Technical Specifications

CSS SENTINEL TOWER

3000/5000 VA/W SINGLE-PHASE
ON LINE Double Conversion Technology (VFI)

riello ups

CONTENTS

1. OBJECTIVE

These specifications define the technical characteristics of the static centralised safety power supply systems defined by the standard as Central Power Supply (CPS).
The CPS are equipment designed especially for use in buildings subject to fire safety regulations, their main task is to provide safety lighting in the event of a power failure and are also used to power:

- Electric circuits for automatic fire extinguishing systems;
- Paging systems and signalling security systems;
- Fume extraction equipment;
- Carbon monoxide alarm systems;
- Special security systems in relation to specific properties, for example high risk areas.

CSS Sentinel Tower (Central Supply System) series is designed and manufactured by Riello UPS, a leader in this field with a range of products from 600 VA to 800 kVA and experience in power protection solutions.

For more information, please visit our website at: www.riello-ups.com

2. SYSTEM DESCRIPTION

The **CSS Sentinel Tower** series is available in 6-20 kVA/kW models utilising the very latest ON LINE double conversion technology and is classified as VFI-SS-111 as defined by IEC EN 62040-3.
The series consists of transformer-free CPS units with single phase input and output and is designed and built using state of-the-art technology and components. It applies advanced technologies such as DSP (Digital Signal Processor) and three level inverter circuits to provide maximum protection and operating efficiency.

The Riello UPS CSS Sentinel Tower series is compatible with the most critical installations thanks to the high level of performance provided and features such as:

Compactness
Modern guidelines and sustainable best practices direct us to conceive and design UPS/CPS with particular focus on the entire product life cycle, therefore applying ultimate but resilient technologies, use of recyclable materials and miniaturisation of assemblies whilst ensuring the systems global reliability, which is pivotal for any UPS/ CPS.

High efficiency
Double-conversion UPS system providing the very highest levels of power availability, flexibility and unrivalled energy efficiency with superior performance for any type of applications.

High power availability
Functional design to obtain the maximum active power value (kVA = kW) regardless of the load power factor or operating temperature (full rated power is available up to 40 °C).

Smart Battery Management
The Riello UPS Smart Battery Management consists of a series of features and capabilities to optimise battery management and obtain the best performance and operating life possible.

Maximum reliability and availability
Distributed parallel configuration of up to 8 units per redundant (N+1) or power parallel system. The CPS continue to operate in parallel even if the connection cable is interrupted (Closed Loop). Advanced technology and the use of high-performance components enables Sentryum to provide exceptional performance and utmost reliability.

Flexibility

With its flexible, configuration, performance, and accessories, Riello UPS's **CSS Sentinel Tower** series is suitable for use in a wide range of applications.

Advanced communications

Riello UPS CSS Sentinel Tower series is equipped with a control panel with transflective LCD display for displaying information, measurements, operating states and alarms. In an illuminated environment, the display can be read without the need to switch on the backlight, making the information immediately available at first glance and allowing to further reduce energy consumption to help increase the overall efficiency of the CPS.

The series consists of the following models:

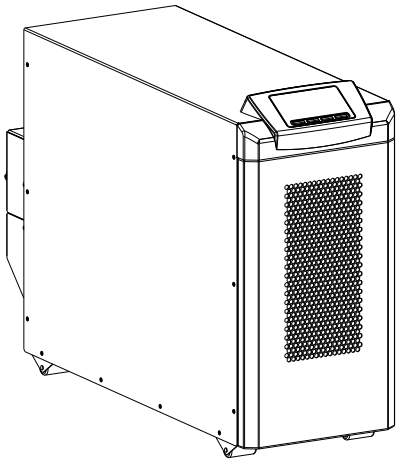
MODELS	DESCRIPTION
CAM 3	3000 VA input single-phase/output single-phase **(2500 VA in accordance with EN 50171)**
CAM 5	5000 VA input single-phase /output single-phase **(4000 VA in accordance with EN 50171)**

Summary table of the main characteristics

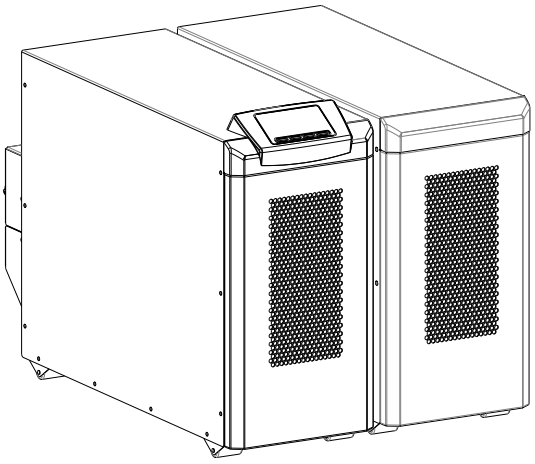
Characteristics	
Power range	3000 - 5000 VA/W
Type/Waveform	VFI (On-Line) / sinusoidal
Output voltage	single-phase
Terminal block / Cable entry	On the rear
Wheels	Yes
Switches	SWIN, SWOUT, SWMB
Ventilation	Front / Rear with fan speed control
Internal batteries	No
Battery connector	Protected / Polarised
Cold Start	Standard
Transflective LCD display	Standard
Expansion slot for communication cards	Vertical
USB Port	Standard
I / O terminal blocks	Standard
IEC sockets with EnergyShare function	Standard

Options and accessories	
Parallel	Optional
Temp. sensor battery	Optional
IP X1 Protection	Optional

General View

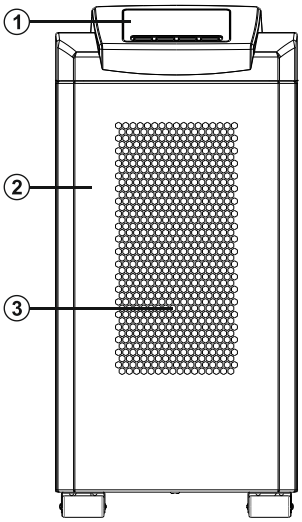


Single CPS (all models)



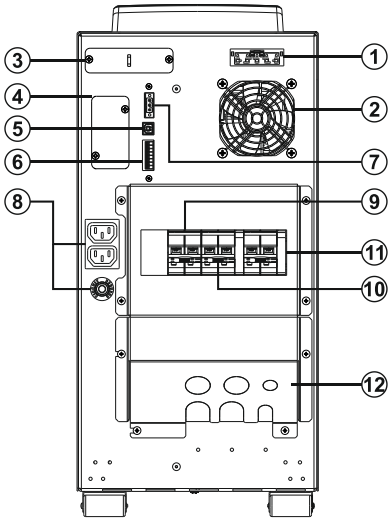
CPS with BATTERY CABINET side by side

Front



1. Display LCD
2. Removable front panel
3. Ventilation grill

Rear



1. Battery connector
2. Cooling fan
3. Parallel card (*optional*)
4. Expansion slot
5. USB Port
6. Volt free contacts
7. Remote commands
8. EnergyShare sockets (10A max) and protection
9. Input disconnector (SWIN)
10. Service Bypass disconnector (SWMB)
11. Output disconnector (SWOUT)
12. Terminal cover

3. REFERENCE STANDARDS

Riello UPS operates a Quality Management System certified to ISO 9001/2015 (Certification No. CERT-04674-99-AQ-VEN-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;
- continued customer support.

The Riello UPS **CSS Sentinel Tower** series meets the VFI-SS-111 classification (according to EN 62040-3) and complies with the following specific standards for UPS:

- **IEC EN 62040-1:** 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 Riello UPS **CSS Sentinel Tower** 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).

The **CSS Sentinel Tower** comply with the EN50171 standard (Centralised power supply systems) if used within the indicated power limits and with “long life” batteries (supplied as standard if internal or with specific Riello UPS battery cabinets).

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**.

RoHS directive 2011/65/EU
Restriction of the Use of Certain Hazardous Substances in Electronic and Electrical Equipment. Aims to prevent hazardous substances from entering the production process and thereby keep them out of the waste stream.

4. APPLICATIONS

The CPS of the CSS Sentryum series are suitable, used as UPS, for applications requiring critical load protection, from a simple installation to those more complex where the requirement for the highest levels of reliability and maintainability are paramount.

LAN, Server and Datacentre: the unitary output power factor (kVA=kW) ensures the greatest power availability for efficient use of the UPS.

e-business and Telecommunications: thanks to parallel operation (up to 8 units) the power of the installed system can be increased to keep pace with the growth of the organisation.

Industrial processes, Transport and Electro-medical systems: the UPS is designed to protect a range of loads, from industrial processes to electro-medical applications. This has been achieved through careful load analysis at the design stage of the **CSS Sentryum** project, to ensure the following characteristics:

- Optimum input technical characteristics with zero impact on the power supply source.
- Extremely high inverter short circuit and overload capacity.
- High battery recharge capacity with the option to use a variety of battery types for long back-up times, for more detailed information contact your local agent

Emergency systems

The CPS can be configured in order to adapt to all different system requirements

Mode according to EN 50171	CPS Mode	Note
Mode without interruption	ON LINE	Load always powered by the inverter
Changeover mode	ECO	Load normally powered by the bypass or by the inverter only in emergency or if the mains is out of tolerance
Non-maintained changeover mode	STANDBY OFF	Load normally not powered, feed only in emergency
Changeover mode with additional control switching device for partial switching of the load	ON LINE / ECO	Part of the load always powered by the CPS in ON LINE (inverter) or ECO Mode (bypass). The remaining part of the load is only powered in an emergency via the EnergyShare sockets (appropriately configured).

For more information on the operating modes, refer to “CPS OPERATING MODES“ paragraph.

Note: Contact your local agent for dedicated emergency light solutions in accordance with the standard EN50171.

5. CONFIGURATIONS

The configurations available are the following:

Single CPS

The single CPS solution, normally used for simple installations, can be expanded in parallel to satisfy increases of connected load or to introduce a redundant level.

Parallel configuration

To increase the power (power parallel) or to improve reliability (redundant parallel) it is possible to connect up to 3 CPS of the same power rating in parallel.
The system is defined as "redundant parallel" when the stopping of one or several CPSs does not determine the loss of the power supply. All the CPSs power the load simultaneously with automatic current sharing.
The units exchange information in relation to the operating status and sync signals through a ring communication circuit, in order to ensure true dual redundancy. This means that even in the event of the accidental interruption of both connections, only the CPS affected by this interruption will switch off, whilst the other unit will continue to operate without any interruption.

Thanks to the **"Hot System Expansion"** feature means that a new CPS can be added to the system while the other units are ON LINE and powering the load from the inverter.
The CPS being integrated will configure itself automatically with the system data without any disturbance to the load.

Note:

- Maximum communication cable length between two CPS should not exceed 50 meters keeping in mind that the total length of the entire ring must not exceed 100 meters.
- For parallel configuration where a transformer is required to be connected downstream of each single CPS, please contact your local agent in advance.
- Parallel CPS are set with separate battery configuration; common battery operation (contact your local agent in advance) can be configured using the Configuration Software (for authorised personnel only).

6. CPS DESCRIPTION

Rectifier

The boost-PFC converter converts the AC voltage into DC voltage to power the inverter; in the event of a power failure, the converter raises the battery voltage to a value suitable for powering the inverter. The PFC control technology based on DSP (Digital Signal Processor) microprocessors, PLD (Programmed Logic Device) and IGBT modules ensure a low impact on the power source thanks to a low harmonic distortion of the input current (THDi) and a high input power factor (PF).

Battery charger

In compliance with the requirements of the EN 50171 standard, the battery charger of the CPS is able to supply a current that guarantees, after a complete discharge of the battery, its recharging to 80% of its capacity within 12 hours from the start of the charge (battery configurations on the price list).

The Riello UPS Smart Battery Management consists of a series of features and capabilities to optimize battery operation and preserve the battery life:

Battery test: during normal operation the battery is automatically tested at regular intervals. The battery test can also be manually activated.
The CPS switches to battery just for the short time needed to execute the battery test and only when the mains are present as backup, therefore the battery charge level and the load safety are not compromised.
If the test returns a negative result a warning is displayed on the CPS panel (or remote panel, if installed).

Battery polarity anti-inversion device: In compliance with the EN 50171 standard, the CPS is equipped with a safety device which, in case of connection of the batteries with incorrect polarity, activates the intervention of an internal protection (fuse) avoiding possible damage to the CPS itself.

Protection against slow discharges: for long runtimes and low load discharges, the end of discharge voltage is raised to approximately 1.8 V/el. as recommended by the battery manufacturers to avoid a deep discharge state.

Full discharge protection: In compliance with the EN 50171 standard, the CPS will show a message on the display when it is switched on again when the power supply returns following the intervention of the complete discharge protection circuit, it will show the anomaly code "ddP" informing the user of the shutdown due to minimum battery voltage. This message must be reset manually before being able to access the display menus again.
The recharging of the batteries is however started automatically immediately when the mains returns.
The CPS restarts automatically in the selected operating mode or remains in standby (load not powered) according to how the “auto restart” function is configured.

Ripple current: recharge ripple current (residual AC component) is one of the most important causes of poor battery reliability and reduced operating life. The **CSS Sentinel Tower** battery charger is a high-frequency design with a negligible level of ripple current.

Battery recharge limit current: The battery recharge current is limited to a prefixed value of Cnom/8 (i.e. 12.5% Cnom). This parameter can be changed using the configuration software, the maximum current available is however limited to 6 A (refer to the technical data table).

Cold Start: This feature allows the Inverter to be switched on and the load to be powered by the battery, when the mains power supply is not present. The cold start function is fitted as standard within all units; for details refer to CPS installation manual.

CPS without batteries: the CPS must always be operated with the batteries connected; if they are not connected alarms will be generated and the CPS will not be able to ensure business continuity. When used as a UPS it is possible to operate the system without any batteries connected.

Inverter

The DC/AC Converter (Inverter) converts the direct current into a stabilised sinusoidal alternating current to power the load.
When the CPS is in ON LINE mode, the load is always powered by the Inverter.
The Inverter type is an IGBT (*Insulated Gate Bipolar Transistor*) based three level design; innovative resonant control as well as dual core DSP microprocessor and high commutation inverter frequencies (18 kHz) make it possible to ensure high quality output voltage, with low noise levels, high operating efficiency and outstanding dynamic performance under any operating condition.

Voltage adjustment: The output voltage is adjusted using the independent phase control and DSP microprocessor; this enables a better static and dynamic response. In detail:

a. static condition: the Inverter output voltage remains within ±1% for all variations of the input voltage within the accepted limits;
b. dynamic condition**:** for load variations from 20 to 100% and 100 to 20%, the output voltage remains within ±1%, with linear load (refer to the technical data table).

Refer to the technical data table.

Frequency adjustment: The Inverter output frequency is generated autonomously by an internal oscillator, in synchronisation with the bypass supply. Frequency stability is operating condition dependent:

a. With the mains supply present: the internal oscillator follows any frequency variations of the bypass supply, in relation to the pre-set value - normally ±5% (configurable from ±0.10% to ±10%).
b. With no mains supply present: the Inverter autonomously generates the frequency of the output voltage with a stability of ±0.01%.

The maximum Inverter output frequency variation speed is 1 Hz/s (adjustable from 0.1 to 4 Hz/s).

Distortion of the output voltage: Inverter output waveform distortion with a linear load is maintained within ±1%. With a non-linear load, thanks to the ultimate digital control, the output voltage distortion does not exceed 1.5%.

Overload: The Inverter is sized to provide a power overload for a limited length of time (see the limits indicated in the "Technical data table").
In compliance with the EN 50171 standard, the CPS is able to withstand overloads up to 120% (% referred to EN 50171 power) without time limits. Refer to the technical data table.
When the time period or power limits are exceeded, the load is transferred to the bypass line.

Short circuit: In the event of a short circuit:

a. When the mains supply is not present: the Inverter can supply a current limited to 2.5x In for 200ms + 1.5In for 300ms.
b. When the mains supply is present: the CPS will changeover to bypass.

Static Switch (Automatic Bypass)

A static switch is an electronic device that can automatically transfer the loads connected to the CPS to the bypass supply in an emergency for example when:

a) Inverter overload limits are exceeded;
b) internal over temperature limits are exceeded;
c) the Inverter fails;
d) DC voltage goes outside the permitted range.

If at the time of switchover, the inverter output voltage is not synchronised with that of the bypass power supply, the transfer is inhibited.

Bypass Input (Emergency Supply Voltage): Transfer to the emergency supply only takes place if the voltage and the frequency are considered 'suitable' for the load and the limits for transfer can be adjusted via the Configuration Software.

- Default voltage range: -22%, +15% (configurable from -22% to +15%);
- Default frequency range: ±5% (configurable from ±0.10% to ±10%)

Overload: The static switch has no over current fast protection devices in order to guarantee maximum continuity.
Overcurrent protection shall be provided by special external devices inserted in the general system in order to ensure compatibility of the CPS.
For further overload limit details and I^2t value current refer to the technical data table.

Redundant Auxiliary Power Supply for the Automatic Bypass: The **CPS of the CSS Sentinel Tower series are** equipped with a redundant auxiliary power supply to allow the automatic bypass to function even if the main power supply has failed.
If the CPS fails in addition to the main power supply, the load is powered through the automatic bypass.
During this condition the microprocessor board and the control panel are not powered and so the CPS display will remain off.

Backfeed protection: The CPS has an internal protection against backfeed (backfeed protection). This protection acts by means of a sensing circuit which turns the inverter off if a fault within the static switch is detected. During this condition, to avoid interrupting the supply to the connected load, the CPS switches to the bypass line.
If this fault occurs during battery operation, the inverter is stopped.

7. CPS OPERATING MODES

The CPS can be operated in five main operating modes: ON LINE, FREQUENCY CONVERTER, ECO, SMART ACTIVE, STANDBY OFF.
The operating modes are described as follows:

ON LINE Mode:

Normal Operation: the rectifier, draws power from the mains power supply, supports the Inverter and charges the batteries; the load is powered by the Inverter which provides a clean and secure supply, synchronised to the bypass supply.
Emergency Operation: if the mains power supply exceeds the permitted input range (voltage and/or frequency), the rectifier is shut down and the Inverter is automatically powered by the battery set for the pre-set back-up time and without disruption to the load. When the mains power supply returns, the rectifier starts up, charges the batteries and eventually powers the Inverter.
Operation from Bypass: if an Inverter overload exceeds permitted limits, the load automatically transfers to the emergency bypass via the static switch and without disruption to the load.

Frequency Converter Mode: The CSS Sentryum can be configured as a frequency converter via the Configuration Software, therefore when the input frequency is 50 Hz the output frequency can be 60 Hz and vice versa. During this mode of operation, the automatic by-pass is disabled. The CPS can work in frequency converter mode with or without the batteries (must be configured via the Configuration Software).
In this operating mode or if the synchronisation with the bypass is disabled, the CPS will derate the output power by 30%.

ECO Mode: The load is normally powered from the emergency bypass supply and the rectifier maintains the battery charge. When the mains power supply exceeds the permitted input range, the load is automatically transferred (transfer time <2 msec.) to the output of the Inverter (ON LINE Mode) until the mains power supply returns within range.
This mode is useful when powering loads that do not require the regulated no-break supply from the Inverter and allows the system to achieve a very high efficiency of up to 99%.

SMART ACTIVE Mode: the CPS automatically selects whether to operate in ON LINE or ECO mode. The decision is made based on statistical calculations performed by the CPS and based on the quality of the mains and bypass supplies: if the latter remains suitable for a certain period, the unit selects ECO mode, otherwise it remains in ON LINE mode.

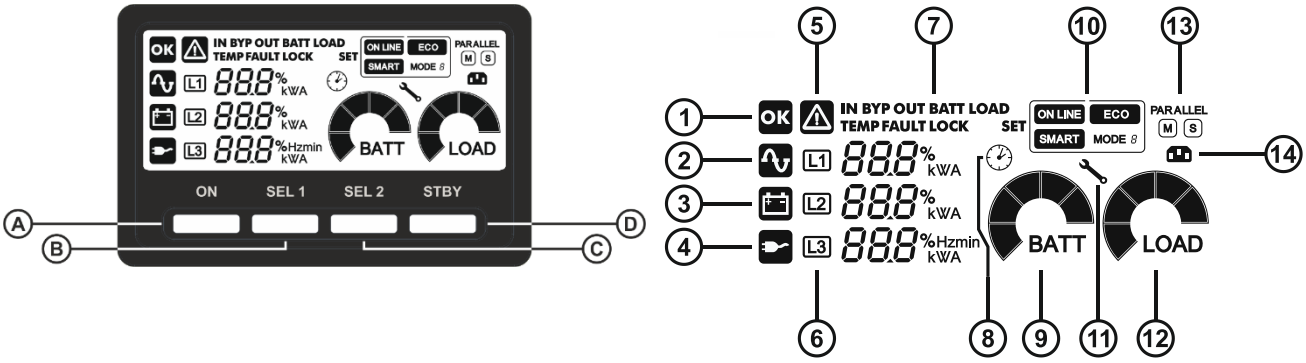
STANDBY OFF Mode [Mode 1]: If selected the CPS is set to operate only in an emergency: when the mains power is present, the load is powered off while, in the event of a black-out, the load is powered by the inverter from the batteries (activation time is less than 0.5 sec); the power supplied is disconnected once the mains power is restored (default time is zero seconds, however this can be adjusted via the Configuration Software).

Note: The ECO and SMART ACTIVE operating modes are only available in single CPS configuration (not parallel).

8. CONTROL PANEL

The control panel consists of 4 buttons and an LCD display that provides information, measurements, operating states, alarms and the configuration of the CPS.

Layout



A	"ON" button	6	Input phase indicator
B	"SEL1" button	7	Measurements display area
C	"SEL2" button	8	Timer
D	"STAND-BY" button	9	Battery charge indicator
1	Normal operation	10	Configuration area
2	Mains operation	11	Maintenance request
3	Battery operation	12	Load level indicator
4	Load powered by bypass	13	Parallel mode indicator
5	Stand-by / alarm	14	EnergyShare socket status indicator

CPS configurations

The following table illustrates all the possible configurations available to the user to better adapt the CPS to their needs. These operations can be carried out using the configuration software. For more information on additional functions, consult the configuration software manual:

FUNCTION	DESCRIPTION	DEFAULT
Operating mode	CPS Mode of operation	ON LINE
Output voltage	Rated output voltage (phase - neutral)	230 V
Output nominal frequency (*)	Rated output frequency	50 Hz
Autorestart	Waiting time for automatic restart after the mains returns	5 s
Auto power off	Automatic shutdown of the CPS in battery operation, if the load is less than 5%	Disabled
Buzzer Reduced	Alarm sound level	Reduced
EnergyShare off	Operating modes of the EnergyShare sockets	Always connected (**)

FUNCTION	DESCRIPTION	DEFAULT
Timer	Scheduled CPS switching on and off (daily)	Disabled
Autonomy limitation	Maximum battery operation time	Disabled (**)
Maximum load	User overload threshold	Disabled (**)
Bypass Synchronization speed	Synchronisation speed of the inverter to the bypass line	1 Hz/s
External temperature	Activation of the external temperature probe	Disabled
Separated bypass line	Activates the display for the separate bypass line (IN/OUT)	Disabled
Bypass mode (*)	Bypass line mode of use	Enabled / High sensitivity
Bypass active in stand-by	Load power supplied from bypass with CPS in stand-by	Disabled (load NOT supplied)
Bypass frequency tolerance	Bypass line frequency operational range to enable the transfer to bypass and for the output synchronisation	± 5% (**)
Bypass min.-max. threshold	Bypass line voltage operational range to enable the transfer to bypass	Low: 180 V High: 264 V
Eco mode sensibility	Intervention sensitivity during operation in ECO mode	Normal
Eco mode min.-max. threshold	Permitted voltage range for operation in ECO mode	Low: 200 V High: 253 V
UPS without battery	Operation mode without batteries (for frequency converters / stabilisers)	Operating with Batteries
Battery low time	Remaining time of estimated autonomy for the end of discharge warning	10 min. (**)
Automatic battery test	Time interval for automatic battery test	40 hours (**)
Parallel common battery	Parallel system with single battery (common to all CPS within the system)	Disabled
Internal battery capacity	Nominal capacity of the internal batteries	Change according with UPS model
External battery capacity	Nominal capacity of the external batteries	9 Ah for UPS without internal batteries; 0Ah all other cases (**)
Battery recharging current	Percentage of charging current compared to the nominal capacity of the batteries	12%

(*) In this operating mode or if the synchronisation with the bypass is disabled, the CPS will derate the output power by 30%.

(**) In accordance with EN 50171 the following parameters must be configured according to the following indications:
Bypass frequency tolerance: Configured to ± 2% or less
Energy Share off: Configure according to the installation methods required
Automatic battery test: Configure the battery test to be performed at least once a week
External battery capacity: Configure the value in Ah according to the connected battery capacity
Battery low time: Minimum configurable value of 10 minutes

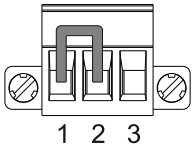
9. COMMUNICATION PORT

On the rear of the CPS (see "CPS VIEWS") there are the following communication ports:

- Remote commands
- Contacts door
- USB communication port
- Expansion slot

Remote commands

Using the 3-pin connector, the CPS enables you to implement Remote Emergency Power Off (R.E.P.O) and Remote Power On (REMOTE ON) functions:



R.E.P.O.	This function is activated by opening the connection between pins 1 and 2.
REMOTE ON	This function is activated by closing the connection between pins 2 and 3 for a few seconds.

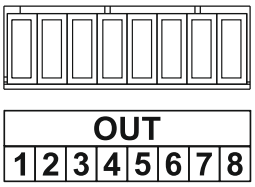
The CPS is supplied with the "Remote Emergency Power Off" (pin 1 and 2) terminals short circuited. At installation, remove the short-circuit and connect to the normally closed contact of the shutdown device, using a double-insulating cable.
When activated from a remote push-button or other device in an emergency, the R.E.P.O connection opens and the CPS switches to standby mode. The CPS no longer powers the load.
Re-start will only occur by pressing the ON button and not from the remote commands.

The REMOTE ON command input (pins 2 and 3) enables you to implement the on and/or off function, configurable via the configuration software (default Remote ON).
The R.E.P.O circuit is supplied with SELV type circuits. No external supply voltage is required.

All connections to the remote commands terminal block must be made using double insulated cable.

Volt free contacts

The volt free contacts provide an indication of the current operational condition (states and/or alarms) of the CPS using 4 separate sets of contacts. The table below shows the pin out of the 8-pole connector and the standard configurations of the 4 relays.
The standard configuration complies with the requirements of EN 50171. The volt free contacts can carry a maximum current equal to: 1A @ 24Vdc or 1A @ 30 Vac.



OUTPUT	FUNCTION	DESCRIPTION
Out 1	Battery working	Contact N.O. between pin 7 and pin 8 *(The CPS system is in battery operation if the contact is closed)*
Out 2	Battery low (*)	Changeover contact: N.O. between pin 6 and pin 8; N.C. between pin 5 and pin 8 *(The battery is at the end of discharge if the contact is closed between pin 6 and pin 8)*
Out 3	Battery circuit alarm	Contact N.C. between pin 3 and pin 4 *(At least one anomaly or fault is active within the charger stage or within the batteries if the contact is open)*
Out 4	Normal operation	Changeover contact: N.O. between pin 2 and pin 4; N.C. between pin 1 and pin 4 *(The CPS system is in normal operation if the contact is closed between pin 6 and pin 8)*

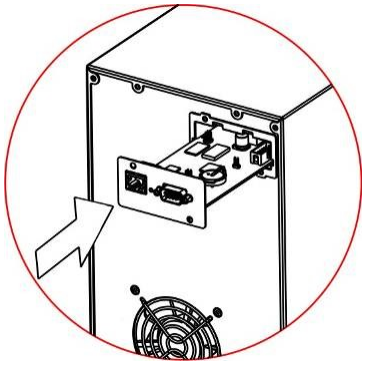
USB Port

The USB port enables a connection to communicate with the CPS from a PC using either Power Shield³ monitoring software or the configuration software. The software can be downloaded from the website www.riello-ups.com.

Expansion slot

The CPS has an expansion slot for additional communication cards or optional contact cards (refer to the rear view) that enable you to communicate with the equipment using the main and most popular communication standards, some examples are:

- Ethernet network agent with TCP/IP protocol, HTTP and SNMP
- JBUS / MODBUS protocol converter card
- PROFIBUS protocol converter card
- Serial duplicator
- Card with isolated relay contacts



Parallel card

Whenever one or more units are connected in parallel (up to 3) to achieve higher power availability or redundancy, the parallel card ensures the communication between the units. For further information refer to the parallel card installation manual.

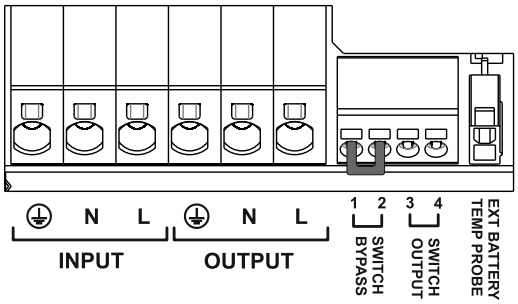
10. CONNECTIONS

The image on the right shows the layout of the input and output terminals on the rear of the CPS.
The maximum cross section of the Input / Output cables are:

- 10 mm² for bare cables

The maximum cross section of the terminals 1 - 4 cables are:

- 2.5 mm² for bare cables
- 1.5 mm² for cables with ferrules



External battery temperature sensor

The CPS has a special connection point for the external temperature, available as an option, useful for measuring temperature inside the external Battery Cabinet, and to enable the battery charge voltage compensation according to the ambient temperature.
Connect the sensor to the "EXT T_BATT" terminals (refer to the image above).
This input is NOT INSULATED, only use the specific sensor as supplied by the manufacturer: the use of any other device that does not comply may cause malfunction or failure of the equipment.

External Bypass

It is possible to install an additional maintenance bypass switch within the external electrical panel, to enable, for example, the replacement of the CPS without interrupting the power supply to the load. In this case, it is absolutely necessary to connect the "SWITCH BYPASS" terminal (refer to the image above) to the normally closed auxiliary contact of the external SERVICE BYPASS switch. The closing of the SERVICE BYPASS switch will open this contact, thus signalling the CPS to transfer to bypass in preparation for maintenance. The lack of this connection can cause the interruption of the power supply to the load, as well as damage to the UPS.
The CPS is supplied from the factory with the "SWITCH BYPASS" terminals short-circuited.

External Output Switch

It is possible to install an additional output switch on a peripheral electrical panel, to allow, for example, the disconnection of the CPS from the load. Connect the "SWITCH OUTPUT" terminals (see figure above) to the normally closed auxiliary contact of the external output switch. The opening of the external output switch closes this contact, notifying the CPS. The lack of this connection on CPS operating in parallel can cause the interruption of the power supply to the load as well as damage to the UPS.

Programmable Auxiliary Sockets (EnergyShare)

The CPS has two EnergyShare IEC sockets with relative thermal protection (max. 10 A common to the two sockets) which allow the automatic disconnection of the load applied to them under certain operating conditions. The events that determine the automatic disconnection of the EnergyShare sockets can be selected by the user through the configuration software. By default, the EnergyShare sockets are always configured active, their status is shown on the display via a dedicated icon.

11. CPS CABINET

The cabinet is made of galvanised steel with an IP20 rating (degree of Ingress Protection).
panels have a thickness of 1.2 mm and are treated with powder coating.

Forced ventilation is provided by means of a fan positioned at the rear of the CPS. The rotational speed of the fan is adjusted according to the conditions of use and the internal temperature of the system. The cool air enters the system at the front and is expelled from the rear.
The CPS is equipped with wheels that allow it to be easily moved and positioned during the installation.

12. BATTERY CABINET

It is necessary to use a Battery Cabinet to ensure adequate autonomy in the event of a mains power failure and the CPS must be configured with the nominal installed capacity. This can only be done via the configuration software.
There are two compatible battery cabinets available:

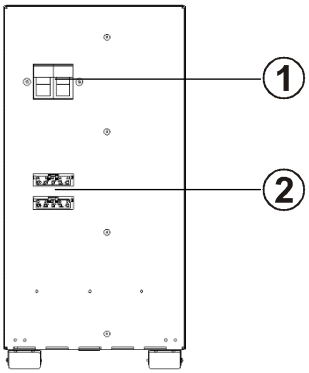
BATTERY CABINET MODEL	AB STW 240V A3	AB 1320 240V B1
DIMENSION W x D x H [mm]	250x698x500	400x815x1320
BATTERY [n°]	1x 15x 7/9 Ah 2x 15x 7/9 Ah	15x 40 Ah
WEIGHT [kg]	26 (empty)	90 (empty)

The CPS works with a fixed number of batteries: 15 x 12 Volt monoblocks in series (180 V nominal) and any multiple strings in parallel to increase the total capacity.

ATTENTION: The CPS is not equipped with devices for disconnecting the external batteries. Check that the Battery Cabinets are equipped with a suitable fuse or fuse holder.

AB STW 240V A3

This Battery Cabinet is a specific accessory for CSS Sentinel Tower and therefore boasts the same dimensions and aesthetic characteristics as the CPS and can accommodate up to two strings of 15 x 7/9 Ah monoblocks.

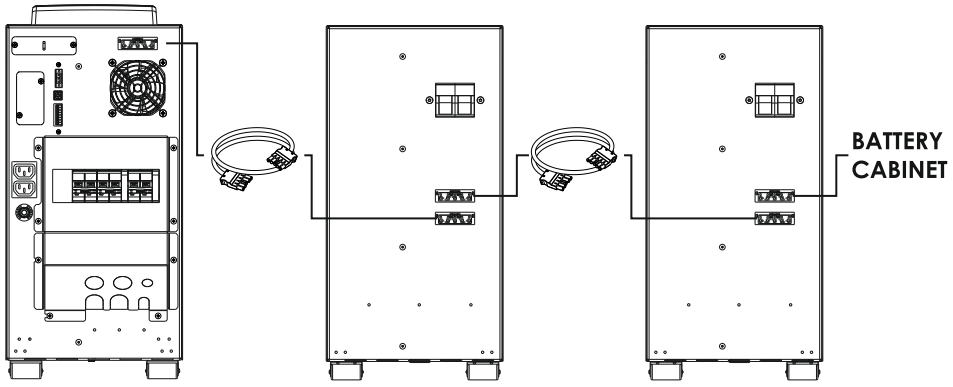


1 Fuse holder isolator

2 Battery expansion connectors

Rear view

It is possible to connect multiple Battery Cabinets in cascade as shown in the figure below in order to obtain the desired autonomy:

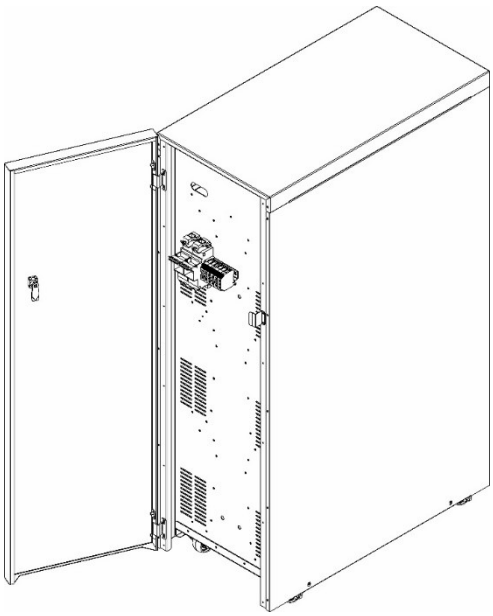


CPS Battery cabinet 1 Battery cabinet 2 → Battery cabinet n…

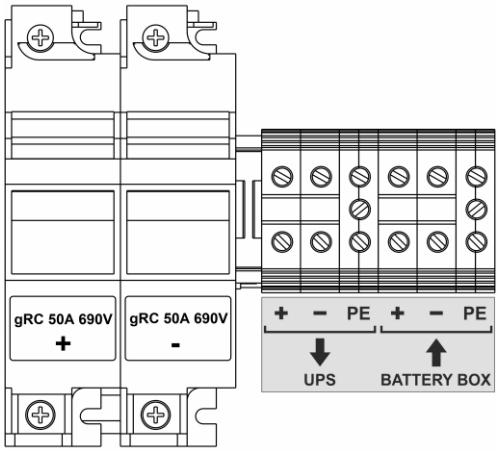
A connection cable 60 cm long and equipped with polarised connectors is supplied with each battery cabinet. A 2.5 metre-long connection cable (code YSPHCB1A) is available as an option and can be purchased separately.

AB 1320 240V B1

This battery cabinet can accommodate 15 x 40 Ah monoblocks and is therefore particularly suitable if a long battery autonomy is required.



Front view



Fuse holders and connection terminal details.

The battery cabinet is equipped with screw terminal connections and is designed for cascade connection with several battery cabinets.

The cable for connecting the CPS to the battery cabinet must be made using the connector and following the instructions supplied with the CPS.

13. ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Characteristics		CSS Sentinel Tower CAM	
		3	5
Cabinet layout	-	Free standing type with wheels and terminals/switches on the rear	
Internal battery	-	No, external battery cabinets required	
Weight without battery	[kg]	24	25
Dimensions W x D x H	[mm]	250 x 698 x 500	
Packaging dimensions W x D x H	[mm]	300 x 800 x 702	
Ventilation	-	Forced, front to rear	
Cabinet IP rating	-	IP20	
Cable input	-	Bottom rear	
Colour	-	RAL 9005	
EMC Compatibility	-	EN 62040-2 Class C2	
Degree of environmental pollution	-	PD2	
Overvoltage category	-	OVC II	
Earth leakage current	[mA]	≤ 1.5	
Audible noise at 1m (according to EN62040-3)	[dBA]	48	
CPS Ambient temperature	[°C]	0 - 40	
Recommended ambient temperature for battery (if present)	[°C]	20 - 25	
Storage Temperature	[°C]	-25 - 60 (CPS) -15 - 40 (battries)	
Relative ambient humidity	[%]	5 - 95 (without condensation)	
Maximum Operating Altitude	[m]	Up to 1000 s.l.m. (1% derating for every 100 m between 1000 and 4000 m)	
CPS standards	-	EN 50171 (if used within the power parameter according to EN 50171)	

14. TECHNICAL DATA

Input		CSS Sentinel Tower CAM	
		3	5
Nominal voltage	[V]	220 - 240 (1P+N+PE)	
Voltage range (without switching to battery power)	[V]	184 - 276 V @100% load 140 - 276 V @50% load	
Nominal frequency	[Hz]	50 / 60	
Input frequency tolerance	[Hz]	40 - 72	
Maximum Input Current (1)	[A]	15	25
Total Harmonic distortion (THDi) with full load and source THDv <1%	[%]	≤ 6	≤ 2.5
Power factor	-	≥ 0.99	
Converter technology	-	IGBT high frequency	

(1) The input current is stated for the following general conditions:

- Input voltage at 220 Volt, battery charging current of 1 Ampere, load level 100%

DC Circuit		CSS Sentinel Tower CAM	
		3	5
Battery configuration	-	15 monoblocks	
Number of battery cells	-	90	
Voltage charge / maintenance (2.27 V/el. adjustable)	[V]	204.3	
End of discharge voltage - load dependent (1.6 V/el. adjustable)	[V]	144	
Battery recharging current (2)	[A]	1 @ load 100% 6 @ load < 80% Linear trend between 80 and 100% of the load	
Voltage compensation (if battery temperature sensor active)	[mV/°C]	20 (for 12 Volt monobloc)	
Protection device according to EN 50171	-	Battery polarity check with disconnection device	

Inverter		CSS Sentinel Tower CAM	
		3	5
Nominal power	[VA]	3000	5000
Nominal active power	[W]	3000	5000
Power according to EN 50171	[VA/W]	2500	4000
Nominal voltage	[V]	220/230/240 (1P+N+PE)	
Nominal frequency(2)	[Hz]	50 / 60	
Static stability	[%]	≤ 1	
Dynamic stability	-	Resistive Load: +/-1% @ 20->100% and 100->20% within 20ms @ full load Mains / battery / mains within 20 ms Non-Linear Load: EN62040-3 class performance 1	
Voltage distortion with linear and distorting load (EN 62040-3)	[%]	≤ 1 with linear load ≤ 3 with distorting load	
Inverter frequency stability without by-pass supply synchronisation	[%]	0.01	
Rate of Frequency variation	[Hz/s]	1 (adjustable from 0.5 to 2)	
Inverter overload capacity (@40°C)	-	103% Infinite 110% 10 min 133% 1 min 150% 5 s > 150% 0.5 s	
Inverter overload capacity referred to power according to EN 50171 (@ 40 °C)	-	120% Infinite	
Short circuit current	-	2.5 x In per 200 ms + 1.5 In per 300 ms (standalone)	
Maximum Efficiency on battery-operation	[%]	92.45	92.55
Converter technology	-	IGBT three level high frequency	
Inverter control	-	Voltage/current DSP signal processing	

(2) Self-learning: if the mains frequency is within ± 5% of the selected value, the UPS output remains synchronised with the mains. If the frequency is out of tolerance or the system is on battery operation, the output frequency will be at the configured value ±+0.1%. Power derating: the UPS derates the output power to 30% of the rated power if the UPS operates as a frequency converter or if the output is configured not to be synchronised to the input (without link) or an option other than 'self-learning.

Bypass		CSS Sentinel Tower CAM	
		3	5
Nominal power	[VA]	3000	5000
Power according to EN 50171	[VA]	2500	4000
Nominal voltage	[V]	220/230/240 (1P+N+PE)	
Output maximum nominal current (3)	[A]	14.5	24
Voltage range to enable switching to bypass	[V]	180 - 264 (adjustable in step of 4 V)	
Nominal frequency	[Hz]	50 / 60	
Frequency range for inverter synchronisation	[Hz]	40 - 72	
Transfer time bypass to Inverter (CPS in "ECO mode")	[ms]	3 (configurable)	
Max current in short circuit for: [20 ms @Tj 25°C]	[A]	1100	
Max energy passing through [I^2t @ tj 25°C]	[A^2s]	6115	
Overload capability on bypass line	-	110% Infinite 130% 60 min 150% 10 min > 150% 3 s	
Operations	-	Continuous operation at nominal load with ventilation fault	

(3) The bypass current is stated for the following conditions:

- Bypass voltage at 230 Volt, Load level 110%

User Interfaces		CSS Sentinel Tower CAM	
		3	5
Communication ports	-	1 transflective LCD display 1 USB 4 programmable output relays 1 programmable opto-isolated input commands 1 Communication Slots	
Auxiliary commands	-	1 REPO (Remote Emergency Power Off) 1 Temperature sensor input	

Efficiency, Losses, Ventilation		CSS Sentinel Tower CAM	
		3	5
AC/AC Efficiency @ Full load	[%]	94.60	94.35
AC/AC Efficiency @ 75% load	[%]	94.15	94.65
AC/AC Efficiency @ 50% load	[%]	93.60	94.45
AC/AC Efficiency @ 25% load	[%]	90.20	93.25
Power dissipated with resistive nominal load (pf=1) and with battery charged *	[kW] [kcal/h] [BTU/h]	170 145 580	290 250 990

System Auto Consumption and ECO Mode efficiency		CSS Sentinel Tower CAM	
		3	5
Auto-consumption: CPS in ON LINE Mode w/o load	[W]	67	67
Auto-consumption: CPS in ECO Mode w/o load	[W]	36	36
Auto-consumption: CPS in STANDBY Mode w/o load	[W]	26	26
Auto-consumption: CPS in mode with ON / OFF switch off	[W]	0.5	0.5
Efficiency: CPS in ECO Mode at 50% load	[%]	97	98
Efficiency: CPS ECO Mode at 100% load	[%]	98	98.5

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