

installation and user manual

SENTINEL DUAL

SDU 5000 - 6000 - 8000 - 10000
SDU 6000 ER - 10000 DI - 10000 ER DI
SDU 8000 TM - 10000 TM - 10000 TM ER



INTRODUCTION

Congratulations on purchasing a **UPS Sentinel Dual** 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 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 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 Box 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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PRESENTATION

SENTINEL DUAL 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.

Up to 3 **SENTINEL DUAL**'s can be operated in parallel in either capacity or N+1 redundant configuration offering increased reliability for critical system.

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

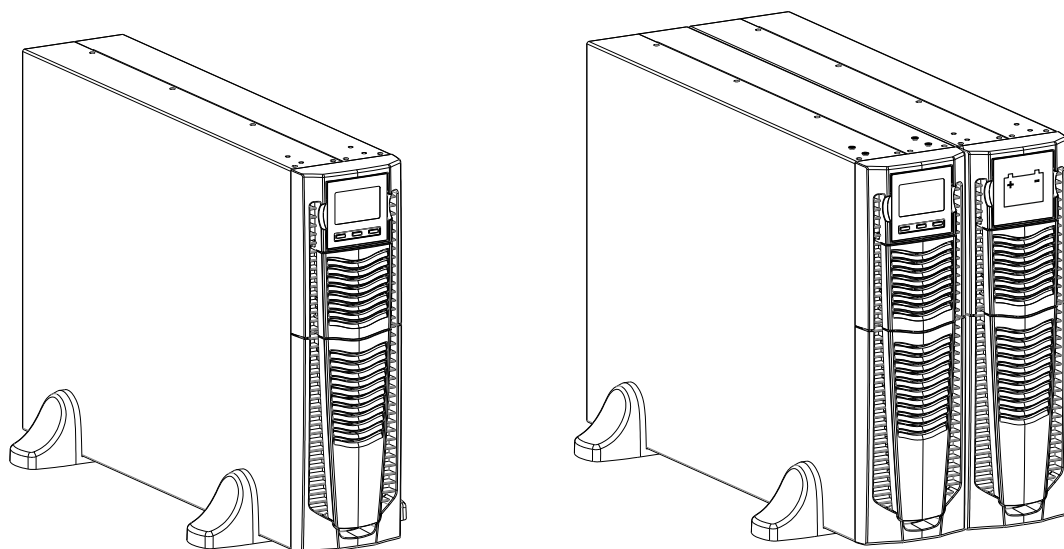
SENTINEL DUAL TM, available in the 8000 VA and 10000 VA versions, was developed to be powered by a three-phase input network. When suitably configured, SENTINEL DUAL TM can also function with a single-phase input.

The batteries are user replaceable without switching off the equipment and without interruption to the load (Hot Swap).

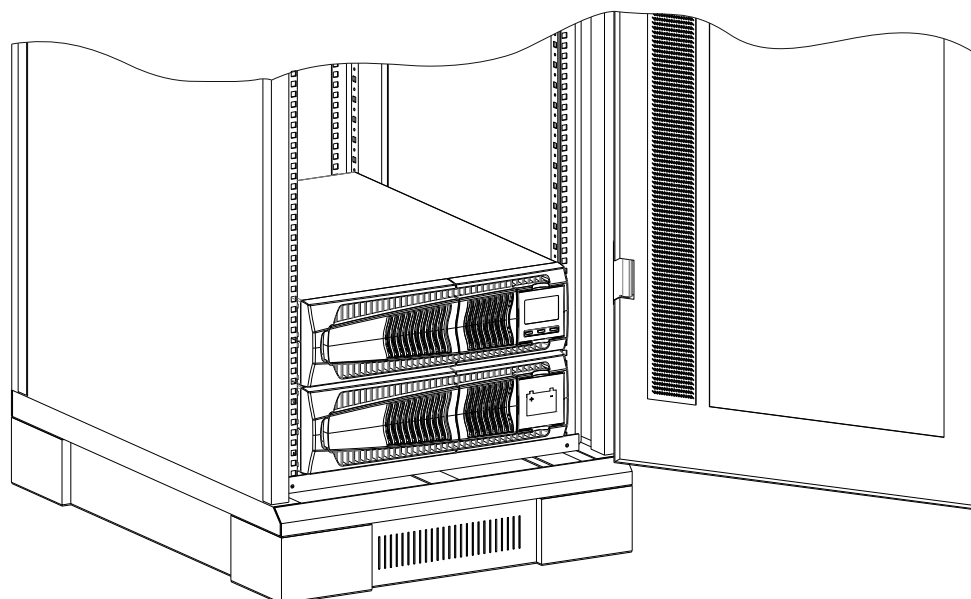
ER series models are fitted with upgraded battery charges for long runtime and business continuity applications. For these versions, the batteries are housed in separate cabinets.

The **DI version** equipped with a separate bypass input line is only available for the 10000VA version.

The **ER DI version** equipped with an enhanced battery charger and separate bypass input is only available for the 10000 VA version.



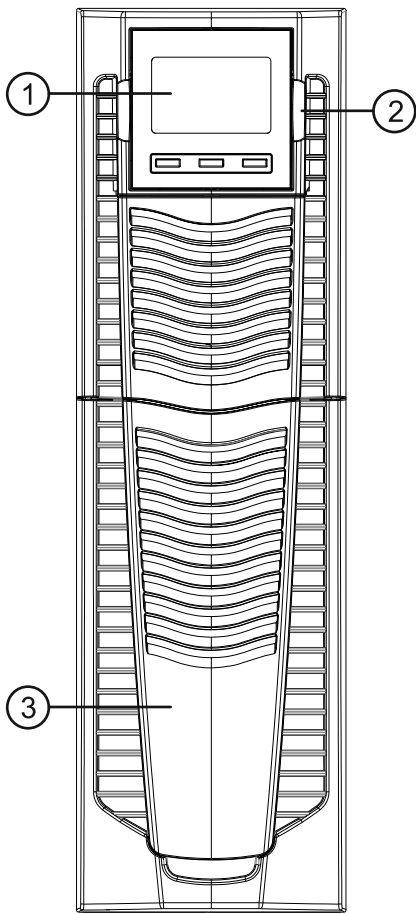
Example of UPS and UPS + BATTERY BOX installed in a tower configuration



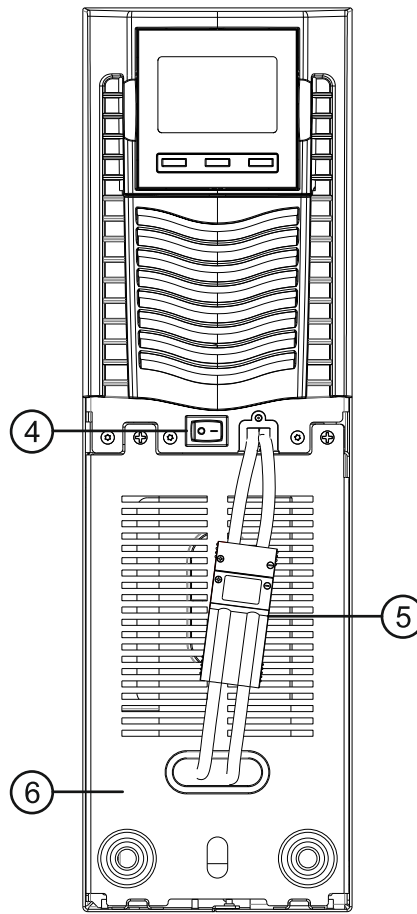
Example of UPS and BATTERY BOX installed in a rack cabinet

UPS VIEWS

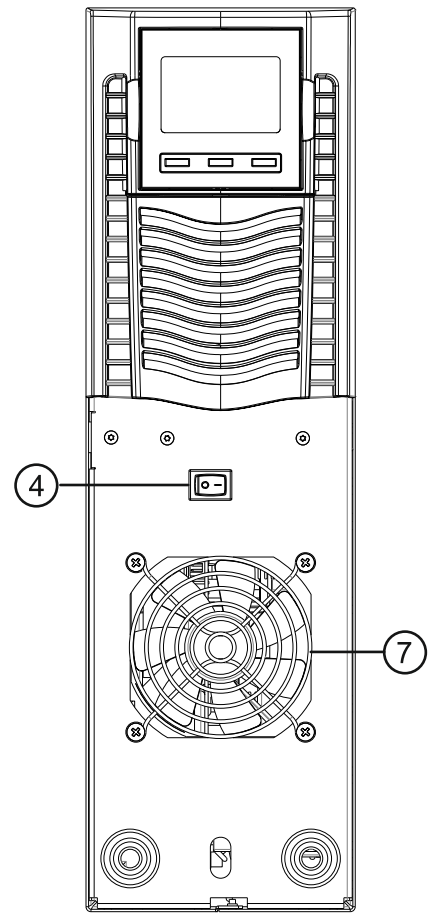
FRONT VIEW



All models



Models 5 – 6 kVA
without front panel



Models 8 – 10 kVA
without front panel

① Extractable/rotatable display plate

⑤ Battery pack connector

② Release slits

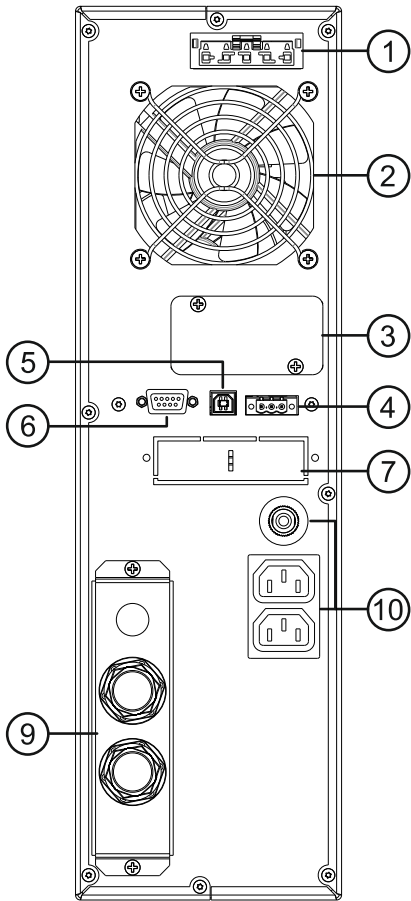
⑥ Battery pack retention panel

③ Removable front panel

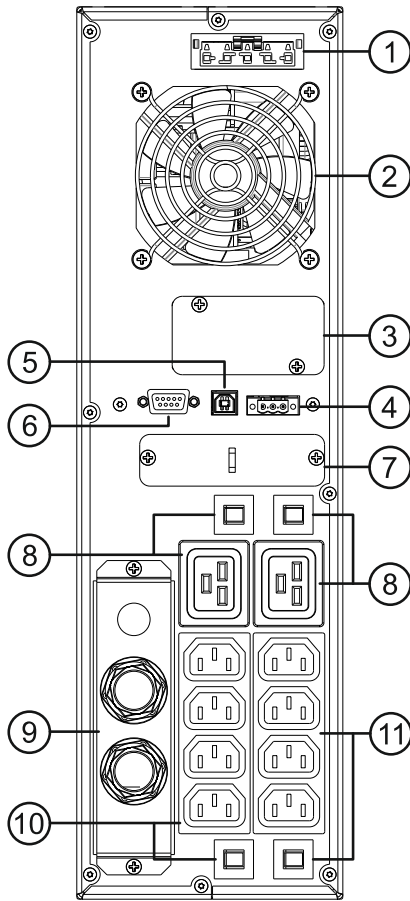
⑦ Cooling fan

④ 1/0 Switch

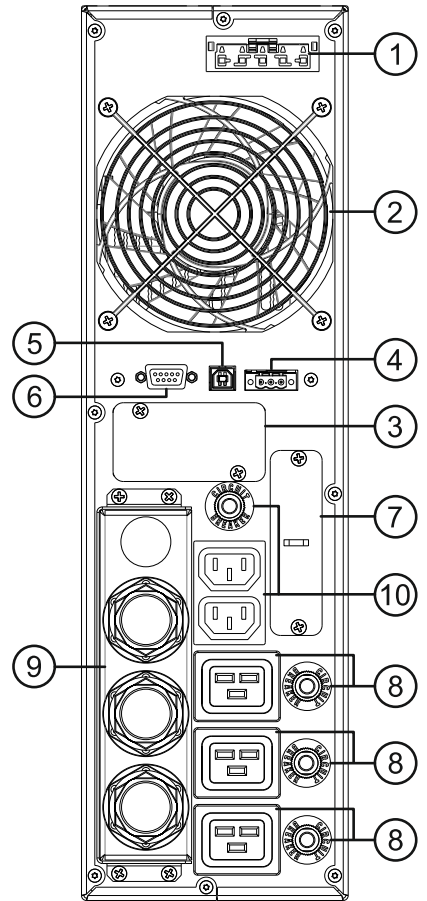
REAR VIEW



Models 5 – 6 kVA



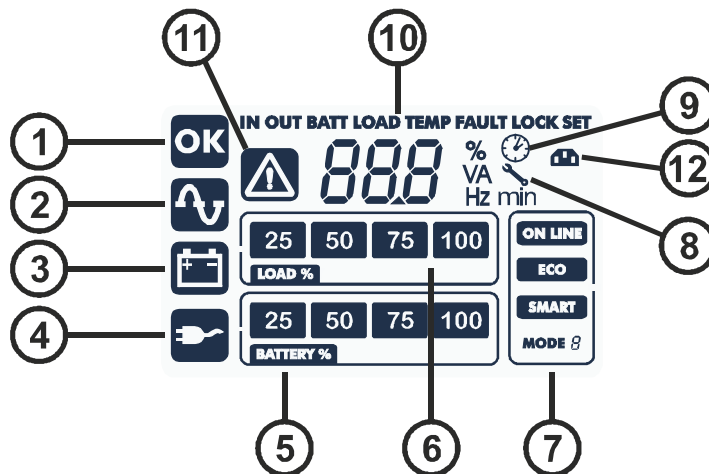
**Models 5 – 6 kVA
with Power Distribution**



Models 8 – 10 kVA

- | | |
|-------------------------------|--|
| ① Battery expansion connector | ⑦ Parallel card slot |
| ② Cooling fan | ⑧ IEC sockets (16A max) and overcurrent protection |
| ③ Communication Card Slots | ⑨ Protection box for IN/OUT connection |
| ④ Remote control terminal | ⑩ EnergyShare sockets (10A max) and overcurrent protection |
| ⑤ USB communication port | ⑪ IEC sockets (10A max) and overcurrent protection |
| ⑥ Communication port RS232 | |

DISPLAY PANEL VIEW



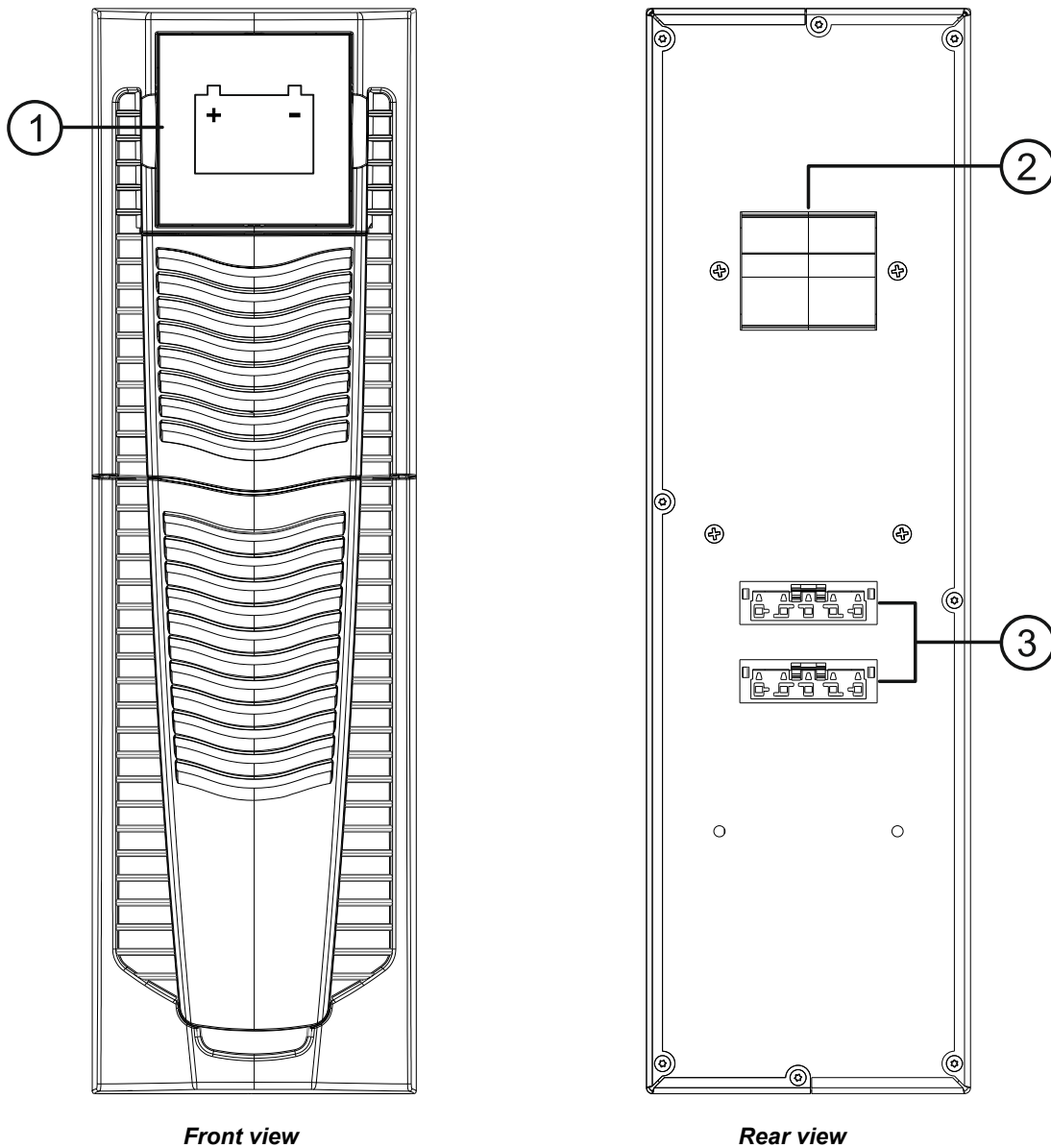
- | | |
|----------------------------|----------------------------|
| Ⓐ "SEL" button | Ⓔ Load level indicator |
| Ⓑ "ON" button | Ⓕ Configuration area |
| Ⓒ "STAND-BY" button | Ⓖ Maintenance request |
| ① Regular operation | ⑨ Timer |
| ② Mains operation | ⑩ Measurement display area |
| ③ Battery operation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

BATTERY BOX (OPTIONAL FOR SOME MODELS)

The BATTERY BOX, with the same dimensions and aesthetic appearance of the UPS, is an accessory supplied as standard for some UPS models and optional for the others.

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 a longer extended runtime.



Front view

Rear view

- ① Extractable/rotatable Battery Box plate
- ② Battery isolator
- ③ Battery expansion connector

SEPARATE BYPASS INPUT (ONLY FOR “DI” VERSIONS)

THE “DI” VERSION OF THE UPS SERIES HAS A BYPASS LINE SEPARATE FROM THE INPUT LINE.

The UPS series with Separate Bypass allows for making a separate connection between the input line and the bypass line. The UPS output will be synchronised with the bypass line in such a way that there will not be any incorrect switching between push-pull voltages if the automatic bypass intervenes or the maintenance bypass switch (SWMB) is closed.

ADDITIONAL INTERNAL BATTERY CHARGERS (ONLY FOR “ER” VERSIONS)

THE “ER” VERSION OF UPS DIFFERS FROM THE STANDARD VERSION IN THAT ADDITIONAL BATTERY CHARGERS ARE USED INSTEAD OF THE BATTERIES .

This series of UPS must be used together with an external Battery Box and is suitable for applications requiring long back-up times .

THREE-PHASE INPUT (“TM” VERSIONS ONLY)

THE “TM” VERSION OF THE UPS SERIES ALLOWS FOR INSTALLING A UPS POWERED BY A THREE-PHASE OR SINGLE-PHASE LINE.

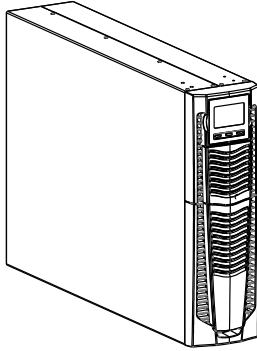
In the THREE-PHASE connection, the load current will be split between the three input phases; if the bypass intervenes or in the bypass mode operation, all the load current will be absorbed by the “L1” input line.

INSTALLATION

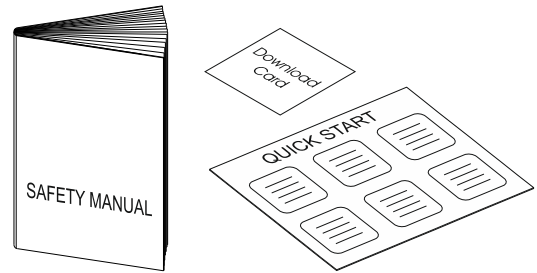
INITIAL CONTENT CHECK

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

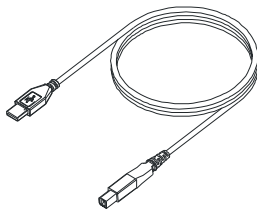
UPS (and eventual BATTERY BOX)



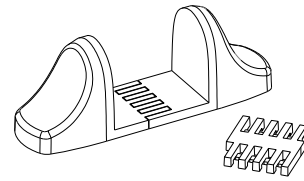
Safety manual + Quick start guide + Download card



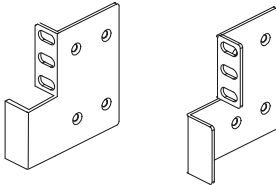
USB cable



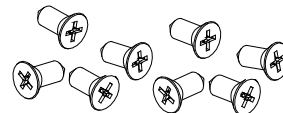
Support feet + extensions



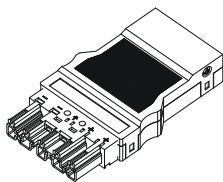
Handles for rack installation



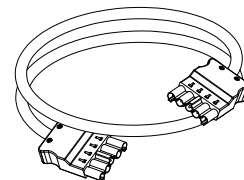
Handle screws



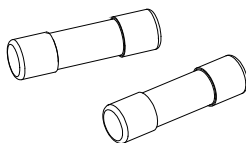
Battery expansion plug
(ER version only)



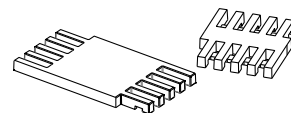
Connection cable UPS - Battery Box
(only for Battery Box)



Fuses
(only for Battery Box)



Support feet extensions
(only for Battery Box)



INSTALLATION ENVIRONMENT

The UPS and the Battery Box 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 VERSION

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



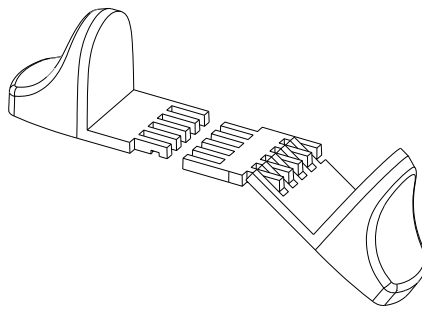
ATTENTION:

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

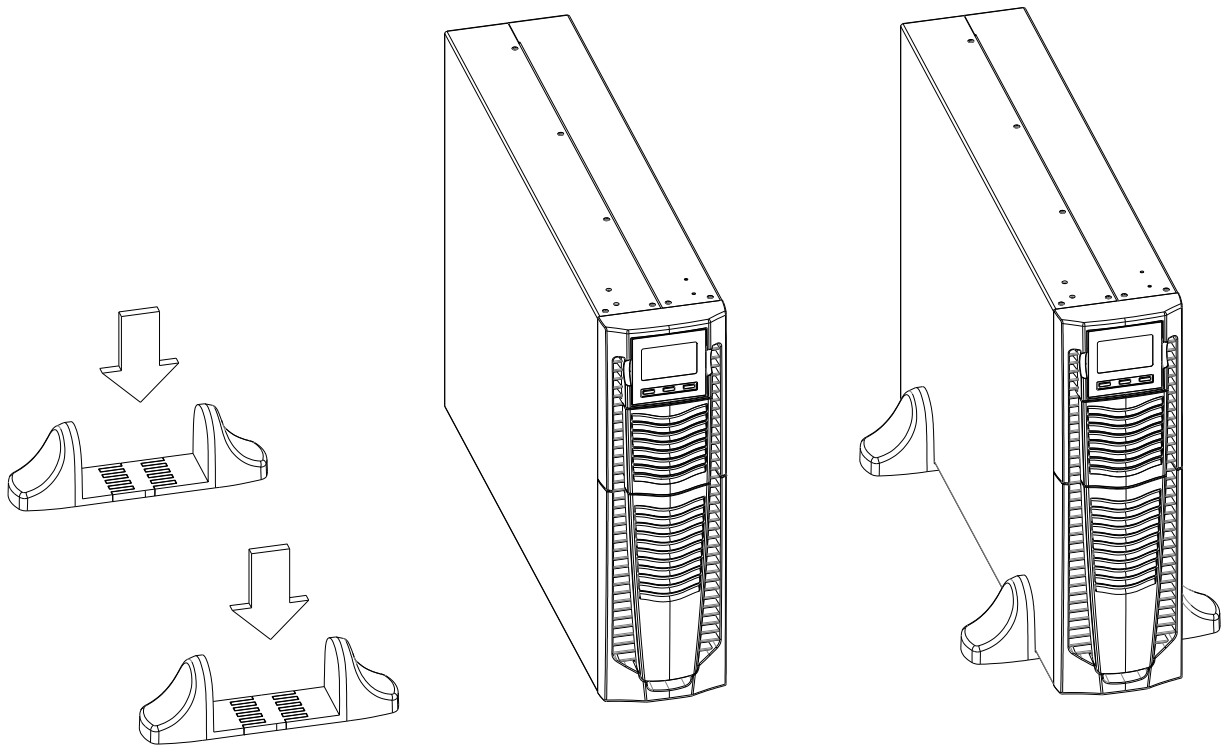
BEFORE YOU CARRY OUT THE FOLLOWING SEQUENCE OF OPERATIONS, MAKE SURE THAT THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD

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 three 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.



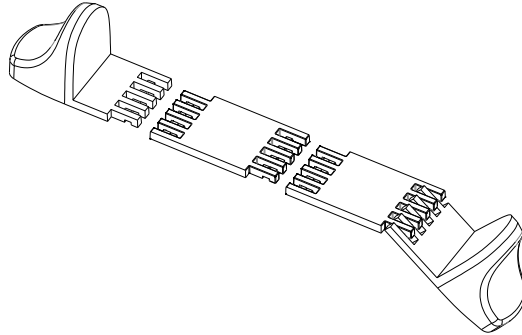
TOWER VERSION WITH BATTERY BOX



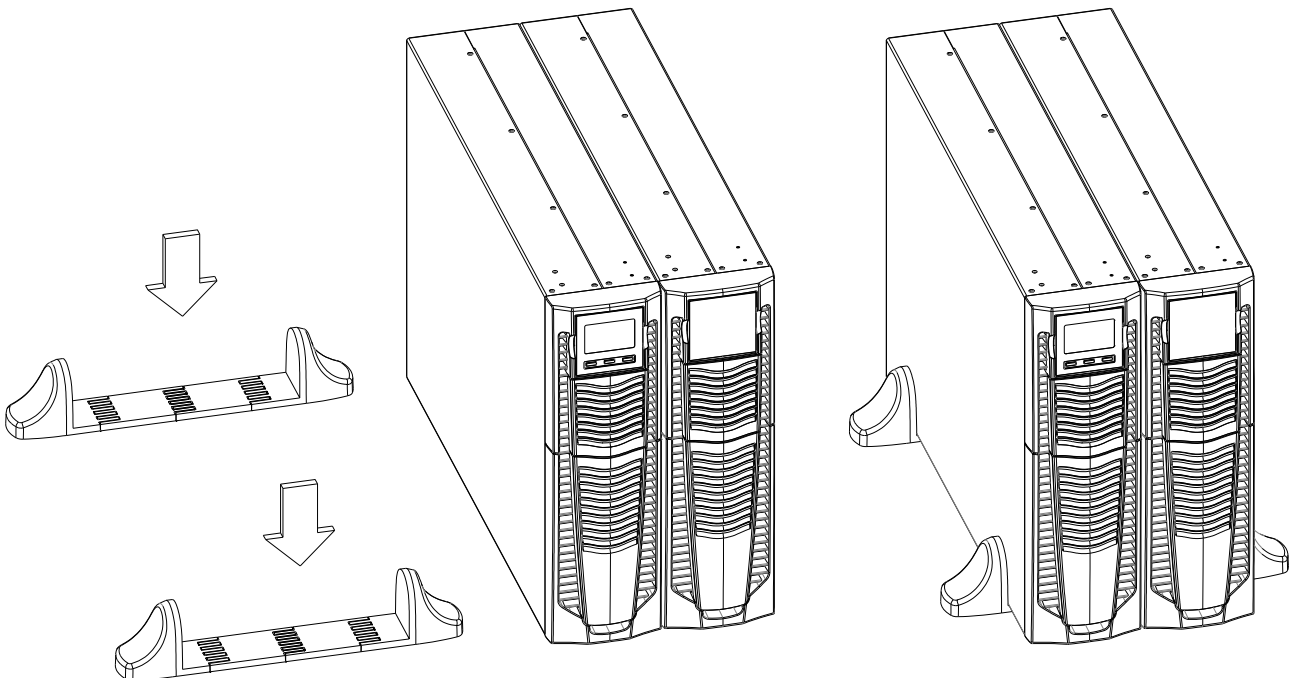
BEFORE CARRYING OUT THE FOLLOWING SEQUENCE OF OPERATIONS, ENSURE THAT:

- **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 four 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.

RACK VERSION

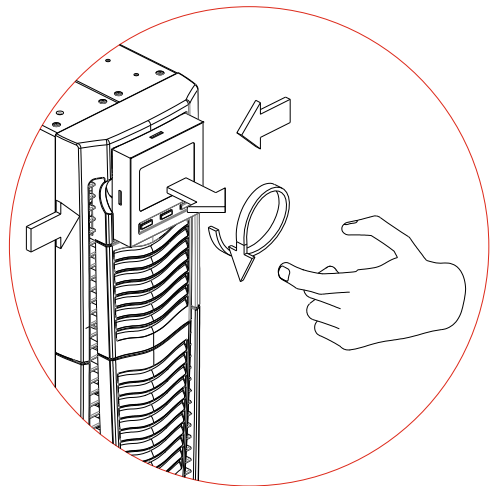
The sequence of operations to be followed in order to transform the UPS or Battery Box into rack version are described below.

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



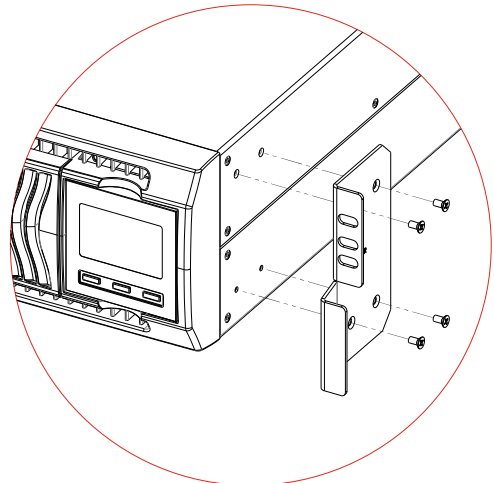
- **THE UPS IS COMPLETELY SWITCHED OFF AND NOT CONNECTED TO THE MAINS POWER SUPPLY OR TO ANY LOAD.**
- **THE BATTERY BOX IS DISCONNECTED FROM THE UPS, FROM ANY OTHER BATTERY BOXES AND WITH THE BATTERY ISOLATOR OPEN**

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 removed 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 be installed in the lower part of the rack cabinet.

POWER CONNECTION



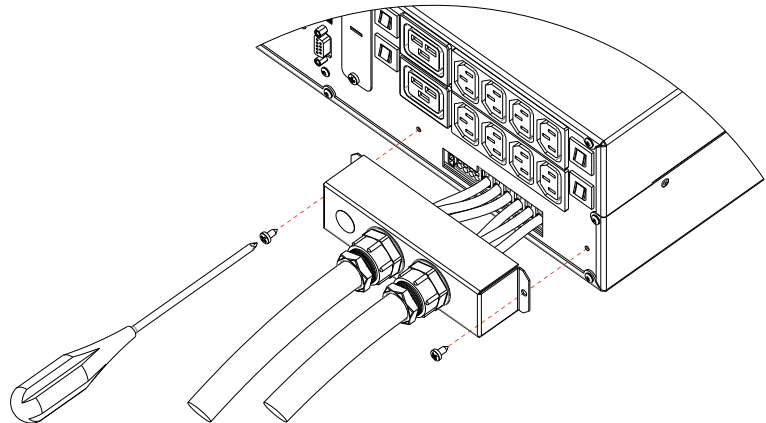
ALL OPERATIONS DESCRIBED IN THIS SECTION MUST BE PERFORMED BY QUALIFIED PERSONNEL ONLY. Our Company assumes no liability for damages caused by incorrect connections or operations not contained in this manual.



The UPS has HAZARDOUS electrical voltages inside it, even when the input and/or battery switches are off. The inside of the UPS is protected by safety panels which should not be removed by untrained personnel. All installation and maintenance or operations involving access inside the UPS require the use of tools and may ONLY be performed by trained personnel.

To carry out the following operations, the UPS must be disconnected from the mains power supply, switched off, and with all the equipment switches and fuse holders open.

1. We recommend using double-insulated multi-core cables to be connected, respectively, to the "INPUT", "OUTPUT" and "BYPASS" terminals (if present).
2. For the cross section, refer to the paragraph "Connection cables cross section details".

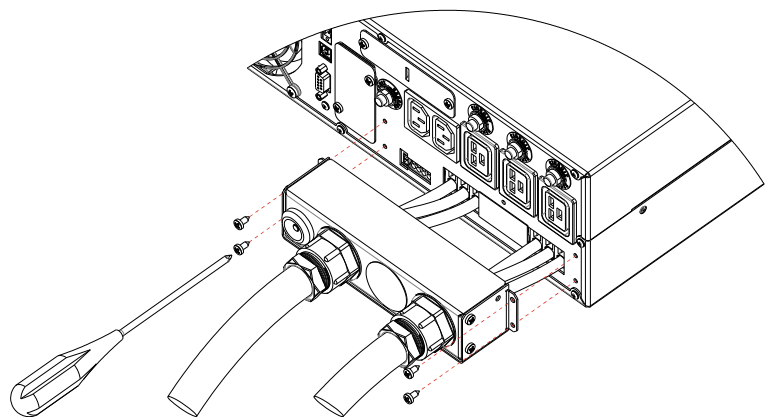


Models 5-6 kVA – Terminals cover installation

3. The wires should be stripped and inserted into the terminals (for the length of the stripping, refer to the paragraph "Connection cables cross section details").

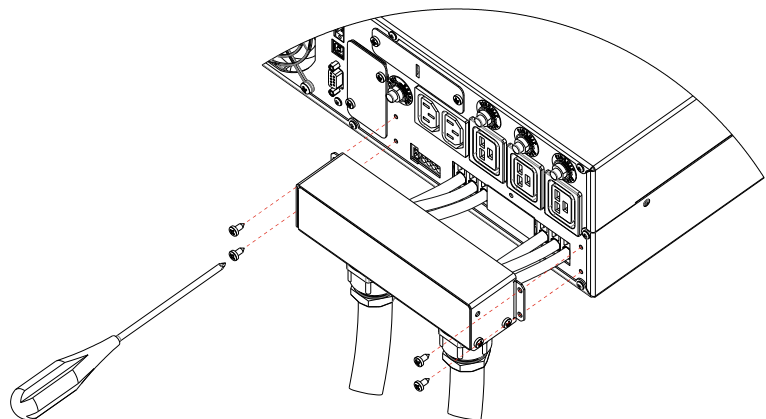
NOTE: To remove the wire, insert a flat blade screwdriver into the clamp slot above the wire inlet.

4. Secure the cables with the cable glands.



Models 8-10 kVA – Terminals cover: standard installation

5. When the installation is complete, close the drawer cover and secure with the screws.



Models 8-10 kVA – Terminals cover: 90° installation

INTERNAL PROTECTIVE DEVICES OF THE UPS

Located within the UPS are fuses (not accessible) in order to protect the rectifier input stage, the output stage of the inverter and the batteries. The table below shows the values of the internal protection fuses.

NOTE: the UPS internal bypass line is not protected by fuses. We recommend installing an external protection device as defined in the chapter "EXTERNAL PROTECTION DEVICES".

Internal protective devices			
UPS Mod.	Input fuses	Battery fuses	Output fuses
5 kVA	2 x 25A GF (6,3x32)	80A aR	2 x 25A GF (6,3x32)
6 kVA	2 x 25A GF (6,3x32)	80A aR	2 x 25A GF (6,3x32)
8 kVA	80A aR	80A aR	63A aR
10 kVA	80A aR	80A aR	63A aR
8 kVA TM	80A aR [L1] 25A GF (6,3x32) [L2/L3]	80A aR	63A aR
10 kVA TM	80A aR [L1] 25A GF (6,3x32) [L2/L3]	80A aR	63A aR

SHORT CIRCUIT

If a fault occurs on the load, the UPS protects itself by limiting the value and the duration of the current supplied (short circuit current). These values also depend on the UPS operating status at the time of the fault, these can either be (in the "Technical Data" table the protection characteristics and timings are described):

- UPS in NORMAL OPERATION: the load is switched instantaneously to the bypass line: the input line is connected to the output without any internal protection.
- UPS in BATTERY OPERATION: the UPS protects itself by providing an higher current than the nominal one (see paragraph "Technical Data") and turns itself off after this time has elapsed.

BACKFEED

The UPS has internal protection against backfeed.

EXTERNAL PROTECTIVE DEVICES

LINE PROTECTION: MAGNETOTHERMAL or FUSE

Within the UPS there are protection devices for output and internal faults.

You must protect the input line (and the separate bypass line if present) with the appropriate protection devices. These devices must comply with the regulations of the country where the UPS is installed.

In order to set up the power line, install a magnetothermal switch upstream from the UPS with intervention curve C or D or gR type fuse. Please follow the indications in the table below:

Automatic external protective devices			
UPS Mod.	Mains input		Separate bypass input (optional) (P+N)
	Single-phase input (P+N)	Three-phase input (3P+N)	
5 kVA	40A	/	/
6 kVA	40A	/	/
8 kVA	63A	63A	/
10 kVA	63A	63A	63A

SAFETY DEVICES: DIFFERENTIAL




The differential switch located upstream must have the following characteristics:

- Differential current adjusted to the sum of UPS + Load; we recommend a suitable margin be kept to prevent unwanted activation.
- Differential type B.

CONNECTION CABLES CROSS SECTION DETAILS

We recommend the INPUT/OUTPUT and BATTERY cables be passed under the UPS.

To determine the minimum cross section of the input and output cables, see the table below:

Cross section of cables (mm ²)*											
UPS Mod.	INPUT					BYPASS (optional)			OUTPUT		
	PE 	N	L1	L2	L3	PE 	L	N	PE 	L	N
5 kVA	6					/			6		
6 kVA	6					/			6		
8 kVA	10 (16 max)					/			10 (16 max)		
10 kVA	10 (16 max)					10 (16 max)			10 (16 max)		
8 kVA TM	10 (16 max)			2,5 (16 max)		/			10 (16 max)		
10 kVA TM	10 (16 max)			2,5 (16 max)		/			10 (16 max)		

The cross sections indicated in the table refer to a maximum length of 10 meters

The L2 and L3 inputs are only available on the SDU TM versions.

The cable cross-sections for the L2 and L3 lines can be reduced to 2.5 mm².

For 8–10 kVA models, the cross-section refers to bare cables (without lugs).

Note: the maximum cross section of the cables that can be inserted into the terminal board are:

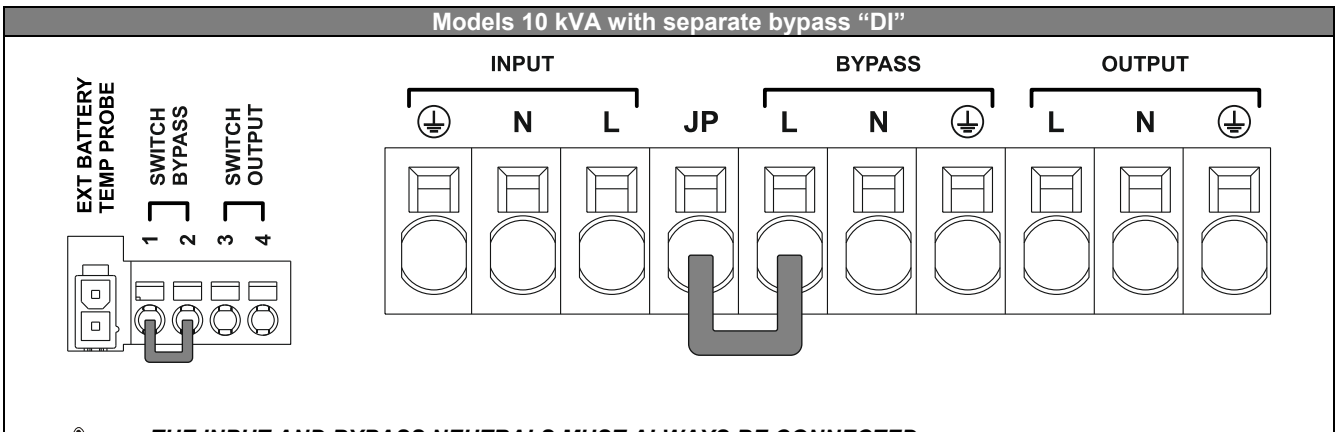
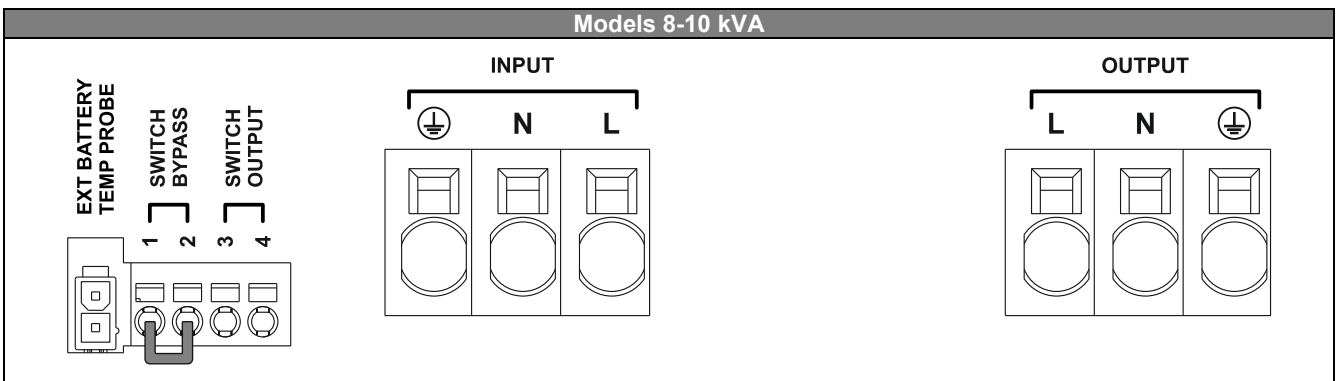
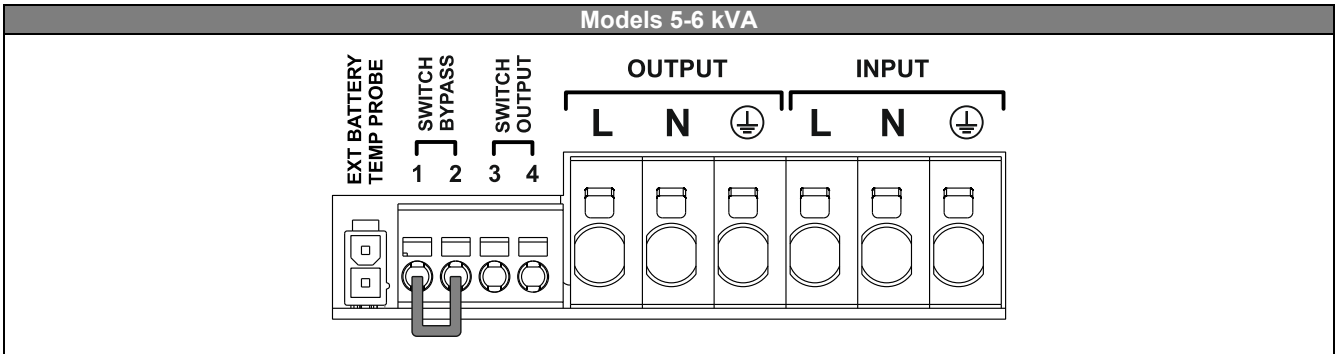
- 15 mm² for UPS 5-6 kVA
- 18 mm² for UPS 8-10 kVA

CONNECTIONS



The first wire to be connected is the protective earth wire, which is to be inserted in the terminal marked PE. During operation the UPS must be connected to the earthing system

Connect the input and output cables to the terminal board as shown in the figure below:

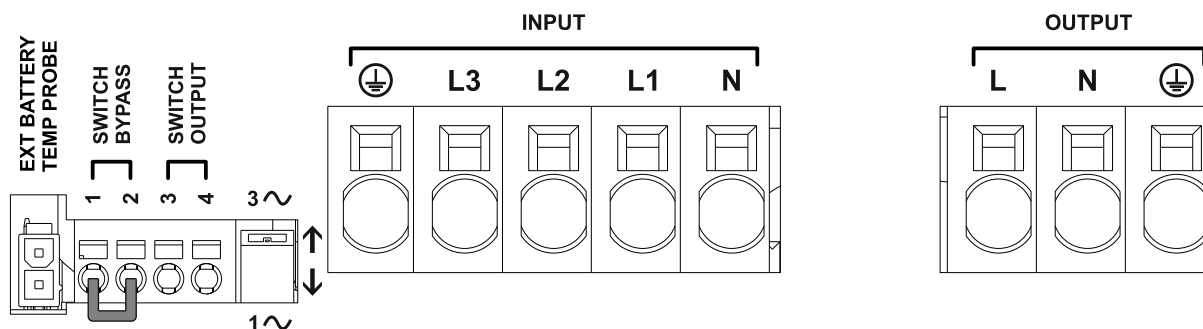


**THE INPUT AND BYPASS NEUTRALS MUST ALWAYS BE CONNECTED.
THE INPUT AND BYPASS LINES MUST REFER TO THE SAME NEUTRAL POTENTIAL.**

THE "DI" VERSION IS PROVIDED WITH A JUMPER TO INSTALL THE UPS EVEN WITHOUT THE SEPARATE BYPASS LINE.

**TO CONNECT THE BYPASS LINE REMOVE THE JUMPER BETWEEN THE "JP" AND "L" TERMINALS.
WARNING: NO OTHER CABLE MUST BE INSERTED IN THE TERMINAL "JP".**

Models 8-10 kVA with three-phase input "TM"



FOR CONNECTION TO A THREE-PHASE LINE WITH NEUTRAL, CONNECT THE THREE PHASES AND THE INPUT NEUTRAL TO "L1", "L2", "L3" AND "N". MAKE SURE THAT THE SWITCH IS IN POSITION "↑ 3~".

FOR CONNECTION TO A SINGLE-PHASE LINE, CONNECT THE LIVE AND THE INPUT NEUTRAL TO "L1" AND "N". SET THE SWITCH TO POSITION "↓ 1~". TERMINALS L2 AND L3 MUST REMAIN FREE.

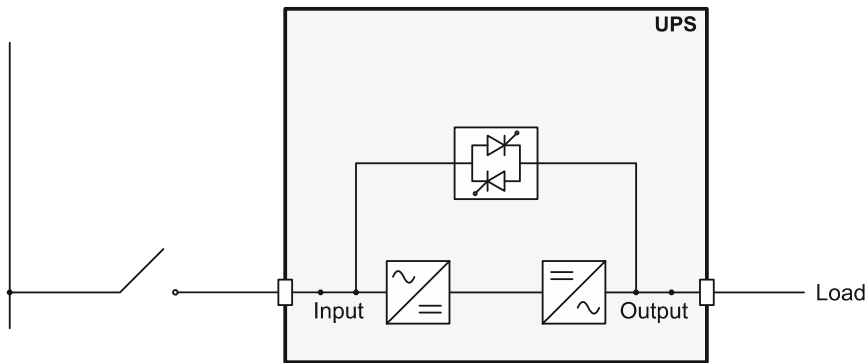
NOTE

1. If an "external manual bypass" is not provided, make sure that there is a jumper between terminals 1 - 2 (Switch bypass).
2. The maximum cross section of the cables that may be inserted in the terminal board 1, 2, 3 & 4 are:
 - 2,5 mm² for bare cables
 - 1,5 mm² for cables with lugs.

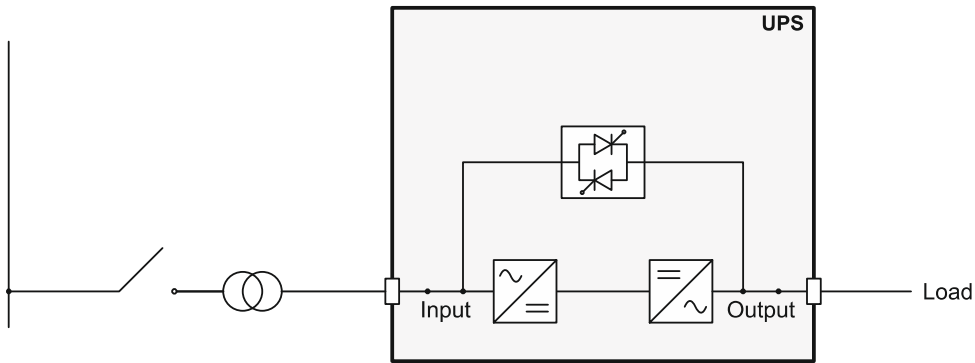
The stripping length is 8 mm

WIRING DIAGRAMS FOR CONNECTING TO THE ELECTRICAL SYSTEM

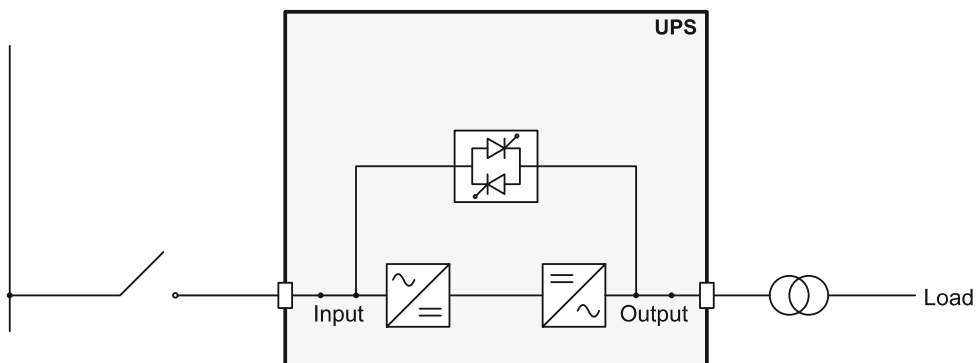
UPS without any variation in neutral condition



UPS with galvanic isolation at input



UPS with galvanic isolation at output

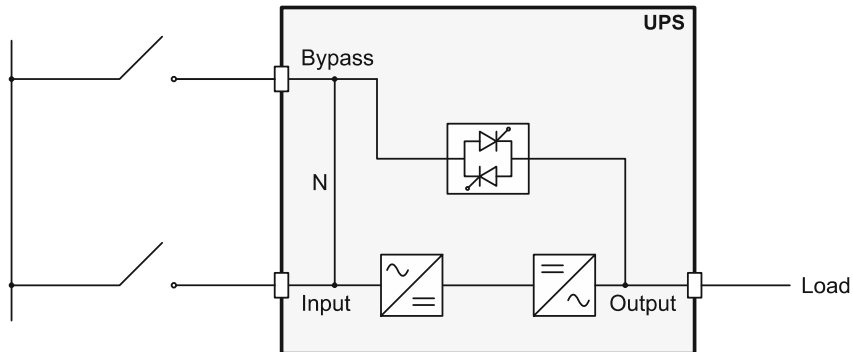


Separate bypass:

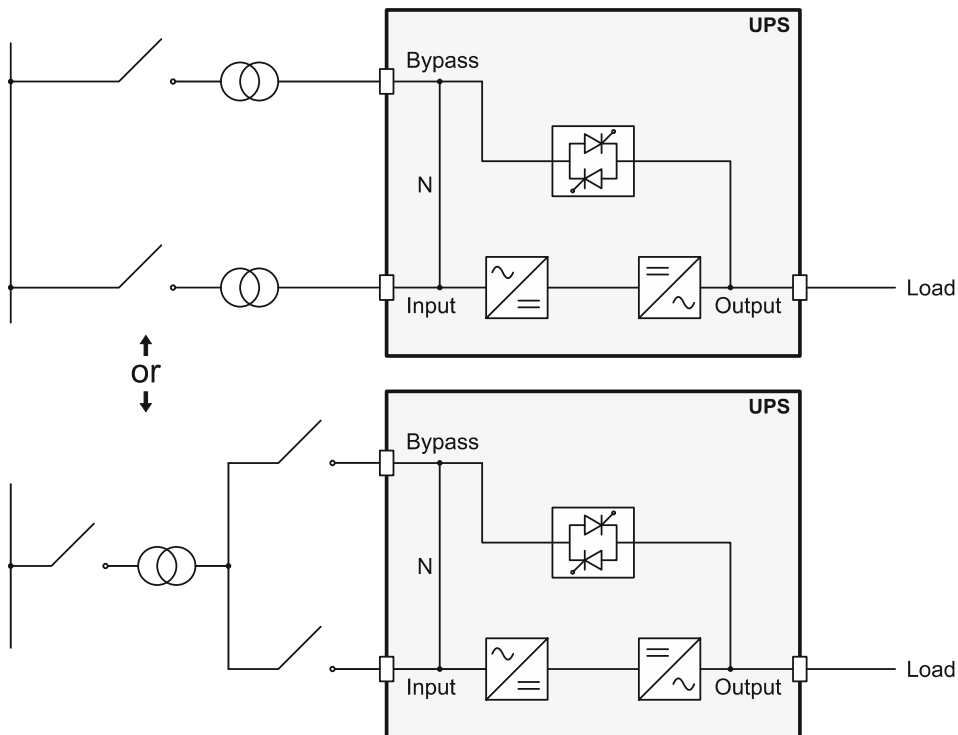
if the separate bypass option "DI" is present, first remove the jumper between JP and L before to connect the bypass line.

Note: the neutral of the main power supply line and the bypass line are connected within the UPS, therefore they must be referenced to the same potential. If the two power supplies are derived from different sources, an isolation transformer must be installed on one of the inputs.

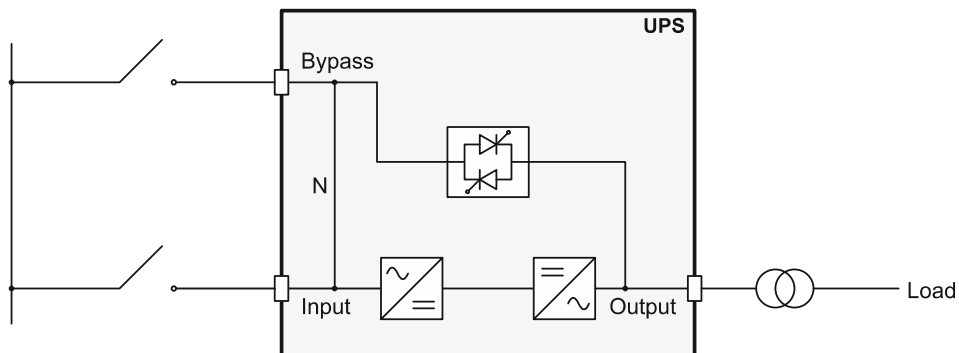
UPS without any variation in neutral condition and with separate bypass input



UPS with galvanic isolation and with separate bypass input



UPS with galvanic isolation at output and separate bypass input

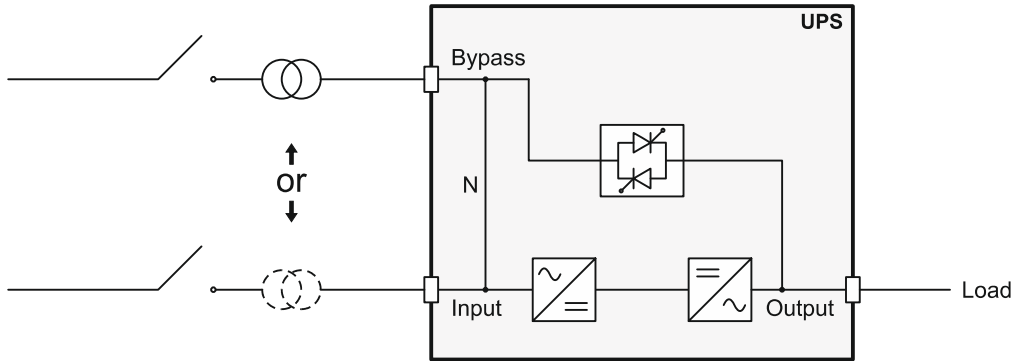


Separate bypass with different lines:

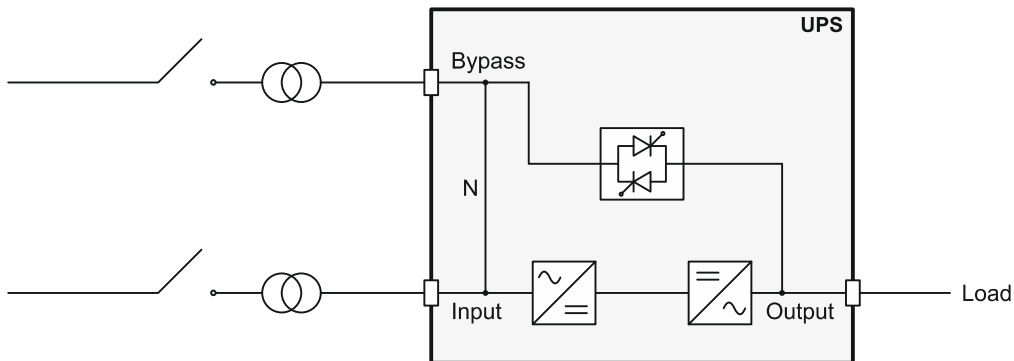
if the separate bypass option “DI” is present, first remove the jumper between JP and L before to connect the bypass line. Protective devices must be present on both the main power supply line and the bypass line.

Note: the neutral of the main power supply line and the bypass line are connected within the UPS, therefore they must be referenced to the same potential. If the two power supplies are derived from different sources, an isolation transformer must be installed on one of the inputs.

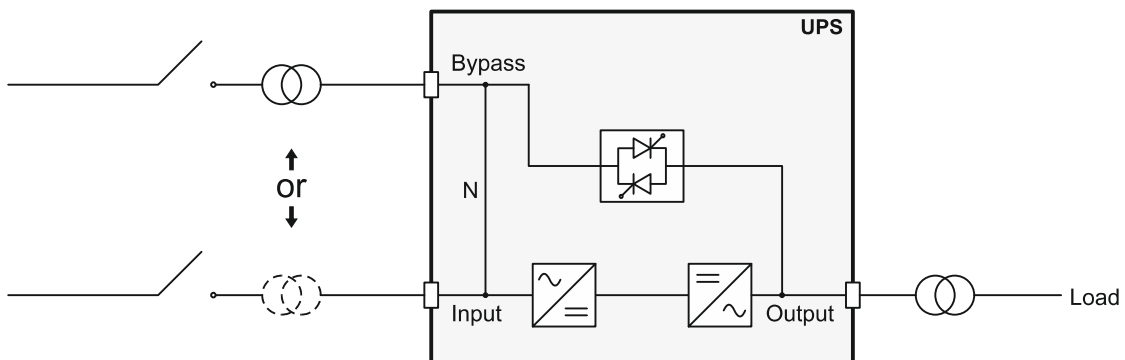
UPS without any variation in neutral condition and with separate bypass input connected to independent power supply line



UPS with separate bypass input on independent power supply line and with galvanic isolation at input



UPS with separate bypass input connected to independent power supply line and with galvanic isolation at output



BATTERY BOX INSTALLATION



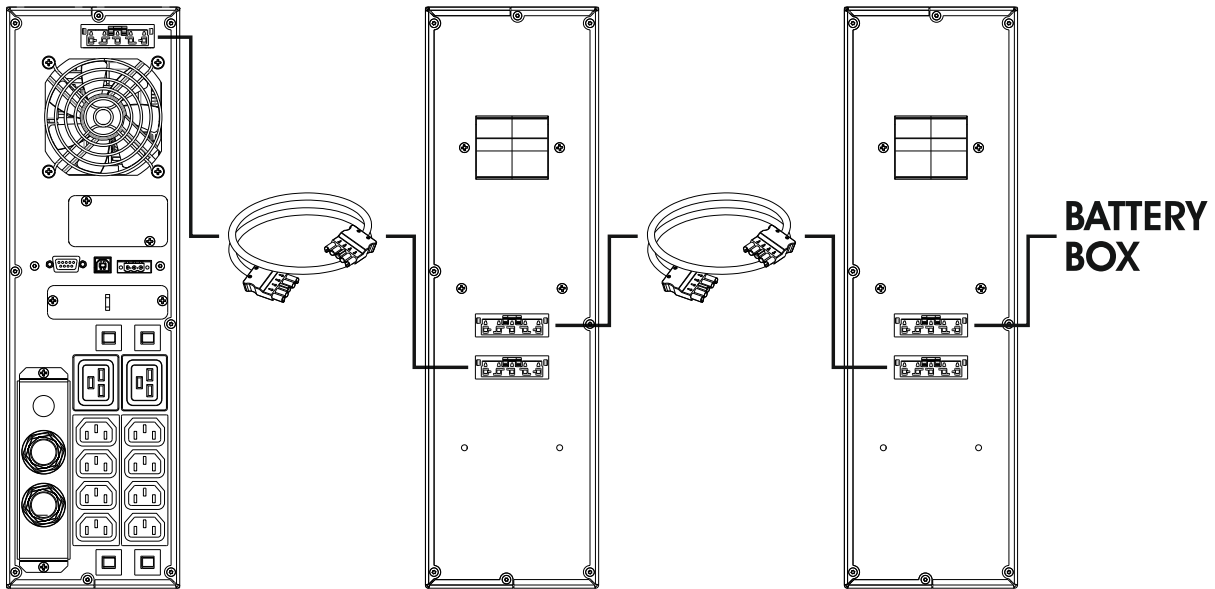
ATTENTION:

CONFIRM ON THE SPECIFICATION LABEL THAT THE VOLTAGE FROM THE BATTERY BOX IS THE SAME AS THAT ALLOWED BY THE UPS.

THE CONNECTION BETWEEN THE UPS AND THE BATTERY BOX MUST BE MADE WITH THE BATTERY BOX FUSE HOLDERS OPEN.

CONNECT THE CABLE BETWEEN THE UPS AND BATTERY BOX. CLOSE THE FUSE HOLDERS ONLY IF THE UPS IS POWERED ON OR IN STAND-BY CONDITION.

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



CONFIGURING THE RATED BATTERY CAPACITY

Before installing one or more Battery Boxes, the UPS must be configured in order to update the rated capacity value (total Ah UPS's internal batteries + external batteries) using the dedicated configuration software.

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.

The maximum length of the connecting cables between the UPS (without internal batteries) and the Battery Box is 3 meters.

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 recommended that you do not connect more than 5 Battery Boxes in cascade to a single UPS. To increase capacity, we recommend installing a Battery Box with higher battery capacity.


CONNECTIONS AND SWITCHING ON FOR THE FIRST TIME

- 1) Power on the UPS.
- 2) Press the 1/0 switch located under the removable front panel.
- 3) 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; and everything is ready for UPS activation. Battery operation is also in stand-by mode provided that the timer is active.
- 4) Connect the equipment to the output of the UPS using cables no longer than 10 metres.
WARNING: Do not connect the IEC 10A and 16A sockets to devices that absorb more than 10A or 16A respectively. For equipment that exceeds these levels, use the appropriate terminals only.
- 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 configurations, set up the UPS with the appropriate configuration software.

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 1/0 switch located under the removable 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 1/0 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 1/0 switch.






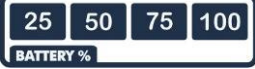




INTERNAL CLOCK SETTING

During the first installation, you must set the internal UPS clock through the configuration software. If the UPS remains off or deactivated for more than 3 days, it will be necessary to re-configure the clock to avoid a failure of any programmed power-on or shut-down configuration.

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 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 *	The EnergyShare sockets are not configured (always connected).
	Fixed*	The EnergyShare sockets was configured via configuration software. At this time the sockets are connected.
	Flashing *	The associated event occurred; the EnergyShare outlets have been disconnected.

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

MEASUREMENT DISPLAY AREA




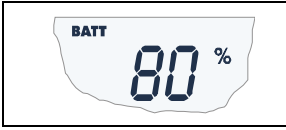



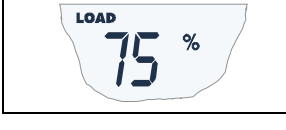

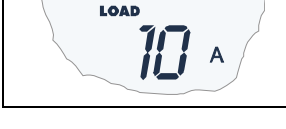




The front panel can be used to display important UPS operating information. When the UPS is switched-on, the display shows the main voltage value.

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:

INDICATIONS ON THE DISPLAY FOR UPS WITH SINGLE-PHASE CONNECTION

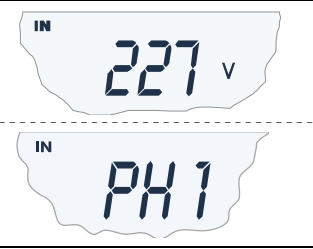
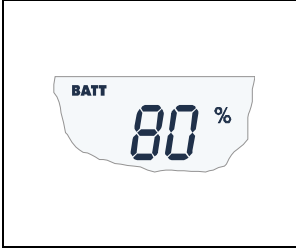
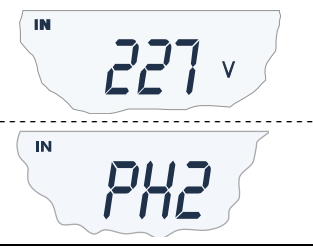

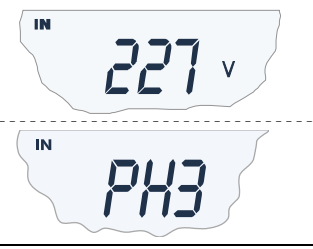
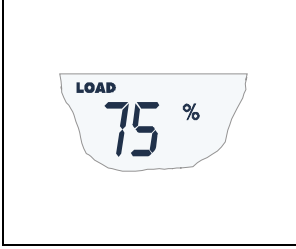

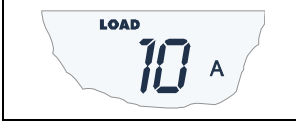

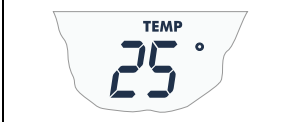
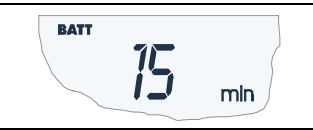


GRAPHIC EXAMPLE ⁽¹⁾	DESCRIPTION	GRAPHIC EXAMPLE ⁽¹⁾	DESCRIPTION
	Mains voltage		Residual battery autonomy
	Mains frequency		Battery charge percentage
	Bypass line voltage (“DI” versions only) ⁽²⁾		Total battery voltage
	Bypass line frequency (“DI” versions only) ⁽²⁾		Applied load percentage
	UPS output voltage		Current absorbed by the load
	Output voltage frequency		UPS internal temperature
	Fault / Alarm ⁽³⁾ : the corresponding code is displayed		Lock ⁽³⁾ : the corresponding code is displayed

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

⁽²⁾ The visualisation of the sizes for the bypass line appear on the display only when the “SEPARATED BYPASS LINE” function is set from the configuration software.

⁽³⁾ The FAULT / LOCK codes can only be displayed if they are active (presence of a fault/alarm or a lock).

INDICATIONS ON THE DISPLAY FOR UPS WITH THREE-PHASE CONNECTION

GRAPHIC EXAMPLE ⁽¹⁾	DESCRIPTION	GRAPHIC EXAMPLE ⁽¹⁾	DESCRIPTION
	Phase 1 ⁽²⁾ voltage		Battery charge percentage
	Phase 2 ⁽²⁾ voltage		Total battery voltage
	Phase 3 ⁽²⁾ voltage		Applied load percentage
	UPS output voltage		Current absorbed by the load
	Output voltage frequency		UPS internal temperature
	Residual battery autonomy		
	Fault / Alarm ⁽³⁾ : the corresponding code is displayed		Lock ⁽³⁾ : the corresponding code is displayed

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

⁽²⁾ Phase No./Voltage alternating indication

⁽³⁾ The FAULT / LOCK codes can only be displayed if they are active (presence of a fault/alarm or a lock).

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.
- To change the mode, press the “ON” button.
- The icon corresponding to the mode currently set lights up.
- To confirm the mode chosen, hold down the “SEL” button for at least 3 seconds.

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 goes out of the permitted tolerance range, the UPS switches to ON LINE operation. If the mains returns 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 "C05" 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 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.

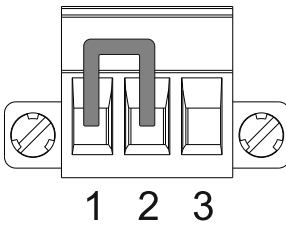
The remote control terminal allows for implementation of the REPO function (Remote Emergency Power Off) and to remotely switch ON and switch OFF the UPS.

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.

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.

REDUNDANT AUXILIARY POWER ADAPTER FOR AUTOMATIC BYPASS

The UPS is equipped with a redundant auxiliary power adapter which permits operation on the automatic bypass even in the event of main auxiliary power faults. If a fault occurs in the UPS shutting off the main auxiliary power supply, the load is powered by the automatic bypass automatic bypass without any internal protection and without any limitation of the power delivered to the load. In this emergency condition, any perturbations present on the input line affect the load. The multiprocessor board and control panel are not powered in this mode; therefore, the LEDs and displays are off.

EXTERNAL TEMPERATURE PROBE

This **NON-ISOLATED** input can be used to measure the temperature inside a remote Battery Box.



It is essential that only the kit provided by the manufacturer is used. Any uses not conforming to the specifications may cause faults or breakdowns of the equipment.

To install, connect the cable included in the special kit to the "EXT BATTERY TEMP PROBE". After installation, enable the outdoor temperature measuring function using the configuration software.

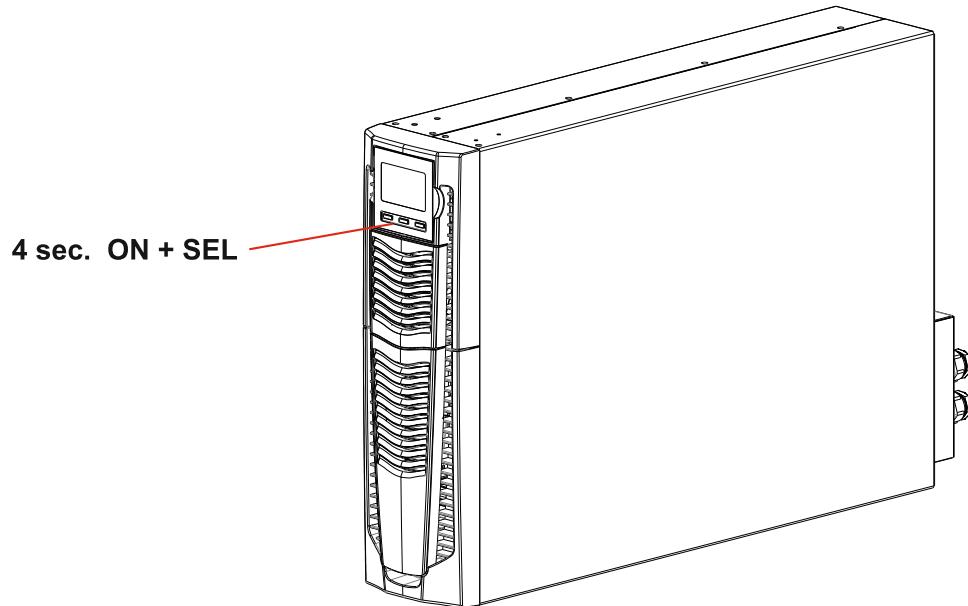
BATTERY PACK REPLACEMENT (ONLY FOR 5 - 6 kVA)

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.

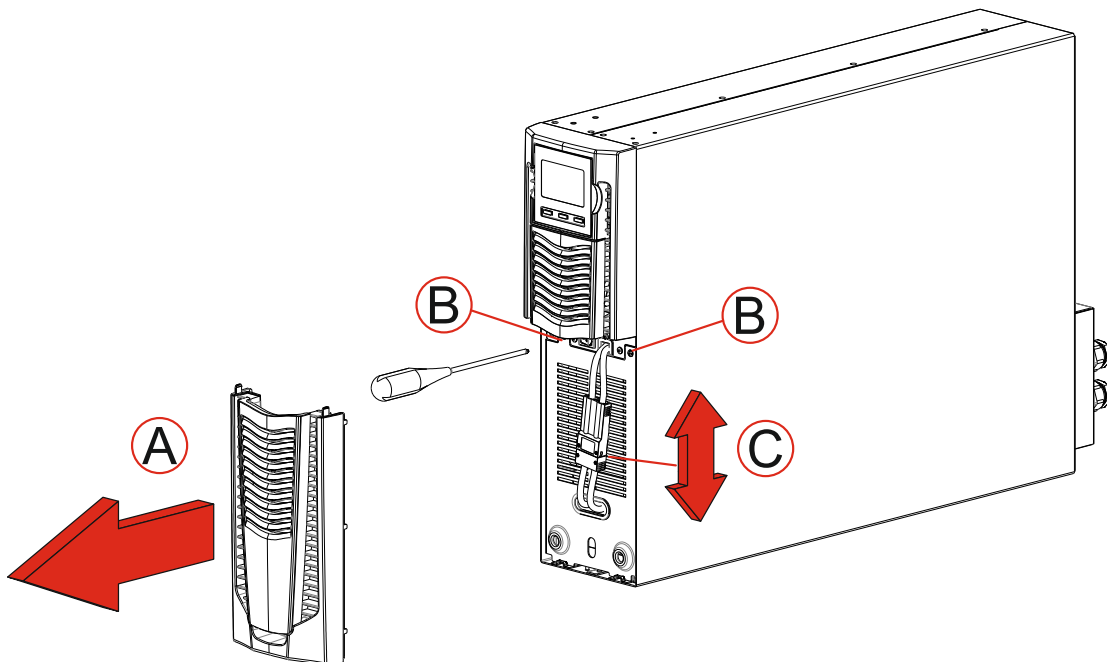


- **WHEN THE BATTERY PACK IS DISCONNECTED, THE LOADS CONNECTED TO THE UPS ARE NOT PROTECTED IN THE EVENT OF A MAINS FAILURE**
- **THE BATTERY PACK IS VERY HEAVY. USE EXTREME CAUTION WHEN REPLACING IT.**

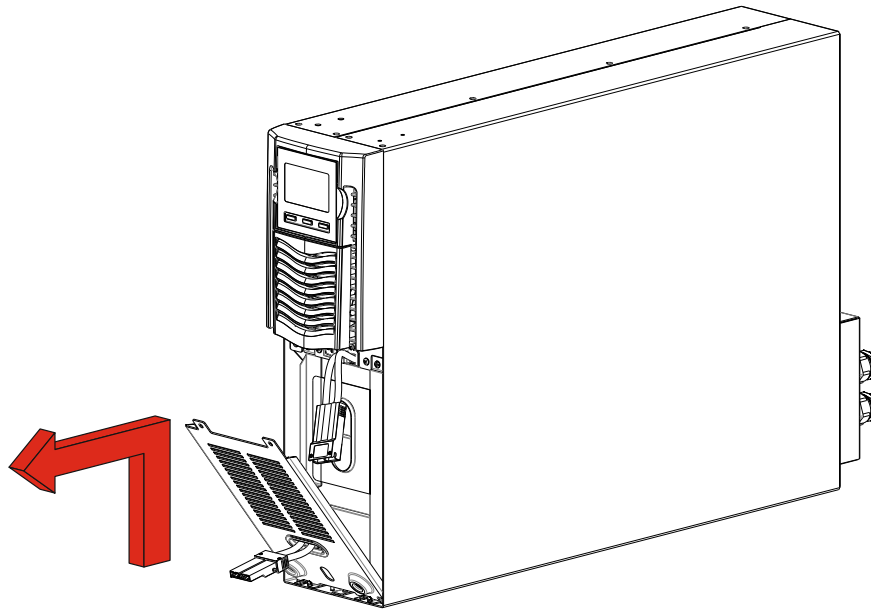
1. Set the UPS to bypass mode manually by pressing the ON-SEL buttons for 4 seconds (see paragraph entitled "Manual Bypass"). The display should show the message "C05" NOTE: in this condition the load is powered by bypass.



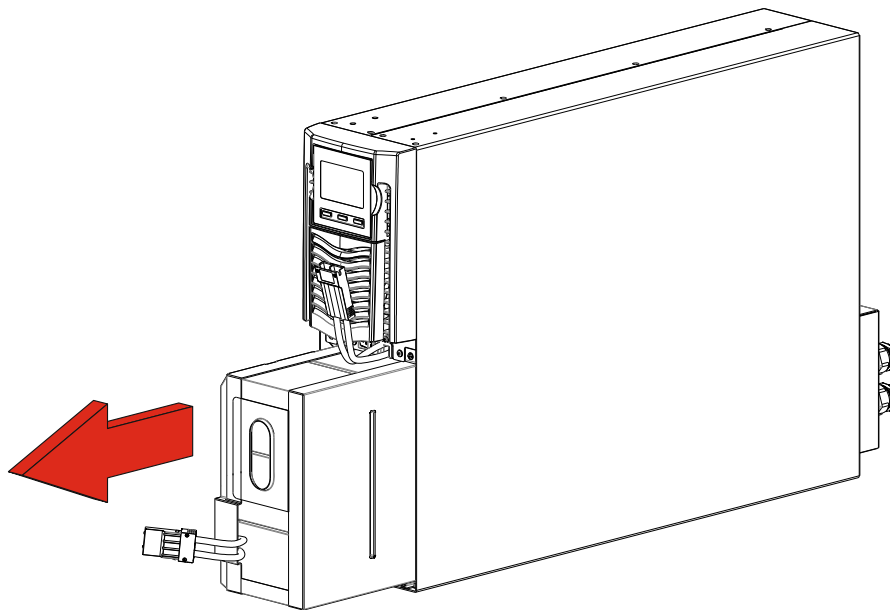
2. The battery pack is positioned behind the UPS front panel. Remove the front panel as shown in the figure below (A). Remove the screws from the battery pack's retention panel (B). Disconnect the connector that connects the battery pack to the UPS (C).



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 C05.
7. Press the ON key for 5 seconds to start the battery status verification procedure.

SOFTWARE

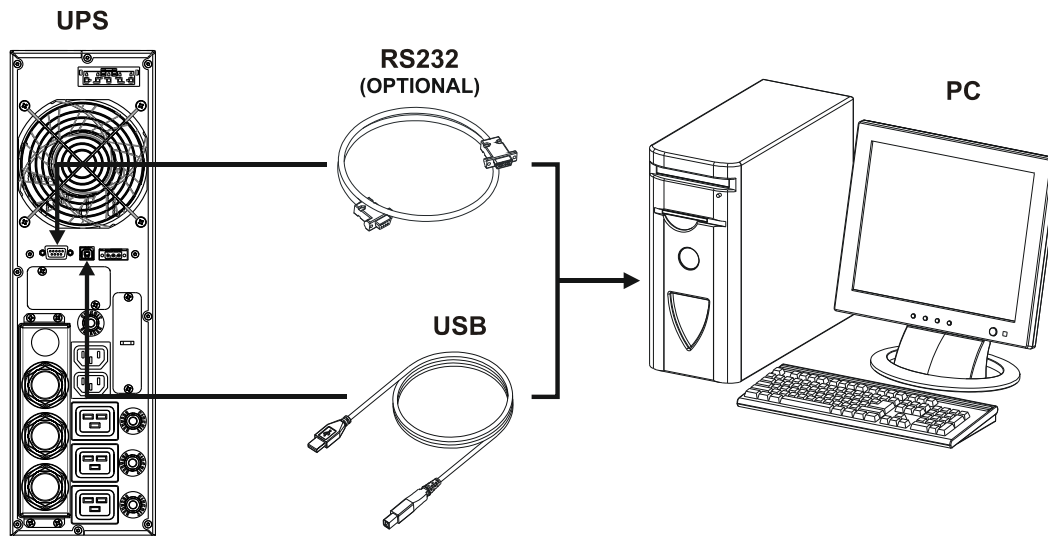


CAUTION:

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 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 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.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 SOFTWARE

Configuration and customisation software allows the configuration and complete visualisation of UPS status via USB or RS232 port. For a list of possible configurations available to the user, refer to the "*UPS Configuration*" paragraph.

INSTALLATION OPERATIONS

Connect one of the UPS's communication ports to one of the PC's communication ports using the cable supplied.

Follow the installation program instructions, For more detailed information about installation and use, refer to the software manual which can be downloaded from our website www.riello-ups.com

UPS CONFIGURATION

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

FUNCTION	DESCRIPTION	DEFAULT
Operating mode	Selects the operating modes	ON LINE
Output voltage	Selects the rated output voltage (Phase - Neutral)	230 V
Output nominal frequency *	Selects the rated output frequency	50 Hz
Autorestart	Waiting time for automatic power-on after the return of mains voltage	5 s
Auto power off	Automatic UPS power-off in battery operation mode if the load is lower than 5%	Disabled
Buzzer Reduced	Selects the audible alarm operating mode	Reduced
EnergyShare off	Selects the operating mode of EnergyShare sockets	Always connected
Timer	Programmed UPS power ON/OFF (daily)	Disabled
Autonomy limitation	Maximum battery operation time	Disabled
Maximum load	Selects the user overload limit	Disabled
Bypass Synchronization speed	Selects the synchronisation speed of the inverter to the bypass line	1 Hz/s
External temperature	Activates reading of the external temperature probe	Disabled
Separated bypass line	Activate the visualisation on the display of the separate bypass line (INOUT)	Disabled
Bypass mode *	Selects the mode of use of the bypass line	Enabled / High sensitivity

FUNCTION	DESCRIPTION	DEFAULT
Bypass active in stand-by	Load supply from bypass with UPS in stand-by	Disabled (load NOT supplied)
Bypass frequency tolerance	Selects the accepted range for the input frequency for switching to the bypass and for the synchronisation of the output	± 5%
Bypass min.-max. threshold	Selects the accepted voltage range for switching to the bypass	Low: 180 V High: 264 V
Eco mode sensibility	Selects the intervention sensitivity during operation in ECO mode	Normal
Eco mode min.-max. threshold	Selects the accepted voltage range for operation in ECO mode	Low: 200 V High: 253 V
UPS without battery	Operating mode without batteries (for converters or voltage stabilizers)	Operating with Batteries
Battery low time	Estimated autonomy time remaining for “battery low” warning	3 min.
Automatic battery test	Interval of time for the automatic battery test	40 hours
Parallel common battery	Common Battery for parallel UPS systems	Disabled
Internal battery capacity	Nominal Battery capacity for internal batteries	Change according with UPS model
External battery capacity	Nominal Battery capacity for external batteries	9 Ah for UPS without internal batteries; 0Ah all other cases
Battery recharging current	Recharging current compare to battery nominal capacity	12%

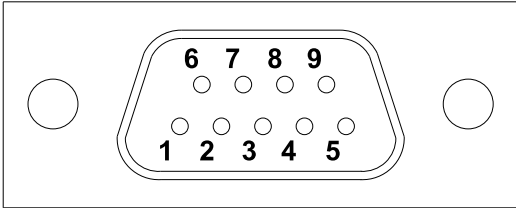
* On all UPS devices of the SDU series, with the exception of the DI versions (10000 VA) and ER DI versions (10000 VA), for “Frequency converter” mode configurations or if the synchronisation with the bypass is disabled, the UPS will derate the output power.

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

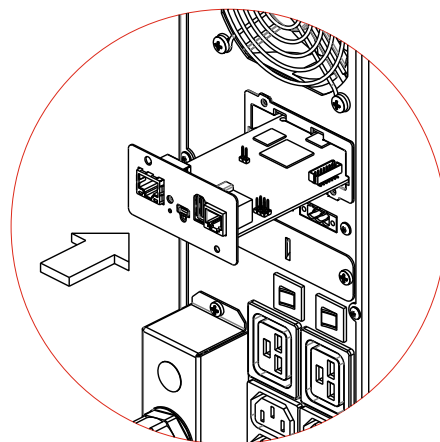
RS232 CONNECTOR		
		
PIN #	SIGNAL	NOTES
1	Programmable OUTPUT #3 *: [default: UPS in lock]	(*) Opto-isolated contact max. +30Vdc / 35mA. These contacts can be associated with other events using the configuration software For further information about interfacing with the UPS, refer to the dedicated manual
2	TXD	
3	RXD	
5	GND	
6	Power supply DC ($I_{max} = 20mA$)	
8	Programmable OUTPUT #1 *: [default: low battery pre-alarm]	
9	Programmable OUTPUT #2 *: [default: 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:

- 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

An irregular operation of the UPS is frequently not due to malfunctions, but to simple problems, inconveniences or distractions. Therefore, the user is advised to consult the table below providing useful information on how to solve the most common problems.



WARNING: the table below often refers to the use of the maintenance *BYPASS* (SWMB). If the device is installed, before restoring the correct operation of the UPS, make sure that it is switched on and **not in *STAND-BY***.

NOTE: For the exact meaning of the codes mentioned in the table, please read the “ALARM CODES” section.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE UPS CONNECTED TO THE MAINS, DOES NOT SWITCH TO STAND BY MODE (THE DISPLAY DOES NOT LIGHT UP)	CONNECTION TO THE INPUT TERMINAL MISSING	Connect the mains to the terminals following the indications in the paragraph on Installation
	NEUTRAL CONNECTION MISSING	The UPS cannot function without the neutral connection. WARNING: the absence of this connection can damage the UPS and/or the load. Connect the mains to the terminals as explained in the paragraph on installation.
	1/0 SWITCH IS SET TO 0	Set the switch to 1
	THE ISOLATOR (SWIN) IS OPEN	Close the isolator
	MAINS POWER MISSING (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. <u>Warning:</u> make sure there is no overload or short circuit on the UPS output.
NO POWER REACHES THE LOAD	CONNECTION TO THE OUTPUT TERMINAL MISSING	Connect the load to the terminals
	THE UPS IS IN STAND-BY MODE	Run the start-up sequence
	THE STAND-BY OFF MODE HAS BEEN SELECTED	The operating mode must be changed. In fact the STAND-BY OFF (emergency) mode only powers the loads when a black out occurs.
	MALFUNCTION OF THE UPS AND AUTOMATIC BYPASS OUT OF USE	Insert the maintenance bypass (SWMB) and contact the nearest service centre
THE UPS OPERATES OFF THE BATTERIES EVEN THOUGH MAINS POWER IS PRESENT	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 OUT OF THE ALLOWED OPERATING VALUES FOR MAINS POWER	Problem caused by the mains power. Wait for the input mains voltage to return within the tolerance limits. The UPS will return automatically to mains operation.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS THE FOLLOWING CODE: C01	THE JUMPER IS MISSING FROM THE R.E.P.O. CONNECTOR OR IT IS NOT INSERTED CORRECTLY	Assemble the jumper or make sure that it is inserted correctly.
THE DISPLAY SHOWS THE FOLLOWING CODE: C05	MAINTENANCE BYPASS ISOLATOR (SWMB) CLOSED	Open the isolator (SWMB).
	THE JUMPER IS MISSING FROM THE TERMINALS "SWITCH BYPASS"	Insert the jumper
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A30, A32 AND THE UPS DOES NOT START UP	AMBIENT TEMPERATURE < 0°C	Heat the environment, wait for the heat sink temperature to rise above 0°C and then start up the UPS
	FAULT IN HEAT SINK TEMPERATURE PROBE	Activate the maintenance bypass (SWMB) if present, turn the UPS off and back on again and exclude the maintenance bypass. If the problem persists, contact the nearest service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F09, F10	THE VOLTAGE VALUE OF PHASE 1 IS NOT SUFFICIENT TO PRE-LOAD THE UPS	Wait for the input network voltage values to stabilise within the ranges accepted by the UPS.
	FAULT IN THE UPS INPUT STAGE	Activate the maintenance bypass (SWMB) if present, turn the UPS off then back on again. Exclude the maintenance bypass. If the problem persists, contact the nearest service centre.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F11, F14, F17, L06, L07, L08, L09, L14, L17, L20	ANOMALOUS LOADS APPLIED	Remove the load. Insert the maintenance bypass (SWMB) if present, turn the UPS off and back on again. Exclude the maintenance bypass. If the problem persists, contact the nearest service centre
	FAULT IN THE INPUT OR OUTPUT STAGE OF THE UPS	Activate the maintenance bypass (SWMB) if present, turn the UPS off and back on again. Exclude the maintenance bypass. If the problem persists, contact the nearest service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F03, F04, F05, A08, A09, A10	CONNECTION MISSING ON ONE OR MORE PHASES (ONLY FOR TM VERSION)	With the three-phase connection the switch must be in position "↑ 3~". Check the connection of Phase 2 and Phase 3.
	CHECK THE POSITION OF THE SWITCH ON THE REAR OF THE UPS (ONLY FOR TM VERSION)	With the single-phase connection the switch must be in position "↓ 1~". Check the position of the switch selector.
	INTERNAL PROTECTION FUSES ON THE PHASE OR ON THE INPUT RELAY BROKEN	Contact the nearest service centre

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS THE FOLLOWING CODE: A13	PROTECTION DEVICE UPSTREAM FROM THE BYPASS LINE OPEN (ONLY IF BYPASS IS SEPARATE)	Restore the protection device upstream. WARNING: check that there is no overload or short circuit at the output of the UPS
	BYPASS ISOLATOR OPEN (SWBYP ONLY IF BYPASS IS SEPARATE)	Close the isolator.
THE DISPLAY SHOWS THE FOLLOWING CODE: F19	BATTERY CHARGER FAULT	Open the battery fuse holders (SWBATT) and insert the maintenance bypass (SWMB) if present, turn the UPS off completely. Turn the UPS back on and if the problem persists, contact the nearest service centre
THE DISPLAY SHOWS THE FOLLOWING CODE: A26	BATTERY FUSES BLOWN OR FUSE HOLDER ISOLATORS OPEN	Replace the fuses or close the isolators (SWBATT). WARNING: if necessary, we recommend fuses be replaced with others of the same type.
THE DISPLAY SHOWS THE FOLLOWING CODE: U06	THE BATTERIES ARE DISCHARGED; THE UPS WAITS FOR THE BATTERY VOLTAGE TO EXCEED THE SET THRESHOLD	Wait for the batteries recharging or force start-up manually.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: L01, L10, L38, L39, L41	FAULT IN: <ul style="list-style-type: none"> ▪ TEMPERATURE PROBE OR UPS COOLING SYSTEM ▪ MAIN AUXILIARY POWER SUPPLY ▪ STATIC BYPASS SWITCH 	Activate the maintenance bypass (SWMB) if present, turn the UPS off and back on again. Exclude the maintenance bypass. If the problem persists, contact the nearest service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A22, F23, L23	THE LOAD APPLIED TO THE UPS IS TOO HIGH	Reduce the load to below the 100% threshold (or user threshold for the code A22)
THE DISPLAY SHOWS THE FOLLOWING CODE: L26	SHORT CIRCUIT AT OUTPUT	Switch off the UPS. Disconnect all the devices. Turn the UPS back on. Reconnect the devices one by one until the fault is identified.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS THE FOLLOWING CODE: A39	THE BATTERIES HAVE FAILED THE PERIODIC EFFICIENCY TEST	It is recommended to replace the batteries of the UPS, since they are no longer able to maintain the charge for a sufficient autonomy. Warning: The replacement of the batteries must be carried out by qualified personnel.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F34, L34	<ul style="list-style-type: none"> ▪ AMBIENT TEMPERATURE HIGHER THAN 40°C ▪ HEAT SOURCES CLOSE TO THE UPS ▪ VENTILATION SLITS OBSTRUCTED OR TOO CLOSE TO THE WALLS 	Activate the maintenance bypass (SWMB) if present, without switching off the UPS. This way, the fans will cool the heat sink more rapidly. Eliminate the cause of the overtemperature and wait for the temperature of the heat sink to drop. Exclude the maintenance bypass.
	FAULT IN TEMPERATURE PROBE OR UPS COOLING SYSTEM	Insert the maintenance bypass (SWMB) if present, without switching off the UPS, so that the fans, while keeping running, cool the heat sink more rapidly and wait for the temperature of the heat sink to drop. Turn the UPS off and back on again. Exclude the maintenance bypass and if the problem persists, contact the nearest service centre.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F37, L37	<ul style="list-style-type: none"> ▪ AMBIENT TEMPERATURE HIGHER THAN 40°C ▪ HEAT SOURCES CLOSE TO THE UPS ▪ VENTILATION SLITS OBSTRUCTED OR TOO CLOSE TO THE WALLS ▪ FAULT IN THE TEMPERATURE PROBE OR IN THE BATTERY CHARGER COOLING SYSTEM 	Eliminate the cause of the overtemperature. Activate the maintenance bypass (SWMB) if present, open the battery fuse holder isolators (SWBATT) and wait for the temperature of the battery charger heat sink to drop. Close the battery fuse holders. If the problem persists, contact the nearest service centre. WARNING: never open the SWBATT fuse holders during battery operation.
THE DISPLAY SHOWS THE FOLLOWING CODE: L11	STATIC BYPASS RUPTURE OR FAULT	Activate the maintenance bypass (SWMB) if present. Turn the UPS off and back on again. Exclude the maintenance bypass and if the problem persists, contact the nearest service centre.
THE DISPLAY SHOWS NOTHING OR PROVIDES INCORRECT INFORMATION	THE DISPLAY HAS POWER SUPPLY PROBLEMS	Activate the maintenance bypass (SWMB), shut down the UPS completely and wait for a few seconds. Turn ON the UPS again and verify display regular operation. Exclude the maintenance bypass. If the fault persists, contact the nearest technical support centre.
THE DISPLAY IS OFF, THE FANS ARE OFF BUT THE LOAD IS POWERED	FAULT IN THE AUXILIARY POWER SUPPLIES. THE UPS IS IN BYPASS SUPPORTED BY THE REDUNDANT POWER SUPPLY.	Activate the maintenance bypass (SWMB) if present. Switch off the UPS, wait for a minute and turn the UPS back on. If the display does not turn on or if the sequence fails, contact the nearest service centre, leaving the UPS in manual bypass mode.



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

STATUS / ALARM CODES

By using a sophisticated self-diagnostic system, this UPS can check and indicate on the display panel its status and any error and/or fault occurred during operation. Whenever a problem arises, the UPS signals the event by showing the code and the corresponding alarm on the display.

- **Commands:** these codes indicate that a command has been activated.

CODE	DESCRIPTION
C01	Remote switch-off command
C02	Remote load on bypass command
C03	Remote start-up command
C04	Battery test running
C05	Manual bypass command
C06	Emergency switch-off command
C08	Load on bypass command

- **User messages:** these messages refer to a specific configuration or operation of the UPS.

CODE	DESCRIPTION
U01	Low battery warning
U02	Programmed switch-off enabled
U03	Programmed switch-off imminent
U04	Bypass disabled
U05	Synchronisation disabled (UPS in Free running mode)
U06	Waiting for battery charging
U07	Service UPS
U08	Service Batteries

- **Anomalies:** these are “minor” problems, which do not bring the UPS to a halt, but can reduce its performance or inhibit the use of some of its functions.

CODE	DESCRIPTION
A03	Inverter not synchronised
A05	Overvoltage on input line of Phase1
A06	Overvoltage on input line of Phase2
A07	Overvoltage on input line of Phase3
A08	Undervoltage on input line of Phase1
A09	Undervoltage on input line of Phase2
A10	Undervoltage on input line of Phase3
A11	Input frequency outside tolerance limits
A13	Voltage on bypass line of Phase1 out of tolerance limits
A16	Bypass frequency out of tolerance limits
A18	Voltage on bypass line out of tolerance limits
A22	Load on Phase1 > user-defined threshold
A25	Output isolator open
A26	Positive branch batteries missing or battery fuses open
A29	System temperature probe damaged
A30	System temperature < 0°C
A31	System temperature too high
A32	Temperature of heat sink Phase1 < 0°C
A37	External battery temperature probe damaged
A38	External battery overtemperature
A39	Positive branch batteries must be replaced

- **Faults:** These are more critical problems compared to the “Anomalies”, as if they persist they may bring the UPS to a halt even in a very short time.

CODE	DESCRIPTION
F01	Internal communication error
F03	Phase1 input fuse blown
F04	Phase2 input fuse blown or input relay locked (will not close)
F05	Phase3 input fuse blown or input relay locked (will not close)
F09	Precharge of positive branch condensers failed
F10	Precharge of negative branch condensers failed
F11	BOOST stage anomaly
F14	Inverter Phase1 sine curve distorted
F17	Inverter stage anomaly
F19	Positive battery overvoltage
F23	Output overload
F26	Phase1 output relay locked (will not open)
F29	Phase1 output fuse broken or output relay locked (will not close)
F32	Battery charger stage anomaly
F33	Battery measures error
F34	Heat sink overtemperature
F37	Battery charger overtemperature
F39	VDC Bus measures error
F40	Fan failure
F41	Redundant Bypass failure

- **Locks:** these codes indicate that the UPS, or one of its parts, is locked. Usually, they are preceded by an alarm signal. In case of faults and consequent locking of the inverter, the latter will be turned off and the load will be powered via the bypass line (this procedure is excluded for locks caused by serious and persistent overloads and for those caused by a short circuit).

CODE	DESCRIPTION
L01	Incorrect auxiliary power supply
L02	One or more internal cables disconnected
L03	Phase1 input fuse broken
L06	BOOST stage overvoltage positive
L07	BOOST stage overvoltage negative
L08	BOOST stage undervoltage positive
L09	BOOST stage undervoltage negative
L10	Static bypass switch fault
L11	L1 bypass output locked
L14	Phase1 inverter overvoltage
L17	Phase1 inverter undervoltage
L20	Continuous voltage at inverter output or Sine curve of Phase1 inverter distorted
L23	Phase1 output overload
L26	Short circuit at Phase1 output
L34	Phase1 heat sink overtemperature
L37	Battery charger overtemperature
L38	Temperature probe 1 damaged
L39	Temperature probe 2 damaged
L41	Battery charger temperature probe damaged
L49	Inverter capacitor damaged

TECHNICAL DATA

UPS MODELS	5 kVA	6 kVA	8 kVA	10 kVA
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SINGLE-PHASE INPUT

Nominal voltage	[Vac]	220 – 240 (1P+N+PE)			
Maximum operating voltage	[Vac]	300			
Nominal frequency	[Hz]	50 - 60			
Accepted tolerance for input voltage without activation of battery		±20% @ 100% load -40% +20% @50% load			
Accepted tolerance for input frequency without activation of battery (for 50/60Hz)		±20% 40-72Hz			
Rated current ⁽¹⁾	[A]	25	30	40	50

THREE-PHASE INPUT – model TM (3~) ⁽²⁾

Nominal voltage	[Vac]	380 - 415 (3W+N+PE)			
Maximum operating voltage towards Neutral (N)	[Vac]	300			
Nominal frequency	[Hz]	50 - 60			
Accepted tolerance for input voltage without activation of battery		±20% @ 100% load -40% +20% @50% load			
Accepted tolerance for input frequency without activation of battery (for 50/60Hz)		±20% 40-72Hz			
Rated current ⁽¹⁾	[A]	L1, L2, L3 = 14		L1, L2, L3 = 17	
Current in operation from BYPASS ⁽³⁾	[A]	L1 = 40 L2, L3 = 0		L1 = 50 L2, L3 = 0	

BATTERY

Recharge time (standard versions)	[h]	< 4h for 80% of the charge			
Nominal voltage	[Vdc]	180		240	
Maximum recharging current (only for ER versions) ⁽⁴⁾	[A]	6		6	

OUTPUT

Nominal voltage ⁽⁵⁾	[Vac]	Selectable: 220 / 230 / 240			
Frequency ⁽⁶⁾	[Hz]	Selectable: 50 / 60			
Rated apparent output power	[kVA]	5000	6000	8000	10000
Rated active output power	[kW]	5000	6000	8000	10000
Overloading: 100% < load < 110%	Bypass line available:	Bypass activated after 10 min. Then continues to work on bypass line			
	Bypass line not available:	Blocked after 10 min			
Overloading: 110% < load < 130%	Bypass line available:	Bypass activated after 1 min. Blocked after 1 hour			
	Bypass line not available:	Blocked after 1 min			
Overload: 130% < load < 150%	Bypass line available:	Bypass activated after 5 s. Blocked after 10 min			
	Bypass line not available:	Blocked after 5 s			
Load overload > 150%	Bypass line available:	Bypass immediately activated. Blocked after 3 s			
	Bypass line not available:	Blocked after 0,5 s			
Short circuit current (Bypass line not available)		$I_{cc} = 2,5 I_n \times 200 \text{ ms} + 1,5 I_n \times 300 \text{ ms}$			
Short circuit current with available bypass line		bypass activated instantaneously			
Specification of Bypass SCR (to size the bypass line protection)		$I^2 t_{max} = 4325 \text{ A}^2 \text{ s}$		$I^2 t_{max} = 11250 \text{ A}^2 \text{ s}$	

OTHER DATA

Leakage current towards ground	[mA]	< 1,5		≤ 1,7	
Room temperature ⁽⁷⁾	[°C]	0 – 40			
Humidity		< 90% without condensation			
Protection devices		excessive battery discharge - over current - short circuit - over voltage - under voltage - thermal			
Dimensions W x D x H	[mm]	131 x 640 x 448 - Tower 19" x 640 x 3U - Rack		2 x (131 x 640 x 448) – Tower 2 x (19" x 640 x 3U) - Rack	
Dimensions W x D x H (only for ER versions)	[mm]	131 x 640 x 448 - Tower 19" x 640 x 3U - Rack		131 x 640 x 448 - Tower 19" x 640 x 3U - Rack	
Weight	[Kg]	45	46	19 + 62	20 + 62
Weight (only for ER versions)		/		21	

BATTERY BOX MODEL	KSDV180P----NP-	KSDV240P----NP-
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Rated voltage	[Vdc]	180	240
Dimensions W x D x H	[mm]	131 x 640 x 448 - Tower 19" x 640 x 3U - Rack	
Weight	[Kg]	42	52

For additional details regarding technical data refer to website

- (1) @ rated load, rated voltage of 220 VAC towards Neutral, battery charging
- (2) For the input technical data of the TM model with "1~" single-phase input, refer to the "SINGLE-PHASE INPUT" section in the table
- (3) In the Bypass operating mode, all the load current is absorbed by the Phase 1 input line
- (4) The recharging current is regulated automatically according to the capacity of the battery installed. Derating of the current delivered with a load greater than 80%.
- (5) To maintain output voltage within the accuracy range specified, recalibration may be necessary after a long period of operation.
- (6) If the mains frequency is within ± 5% of the selected value, the UPS is synchronized with the mains. If the frequency is out of tolerance range or in battery operation, the frequency is that selected ± 0.1%.
- (7) 20 - 25 °C for maximum battery life.



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