Technical Specifications

CSS sentryum

6/20 kVA/kW THREE-PHASE-SINGLE-PHASE/SINGLE-PHASE
10/20 kVA/kW THREE-PHASE/THREE-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 Sentryum (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 Sentryum** series is available in 6-20 kVA/kW models utilising the very latest ON LINE double conversion technology and, it is classified as VFI-SS-111 as defined by IEC EN 62040-3.
The **CSS Sentryum** series consists of transformer-free CPS units available in 6-8-10-15-20 kVA/kW models with three-phase/single-phase input and single-phase output, and 10-15-20 kVA/kW models with three-phase input and output.
CSS Sentryum series is designed and built using state of-the-art technology and components. It applies the advanced technologies such as DSP (Digital Signal Processor), dual core microprocessor, three level inverter circuits and resonant control to provide maximum protection to the critical loads with no impact on downstream systems, whilst maintaining optimised energy savings.

The Riello UPS CSS Sentryum 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 Sentryum** series is suitable for use in a wide range of applications.

Advanced communications

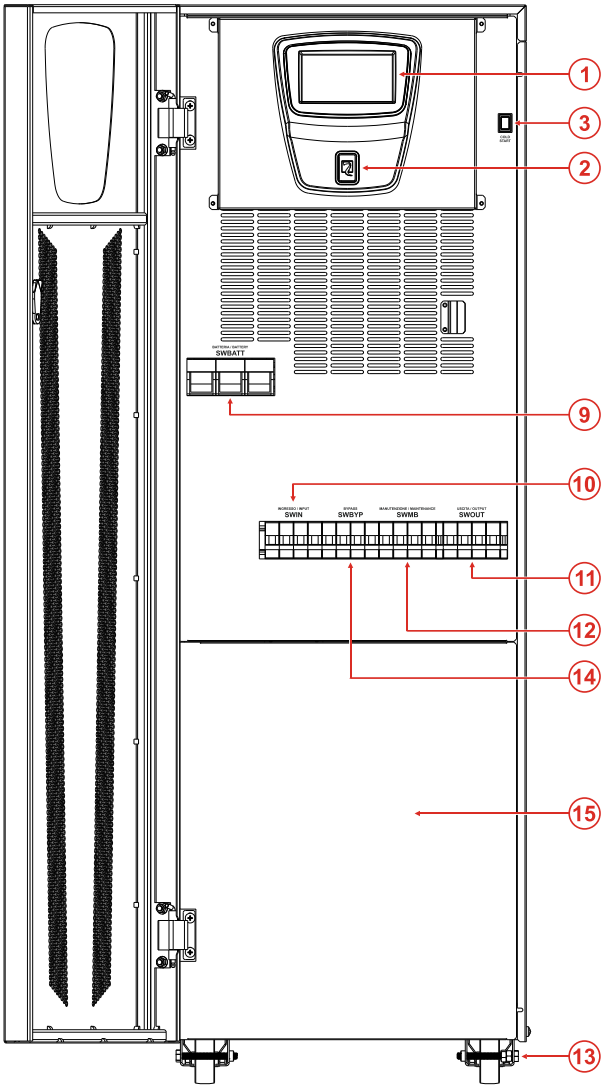
Riello UPS's **CSS Sentryum** series is equipped with a coloured graphic touch screen display providing UPS information, measurements, operating states and alarms in different languages.

The series consists of the following models:

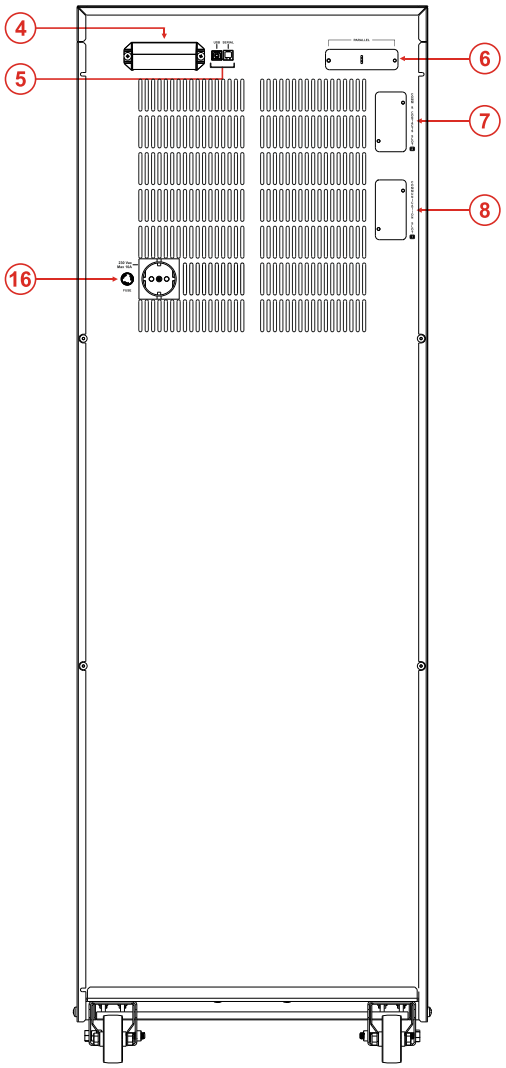
THREE-PHASE OUTPUT MODELS	DESCRIPTION
CBT 10	10 kVA input three-phase/output three-phase **(8 kVA in accordance with EN 50171)**
CBT 15	15 kVA input three-phase/output three-phase **(12 kVA in accordance with EN 50171)**
CBT 20	20 kVA input three-phase/output three-phase **(16 kVA in accordance with EN 50171)**

SINGLE-PHASE OUTPUT MODELS	DESCRIPTION
CBM 6	6 kVA input single-phase or three-phase / output single-phase **(5 kVA in accordance with EN 50171)**
CBM 8	8 kVA input single-phase or three-phase / output single-phase **(6 kVA in accordance with EN 50171)**
CBM 10	10 kVA input single-phase or three-phase/output single-phase **(8 kVA in accordance with EN 50171)**
CBM 15	15 kVA input single-phase or three-phase/output single-phase **(12 kVA in accordance with EN 50171)**
CBM 20	20 kVA input single-phase or three-phase/output single-phase **(16 kVA in accordance with EN 50171)**

2.1. GENERAL VIEW



FRONT



REAR

1. Display Touch screen
2. Status LED
3. Battery power button (COLD START)
4. Communications port (R.E.P.O., SIGNAL IN/OUT)
5. Communications port (USB, SERIAL)
6. Parallel card (*optional*)
7. Slot for accessory communication cards and contact cards
8. Slot for communication accessory cards
9. Battery fuse holder disconnector (SWBATT)
10. Input switch (SWIN)
11. Output switch (SWOUT)
12. Manual bypass switch (SWMB)
13. Screw-brake for locking wheels
14. Bypass input switch (SWBYP)
15. Terminal cover panel
16. Schuko socket (10A max)

2.2. SUMMARY TABLE

Characteristic	
Power range	6-8-10-15-20 kVA
Output voltage	Three-phase or single phase
Terminal / Cable entry	Bottom front
Front door	Yes
Wheels	Yes
Switches	SWIN, SWOUT, SWMB, SWBYP
DI (input bypass line and separate switches)	Standard
Battery fuse holder	Internal CPS battery protection
Internal batteries	1-3x 40 blocks
Cold Start	Standard
Display touch screen 5”	Vertical
Status Led	Standard
Schuko socket	Standard
Options and accessories	
Parallel	Optional
DI (separate bypass)	Standard
External synchronisation	Optional
Temp. sensor battery	Optional
IP X1 Protection	Optional
Front door air filter	Optional
Internal output transformer	Optional

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 Sentryum 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 Sentryum 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 62477-1:** Safety requirements for power electronic converter systems and equipment
- **IEC 61000-2-2:** Electromagnetic compatibility immunity;
- **IEC 61000-3-12:** Harmonic current emissions (for equipment with rated current > 16 A ≤ 75).
- **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 61000-4-6** Immunity to conducted disturbances, induced by radio-frequency fields
- **IEC 61000-4-8** Power frequency magnetic field immunity test
- **IEC 61000-6-4** Emission standard for industrial environments

The CSS Sentryum 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 (sealed valve regulated open-vented, Nickel Cadmium, Li-Ion) for long back-up times
- Compatibility with supercapacitors for short time back-up needs and green cost-effective solutions
- Higher IP rating on site add on solution

Emergency systems

The UPS 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). Other part of the load powered only in emergency via optional EOS device.

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

Up to 8 CPSs having the same power rating (4 units when using the single-phase version) can be connected in parallel to increase the power of the uninterruptible power system (power parallel) or to enhance its reliability (redundant 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 the sync signals, via a communication loop providing 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.

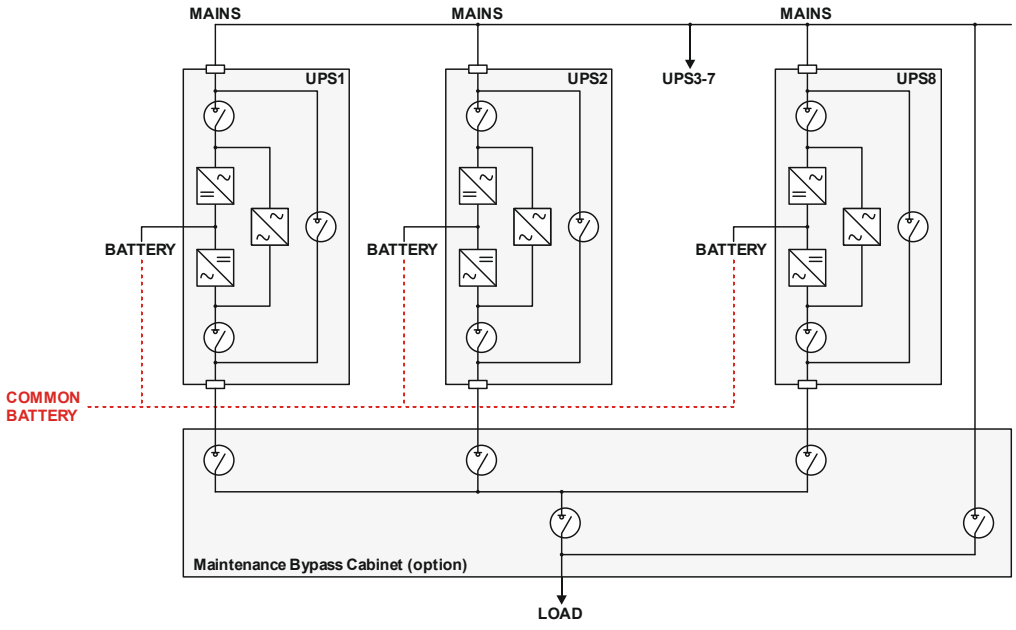
Note:

- Maximum communication cable length between two CPS should not exceed 50 meters keeping in mind that total length for the overall ring should not exceed 100 meters.

- The standard communication cable, part of installation kit is 5 meters long for all **CSS Sentryum CBM/CBT** range 6-20 kVA; the user may arrange for a longer cable (in accordance with the specification above) using a standard RJ45 type cable as available on the market.

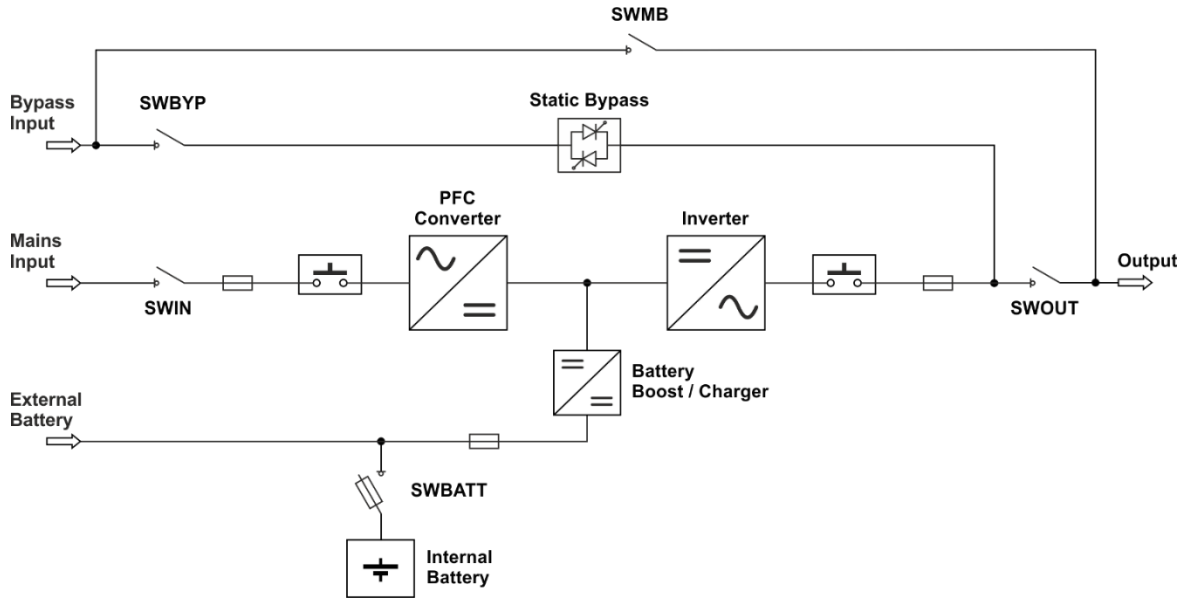
- For parallel configuration where a transformer is required to be connected downstream of each single CPS, please contact your local agent in advance.

- Parallel CPS are set with separate battery configuration (as depicted below in black); common battery operation (as depicted below red) can be configured using the Configuration Software (for authorised personnel only).



6. CPS DESCRIPTION

The **CSS Sentryum CBM/CBT** block diagram is as follows:



The **CSS SENTRYUM** is supplied as standard with a separate bypass input line.

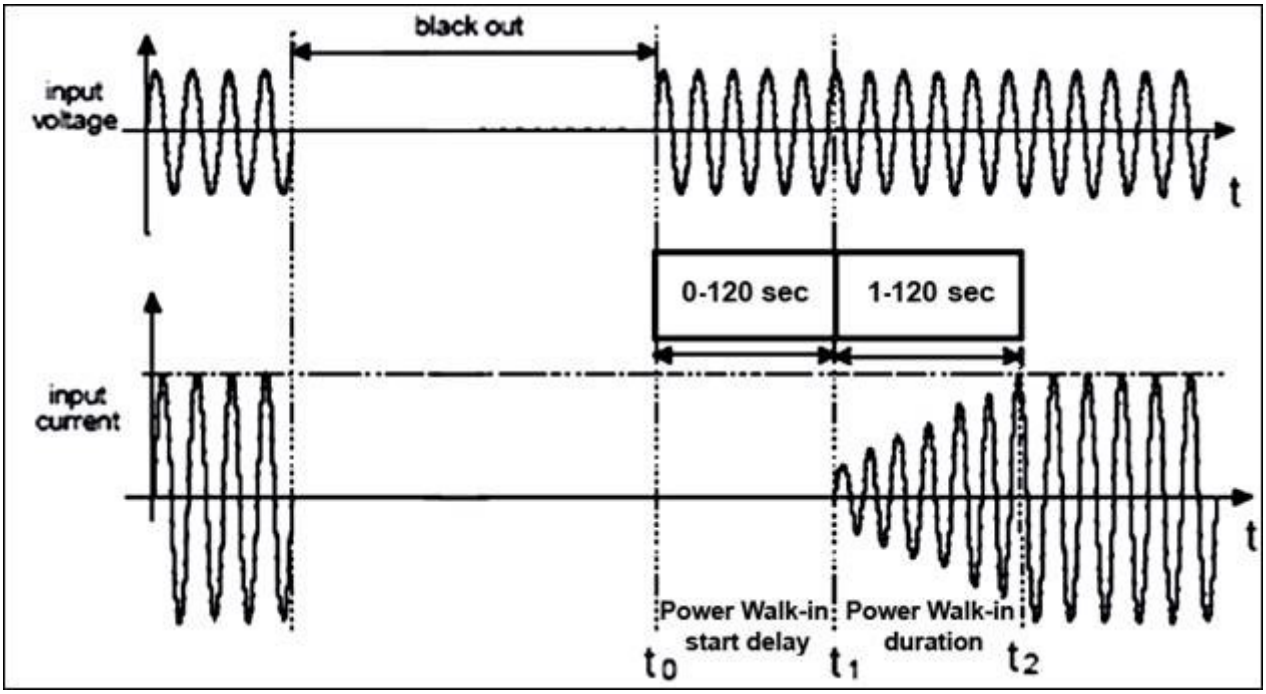
6.1. PFC CONVERTER (ZERO IMPACT SOURCE)

The PFC Converter converts the AC voltage into a DC voltage to power the Inverter; if the mains or alternative power supply fails, the Converter will raise the battery voltage to a value suitable with which to power the Inverter. The PFC control technology benefits from Dual core Digital Signal Processor (DSP) microprocessors, advanced Programmed Logic Device (PLD) and latest generation of IGBT modules to achieve a low impact on the power supply source, low harmonic distortion and high input power factor.
The UPS negligible input harmonic distortion of 3% and high input power factor (> 0.99); make it possible to reduce the size of a possible generator and/or a distribution transformer MT/BT placed upstream of the CPS.

A zero impact on the supply source is ensured, due to the following configurable operational control parameters:

- **Power Walk in-start Delay (t0-t1):** when the mains power supply returns, this parameter delays the input stage start up for a period of time that can be set between 0 and 120 seconds. This function is particularly useful when the mains power supply returns after an interruption (or when the generator set is started) and the source is required to supply various CPS or, more typically, multiple loads.

- **Power Walk-in duration (t1-t2):** when the mains power supply returns, absorption of the mains power supply progressively reaches the nominal value within a time period that can be set from 1 to 120 seconds. This function is normally disabled but whether active or not the CPS maximum input current (Inrush) is anyway limited and never greater than the nominal current

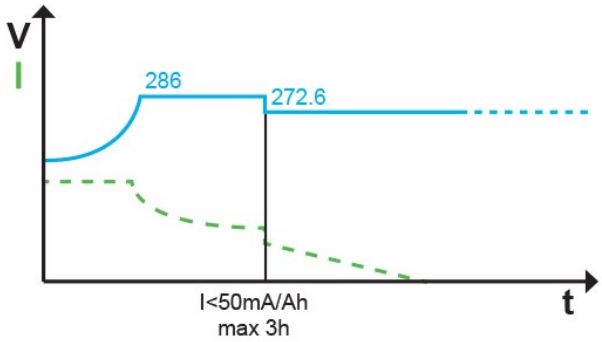
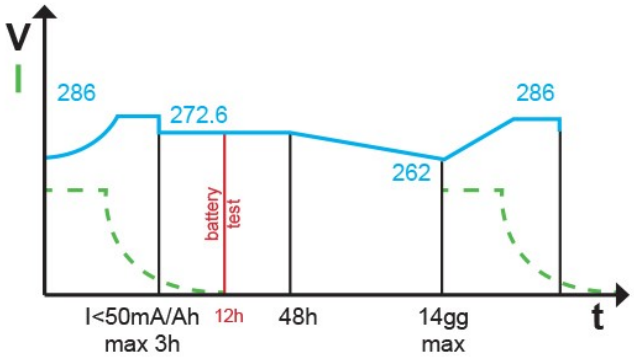
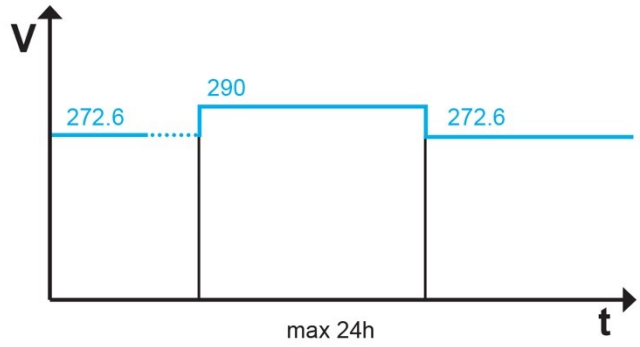


6.2. BATTERY CHARGER (Smart Battery Management)

In compliance with the EN 50171 standard, the CPS (if internal battery is provided) and the external battery cabinets available for the CSS Sentryum series use “High Performance” type batteries with 10 years of expected life.

Battery recharging: the UPS can be used with sealed lead batteries (VRLA), AGM, open-vented, NiCad and lithium batteries.
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).

According to the type of battery used, three different charging methods are available:

Recharging modes (selectable via the Configuration Software)	CSS SENTRYUM configurations
	**Floating:** the charge state of the battery is continuously monitored; when the mains power supply is present, the batteries are charged at a pre-set voltage level and limited current relative to the recharge time required and the capacity of the connected battery.
	**Two-level recharge (standard):** this recharge is at limited current with two levels of voltage. In the first instance, the process uses a quick charge voltage, whilst in the second stage a float charge. This type of charging is mainly used with open-vented batteries or other types when an accelerated recharge time is required.
	**Cyclical recharge:** this recharge is sometimes recommended by battery manufacturers to prolong the battery life. It consists of battery charge and discharge cycles as indicated in the diagram.
	**"Commissioning Charge":** this charge method is useful every time new batteries are installed in the UPS. By increasing the voltage to 290 (adjustable value) Volts for a maximum of 24 hours, perfect equalisation of the battery charge is assured, thus guaranteeing a uniform discharge and wear of the individual battery blocks.

The various recharge methods and the pre-set voltage values are defined using the Configuration Software.
The presence of the external temperature sensor option may activate (via the configuration software) compensation of the voltage depending on the temperature (20 mV/°C on each battery block).

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, the CPS recognises the anomaly and does not enable the closing of the battery relays, 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, informing the user of the occurred 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 Sentryum** 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 for the 6kVA version, 8 A for the 8 kVA version, 12 A for the 10 kVA version and 20 A for the 15 kVA and 20 kVA (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 Sentryum units with the cold start button located either at the front or rear of the unit according with the version type (CPT, ACT, XTD); for details refer to UPS 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 UPS will not be able to ensure business continuity if mains power supply fails.

6.3. 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 IGBT Inverter (*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).

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) **Frequency stability**
   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%.
b) **Frequency variation speed**
   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, it is able to withstand overloads up to 120% (% referred to EN 50171 power) without time limits.
When the time period or power limits are exceeded, the load is transferred to the bypass line ~~supply~~.

Short circuit capacity
In the event of an overcurrent at the output, the inverter is able to distinguish whether it is actually a short circuit or whether it is an overload. A short circuit is detected if the output voltage = VOUT<190 V:

- When bypass supply is not present, the Inverter can supply a current limited to 2.7x In for 200ms + 1.5In for 300ms, even in battery operation.
- When the mains supply is present, the CPS changeover to bypass suppling a limited current for 1 sec.

The table below recommends the sizing of the various protection devices located downstream of the CPS in order to guarantee their discrimination even in the event of a power failure:

Output protections (recommended values for selectivity)	
Normal fuses (GI)	In (Nominal current)/4
Normal switches (C curve)	In (Nominal current)/4
Ultra-fast fuses (GF)	In (Nominal current)/2

6.4. STATIC SWITCH (Automatic Bypass)

A static switch is an electronic device that can automatically transfer the loads connected to the UPS 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 voltage is not synchronised with that of the bypass power supply, the transfer is inhibited. In consideration of the various types of loads it is possible to enable the transfer with a fixed delay (20 msec.) or to adjust the transfer delay (10-100 msec.). All the settings can be modified via the Configuration Software.

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.

UPS static switch is sized to support the following overload periods; above these limits the UPS is automatically turned Off:

- 110% permanently
- 125% for 60 minutes
- 150% for 10 minutes
- 200% 1 min
- >200% 20 sec

Note: 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 Sentryum 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.
The control card, the display and communication slots remain powered, thus maintaining the communication interfaces to enable the CPS monitoring.

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.
A volt free contact can be configured to drive a disconnecting device to be installed upstream of the bypass input to the CPS, in this case when the protection occurs, the system opens the external disconnecting device, hence avoiding the requirement to stop the inverter (refer to the user manual to configure this option).

6.5. 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:

Mode: ON LINE

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 gradually starts up, charges the batteries and eventually powers the Inverter.

Operation from Bypass: if an Inverter overload exceeds permitted limits, or is manually shutdown, the load automatically transfers to the emergency bypass via the static switch and without disruption to the load.

Mode: FREQUENCY CONVERTER

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 Frequency converter mode the static bypass is not available, therefore the user cannot perform a manual bypass operation.

Mode: ECO

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 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%.

Mode: SMART ACTIVE

When the CPS is configured to operate in SMART ACTIVE mode, it 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.

Mode: STANDBY OFF

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) and is then powered off again when mains power is restored (default time is zero seconds, however this can be adjusted via the Configuration Software).

Note: The above listed operating modes are available both in single CPS configuration and in parallel CPS system configuration.

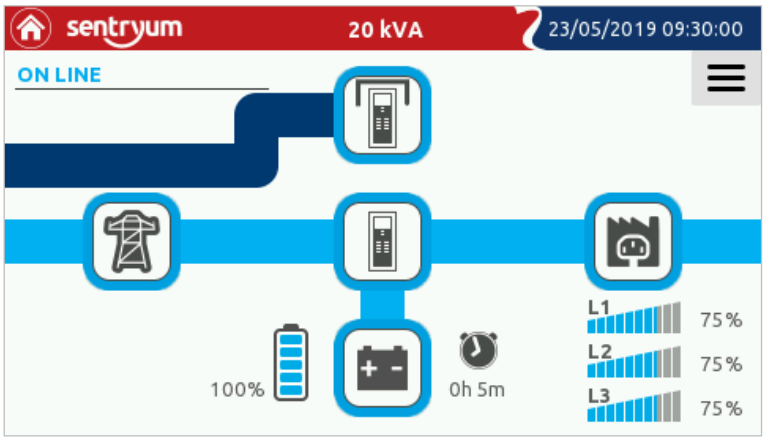
7. CONTROL PANEL

The control panel consists of a 5" touch screen graphic display (resolution is 480x272 pixel) and multicolour status led placed below the display which delivers immediate and clear information regarding the overall status of the CPS by changing the colour (light blue, dark blue, yellow and red) according with the operating mode and condition.

7.1. DISPLAY AND STATUS LED

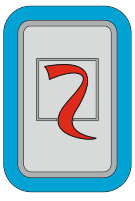
Graphic display provides CPS information, measurements, operating states, alarms and configuration in different languages.
The default screen displays the CPS status, graphical indication of the energy path through the CPS and the operational condition of the various assemblies (rectifier, batteries, inverter, bypass) within the CPS.
Multilevel access menu grants easy, intuitive and secure access to information, measurement, and configuration, for both service personnel and user according with the selected profile.

DISPLAY:



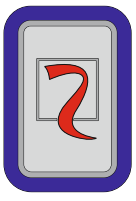
STATUS LED

Below the touch screen display, an illuminated Riello UPS logo will inform the user at a glance, the status of the CPS.
The operational conditions are indicated via the various colours as follows. For further details refer to CPS user manual.



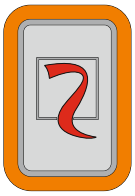
Light blue (pulsing): Normal operation

No anomalies are present, and the system is working in the selected mode.



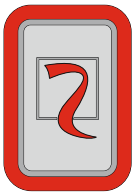
Dark blue: Bypass operation

The system is working from a temporary bypass.



Orange: Anomaly

The system is working from battery, forced to bypass or an anomaly or warning has occurred.

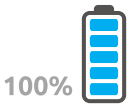


Blinking red: Fault condition

A fault or lock occurred, or the load is not powered due to an unexpected condition (e.g. Emergency Power Off).

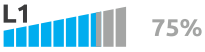
7.2. DISPLAY ICONS AND SYMBOLS

System input/mains status



% Battery charge level

System output status

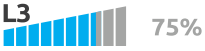


% Phase 1 load level

Bypass status

% Phase 2 load level

Battery status



% Phase 3 load level

System status

Manual bypass switch closed (SWMB)

Grey: communication lost (Com-Lost)

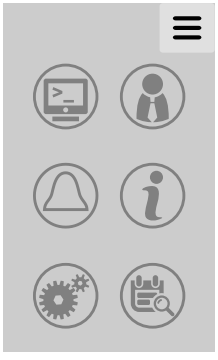
Orange: anomaly

Light blue: normal status

Flashing red: alarm

Blue: Temporary bypass status

The tab icon located on the righthand side of the display makes it possible to expand/reduce the main menu; this drop-down list contains the access to the following operations:



Command launcher

Access level selection.
The icon changes depending on the preset access level

Buzzer toggle button

CPS info

Settings menu

Event log

7.3. DISPLAY OPERATIONS

1-MEASUREMENT

By tapping the four icons at the edge of home page display it is possible to collect the CPS measurements and particularly:
System input/mains icon: Input voltage (ph-ph and ph-neutral) plus input current and frequency
System output icon: Output voltage, (ph-ph and ph-neutral) rms and peak current, power (kW/kVA/PF) and load level
Bypass icon: Input voltage phase to phase and phase to neutral and frequency
Battery icon: Battery voltage and current, charging level and autonomy time

1 COMMANDS

Command icon makes it possible to access the system and battery commands.

2-BEEPER

Beeper icon can silence the alarm by pressing the beeper toggle button.

3-SETTING

Main set up icon access to the CPS configuration referring to languages, and display settings (system clock, screen saver buzzer, and display access profile password) - Refer to paragraph “CPS configuration”.

4-ACCESS LEVEL

Access level icon allows the selection to the required access level for the user operating the CPS; up to three levels are available named: “User”, “Power User”, “Expert” (Expert is for service personnel, only).

5- CPS info

Info icon access to the CPS general information pages (CPS model, serial number, power rating, firmware version, and general configuration sum up).

6- Event log

Event Log icon access to the system log; by using the arrows, the user can scroll up and down the event list.
The CPS will record the last 960 events occurred. The older ones are then overwritten.

Note: For more information about the display menu and operations refer to the CPS user manual.

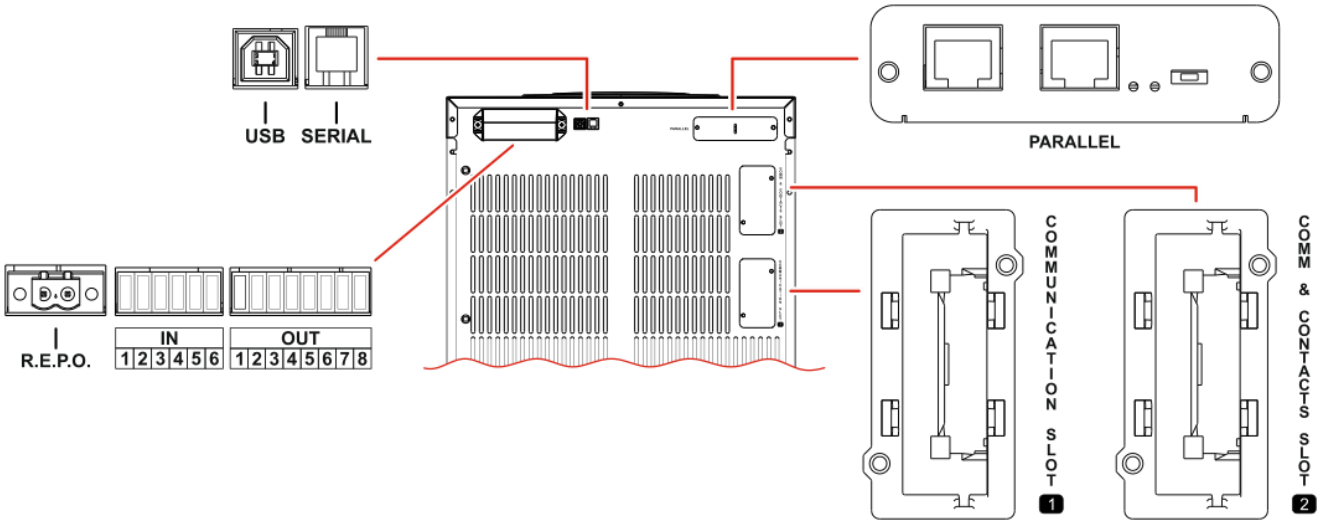
7.4. CPS CONFIGURATIONS

Configurations which can be modified from the display are listed here below:

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE CONFIGURATIONS	ACCESS LEVEL
Language	Selection of the mimic panel language	English	• English • Italian • German • French • Spanish	**"PowerUser"**
Homepage timeout	Selection of the screen saver timeout	5 min.	1-240 minutes	**"PowerUser"**
Buzzer	Disables the alarm buzzer	ON	• OFF • ON	**"PowerUser"**
Date and time	CPS internal clock setup	-	-	**"PowerUser"**
Operating mode	Selection from among five different operating modes	ON LINE	• ON LINE • ECO • FREQUENCY CONVERTER • SMART ACTIVE • STAND BY OFF	**"Expert"**
Battery low	Estimated autonomy time remaining for "battery low" warning	3 min.	1-7 @ 1 min step	**"Expert"**
Auto Restart	Enables the auto restart function	5 sec.	• OFF • ON (configurable 0-240 seconds)	**"Expert"**
Auto Power Off	Enables and configures the auto power off function	OFF	• OFF • ON (configurable 2-10%)	**"Expert"**
Output voltage	Selection of the output voltage (Phase - Neutral)	230 V	• 220-240 V (custom) • 208 V • 200 V	**"Expert"**
Output frequency	Selection of the inverter frequency	50 Hz	• 50 Hz • 60 Hz	**"Expert"**
Automatic battery test	Enables and schedules the automatic battery test	40 h	• OFF • ON (programmable)	**"Expert"**
User password change	Replacement of the current password with a new one	-	Any combination of characters for a maximum of 16	**"User"**
"PowerUser" password change	Replacement of the current password with a new one	-	Any combination of characters for a maximum of 16	**"PowerUser"**
"Expert" password change	Replacement of the current password with a new one	Expert	Any combination of characters for a maximum of 16	**"Expert"**

8. COMMUNICATION INTERFACES

Communication interfaces are located at the rear of the CPS:

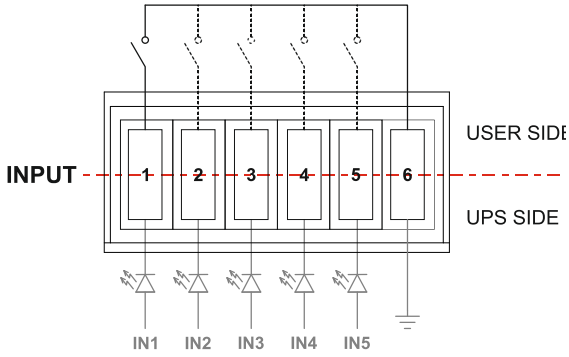


8.1. COMMUNICATION BOARD

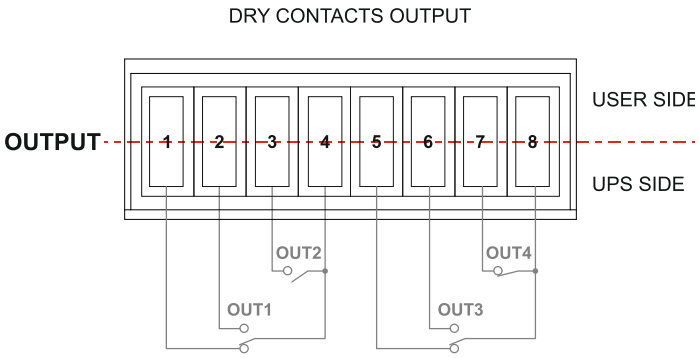
It includes R.E.P.O., IN/OUT signals interface, USB communication port, serial port.

R.E.P.O: This insulated input is used to switch off the CPS in an emergency. The CPS is supplied with the "Remote Emergency Power Off" (R.E.P.O.) 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.
The R.E.P.O circuit is supplied with SELV type circuits. No external supply voltage is required. When it is closed (normal condition), a maximum current of 10 mA flows.
After an emergency shutdown, the CPS will only return to ON LINE operating mode once it receives a start-up command from the mimic panel (provided that the Remote Emergency Power Off device is not still active).

IN/OUT signal interface makes it possible to configure five opto insulated CPS input commands and four different output alarms.
The CPS is delivered with standard input and output alarm configuration (both enabled via the display prior to “Expert” access level).
The commands and alarms list can only be modified using the Configuration Software.



In case of an external maintenance bypass or Battery Cabinet installation, the relative switch auxiliary contacts must be connected selecting the appropriate inputs (amongst the five) and programming them accordingly.



The output dry contacts are rated to 1A @ 24Vdc or 1 A @ 30 Vac

INPUT FACTORY DEFAULT SETTING

INPUT	FUNCTION
IN 1 *	SWMB Aux closed
IN 2 *	SWOUT Aux open
IN 3 *	CB OFF
IN 4 *	Bypass ON
IN 5 #	System ON

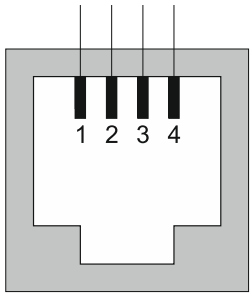
#This input is always enabled

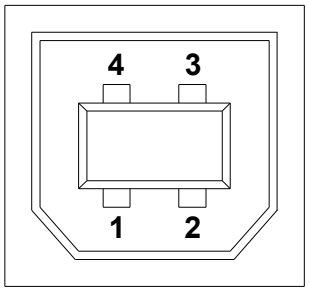
*These inputs must be enabled on the display

OUTPUT FACTORY DEFAULT SETTING

OUTPUT	FUNCTION
OUT 1	Battery low
OUT 2	Battery working
OUT 3	Normal Operation
OUT 4	Battery circuit alarm

RS232 Connector	USB Connector





PIN #	SIGNAL
1	GND
2	TX serial line
3	RX serial line
4	Reserved

PIN #	SIGNAL
1	VBUS
2	D-
3	D+
4	GND

>8.2 PARALLEL CARD

Whenever one or more units are connected in parallel to achieve higher power availability or redundancy, the parallel card ensures the communication between the units. For further information refer to paragraph 5 and the parallel card installation manual.

>8.3 COMMUNICATION SLOTS

The CPS has two panel expansion slots for slot-in interface accessories that can be used for a variety of communications options, including:

- Second RS232 port
- Serial port duplicator
- Ethernet network agent with TCP/IP protocol, HTTP and SNMP
- RS232 + RS485 port with MODBUS protocol

Communication slot labelled as “2” is also suitable to host relay cards such as:
-MULTICOM 384 (**three** opto insulated inputs and **four** programmable contacts 250 Vac, 3 Amps)
-MULTICOM 392 (**three** opto insulated inputs and **eight** programmable volt free output contacts 25 Vac / 30 Vdc, 1 Amp)
In order to carry out card installation and configuration refer to the specific cards dedicated user manual.
For further accessory information please visit our website.

8.4. EXTERNAL SYNCHRONISATION

This non-insulated input can be used to synchronise the Inverter output to a suitable signal from an external source. It is essential when the **CSS SENTRYUM** is used in combination with Static Switch Transfer Systems.
During installation, it is important to:

- use an insulation transformer with insulated single-phase output (SELV), 12-24 Vac and a power ≥ 0.5 VA (available if required as an optional item- refer to the options paragraph);
- connect the transformer secondary to the "EXTERNAL SYNC" terminal through a double-insulation cable with a cross-sectional area of 1 sqmm. (refer to the picture on the right)

The external synchronisation must be configured via the Configuration Software assigned to authorised personnel.

External synchronisation (identified as “EXT SYNC”) and External battery temperature sensor (identified as “EXT T_BATT) input connections are positioned within the terminals area close to the input/output power connections for all three UPS versions.

8.5. 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, indicating the temperature on the display and adjusting the battery voltage in accordance with the room temperature. (refer to paragraph 11.2)
Connect the sensor to the "EXT T_BATT" terminals (refer to the picture on the right)

8.6. MONITORING AND CONTROL SOFTWARE

The PowerShield^3 software guarantees effective, intuitive CPS management, displaying all the most important information such as input voltage, applied load and battery capacity.
It is also able to perform shutdown operations, send e-mails and network messages automatically when certain events (selected by the user) occur.

INSTALLATION OPERATIONS

- Connect one of the CPS’s communication ports to one of the PC’s communication ports using the cable supplied.
- Download the software from the web site www.riello-ups.com selecting the specific operating system.
- Follow the installation program instructions.
- For more detailed information please read the CPS user manual which can be downloaded from www.riello-ups.com.

9. ISOLATING SWITCHES

The CPS is supplied with the following isolation switches located at the front of the CPS:

- Mains input switch (SWIN)
- Output switch (SWOUT)
- Manual bypass switch (SWMB)
- Internal battery fuse holder isolator (SWBATT)
- Bypass input switch (SWBYP) (Not available for *Compact,* optional for *Active*, standard for *Xtend* versions)

Note: SWBATT fuse isolator only protects the internal battery only; any additional battery cabinets should come with their own dedicated provision to protect the external battery.

10. CPS CABINET

The cabinet is made of galvanised steel with an IP20 rating (degree of Ingress Protection), even with the front door open.
Side and cover panels have a thickness of 0.8 mm and are treated with powder coating.

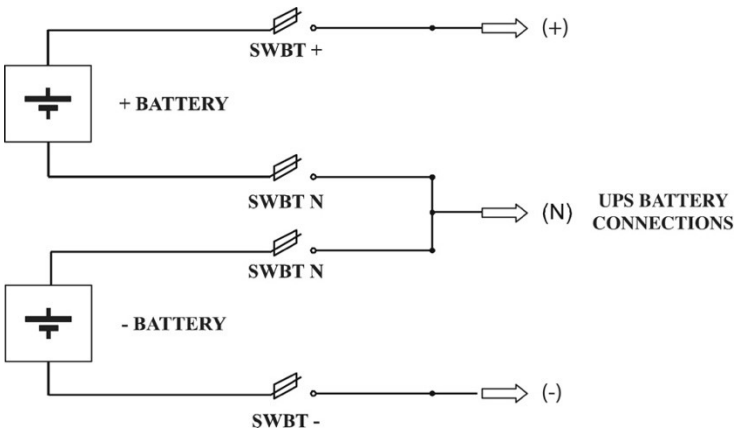
Ventilation is forced and is provided by fans located on the front; the air flow is front to rear with the output at the back.
The CPS is equipped with wheels that allow it to be easily moved and positioned during the installation.

11. OPTIONS AND ACCESSORIES

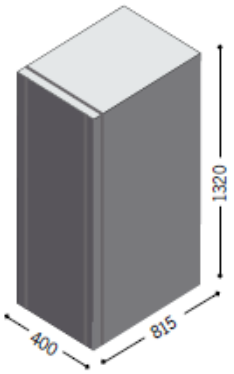
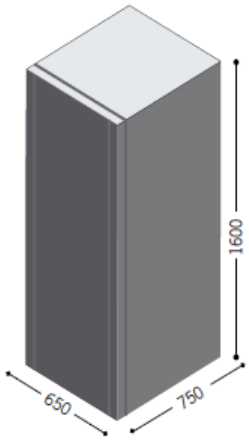
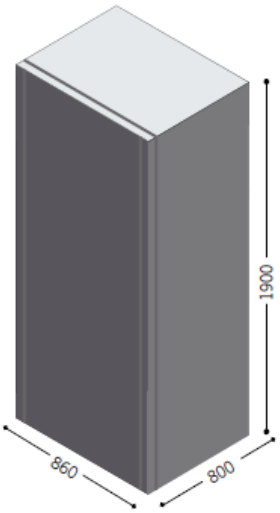
11.1. BATTERY CABINETS

The Battery Cabinet should be used to provide suitable power backup time during the failure of the incoming mains power supply.
The CPS can monitor the status of the battery switch located within the cabinet via an auxiliary switch contact connected to Input contact on the communication board or to the MultiCOM 392 card (contact configuration is reserved only for authorised personnel via the Configuration Software). If one or more Battery Cabinets are installed the CPS must be configured to update the rated capacity value (Ah of batteries inside the CPS if present, plus the Ah of all external battery cabinets). This operation can only be performed via the Configuration Software.

The Riello UPS Battery Cabinet configuration is shown below.



Other solutions may be developed on site, bearing in mind that:
-The structure of the battery enclosure must respect that described above.
-The number of batteries must remain constant (20+20 12 Volt blocks and multiple strings in parallel if required).
-The battery capacity (expressed in Ah) must fall within the range of 4 and 20 times the available recharging current (see the “Technical Specifications Table”).

MODELS BATTERY CABINETS	AB 1320 480-T5	AB 1600 480–S5	AB 1900 480-V9
DIMENSIONS **W x D x H [mm]**			
WEIGHT [kg]	90 (empty)	150 (empty)	180 (empty)

For further details on Battery Cabinet installation refer to the CPS user manual

11.2. EXTERNAL BATTERY TEMPERATURE SENSOR

The CPS has a specific connection point for measuring the temperature inside an external Battery Cabinet and indicating the temperature on the display and the compensation of the battery voltage according to the temperature.
The specific kit supplied by the manufacturer includes a bipolar double insulated cable measuring 10 meters. The use of a bipolar cable without insulation exposes the CPS and the user to risks resulting from a lack of insulation as the reading refers directly to the CPS neutral earthing.
Once the sensor is installed, it is necessary to enable the temperature display information and activate the voltage compensation. Both operations can be performed using the Configuration Software.
The kit enables the connection of a temperature probe for a Battery Cabinet placed adjacent to the CPS or 10 meters away. If it is not enough it is possible to extend it up to 25 meters (sensor cable length shall be arranged by the user).
For further details refer to dedicated option installation manual.

11.3. EXTERNAL MAINTENANCE BYPASS

An external remote maintenance bypass can be installed with the CPS, to allow, for example, CPS replacement without disruption to the load.
If this option is chosen, it is mandatory to connect the "SERVICE BYPASS" terminals (see “CPS installation manual”) to the NC auxiliary contact of the SERVICE BYPASS switch. Closing the SERVICE BYPASS switch opens this auxiliary contact which informs the CPS that the maintenance bypass has been activated. If such a connection is not made, operation of the remote maintenance bypass may disrupt the supply of power to the load and damage the CPS.
Refer to CPS installation manual for further details.

Note: Always check that the remote maintenance bypass installation (if selected) is compatible with any transformer options selected for the CPS (see paragraph 11.5 Optional Transformer).

11.4. EXTERNAL SYNC KIT

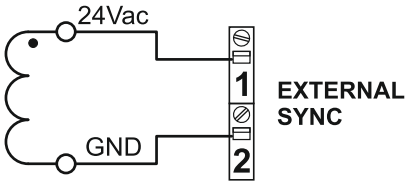
In order to synchronise the inverter output to an external source, a synchronisation kit is available. This kit contains an isolated single-phase low voltage output transformer (SELV).

Connect the transformer secondary to the "EXT SYNC" terminal block (marked as 1 and 2) located within the power connections area (refer to “Power connection details” paragraph of the CPS installation manual for further details) using a double insulated cable with a 1 sqmm cross-section.

Make sure to respect the polarisation as in the figure at the right.

After installation, enable the control using the Configuration Software.

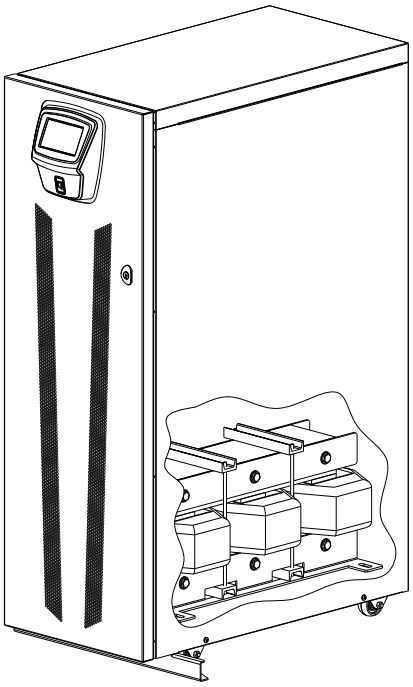
To minimise disturbances, keep the cable length as short as possible (suggested 25 m maximum). If extended length is required, please contact your local service centre

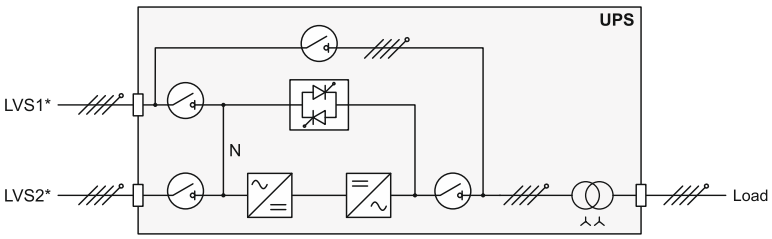


11.5. OPTIONAL TRANSFORMERS

A transformer can be installed in combination with the CPS. The optional transformer can be used for the following purposes: recreate the power supply neutral, create galvanic isolation and / or modify (increase or reduce) the output voltage.

a) **<u>Transformer located inside the CPSS:</u>** the optional internal transformer is connected to the output to guarantee galvanic isolation both during inverter and bypass operating modes.
A Star-Star type transformer is used which does not induce phase displacement between the input and output; the neutral of the secondary is not earthed, hence making the UPS suitable for TT, TN and IT connections; therefore on site, the CPS output neutral shall be bound to earth according with neutral installation arrangement.
The transformer is connected to the output terminals of the CPS, therefore the values shown on the display refer to quantities measured upstream of the transformer.





Model	Dimensions	Weight	Circuit Primary/ Secondary	Vector Group	Class Temperature / Insulation
CBT 10 OT **CBT 15 OT** **CBT 20 OT**	440*840*1320	188 230 232	Star / Star	YNYn0	H / H
CBM 6 OT **CBM 8 OT** **CBM 10 OT** **CBM 15 OT** **CBM 20 OT**	440*840*1320	157 157 158 195 197	Mono / Mono	/	H / H

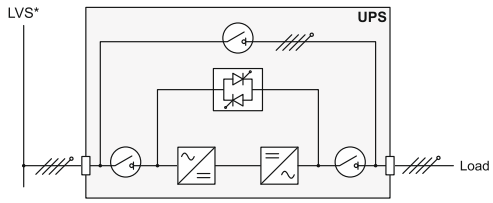
Note: The presence of the transformer inside the CPS changes the neutral system. The eventual installation of a "remote maintenance bypass " in parallel with the CPS is incompatible with the presence of the transformer. If fitted, make sure that simultaneously with the closing of the bypass switch the CPS is insulated from the plant by opening the disconnectors of the input and output.

b) **Transformer located outside the UPS** (depending on the requirements and the type of electrical set up described below).

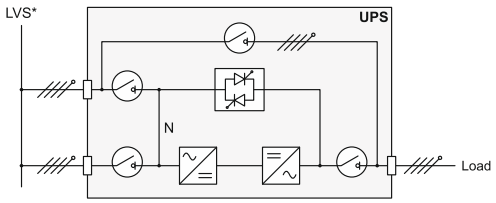
Note: the presence of the transformer will modify the neutral arrangements of the installation. The eventual installation of a "remote maintenance bypass" to isolate the CPS, in case of breakdown / maintenance has to be located after the transformer (if the same is installed in the CPS input) or upstream of the transformer (if the same is installed in the CPS output).

The following drawings provide a general overview of the possible installation scenarios.
Every configuration should be carefully evaluated according with the real installation environment.

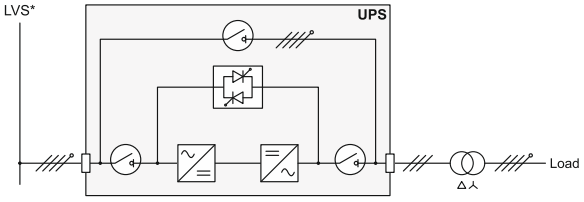
CPS *without any variation in the neutral condition*



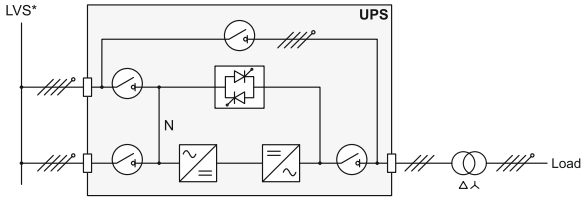
CPS *w/o any variation in the neutral condition and a Dual Input option*



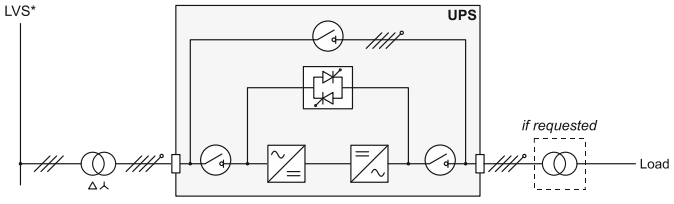
CPS *with galvanic isolation at the output*



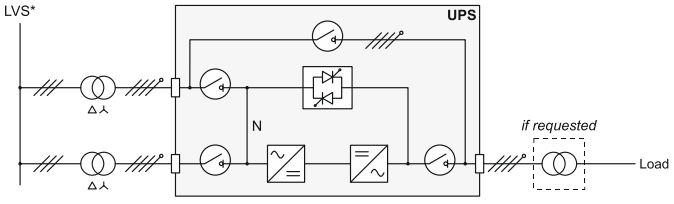
CPS *with galvanic isolation at the output and a Dual Input option*



CPS *with galvanic isolation at the input*



CPS *with galvanic isolation and a Dual Input option*



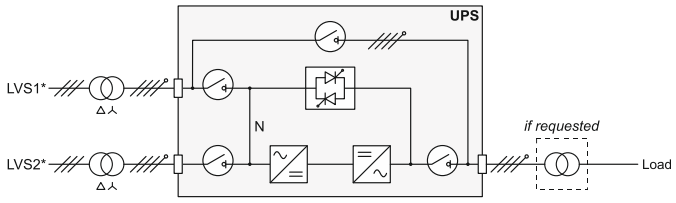
* LVS: low voltage source

Separated lines upstream (DI):

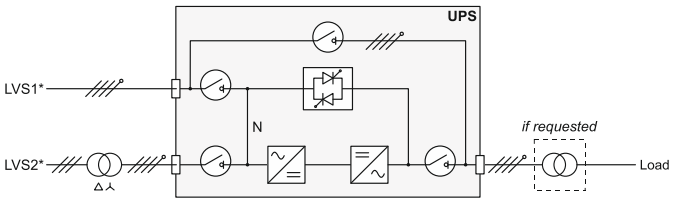
If the Dual Input option is present and the bypass is supplied from a separate low voltage source, protective devices must be present on both the main input supply and the bypass supply. (refer to the CPS installation manual)

Neutral of the input line and that of the bypass are joined inside the equipment, therefore they will refer to the same potential. If the two mains supplies are different, it is necessary to use an isolation transformer on one of the inputs.

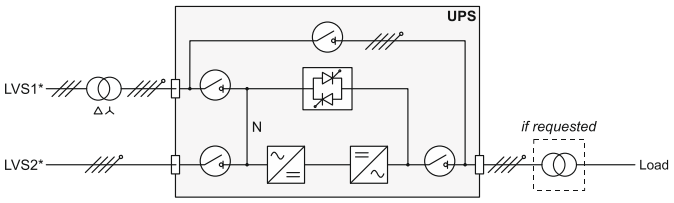
CPS *with galvanic isolation*



CPS *with galvanic isolation at the input*



CPS ***with galvanic isolation at the Bypass input***



* LVS1: low voltage source 1; LVS2: low voltage source 2;

11.6. FRONT DOOR AIR FILTER

CSS Sentryum can be supplied (ex-works) with a special door fitted with a dust filter to preserve UPS operation even within a dusty environment.

It is possible to replace the standard door onsite with the special one having the embedded filter (dedicated kit).

If the correct maintenance works are carried out to keep the filter clean, the CPS performance will not be restricted (No power downgrading).

11.7. IP30 VERSION

CSS Sentryum can be supplied (ex-works) with a special frame complying to IP30. IP30 protection degree does not affect the UPS performance (No power downgrading)

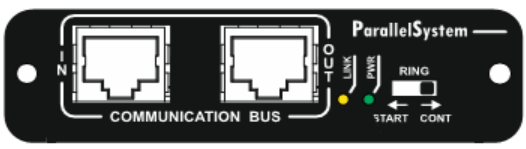
11.8. IPX1 KIT

CSS Sentryum can be supplied (ex-works) with an on-site installation kit for an optional roof, to protect the CPS against vertical falling drops of water. This kit is suitable for standard chassis (to achieve IP21 protection degree) or for IP30 version (to achieve IP31 protection degree). Neither the IP21 nor IP31 protection degree affect the CPS performance (No power downgrading).

11.9. PARALLEL

Any **CSS Sentryum** can be paralleled with other units of the same size through an optional parallel board, inserted into the dedicated slot.

For further information about the parallel feature, please refer to the paragraph 5 “Parallel kit” manual.



11.10. REMOTE PANEL

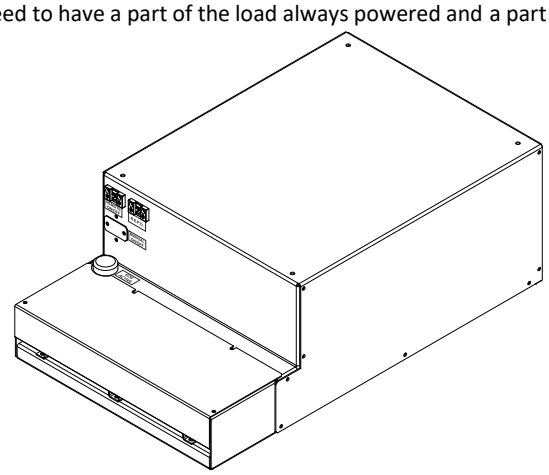
Multi Panel: MultiPanel is a remote monitoring device that can provide a detailed CPS status overview in real time. It is compatible with all Riello UPS and CPS and can display values for specific input and output supplies, and CPS battery set measurements. MultiPanel has a high-definition graphical display and can report in 13 languages: English, Italian, German, French, Spanish, Russian, Chinese, Polish, Turkish, Finnish, Czechoslovak, Hungarian and Portuguese. It has 3 independent serial ports, one of which allows for CPS monitoring via the MODBUS protocol (on either an RS485 or RS232 serial line). The others can be used with devices such as the Netman or a PC running PowerShield^3 software.
For further information please refer to option dedicate manual.

11.11. COMMUNICATION CARDS

The CPS is equipped with two expansion slots for accessory communication cards that make it possible to communicate with the UPS using different communication protocols.
For further information refer to paragraph 8.3

11.12. ACCESSORY EOS

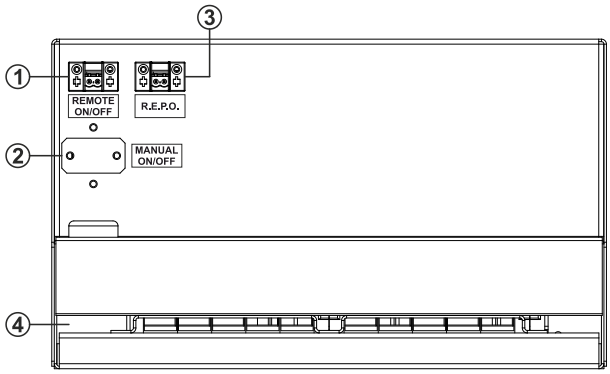
The EOS (Emergency Only Switch) accessory is necessary whenever there is a need to have a part of the load always powered and a part powered only during a power failure (see paragraph "Operating modes").
By connecting several EOS accessories in cascade, it is also possible to provide for delayed sequential switching on of the loads (if supported by a CPS).

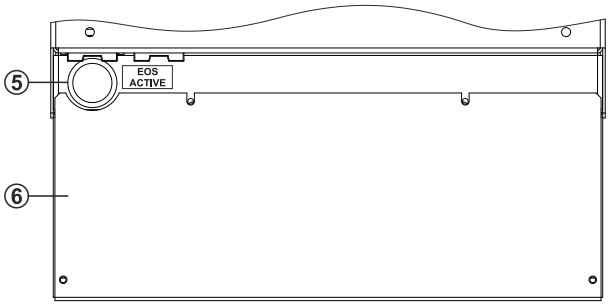


The purpose of the optional EOS accessory is to provide a sectioning of the load using an automatic / manual command. It is possible to connect up to 4 EOS devices to each CPS by distributing the total load over several lines. It is also possible to program the activation of the EOS devices to carry out the sequencing of the switching on of the loads (if supported by the CPS): it is possible to exploit this property, for example, to support loads with a high crest factor.

The device used in combination with a CPS creates a continuity system for emergency equipment with double type of output (always powered, emergency only) compliant with the 50171 standards. If configured in this mode, the device is controlled directly by the CPS only in an emergency. For CPS settings and device connections, refer to the manual of the CPS and the EOS accessory.
Note: The EOS accessory requires the installation of the optional Multicom 392 communication card in the CPS.

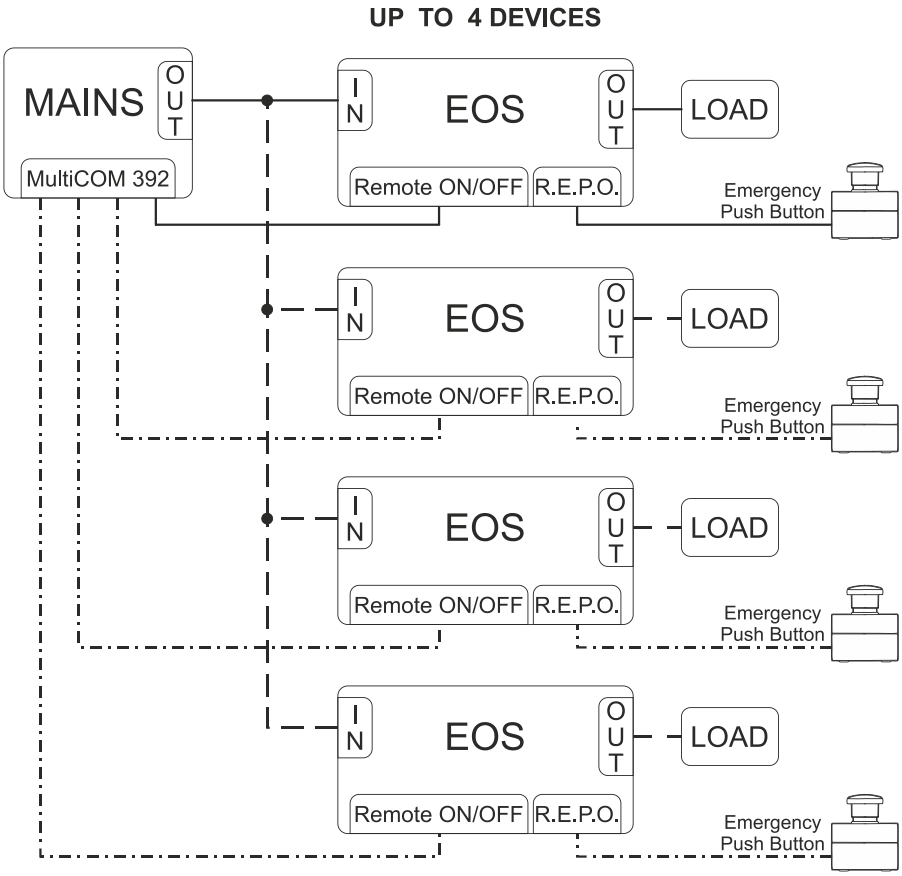
Front views:





1. Connector for remote ON / OFF control
2. Manual ON / OFF button
3. R.E.P.O (Remote Emergency Power OFF)
4. Slot for cable entry
5. EOS active indicator light
6. Terminal cover panel

Principle diagram:



Internal EOS protections:

The table below shows the sizes of the fuses to protect the device.

Model	Dimension
25 kVA	63A gG 400 V
50 kVA	100A gG 400 V
100 kVA	200A gG 400 V

12. ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Mechanical Characteristics		**CSS Sentryum CBM/CBT**	
Cabinet layout description	-	Free standing type with wheels and terminals/switches on the rear	
Range [kW]	[kW]	6-8-10-15-20 (single-phase) 10-15-20 (three-phase)	
Battery	-	Room for: 3 x (20+20) 7/9 Ah blocks (Output transformer alternative to internal batteries)	
Weight without battery [kg]	[kg]	6-8 kVA	102
		10 kVA	103
		15 kVA	105
		20 kVA	107
Dimensions [mm] • Width • Depth • Height	[mm]	• 440 • 840 • 1320	
Ventilation	-	Forced, front to rear	
Cabinet IP rating	-	IP20 finger proof (either with the cabinet doors open or closed) IP21/31 optional	
Cable input	-	Bottom (front side)	
Colour	-	RAL 7016	
EMC Compatibility	-	EN 62040-2 C2 Class	
Audible noise at 1 mt (according to EN62040-3) [dBA +/-2dBA]	[dBA]	6-8-10 kVA:	51 +/-2 @ 50% load 55 +/-2 @ 100% load
		15-20 kVA:	55 @ 50% load 60 @ 100% load
UPS Ambient temperature	[°C]	0 ÷ 40	
Recommended ambient temperature for battery (if present)	[°C]	20 ÷ 25	
Relative ambient humidity	[%]	5 ÷ 95 (without condensation)	
Maximum Operating Altitude	[m]	Up to 1000 m o.s.l. (derating of 1% for each 100 m between 1000 and 4000 m)	
Storage Temperature	[°C]	-25 - 60 (CPS) -15 - 40 (batteries)	
CPS standards	-	EN 50171 (if used within the power parameter according to EN 50171)	

13.TECHNICAL DATA 10 - 20 kVA - Three-phase output version

INPUT		CSS Sentryum CBT		
		10	15	20
Nominal voltage	[V]	380-400-415 Three-Phase plus neutral		
Voltage range (without switching to battery power)	[V]	320 - 480 @100% load 240 - 480 @50% load		
Maximum load applicable with ONE input phase missing (1)	[%]	66		
Maximum load applicable with TWO input phases missing (1)	[%]	33		
Nominal frequency	[Hz]	50 or 60		
Input frequency tolerance	[Hz]	40 to 72		
Maximum Input Current (2)	[A]	21	31.5	40
Total Harmonic distortion (THDi) with full load and source THDv <1%	[%]	≤3		
Power factor	-	≥0.99		
Rectifier progressive start-up (Power Walk-in duration)	[s]	Programmable from 1 to 120 seconds in steps of 1 second		
Adjustable delay for the rectifier start up (Power Walk-in start delay)	[s]	Programmable from 0 to 120 seconds in steps of 1 second (3 seconds by default)		
Converter technology	-	IGBT high frequency		
PFC control	-	Digital PFC with medium current control (on each phase)		

(1) From system OFF it will only start up from one phase if L1 is present.

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

- Input voltage at 364 Volt
- Battery charging current of 4 Ampere for size 10 kVA and 6 Ampere for sizes 15-20 kVA

DC CIRCUIT		CSS Sentryum CBT		
		10	15	20
Battery arrangement	-	20+20 blocks with Neutral central point		
Number of battery cells	-	120+120		
Float voltage (2.27 V/el. adjustable)	[V]	273+273		
Charging voltage (2.38 V/el. adjustable)	[V]	286+286		
End of discharge voltage - load dependent (1.6 V/el. adjustable)	[V]	190+190		
Battery recharging current (3)	[A]	4 @full load 7 @ 90% load 9 @ 80% load 11 @ 70% load 12 @65% load	6 @full load 11 @ 90% load 15 @ 80% load 18 @ 70% load 20 @ 65% load	
Maximum current drawn from batteries with UPS working at nominal power	[A]	27.5	41	55
Battery recharge method (default)	-	Two level charging		
Residual low frequency current ripple (<1 kHz)	-	< 2% C10 (for 9 Ah battery)		
Voltage compensation (if battery temperature sensor active)	[mV/°C]	20 (12 Volt block)		
Protection device according to EN 50171	-	Battery polarity check with disconnection device		

(3) The currents refer to input voltages ≥ 364 Volt

INVERTER		CSS Sentryum CBT		
		10	15	20
Nominal power	[kVA]	10	15	20
Nominal active power	[kW]	10	15	20
Nominal power with load power factor from 0.8 inductive to 0.8 capacitive - without power downgrading (0-40°C)	[kVA]	10	15	20
Power according to EN 50171	[kVA/kW]	8	12	16
Nominal voltage	[V]	380/400/415 Vac Three-Phase plus neutral		
Downgrading for different output voltages	[%]	220 Volt [Ph-N]: -4% 208 Volt [Ph-N]: -10% 200 Volt [Ph-N]: -13%		
Nominal frequency	[Hz]	50 or 60		
Static stability	[%]	± 0.5%		
Dynamic stability	-	Resistive Load: +/-1% @ 20->100% and 100->20% within 20 msec @ full load Mains / battery / mains within 20 msec		
		Non-Linear Load: EN62040-3 class performance 1		
Voltage distortion with linear and distorting load (EN 62040-3)	[%]	< 1% with linear load ≤1.5% with distorting load		
Inverter frequency stability without by-pass supply synchronization	[%]	0.01		
Rate of Frequency variation	[Hz / sec]	1 (adjustable from 0.5 to 2)		
Voltage phase Dissymmetry with balanced and unbalanced loads	[%]	± 1%		
Voltage phase shift with balanced and unbalanced loads	[°]	120 ± 1 °		
Inverter Overload (@40°C)	-	103% Infinite 110% 60 min 125% 10 min 150% 60 sec 200% 0.5 sec > 200% 0.2 sec		
Inverter overload capacity referred to power according to EN 50171 (@ 40 ° C)	-	120% Infinite		
Short circuit current (Ph-N)	-	2.7 x In per 200 ms + 1.5 x In per 300 ms (single unit)		
Maximum Efficiency on battery-operation	[%]	95.9	96.4	96.4
Converter technology	-	IGBT three level high frequency		
Inverter control	-	Voltage/current DSP signal processing		

BYPASS		CSS Sentryum CBT		
		10	15	20
Nominal power	[kVA]	10	15	20
Power according to EN 50171	[kVA]	8	12	16
Nominal voltage	[V]	380-400-415 Three-Phase plus neutral		
Output maximum nominal current (4)	[A]	16	24	32
Bypass voltage range	[V]	from 312 - 460 (adjustable in step of 4 V)		
Nominal frequency	[Hz]	50 / 60		
Bypass input frequency range	[Hz]	40-72		
Transfer time bypass to Inverter (CPS in "ECO mode")	[msec]	2 msec typical		
Max current in short circuit for: [20 ms @Tj 25°C]	[ms]	1500	1500	1500
Max energy passing through [I^2t @ tj 25°C]	[A^2s]	11250	11250	11250
Overload capability on bypass line	-	110% Infinite 125% 60 min 150% 10 min 200% 1 min >200% 20 sec		
Operations	-	Continuous operation at nominal load with ventilation fault		

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

- Bypass voltage at 400 Volt
- Load level 110%

User Interfaces		CSS Sentryum CBT		
		10	15	20
Communication ports	-	1x Touch screen display 5” (480x272 pixel) 1x USB 1x RS232 (RJ10) 4x programmable output alarms 5x programmable opto-isolated input commands 2x Communication Slots		
Auxiliary commands	-	1x REPO (Remote Emergency Power Off) 1x External synchro input 1x Temperature sensor input		

Efficiency, Losses, Ventilation		CSS Sentryum CBT		
		10	15	20
AC/AC Efficiency @ Full load	[%]	96.11	96.24	95.98
AC/AC Efficiency @ 75% load	[%]	96.05	96.32	96.26
AC/AC Efficiency @ 50% load	[%]	95.60	96.20	96.29
AC/AC Efficiency @ 25% load	[%]	94.39	95.28	95.67
Power dissipated with resistive nominal load (pf=1) and with battery charged *	[kW] [kcal/h] [BTU/h]	0.41 350 1400	0.59 505 2000	0.84 720 2860

* 3.97 B.T.U. = 1 kcal

System Auto Consumption and ECO MODE efficiency		CSS Sentryum CBT		
		10	15	20
Auto-consumption: CPS in ON LINE Mode w/o load	[W]	100	119	
Auto-consumption: CPS in STANDBY Mode w/o load	[W]	20		
Efficiency: CPS in ECO Mode at 50% load rate	[%]	99.00	99.42	
Efficiency: CPS ECO Mode at 100% load rate	[%]	99.31	99.55	

14.TECHNICAL DATA 6 - 20 kVA - Single-phase output version

INPUT		CSS Sentryum CBM				
		6	8	10	15	20
Nominal voltage	[V]	380-400-415 Three-Phase plus neutral or 220-230-240 Single-Phase plus neutral				
Voltage range (without switching to battery power)	[V]	320 - 480 V @100% load / 240 - 480 V @50% load (3 Ph) 184 - 276 V @100% load / 140 - 276 V @50% load (1 Ph)				
Maximum load applicable with ONE input phase missing [5] (if 3 Ph Input)	%	66				
Maximum load applicable with TWO input phases missing [5] (if 3 Ph Input)	%	33				
Nominal frequency	[Hz]	50 / 60				
Input frequency tolerance	[Hz]	40 to 72				
Maximum Input Current [6] 3Ph / 1Ph	[A]	14 / 42	17 / 51	21 / 63	31.5 / 94.5	40 / 120
Total Harmonic distortion (THDi) with full load and source THDv <1% (if 3 Ph Input)	[%]	≤4	≤3			
Total Harmonic distortion (THDi) with full load and source THDv <1% (if 1 Ph Input)	[%]	≤4	≤3	≤2.5		
Power factor (3Ph / 1 Ph)	-	0.99 / 0.99				
Rectifier progressive start-up (Power Walk-in duration)	[s]	Programmable from 1 to 120 seconds in steps of 1 second				
Adjustable delay for the rectifier start up (Power Walk-in start delay)	[s]	Programmable from 0 to 120 seconds in steps of 1 second (3 seconds by default)				
Converter technology	-	IGBT three level high frequency				
PFC control	-	Average current mode digital PFC (on each phase)				

[5] From system OFF it will only start up from one phase if L1 is present.

[6] The input current is stated for the following general conditions:

- Input voltage at 364 Volt
- Battery charging current of 4 Ampere for size 10 kVA, 6 Ampere for sizes 6-15-20 kVA and 8 Ampere for sizes 8 kVA

DC CIRCUIT		CSS Sentryum CBM				
		6	8	10	15	20
Battery arrangement	-	20+20 blocks with Neutral central point				
Number of battery cells	-	120+120				
Float voltage (2.27 V/el. adjustable)	[V]	273+273				
Charging voltage (2.38 V/el. adjustable)	[V]	286+286				
End of discharge voltage - load dependent (1.6 V/el. adjustable)	[V]	190+190				
Battery recharging current (7)	[A]	6	8	4 @full load 7 @ 90% load 9 @ 80% load 11 @ 70% load 12 @ 65% load	6 @full load 11 @ 90% load 15 @ 80% load 18 @ 70% load 20 @ 65% load	
Maximum current drawn from batteries with UPS working at nominal power	[A]	16	22	27.5	41	55
Battery recharge method (default)	-	Two level charging				
Residual current ripple	-	< 2% C10 (for 9 Ah battery)				
Voltage compensation (if battery temperature sensor active)	[mv/°C]	20 mv/°C (12 Volt block)				
Protection device according to EN 50171	-	Battery polarity check with disconnection device				

(7) The currents refer to input voltages ≥ 364 Volt

INVERTER		CSS Sentryum CBM				
		6	8	10	15	20
Nominal power	[kVA]	6	8	10	15	20
Nominal active power	[kW]	6	8	10	15	20
Nominal power with load power factor from 0.8 inductive to 0.8 capacitive - without power downgrading (0 - 40°C)	[kVA]	6	8	10	15	20
Power according to EN 50171	[kVA/kW]	5	6	8	12	16
Nominal voltage	[V]	220/230/240 Single-Phase plus neutral				
Downgrading for different output voltages	[%]	220 Volt [Ph-N]: -4% 208 Volt [Ph-N]: -10% 200 Volt [Ph-N]: -13%				
Nominal frequency	[Hz]	50 / 60				
Static stability	[%]	± 0.5				
Dynamic stability	-	Resistive Load: +/-1% @ 20->100% and 100->20% within 20msec @ full load Mains / battery / mains within 20 msec				
		Non-Linear Load: EN62040-3 class performance 1				
Voltage distortion with linear and distorting load (EN 62040-3)	[%]	< 1% with linear load ≤ 1.5% with distorting load				
Inverter frequency stability without by-pass supply synchronisation	[%]	0.01				
Rate of Frequency variation	[Hz/s]	1 Hz/sec (adjustable from 0.5 to 2)				
Inverter Overload capacity (@40°C)	-	103% Infinite 110% 60 min 125% 10 min 150% 60 sec 200% 0.5 sec > 200% 0.2 sec				
Inverter Overload capacity referred to power according to EN 50171 (@40 °C)	-	120% infinite				
Short circuit current (Ph-N)	-	2.7 x In for 200 ms + 1.5 x In for 300 ms (standalone)				
Maximum Efficiency on battery-operation	[%]	95.9				
Converter technology	-	IGBT three level high frequency				
Inverter control	-	Voltage/current DSP signal processing				

BYPASS		CSS Sentryum CBM				
		6	8	10	15	20
Nominal power	[kVA]	6	8	**10**	**15**	**20**
Power according to EN 50171	[kVA]	5	6	8	12	16
Nominal voltage	[V]	220 / 230 / 240 Vac Single-Phase plus neutral				
Output maximum nominal current [8]	[A]	29	38	48	72	96
Voltage range for bypass switching enable	[V]	from 180 V to 264 V (adjustable in step of 4 V)				
Nominal frequency	[Hz]	50 / 60				
Bypass input frequency range	[Hz]	40 - 72				
Transfer time bypass to Inverter (CPS in "ECO mode")	[msec]	2 ms (typical)				
Max current in short circuit for: (20 ms @ Tj 25°C)	[A]	2000	2000	2000	2650	2650
Max energy passing through (I^2t @ tj 25°C)	[A^2S]	20000	20000	20000	35000	35000
Overload capability on bypass line	-	110% Infinite 125% 60 min 150% 10 min 200% 1 min >200% 20 sec				
Operations	-	Continuous operation at nominal load with ventilation fault				

[8] The bypass current is stated for the following conditions:

- Bypass voltage at 230 Volt
- Load level 110%

User Interfaces		CSS Sentryum CBM				
		6	8	10	15	20
Communication ports	-	1x Touch screen display 5” (480x272 pixel) 1x USB 1x RS232 (RJ10) 4x programmable output alarms 5x programmable opto-isolated input commands 2x Communication Slots				
Auxiliary commands	-	1x REPO (Remote Emergency Power Off) 1x External synchro input 1x Temperature sensor input				

Efficiency, Losses, Ventilation (CPS working with single input voltage)		CSS Sentryum CBM				
		6	8	10	15	20
AC/AC Efficiency @ Full load	[%]	95.95	95.90	95.83	96.06	95.75
AC/AC Efficiency @ 75% load	[%]	95.80	95.89	96.00	96.29	96.05
AC/AC Efficiency @ 50% load	[%]	94.87	95.39	95.81	96.13	96.19
AC/AC Efficiency @ 25% load	[%]	93.02	93.81	94.62	94.95	95.67
Power dissipated with resistive nominal load (pf=1) and with battery charged *	[kW]	0.25	0.33	0.44	0.62	0.89
	[kcal/h]	207	280	375	530	765
	[BTU/h]	830	1120	1485	2100	3030

* 3.97 B.T.U. = 1 kcal

System Auto Consumption and ECO MODE efficiency		CSS Sentryum CBM				
		6	8	10	15	20
Auto-consumption: CPS in ON LINE mode w/o load	[W]	100	100	100	120	
Auto-consumption: CPS in STAND BY mode w/o load	[W]	20				
Efficiency: CPS in ECO MODE at 50% load rate	[%]	98.76	98.88	99.02	99.02	
Efficiency: CPS ECO MODE at 100% load rate	[%]	99.06	99.18	99.09	98.9	

15.TECHNICAL DATA EOS

MODEL	25 kVA	50 kVA	100 kVA
INPUT			
Nominal Voltage	380-400-415 Vac Three-phase with neutral (4 wire) 220-230-240 Vac Single-phase	380-400-415 Vac Three-phase with neutral (4 wire)	
Nominal Frequency	50-60Hz		
Voltage range (referred to 400Vac)	90 ~ 264V (PH-N)		
Frequency range (referred to 50/60Hz)	±20% 40-72Hz		
OUTPUT			
Nominal voltage	380-400-415 Vac Three-phase with neutral (4 wire) 220-230-240 Vac Single-phase	380-400-415 Vac Three-phase with neutral (4 wire)	
Nominal frequency	50/60Hz		
Appearent nominal power	25 kVA	50 kVA	100 kVA
Active nominal power	22,5 kW	45 kW	90 kW
Output power factor	0,9		
Short circuit current	1,5xIn for t>500ms		
Crest factor	3:1		
Internal protection	63 A Gg	100 A Gg	200 A Gg
Overload	120% infinite, 130% 10 min, 160% 1 min, 180% 5 sec, >180% 0,5 sec		
DIMENSIONS AND WEIGHT			
W x D x H	330 x 561,5 x 198 mm		
Weight	15 kg	18 kg	21 kg
ACCESSORIES AND COMMUNICATION			
I/O external comands	R.E.P.O. (Remote Emergency Power Off), Manual ON/OFF, Automatic ON/OFF		
OTHERS			
Colour	RAL 7016		
Room ambient temperature	0 – 40 °C		

this page intentionally left blank

this page intentionally left blank

www.riello-ups.com

SPTCBTB2T21DREN Ver. April 2021 **- Subject to change without notice and inaccuracies**