Technical Specifications

Sentinel Rack

1500 VA and 3000 VA

riello ups

Contents

1. GENERAL DESCRIPTION

The SENTINEL RACK UPS is an online single-phase unit, with power levels of 1.5 kVA and 3 kVA, in a rack 19” cabinet.

That 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 pre-set tolerances, the UPS will switch to ON LINE functionality. Once the network has moved back within the pre-set tolerances for at least five minutes, the UPS will go back to powering the load through the bypass.

ADDITIONAL FUNCTIONS

- **MANUAL BYPASS**

The Manual Bypass function allows the UPS to be switched to the bypass line. In this configuration, the load is powered directly by the input network and any network disruptions will have a direct effect on the load.

BATTERY BOX
To the model SER 3000 ER is combined a Battery Box with the same aesthetic.
The Battery Box is supplied without battery charger boards being the model SER 3000 ER equipped with a high-powered battery charger configurable to supply a recharging current from 0.8 A to a maximum of 6 A.

1.1. *Main features of the UPS unit*

The main features of the SENTINEL RACK series include:

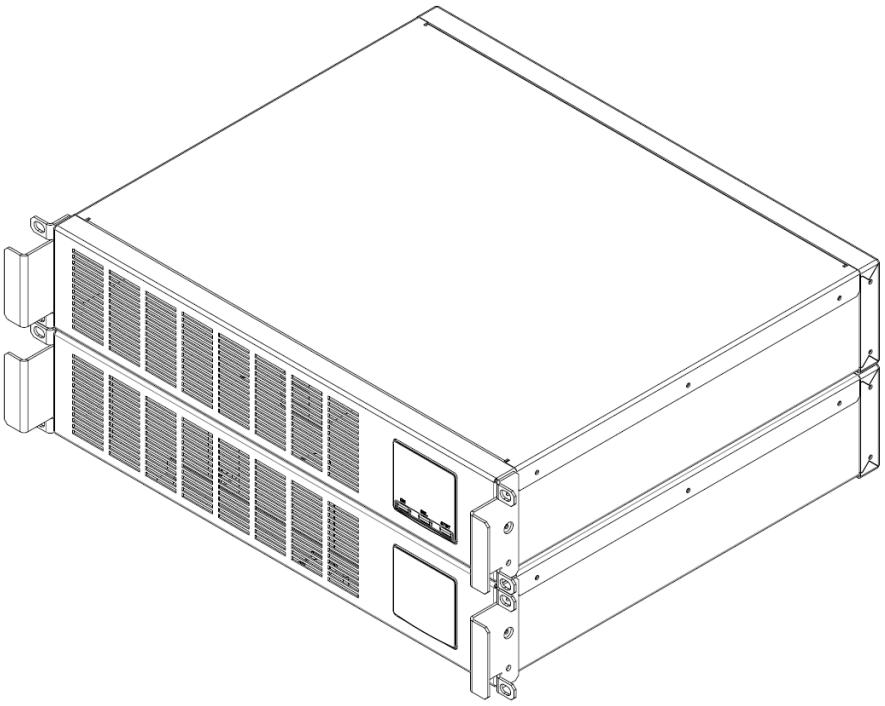
- VFI (On-line) / pure sinusoidal waveform during battery-powered functionality
- Reduced dimensions, 380 mm deep only
- Output frequency with automatic selection (auto-sensing)
- Front/rear ventilation
- LCD display
- UPS with configurable and customizable functions (i.e. by-pass thresholds, automatic 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. *Versions*

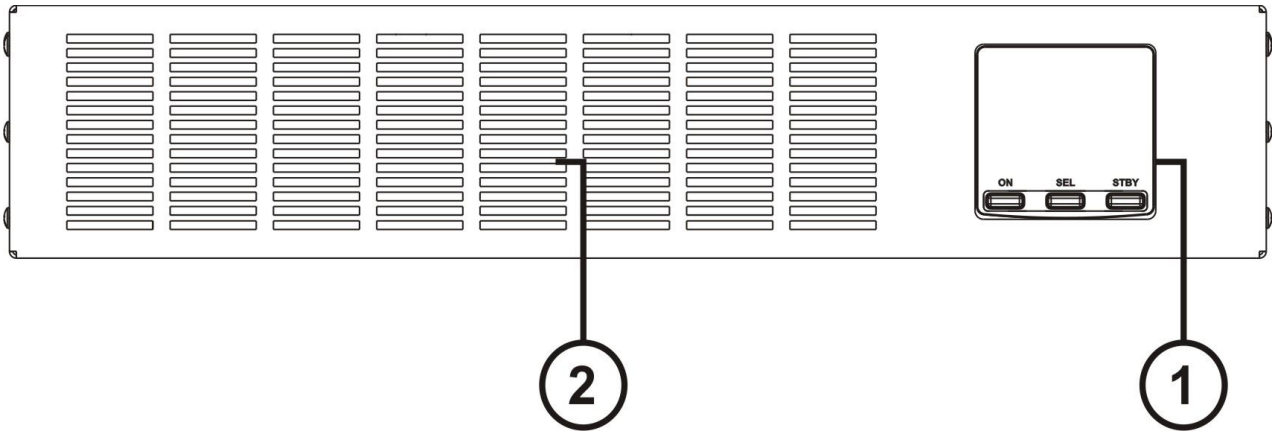
- 1500 VA – 1350 W – PF 0,9 – 3 batteries 12 V 9 Ah
- 3000 VA – 2700 W – PF 0,9 – battery charger of 6 A – separate cabinet for 6 batteries 12V 9Ah – with battery expansion.

2. SENTINEL RACK SERIES UPS AESTHETICS

2.1. *SENTINEL RACK front panel*



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

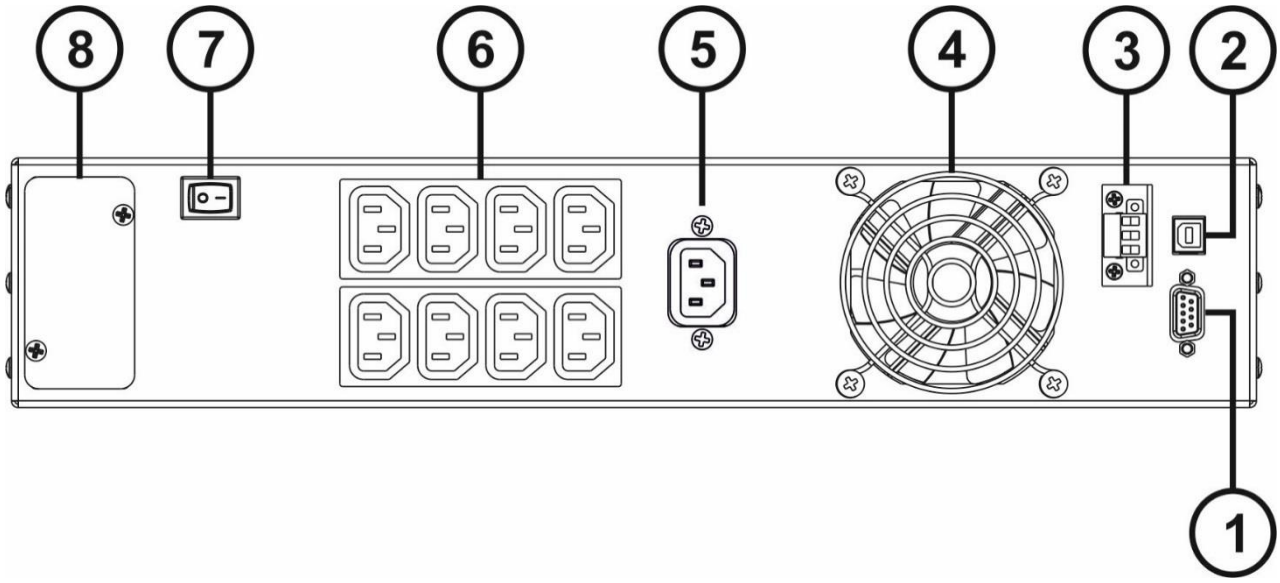


① Display LCD

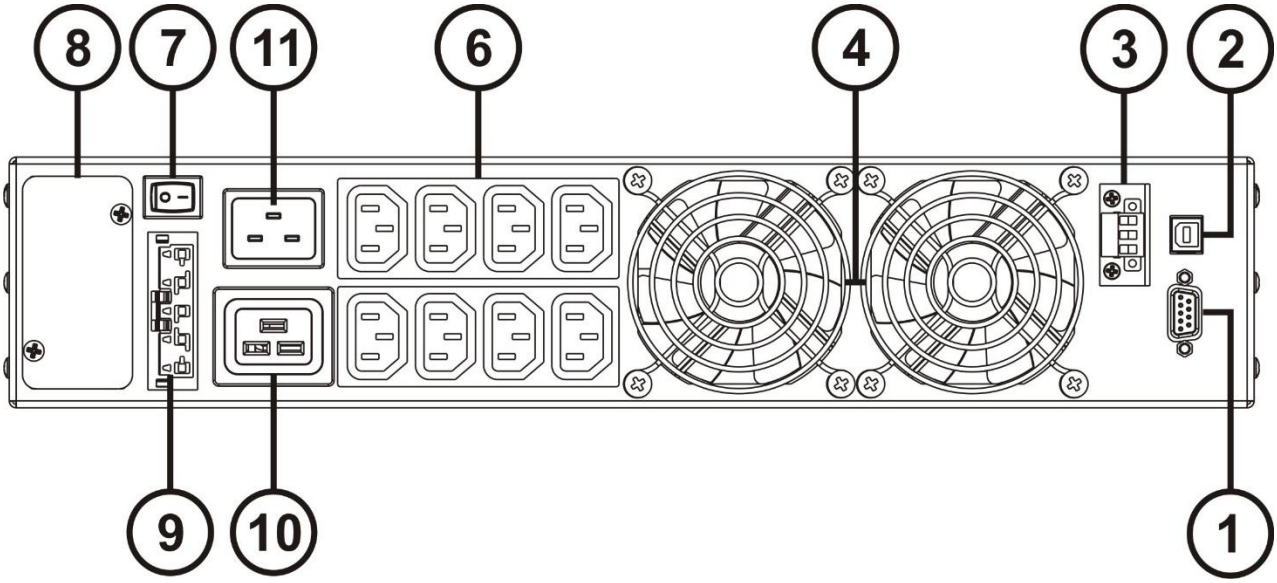
② Ventilation slots

2.2. *SENTINEL RACK rear panel*

SER 1500

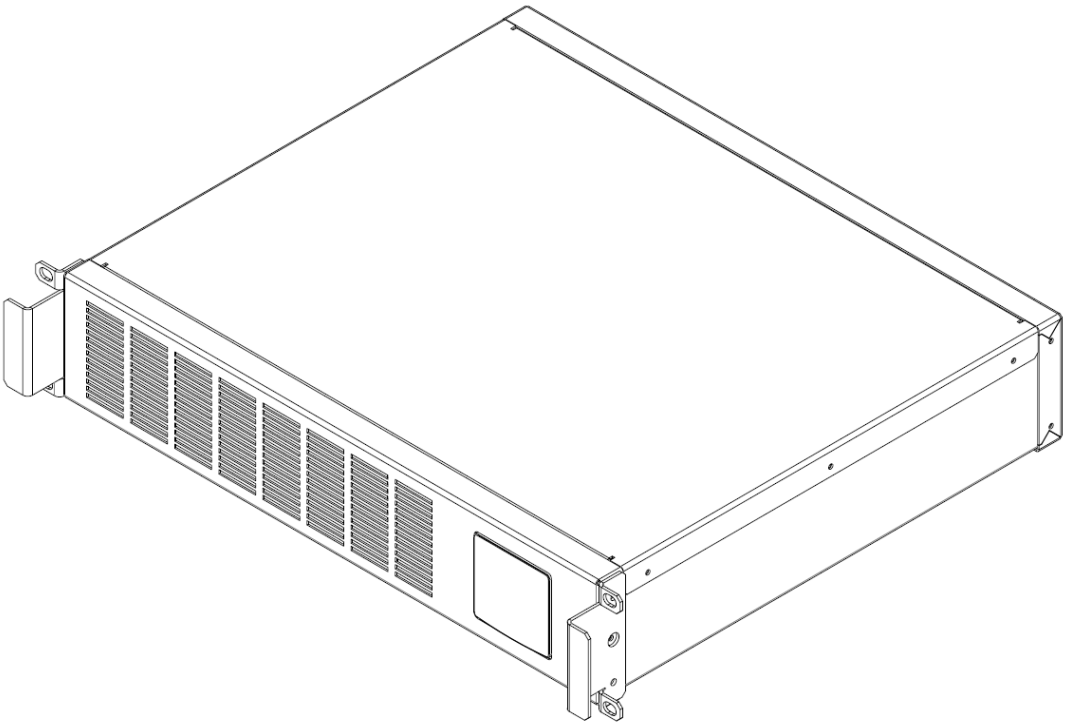


SER 3000 ER



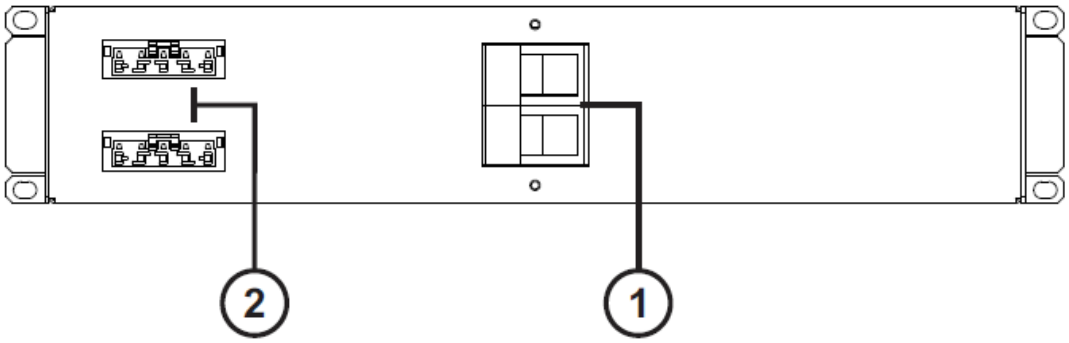
①	RS232 communication port and contacts	⑦	I/O switch
②	USB communication port	⑧	Slot for communication cards
③	Remote control terminal board	⑨	Battery expansion connector
④	Cooling fans	⑩	IEC 16A input plug
⑤	IEC 10A input plug	⑪	IEC 16A output socket
⑥	IEC 10A output socket		

2.3. *Battery Box front panel*



2.4. *Battery Box rear panel*

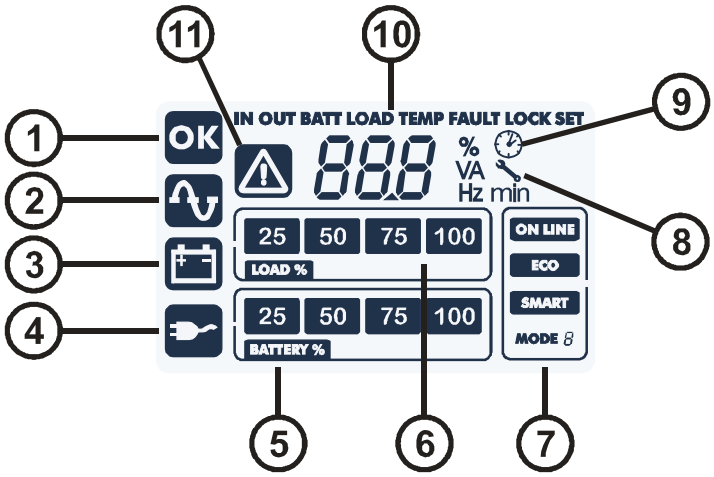
Battery Box JSER



① Battery disconnector (SWBATT)

② Battery expansion connector

2.5. *Display panel view*



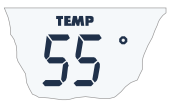
(A)	"SEL" button (Select)	(5)	Battery charge indicator
(B)	"ON" button	(6)	Load level indicator
(C)	"STAND-BY" button	(7)	Configuration area
(1)	Regulation operation	(8)	Maintenance request
(2)	Mains operation	(9)	Timer
(3)	Battery operation	(10)	Measurement display area
(4)	Load powered by bypass	(11)	Stand-by / alarm

2.6. *Measurement display area*

It is possible to display the most important measurements regarding the UPS in sequence on the display.
When the UPS is switched-on, the display shows the main voltage value.
To display a different measurement, press the “SEL” button repeatedly until the desired measurement appears.
In the event of a fault/alarm (FAULT) or a lock (LOCK), the display will automatically show the type and code of the corresponding alarm.

Some examples are shown below:

GRAPHIC EXAMPLE (1)	DESCRIPTION
	Mains voltage
	Mains frequency
	UPS output voltage
	Output voltage frequency
	Residual battery autonomy
	Fault / Alarm (2): the corresponding code is displayed

GRAPHIC EXAMPLE (1)	DESCRIPTION
	Battery charge percentage
	Total battery voltage
	Applied load percentage
	Current absorbed by the load
	Temperature of the electronics cooling system inside the UPS
	Lock (2): the corresponding code is displayed

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

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

3. TECHNICAL DATA TABLE

3.1. *SENTINEL RACK UPS*

UPS SENTINEL RACK		SER 1500	SER 3000 ER
INPUT			
Rated voltage	[Vac]	220 - 230 – 240	
Maximum allowed input voltage	[Vac]	300	
Voltage and frequency range for no battery intervention (configurable through UPSTools)		Maximum: 276 Vac Minimum: 184 Vac AT 100% load Minimum: 184 Vac ÷ 140 Vac (from 100% to 50% load in linear mode) Return to network powered functionality: 190 Vac Frequency: 40 ÷ 72	
Rated frequency	[Hz]	50 – 60	
Power factor		≥ 0.98	
Current distortion @ maximum load		≤ 6,5%	
Maximum current@184 Vac (1)	[A]	15.5	15.5
Rated current@220 Vac (2)	[A]	6.3	16

(1) @ rated load, minimum voltage of 184 Vac, battery charging
(2) @ rated load, rated voltage of 220 Vac, battery charging

BYPASS		
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: 4

BATTERY			
Number of batteries / V	[n°] /[V]	3 / 12	6 / 12
Standard capacity	[Ah]	9 (b)	-
Charging current	[A]	0,7÷0.8 A @ UPS ON with fan at maximum speed 1A @ UPS in Stand-By	0,7÷6 A (d)
Charging time (c)	[h]	<4 for 80% of the load	
Expandability and rated voltage of the Battery Box	[Vdc]	-	72
Minimum capacity of the Battery Box	[Ah]	-	> 9

((b) 12 V / 9 Ah Batteries: **CSB HR1234W-F2, UPS 12460** or **YUASA NPW45-12**
(c) For the ER versions, the charging time depends on the batteries installed in the Battery Box
(d) The charging current depends on the input voltage and the internal temperature of the UPS. Under normal conditions, temperature derating of about 2-3 A may occur
In order to select the minimum capacity of the Battery Box, verify the maximum charging current accepted by the batteries.

UPS SENTINEL RACK	SER 1500	SER 3000 ER

OUTPUT

Rated voltage [Vac]	Selectable: 220 / 230 / 240	
Static variation (3)	1.5%	
Dynamic variation (4)	≤ 5% in 20 ms	
Waveform	Sinusoidal	
Voltage distortion @ linear load	≤ 2%	
Voltage distortion @ distorting load	≤ 5%	
Frequency (5) [Hz]	Selectable: 50 / 60 / automatic detection	
Current crest factor	≥ 3 : 1	
Rated power [VA]	1500	3000
Rated power [W]	1350	2700
Derating: Frequency converter / forced frequency de-synchronization	-30%	
Overload: 100% <load <110%	Bypass line available: Bypass line unavailable:	activates the bypass after 2 sec. shut down after 120 sec. shutdown after 60 sec.
Overload: 110% <load <150%	Bypass line available: Bypass line unavailable:	activates the bypass after 2 sec. shutdown after 4 sec. shutdown after 4 sec.
Load overload >150%	Bypass line available: Bypass line unavailable:	activates the bypass instantaneously shutdown after 1 sec. shutdown after 0.5 sec.
Inverter short circuit	Short circuit current ≤ Power [VA] / 220 V x 2 shutdown after 300 ms	

(3) Network/Battery @ 0% - 100% load
(4) @ Network / battery / network @ 0% / 100% / 0% resistive load
(5) 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%

UPS SENTINEL RACK	SER 1500	SER 3000 ER

AUTONOMY

Measured autonomy @ 100% linear load – with minimum batteries configuration.	4'05"	4'05"

MISCELLANEOUS

Leakage current to ground [mA]	≤ 2	
AC/AC yield in ON-LINE mode	91.7%	93.1%
Automatic consumption in ECO mode (batteries disconnected)	10.5 W	12 W
DC/AC yield in BATTERY mode	88.4%	90.5%
Automatic consumption from the network (batteries disconnected)	29 W	44 W
Automatic consumption in Stan by mode (batteries disconnecte	< 7 W	
Automatic consumption with on/off switch turned off	0.1 W	0.4 W
Power loss with resistive nominal load [W] [BTU/h] [kcal/h]	121.8 416 105	202.6 691 174
Operating room temperature (6) [°C]	0 – 40	
Humidity	< 90% without condensation	
Installation elevation	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 – under voltage – thermal	
Overvoltage protection	n°2 MOV x 300 Joule	
Noise levels	< 40 dB(A) at 1 m	
Dimensions LxDxH [mm]	450 x 380 x 87	
Packaging dimensions LxDxH [mm]	540 x 490 x 190	
Net weight [Kg]	18	14 (without batteries)
Gross weight [Kg]	19	15

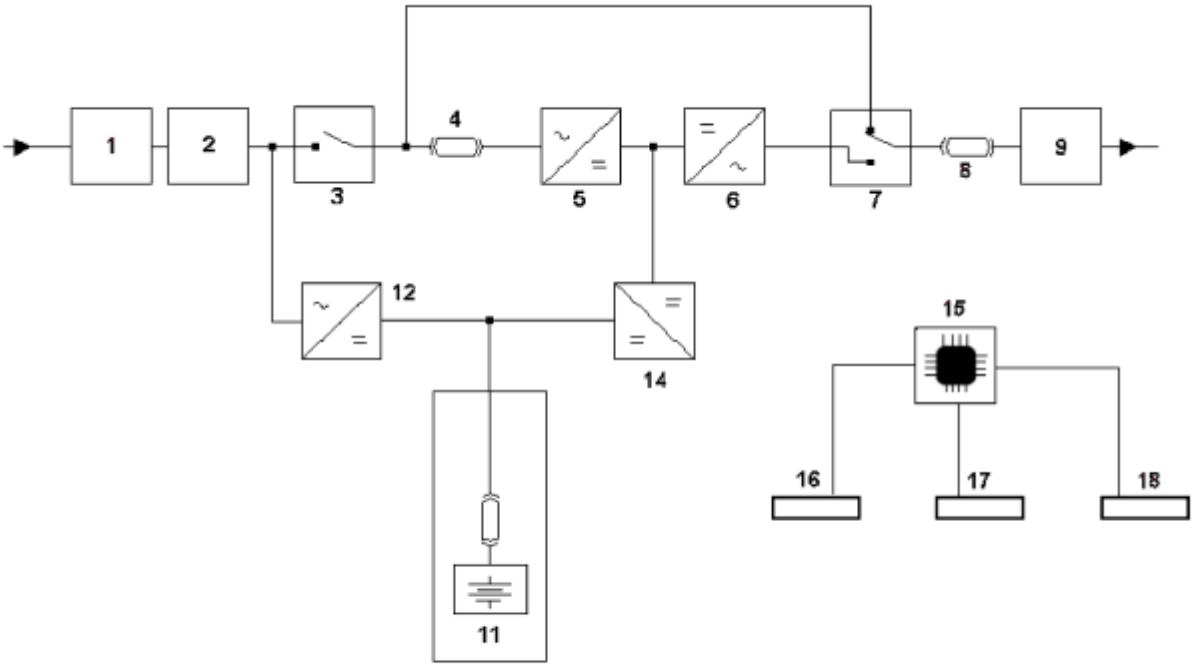
ADDITIONAL INFORMATION

Safety compliance	EN 62040-1 and directive 2006/95/EC
EMC compliance	EN 62040-2 cat. C2 and directive 2004/108/EC
Certifications	CE

3.2. *Battery Box JSER*

BATTERY BOX JSER		AB72-A5	BB72-A5
Rated battery voltage	[Vdc]	72	
Number of batteries / V	[n°]/[V]	0 / 12	6 / 12
Standard capacity	Ah	0	9
Dimensions LxDxH	[mm]	450 x 380 x 87	
Packaging dimensions LxDxH	[mm]	540 x 490 x 190	
Net weight	[Kg]	12	27
Gross weight	[Kg]	14	29

4. BLOCK DIAGRAM



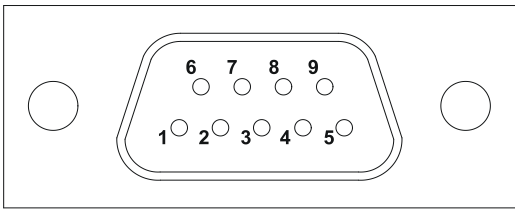
1) Resettable Input protection
2) Input filter
3) Back-feed relay
4) Input fuse
5) Rectifier
6) Inverter
7) Automatic By-pass
8) Output fuse (only for 2.2 and 3 kVA models)
9) Output filter (only for 2.2 and 3 kVA models)
10) Batteries (SER 1500)
11) External batteries (SER 3000 ER)
12) Battery charger
13) Batteries fuse
14) DC/DC Boost
15) Microprocessor
16) Communication slot
17) RS232 and USB interface
18) LCD Display

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

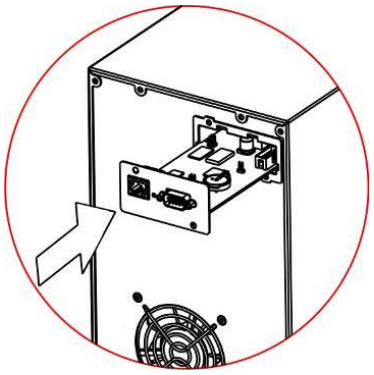


PIN #	SEGNALE	NOTE
1	Programmable output*: [default: UPS shutdown]	(*) Opto-isolated contact max. +30 Vdc / 35 mA. These contacts can be associated with other events using the appropriate software For additional information about interfacing with the UPS unit, please refer to the appropriate manual
2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

Communications Slot

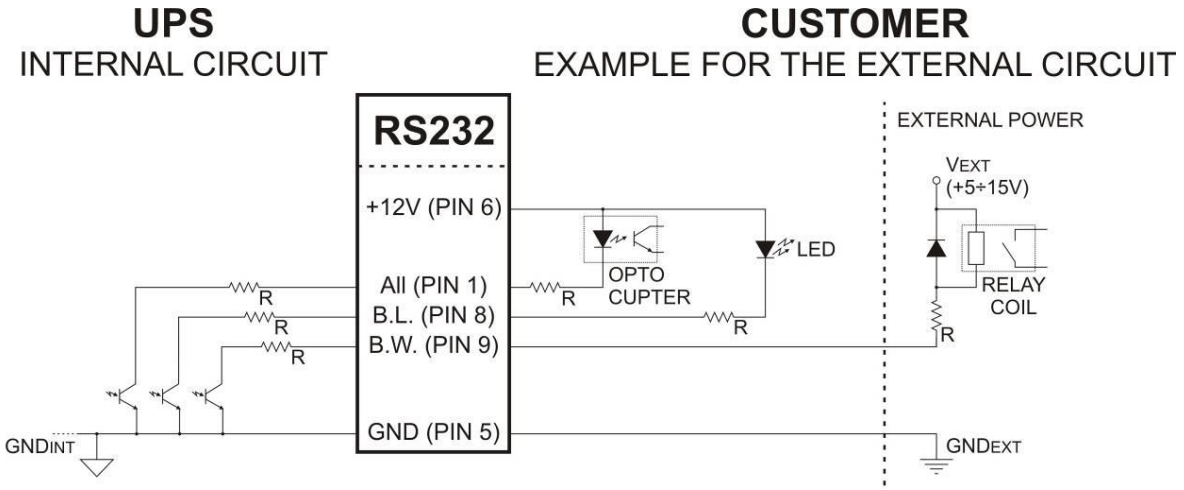
The UPS comes supplied with an expansion slot for optional communication cards (see the diagram on the right), which can allow the device to communicate using the most common communication standards.
Some examples include:

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



Please consult the website **www.riello-ups.com** to check the availability of additional accessories

5.1. Examples for connecting signals through the RS232 port



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

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

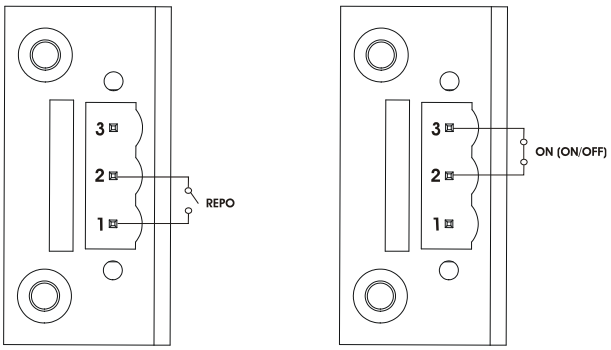
Vcc max: 10.8 Vdc without load
Vcc min: 8 Vdc @ 25 mA

5.3. Firmware

The firmware of the UPS unit can be updated by inserting the appropriate programming card into the expansion slot. This operation must be carried out by authorized personnel.

5.4. Examples for REPO connector connections

Connections for REPO functionality and remote ON/OFF



www.riello-ups.com

SPTSERA1S18FREN Ver. June 2018 **- Subject to change without notice and inaccuracies.**