Technical Specifications

Sentinel DUAL

5000 VA/W 6000 VA/W 8000 VA/W 10000 VA/W

riello ups

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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 5000 VA 6000 VA 8000 VA 10000 VA, with an output power factor equal to 1.
The unit with power ratings of 6000 VA is also available in relative ER (extended autonomy) versions, with a high-powered 6 A battery charger in place of the battery tray.
The 10000 VA version is also available with dual input DI equipped with separate input for rectifier and by-pass line and a version with ER and dual input DI with a high-powered 6 A battery charger.

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 3U for the 5000 and 6000 VA and 3+3U for the 8000 VA and 10000 VA, they come 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 UPS 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 5000 VA and 6000 VA PDIST versions, the 8000 VA and the 10000 VA versions are equipped with Energy Share sockets, which can be setup using the UPS 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.

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

The main features of the SENTINEL DUAL 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

- 5000 VA – 5000 W – PF 1 – 15 batteries, 12 V, 6 Ah – battery included and with battery expansion
- 6000 VA – 6000 W – PF 1 – 15 batteries, 12 V, 6 Ah – battery included and with battery expansion
- 8000 VA – 8000 W – PF 1 – 20 batteries, 12 V, 9 Ah – two cabinet with battery expansion
- 10000 VA – 10000 W – PF 1 – 20 batteries, 12 V, 9 Ah – two cabinet - with battery expansion

1.3. ER Versions for Extended Autonomy

- 6000 VA ER
- 6 A battery charger
- Same features as the standard version

1.4. DI Version for Separate input

- 10000 VA DI
- Dual input for rectifier and by-pass, features as the standard version

1.5. DI ER Versions for Separate input and Extended Autonomy

- 10000 VA DI ER
- 6 A battery charger
- Dual input for rectifier and by-pass, features as the standard version

1.6. X06 Battery Box

The X06 BATTERY BOX is an accessory which is dedicated to this series of UPS units, or rather has the same dimensions (3U) and design.
It is available in the same size of UPS cabinet 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 180 Vdc version is equipped with 15 batteries 7 Ah or 9 Ah and can only be used in conjunction with the 5000 VA and 6000 VA unit.
The 240 Vdc version can be equipped with 20 batteries 9 Ah and can be used in conjunction with the 8000 VA and 10000 VA units.

Battery Box

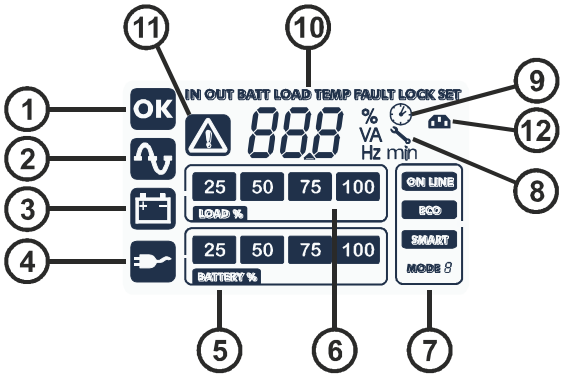
2. APPEARANCE AND ACCESSORIES

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.



A	"SEL" Button	6	Charge level indicator
B	"ON" Button	7	Configuration area
C	"STAND-BY" Button	8	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 charge indicator		

2.2. Generic Accessories

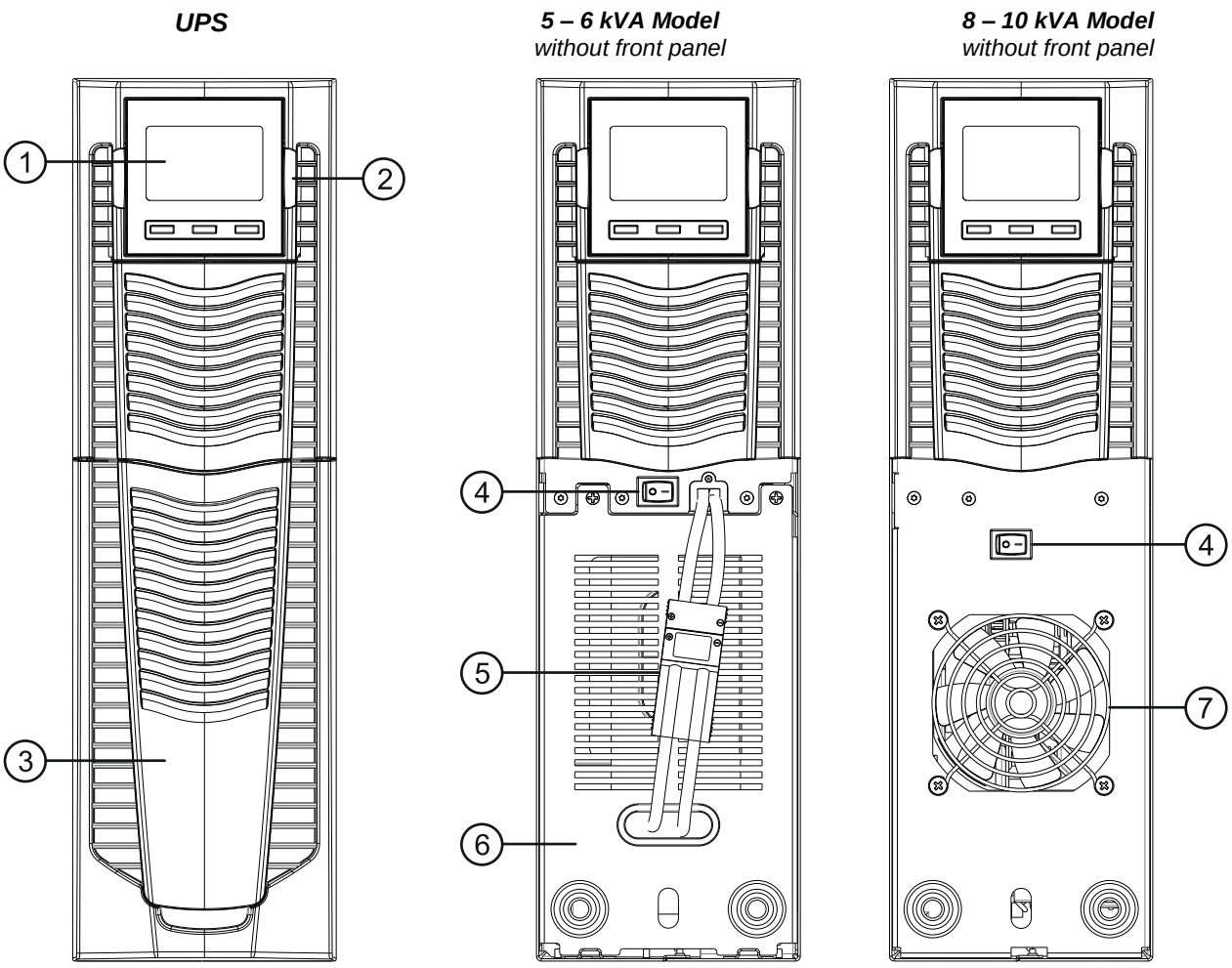
MULTIPASS

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.
Visit www.riello-ups.com for the updated list of compatible accessories.

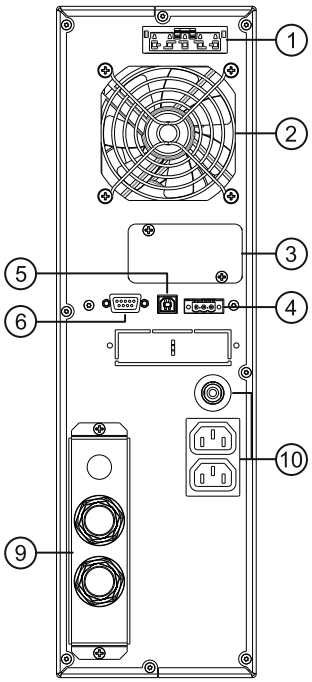
2.3. Frontal View



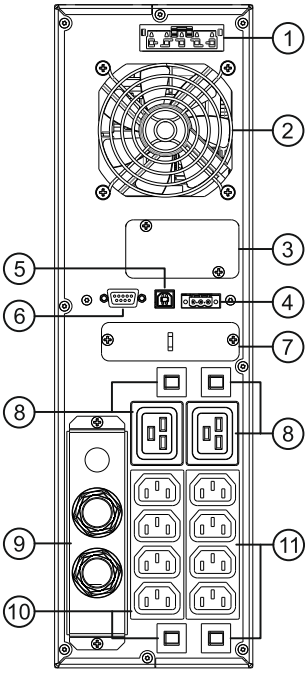
1. Extractible/rotating display mask
2. Release slits
3. Removable front panel
4. 1 / 0 Switch
5. Battery pack connector
6. Battery pack retention panel
7. Cooling fan

2.4. Rear Views

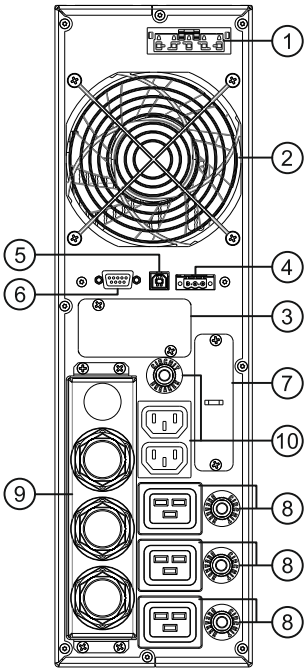
The rear portions are illustrated below:



5 kVA / 6000VA Model



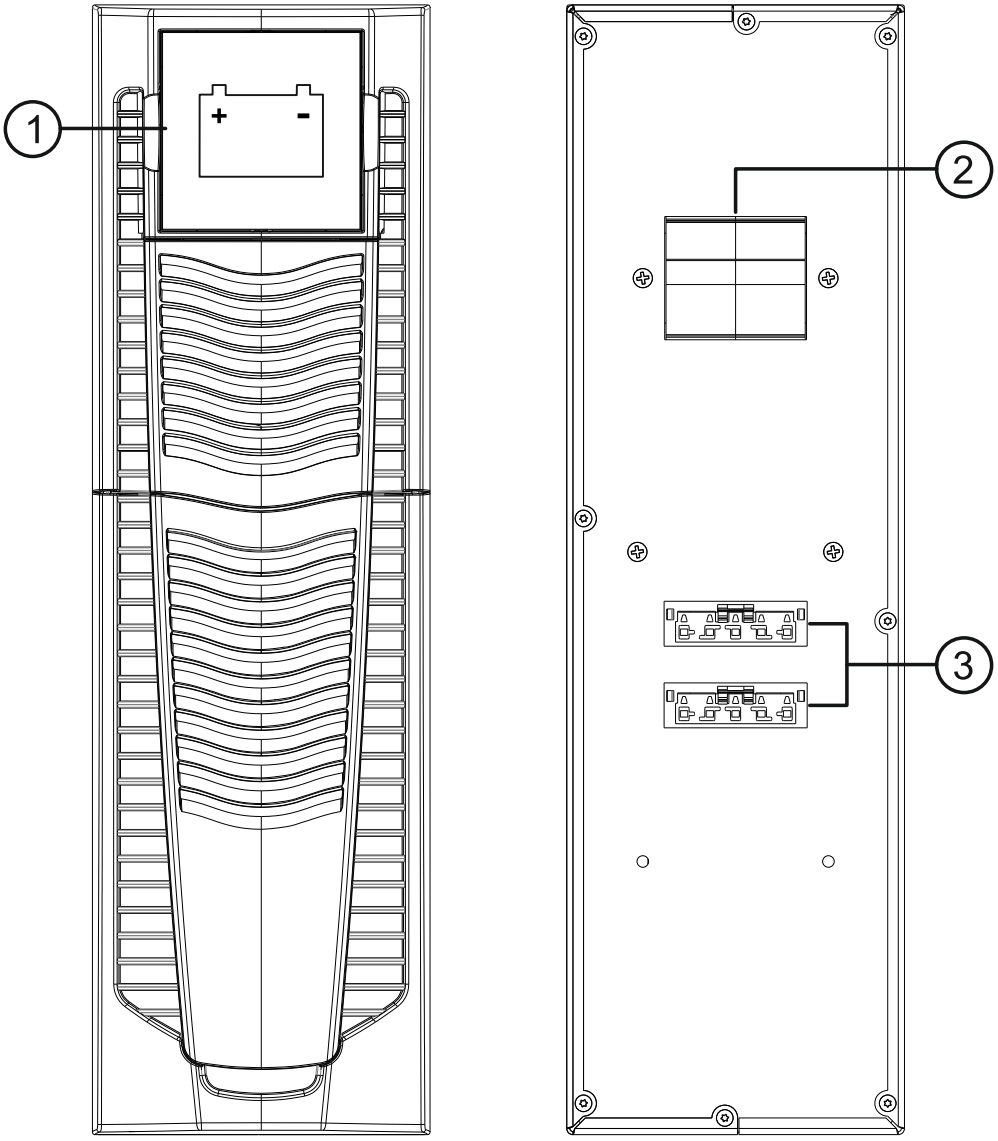
5 kVA / 6 kVA Model
with Power Distribution



8 kVA / 10 kVA Model

1. Battery expansion connector
2. Cooling fan
3. Slot for communication cards
4. Remote control terminal board
5. USB communication port
6. RS232 communication port
7. Slot for parallel board (optional)
8. IEC 16 A output socket with circuit breaker
9. Input / Output terminal strip
10. IEC 10 A Energy Share input plug with circuit breaker
11. IEC 10 A input plug with 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.



1 Extractible/rotating display mask

2 Battery switch

3 Battery expansion connector

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.

REFERENCE STANDARDS

Riello UPS operates a Quality Management System certified to ISO 9001/2000 (Certification No. CERT-04116-99-AQ-MIL-SINCERT) covering all company functions from design and manufacture to after sales services.

This certification is a guarantee for the customer with regard to the following aspects:

- use of quality materials;
- meticulousness in the production and testing phases;
- constant customer support.

In addition, the UPS meets the VFI-SS-111 classification (according to EN 62040-3) and complies with the following specific standards for UPS:

- **IEC EN62040-1: Static uninterruptible power supplies (UPS): general and safety provisions;**
- **IEC EN 62040-2: Electromagnetic compatibility (EMC) requirements category C2;**
- **EN 62040-3: Methods of specification of performances and test provisions;**

The SENTINEL DUAL series also satisfies the following general standards, where applicable:

- **IEC 60529: Degree of protection provided by enclosures;**
- **IEC 60664: Insulation for low-voltage equipment;**
- **IEC 60755: General Requirements for Residual Current Operated Protective Devices;**
- **IEC 60950: General safety provisions for "Information Technology" equipment;**
- **IEC 61000-2-2: Electromagnetic compatibility immunity;**
- **IEC 61000-4-2: Electrostatic discharge immunity test;**
- **IEC 61000-4-3: Radio frequencies, electromagnetic immunity test;**
- **IEC 61000-4-4: Transitory overvoltage immunity test;**
- **IEC 61000-4-5: Overvoltage immunity test;**
- **IEC 61000-4-11: Voltage dips, short interruptions and voltage variations immunity test.**
- **IEC 61000-3-12: Harmonic current emissions (for equipment with rated current > 16 A ≤ 75).**

European Directives:

LVD directive 2014/35/EU
The LVD covers all health and safety risks of electrical equipment operating with a voltage between 50 and 1000 V for alternating current and between 75 and 1500 V for direct current.

EMC directive 2014/30/EU
The EMC Directive **limits electromagnetic emissions from equipment**; The Directive also **governs the immunity of such equipment to interferences.**

4. TECHNICAL DATA TABLE

UPS MODELS		SDU 5000	SDU 6000 SDU 6000 ER	SDU 8000	SDU 10000 SDU 10000 DI SDU 10000 DI ER
INPUT					
Rated voltage		220 - 230 – 240 Vac (1W+N+PE)			
Maximum operating voltage	**[Vac]**	300			
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			
Maximum current (1)	**[A]**	30	36	49.1	60.6
Rated current (2)	**[A]**	25	30	40	49.6
Power factor @ rated load and voltages		≥0.99			
Current distortion @ rated load and voltages		≤2%			

UPS MODELS		SDU 5000	SDU 6000 SDU 6000 ER	SDU 8000	SDU 10000 SDU 10000 DI SDU 10000 DI ER
BYPASS					
Separate input					DI version only
Separate input voltage	**[Vac]**				220 - 230 - 240 (1W+N+PE)
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	**[ms]**	Typical: 3			

UPS MODELS		SDU 5000	SDU 6000 SDU 6000 ER	SDU 8000	SDU 10000 SDU 10000 DI SDU 10000 DI ER
BATTERY					
Number of batteries / V	**[n°]x [V]**	15x12 V		20x12 V	
Standard capacity	**[Ah]**	5 Ah (a)	5 Ah (a)	9 Ah (b)	9 Ah (b)
Charging current	**[A]**	0.7÷0.8 A @ UPS on with maximum fan speed About 1 A with UPS in Stand-By			
Charging time (6)	**[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		180 Vdc		240 Vdc	
Charging current (only for ER versions)		N/A	6 A	N/A	6 A
Suggested Battery Box capacity (only for ER versions)		N/A	>40 Ah	N/A	>40 Ah

(a) 12 V / 5 Ah: ***CSB HR1221WF2***
(b) 12 V / 7 Ah Batteries: ***CSB GP1272-F2*** or ***CSB GP1272(28W)*** or ***CSB UPS12360-7*** or ***YUASA NPW36-12***
(c) 12 V / 9 Ah Batteries: ***CSB HR1234W-F2*** or ***YUASA NPW45-12***

UPS MODELS		SDU 5000	SDU 6000 SDU 6000 ER	SDU 8000	SDU 10000 SDU 10000 DI SDU 10000 DI ER
OUTPUT					
Rated voltage	**[Vac]**	Selectable: 220 / **230** / 240 ±1%			
Frequency (3)	**[Hz]**	Selectable: 50, 60 or **automatic detection**			
Rated power	**[kVA]**	5	6	8	10
Rated power	**[kW]**	5	6	8	10
Overload: 100% <load <110%		Bypass line available: activates the bypass after 10 min Continues to work on by-pass Bypass line unavailable: shutdown after 10 min			
Overload: 110% <load <133%		Bypass line available: activates the bypass after 1 min shut down after 1 h Bypass line unavailable: shutdown after 1 min			
Overload: 133% <load <150%		Bypass line available: activates the bypass after 5 s shutdown after 10 min Bypass line unavailable: shutdown after 5 s			
Overload: >150%		Bypass line available: activates the bypass instantaneously shutdown after 3 s (load > 150%) shutdown after 2 s (load > 200%) Bypass line unavailable: shutdown after 0.5 s			
Static variation		≤1%			
Dynamic variation @ linear load		≤1% EN62040-3 Class 1 performance-linear load			
Dynamic variation @ distorting load		6.6% in 5 ms 10% in 10 ms 13.6% in 20 ms		6% in 5 ms 8.5% in 10 ms 12% in 20 ms	
Voltage distortion @ linear load		≤1%			
Voltage distortion @ distorting load		≤3%			
Current crest factor		≥3:1			
Inverter short-circuit (no by-pass available)		Icc= 2.5 In for 200 ms + 1.5 In x 300 ms [where In = Power [VA] / 220 V]			
Inverter short-circuit (by-pass available)		By-pass activated simultaneously			
By-pass SCR characteristics		I^2t_{max} = 4325 A^2S		I^2t_{max} = 11250 A^2S	

UPS MODELS		SDU 5000	SDU 6000 SDU 6000 ER	SDU 8000	SDU 10000 SDU 10000 DI SDU 10000 DI ER
MISCELLANEOUS					
Leakage current to ground	**[mA]**	<1.5		<1.7	
AC/AC yield @ load=100%Res		94.65%	94.50%	95.00%	94.70%
AC/AC yield @ load=100%Dist		87.6%	89.5%	92.5%	92.37%
ECO mode yield @ rated load		98%			
DC/AC yield in BATTERY mode		92.60%	92.60%	93.60%	93.30%
Auto-consumption in ECO mode (batteries disconnected)		36 W	36 W	26 W	26 W
Auto-consumption in ONLINE mode (batteries disconnected)		67 W	67 W	84 W	84 W
Auto-consumption in Stand-by mode (batteries disconnected)		26 W	26 W	14 W	14 W
Auto-consumption with on/off switch turned off		0.5 W			0.33 W
Power loss with resistive nominal load	**[W]** **[BTU/h]** **[kcal/h]**	290 990 250	350 1195 300	420 1430 360	560 1910 480
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		1 VDR x 300 Joules			
Noise levels		<48 dB(A) at 1 m		<50 dB(A) at 1 m	
Dimensions L x D x H (5)	**[mm]**	T 131 x 640 x 448 R 19” x 640 x 3U		T 2 x (131 x 640 x 448) R 2 x (19” x 640 x 3U) ER version: T 131 x 640 x 448 R 19” x 640 x 3U	
Carton box dimensions L x D x H	**[mm]**	800 x 600 x 240 + H12 ER version: 760 x 580 x 240		2 x (800 x 600 x 240) + H12 ER version: 760 x 580 x 240	
Net weight	**[kg]**	45	46 ER version: 20	19+62	20+62 ER version: 21
Gross weight	**[kg]**	53	54 ER version: 28	92	93 ER version: 25

(1) @ rated load, minimum voltage of 184 Vac, battery charging

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

(3) *Automatic detection:* If the network frequency is within ±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 ±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.

(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 3U or 3U+3U.

(6) For the ER versions, the recharging time depends on battery type installed.

BATTERY BOX MODELS		BB SDU 180-A3	BB 1320 180-B1	BB SDU 240-A3	BB 1320 240-B1
Rated battery voltage	**[Vdc]**	180		240	
Rated battery capacity	**[Ah]**	7 (a)	40 (b)	7 (a)	40 (b)
Dimensions L x D x H	**[mm]**	131 x 640 x 448	400 x 815 x 1320	131 x 640 x 448	400 x 815 x 1320
Net weight	**[kg]**	42	293	52	360
Gross weight	**[kg]**	47	303	57	370

In the event that the UPS unit is connected to a Battery Box, the maximum active power will be NOT derated.

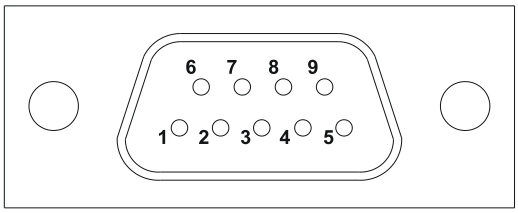
(a) 12 V / 7 Ah Batteries: ***CSB GP1272-F2*** or ***CSB GP1272(28W)*** or ***CSB UPS12360-7*** or ***YUASA NPW36-12***
(b) 12 V / 40 Ah Batteries: ***CSB GP12400***

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

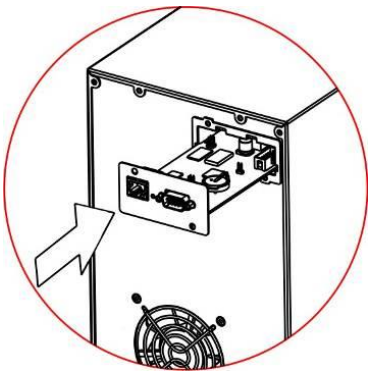


PIN #	SIGNAL	NOTES
1	Programmable output *: [default: UPS shut down]	(*) Opto-isolated contact max. +30 Vdc / 35 mA. These contacts can be associated with other events using the appropriate software For additional information about interfacing with the UPS unit, please refer to the appropriate manual
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

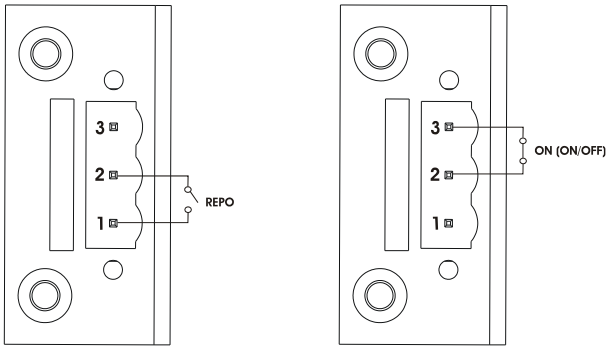
The UPS comes supplied with an expansion slot for optional communication cards (see the diagram on the right), which can allow the device to communicate using the most common communication standards.
Some examples include:

- 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** 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

SPTSDUA1Y17LREN Ver. September 2017 **- Subject to change without notice and inaccuracies**