Technical Specifications

Sentinel PRO

700 VA up to 3000 VA
1000 VA ER-2200 VA ER-3300 VA ER

riello ups

CONTENTS

1. GENERAL DESCRIPTION

The SENTINEL PRO family UPS is an online single phase unit, with power levels of up to 3 kVA, in a cabinet tower configuration of two different sizes based on the power required.

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 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.

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.

This family of UPS units is completed with relative battery cabinets.
The BB36 and BB72 Battery Boxes have the same aesthetic design as the UPS units and are capable of housing one or two battery branches in parallel.
The BB36-B1 and BB72-B1 Battery Boxes are larger battery cabinets which are suitable for housing 40 Ah batteries.
Both Battery Box versions are available without batteries. These versions come complete with all of the required kits so that the user can decide upon the most suitable configuration to meet his/her needs.
All of the Battery Box versions are supplied without battery charger boards.

For increased recharging current, ER version UPS units are available, which contain high-powered battery charger boards instead of batteries.

1.1. Main features of the UPS unit

The main features of the SENTINEL 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

- 700 VA – 560 W – PF 0.8 – 2 batteries, 12 V, 7 Ah – small cabinet
- 1000 VA – 800 W – PF 0.8 – 3 batteries, 12 V, 7 Ah – small cabinet – with battery expansion
- 1500 VA – 1200 W – PF 0.8 – 3 batteries, 12 V, 9 Ah – small cabinet
- 2200 VA – 1760 W – PF 0.8 – 6 batteries, 12 V, 7 Ah – large cabinet – with battery expansion
- 3000 VA – 2400 W – PF 0.8 – 6 batteries, 12 V, 9 Ah – large cabinet - with battery expansion

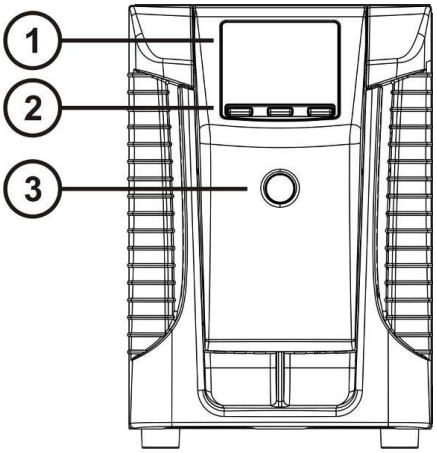
1.3. ER Versions for extended autonomy

- 1000 VA ER, 2200 VA ER, 3000 VA ER
- Same features as the standard version

2. SENTINEL PRO SERIES UPS AESTHETICS

2.1. SENTINEL PRO front panel

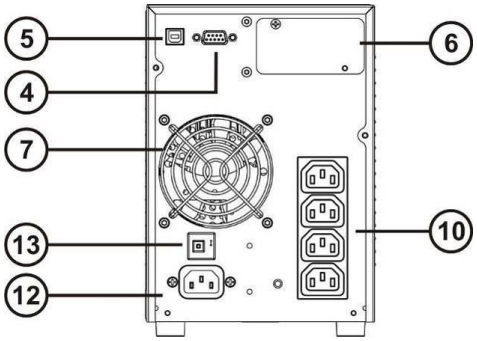
- Chassis reference colour: Pantone Black 6U
- Colour of the silver parts: RAL 9006



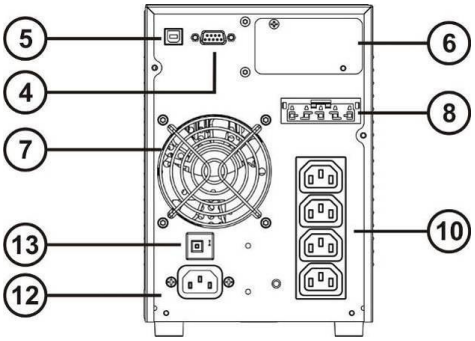
1. Display
2. Multifunction keys
3. ON/OFF button

2.2. SENTINEL PRO rear panel

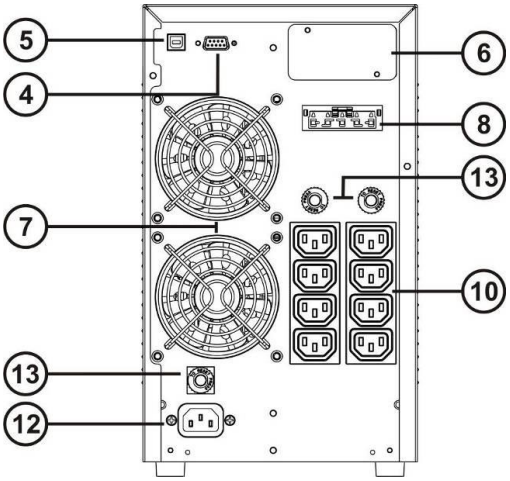
700 VA / 1500 VA



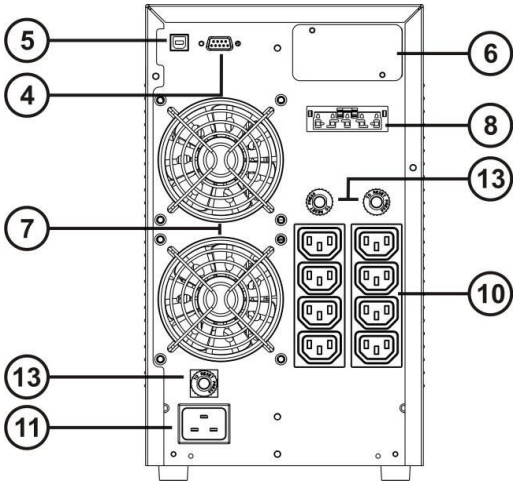
1000 VA / 1000 VA ER



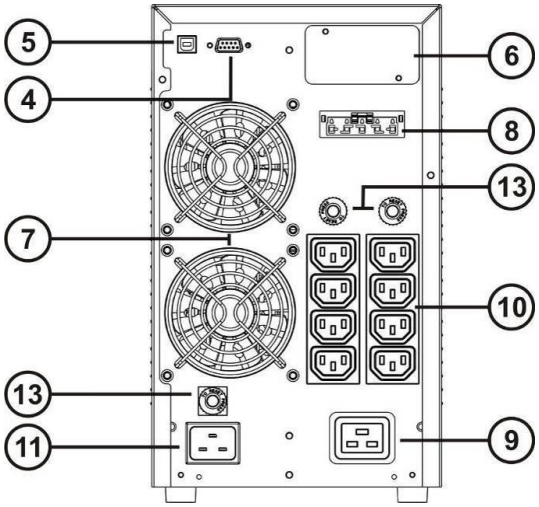
2200 VA



2200 VA ER



3000 VA / 3000 VA ER

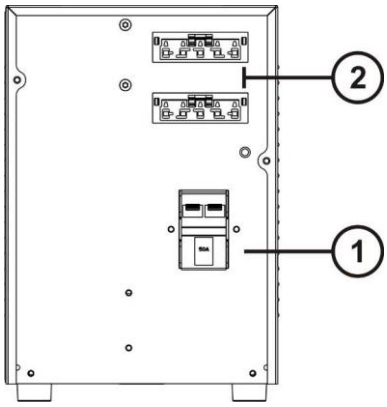


4. RS232 communication port and opto-isolated contacts
5. USB Port
6. Expansion slot
7. Cooling fans
8. Battery expansion connector
9. IEC 16 A output socket
10. IEC 10 A output socket
11. IEC 16 A input plug
12. IEC 10 A input plug
13. Thermal switch

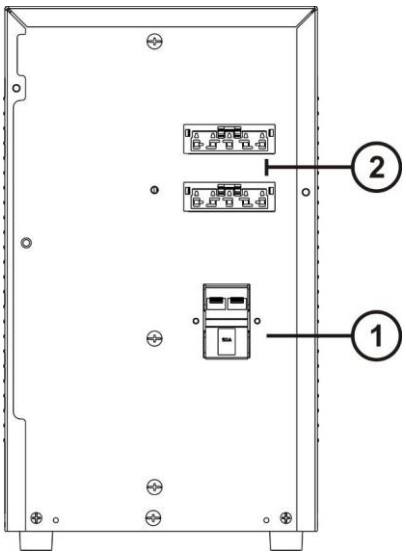
2.3. Battery Box front panel

2.4. Battery Box rear panel

36 V Battery Box



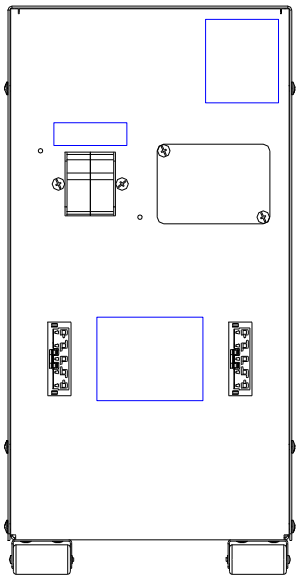
72 V Battery Box



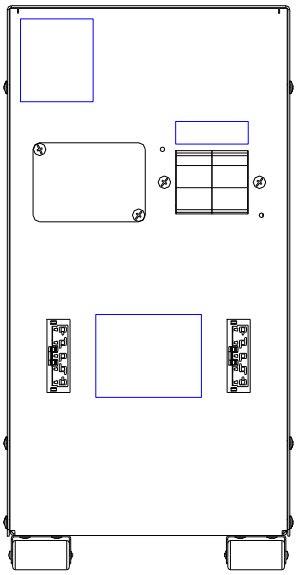
1. Battery disconnection switch (SWBATT)
2. Battery expansion connector

2.5. BBox T12 rear panel

36 V Battery Box



72 V Battery Box



1. Battery disconnection switch (SWBATT)
2. Battery expansion connector

3. TECHNICAL DATA TABLE

3.1. SENTINEL PRO UPS

SENTINEL PRO UPS		700 VA	1000 VA 1000 VA ER	1500 VA	2200 VA 2200 VA ER	3000 VA 3000 VA ER
INPUT						
Rated voltage	**[Vac]**	220 - 230 – 240 Vac				
Maximum allowed input voltage	**[Vac]**	300 Vac				
Voltage 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				
Rated frequency	**[Hz]**	50 – 60				
Power factor		≥0.98				
Current distortion @ maximum load		≤7%				
Maximum current@184 Vac (1)	**[A]**	3.7	5.2	7.8	11.2	15.5
Rated current@220 Vac (2)	**[A]**	3.3	4.5	6.5	9.5	12.5
Circuit breaker	**[A]**	7	7	10	12	16
Rated current (only for ER versions) @220 Vac(2)	**[A]**	N/A	6	N/A	13.5	16
Circuit breaker (only for ER versions) (2)	**[A]**	N/A	10	N/A	16	20

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

SENTINEL PRO UPS		700 VA	1000 VA 1000 VA ER	1500 VA	2200 VA 2200 VA ER	3000 VA 3000 VA ER
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	**[msec]**	Typical: 4				
BATTERY						
Number of batteries / V	**[no.] /[V]**	2 / 12 V	3 / 12 V	3 / 12 V	6 / 12 V	6 / 12 V
Standard capacity	**[Ah]**	7 Ah (a)	7 Ah (a)	9 Ah (b)	7 Ah (a)	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 (c)	**[h]**	<4 h for 80% of the load				
Expandability and rated voltage of the Battery Box		Not expandable	36 Vdc	Not expandable	72 Vdc	72 Vdc
Charging current (only for ER versions)		N/A	8 A (d)	N/A	8 A (d)	8 A (d)
Minimum Battery Box capacity (only for ER versions)		N/A	>40 Ah (e)	N/A	>40 Ah (e)	>40 Ah (e)

(a) 12 V / 7 Ah Batteries: ***CSB GP1272-F2*** or ***CSB GP1272(28W)*** or ***CSB UPS12360-7*** or ***YUASA NPW36-12***
(b) 12 V / 9 Ah Batteries: ***CSB HR1234W-F2*** 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
(e) In order to select the minimum capacity of the Battery Box, verify the maximum charging current accepted by the batteries.

SENTINEL PRO UPS		700 VA	1000 VA 1000 VA ER	1500 VA	2200 VA 2200 VA ER	3000 VA 3000 VA ER
OUTPUT						
Rated voltage	**[Vac]**	Selectable: 220 / 230 / 240				
Static variation (3)		1.5%				
Dynamic variation (4)		≤5% in 20 msec				
Waveform		Sinusoidal				
Voltage distortion @ linear load		≤2%				
Voltage distortion @ distorting load		≤5%				
Frequency (5)	**[Hz]**	Selectable: 50 / 60 / Hz / automatic detection				
Current crest factor		≥3:1				
Rated power	**[VA]**	700 VA	1000 VA	1500 VA	2200 VA	3000 VA
Rated power	**[W]**	560 W	800 W	1200 W	1760 W	2400 W
Derating: Frequency converter / forced frequency de-synchronization		-30%				
Overload: 100% <load <110%		Bypass line available: activates the bypass after 2 sec. shut down after 120 sec. Bypass line unavailable: shutdown after 60 sec.				
Overload: 110% <load <150%		Bypass line available: activates the bypass after 2 sec. shutdown 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.				
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%

SENTINEL PRO UPS		700 VA	1000 VA 1000 VA ER	1500 VA	2200 VA 2200 VA ER	3000 VA 3000 VA ER
AUTONOMIES						
Measured autonomy @ 100% linear load – only internal batteries		5’	6’30”	5’	5’	4’30”
Back up time with internal batteries		10*	11*	10*	10*	10*
MISCELLANEOUS						
Leakage current to ground	**[mA]**	≤1.5			≤2	
AC/AC yield in ON-LINE mode		87.2%	88.9%	90.4%	90.6%	91.2%
Automatic consumption in ECO mode (batteries disconnected)		8 W	9 W	9 W	10.4 W	10.2 W
DC/AC yield in BATTERY mode		83.5%	85.0%	86.2%	86.4%	86.6%
Automatic consumption from the network (batteries disconnected)		41 W	46 W	40 W	65 W	58 W
Automatic consumption in Stand-by mode (batteries disconnected)		6 W	6 W	6 W	7 W	14 W
Automatic consumption with on/off switch turned off		0.5 W	0.5 W	0.5 W	0.5 W	0.33 W
Power loss with resistive nominal load	**[W] [BTU/h] [kcal/h]**	80 270 68	100 335 85	130 445 112	180 610 155	230 790 200
Operating room temperature (6)	**[°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 Joule				
Noise levels		<40 dB(A) at 1 m				
Protection level		IP 20 on request IP 21				
Dimensions L x D x H	**[mm]**	158 x 422 x 235			190 x 446 x 333	
Packaging dimensions L x D x H	**[mm]**	245 x 500 x 340			325 x 585 x 470	
Net weight	**[kg]**	11	13	14	26	28
Gross weight	**[kg]**	12.5	14.5	15.5	29	31
Net weight (only for ER versions)	**[kg]**	N/A	7	N/A	14	15
Gross weight (only for ER versions)	**[kg]**	N/A	8.5	N/A	17	18

SENTINEL PRO UPS	700 VA	1000 VA 1000 VA ER	1500 VA	2200 VA 2200 VA ER	3000 VA 3000 VA ER
ADDITIONAL INFORMATION					
Safety compliance	EN 62040-1 and 2006/95/EC Directives				
EMC compliance	EN 62040-2 cat. C2 and 2004/108/EC Directives				
Certifications	CE		Nemko GS geprüfte Sicherheit		

3.2. T10 Battery Box

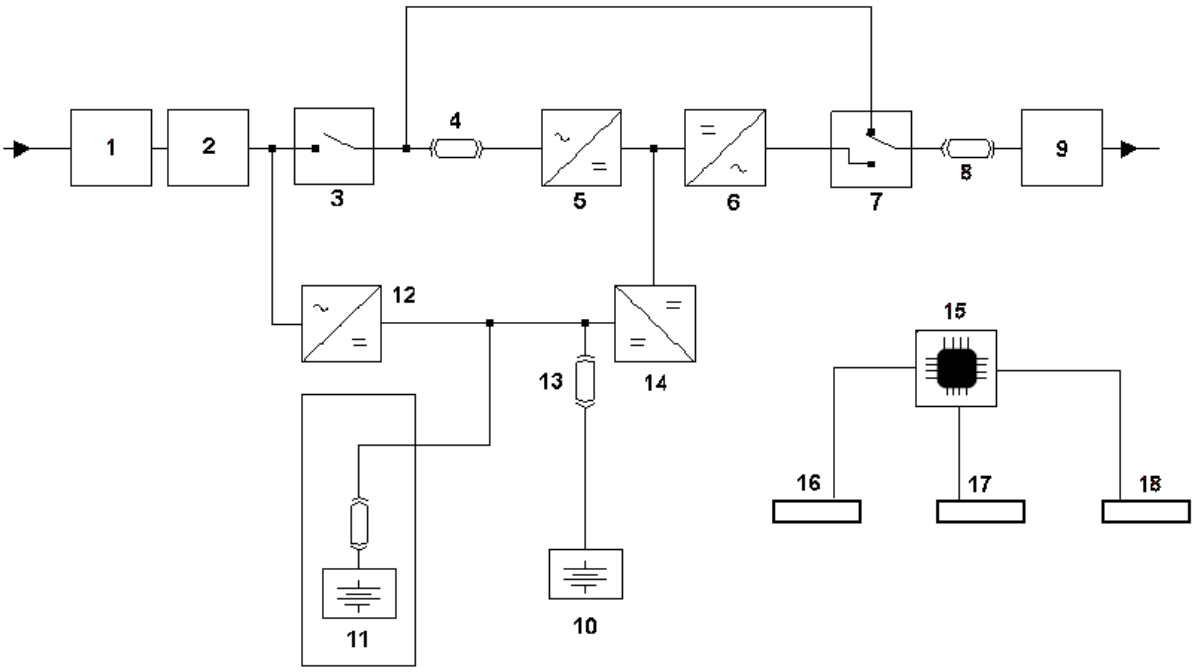
T10 BATTERY BOX		AB36-M1	BB36-A3	BB36-M1	AB72-M1	BB72-A3	BB72-M1
Rated battery voltage	[Vdc]	36 Vdc			72 Vdc		
Number of batteries / V	[no.]/[V]	0 / 12 V	3 / 12 V	3+3 / 12 V	0 / 12 V	6 / 12 V	6+6 / 12 V
Standard capacity	Ah	0	7	14	0	7	14
Dimensions L x D x H	[mm]	158 x 422 x 235			190 x 446 x 333		
Packaging dimensions L x D x H	[mm]	245 x 500 x 340			325 x 585 x 470		
Net weight	[kg]	6	14	21	12	27	41
Gross weight	[kg]	7	15	22	14	29	43

3.3. T12 Battery Box

T12 BATTERY BOX		BB36-B1	BB72-B1	AB72-B1
Rated battery voltage	[Vdc]	36 Vdc	72 Vdc	36 Vdc / 72 Vdc
Number of batteries / V	[no.]/[V]	3 / 12 V	6 / 12 V	0 / 12 Vdc
Standard capacity	Ah	40	40	0
Dimensions L x D x H	[mm]	158 x 422 x 235		
Packaging dimensions L x D x H	[mm]	590 x 320 x 760		
Net weight	[kg]	55	100	10
Gross weight	[kg]	65	110	20

* The autonomy depends on the load type.

4. BLOCK DIAGRAM



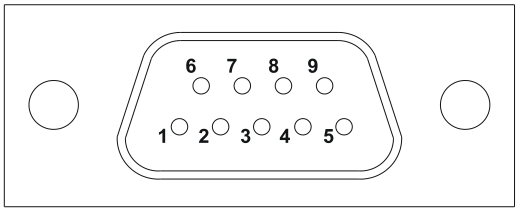
1) Resettable Input protection
2) Input filter
3) Back-feed relay
4) Input fuse
5) Rectifier
6) Inverter
7) Automatic By-pass
8) Output fuse (only for 2.2 and 3 kVA models)
9) Output filter (only for 2.2 and 3 kVA models)
10) Batteries
11) External batteries (optional)
12) Battery charger
13) Batteries 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

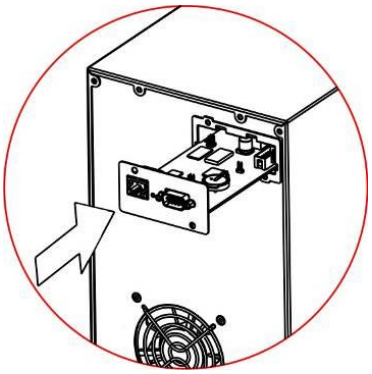


PIN #	SIGNAL	NOTES
1	Programmable output*: [default: UPS shutdown]	(*) Opto-isolated contact max. +30 Vdc / 35 mA. These contacts can be associated with other events using the appropriate software (**) Opto-isolated control +5÷15 Vdc. These contacts can be associated with other events using the appropriate software For additional information about interfacing with the UPS unit, please refer to the appropriate manual
2	TXD	
3	RXD	
4	Programmable input**: [default: disabled]	
5	GND	
6	DC Power Supply (Imax = 20 mA)	
7	Programmable input**: [default: disabled]	
8	Programmable output*: [default: discharge pre-alarm]	
9	Programmable output*: [default: battery-powered functionality]	

Communications Slot

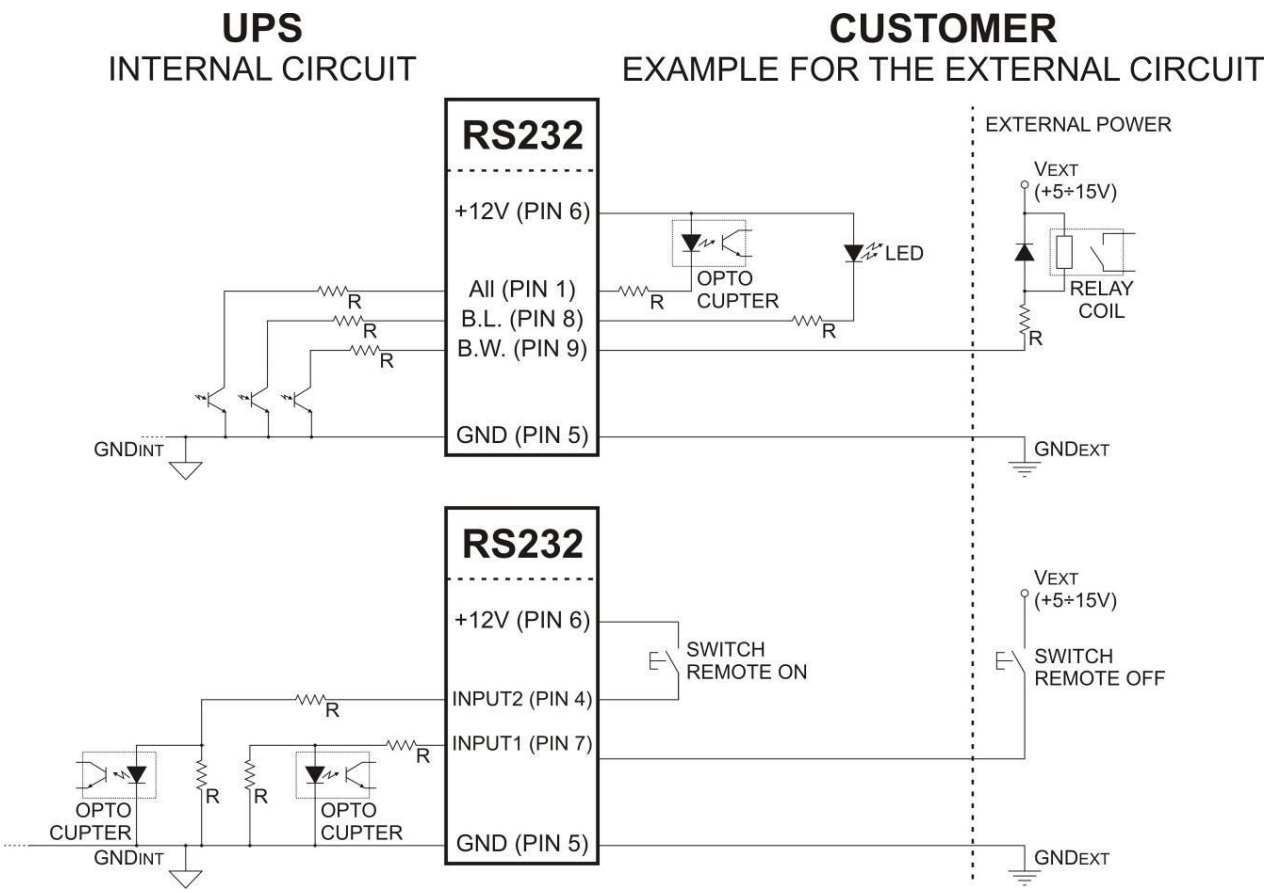
The UPS comes supplied with an expansion slot for optional communication cards (see the diagram on the right), which can allow the device to communicate using the most common communication standards.
Some examples include:

- Additional RS232 and USB communication ports
- Serial duplicator
- Ethernet network card with TCP/IP, HTTP 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

5.1. Examples for connecting signals through the RS232 port



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

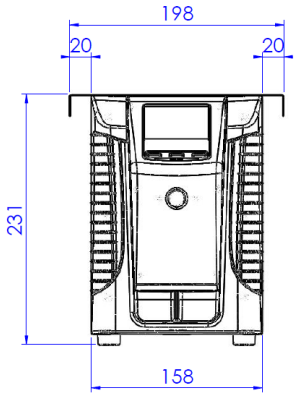
The voltage provided by the serial port’s 6pin power depends on the absorbed current.

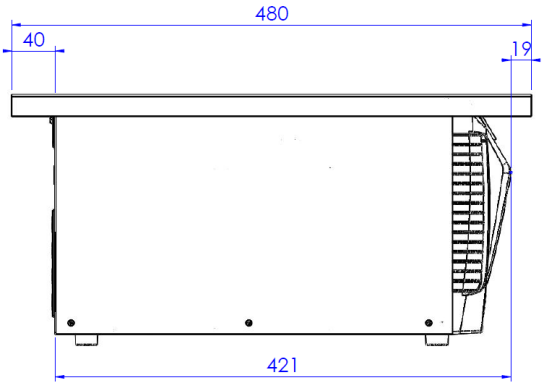
Vcc max: 10.8 Vdc without load
Vcc min: 8 Vdc @ 25 mA

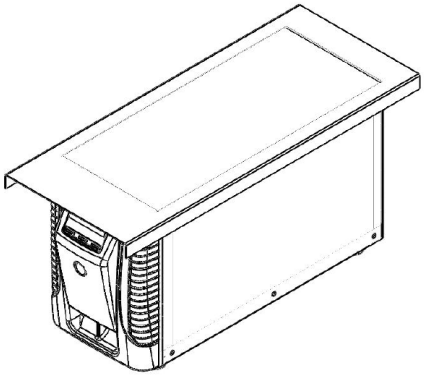
5.3. Firmware

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.

6. PROTECTION LEVEL IP21







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