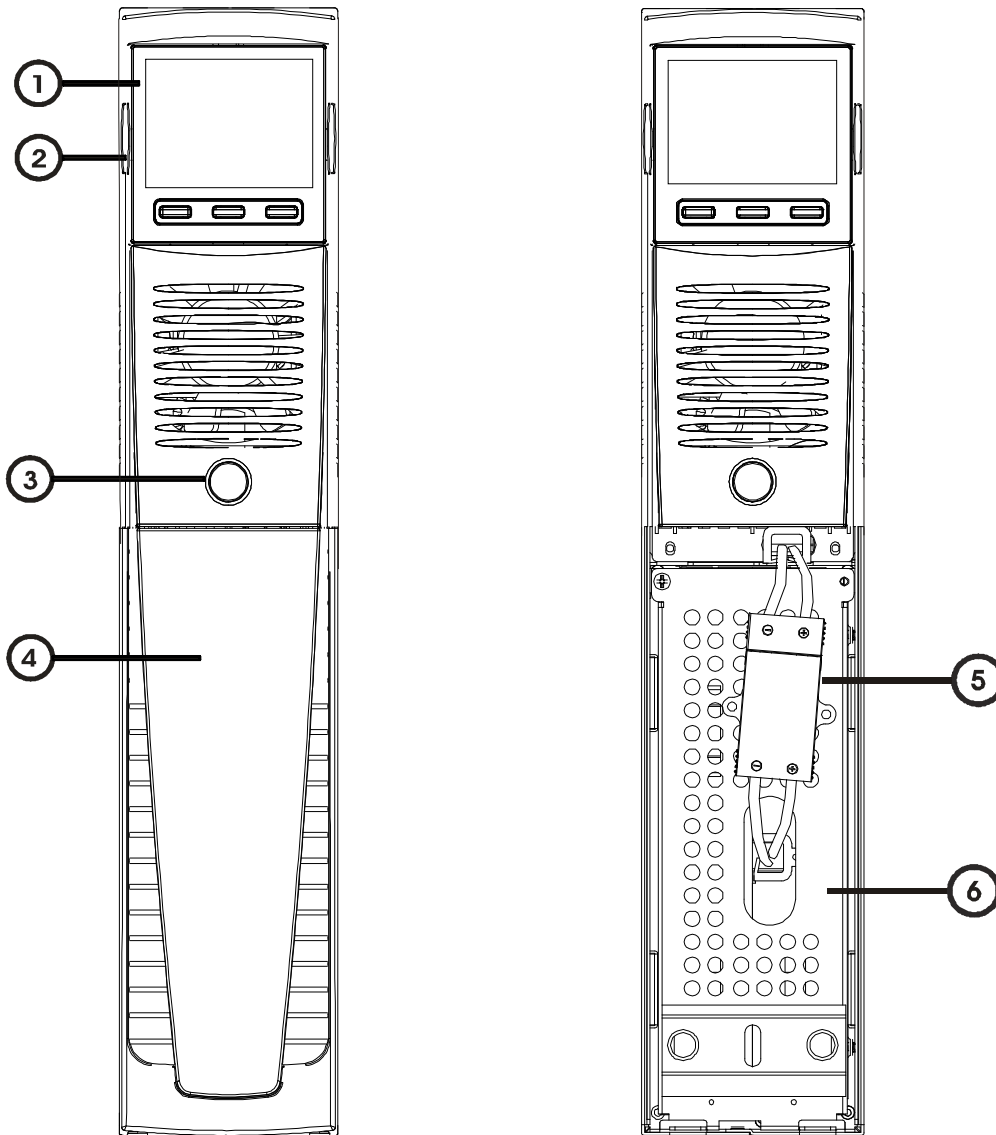
It is possible to use one or more autonomy expansion units known as **BATTERY BOXES** (optional accessories) with the same dimensions and aesthetic appearance as the UPS.



**ER series** models are fitted with upgraded battery charges for long runtime and business continuity applications. For these versions, the batteries are housed in separate cabinets.

# UPS VIEWS

## FRONT VIEW



① Extractable/rotatable display plate

② Release slits

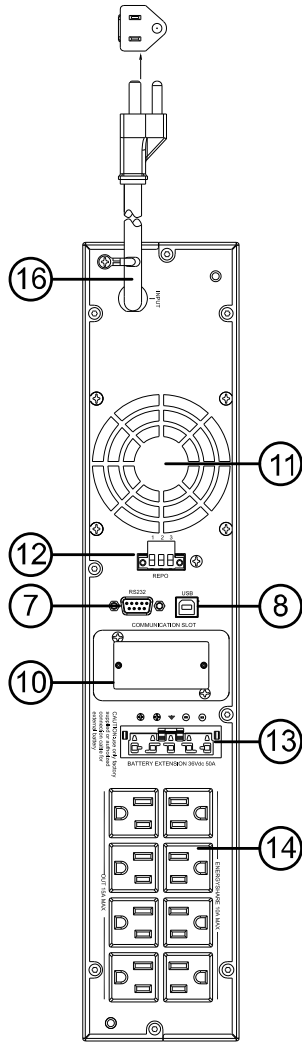
③ ON/OFF Switch

④ Removable front panel

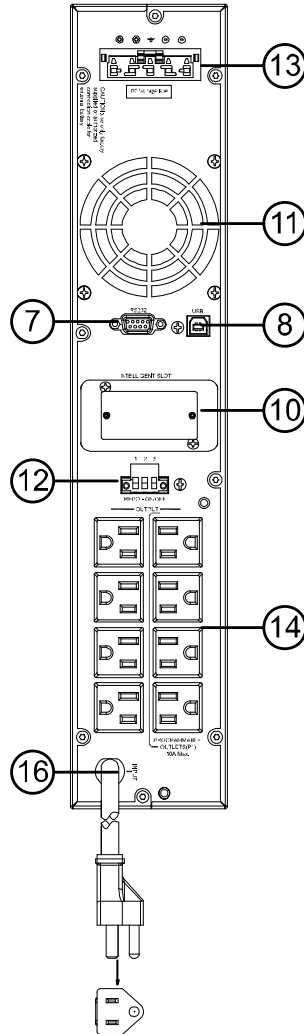
⑤ Battery pack connector

⑥ Battery pack retention panel

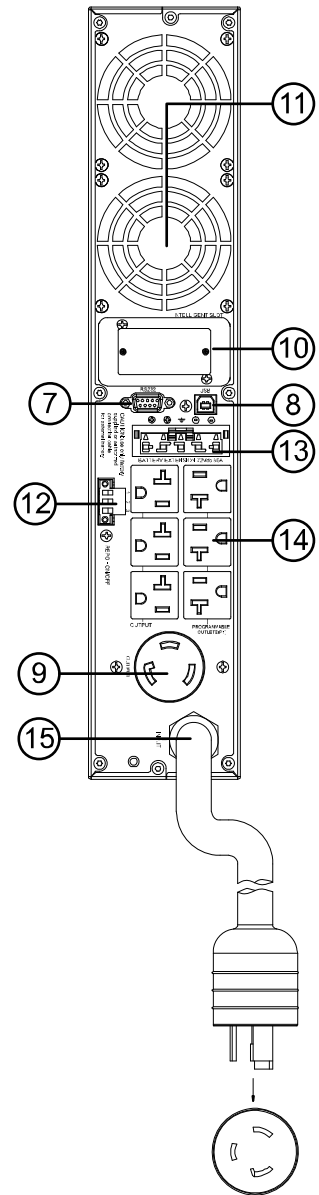
# REAR VIEW



**Model 1000VA / 1500VA**



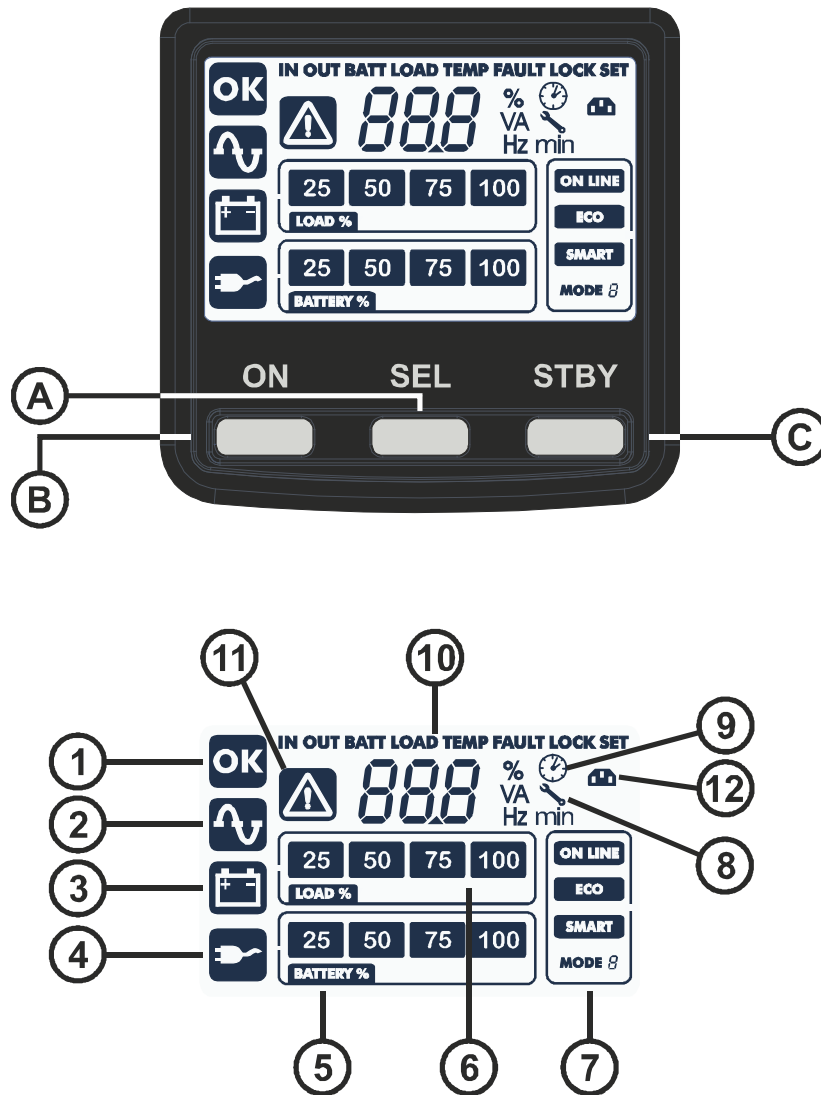
**Model 2000VA**



**Model 3000VA**

- |   |                          |   |  |
|---|--------------------------|---|--|
| ⑦ | Communication port RS232 | ⑫ | Remote control terminal board          |
| ⑧ | USB communication port   | ⑬ | Battery expansion connector (optional) |
| ⑨ | NEMA 30A output socket   | ⑭ | NEMA 20A output socket                 |
| ⑩ | Communication Card Slots | ⑮ | NEMA 30A input plug                    |
| ⑪ | Cooling fans             | ⑯ | NEMA 20A input plug                    |

## DISPLAY PANEL VIEW



- |                            |                            |
|----------------------------|----------------------------|
| Ⓐ "SEL" button (Select)    | Ⓔ Load level indicator     |
| Ⓑ "ON" button              | Ⓕ Configuration area       |
| Ⓒ "STAND-BY" button        | Ⓖ Maintenance request      |
| ① Regular operation        | ⑨ Timer                    |
| ② Mains operation          | ⑩ Measurement display area |
| ③ Battery operation        | ⑪ Stand-by / Alarm         |
| ④ Load powered by bypass   | ⑫ EnergyShare              |
| ⑤ Battery charge indicator |                            |

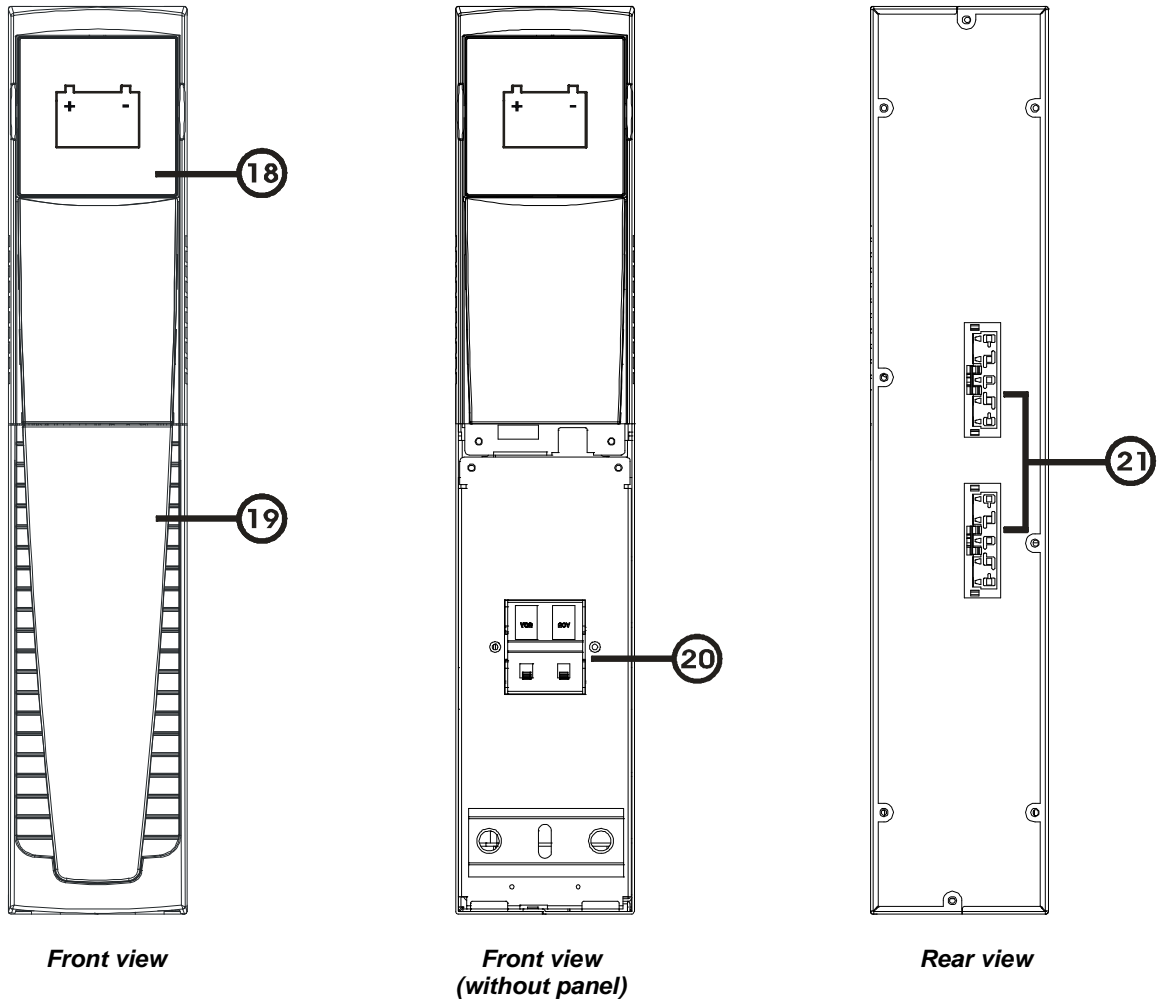


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## **BATTERY BOX (ACCESSORY NOT INCLUDED WITH THE UPS)**

The BATTERY BOX is an optional accessory for this range of UPS (same dimensions and aesthetic appearance). The BATTERY BOX contains batteries which allow the operating time of the uninterruptible power supplies to be increased during extended blackouts. The number of batteries contained can vary according to the type of UPS for which the BATTERY BOX is intended. It is therefore necessary to take great care to ensure that the battery voltage of the BATTERY BOX is the same as the voltage permitted by the UPS. Several battery boxes can be connected in series to achieve longer extended runtime.

### **REAR VIEW**



⑱ Extractable/ rotatable battery box plate

⑲ Removable front panel

⑳ Battery isolator

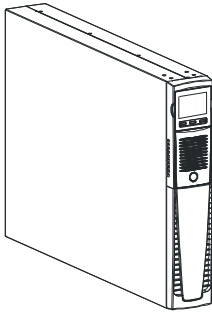
㉑ Battery expansion connector

# INSTALLATION

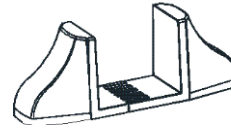
## INITIAL CONTENT CHECK

After opening the packaging, it is first necessary to check the contents.  
The package must contain:

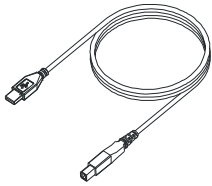
UPS



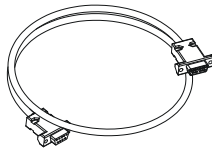
Support feet



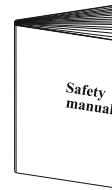
USB cable



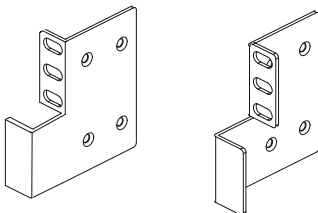
RS232 cable



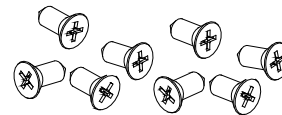
Safety manual



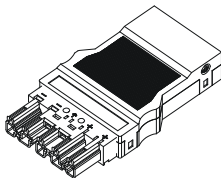
Handles for rack installation



Handle screws



Battery expansion plug



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## INSTALLATION ENVIRONMENT

The UPS and the Battery Box must be installed in ventilated, clean environments, sheltered from bad weather. The relative humidity in the environment must not exceed the maximum values shown in the Technical Data table. The ambient temperature, whilst the UPS is in operation, must remain between 0 and 40°C, and the UPS must not be positioned in places which are exposed to direct sunlight or hot air.



The recommended operating temperature for the UPS and the batteries is between 20 and 25°C. The actual operating life of the batteries is 5 years on average with an operating temperature of 20°C. If the operating temperature reaches 30°C, the operating life is halved.



This is a category C2 UPS product. In a residential environment, this product may cause radio interferences, in which case the user may be required to take additional measures.

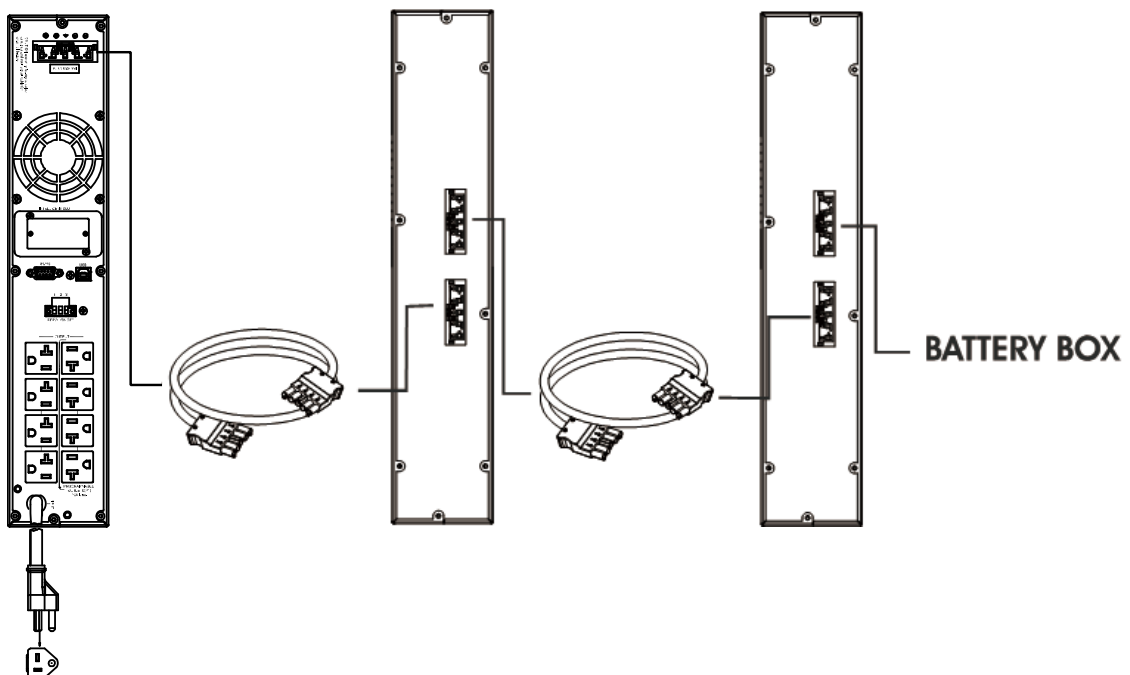
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## BATTERY BOX INSTALLATION



**ATTENTION:**  
**CHECK ON THE DATA PLATE THAT THE VOLTAGE OF THE BATTERY BOX IS THE SAME AS THAT ALLOWED BY THE UPS.**

Battery boxes can be installed in series for extended runtimes. Connect the Battery Boxes in series as shown in the figure below:



## SETTING THE NOMINAL BATTERY CAPACITY

Before installing one or more Battery Boxes, the UPS must be configured in order to update the nominal capacity value (total Ah = UPS's internal batteries + external batteries) by LCD setting. The battery box must only be installed while the UPS is switched off and disconnected from the mains power supply.

### CAUTION:

The connection cables cannot be extended by the user.

After connecting the UPS to its Battery Boxes, insert the fuses and turn the Battery Box battery isolators (SWBATT) to the ON position.

It is not possible to connect more than one UPS to a single battery box, or to several Battery Boxes connected in a series.



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## TOWER VERSION

This chapter describes the steps for preparing the UPS and battery box for tower version use.



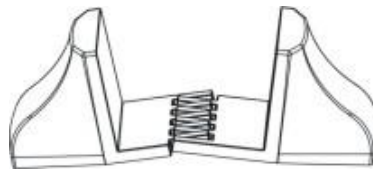
**ATTENTION:**

For your safety and that of the product, you must carefully follow the instructions given here below.

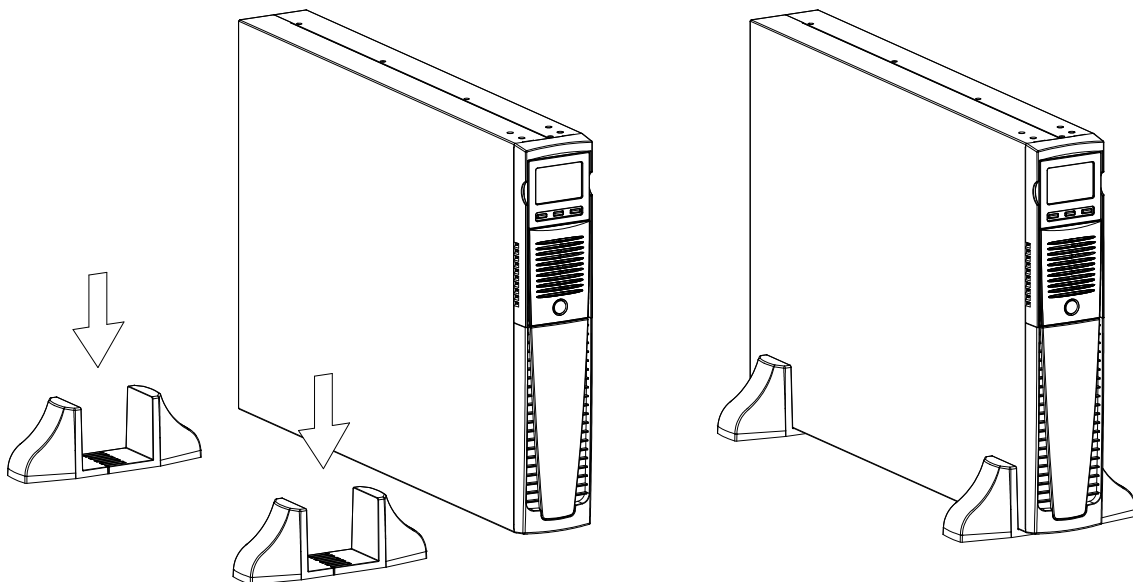
**BEFORE YOU CARRY OUT THE FOLLOWING SEQUENCE OF OPERATIONS, MAKE SURE THAT THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD.**

Once removed from the packaging, the UPS is already preset for installation in the tower configuration. To complete the configuration, simply mount the UPS on the two support feet.

- Each leg consists of two parts, connecting to each other at joints. To put a leg together proceed as shown in the figure.



- Assemble two legs and secure the UPS on top of them as shown in the figure below.



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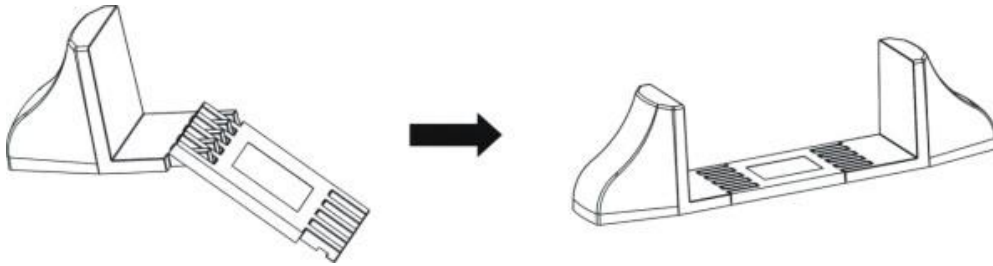
## TOWER VERSION WITH BATTERY BOX



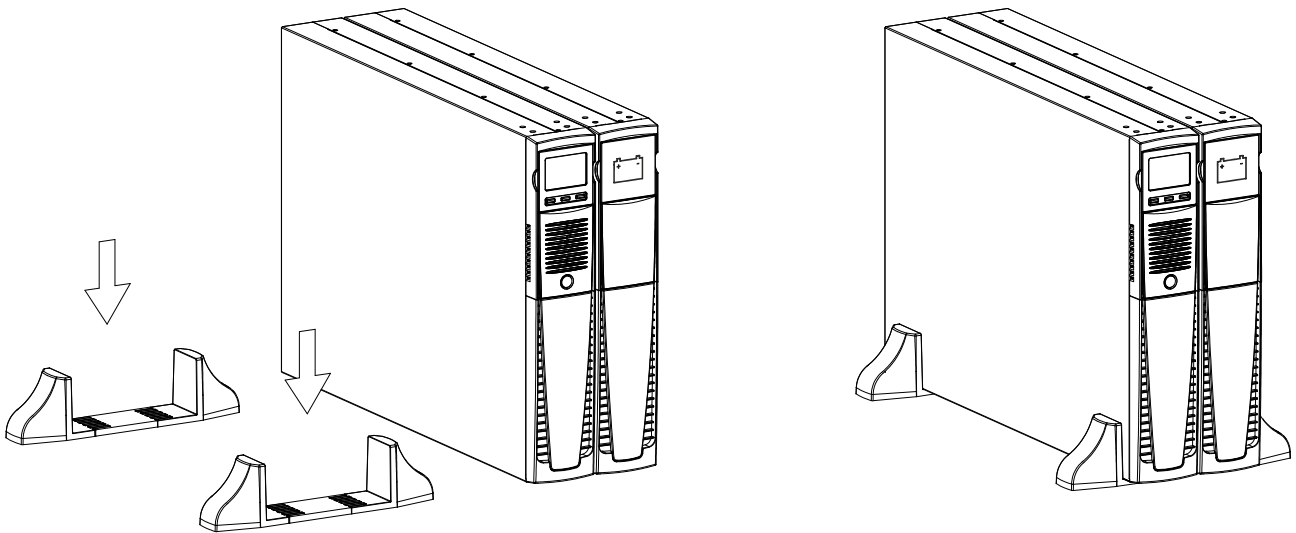
BEFORE CARRYING OUT THE FOLLOWING SEQUENCE OF OPERATIONS, ENSURE THAT:

- THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD.
- THE BATTERY BOX IS DISCONNECTED FROM THE UPS, FROM ANY OTHER BATTERY BOXES AND WITH THE BATTERY ISOLATOR OPEN.

- For the battery box version each foot is composed of three parts: two supports and an extension. Assemble two feet as indicated in the figure below.



- Slide the UPS and the battery box into the two supports.



- For any additional battery boxes repeat the sequence of operations shown above.

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## RACK VERSION

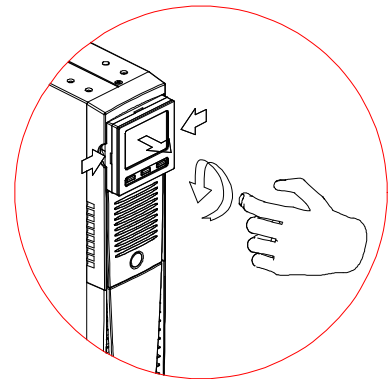
The sequence of operations to be followed in order to transform the UPS or battery box into rack version are described below.



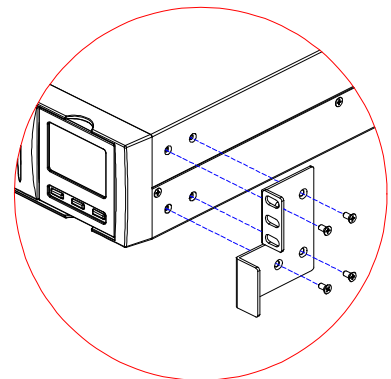
**BEFORE CARRING OUT THE FOLLOWING SEQUENCE OF OPERATIONS, ENSURE THAT:**

- **THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD.**
- **THE BATTERY BOX IS DISCONNECTED FROM THE UPS, FROM ANY OTHER BATTERY BOXES AND WITH THE BATTERY ISOLATOR OPEN.**

- 1 - Pick up the panel from the sides and gently pull it away from its position just enough to be able to rotate it. **ATTENTION:** The panel must be pulled carefully. DO NOT ATTEMPT IN ANY WAY TO REMOVE THE PANEL FROM THE UPS.



- 2 - Rotate the panel 90° counter clockwise and reinsert it carefully into the special housing.




- 3 - At this point, with the UPS or battery box in the horizontal position, secure the handles using the screws provided, as shown in the figure.

**NOTE:** Given the heavy weight, the use of support brackets is mandatory during rack installation (guide with L-shaped support). For the same reason, it is recommended that the UPS and battery box are installed in the lower part of the rack cabinet.

---


## CONNECTIONS AND SWITCHING ON FOR THE FIRST TIME

- 1) Check that there is a protection device against overcurrents and short circuits in the system upstream from the UPS. The recommended protection value is 15A (for the 1000VA and 1500VA versions), 20A (for the 2000VA version) and 30A (for the 3000VA version) with a B or C trip curve.
- 2) Power the UPS using the input cable provided.
- 3) Press the ON/OFF switch located on the front panel.
- 4) After a few moments, the UPS will switch on, the display will light up, there will be a beep and the  icon will start to flash. The UPS is in stand-by mode: meaning that it is only consuming a small amount of power. The microcontroller supervising the self-diagnoses is powered; the batteries are charging; everything is ready for UPS activation. Battery operation is also in stand-by mode provided that the timer is active.
- 5) Check which operating mode is set on the display and, if necessary, see the “**Configuring operating modes**” paragraph to set the required mode. For advanced UPS configurations execute the software ViewPower which can be downloaded from the web site [www.rielloupsamerica.com/download\\_categories](http://www.rielloupsamerica.com/download_categories).

## SWITCHING ON FROM THE MAINS

- 1) Press the “ON” button for 1 second. After pressing it, all the icons on the display light up for 1 second and the UPS beeps.
- 2) Switch on the equipment connected to the UPS.


**When switching on for the first time only:** after 30 seconds, check that the UPS is operating correctly:

- 1) Simulate a blackout by disconnecting power to the UPS.
- 2) The load must continue to be powered, the  icon on the display must light up and there must be a beep every 4 seconds.
- 3) When power is reconnected, the UPS must go back to operating from the mains.

## SWITCHING ON FROM THE BATTERY

- 1) Press the ON/OFF switch located on the front panel.
- 2) Hold down the “ON” button for at least 5 seconds. All the icons on the display light up for 1 second.
- 3) Switch on the equipment connected to the UPS.

## SWITCHING OFF THE UPS











In order to switch off the UPS, hold down the “STBY” button for at least 2 seconds. The UPS goes back to stand-by mode and the  icon starts to flash:

- 1) If the mains power is present, the ON/OFF switch must be pressed to completely turn off the UPS.
- 2) During battery mode operation with the timer not set, the UPS automatically switches off after 30 seconds. However, if the timer is set, press and hold down the “STBY” key for at least 5 seconds to turn off the UPS. For complete shutdown, press the ON/OFF switch.

## DISPLAY PANEL MESSAGES

This chapter describes, in detail, the various information that can be displayed on the LCD.

### UPS STATUS MESSAGES

ICON	STATUS	DESCRIPTION
	Fixed	Indicates a fault.
	Flashing	The UPS is in stand-by mode.
	Fixed	Indicates regular operation.
	Fixed	The UPS is operating from the mains.
	Flashing	The UPS is operating from the mains, but the output voltage is not synchronized with the mains voltage.
	Fixed	The UPS is operating from the battery. In this condition, the UPS emits an acoustic signal (beep) at regular 4-second intervals.
	Flashing	Low battery pre-alarm. Indicates that battery autonomy is coming to an end. In this condition, the UPS emits a beep at regular 1-second intervals.
	Fixed	Indicates that the loads connected to the UPS are powered by the bypass.
	Dynamic	Indicates the estimated percentage charge of the batteries.
	Dynamic	Indicates the percentage of charge applied to the UPS compared with the nominal value.
	Flashing	Maintenance is required. Contact the support center.
	Fixed	Indicates that the timer is active (programmed switch-on and switch-off). The timer can be activated/deactivated using the software provided.
	Flashing	1 minute until the UPS switches back on or 3 minutes until it switches off.
	Fixed	The programmable outlet has output.



## MEASUREMENT DISPLAY AREA




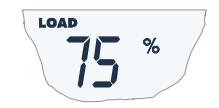



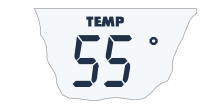






It is possible to display the most important measurements regarding the UPS in sequence on the display.

When the UPS is switched-on, the display shows the main voltage value.

To display a different measurement, press the "SEL" button repeatedly until the desired measurement appears.

In the event of a fault/alarm (FAULT) or a lock (LOCK), the display will automatically show the type and code of the corresponding alarm.

Some examples are shown below:

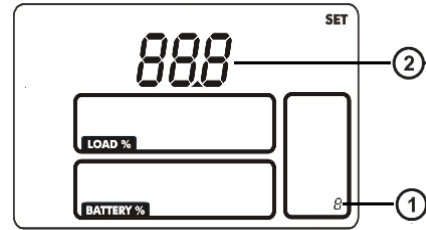
GRAPHIC EXAMPLE <sup>(1)</sup>	DESCRIPTION	GRAPHIC EXAMPLE <sup>(1)</sup>	DESCRIPTION
	Mains voltage		Total battery voltage
	Mains frequency		Applied load percentage
	UPS output voltage		Current absorbed by the load
	Output voltage frequency		Temperature of the electronics cooling system inside the UPS
	ResiRT battery autonomy		Mains current
	Battery charge percentage		Battery current
	Fault / Alarm <sup>(2)</sup> : the corresponding code is displayed		Lock <sup>(2)</sup> : the corresponding code is displayed

<sup>(1)</sup> The values shown in the images in the table are purely as an indication.

<sup>(2)</sup> The FAULT / LOCK codes can only be displayed if they are active (presence of a fault/alarm or a lock).

# CONFIGURING THE UPS PARAMETERS

The area of the display shown in the figure displays the setting interface and allows the user to configure some UPS parameters directly from the display panel.



## HOW TO PROCEED:

- To enter the setting mode, hold down the “SEL” button for at least 3 seconds when the UPS is in STAND-BY mode.
- The setting item 1 will be show.
- To change the different setting item, press the “ON” button for UP, or press the “SEL” button for DOWN.
- To confirm the setting item chosen, hold down the “STBY” button for at least 200 milliseconds.
- After setting the item chosen, to change the different parameters, press the “ON” button for UP, or press the “SEL” button for DOWN.
- To confirm the parameters chosen, hold down the “STBY” button for at least 200 milliseconds.
- To return to upper menu if it is not in top menu or exit the setting mode if it is in top menu, hold down the “ON” and “SEL” button for at least 200 milliseconds.

## POSSIBLE SETTINGS

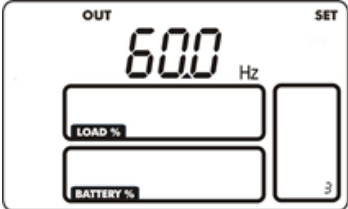
- **01: Output voltage setting.**

Interface	Setting
	<p><b>Parameter 2: Output voltage.</b></p> <p><b>100:</b> presents output voltage is 100Vac  <b>110:</b> presents output voltage is 110Vac  <b>115:</b> presents output voltage is 115Vac  <b>120:</b> presents output voltage is 120Vac (Default)  <b>127:</b> presents output voltage is 127Vac</p>

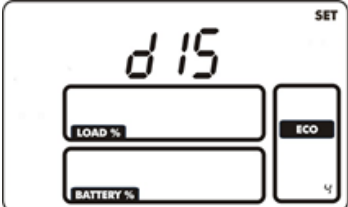
- **02: Frequency Converter enable/disable.**

Interface	Setting
	<p><b>Parameter 2:</b> Enable or disable converter mode. You may choose the following two options:</p> <p><b>ENA:</b> converter mode enable  <b>DIS:</b> converter mode disable (Default)</p>

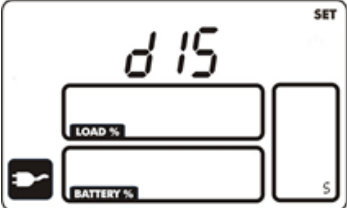
- 03: Output frequency setting.

Interface	Setting
	<p><b>Parameter 2: Output frequency setting.</b>  <b>50:</b> presents output frequency is 50Hz  <b>60:</b> presents output frequency is 60Hz</p>

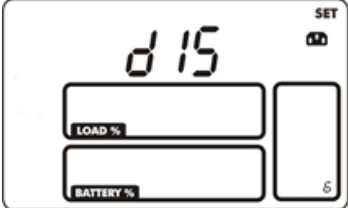
- 04: ECO enable/disable.

Interface	Setting
	<p><b>Parameter 2:</b> Enable or disable ECO function. You may choose the following two options:  <b>ENA:</b> ECO mode enable  <b>DIS:</b> ECO mode disable (Default)</p>

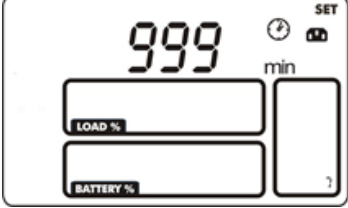
- 05: Bypass enable/disable when UPS is off.

Interface	Setting
	<p><b>Parameter 2:</b> Enable or disable Bypass function. You may choose the following two options:  <b>ENA:</b> Bypass enable  <b>DIS:</b> Bypass disable (Default)</p>

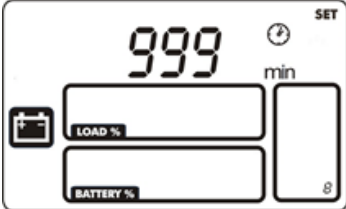
- 06: Programmable outlets enable/disable.

Interface	Setting
	<p><b>Parameter 2:</b> Enable or disable programmable outlets.  <b>ENA:</b> Programmable outlets enable  <b>DIS:</b> Programmable outlets disable (Default)</p>

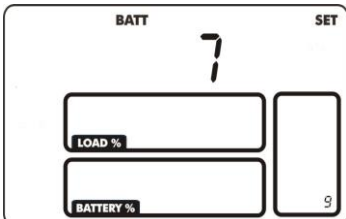
- 07: Programmable outlets setting.

Interface	Setting
	<p><b>Parameter 2:</b> Set up backup time limits for programmable outlets.  <b>0-999:</b> setting the backup time limits in minutes from 0-999 for programmable outlets which connect to non-critical devices on battery mode. (Default: 999)</p>

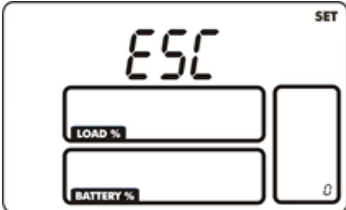
- 08: Autonomy limitation setting.

Interface	Setting
	<p><b>Parameter 2:</b> Set up backup time on battery mode for general outlets.  <b>0-999:</b> setting the backup time in minutes from 0-999 for general outlets on battery mode.  <b>DIS:</b> Disable the autonomy limitation and the backup time will depend on battery capacity. (Default)  <b>Note:</b> When setting as "0", the backup time will be only 10 seconds.</p>

- 09: Battery total AH setting.

Interface	Setting												
	<p><b>Parameter 2:</b> Set up the battery total AH of the UPS.  <b>7-999:</b> setting the battery total capacity from 7-999 in AH. Please set the correct battery total capacity if external battery bank is connected.</p> <table border="1"> <thead> <tr> <th>Battery capacity (AH)</th> <th>charger current adapted (A)</th> </tr> </thead> <tbody> <tr> <td>7~9</td> <td>1</td> </tr> <tr> <td>10~19</td> <td>2</td> </tr> <tr> <td>20~33</td> <td>4</td> </tr> <tr> <td>34~46</td> <td>6</td> </tr> <tr> <td>&gt;47</td> <td>8</td> </tr> </tbody> </table>	Battery capacity (AH)	charger current adapted (A)	7~9	1	10~19	2	20~33	4	34~46	6	>47	8
Battery capacity (AH)	charger current adapted (A)												
7~9	1												
10~19	2												
20~33	4												
34~46	6												
>47	8												

- 00: Exit setting.

Interface	Setting
	<p>Exit the setting mode.</p>

## ADDITIONAL FUNCTIONS

### MANUAL BYPASS

Using the Manual Bypass feature, the UPS can be switched to bypass. In this condition the load is powered directly by the input mains, any disruption in the mains directly affects the load.



**CAUTION:**  
**BEFORE CARRYING OUT THE FOLLOWING SEQUENCE OF OPERATIONS, ENSURE THAT THE UPS'S INPUT AND OUTPUT FREQUENCY COINCIDE AND THAT THE UPS IS NOT OPERATING FROM THE BATTERY.**

**Attention: even when the UPS is switched on, the load is disconnected in the event of a mains blackout.**

If the input mains deviates from the established tolerances, the UPS automatically switches to Std-by mode and disconnects the load.

To force the UPS into manual bypass mode, press and hold down the "ON" and "SEL" keys simultaneously for at least 4 seconds.

The code "C02" appears on the display.

To return to the normal operation mode press the "ON" and "SEL" keys again for at least 4 sec.

### PROGRAMMABLE AUXILIARY SOCKET (EnergyShare)

The EnergyShare sockets are outlets that allow for the automatic disconnection of the load applied to them in certain operating conditions. The events that determine automatic disconnection of the EnergyShare sockets can be selected by the user through the **UPSTools** configuration software. For example, it is possible to select disconnection after a certain period of battery operation; when the pre-alarm threshold for battery discharge has been reached, or when an overloading event occurs.

By default the Energyshare sockets are not configured and therefore function as other outlets.

The EnergyShare function is associated with an icon on the display whose meaning is explained in the paragraph entitled "**Display panel indications**".

The presence and the number of these sockets depend on the UPS type, and they are distinguished by a different color compared to other sockets.

### REMOTE CONTROL TERMINAL BOARD

The remote control terminal allows for implementation of the REPO function (Remote Emergency Power Off).

The UPS is provided by the manufacturer with the REPO terminals short-circuited. For installation remove the short circuit and connect to the device's normally closed contact.

In case of an emergency, if the stop device is used, the REPO control is opened, the UPS goes into stand-by mode and the load is completely disconnected.

**Attention:** before restarting the UPS, reset the stop device.

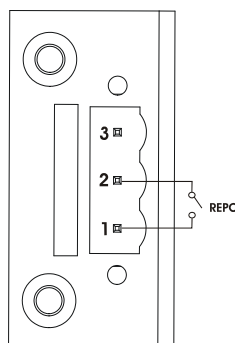
The circuitry of the remote-control terminal board is self-powered with SELV circuits. Therefore, an external voltage supply is not required. When a contact is closed, a maximum current of 15mA circulates.

All connections with the remote-control terminal board are made through a cable which guarantees a double insulation connection.

Logic of the connections:

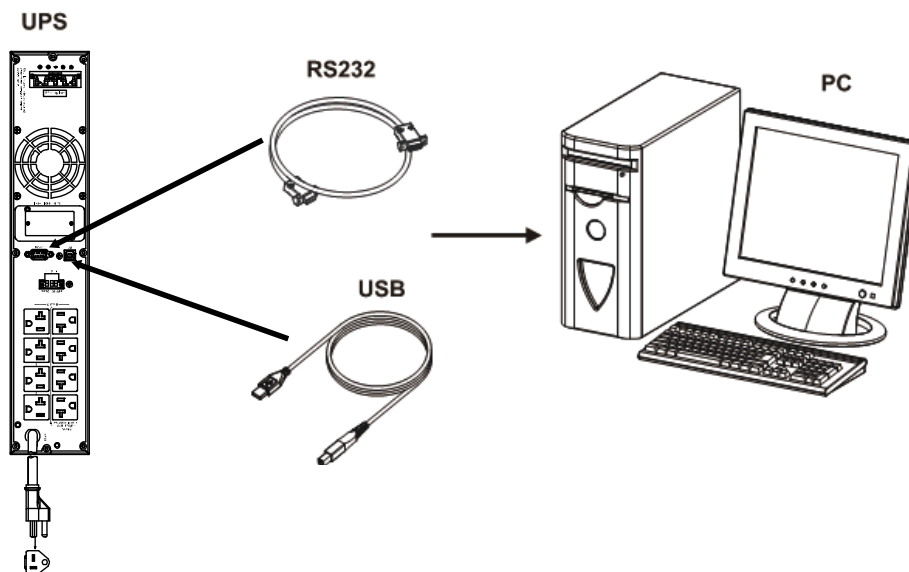
- **PIN 1-2 REPO**

The function is activated when the contact is opened.



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## SOFTWARE



### MONITORING AND CONTROL SOFTWARE

The **ViewPower** software guarantees effective, intuitive UPS management, displaying all the most important information such as input voltage, applied load and battery capacity. It is also able to perform shutdown operations and send e-mails, text messages and network messages automatically when certain events, selected by the user, occur.

#### INSTALLATION OPERATIONS

- 1) Connect one of the UPS's communication ports to one of the PC's communication ports using the cable supplied.
- 2) Download the software from the web site [www.rielloupsamerica.com/download\\_categories](http://www.rielloupsamerica.com/download_categories) selecting the specific operating system.
- 3) Follow the installation program instructions.
- 4) For more detailed information please read the user manual which can be downloaded from [www.rielloupsamerica.com/download\\_categories](http://www.rielloupsamerica.com/download_categories).

### CONFIGURATION SOFTWARE

The **ViewPower** software allows the configuration and full display of the status of the UPS via USB or RS232. For a list of possible configurations available to the user, refer to the UPS Configuration paragraph.

#### INSTALLATION OPERATIONS

- 1) Connect one of the UPS's communication ports to one of the PC's communication ports using the cable supplied.
- 2) Follow the installation instructions shown within the software manual which can be located in the ViewPower directory or downloaded from the web site [www.rielloupsamerica.com/download\\_categories](http://www.rielloupsamerica.com/download_categories).

#### CAUTION:

If the RS232 communication port is used, it is not possible to communicate with the USB port and vice versa.

It is advisable to use a cable which is shorter than 3 meters for communication with the UPS.

To obtain additional communication ports with different functions, independent from the standard USB and RS232 ports on the UPS, various accessories are available which can be inserted into the communication card slot.



To check the availability of newer, updated software versions and for more information about the available accessories, consult the website [www.rielloupsamerica.com/download\\_categories](http://www.rielloupsamerica.com/download_categories).

## UPS CONFIGURATION

The table below illustrates all the possible configurations available to the user in order to best adapt the UPS to individual requirements. It is possible to perform these operations using the LCD setting and ViewPower software.

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE CONFIGURATIONS
<b>Output voltage</b>	Selects the nominal output voltage	120V	100/110/115/120/127
<b>Converter mode</b>	Converter mode enable or disable	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Output frequency</b>	Selects the nominal output frequency when converter mode enable	50Hz	<ul style="list-style-type: none"> <li>• 50 Hz</li> <li>• 60 Hz</li> </ul>
<b>ECO mode</b>	ECO mode enable or disable	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Bypass when UPS is off</b>	Bypass when UPS is off enable or disable	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Programmable outlets</b>	Programmable outlets control enable or disable when the UPS works on battery mode.	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Programmable outlets time</b>	Programmable outlets backup time.	999	0 – 999 in 1 minute's steps
<b>Autonomy limit</b>	Maximum battery operation time	Disabled	<ul style="list-style-type: none"> <li>• Disabled (complete battery discharge)</li> <li>• 0 (10 seconds)</li> <li>• (1 - 999) minutes in 1 minute's steps</li> </ul>
<b>Battery total AH</b>	Battery total AH (internal and external)	7 or 9	7 – 999 in Ah steps
<b>UPS alarm</b>	UPS alarm enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Alarm at bypass mode</b>	Alarm at bypass mode enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>

\* For configurations of the  $F_{out} = 50, 60\text{Hz}$  or if the sync is disabled with the input, the UPS downgrades the output power.

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE CONFIGURATIONS
<b>Alarm at battery mode</b>	Alarm at battery mode enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Auto reboot</b>	Auto reboot enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Green power function</b>	Green power function enable or disable	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Cold start</b>	Cold start enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Bypass not allowed</b>	Bypass not allowed enable or disable	Disabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Battery deep-discharging protection</b>	Battery deep-discharging protection enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Site fault detection</b>	Site fault detection enable or disable	Enabled	<ul style="list-style-type: none"> <li>• Enabled</li> <li>• Disabled</li> </ul>
<b>Bypass voltage thresholds</b>	Selects the permitted voltage range for switching to the bypass	Low: 85V High: 132V	<ul style="list-style-type: none"> <li>• Low: 85 - 115 in 1V steps</li> <li>• High: 132 - 200 in 1V steps</li> </ul>
<b>Input frequency tolerance range</b>	Selects the permitted range of the input frequency for switching to the bypass and for the synchronization of the output	$\pm 3\text{Hz}$	$(\pm 1 - \pm 5)$ in 0.1 Hz steps
<b>Bypass voltage threshold for ECO</b>	Selects the permitted voltage range for operation in ECO mode	Low: -6V High: +6V	<ul style="list-style-type: none"> <li>• Low: <math>-(3 - 12)</math> in 1V steps</li> <li>• High: <math>+(3 - 12)</math> in 1V steps</li> </ul>
<b>Battery numbers in parallels</b>	Selects battery group numbers	0	0 - 99 in 1 steps

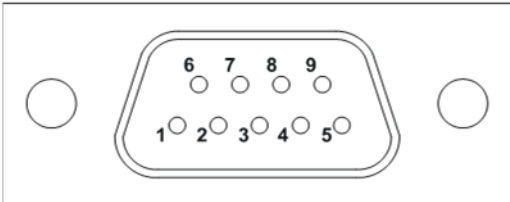


## COMMUNICATION PORTS

On the back of the UPS (see *UPS Views*), the following communication ports are present:

- RS232 connector
- USB connector
- Expansion slot for additional communication cards

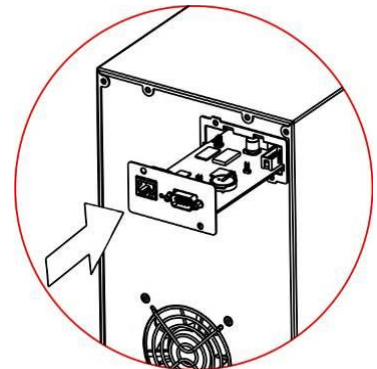
### RS232 CONNECTOR

RS232 CONNECTOR		
		
PIN #	SIGNAL	NOTES
2	TXD	For further information about interfacing with the UPS, refer to the manual provided
3	RXD	
5	GND	

### COMMUNICATION SLOT

The UPS is equipped with an expansion slot for optional communication cards (see figure on right) which allows the device to communicate using the main communication standards.  
Some examples:

- Ethernet network card with TCP/IP, HTTP and SNMP protocols
- MODBUS protocol converter card
- Card with relay isolated contacts



To check the availability of other accessories, visit the website [www.riello-ups.com](http://www.riello-ups.com).

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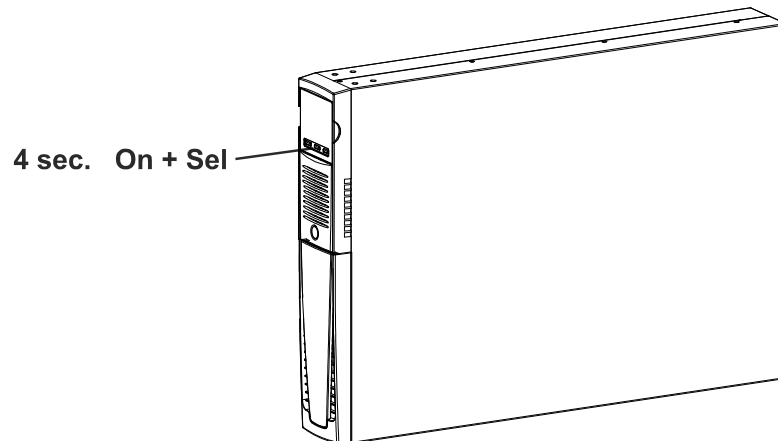
## BATTERY PACK REPLACEMENT

The UPS is also equipped with a dedicated battery pack that allows for easy replacement of batteries (**hot swap**) in complete safety, thanks to the protected connection system.

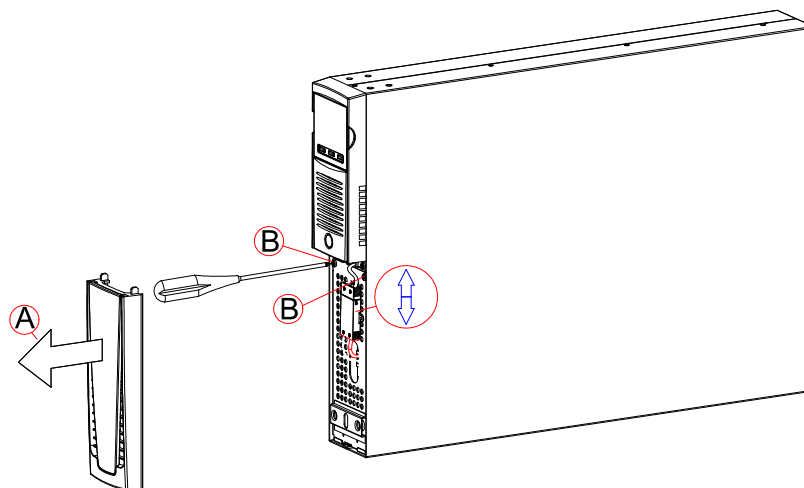


- **WHEN THE BATTERY PACK IS DISCONNECTED, THE LOADS CONNECTED TO THE UPS ARE NOT PROTECTED IN THE EVENT OF A MAINS FAILURE.**
- **THE BATTERY PACK IS VERY HEAVY. USE EXTREME CAUTION WHEN REPLACING IT.**

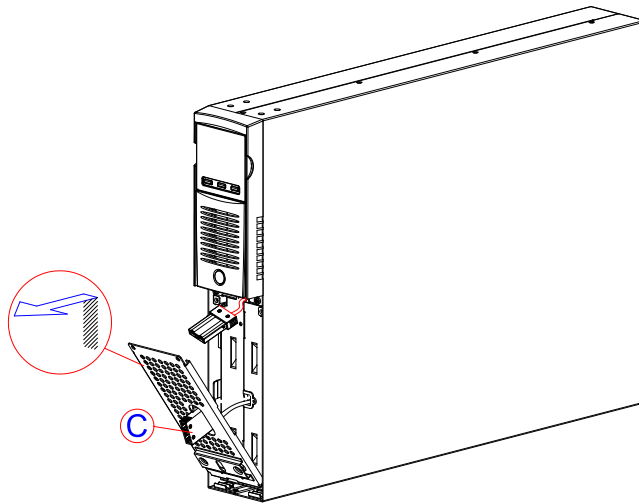
1. Set the UPS to bypass mode manually by pressing the “ON”+”SEL” buttons for 4 seconds (see paragraph entitled "USE / Configuration of Operating Mode"). The display should show the message "C02". NOTE: in this condition the load is powered by bypass.



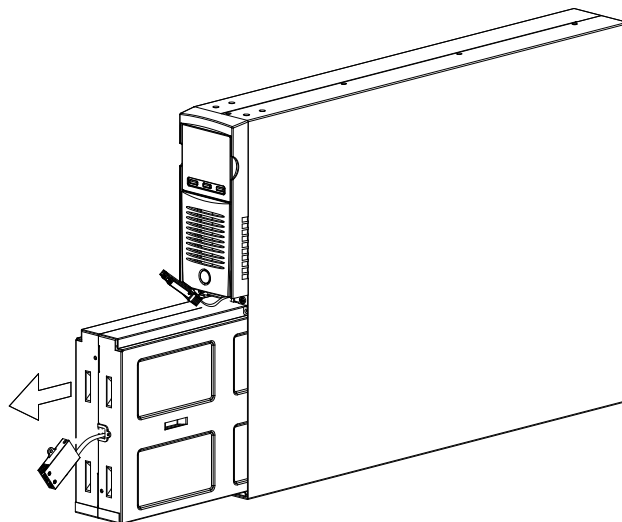
2. The battery pack is positioned behind the UPS front panel. Remove the front panel as shown in the figure below (A). Remove the screws from the battery pack's retention panel (B). Disconnect the connector that connects the battery pack to the UPS.



3. Remove the battery pack's retention panel carrying out the operations shown in the figure below (C).



4. Slip off the battery pack pulling it towards the outside, as shown in the figure below. Be careful when extracting and lifting up the battery pack as it is heavy. ATTENTION: the new battery pack must contain the same number and type of batteries (see the label located on the battery pack near the connector).



5. Insert the new battery pack into the compartment, sliding it into the UPS. Put the battery pack retention panel back in position and secure it with the two screws removed previously. Connect the battery pack cable to the UPS and close the front panel. Set the UPS to normal operation mode by pressing "ON" + "SEL" for at least 4 seconds.
6. Make sure that the display does not show the code "C02".
7. Press the "ON" key for 5 seconds to start the battery status verification procedure.

## TROUBLESHOOTING

Irregular UPS operation is most likely not an indication of a fault but due to simple problems or distraction. It is therefore advisable to consult the table below carefully as it summarizes useful informations for solving the most common problems.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY DOES NOT LIGHT UP	ON/OFF SWITCH NOT PRESSED	Press the "ON/OFF" switch on the front panel.
	MAIN CONNECTION CABLE MISSING	Check that the power cable is connected correctly.
	NO MAINS VOLTAGE (BLACKOUT)	Check that the power reaches the socket where the UPS is connected (try with a table lamp, for example).
	INTERVENTION OF THE INPUT CIRCUIT BREAKER	If present, reset the circuit breaker by pressing the button on the back of the UPS. <b>CAUTION:</b> Check that there is no output overload to the UPS.
THE DISPLAY IS ON BUT THE LOAD IS NOT POWERED	THE UPS IS IN STAND-BY MODE	Press the "ON" button on the front panel to power the loads.
	THE STAND-BY OFF MODE IS SELECTED	It is necessary to change mode. The STAND-BY OFF (emergency power supply) mode, in fact, only powers the loads in the event of a blackout.
	NO CONNECTION TO THE LOAD	Check the connection to the load.
THE UPS IS OPERATING FROM THE BATTERY DESPITE THE PRESENCE OF MAINS VOLTAGE	THE INPUT VOLTAGE IS OUTSIDE THE PERMITTED TOLERANCE RANGE FOR MAINS OPERATION	Problem with the mains. Wait until the input mains voltage returns within the tolerance range. The UPS will automatically return to mains operation.
	INTERVENTION OF THE INPUT CIRCUIT BREAKER	If present, reset the circuit breaker by pressing the button on the back of the UPS. <b>CAUTION:</b> Check that there is no output overload to the UPS.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: <b>F50, L50</b>	THE LOAD APPLIED TO THE UPS IS TOO HIGH	Reduce the load to within the threshold of 100%. If the display shows a lock, remove the load and switch the UPS off and back on again.
THE DISPLAY SHOWS THE FOLLOW CODE: <b>A61</b>	REPLACE THE BATTERIES	Contact the support center for battery replacement.
THE DISPLAY SHOWS THE FOLLOW CODE: <b>A62</b>	BATTERIES MISSING OR BATTERY BOX MISSING OR NOT CONNECTED	On the versions with an additional battery charger in place of the batteries, check if the Battery Box is inserted and connected to the UPS correctly.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS THE FOLLOW CODE: <b>A63</b>	THE BATTERIES ARE FLAT; THE UPS IS WAITING FOR THE BATTERY VOLTAGE TO EXCEED THE SET THRESHOLD	Wait until the batteries have recharged or force power-on manually by holding down the "ON" button for at least 2 seconds.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: <b>F04, L04</b>	THE TEMPERATURE OF THE DISSIPATORS INSIDE THE UPS IS TOO HIGH	Check that the temperature of the environment in which the UPS is located does not exceed 40°C.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: <b>L53</b>	THERE IS A FAULT ON ONE OR MORE OF THE UTILITIES POWERED BY THE UPS	Disconnect all the utilities, switch the UPS off and back on again, reconnect the utilities one at a time to identify which one is faulty.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: <b>F60, L03, L13, L20, L21, L40, L41, L42, L43</b>	THE UPS IS MALFUNCTIONING	If possible, disconnect the power to the load, switch the UPS off and back on again; if the problem occurs again, call the support center.
THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: <b>C01</b>	EMERGENCY POWER OFF IS ACTIVE	If unwanted, check the status of the emergency power off connector.
THE DISPLAY SHOWS <b>C02</b>	THE MANUAL BYPASS FUNCTION IS ACTIVE	To exit manual bypass mode, press the "ON"+"SEL" buttons at the same time for at least 4 seconds.



**ATTENTION:**

The UPS in case of a permanent failure will be not able to supply the load. To ensure total protection of your equipment we suggest you install an ATS device (Automatic Transfer Switch) or an external automatic bypass.

For more information visit [www.riello-ups.com](http://www.riello-ups.com).

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## ALARM CODES

Using a sophisticated self-diagnosis system, the UPS is able to check its own status and any anomalies and/or faults which may occur during normal operation and display them on the display panel. If there is a problem, the UPS signals the event by showing the code and the type of active alarm on the display (FAULT and/or LOCK).

### FAULT

FAULT alerts can be divided into three categories:

- **Anomalies:** these are “minor” problems which do not cause the lock of the UPS but reduce performance or prevent certain functions from being used.

CODE	DESCRIPTION
<b>A61</b>	Replace batteries
<b>A62</b>	Batteries missing or Battery Box missing/Not connected
<b>A63</b>	Waiting for battery charging

- **Alarms:** these are more critical problems than anomalies because, if they persist, they could cause the UPS to lock in a very short time.

CODE	DESCRIPTION
<b>F04</b>	Overheat
<b>F38</b>	Battery charger faulty
<b>F50</b>	Overload
<b>F60</b>	Battery overvoltage
<b>F61</b>	Site wiring fault
<b>F63</b>	EEPROM error
<b>F64</b>	Out of bypass voltage range
<b>F65</b>	Bypass frequency unstable
<b>F66</b>	Over input current
<b>F67</b>	Battery fault

- **Active commands:** Indicates the presence of an active remote command.

CODE	DESCRIPTION
<b>C01</b>	Emergency power off
<b>C02</b>	Load on bypass or manual bypass command
<b>C04</b>	Battery test in progress

## **LOCK**

LOCK alerts are normally preceded by an alarm signal and their scale leads to the power-off of the inverter and the load being powered by the bypass line (this procedure is excluded for locks due to serious, persistent overloads and short circuits).

CODE	DESCRIPTION
<b>L03</b>	Incorrect auxiliary power supply
<b>L04</b>	Overheat
<b>L13</b>	Capacitor pre-charge failed
<b>L20</b>	Capacitor bank undervoltage
<b>L21</b>	Capacitor bank overvoltage
<b>L40</b>	Inverter overvoltage
<b>L41</b>	Continuous output voltage
<b>L43</b>	Inverter undervoltage
<b>L50</b>	Overload
<b>L53</b>	Short circuit
<b>L66</b>	Over input current
<b>L67</b>	Battery fault

# TECHNICAL DATA

UPS MODELS	SDH 1000 RT	SDH 1500 RT	SDH 2000 RT	SDH 3000 RT
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## INPUT

Nominal voltage	[Vac]	100 / 110 / 115 / 120 / 127			
Maximum operating voltage	[Vac]	150			
Nominal frequency	[Hz]	50/60			
Rated current (1)	[A]	13.2	13.2	17.6	26.4

## BATTERY

Recharge time (only internal battery)	[h]	< 4h for 80% of the load			
No. of internal batteries		3	3	6 / 0	6 / 0
Expandability and nominal voltage of the Battery Box		36Vdc	36Vdc	72Vdc	72Vdc
Charging current (Max)		8A	8A	8A	8A

## OUTPUT

Nominal voltage (2)	[Vac]	Selectable: 100 / 110 / 115 / 120 / 127			
Frequency (3)	[Hz]	Selectable: 50, 60 or <b>auto sensing</b>			
Nominal power (5)	[VA]	1000	1500	2000	3000
Nominal power (5)	[W]	1000	1500	2000	3000
Overload: 100% < load < 110%		Overload warning only			
Overload: 110% < load < 130%		Bypass line available: activates the bypass after 5(Line mode) /2(Battery mode) minutes, locks after 30 (110%~120%) /10 (120%~130%) minutes. Bypass line not available: locks after 5(Line mode) /2(Battery mode) minutes			
Overload: 130% < load < 140%		Bypass line available: activates the bypass after 30/10 seconds, locks after 1 minute. Bypass line not available: locks after 10 seconds			
Overload load > 140%		Bypass line available: activates the bypass after 1.5 seconds, locks after 1 minute. Bypass line not available: locks after 1.5 seconds			

## OTHER DATA

Leakage current towards ground	[mA]	< 1,0			
Room temperature (4)	[°C/°F]	0 – 40 / 32 - 104			
Humidity		< 90% without condensation			
Protection devices		excessive battery discharge - over current - short circuit - over voltage - under voltage - thermal			
Dimensions W x D x H (5)	[in]	3.42 x 16.73 x 17.71		3.42 x 24.60 x 17.71	
Dimensions W x D x H (5)	[mm]	87 x 425 x 450		87 x 625 x 450	
Weight	[Lb]	37.48	39.68	58.42	68.34
Weight	[kg]	17	18	26.5	31

For additional details regarding technical data refer to website

(1) Input power cord safety specification.

(2) To maintain output voltage within the accuracy range specified, recalibration may be necessary after a long period of operation.



- (3) If the network frequency is within  $\pm 3\text{Hz}$  of the selected value, the UPS is synchronized with the network. If the frequency is out of tolerance range or in battery operation, the frequency is that selected  $\pm 0.1\%$ .
- (4) 20 - 25 °C / 68 – 77 °F for longer battery life.
- (5) Output Power Rating Table.

Model name	Input rating	Output rating
<b>SDH 1000 RT</b>	110-127Vac, 50/60Hz, 12A, 1Ø	100/110/115/120/125/127Vac, 50/60Hz, 1000VA/1000W, 1Ø, 10A
<b>SDH 1500 RT</b>	110-127Vac, 50/60Hz, 12A, 1Ø	100/110/115/120/125/127Vac, 50/60Hz, 1Ø 1500VA/1450W (@127Vac input) ; 1500VA/1430W (@125Vac input) ; 1500VA/1300W (@120Vac input) ; 1500VA/1270W (@115Vac input) ; 1500VA/1200W (@110Vac input) ; 1500VA/1040W (@100Vac input)
<b>SDH 2000 RT</b>	110-127Vac, 50/60Hz, 16A, 1Ø	100/110/115/120/125/127Vac, 50/60Hz, 1Ø 2000VA/1930W (@127Vac input) ; 2000VA/1930W (@125Vac input) ; 2000VA/1850W (@120Vac input) ; 2000VA/1740W (@115Vac input) ; 2000VA/1640W (@110Vac input) ; 2000VA/1500W (@100Vac input)
<b>SDH 3000 RT</b>	110-127Vac, 50/60Hz, 24A, 1Ø	100/110/115/120/125/127Vac, 50/60Hz, 1Ø 3000VA/2880W (@127Vac input) ; 3000VA/2850W (@125Vac input) ; 3000VA/2740W (@120Vac input) ; 3000VA/2650W (@115Vac input) ; 3000VA/2500W (@110Vac input) ; 3000VA/2300W (@100Vac input)

BATTERY BOX MODELS		JSDH036-NPA-	JSDH036-NPM-	JSDH072-NPA-	JSDH072-NPM-
Battery rated voltage	[Vdc]	36Vdc		72Vdc	
Dimensions W x D x H	[in]	3.42 x 16.73 x 17.71		3.42 x 24.60 x 17.71	
Dimensions W x D x H	[mm]	87 x 425 x 450		87 x 625 x 450	
Weight	[Lb]	29.76	45.19	55.11	83.77
Weight	[kg]	13.5	20.5	25	38

The "-" symbol replaces an alphanumeric code for internal use.



[www.riello-ups.com](http://www.riello-ups.com)

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