

Technical Specifications

# Sentinel DUAL

1000 VA-1500 VA-2200 VA-3000 VA



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## 1. GENERAL DESCRIPTION

### 1.1. The Sentinel Dual UPS

The SENTINEL DUAL UPS is an online single-phase unit for tower/rack installation.

The units are available with power ratings of 1000 VA-1500 VA-2200 VA-3000 VA, with an output power factor equal to 0.9.

The units with power ratings of 2200 VA and 3000 VA are also available in relative ER (extended autonomy) versions, with a high-powered 6 A battery charger in place of the battery tray.

The 1500 VA version is not equipped with extended autonomy.

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

- **ON-LINE** is the operating mode which offers maximum load protection and the best output waveform quality (\*)
- **ECO** is the operating mode which offers the least UPS consumption, or rather maximum efficiency (\*\*)
- **SMART ACTIVE** is the operating mode which allows the UPS to decide whether to enable ON-LINE or ECO functionality, based on a statistic regarding the quality of the Power Supply network.
- **STAND-BY OFF [Mode 1]** is the operating mode in which the UPS functions as an emergency device. While power is present the UPS does not intervene. In the event of a blackout, the necessary power is provided by the UPS.

(\*) The effective values (rms) of the voltage and the output frequency are constantly controlled by the microprocessor independently with respect to the waveform of the network voltage, thereby maintaining the output frequency synchronized with the network within a configurable interval.

Outside of this interval, the UPS eliminates its synchronism with the network and brings itself to its nominal frequency; under these conditions, the UPS cannot utilize the bypass.

(\*\*) In order to optimize yield, the load is normally powered by the bypass in ECO mode. In the event that the network should move outside of the preset tolerances, the UPS will switch to ON LINE functionality. Once the network has moved back within the preset tolerances for at least five minutes, the UPS will go back to powering the load through the bypass.

The internal battery tray is of a hot-swap typology and the connector is secured to the test finger and the pin based on the requirements of the TUV.

The battery tray can be replaced using the manual bypass function. This function can be enabled by pressing and holding down the ON and SEL keys for 4 seconds.

The display is of a positive typology (white background with black lettering). For this reason, in order to avoid unnecessary power consumption, the display's backlighting must be turned off when it is not in use.

As already indicated above, the unit's structure is designed for both Tower and Rack installation, with a hot-swap battery tray. The UPS unit is 2 U and comes supplied with support feet for the tower installation. The unit is front and rear ventilated in order to allow for rack installation and, in the case of tower installation, to allow for the battery box or other equipment to be positioned laterally.

The UPS unit's on board communications are comprised of: an RS232 serial port, a USB port (not for simultaneous use) and a slot for additional communication cards (with a second serial port independent from the first). The serial port also contains 3 opto-isolated outputs whose functionalities can be programmed using the UPSTools configuration software. Every version is equipped with a rear 3-pole connector which, by default, performs the R.E.P.O. and Remote ON functions.

The UPS unit's control card has an on board E2PROM in order to allow for various information to be saved, including the unit's settings, backlog data, calibration data, etc.

The unit's operating mode can be set directly from the display. The firmware of the UPS unit can be reprogrammed on site using the appropriate programming card.

Inverter/bypass switching only takes place in the case of the inverter's final shutdown or in the event of continuous overloading.

The front panel has a main switch (1 / 0) which can be used to disconnect the entire UPS unit, for example, in cases of prolonged disuse. In addition to ensuring that the entire unit has been disconnected, this switch also serves an important energy saving function, for example, in structures where various small UPS units have been installed. It is also useful in the case of rack installation where the rear portion of the device cannot be accessed in order to disconnect the cables.

"Cold starts" (activation using the batteries) can even be performed at full charge.

The 2200 VA and 3000 VA versions are equipped with Energy Share sockets, which can be setup using the UPSTools configuration software. An icon on the display indicates the status of the Energy Share sockets.

The speed of the fans is regulated by means of a dedicated variable continuous power supply in order to reduce noise levels and increase the reliability of the fans themselves (only for the 2 k 2-3 k versions).

All the models are equipped with backfeed relays and the relative functionality test.

The main features of the PREMIUM PRO series include:

- VFI (On-line) / pure sinusoidal waveform during battery-powered functionality
- Output frequency with automatic selection (auto-sensing)
- Front/rear ventilation
- LCD display
- UPS with configurable and customizable functions (i.e. by-pass thresholds, automatic testing, acoustic alarm, etc.) through proprietary configuration software
- Protected battery expansion connector
- Unlimited expandability of autonomy with dedicated or custom Battery Boxes
- Expansion slot for communication cards (i.e. second USB and RS232 Port, SNMP, ModBus, etc.)
- RS232 and USB communication ports
- Frequency converter mode with a derating of 30%
- "Free Running" mode with a derating of 30%
- Eco mode function with 98% yield

### **1.2. Standard Versions**

- 1000 VA – 900 W – PF 0.9 – 3 batteries, 12 V, 7 Ah – Small cabinet – with battery expansion
- 1500 VA – 1350 W – PF 0.9 – 3 batteries, 12 V, 9 Ah – Small cabinet
- 2200 VA – 1980 W – PF 0.9 – 6 batteries, 12 V, 7 Ah – Large cabinet - with battery expansion
- 3000 VA – 2700 W – PF 0.9 – 6 batteries, 12 V, 9 Ah – Large cabinet - with battery expansion

### **1.3. ER Versions For Extended Autonomy**

- 2200 VA ER, 3000 VA ER
- Same features as the standard version

### 1.4. X05 Battery Box

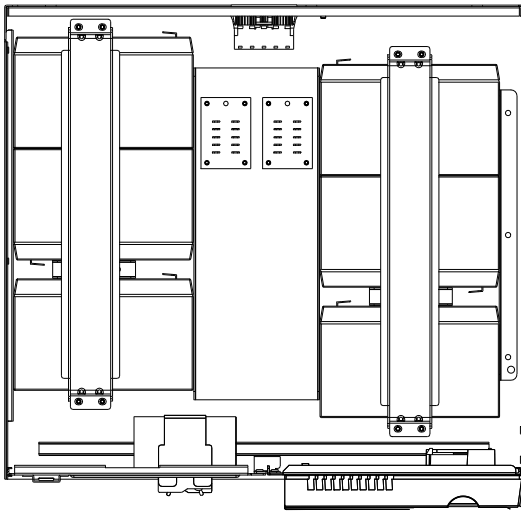
The X05 BATTERY BOX is an accessory which is dedicated to this series of UPS units, or rather has the same dimensions (2 U) and aesthetic design.

It is available in two versions (short and long) to be perfectly matched with the various UPS power ratings.

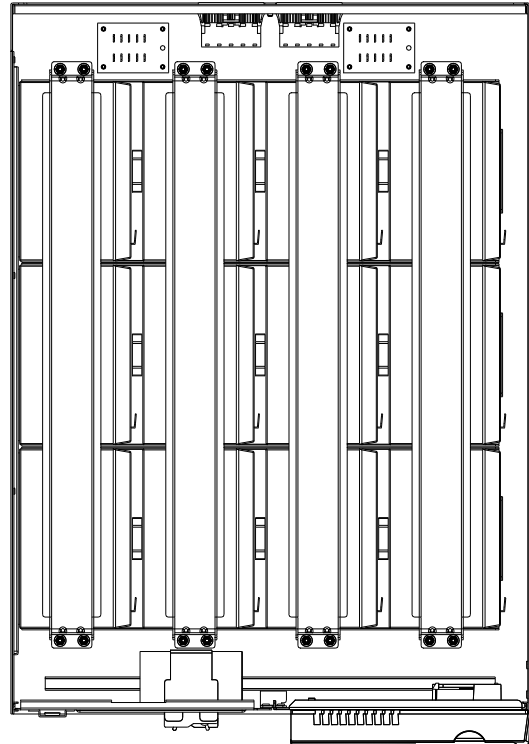
There are no internal battery trays: in this case, the hot swap functionality is intended for the entire Battery Box. The short version can be equipped with 3 or 3+3 (in parallel) 7 Ah or 9 Ah batteries and can only be used in conjunction with the 1000 VA unit.

The long version can be equipped with 6 or 6+6 (in parallel) 7 or 9 Ah batteries and can be used in conjunction with the 2200 VA and 3000 VA units.

*Short Battery Box*



*Long Battery Box*



## 2. APPEARANCE AND ACCESSORIES

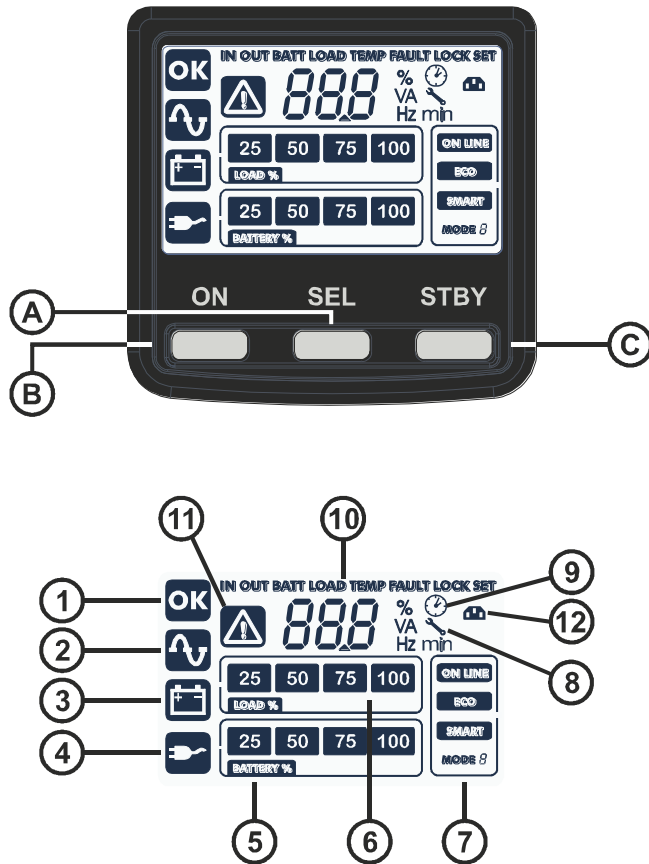
### Appearance



- Chassis reference colour: Pantone Black 6 U
- Colour of the silver parts: RAL 9006

### 2.1. Display

The diagram below illustrates the layout of the display. It includes the Energy Share socket icon and the possibility of selecting additional operating modes, indicated with MODE 1...MODE 8.



- |                          |                                  |
|--------------------------|----------------------------------|
| Ⓐ "SEL" Button           | Ⓔ Charge level indicator         |
| Ⓑ "ON" Button            | Ⓕ Configuration area             |
| Ⓒ "STAND-BY" Button      | Ⓖ Maintenance required indicator |
| ① Regular operating mode | ⑨ Timer indicator                |
| ② Network operating mode | ⑩ Measurement display area       |
| ③ Battery operating mode | ⑪ Stand-by / alarm indicator     |
| ④ Load powered by bypass | ⑫ Energy Share indicator         |
| ⑤ Battery life indicator |                                  |

## **2.2. Generic Accessories**

### **MULTIPASS**

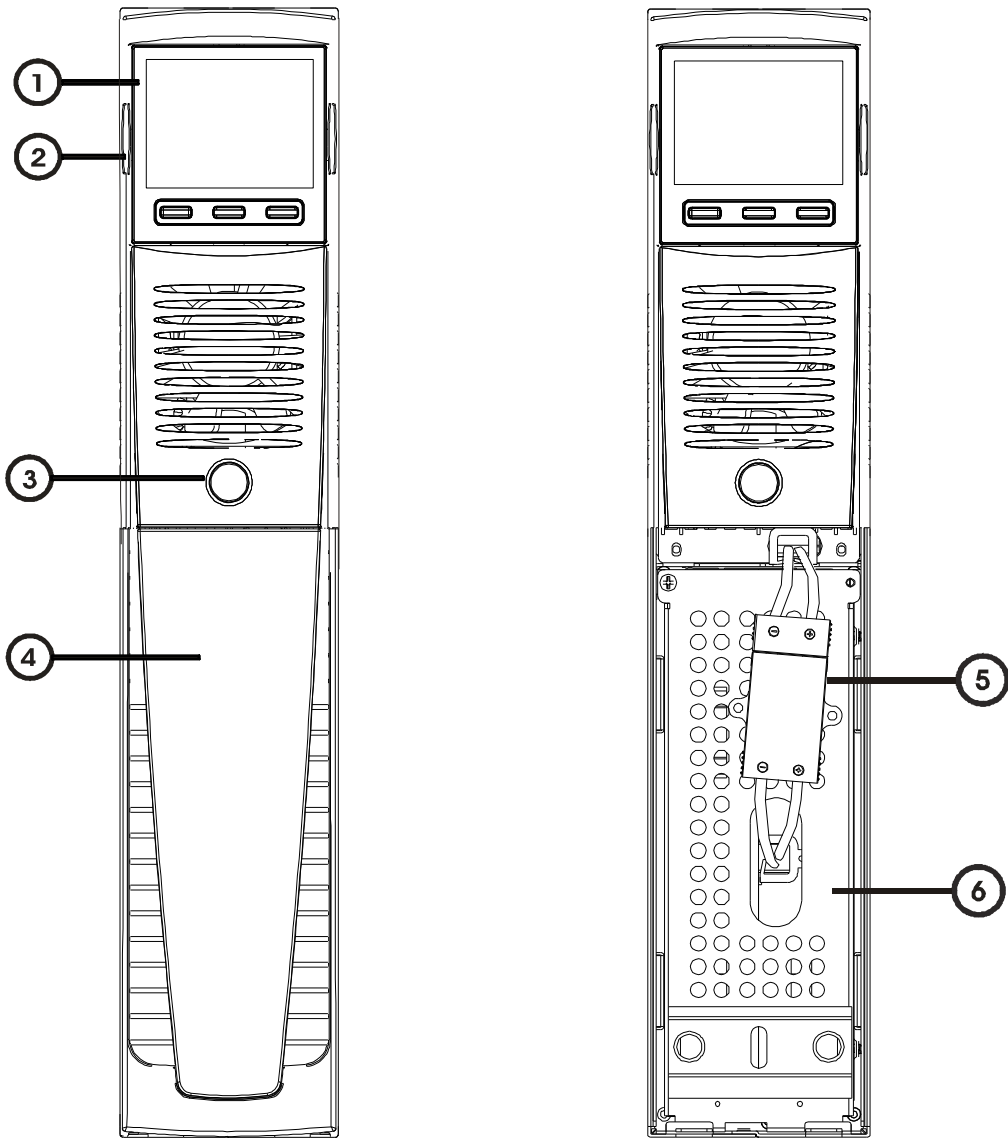
The UPS unit is compatible with the manual and automatic "MULTIPASS" external bypass, which even allows for hot swapping to be performed for the entire UPS unit.

### **OPTIONAL SLOT CARDS**

The slot complies with our normal company standard and can therefore accept any of the accessory cards which are currently available for the other series, such as the various MultiCOM cards and the NetMan card.



**2.3. Frontal View**

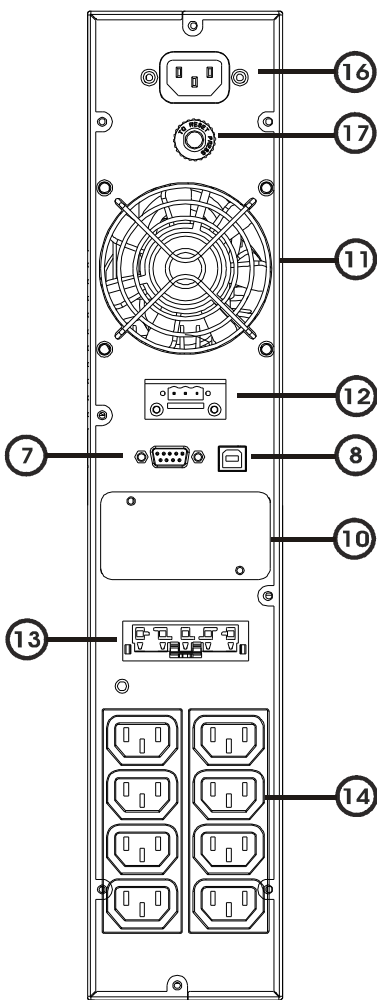


- ① Extractible/rotating display mask
- ② Release slits
- ③ 1 / 0 Switch

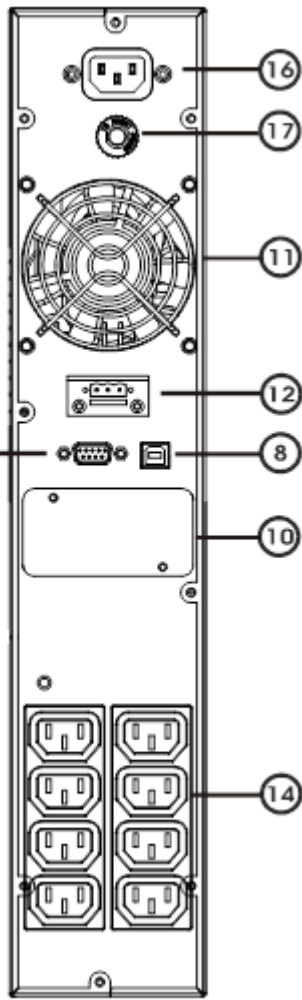
- ④ Removable front panel
- ⑤ Battery pack connector
- ⑥ Battery pack retention panel

### 2.4. Rear Views

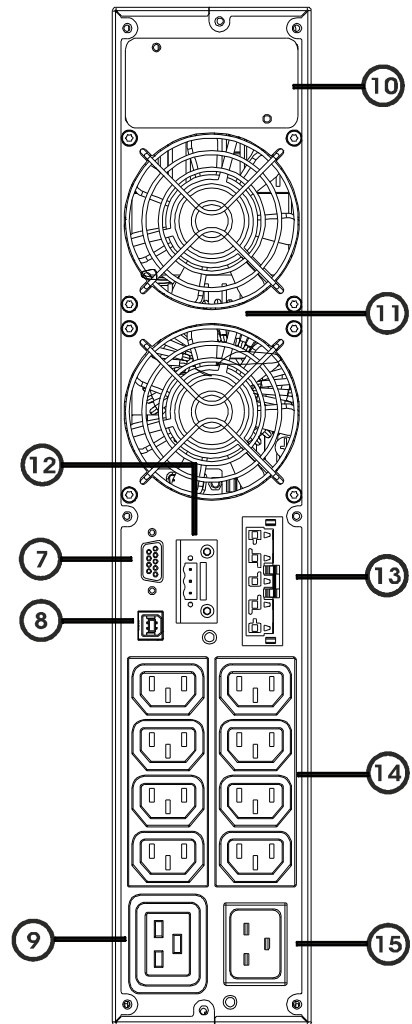
The rear portions are illustrated below:



**1000 VA Model**



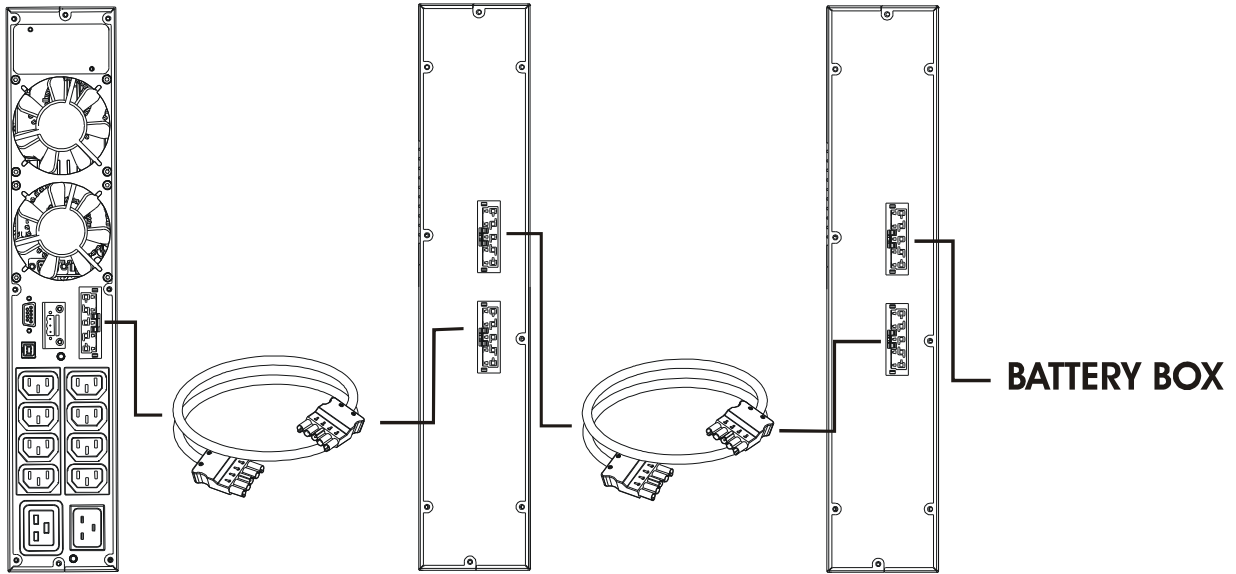
**1500 VA Model**



**2200 VA / 3000 VA Model**

- ⑦ RS232 Communication port
- ⑧ USB Communication port
- ⑨ IEC 16 A output socket
- ⑩ Slot for communication cards
- ⑪ Cooling fan
- ⑫ Remote control terminal board
- ⑬ Battery expansion connector (optional)
- ⑭ IEC 10 A output socket
- ⑮ IEC 16 A input plug
- ⑯ IEC 10 A input plug
- ⑰ Circuit breaker

Every Battery Box comes supplied with a wiring set and 2 expansion connectors for connection to the UPS unit or to a chain of Battery Boxes.



**3. CERTIFICATIONS**

The UPS unit is certified according to EMI / EMC EN62040-2 compatibility class C1 for emissions and class C2 for immunity.

The product is classified VFI-SS-111

#### 4. TECHNICAL DATA TABLE

UPS MODELS		SDH 1000	SDH 1500	SDH 2200 / SDH 2200 ER	SDH 3000 / SDH 3000 ER
<b>INPUT</b>					
Rated voltage		220 - 230 – 240 Vac			
Maximum operating voltage		300 Vac			
Voltage range and frequency for no battery intervention	[Vac] [Vac] [Vac] [Hz]	Maximum: 276 Minimum: 184 ÷ 140 (from 100% to 50% load in linear mode) Return to network powered functionality: 190 Frequency: 40 ÷ 72			
Rated frequency	[Hz]	50 - 60			
Rated current (1)	[A]	5	7	10.5 / 11.5	14 / 15
Power factor @ rated load and voltages		≥0.99			
Current distortion @ rated load and voltages		6%		10%	
<b>BYPASS</b>					
Accepted voltage range for switching	[Vac]	Minimum configurable threshold: 180 ÷ 200 Maximum configurable threshold: 250 ÷ 264			
Accepted frequency range for inverter synchronization		Selectable: 3% ÷ 10% Default: ±5 %			
Switching time	[msec]	Typical: 4			
<b>BATTERY</b>					
Number of batteries / V	[n°]x[V]	3x12 V		6x12 V / 0	
Standard capacity	[Ah]	7 Ah	9 Ah	7 Ah	9 Ah
Charging current	[A]	0.7÷0.8 A @ UPS on with maximum fan speed About 1 A with UPS in Stand-By			
Charging time (c)	[h] [h]	<4 h for 80% of the load <4-6 h for 90% of the load			
Expandability and rated voltage of the Battery Box		36 Vdc	Not expandable	72 Vdc	
Charging current (only for ER versions)		N/A		6 A	
Minimum Battery Box capacity (only for ER versions)		N/A		>40 Ah	
<b>OUTPUT</b>					
Rated voltage	[Vac]	Selectable: 220 / <b>230</b> / 240 ±1%			
Frequency (2)	[Hz]	Selectable: 50, 60 or <b>automatic detection</b>			
Rated power	[kVA]	1	1.5	2.2	3
Rated power (3)	[kW]	0.9	1.35	1.98 / 1.76	2.7 / 2.4
Overload: 100% <load <110%		Bypass line available:		activates the bypass after 2 sec. shutdown after 120 sec.	
		Bypass line unavailable:		shutdown after 60 sec.	
Overload: 111% <load <150%		Bypass line available:		activates the bypass after 2 sec. shut down after 4 sec.	
		Bypass line unavailable:		shutdown after 4 sec.	
Load overload >150%		Bypass line available:		activates the bypass instantaneously shutdown after 1 sec.	
		Bypass line unavailable:		shutdown after 0.5 sec.	
Voltage distortion @ linear load		≤2%			
Voltage distortion @ distorting load		≤4%		≤3.5%	
Current crest factor		≥3:1			

MODELLI UPS		SDH 1000	SDH 1500	SDH 2200 / SDH 2200ER	SDH 3000 / SDH 3000ER
<b>MISCELLANEOUS</b>					
Leakage current to ground	[mA]	<2			
AC/AC yield @ load=100%Res		89%	90.5%	91.7%	92.65%
AC/AC yield @ load=100%Dist		87.6%	89.5%	92.5%	92.37%
ECO mode yield @ rated load		97.3%	98%		
Automatic consumption in ECO mode (batteries disconnected)		19 W	17.1 W	24.3	28 W
DC/AC yield in BATTERY mode		85.0%	86.2%	86.4%	86.6%
Automatic consumption from the network (batteries disconnected)		49.2 W	48.6 W	59.3 W	58.5 W
Automatic consumption in Stand-by mode (batteries disconnected)		15.7 W	14.7 W	15.1 W	18 W
Automatic consumption with on/off switch turned off		0.5 W			0.33 W
Power loss with resistive nominal load	[W]	100	130	164	200
	[BTU/h]	335	445	560	670
	[kcal/h]	85	112	141	170
Operating room temperature (4)	[°C]	0 – 40			
Humidity		<90% without condensation			
Installation height		Operation: 1000 m at nominal power (-1% power for every 100 m above 1000 m) 4000 m maximum			
		Transport: <15000 m			
Protection devices		excessive battery discharge – overcurrent – short circuit – over voltage – undervoltage – thermal			
Overvoltage protection		2 VDR x 300 Joules			
Noise levels		<40 dB(A) at 1 m			
Dimensions L x D x H (5)	[mm]	87 x 425 x 450		87 x 625 x 450	
Net weight	[kg]	17	18	29.5 / 14.5	31.5 / 15
Gross weight	[kg]	20.5	21.5	33.5 / 18.5	36 / 19

(1) @ rated load, rated voltage of 220 Vac, battery charging

(2) *Automatic detection*: If the network frequency is within  $\pm 5\%$  of the selected value, the UPS is synchronized with the network. If the frequency is off tolerance or battery-powered functionality is enabled, the frequency is that which is selected  $\pm 0.1\%$ . *Power derating*: The UPS unit derates the output power to 70% of the rated power if the UPS is operating as a frequency converter. This means that it is configured so the output is not synchronised with the input (without link) or else is configured with an option other than automatic detection.

(3) The UPS unit derates the active output power from PF= 0.9 to PF= 0.8 if a battery box is used for extended autonomy.

(4) 20 - 25 °C for increased battery life.

(5) The dimensions shown in the table refer to the tower version, taking the support feet into account. The rack version is suitable for being housed in a 19" cabinet with an encumbrance of 2 U.

BATTERY BOX MODELS		BB SDH 36-Ax-A	BB SDH 36-Mx-A	BB SDH 72-Ax-A	BB SDH 72-Mx-A
Rated battery voltage	[Vdc]	36 Vdc		72 Vdc	
Dimensions L x D x H	[mm]	87 x 425 x 450		87 x 625 x 450	
Net weight	[kg]	13.5	20.5	25	38
Gross weight	[kg]	16.5	23.5	29	42

The symbol "x" is used to substitute an alphanumeric code for internal use

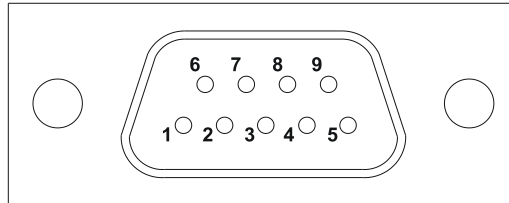
In the event that the UPS unit is connected to a Battery Box, the maximum active power will be derated from PF 0.9 to PF 0.8.

## 5. COMMUNICATION PORTS AND FIRMWARE

The UPS comes with a standard RS232 port with input and output signals, a USB Port and an expansion slot for connecting additional electronic boards.

### RS232 Connector

**RS232 CONNECTOR**

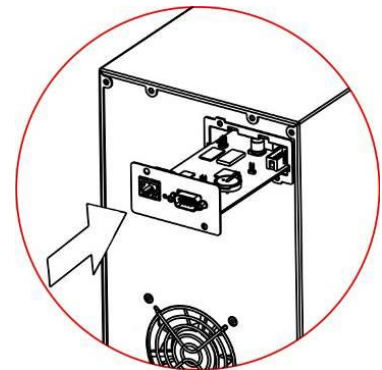


PIN #	SIGNAL	NOTES
1	Programmable output *: [default: UPS shut down]	(*) Opto-isolated contact max. +30 Vdc / 35 mA. These contacts can be associated with other events using the appropriate software  (**) Only on request  For additional information about interfacing with the UPS unit, please refer to the appropriate manual
2	TXD	
3	RXD	
5	GND	
6	DC Power Supply (Imax = 20 mA)	
8	Programmable output *: [default: discharge pre-alarm]	
9	Programmable output *: [default: battery-powered functionality]	

### Communication Slot

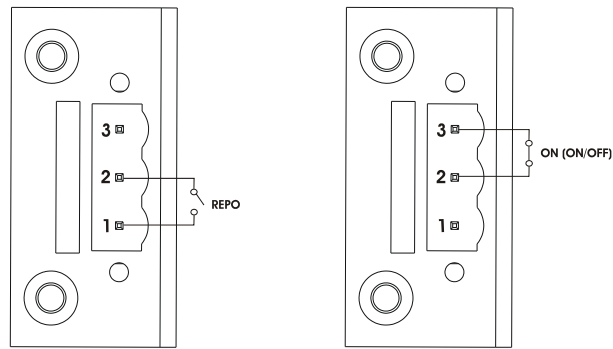
The UPS comes supplied with an expansion slot for optional communication cards (see the diagram on the right), which can allow the device to communicate using the most common communication standards. Some examples include:

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



Please consult the website [www.riello-ups.com](http://www.riello-ups.com) to check the availability of additional accessories

### Connections for REPO and remote ON/OFF functionality



The ON (ON/OFF) contact can be associated with other events using the appropriate software

#### 5.1. Technical data for “pin 6” power through the RS232 port

The voltage provided by the serial port’s pin 6 power depends on the absorbed current.

- Vcc max: 10.8 Vdc without load
- Vcc min: 8 Vdc @ 25 mA

#### 5.2. Firmware

The firmware of the UPS unit can be updated by inserting the appropriate programming card into the expansion Slot.





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