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installation and use manual

SENTINEL DUAL2

SD2 1000-1500-2200-3000
SD2 2200-3000 ER

RIELLO ELETTRONICA
riello ups

INTRODUCTION

Congratulations on purchasing a **UPS Sentinel Dual2** 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 INSTALLTION AND USER MANUAL CAREFULLY.**

The UPS and the Battery Cabinet internally generate DANGEROUS electrical voltages. All maintenance operations must be carried out SOLELY by qualified operators.

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

ENVIRONMENTAL PROTECTION

In the development of its products, the company devotes abundant resources to analysing 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 favouring recyclable materials.
For correct disposal, please separate and identify the type of material of which the packaging is made according to the table below. Dispose of all material in compliance with applicable standards in the country in which the product is used.

DESCRIPTION	MATERIAL
Box	Cardboard
Packaging corner	Polythene/cardboard
Protective bag	Polythene
Accessories bag	Polythene
Pallet	Heat-treated pine

DISPOSING OF THE PRODUCT

The UPS and the Battery Cabinet contain electronic internal material that (in case of dismiss / disposal) are considered TOXIC and HAZARDOUS WASTE, such as electronic circuit boards and batteries. Treat these materials according to the laws applicable referring to qualified service personnel. Their proper disposal contributes to respect the environment and human health.

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INDEX

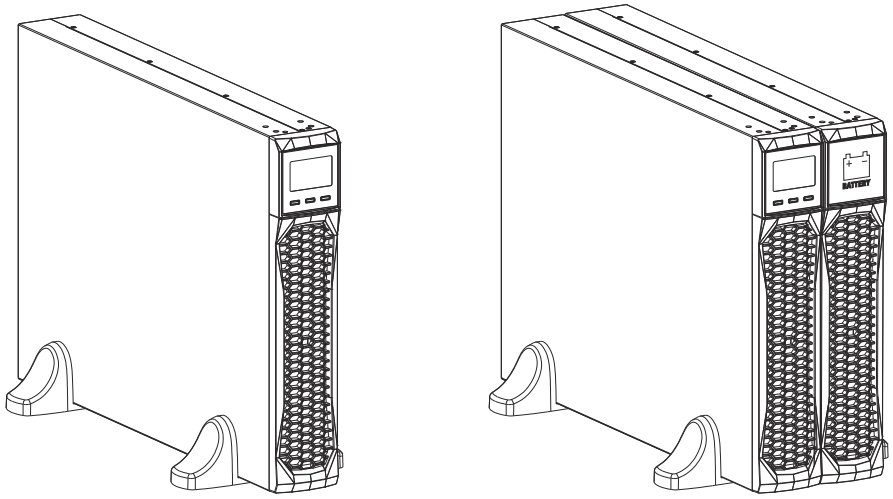
PRESENTATION

SENTINEL DUAL2 Sentinel Dual is the best solution for powering mission critical applications and electro-medical devices requiring maximum power reliability.
Flexibility of installation and use (digital display, user-replaceable battery set), as well as the many communication options available, makes the Sentinel Dual suitable for many different applications from IT to security.

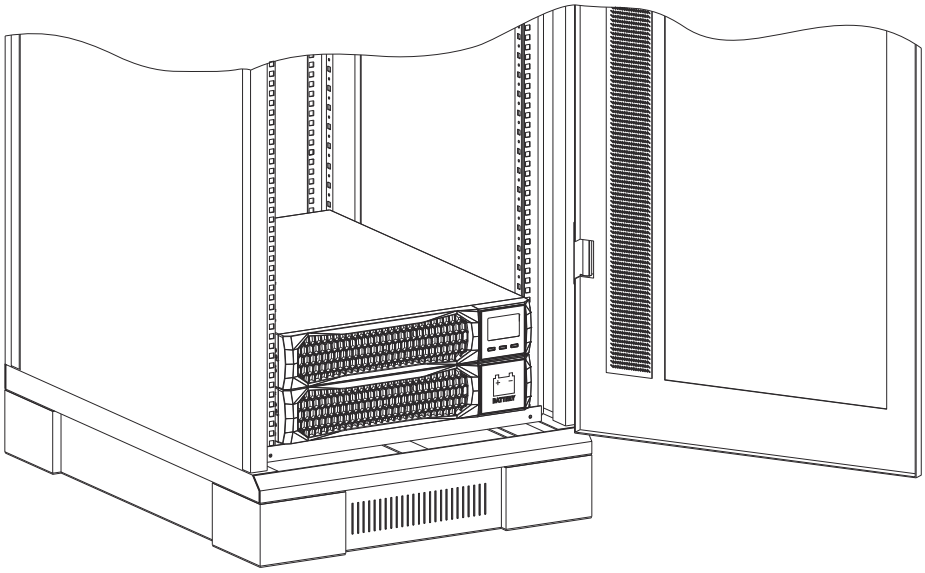
SENTINEL DUAL2 can be installed as Tower (floor standing) or Rack, ideal for network and server rack applications.

In ***SENTINEL DUAL2*** the batteries are user replaceable without switching off the equipment and without interruption to the load (Hot Swap).

SENTINEL DUAL2 ER is the version with upgraded battery chargers, the solution for Business Continuity applications which require long battery-powered operating times. For this version the batteries are housed in separate cabinets which are designed to contain even large, high-capacity batteries.



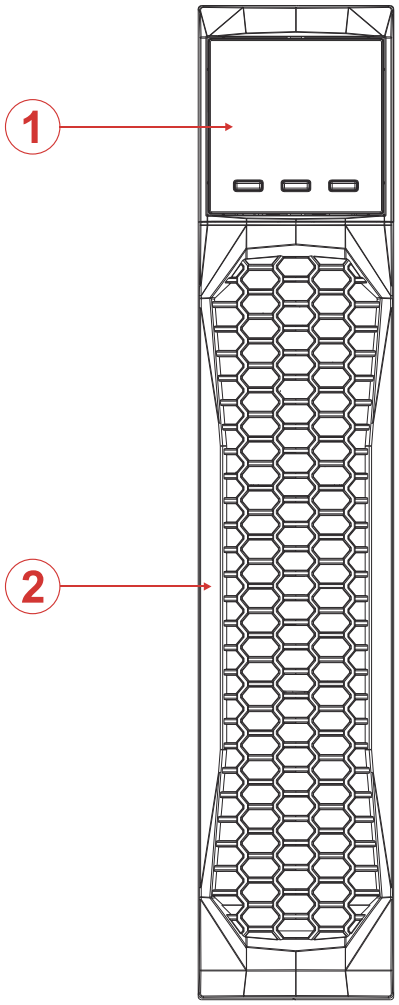
Example of UPS and UPS + BATTERY CABINET (optional) installed in a tower configuration



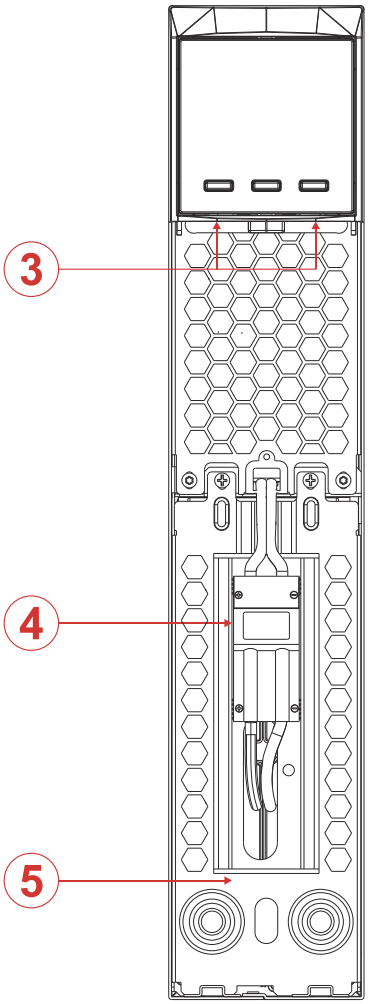
Example of UPS and BATTERY CABINET (optional) installed in a rack cabinet

UPS VIEWS

FRONT VIEW



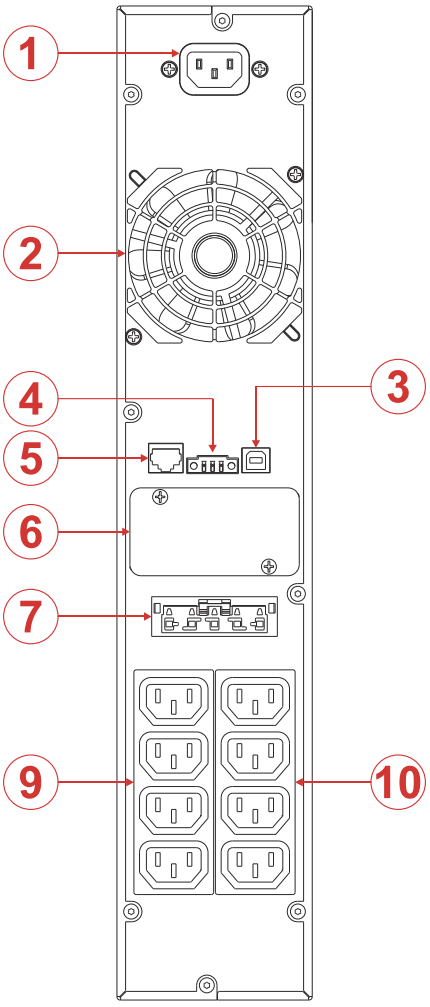
With front panel



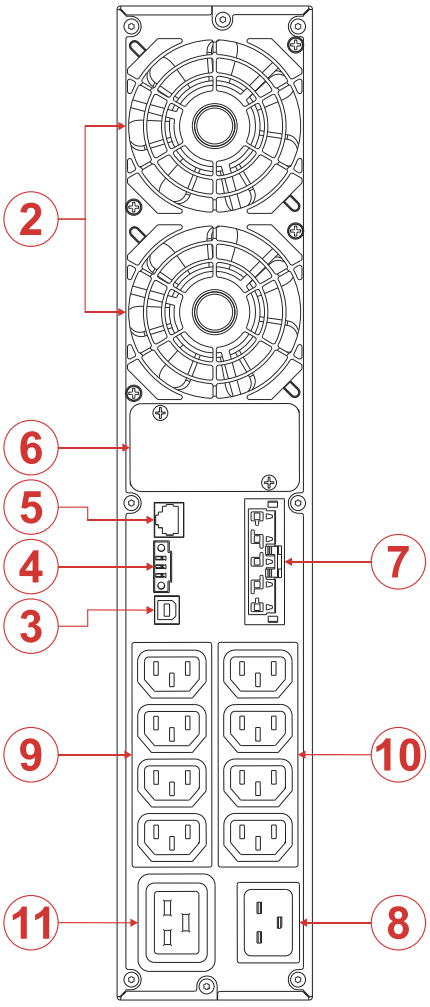
Without front panel

1. Extractable/rotatable display plate
2. Removable front panel
3. Release slts
4. Battery pack connector
5. Battery pack retention panel

REAR VIEW



1000VA / 1500VA models

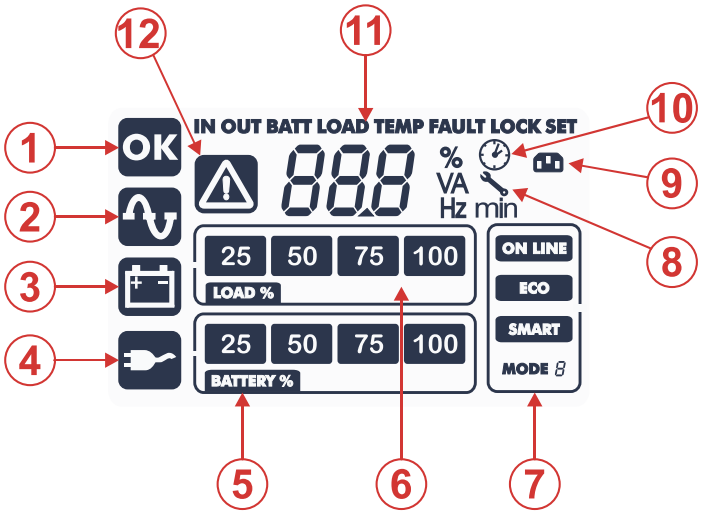


2200VA / 2200VA ER / 3000VA / 3000VA ER models

1. IEC 10A input plug
2. Cooling fan
3. USB communication port
4. Remote control terminal board / R.E.P.O.
5. Communication port and contacts
6. Communication Cards Slot
7. Battery expansion connector (not present on 1500VA models)
8. IEC 16A input plug
9. IEC 10A output sockets
10. EnergyShare programmable output sockets
11. IEC 16A output socket

DISPLAY PANEL VIEW

A	"ON" button	C	"STAND-BY" button
B	"SEL" button (Select)	D	Backlit LED bar

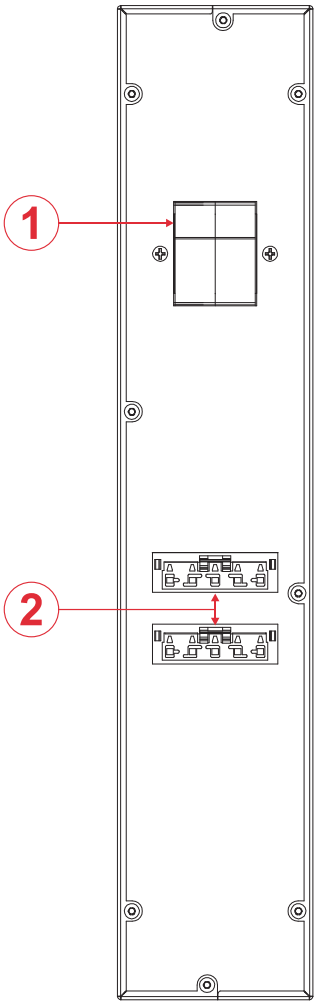


1	Regular operation	7	Configuration area
2	Mains operation	8	Maintenance request
3	Battery operation	9	EnergyShare
4	Load powered by bypass	10	Timer
5	Battery charge indicator	11	Measurement display area
6	Load level indicator	12	Stand-by / alarm

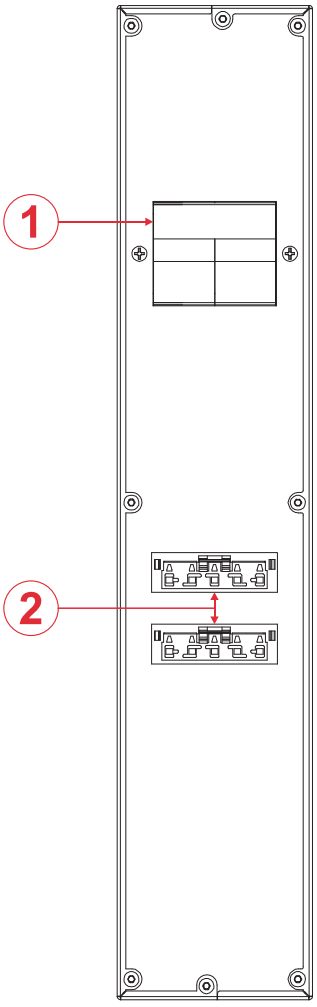
BATTERY CABINET (OPTIONAL)

The BATTERY CABINET, with the same dimensions and aesthetic appearance of the UPS, is optional.
The BATTERY CABINET 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 CABINET is intended. It is therefore necessary to take great care to ensure that the battery voltage of the BATTERY CABINET is the same as the voltage permitted by the UPS.
It is possible to connect further BATTERY CABINETS in order to create a chain, suitable for achieving any autonomy time without mains power.

REAR VIEW



36Vdc Battery Cabinet



72Vdc Battery Cabinet

1 Battery disconnector (SWBATT)

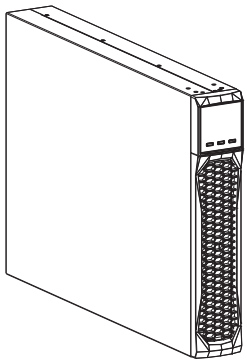
2 Battery expansion connector

INSTALLATION

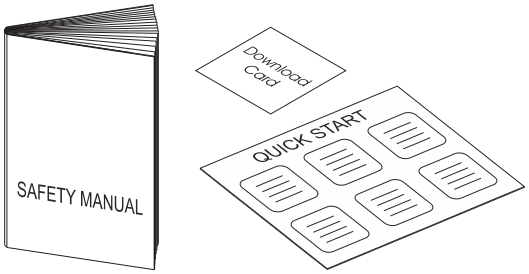
INITIAL CONTENT CHECK

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

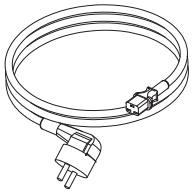
UPS (and eventual BATTERYCABINET)



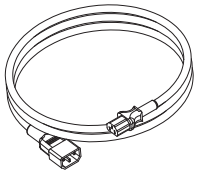
Safety manual + Quick start guide + Download card



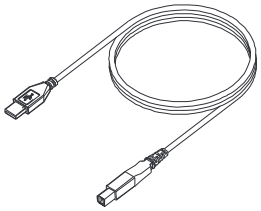
Schuko power cord:
– IEC 10A (for 1000VA / 1500VA models)
– IEC 16A (for 2200VA / 3000VA models)



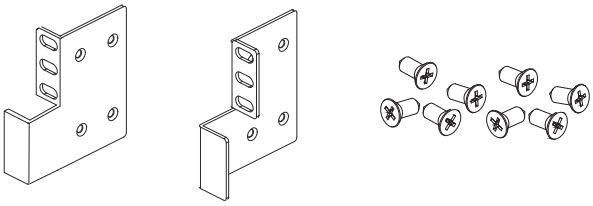
IEC 10A connection cable



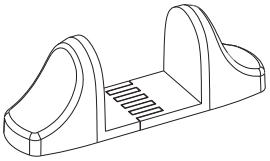
USB cable



Handles + screws for rack installation

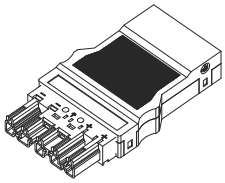


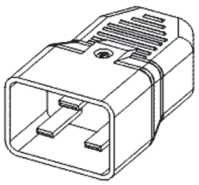
Support feet



Battery expansion plug
(only on ER models)

IEC 16A flying plug
(only for 3000VA models)

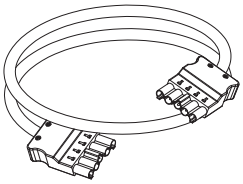


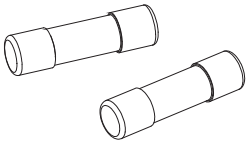


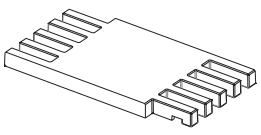
Connection cable UPS - Battery Cabinet
(only for Battery Cabinet)

Fuses
(only for Battery Cabinet)

Support feet extensions
(only for Battery Cabinet)







INSTALLATION ENVIRONMENT

The UPS and the Battery Cabinet must be installed in ventilated, clean environments which are 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 to 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 interference, in which case the user may be required to take additional measures.

TOWER CONFIGURATION

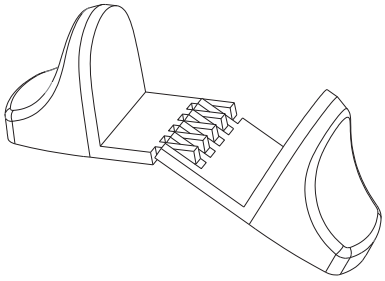
This chapter describes the steps for preparing the UPS and Battery Cabinet for tower version use.

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

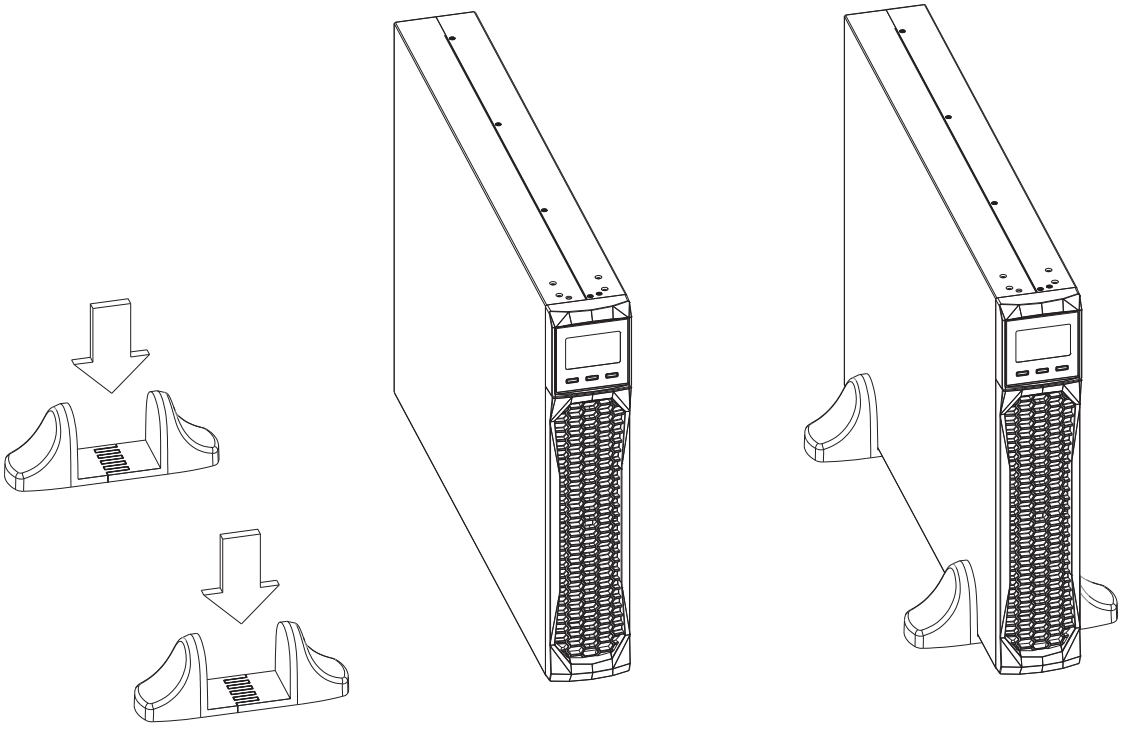
- **THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD.**
- **THE BATTERY CABINET IS DISCONNECTED FROM THE UPS, FROM ANY OTHER BATTERY CABINETS AND WITH THE BATTERY ISOLATOR OPEN**

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.

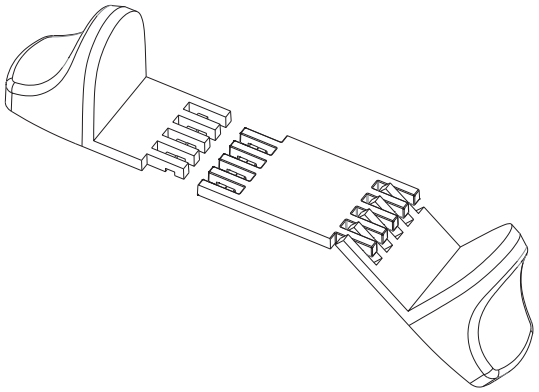


TOWER CONFIGURATION WITH BATTERY CABINET

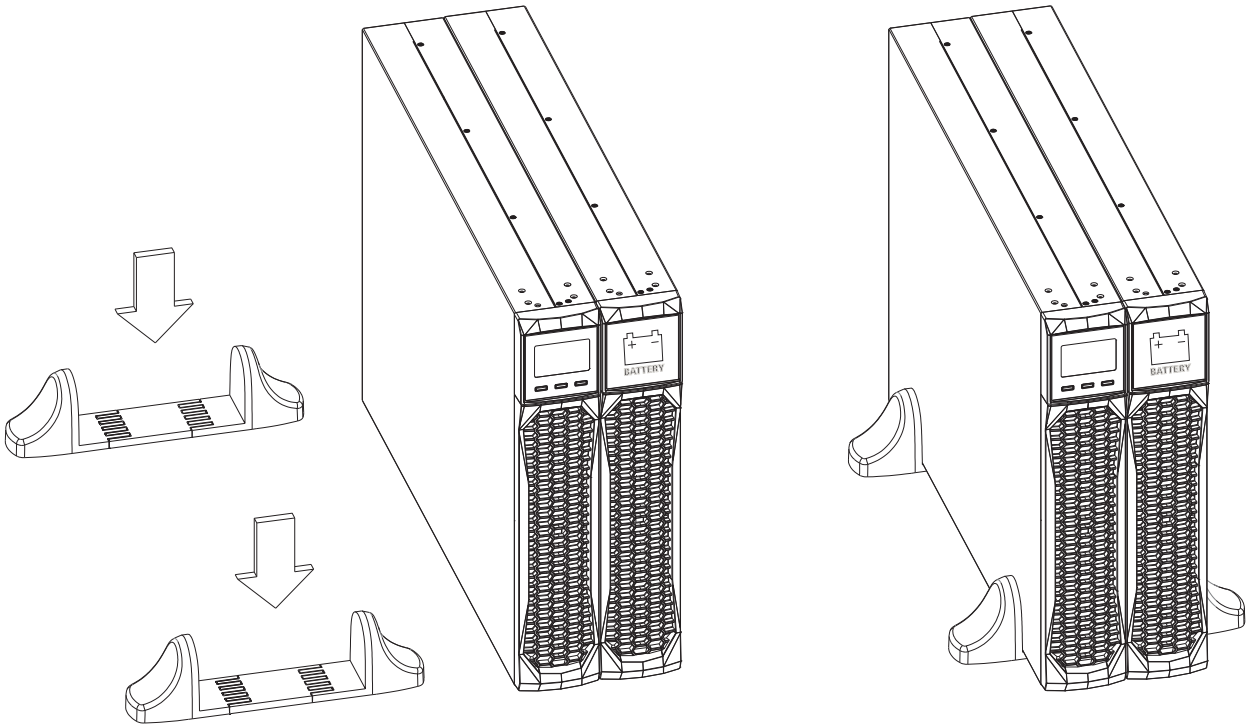
BEFORE CARRING OUT THE FOLLOWING SEQUENCE OF OPERATIONS, ENSURE THAT:

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

- For the Battery Cabinet version, each foot is composed of four parts: two supports and an extension. Assemble two feet as indicated in the figure below.



- Slide the UPS and the Battery Cabinet into the two supports.



- For any additional Battery Cabinets repeat the sequence of operations shown above.

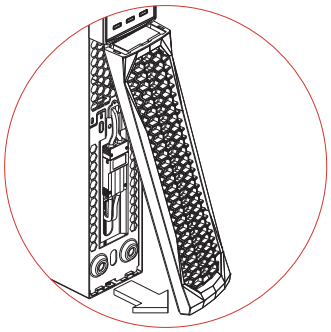
RACK CONFIGURATION

The sequence of operations to be followed in order to transform the UPS or Battery Cabinet 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 CABINET IS DISCONNECTED FROM THE UPS, FROM ANY OTHER BATTERY CABINETS AND WITH THE BATTERY ISOLATOR OPEN**

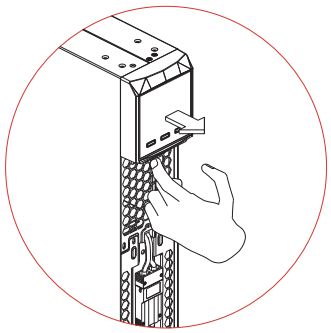
1 - Remove the removable front panel as shown in the image alongside



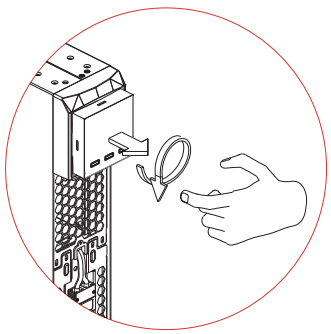
2 - Through one of the two slots located in the lower part of the front panel it is possible to extract the display mask from its seat and extract it just enough to be able to rotate it.

ATTENTION: the panel must be removed carefully.

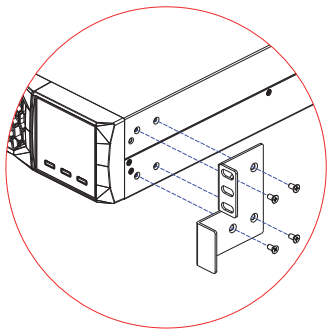
DO NOT ATTEMPT IN ANY WAY TO REMOVE THE PANEL FROM THE UPS.



3 - Rotate the display mask 90° counterclockwise and gently reinsert it into its housing.



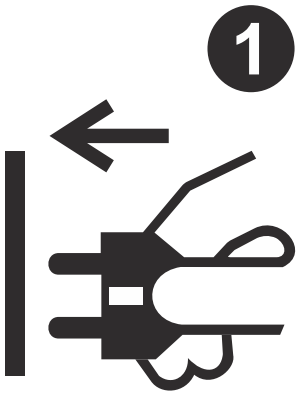
4 - At this point, with the UPS or Battery Cabinet in the horizontal position, secure the handles using the screws provided, as shown in the figure.



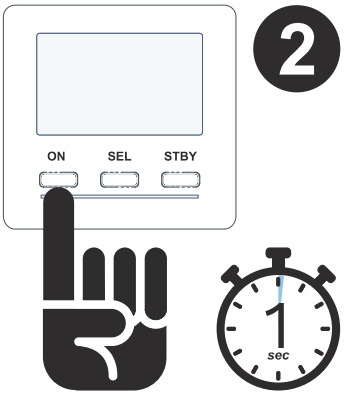
NOTE: Given the heavy weight, the use of support brackets is mandatory during rack installation (guide with L-shaped support). For the same reason, it is recommended that the UPS and Battery Cabinet be installed in the lower part of the rack cabinet.

UPS INSTALLATION

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 10A (for the 1000VA and 1500VA versions) and 16A (for the 2200VA, 3000VA and ER versions) with a B or C trip curve and breaking capacity ≥3kA.
2) Power the UPS using the input cable provided.
3) Press the “ON” button on the display for at least 1 second.



CONNECT TO THE MAINS



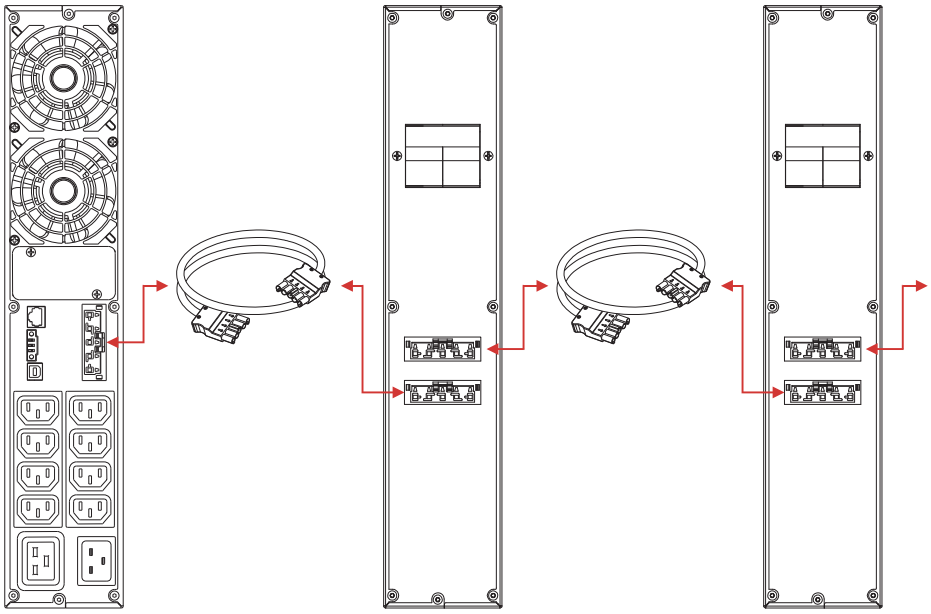
PRESS FOR “STAND-BY”

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 is powered which supervises the self-diagnoses; the batteries are charging; everything is ready for the UPS to turn on.
5) Connect the equipment to be powered to the sockets on the back of the UPS, using the cable supplied or a cable no longer than 10 metres.
   CAUTION: do not connect equipment which absorbs more than 10A to the IEC 10A sockets. For equipment which exceeds this level of absorption, use the IEC 16A socket only (available on the 2200VA and 3000VA versions).
6) 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 **UPSTools** which can be downloaded from the web site **www.riello-ups.com.**

BATTERY CABINET INSTALLATION

CAUTION:
CHECK THAT THE BATTERY CABINET VOLTAGE IS THE SAME AS THE VOLTAGE PERMITTED BY THE UPS.
THE CONNECTION BETWEEN THE UPS AND THE BATTERY CABINET MUST BE MADE WITH THE BATTERY CABINET FUSE HOLDERS OPEN.
CONNECT THE CABLE BETWEEN THE UPS AND BATTERY CABINET.
CLOSE THE FUSE HOLDERS ONLY IF THE UPS IS POWERED ON OR IN STAND-BY CONDITION.

It is possible to connect more than one Battery Cabinet in order to achieve any level of autonomy without mains power. Connect any Battery Cabinets in a cascade as shown in the figure below:



SETTING THE NOMINAL BATTERY CAPACITY

Before installing one or more Battery Cabinets the UPS must be configured in order to update the nominal capacity value (total Ah UPS's internal batteries + external batteries) using the dedicated configuration software **UPSTools**.
The Battery Cabinet must be installed while the UPS is switched off and disconnected from the main.

CAUTION:
The connection cables cannot be extended by the user.
The maximum length of the connecting cables between the UPS (without internal batteries) and the Battery Cabinet is 3 meters.
After connecting the UPS to its Battery Cabinets, insert the fuses and turn the Battery Cabinet battery isolators (SWBATT) to the ON position.
Do not open the Battery Cabinet battery disconnectors (SWBATT) with the UPS turned on.
It is recommended that you do not connect more than 5 Battery Cabinets in cascade to a single UPS. To increase capacity, we recommend installing a Battery Cabinet with higher battery capacity.
The maximum external battery capacity that can be connected to the UPS is less than 70 kWh.

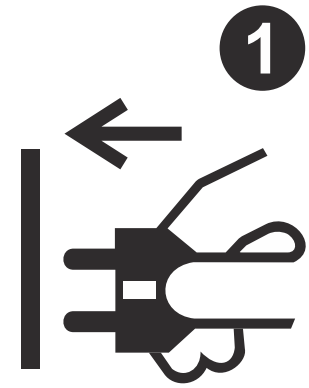
To check whether a new version of the most up-to-date software is available, consult the website: **www.riello-ups.com.**

USE

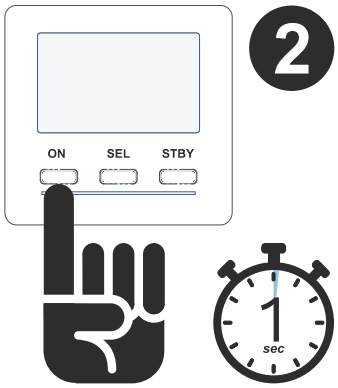
SWITCHING THE UPS ON AND OFF

SWITCHING ON FROM THE MAINS

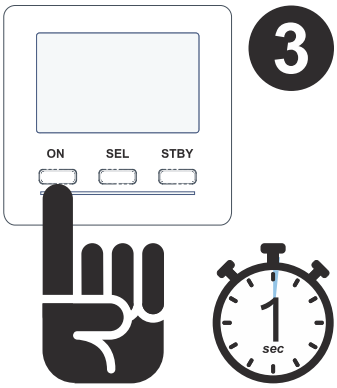
1) To turn on the UPS from the mains, perform the sequence of operations shown below:



CONNECT THE UPS TO THE MAINS



PRESS FOR "STAND-BY"



PRESS FOR "ON"

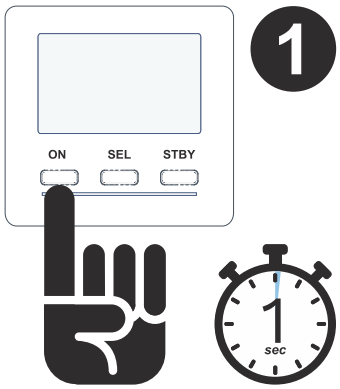
2) Switch on the equipment connected to the UPS.

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.

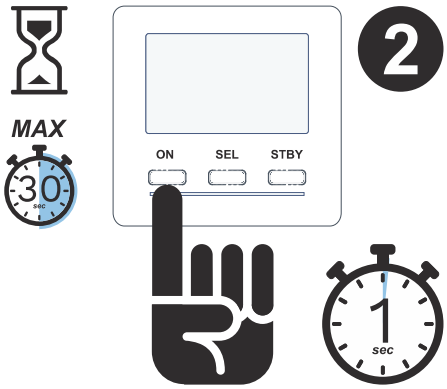
SWITCHING ON FROM THE BATTERY

1) To turn on the UPS from the battery, perform the sequence of operations indicated below:



PRESS FOR "STAND-BY"

(UPS REMAINS IN STAND-BY FOR 30 SECONDS)

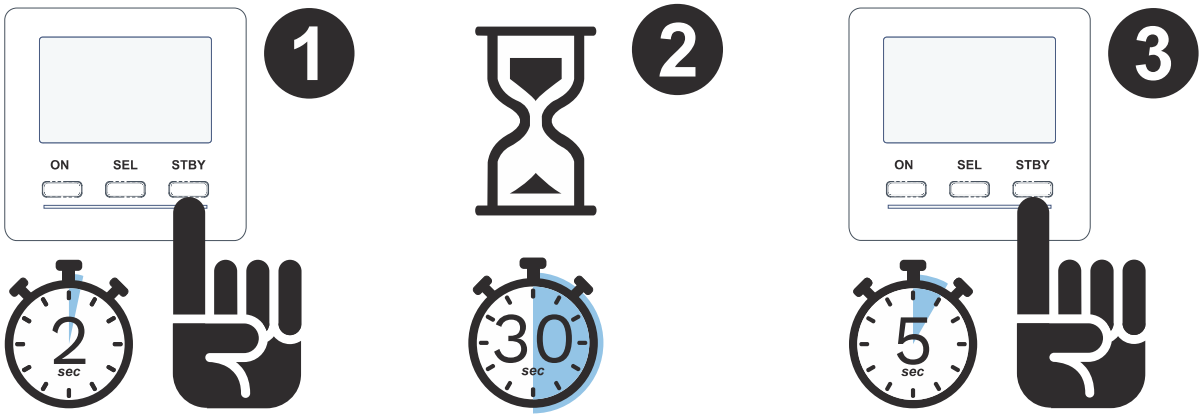


PRESS FOR "ON"

2) Switch on the equipment connected to the UPS.

SWITCHING OFF FROM THE MAINS

In order to switch off the UPS from the mains, perform the sequence of operations shown below:



PRESS FOR "STAND-BY" ***WAIT 30 SECONDS*** ***PRESS FOR "OFF"***

SWITCHING OFF BY BATTERY

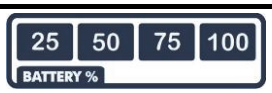
In order to switch off the UPS from battery, perform the sequence of operations shown below:

PRESS FOR "STAND-BY" ***AUTOMATIC "OFF" AFTER 30 SECONDS***

DISPLAY PANEL MESSAGES

This chapter describes, in detail, the various information that can be displayed on the LCD display and the status-color associations of the backlit bar.

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 synchronised 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 load applied to the UPS compared with the nominal value.
	Flashing	Maintenance is required. Contact the support centre.
	Fixed	Indicates that the timer is active (programmed switch-on and switch-off). The timer can be activated/deactivated using the configuration software.
	Flashing	1 minute until the UPS switches back on or 3 minutes until it switches off
	Off *	EnergyShare sockets are not configured (Always on).
	Fixed*	An event associated with the EnergyShare sockets has been configured using the UpsTools software (e.g. End of discharge pre-alarm threshold) but the sockets are currently active.
	Flashing *	The associated event occurred, EnergyShare outlets have been disconnected.

** For more information about the configuration of the EnergyShare sockets, see "Additional functions" section.*

MEASUREMENT DISPLAY AREA

The front panel can be used to display important UPS operating information. 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 (1)	DESCRIPTION
	Mains voltage
	Mains frequency
	UPS output voltage
	Output voltage frequency
	Fault / Alarm (2): the corresponding code is displayed
	Lock (2): the corresponding code is displayed

GRAPHIC EXAMPLE (1)	DESCRIPTION
	Residual battery autonomy
	Battery charge percentage
	Total battery voltage
	Applied load percentage
	Current absorbed by the load
	UPS internal temperature

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

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

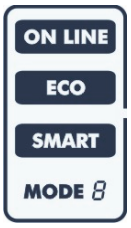
STATUS LED

Located below the display buttons, a backlit bar will alert the user at a glance about the UPS status. The different status-color associations are illustrated below.

LED BAR COLOR	UPS STATUS	DESCRIPTION
Light blue	Normal operation	No anomalies are present and the system is working in the selected mode.
Blue	Bypass operation	The system is working in temporary bypass mode.
Orange	Anomaly	The system is running on battery, forced bypass or an anomaly or warning has occurred. Refer to the “ALARM CODES” section for detailed information about the status of the UPS.
Red	Fault condition	A fault or lock has occurred, or the load is not powered due to an unexpected condition (e.g. Emergency Power Off). Refer to the alarm page on the display for detailed information about the status of the UPS.
Magenta (Flashing light)	Enabled wireless communication	On the equipped models, wireless communication with a mobile device is enable. For more detailed information on this feature, please refer to ***UPStools (App)*** manual available on our website **www.riello-ups.com.**

OPERATING MODE CONFIGURATION

The area of the display shown in the figure displays the active operating mode and allows the user to choose other modes directly from the display panel.



HOW TO PROCEED:

- To access the configuration area, hold down the “SEL” button for at least 3 seconds till the “SET” icon lights up.
- To change the mode, press the “ON” button.
- To confirm the mode chosen, hold down the “SEL” button for at least 3 seconds till the “SET” icon lights down.

POSSIBLE SETTINGS

The UPS is designed to be configured in various operating modes:

- **ON-LINE** is the mode with the greatest load protection and the best quality of the output waveform (*)
- **ECO** is the mode with which the UPS consumes the least amount of power, and is therefore the most efficient (**)
- **SMART ACTIVE:** in this mode, the UPS decides whether to operate in ON-LINE or ECO mode according to a statistic about the quality of the mains power.
- **STAND-BY OFF** [Mode 1]: the UPS operates as an emergency power supply. If mains power is present, the load is not powered, however should the mains supply fail, the load is powered by the UPS.

Additional operating modes can be set through the configuration software.

(*) The effective value (rms) of the output frequency and voltage is constantly controlled by the microprocessor, independently from the waveform of the mains voltage, maintaining the output frequency synchronised to the mains within a configurable range.
Outside this range, the UPS output de-synchronises from the mains supply, moving to the nominal frequency; in this condition, the UPS cannot use the bypass.

(**) In order to optimise performance, in ECO mode, the load is normally powered by the bypass. If the mains go out of the permitted tolerance range, the UPS switches to ON LINE operation. If the mains return within the permitted tolerance range for at least five minutes, the UPS goes back to powering the load from the bypass.

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 Stdby 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.

AUTORESTART

The Autorestart allows the automatic switch on of the UPS when power is restored, if during battery operation the UPS switches off due to end of autonomy, remote shutdown command or Auto power off enabled.

CAUTION:
THE AUTORESTART FUNCTION IS ENABLED BY DEFAULT.

PROGRAMMABLE AUXILIARY SOCKETS (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 configuration software. For example, it is possible to select disconnection after a certain period of battery operation; or 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 messages*".
The presence and the number of these sockets will depend upon the UPS type, these sockets are easily recognised by the EnergyShare label located beside them.

REMOTE CONTROL TERMINAL BOARD and R.E.P.O.

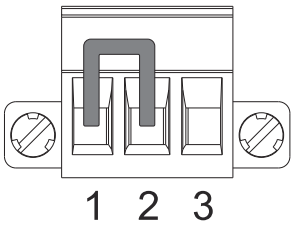
The remote control terminal allows for implementation of the REPO function (Remote Emergency Power Off) and to remotely switch ON and switch OFF the UPS.

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 and the UPS goes into stand-by mode and the load is completely disconnected.

Attention: before restarting the UPS, reset the stop device. Shutdown via R.E.P.O. inhibits the "Remote ON" function; it is only possible to turn the UPS back on using the "ON" button on the display panel.

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:

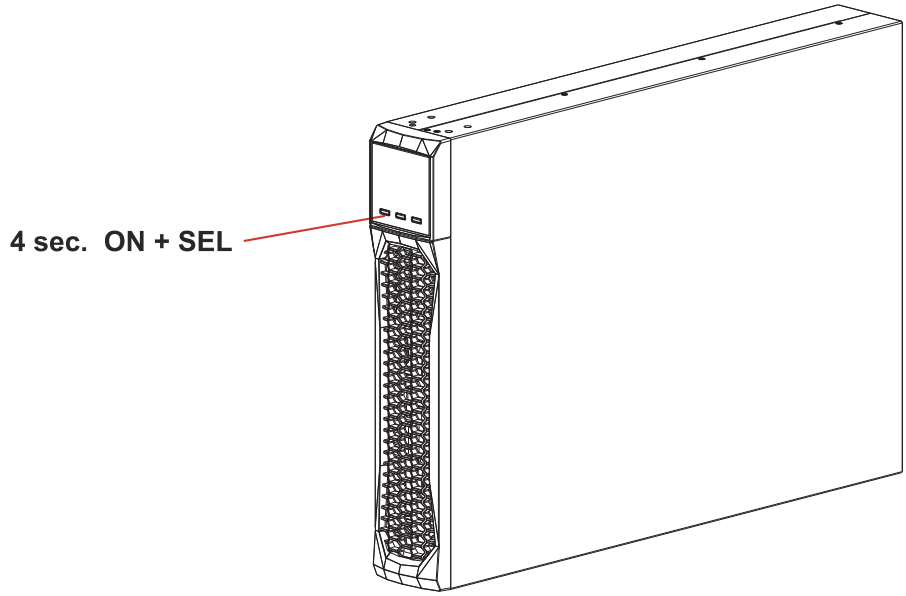
	R.E.P.O.	This feature is activated by opening the contact between pin's 1 and 2.
	REMOTE ON	This feature is activated by closing the contact between pin's 2 and 3 for a few seconds.

BATTERY PACK REPLACEMENT

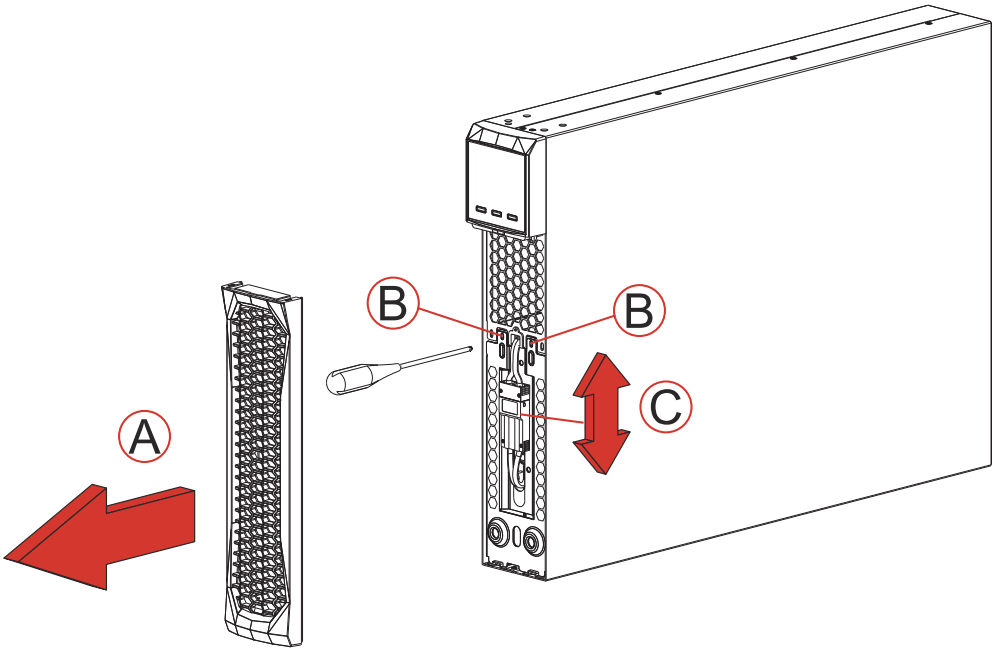
The UPS is also equipped with a dedicated battery pack that allows for easy replacement of batteries (**hot swap**) in complete safety, thanks to the protected connection system.

- **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.**

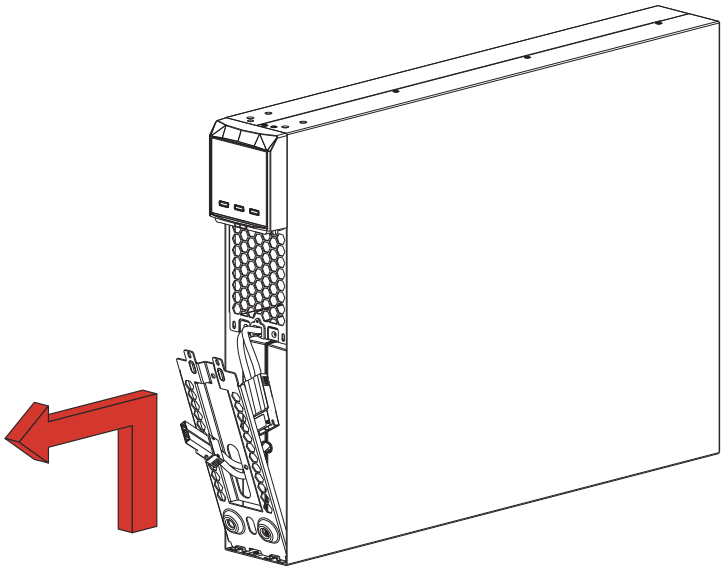
1. Set the UPS to bypass mode manually by pressing the ON-SEL buttons for 4 seconds (see paragraph entitled "Manual Bypass"). The display should show the message "C02".
   NOTE: in this condition the load is powered by bypass.



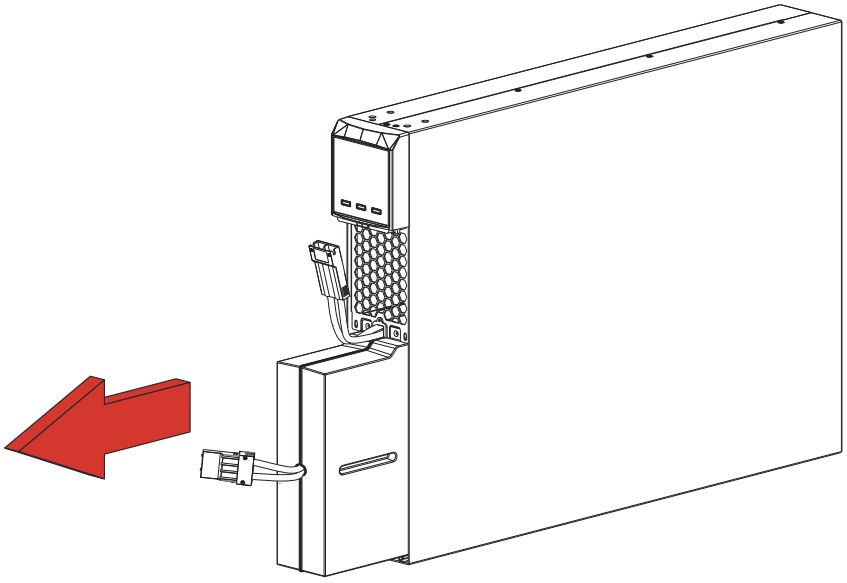
2. The battery pack is positioned behind the UPS front panel. Remove the front panel as shown in the figure below (A). Remove the screws from the battery pack's retention panel (B). Disconnect the connector that connects the battery pack to the UPS (C).



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



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.

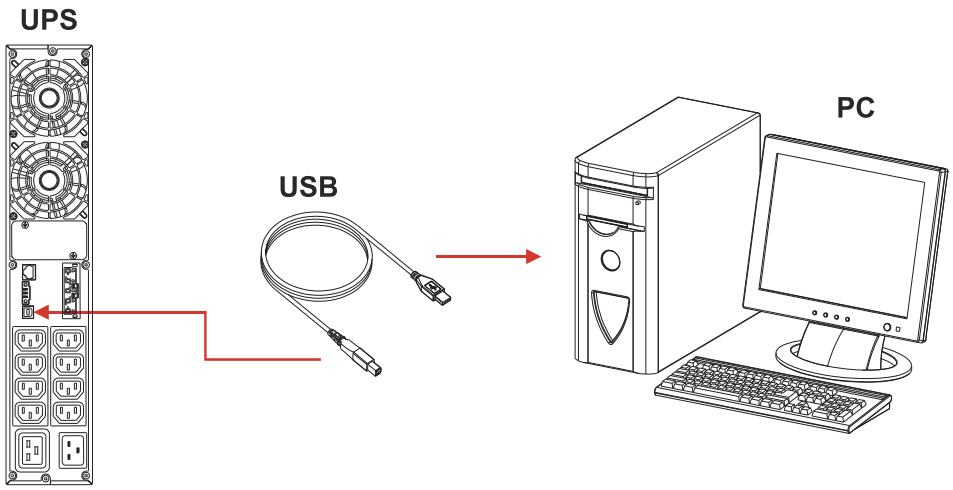
6. Make sure that the display does not show the code “C02”.

7. Press the ON key for 5 seconds to start the battery status verification procedure.

SOFTWARE

CAUTION:
If the USB port is used, it is not possible to communicate with the RS232 communication port and vice versa.
It is advisable to use a cable which is shorter than 3 metres 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 new, more updated software versions or for more information about the accessories available, consult the website **www.riello-ups.com**.



MONITORING AND CONTROL SOFTWARE

The **PowerShield³** 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, send e-mails and network messages automatically when certain events (selected by the user) occur.

INSTALLATION OPERATIONS

1) Connect the UPS to the PC using the USB cable provided.
2) Download the software from the web site **www.riello-ups.com** 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.riello-ups.com**.

CONFIGURATION AND CUSTOMIZATION SOFTWARE

Configuration and customization software (**UPSTools**) allows the configuration and full display of the UPS status via USB.
For a list of possible configurations available to the user, refer to the "*UPS Configuration*" paragraph.

INSTALLATION OPERATIONS

1) Connect the UPS to the PC using the USB cable provided.
2) Follow the installation instructions shown within the software manual, which can be downloaded from the website **www.riello-ups.com**.

UPS CONFIGURATION

The table below illustrates some of 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 configuration software.

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE CONFIGURATIONS
Output frequency	Selects the nominal output frequency	Auto	• 50 Hz • 60 Hz • Auto: automatic learning of the input frequency
Output voltage	Selects the nominal output voltage	230V	220 - 240 in 1V steps
Operating mode	Selects one of the 4 different operating modes	ON LINE	• ON LINE • ECO • SMART ACTIVE • STAND-BY OFF (MODE 1)

* For “Frequency converter” mode configurations or if synchronization with the bypass is disabled, the UPS performs an output power derating.

To find out more about the other available configurations, consult the configuration software manual which can be downloaded from the website **www.riello-ups.com**.

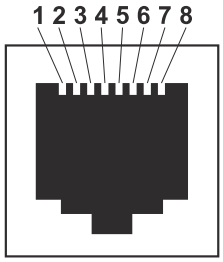
COMMUNICATION PORTS

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

- Communication port / contacts (RJ45 connector)
- USB port
- Expansion slot for additional communication cards

COMMUNICATION PORT / CONTACTS

RJ45 CONNECTOR

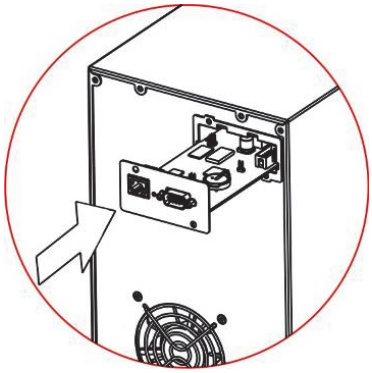


PIN #	SIGNAL	NOTES
1	Programmable output *: [default: UPS in lock]	(*) Opto-isolated contact max. +30Vdc / 35mA. These contacts can be associated with other events using the software provided (**) RS232 protocol (***) Opto-isolated command +5 - 15Vdc. (In parallel to pin 3 of REPO connector). This input can be set by the software provided For further information about interfacing with the UPS, refer to the manual provided
2	TXD **	
3	RXD **	
4	Remote input *** [default: Remote ON]	
5	GND	
6	Power supply DC (Imax = 20mA)	
7	Programmable output *: [default: low battery pre-alarm]	
8	Non-programmable output *: [battery operation]	

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:

- Second RS232 / USB port
- Serial duplicator
- Ethernet network card with TCP/IP, HTTP, HTTPS and SNMP protocols
- JBUS / MODBUS protocol converter card
- PROFIBUS protocol converter card
- Card with relay isolated contacts



To check the availability of other accessories, visit the website **www.riello-ups.com**.

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 summarises information which is useful for solving the most common problems.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY DOES NOT TURN ON	MAIN CONNECTION CABLE MISSING	Check that the power cord is connected correctly.
	NO MAINS VOLTAGE (BLACKOUT)	Make sure the mains power is present. If necessary, perform battery start-up to power the load.
	INTERVENTION OF THE UPSTREAM PROTECTION DEVICE	Restore the protection. WARNING: make sure there is no overload or short circuit on the UPS output.
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	INTERVENTION OF THE UPSTREAM PROTECTION DEVICE	Restore the protection. WARNING: make sure there is no overload or short circuit on the UPS output.
	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.
THE UPS DOES NOT COME ON AND THE DISPLAY SHOWS THE CODE: **A06, A08**	THE TEMPERATURE OF THE UPS IS LOWER THAN 0°C	Check the temperature of the environment in which the UPS is located; if it is too low, bring it past the minimum threshold (0°C).
THE DISPLAY SHOWS THE FOLLOW CODES: **L10, L11, F11**	INPUT RELAY FAULTY	Switch off and disconnect the UPS from the power supply and contact the support centre.
THE DISPLAY SHOWS THE FOLLOW CODE: **L02**	CONTROL CARD IS NOT INSERTED CORRECTLY	Switch off and disconnect the UPS from the power supply and contact the support centre.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: **A54, F50, F51, F52, F55, L50, L51, L52**	THE LOAD APPLIED TO THE UPS IS TOO HIGH	Reduce the load to within the threshold of 100% (or user threshold in the case of code **A54**). If the display shows a lock: remove the load and switch the UPS off and back on again.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS THE CODE: **A61**	REPLACE THE BATTERIES	Contact the support centre for battery replacement.
THE DISPLAY SHOWS THE CODE: **A62**	BATTERIES MISSING OR BATTERY CABINET MISSING OR NOT CONNECTED	On the versions with an additional battery charger in place of the batteries, check that the Battery Cabinet is inserted and connected to the UPS correctly.
THE DISPLAY SHOWS THE CODE: **A63**	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: **F03, F05, F07, F13, F21, F40, F41, F42, F43**	THE UPS IS MALFUNCTIONING; IT WILL PROBABLY LOCK SOON	If it is possible to disconnect the load, turn the UPS off and on again; if the problem occurs again, contact the support center.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: **F04, L04**	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: **F53, L53**	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: **F60, L03, L05, L07, L13, L20, L21, L40, L41, L42, L43**	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 centre.
THE BUZZER SOUNDS CONTINUOUSLY AND THE DISPLAY SHOWS THE CODE: **L45**	ABNORMAL OUTPUT SINUSOIDAL VOLTAGE	If possible, disconnect the power to the load, switch the UPS off and back on again: if the problem disappears, check the features of the load otherwise call the support centre.
THE DISPLAY SHOWS ONE OF THE FOLLOWING CODES: **C02, C03, C06**	A REMOTE COMMAND IS ACTIVE	If unwanted, check the status of the command inputs of any optional contact card or the status of any emergency devices.
THE DISPLAY SHOWS **C02**	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 by-pass.
For more information visit **www.riello-ups.com**

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
A06	Sensor1 temperature under 0°C
A08	Sensor2 temperature under 0°C
A54	Load percentage greater than the user threshold set
A56	Input plug maximum admissible current reached
A61	Replace batteries
A62	Batteries missing or Battery Cabinet missing or not connected
A63	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
F03	Incorrect auxiliary power supply
F04	Dissipator overtemperature
F05	Temperature sensor1 faulty
F07	Temperature sensor2 faulty
F11	Input relay faulty
F13	Capacitor pre-charge failed
F21	Capacitor bank overvoltage
F40	Inverter overvoltage
F41	Continuous output voltage
F42	Incorrect inverter voltage
F43	Inverter undervoltage
F50	Overload: load > 103%
F51	Overload: load > 110%
F52	Overload: load > 150%
F53	Short circuit
F55	Waiting for load reduction to return to inverter
F60	Battery overvoltage

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

CODE	DESCRIPTION
C02	Remote control 2 (load on bypass or manual bypass command)
C03	Remote control 3 (Switch On/Off)
C04	Battery test in progress
C06	Emergency switch-off command

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
L02	Control card is not inserted correctly
L03	Incorrect auxiliary power supply
L04	Dissipator over temperature
L05	Temperature sensor1 faulty
L07	Temperature sensor2 faulty
L10	Input fuse broken or input relay stuck (does not close)
L11	Input relay faulty
L13	Capacitor pre-charge failed
L20	Capacitor bank undervoltage
L21	Capacitor bank overvoltage
L40	Inverter overvoltage
L41	Continuous output voltage
L42	Incorrect inverter voltage
L43	Inverter undervoltage
L45	Abnormal sinusoidal output voltage
L50	Overload: load > 103%
L51	Overload: load > 110%
L52	Overload: load > 150%
L53	Short circuit

TECHNICAL DATA

UPS

SENTINEL DUAL2 – 1 / 1.5 / 2.2 / 3 kVA		
INPUT		
Nominal voltage [Vac]		220 – 240 (1W+N+PE)
Earthing system (1)		TN – TT - IT
Maximum operating voltage [Vac]		300
Nominal frequency [Hz]		50 – 60
Accepted tolerance for input voltage without activation of battery		Maximum: 276V Minimum: 184V @ 100% load 140V @ 50% load Back to main: 190V
Accepted tolerance for input frequency without activation of battery (for 50/60Hz) [Hz]		40 – 72
Maximum input current [A]	SD2 1000	6.4
	SD2 1500	9.3
	SD2 2200 / ER	13.7 / 15.9
	SD2 3000 / ER	16 / 16
OUTPUT		
Nominal voltage (2) [Vac]		Selectable: 220 - **230** - 240
Frequency (3) [Hz]		Selectable: 50, 60 or **auto sensing**
Nominal power [kVA = kW]	SD2 1000	1
	SD2 1500	1.5
	SD2 2200 / ER	2.2 / 2.2
	SD2 3000 / ER	3 / 3
Overload: 100% < Load < 110%		Bypass line available: activates the bypass after 2 seconds, locks after 120 seconds Bypass line not available: locks after 60 seconds
Overload: 110% < Load < 150%		Bypass line available: activates the bypass after 2 seconds, locks after 4 seconds Bypass line not available: locks after 4 seconds
Overload: Load > 150%		Bypass line available: activates the bypass instantly, locks after 1 seconds Bypass line not available: locks after 0.5 seconds
Short circuit current (Bypass line not available)		Icc = 2 In x 300 ms
BATTERY		
Recharge time (standard versions) [h]		< 4h for 80% of the load
Expandability and nominal voltage of the Battery Cabinet	SD2 1000	36 Vdc
	SD2 1500	Not expandable
	SD2 2200 / ER	72 Vdc
	SD2 3000 / ER	
Charging current (for ER versions only)	SD2 2200 ER	6 A
	SD2 3000 ER	

OTHER		
Leakage current to earth [mA]	SD2 1000	< 1
	SD2 1500	
	SD2 2200 / ER	< 1.3
	SD2 3000 / ER	
Ambient temperature [4] [°C]		0 – 40
Operating relative humidity range		5 - 95% non-condensing
Storage temperature [°C]		-15 ÷ 40 (UPS with batteries) -25 ÷ 60 (UPS without batteries)
Maximum Operating Altitude (according with IEC/EN 62040-3)		Full power up to 1000 m (power derating of 0.5% for each 100 m between 1000 and 4000 m)
Safety standard		CEI EN 62040-1 (*General and safety requirements for UPS*)
Electromagnetic compatibility		Cat. C2
Pollution degree		PD2
Overvoltage category		OVC II
Protective class		Class I
IP protection class		IP20
Protection devices		excessively low batteries - overcurrent - short circuit - overvoltage - undervoltage - circuit breaker
DIMENSIONS AND WEIGHTS		
W x D x H [5] [mm]	SD2 1000	87 x 425 x 450
	SD2 1500	
	SD2 2200 / ER	87 x 625 x 450
	SD2 3000 / ER	
Weight [kg]	SD2 1000	15.0
	SD2 1500	16.0
	SD2 2200 / ER	24.8 / 12.5
	SD2 3000 / ER	27.2 / 12.7

For more details please consult the web site.

(1) *@ When UPS is connected to an external distribution system, it must comply with national or local regulations*

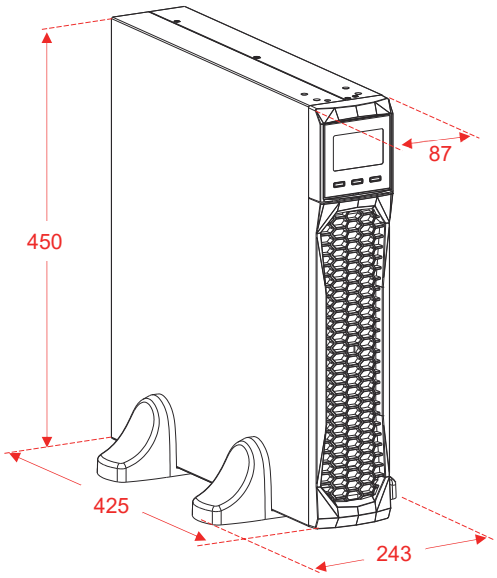
(2) *To keep the output voltage within the indicated range of precision, recalibration may be necessary after a long period of operation*

(3) *If the mains frequency is within ±5% of the selected value, the UPS is synchronised with the mains. If the frequency is out of the tolerance range or operating from the battery, the frequency is the one selected ±0.1%*

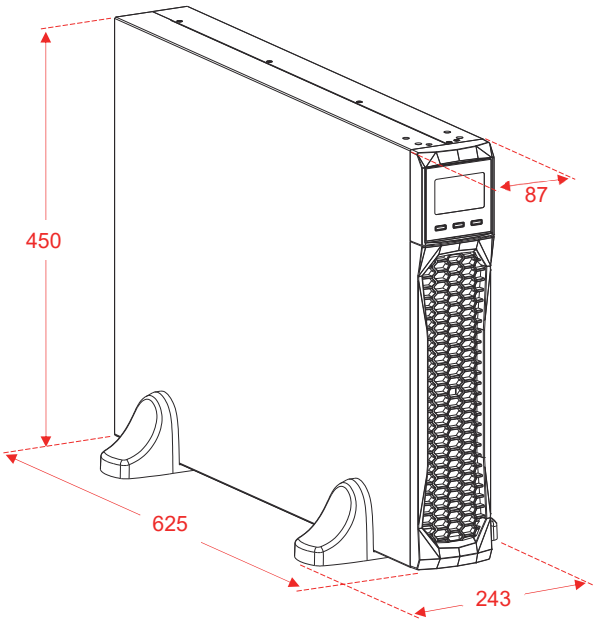
(4) *20 - 25 °C for longer battery life*

(5) *The dimensions shown in the table are for the tower version, taking into account the support feet.*
The rack version is suitable for being housed in 19" cabinets with a 2U footprint

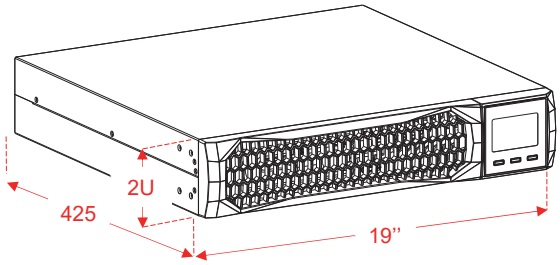
MECHANICAL DIMENSIONS (UPS)



TOWER installation
(dimension in mm)

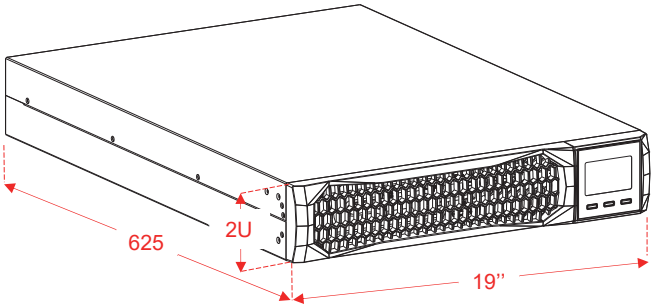


TOWER installation
(dimension in mm)



RACK installation

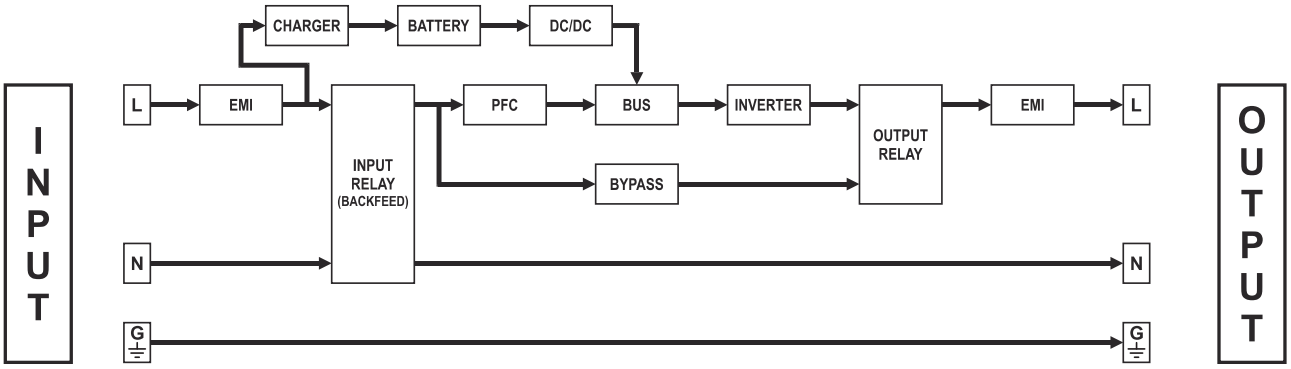
Models: SD2 1000
SD2 1500



RACK installation

Models: SD2 2200 / 2200 ER
SD2 3000 / 3000 ER

BLOCK DIAGRAM (UPS)



Block diagram of the UPS

BATTERY CABINET

BTC SD2 36V / BTC SD2 72V		
BATTERY		
Nominal battery voltage [Vdc]	KSD2036--------	36
	KSD2072--------	72

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

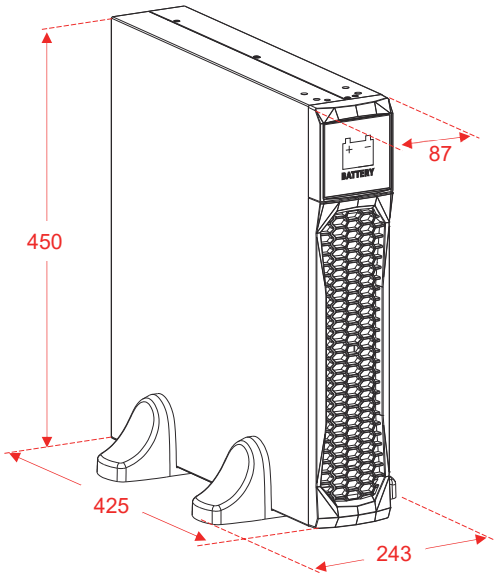
OTHER		
Ambient temperature [1] [°C]		0 – 40
Storage temperature [°C]		-15 ÷ 40
Maximum operating altitude [m]		4000
Safety standard		CEI EN 62040-1 (General and safety requirements for UPS)
Pollution degree		PD2
Overvoltage category		OVC II
Protective class		Class I
IP protection class		IP20
Protection devices		Over current – Short circuit
DIMENSIONS AND WEIGHTS		
W x D x H [2] [mm]	KSD2036--------	87 x 425 x 450
	KSD2072--------	87 x 625 x 450
Weight [kg]	KSD2036-A3-----	12.7
	KSD2036-A5-----	14
	KSD2036-M1-----	19
	KSD2036-M4-----	21.5
	KSD2072-A3-----	22.5
	KSD2072-A5-----	25
	KSD2072-M1-----	35
	KSD2072-M4-----	40

For more details please consult the web site

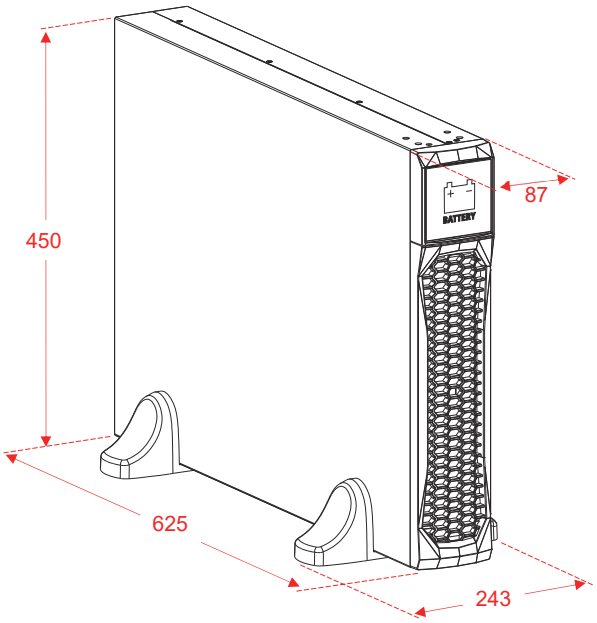
(1) 20 - 25 °C for longer battery life

(2) *The dimensions shown in the table are for the tower version, taking into account the support feet. The rack version is suitable for being housed in 19" cabinets with a 2U footprint*

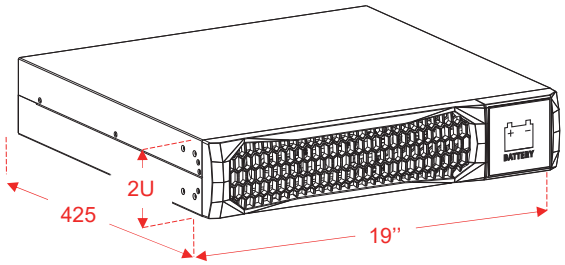
MECHANICAL DIMENSIONS (BATTERY CABINET)



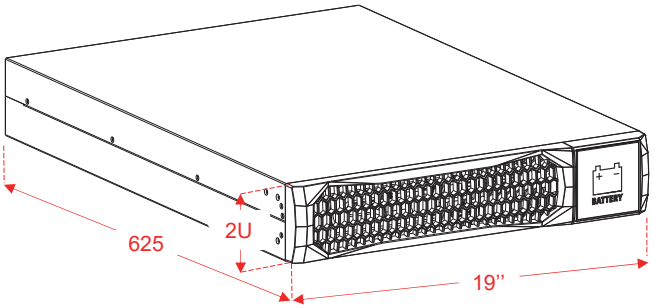
TOWER installation
(dimension in mm)



TOWER installation
(dimension in mm)



RACK installation



RACK installation

Models: KSD2036--------

Models: KSD2072--------

ELROND

08-449 80 80 www.elrond.se

www.riello-ups.com

RPS SpA – *Riello Power Solutions*
Viale Europa, 7
37045 Legnago (VR)
Italy

0MNSD21KORUENUB