

centiel
continuous power availability



StratusPower™

StratusPower™

User & Operation Manual

StratusPower™

208V

English
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Product Warranty

Download or ask the manufacturer for the latest version of the warranty policy and procedures, document POL-0002-EN.

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Changes Revision Table

Revision	Notes	Author/Checked
REV01	First English version released	MT/GL
REV02	Modified customer interface picture + correction	MT/GL
REV03	Added SM05-15-2V-S modules and relative frames	MT/GL
REV04	Removed CAB-SP301, added CAB-SP240, added CB for SM05-15-2V-S frames with included battery and on SR models. Revised mechanical drawings, weights, and module's maximum charging current.	NM/MT








1 Information on this Document

1.1 Validity

This document is valid for the following device types:

Modules	SM05-2V-S, SM10-2V-S, SM12-2V-S, SM15-2V-S SM25-2V-M, SM31-2V-M
Standard Frames	CAB-SP060-I240-2S-A0, CAB-SP060-I080-2S-A1, CAB-SP120-I320-4S-B0, CAB-SP120-E-4S-A1, CAB-SP180-E-6S-A0, CAB-SP240-E-8S-A0, CAB-SP375B-E-6M-AV-K, CAB-SP375T-E-6M-AV-K, CAB-SP750B-E-12M-AV-2K, CAB-SP750T-E-12M-AV-2K, CAB-SP1125B-E-18M-AV-3K, CAB-SP1125T-E-18M-AV-3K, CAB-SP1500B-E-24M-AV-4K, CAB-SP1500T-E-24M-AV-4K, CAB-SP375B-E-6M-LT-K, CAB-SP375T-E-6M-LT-K, CAB-SP750B-E-12M-LT-2K, CAB-SP750T-E-12M-LT-2K, CAB-SP1125B-E-18M-LT-3K, CAB-SP1125T-E-18M-LT-3K, CAB-SP1500B-E-24M-LT-4K, CAB-SP1500T-E-24M-LT-4K
Universal Racks	CAB-SR030-E-1S-C0, CAB-SR060-E-2S-C0, CAB-SR120-E-4S-C1

1.2 Symbols

Symbol	Explanation
	Indicates that operations have to be performed accurately and following this User Manual
	Indicates that the weight of the equipment is higher than 25 kg and it has to be handled by 2 persons
	Indicates that operations have to be carried out by authorized technical personnel only. "Qualified personnel". THE RISK OF ELECTRICAL IMPACT IS HIGH
	Indicates that the batteries could release acid and gas.
	Indicates ground (PE or PEN) connection
	Indicates that parameters and/or values need to be verified
	Article Order Code

1.3 Nomenclature

Complete Designation	Designation in this Document
Stratus Module	SM
Stratus Power	SP
Uninterruptible Power Supply	UPS
Circuit Breaker	CB
Stratus Universal Rack	SR

2 Foreword

Dear Customer,

Thank you for choosing a StratusPower™ Uninterruptible Power Supply and a warm welcome to Centiel™ world.

Our company's mission is to contribute to the success of your business by protecting your critical applications and by ensuring a continuous power availability.

The innovative technology of our products and the constant support offered by our after-sales team are a guarantee of maximal performance. We will provide you with high-quality products and assistance in each phase of your StratusPower™ UPS life.

To help you grow and succeed, we need your contribution. A kind feedback would be highly appreciated. It will allow us to supply you with the most advanced products and solutions.

Sincerely,

CENTIEL™ TEAM

3 Safety

3.1 Intended Use

This User Manual contains all the detailed instructions concerning the handling, installation and operation procedures of StratusPower™ UPS. Therefore, it is strongly recommended to read it carefully before starting the installation. The manufacturer assumes no responsibility for errors and misinterpretations mentioned in this User Manual.

This document may be subject to modifications without notice.

This document must not be copied and imparted to a third party for use in unauthorized purposes.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference.

3.2 Qualified Personnel Skills

The UPS can be installed, commissioned and serviced only by technicians and engineers certified by the manufacturer.

Only qualified personnel are allowed to perform the activities marked with the symbol described in section 1.2.

The UPS has been designed to be used in restricted access areas only. If the mentioned conditions are not respected, the manufacturer might be able to invalidate the warranty.

3.3 Safety Precautions

This section describes the safety precautions that must be observed when working with the product.

Danger!

Operations inside the UPS

Operations inside the UPS must be performed only by qualified personnel, service engineers certified by the manufacturer or by an agent authorized by the manufacturer.

Danger!

In operation mode

In order to avoid electrical shocks, in operation mode do not remove any screws or protection panels from the UPS and the Battery Cabinet.

Warning!**Operator precautions**

The UPS has been designed to be used in restricted access areas and can be operated by authorized personnel only. Therefore, the user has the permission to operate as follows:

- Use the management display as described in this manual;
- Start up and shut down the UPS as described in this manual;
- Perform the connections on the Customer Interface;
- Install and manage the SNMP adapter;

The manufacturer does not take any responsibility for damages caused by manipulation not conform to the procedures described in this manual.

Notice!**Damage to internal components due to electrostatic discharge**

Touching electronic components can cause damage and destroy parts of the UPS due to electrostatic discharge. Ground yourself before touching any internal electronic board or component.

3.4 Environmental, Disposal and Recycling Considerations

In accordance with the standard IEC 62040-4, the UPS has been designed by taking into account all environmental aspects.

Notice!

The UPS makes use of components dangerous for the environment (electronic cards, electronic components and batteries). At the end of life, Batteries and UPS must be taken to specialized collection and disposal centers.

Notice!

In case of complete UPS dismantling, the operation shall be carried out by specialized personnel and the equipment must be taken to centers specialized in collection and disposal of dangerous substances.

3.4.1 Battery and UPS Disposal and Recycling

Since the batteries contain dangerous substances that will harm the environment it is forbidden to deposit them in a landfill. The replaced batteries must be delivered to an entity qualified for disposal and recycling.

The similar situation is the disposal of the UPS at the end of life. It is necessary to deliver the equipment to a local disposing and recycling treatment facility. They disassembling the complete apparatus assuring the recycling and disposal of each specific part.

3.5 Declarations of Conformity, Safety and CE Marking

The UPS complies with CE standards and with the IEC concerning Uninterruptible Power Supply Systems (UPS).

3.5.1 CE Marking

The UPS is provided with CE marking according to:

Type	Directive
Low Voltage Directive	(2014/35/EU)
EMC Directive	(2014/30/EU)



3.5.2 Declarations of Conformity

Type	Standard
Safety (General Requirements)	IEC 62477-1
Safety (UPS Requirements)	IEC 62040-1
EMC (UPS Requirements)	IEC 62040-2
Performance (UPS Requirements)	IEC 62040-3

The Declarations of Conformity regarding Safety, EMC and Performance are available.

4 Product Description

4.1 General System Description

StratusPower™ was created to respond to highest availability requirements i.e. to eliminate risks that may cause computer downtime of business-critical applications.

StratusPower™ is a new series of modular fault-tolerant 3phase UPS-systems, that thanks to our extensive failure analysis research and insights gathered from 35+ years of field experience working with a large number of data centers and other critical environments, our power protection solutions have reached the **highest levels of availability** to reduce downtime risk, avoid costly errors, and increase energy efficiency.

Unlike traditional centralized parallel multi-module systems, the advanced StratusPower™ technology combines a unique **Intelligent Module Technology (SMT)**, with a fault-tolerant parallel architecture, called **Distributed Active-Redundant Architecture (DARA)**, thereby fulfilling the highest availability and reliability requirements.

4.2 Stratus Module Technology (SMT)

Thanks to our long experience in module-design, the StratusPower™ modules are equipped with all hardware (power circuits) and all software (intelligence and monitoring) functions, which make them fully independent and capable of safely isolating themselves from the multi-module system whenever an internal fault occurs. The rest of the multi-module system will continue to provide protected power to the critical load without interruptions. The integration of all hardware and software in each module allowed us to eliminate all the risky single points of failure that would compromise the entire system and the power to the critical data center.

The core technology of the StratusPower product family is based in 6 Stratus Modules sizes that can be piled to create systems from 5kVA/kW to 1.86MW

Furthermore, the modules 25 and 31kW have been designed also for facilities which input, and output voltage includes 208V.

Module	Module Type	Power
SM05-2V-S	S	5kVA / kW
SM10-2V-S	S	10kVA / kW
SM12-2V-S	S	12.5kVA / kW
SM15-2V-S	S	15kVA / kW
SM25-2V-M	M	25kVA / kW
SM31-2V-M	M	31kVA / kW

4.3 Distributed Active-Redundant Architecture (DARA)

The Distributed Active-Redundant Architecture of the multi-module UPS-system StratusPower™ was designed to respond to the highest availability requirements. This is achieved with the implementation of the “democratic” majority load transfer decision-making in an event of a critical failure, and a correct management of the load sharing to avoid crosscurrents between the modules. The communication between the logic circuits of the modules is accomplished by means of a redundant communication BUS.

In an event of a critical failure, every module will decide, by means of its logic circuit, whether the load should remain on the inverter or be transferred to the bypass. The load transfer will be conducted depending on the decision made by the majority of the modules. To avoid crosscurrents between the modules, a master-slave load sharing technique is adopted. The first module is designated to be the master, which provides the load value to be shared by the rest of the modules (slaves). If the master experiences a failure, the next module will automatically become the leading master.

DARA Modular Architecture



5 Delivery Transportation and Storage

5.1 Material and UPS Receipt

The equipment must be transported in an upright position, as indicated by the labels on the package.

Please ensure that the received material corresponds to the indications reported on the delivery note.

The UPS, batteries and accessories are delivered on a specific pallet and they are packed with adequate indications (FRAGILE and position arrows) and protections.



Handle the UPS, the Battery Cabinet and the batteries carefully. The heavy weight can cause injury to persons or damage to facilities in the surrounding area.

5.2 Storage

The UPS should be stored in the original packing. If the UPS is stored unpacked, a protection against dust has to be applied and the environment has to be dry and clean.

5.2.1 Storage without Batteries

If the UPS is not equipped with batteries, the ambient temperature can vary between -25 °C and +70 °C, and the ambient humidity should not exceed 95%, non-condensing.

5.2.2 Storage with Batteries (only for Complete Enclosure)

The ambient temperature can compromise the battery life.

For sealed maintenance-free Lead-Acid batteries, it is suggested to keep them stored at a room temperature varying between -15 °C and +40 °C. Since Lead-Acid batteries have to be stored fully charged, for long term storage it is strongly recommended to recharge the batteries every 6 months.

For LiFePo batteries, the storage temperature range is from +20 °C to +35 °C. However for prolonged storage periods (≥12months) it is recommended to verify the voltage of the battery module.

If $\leq 50.32V$ (3.145V/Cell) with the SOC less than 10%, it must be charged to 55.2V (3.45V/Cell) with a current of 0.2C during 15minutes.

5.3 External Visual Inspection

The UPS and the Battery Cabinet packages are provided with labels indicating the center of gravity, and with a “Tilt watch” label indicating whether the packages have been overturned during transportation.



Correct indication, proceed to unpack.



Do not unpack if the indication on the “Tilt watch” is red. Immediately inform the manufacturer and the transportation company.

During transport, the UPS may be damaged, but there are no obvious signs. We therefore suggest that you accept the delivered cabinet with “reserve”, carefully unpack the UPS, carry out a thorough visual inspection and report any damage to the transport company and the manufacturer. For further information please refer to FAQ-0004 on Centiel portal.

5.4 Unpacking

Unpack the equipment by removing the shipping materials and verify the status of the goods (see section 5.5).

For wooden box packages, remove the screws from the box and peel off the sides.

Standard packing



Sea freight Light package



Sea freight package



5.4.1 How to remove the anti-shock bars

Remove the 4 x screws of the protection bars located on the bottom of the sides:



Remove the bars fixing screws, lift the cabinet with a trans-pallet, and pull the bars out.



Notice!

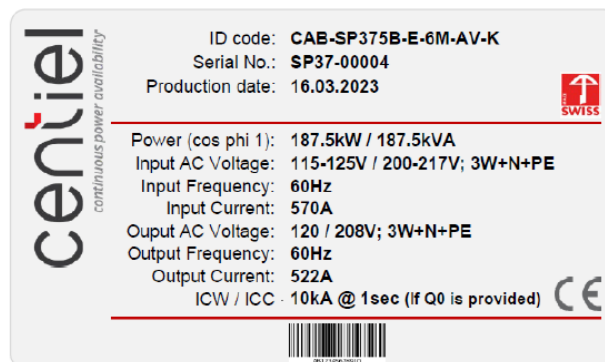
All accessories are located in a box (glove compartment) on top of the cabinet.

5.5 General Inspections after Unpacking

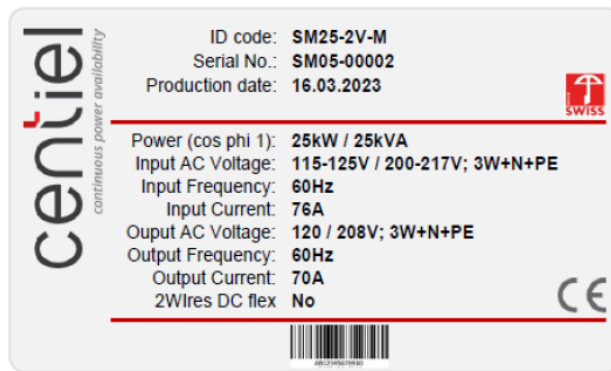
5.5.1 Nameplates and Identifications

The nameplates, indicating technical specifications and serial numbers, are located inside the UPS frame and on the module's right side.

Example of Frame's Nameplate



Example of Module's Nameplate



5.5.2 Documentation

Each UPS is provided with User Manual, ID Cards which includes the Factory Test Report. The user manual and ID cards are in the glove compartment; box added to the top of the cabinet.

For service purposes, these documents shall be kept close to the installed equipment.

5.5.3 Internal Visual Inspection

Before positioning the UPS and the Battery Cabinets, remove all panels and perform a visual inspection of all mechanical parts. Pay particular attention to the wirings: they must not have undergone damages during transportation.

5.5.4 Delivered Options

Check the delivery note and verify that all required options have been placed in the glove compartment.

The ordered battery trays and links are located inside the UPS cabinet. Make sure that they correspond to the requested battery configuration.

Notice!

If parts are missing or wrong parts are delivered, notify the manufacturer for prompt action.

6 Mechanical Dimensions and Installation

6.1 Dimensions and Weight

6.1.1 Frames Dimensions and weight for modules 5, 10, 12.5 and 15kW



Model	CAB-SP060-I080-2S-A1	CAB-SP060-I240-2S-A0	CAB-SP120-I320-4S-B0	CAB-SP120-E-4S-A1
Module Type	S			
Module SMXX-2V-S	XX = 05/10/12.5/15 kW			
Max # of Modules	2	2	4	4
Max Power (208V)	30 kVA/kW	30 kVA/kW	60 kVA/kW	60 kVA/kW
Internal batteries	80 x 9Ah	240 x 9Ah	320 x 9Ah or 80 x 28Ah	-
Dimensions (WxHxD) mm	510x1'315x815	510x1'980x 815	730x1'980x 815	510x1'315x 815
Weight empty frame*	100 Kg	154 Kg	235 Kg	104 Kg
Weight frame**	140 Kg	194 Kg	315 Kg	184 Kg
Color	RAL 7024 Graphite grey			

*w/o Batteries, w/o modules

**w/o Batteries, with 15kW modules



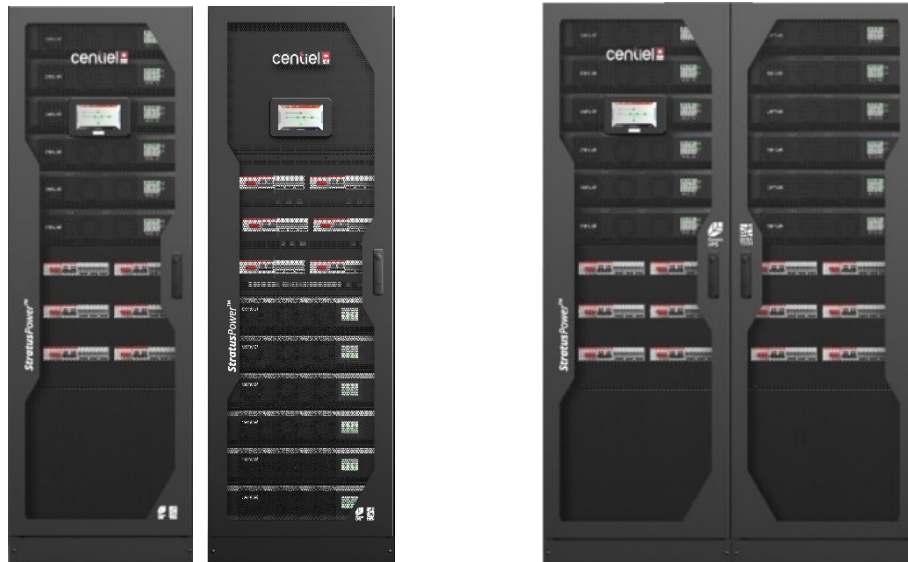
Model	CAB-SP180-E-6S-A0	CAB-SP240-E-8S-A0	CAB-SR030-E-1S-C0	CAB-SR060-E-2S-C0	CAB-SR120-E-4S-C1
Module Type	S				
Module SMXX-2V-S	XX = 05/10/12.5/15 kW				
Max # of Modules	6	8	1	2	4
Max Power (208V)	90 kVA/kW	120 kVA/kW	15 kVA/kW	30 kVA/kW	60 kVA/kW
Internal batteries	-	-	-	-	-
Dimensions (WxHxD) mm	510x1'980x815	510x1'980x815	482x267(6HU)x 565	482x487(11HU)x 565	482x932(21HU)x 565
Weight empty frame*	(163 Kg)	168 Kg	19 Kg	32 Kg	51 Kg
Weight frame**	283 Kg	328 Kg	39 Kg	72 Kg	131 Kg
Color	RAL 7024 Graphite grey		Frontal RAL 9011 OP		

* w/o Batteries, w/o modules

** w/o Batteries, with 30kW modules

Note: shown pictures are indicative, all the frames can be filled-up to the maximum number of slots.

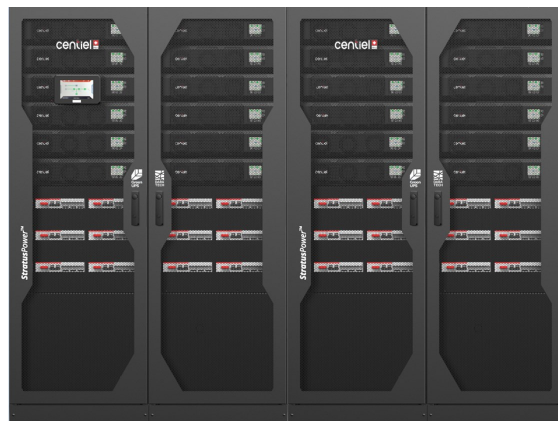
6.1.2 Frames Dimensions and weight for modules 25 / 31kW



Model	CAB-SP375(B/T)-E-(LT/AV)-K	CAB-SP750(B/T)-E-(LT/AV)-2K
Module Type	M	M
Max # of Modules	6	12
Module SMXX-2V-M	XX = 25/31 kW	XX = 25/31 kW
Max Power (208V)	186 kVA/kW	372 kVA/kW
Manual maintenance bypass	Optional	Optional
Common/separate batteries	Standard / Optional	Standard / Optional
Internal batteries	-	-
Dimensions (WxHxD) mm	656x1'982x 900	1312x1'982x 900
Weight empty frame*	208 Kg	425 Kg
Weight frame**	484 Kg	977 Kg
Color	RAL 7024 Graphite grey	

*w/o Batteries, w/o modules / **w/o Batteries, with modules 31 kW

Note: shown pictures are indicative, all the frames can be filled-up to the maximum number of slots.



Model	CAB-SP1125(B/T)-E-(LT/AV)-3K	CAB-SP1500(B/T)-E-(LT/AV)-4K
Module Type	M	M
Max # of Modules	18	24
Module SMXX-2V-M	XX = 25/31 kW	XX = 25/31 kW
Max Power (208V)	558 kVA/kW	744 kVA/kW
Manual maintenance bypass	Optional	Optional
Common/separate batteries	Standard / Optional	Standard / Optional
Internal batteries	-	-
Dimensions (WxHxD) mm	2000x1'982x 900	2653x1'982x 900
Weight empty frame*	(675 Kg)	(840 Kg)
Weight frame**	(1503 Kg)	(1944 Kg)
Color	RAL 7024 Graphite grey	

*w/o Batteries, w/o modules / **w/o Batteries, with modules 31 kW

Note: shown pictures are indicative, all the frames can be filled-up to the maximum number of

Advice!

For detailed mechanical drawings refer to the Partner Portal

6.1.3 Modules Dimensions and weight



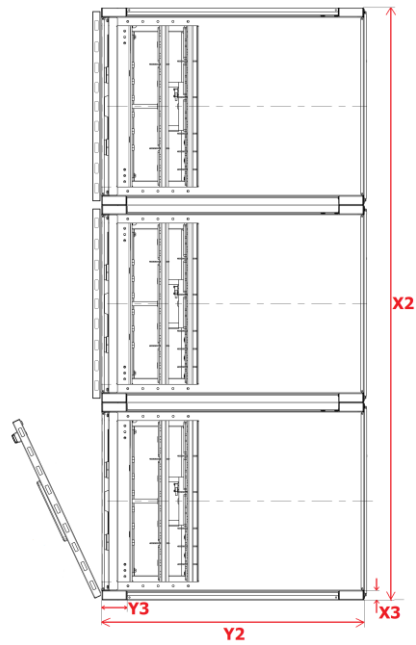
SMXX-2V-M	SM05/10-2V-S	SM12/15-2V-S	SM25-2V-M	SM31-2V-M
Max Power [kW]	5/10	12.5/15	25	31
Module Type	S	S	M	M
Output Power Factor	1	1	1	1
Battery Blocks*	14 to 30	14 to 30	14 to 30	14 to 30
Battery Charger current [A]	15/25	30/35	50A	60A
Weight [kg]	(18)	20	46	46
U Height	3U	3U	3U	3U
Dimensions (WxHxD)	442x132x522	442x132x522	581x132x848	581x132x848
Front panel colour	RAL 9011, matt, thin structure			

* Please refer to the Battery Blocks Vs Output power de-rating table on Technical Specification to check if any de-rating may need to be applied. Odd battery blocks can only be installed with the DCFlex 2wires battery connection option.

6.2 Mechanical Footprint

Drawing	Model	X2 (mm)	Y2 (mm)	X3 (mm)	Y3 (mm)
	CAB-SP060-I240-2S-A0	510	770	30	80
	CAB-SP060-I080-2S-A1	510	770	30	80
	CAB-SP120-E-4S-A1	510	770	30	80
	CAB-SP120-I320-4S-B0	730	770	30	80
	CAB-SP180-E-6S-A0	510	770	30	80
	CAB-SP240-E-8S-A0	510	770	30	80
	CAB-SP375B-E-6M-XX-K CAB-SP375T-E-6M-XX-K	656	865	30	80
	CAB-SP750B-E-12M-XX-2K CAB-SP750T-E-12M-XX-2K	1312	865	30	80

Drawing	Model	X2 (mm)	Y2 (mm)	X3 (mm)	Y3 (mm)
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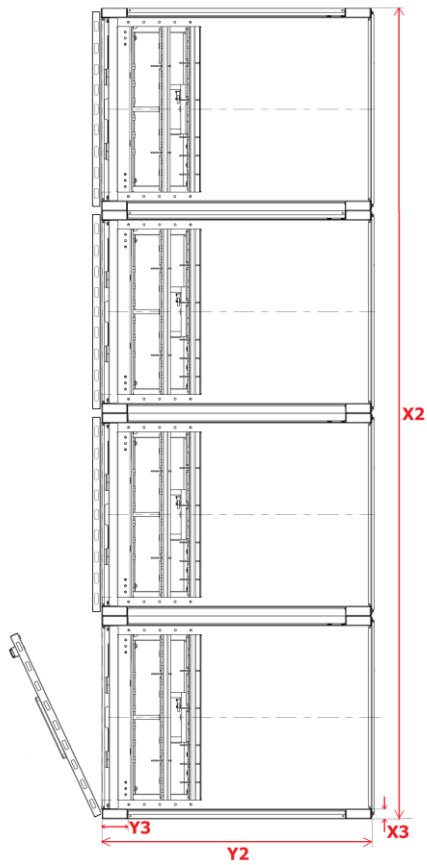
CAB-SP1125B-E-18M-XX-3K
CAB-SP1125T-E-18M-XX-3K

2000

865

30

80



CAB-SP1500B-E-24M-XX-4K
CAB-SP1500T-E-24M-XX-4K

2653

865

30

80

6.2.1 Mechanical Drawings

Mechanical drawings, indicating all quotes, are necessary to move the cabinets through corridors and doors. Pay attention to the weight (see section 6.1) because some floors cannot support excessive load.

A footprint drawing is also available (see section 0). It allows the user to design a support frame in case the cabinets are installed on a floating floor (see example in section 0).

6.2.2 Mechanical Appearance for Stratus Rack product

The following picture provides an example of a Stratus Rack installed in a cabinet:



6.3 Location and Positioning

6.3.1 Operating Environment

The UPS is intended to be installed indoor, in a dustless room and with adequate clean air ventilation in order to keep the temperature within the specifications reported in section 6.3.2.

The StratusPower™ SM05-2V-S, SM10-2V-S, SM12-2V-S, SM15-2V-S modules are air-cooled by means of one fan, whereas SM25-2V-M, SM31-2V-M modules are air-cooled by means of three fans. Air inlets are in the front of the cabinet and outlets in the rear. Please refer to section 6.3.4 for the recommended clearance distances.

When installed at a maximum altitude of 1000 m above sea level, the UPS will provide the nominal power. For operation between 1000 and 2000 m a.s.l., a power de-rating of 1% for each 100 m over 1000 m has to be applied. If the UPS is installed over 2000 m, please contact the manufacturer to get information about the specific installation conditions.

6.3.2 UPS Room

Installation Room Requirements

Ambient temperature range	0 °C to +40 °C (32 °F to 104 °F)
Recommended operating temperature range (if the UPS is equipped with internal batteries or batteries located in the same room as the UPS)	+20 °C to +25 °C (68 °F to 77 °F)
Maximum relative humidity	From 10 to 95% (non-condensing)
Protected against dust	
Fire protection standard has to be fulfilled	
Corrosive or explosive gases must be absent	

6.3.3 Battery Room

During operation, the battery room has to be kept at a constant temperature in order to avoid damage to the batteries which might cause a drastic loss of their capacity.

Typically, the maximal lifetime of the batteries is reached at a temperature of 20-25 °C. The manufacturer kindly suggests providing a room able to maintain this temperature. If it is not possible, an air conditioning system has to be installed.

Notice!

Review specifications of your battery manufacturer for better results.

6.3.4 Positioning Clearances

The UPS is designed to be located in restricted access areas only.

It is recommended to provide at least 200 mm clearance between the sides and back of the StratusPower™ UPS and 300 mm from the top of the room.

It is possible to reduce the sides and top clearances if the room is provided with rear air extraction, or if the warm air can be easily evacuated on the rear of the UPS.

If a Battery Cabinet is installed, it is recommended to keep a distance of at least 600 mm between the Battery Cabinet and the UPS sides. This will avoid an increase in the battery temperature caused by the influence of the warm air ejected by the UPS.

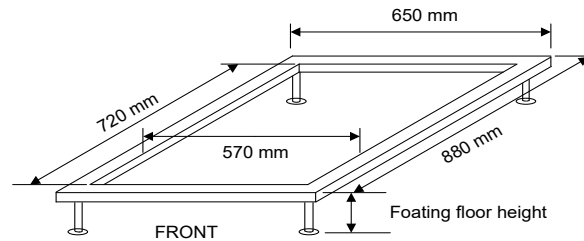
It is possible to reduce the distance between the UPS and the Battery Cabinet sides if the room is provided with rear air extraction, or if the warm air can be easily evacuated on the rear.



6.3.5 Suggested Support Frame

Frequently, UPS systems are installed in a room provided with raised floor.

The following drawing is an example of how to build a pedestal for CAB-xxx-xxx-Ax frames. The design of these supports must be suitable for the weight of the equipment.



N.B.: the support dimensions must follow the Mechanical Footprint as per Chapter 6.2.

6.4 Battery Installation and Configuration



Battery installation has to be performed by qualified personnel since the exposure to dangerous DC voltage is high.



Damaged battery can release acid and gas

Warning!

Special gloves and glasses have to be worn while working on the batteries.

Warning!

To prevent involuntary risk of arc during the wiring, only insulated tools have to be used.

6.4.1 About Battery Trays and Cable Links for CAB-SP060 with internal batteries

The CAB-SP060-I240-2S-A0 frame can hold up to 240 internal batteries of 7/8/9 Ah. This allows for a maximum of 3 strings of 30 battery blocks per module.

The CAB-SP060-I080-2S-A1 frame can hold up to 80 internal batteries of 7/8/9 Ah. This allows 2 strings in parallel or 1 string of up to 30 batteries for each module.

Notice!

CAB-SP060 and CAB-SP120 frames with internal batteries are wired in the factory. For CAB-SP060-I240-2S-A0 be sure to provide the battery string size to the manufacturer.

Battery Trays are needed in order to place batteries into the frame.
Customers must order as many sets as the number of needed strings.



Batt Trays Set	Order Code
(1x20/30/40) x 7/8/9 Ah	00-00031

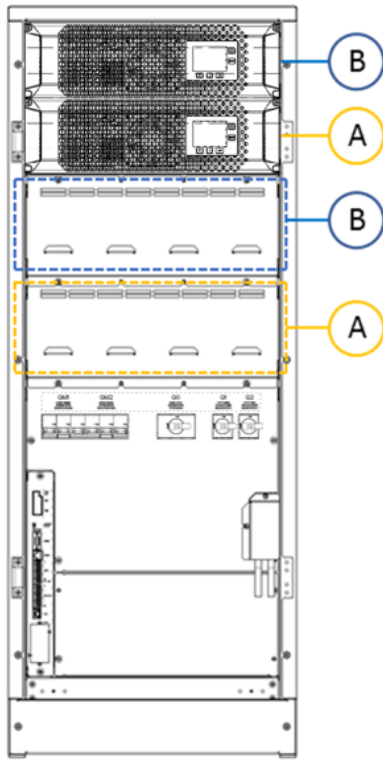
Each set of battery cable links contains the cables and instructions necessary to connect the battery configuration.



Batt Cable Links	Order Code
(1x40) x 7/8/9 Ah	00-00035

6.4.2 CAB-SP060-Ixxx-2S-Ax Battery Configuration and Autonomies

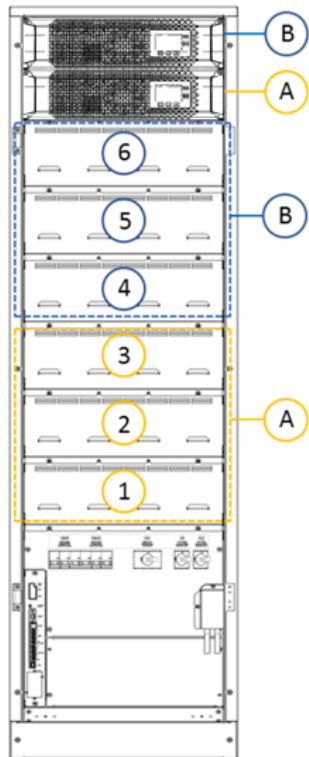
General Concept

**CAB-SP060-I080-2S-A1**

Each module can have 1 string of 30 battery blocks.

Module 1 (A in this figure) uses battery shelves 1 (yellow area).

Module 2 (B in this figure) uses shelves 2 (blue area).

**CAB-SP060-I240-2S-A0**

Each module can have up to 3 strings of 30 battery blocks.

Module 1 (A in this figure) uses battery shelves 1 to 3 (yellow area).

Module 2 (B in this figure) uses shelves 4 to 6 (blue area).

Example of battery autonomies for 5 kW power:

Autonomy (min)	# Strings	# Blocks/ Strings	Battery Type	Set of Batt Tray	Batt Links
20	2	20	7.2Ah	2 x (1x40)	2 x (1x40)
35	2	30	7.2Ah	2 x (1x40)	2 x (1x40)
40	2	30	9Ah	2 x (1x40)	2 x (1x40)
60	4	20	9Ah	4 x (1x40)	4 x (1x40)
90	4	30	9Ah	4 x (1x40)	4 x (1x40)

Example of battery autonomies for 10kW power:

Autonomy (min)	# Strings	# Blocks/ Strings	Battery Type	Set of Batt Tray	Batt Links
20	4	20	7.2Ah	4 x (1x40)	4 x (1x40)
25	4	20	9Ah	4 x (1x40)	4 x (1x40)
45	4	30	9Ah	4 x (1x40)	4 x (1x40)
45	6	20	9Ah	6 x (1x40)	6 x (1x40)
70	6	30	9Ah	6 x (1x40)	6 x (1x40)

Notice!

The values presented in these tables are for guidance purposes only, be sure to verify such values with the manufacturer of the chosen batteries.

6.4.2.1 Example using CAB-SP060-I240-2S-A0 and SM10-2V-S Modules in Non-Redundant Configuration

This example illustrates how to configure a system with the following characteristics:

Characteristic	Requirement
Total power demand	20 kW
Redundancy	Not redundant
Autonomy	10 min
Battery configuration	Separate batteries

To meet the power requirements, 2x SM10-2V-S modules are needed. For the autonomy time in this example, 2 strings of 30 blocks of 9 Ah batteries are chosen.

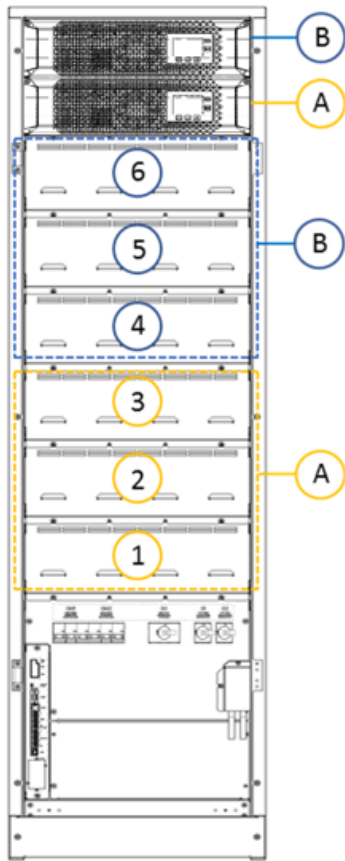
In total, the following components need to be provided:

Element	Quantity	Type
Frame	1	CAB-SP060-I240-2S-A0
Modules	2	SM10-2V-S
Batteries	90 (3x30)	9 Ah
Battery Trays	3	(1x40) x 7/8/9 Ah
Battery Cable Links	3	(1x40) x 7/8/9 Ah



Please ask your distributor for specific cabling diagrams and battery configurations.

Battery Shelves Configuration



Shelf 1: 1st string of 1x30 for module 1 (A in this image)

Shelf 2: 2nd string of 1x30 for module 1 (A in this image)

Shelf 3: Free

Shelf 4: 1st string of 1x30 for module 2 (B in this image)

Shelf 5: 2nd string of 1x30 for module 2 (B in this image)

Shelf 6: Free

6.4.3 About Battery Trays and Cable Links for CAB-SP120 with internal batteries

The CAB-SP120-I320-4S-B0 frame can hold up to 320 internal batteries of 7/8/9 Ah. This allows for a maximum of 2 strings of 30 battery blocks per module.

For configurations using common batteries, we strongly recommend not to exceed the limit of 4 x strings in parallel.

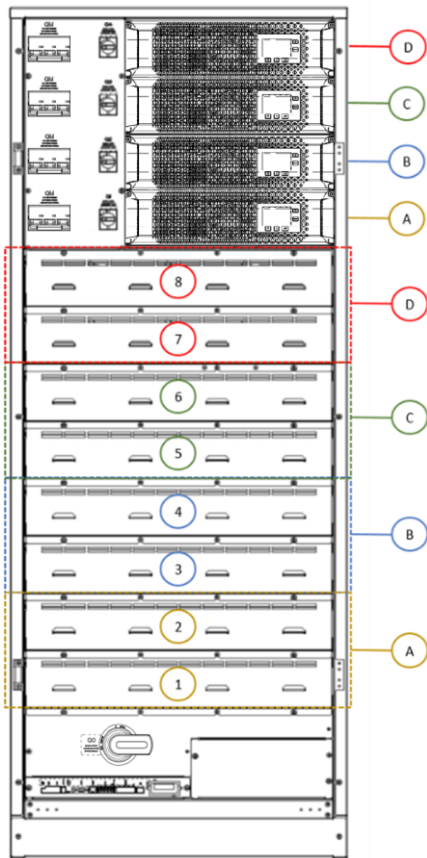
Notice!

CAB-SP120-I320-4S-B0 frames are wired in the factory for a configuration of 2 x 30 blocks for each module.

For common batteries is recommended maximum 4 strings in parallel (120 Battery blocks).

6.4.3.1 CAB-SP120-I320-4S-B0 Battery Configuration and Autonomies

Battery Shelves Configuration



Shelf 1: 1st string of 1x30 for module 1 (A in this image)

Shelf 2: 2nd string of 1x30 for module 1 (A in this image)

Shelf 3: 1st string of 1x30 for module 2 (B in this image)

Shelf 4: 2nd string of 1x30 for module 2 (B in this image)

Shelf 5: 1st string of 1x30 for module 3 (C in this image)

Shelf 6: 2nd string of 1x30 for module 3 (C in this image)

Shelf 7: 1st string of 1x30 for module 4 (D in this image)

Shelf 8: 2nd string of 1x30 for module 4 (D in this image)

For autonomy times, please refer to CAB-SP120-I320-4S-B0 tables, section 6.4.4.

6.4.4 Battery Configuration and Autonomies for cabinets with external battery connection

CAB-SP120-E-4S-A1, CAB-SP180-E-6S-A0 and CAB-SP240-E-8S-A0 frames hold respectively up to 4 SM05/10/12/15 modules up to 4 (max power 60 kW), up to 6 modules (max power 90kW) and up to 8 modules (max power 120kW) and they are designed for the connection of external batteries.

CAB-SP375B(T)-E-6M-XX-K frames holds up to 6 modules SM25/31-2V-M, CAB-SP750B(T)-E-12M-XX-2K up to 12, CAB-SP1125B(T)-E-18M-XX-3K up to 18 and CAB-SP1500B(T)-E-24M-XX-4K up to 24, are also designed for the connection of only external batteries.

The frame's battery lines connections of cabinets type **AV** with modules type **M** and for all **S**-type modules are protected with a per-module Battery Breaker (QMx) as seen in section 6.5. Battery protection for **M** modules installed in an **LT** cabinet is embedded into the module itself.

The following table illustrates different examples of autonomy time for an N+1 redundant system, configured with separate batteries (each 10kW module with its own battery strings).

Notice!

The values presented in this table are for guidance purposes only, be sure to verify such values with the manufacturer of the chosen batteries.

SM10-2V-S (10 kW) with 7.2, 9 and 28 Ah batteries @ 25 °C

Autonomy (min)	# Strings	# Blocks/String	Battery Type
20	4	20	7.2 Ah
25	4	20	9 Ah
45	4	30	9 Ah
45	6	20	9 Ah
70	6	30	9 Ah
80	2	30	28 Ah
120	4	20	28 Ah
190	4	30	28 Ah

SM25-2V-M (25 kW) and 28 Ah batteries @ 25 °C

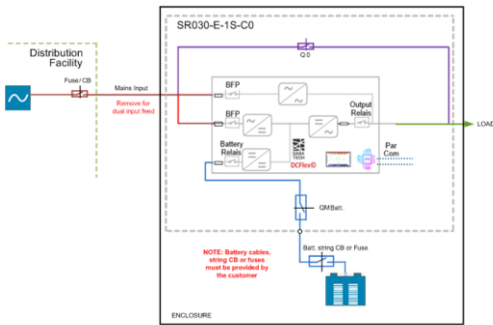
Autonomy (min)	# Strings	# Blocks/String	Battery Type
40	4	20	28 Ah
70	4	30	28 Ah
70	6	20	28 Ah
100	6	30	28 Ah

Notice!

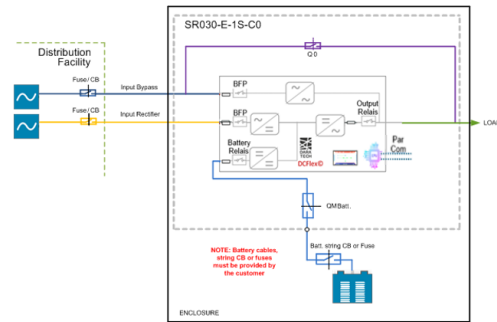
It is strictly recommended never connect in parallel battery strings with different battery types and capacity.

6.5.4 CAB-SR030-E-1S-C0

Single input feed

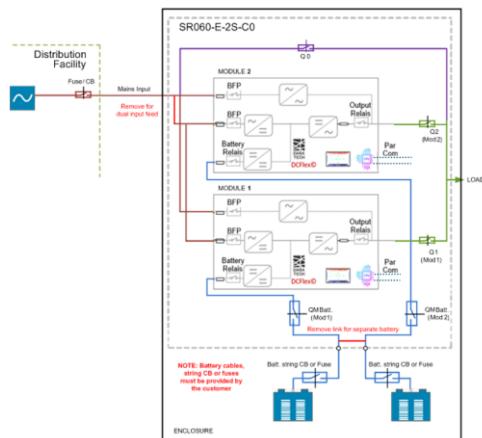


Dual input feed

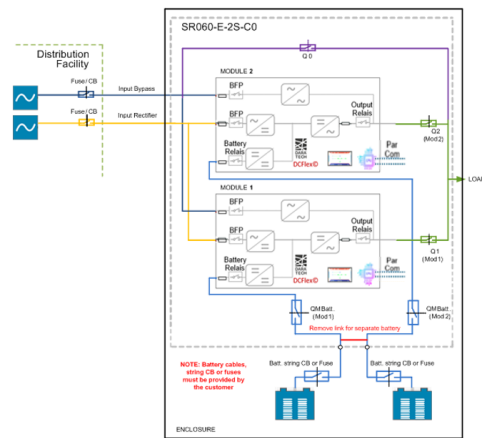


6.5.5 CAB-SR060-E-2S-C0

Single input feed

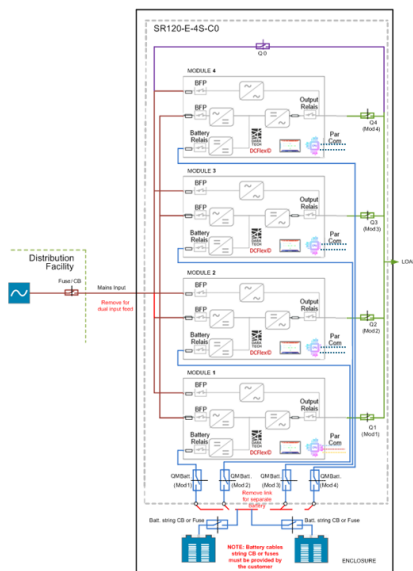


Dual input feed

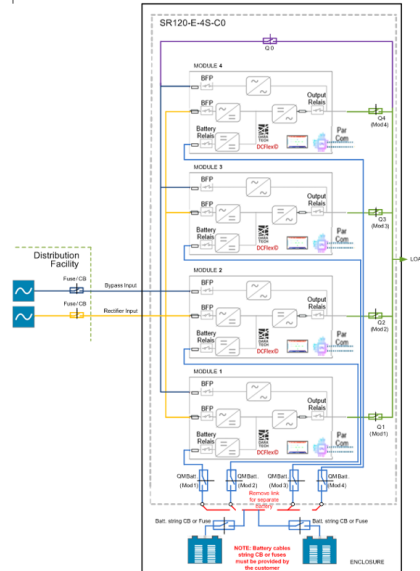


6.5.6 CAB-SR120-E-4S-C1

Single input feed

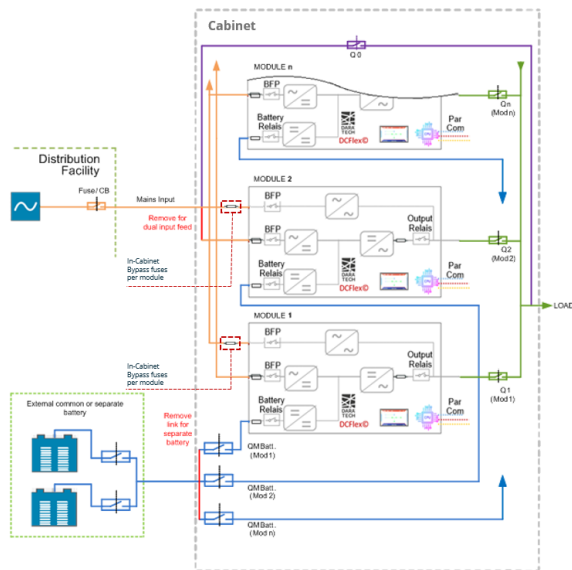


Dual input feed

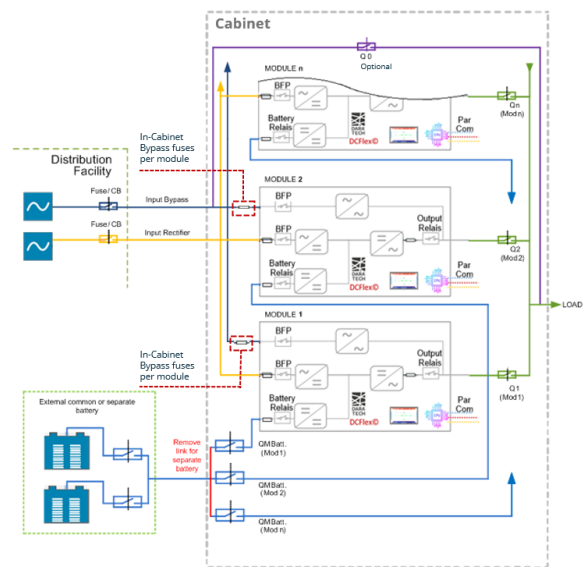


6.5.7 CAB-SP375B(T)-E-6M-AV-K, CAB-SP750B(T)-E-12M-AV-2K,
CAB-SP1125B(T)-E-18M-AV-3K, CAB-SP1500B(T)-E-24M-AV-4K

Single input feed

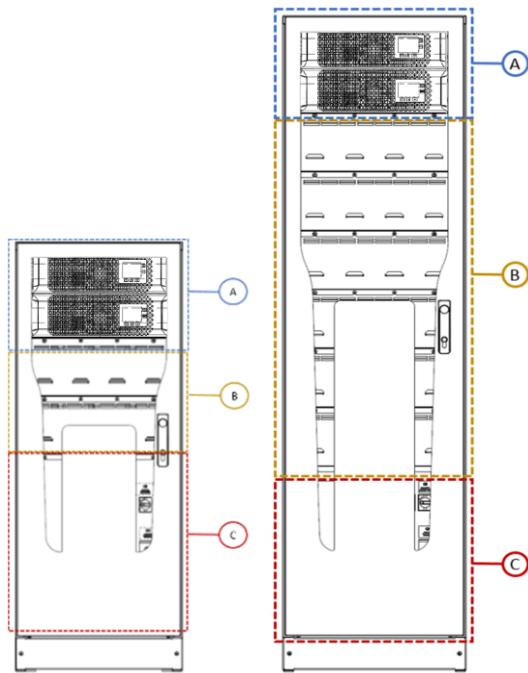


Dual input feed



6.6 Cabinets Frontal View

CAB-SP060-I080-2S-A1 and CAB-SP060-I240-2S-A0

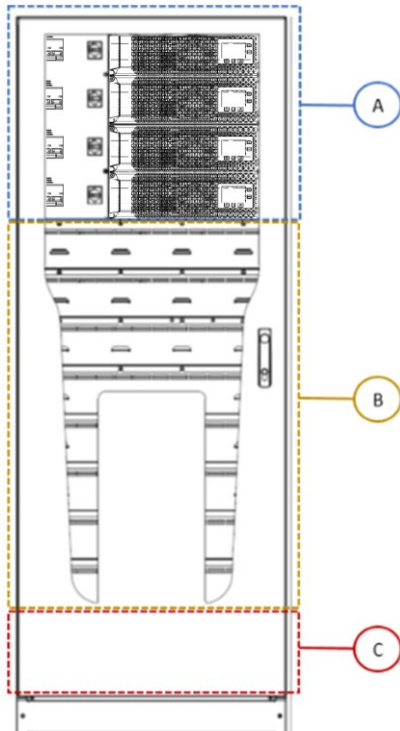


A:
Modules Section
Up to 2 Stratus Modules, SM05/10/12/15-2V-S

B:
Battery Section
Up to 240 batteries (total) for CAB-SP060-I240-2S-A0
Up to 080 batteries (total) for CAB-SP060-I080-2S-A1
40 blocks (7/9 Ah) per level (4 Battery Trays of 10 batteries each)
Up to 3 strings of 40 blocks

C:
Distribution and Wiring

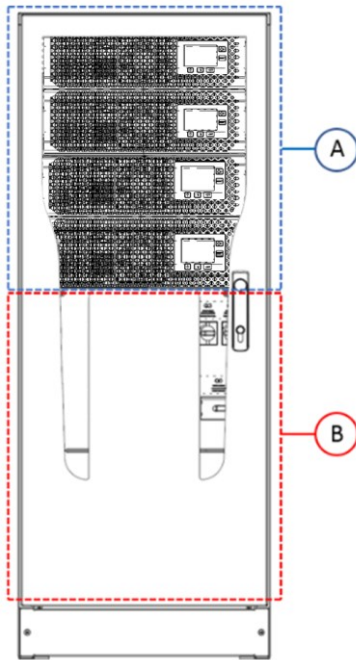
CAB-SP120-I320-4S-B0



A:
Modules Section
Up to 4 Stratus Modules, SM05/10/12/15-2V-S

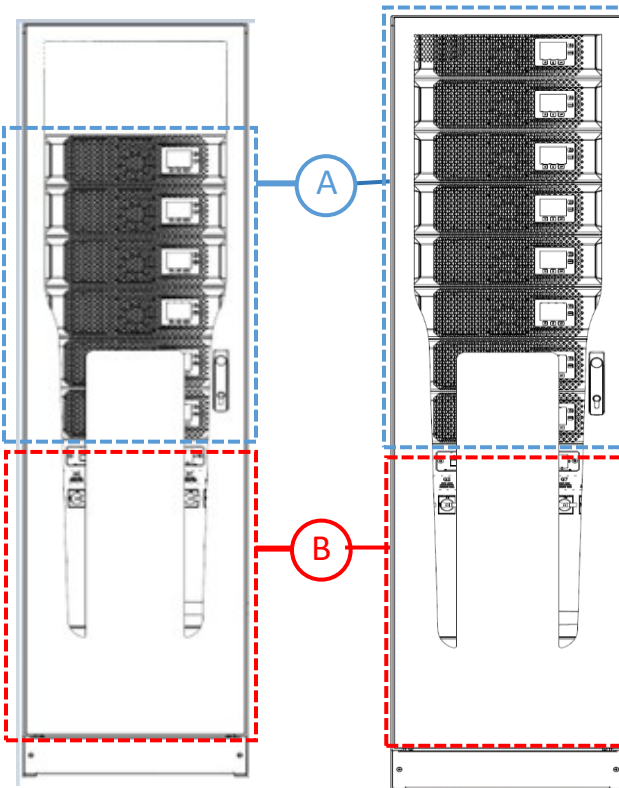
B:
Battery Section
Up to 320 batteries (total)
40 blocks (7/9 Ah) per level (4 Battery Trays of 10 batteries each)
Up to 80 batteries 28Ah
Up to 2 strings of 40 blocks

C:
Distribution and Wiring

CAB-SP120-E-4S-A1

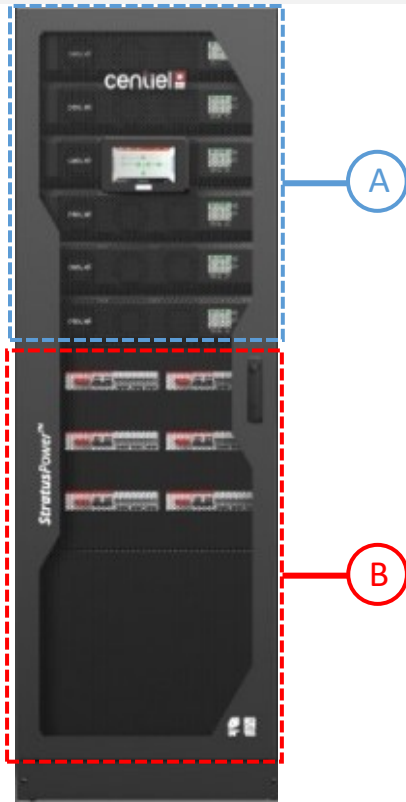
A: Modules Section
Up to 4 Stratus Modules, SM05/10/12/15-2V-S

B: Distribution and Wiring

CAB-SP180-E-6S-A0 / CAB-SP240-E-8S-A0

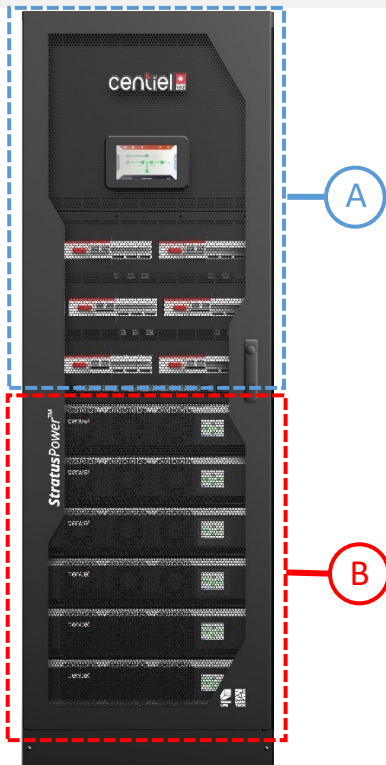
A:
Modules Section
Up to 6 Stratus Modules,
SM05/10/12/15-2V-S for SP180 and up to
8 for SP240

B:
Distribution and Wiring

CAB-SP375B-E-6M-XX-K

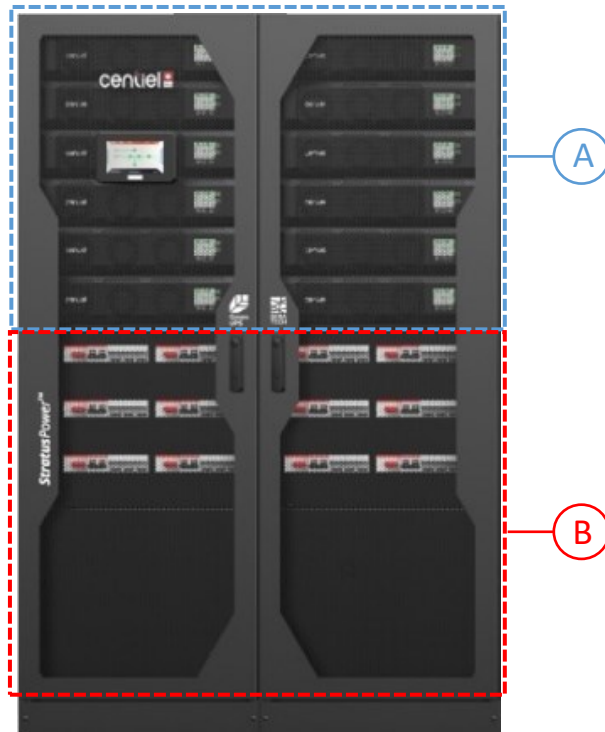
A:
Modules Section
Up to 6 Stratus Modules SM25/31-2V-M

B:
Distribution and Wiring

CAB-SP375T-E-6M-XX-K

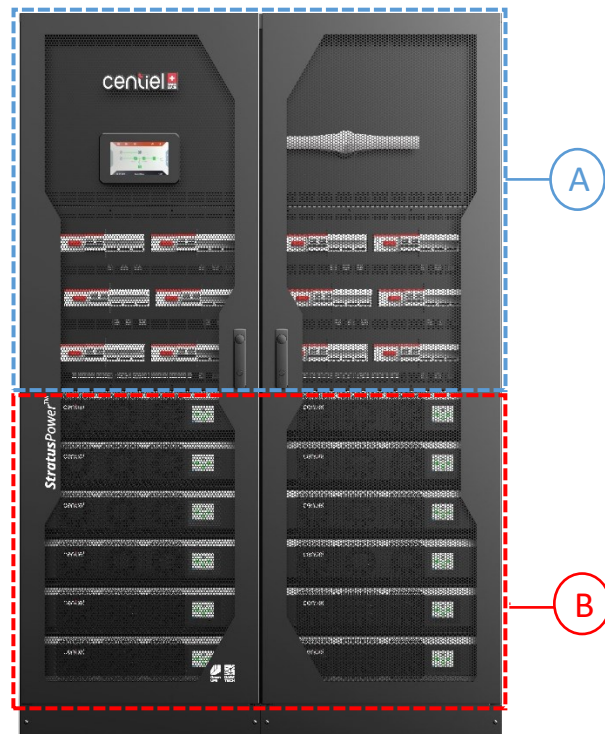
A:
Distribution and Wiring

B:
Modules Section
Up to 6 Stratus Modules SM25/31-2V-M

CAB-SP750B-E-12M-XX-2K

A:
Modules Section
Up to 12 Stratus Modules
SM25/31-2V-M

B:
Distribution and Wiring

CAB-SP750T-E-12M-XX-2K

A:
Distribution and Wiring

B:
Modules Section
Up to 12 Stratus Modules
SM25/31-2V-M

CAB-SP1125B-E-18M-XX-3K

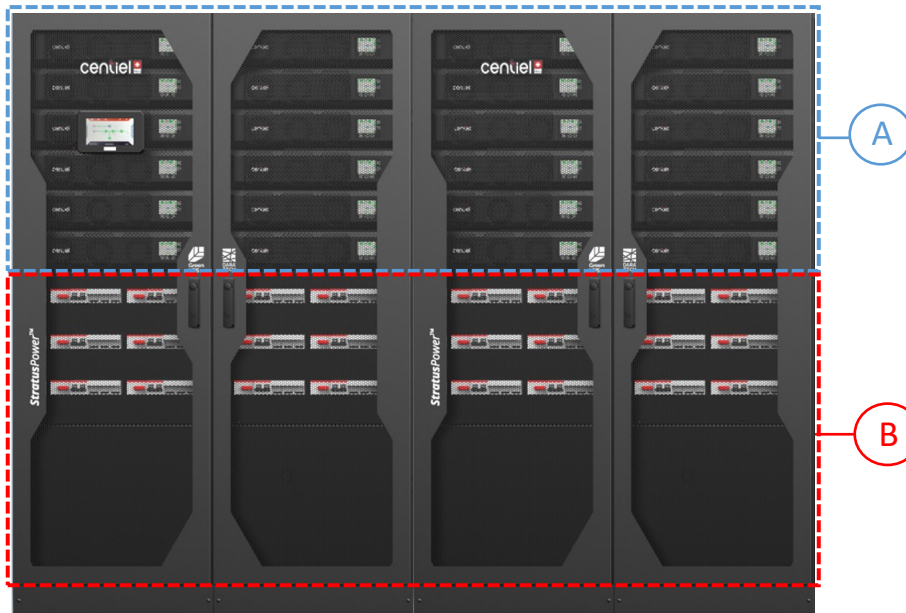
A:
Modules Section
Up to 18 Stratus Modules
SM25/31-2V-M

B:
Distribution and Wiring

CAB-SP1225T-E-18M-XX-3K

A:
Distribution and Wiring

B:
Modules Section
Up to 18 Stratus Modules
SM25/31-2V-M

CAB-SP1500B-E-24M-XX-4K

A:
Modules Section
Up to 24 Stratus
Modules SM25/31-
2V-M

B:
Distribution and
Wiring

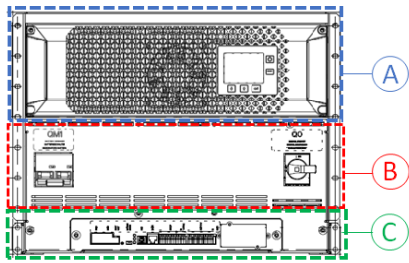
CAB-SP1500T-E-24M-XX-4K

A:
Distribution and
Wiring

B:
Modules Section
Up to 24 Stratus
Modules SM25/31-
2V-M

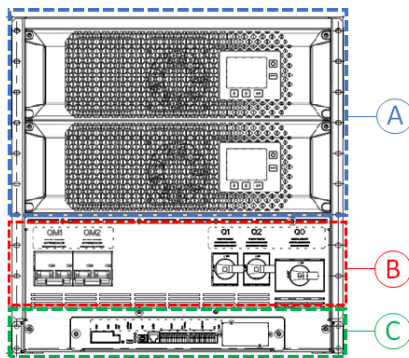
6.7 Universal Racks Frontal View

CAB-SR030-E-1S-C0



- A:
Modules Section
1 x Stratus Module type S (SM05/10/12/15-2V-S)
-
- B:
Manual Bypass (Q0)
-
- C:
Customer Interface
-

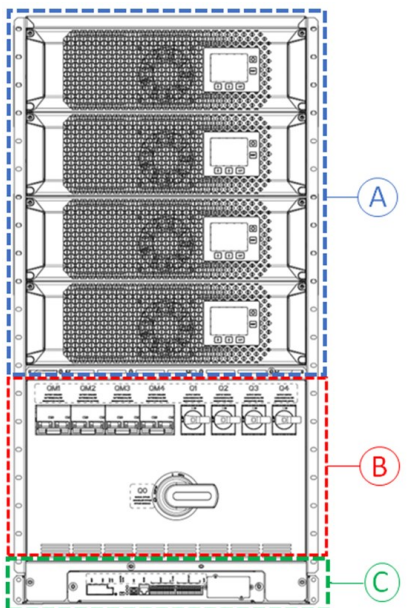
CAB-SR060-E-2S-C0



- A: Modules Section
Up to 2 Stratus Module type S (SM05/10/12/15-2V-S)
-
- B:
Battery Breakers (QM1, Mod1 / QM2, Mod2)

Parallel Isolator Switches (Q1 / Q2)
Manual Bypass (Q0)
-
- C:
Customer Interface
-

CAB-SR120-E-4S-C1



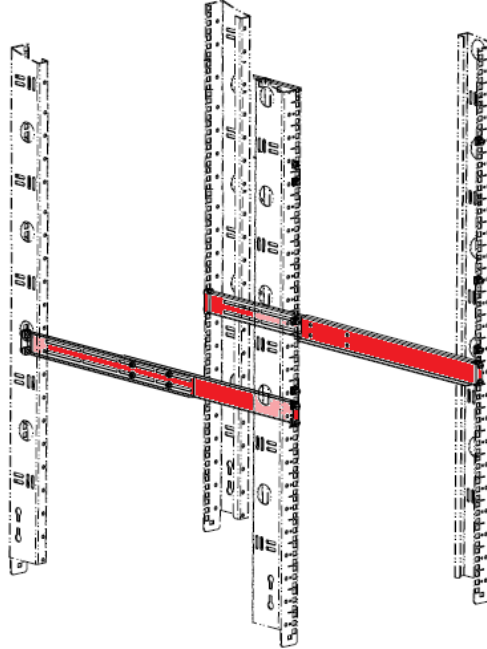
- A:
Modules Section
Up to 4 Stratus Module type S (SM05/10/12/15-2V-S)
-
- B:
Battery Breakers (QM1, Mod1 / QM2, Mod2 QM3, Mod3 /
QM4, Mod4)

Parallel Isolator Switches (Q1, Mod1 / Q2, Mod2 Q3, Mod3 /
Q4, Mod4)
Manual Bypass (Q0)
-
- C:
Customer Interface
-

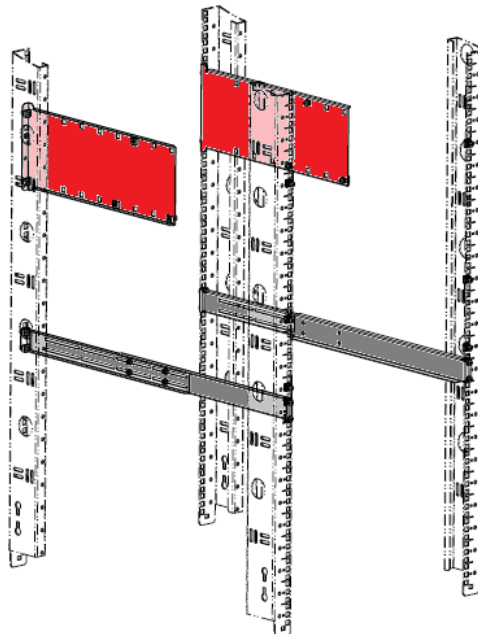
6.8 Mechanical Installation (only for Stratus Rack)

The installation of a Stratus Universal Rack (SR) is similar for all sizes. To assemble the UPS in a 19" rack cabinet, carefully follow this procedure:

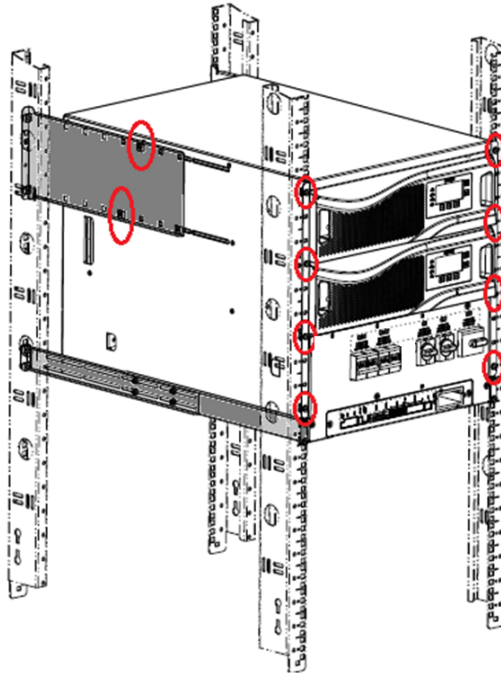
Secure to the enclosure the right and left bottom rails to the desired height.



- 1) Add the rear mounting brackets (SR060 bracket left and right and SR120 2 x brackets left and right)

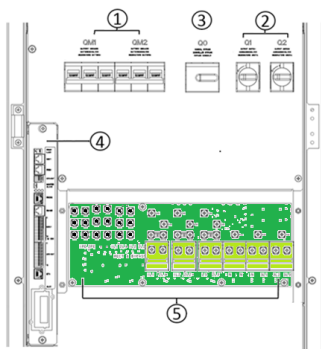


- 2) Insert the SR on the rails and fix it with screws to the side brackets and to the front spars.



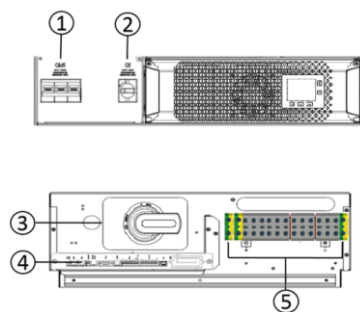
6.9 Distribution and Wiring

CAB-SP060-I080-2S-A1 and CAB-SP060-I240-2S-A0

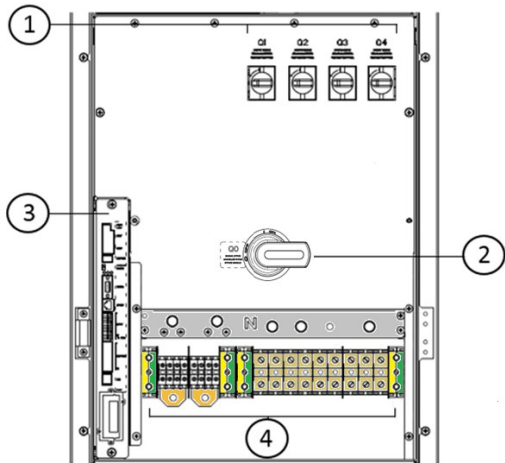


- | | |
|----|---|
| 1: | Per-module Battery Breaker QM1/QM2 |
| 2: | Per-module Parallel Isolator Q1/Q2 |
| 3: | Manual Bypass Switch Q0 |
| 4: | Interfacing Board (see chapter 8) |
| 5: | Connections and Wiring (see chapter 54) |

CAB-SP120-I320-4S-B0



- | | |
|----|--|
| 1: | Per-module Battery Breaker QM1/QM2/QM3/QM4 |
| 2: | Per-module Parallel Isolator Q1/Q2/Q3/Q4 |
| 3: | Manual Bypass Switch Q0 |
| 4: | Interfacing Board (see chapter 8) |
| 5: | Connections and Wiring (see chapter 7.4) |

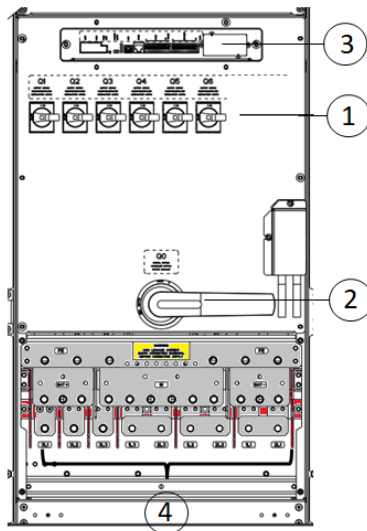
CAB-SP120-E-4S-A1

- 1: Per-module Parallel Isolator Q1/Q2/Q3/Q4

- 2: Manual Bypass Switch Q0

- 3: Interfacing Board (see chapter 8)

- 4: Connections and Wiring (see chapter 0)

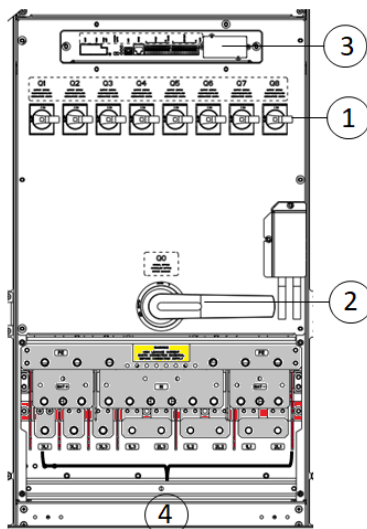
CAB-SP180-E-6S-A0

- 1: Per-module Parallel Isolator Q1/Q2.../Q6

- 2: Manual Bypass Switch Q0

- 3: Interfacing Board (see chapter 8)

- 4: Connections and Wiring (see chapter 7.6)

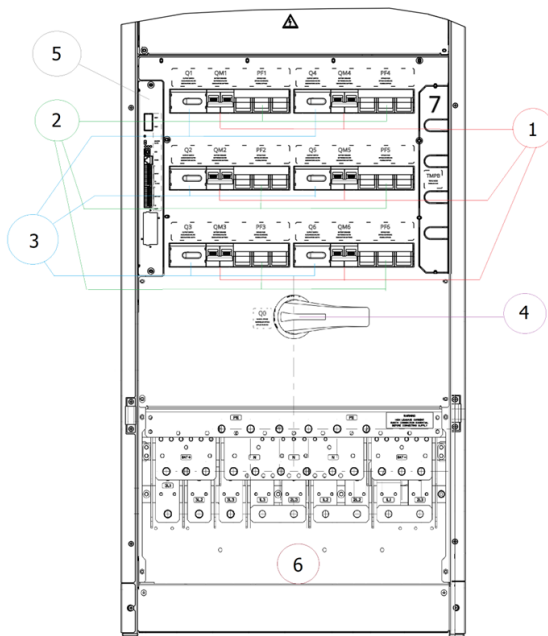
CAB-SP240-E-8S-A0

- 1: Per-module Parallel Isolator Q1/Q2.../Q8

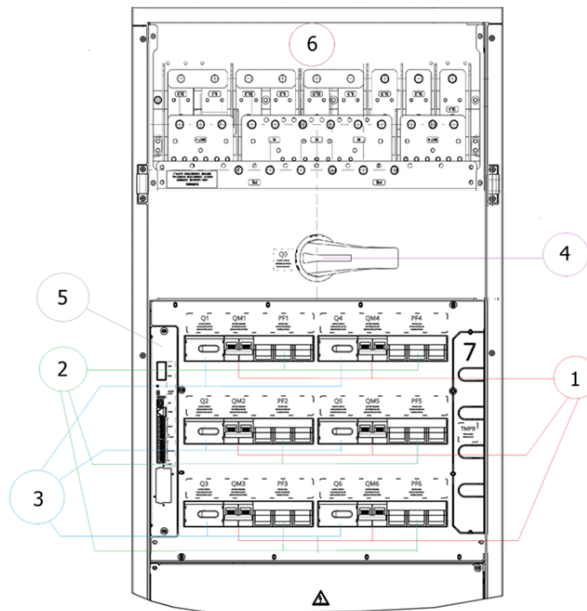
- 2: Manual Bypass Switch Q0

- 3: Interfacing Board (see chapter 8)

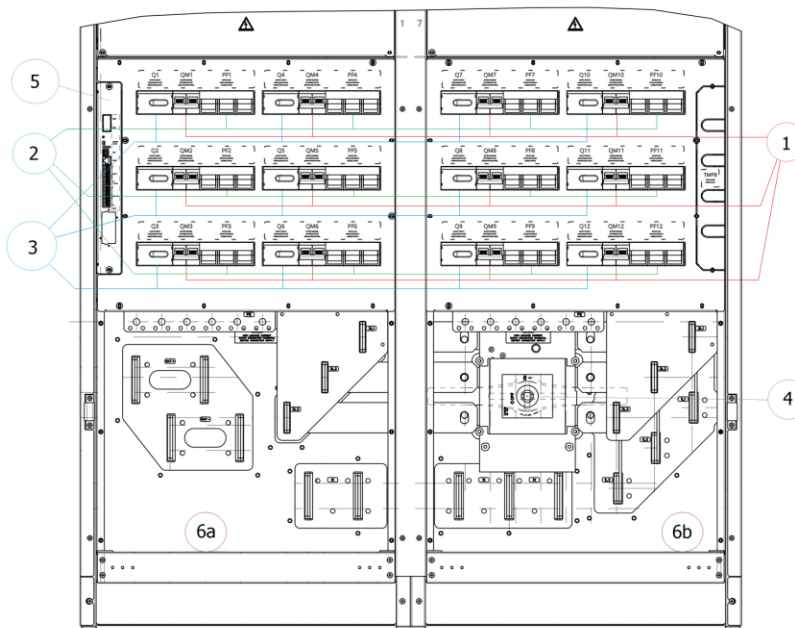
- 4: Connections and Wiring (see chapter 7.6)

CAB-SP375B-E-6M-AV-K

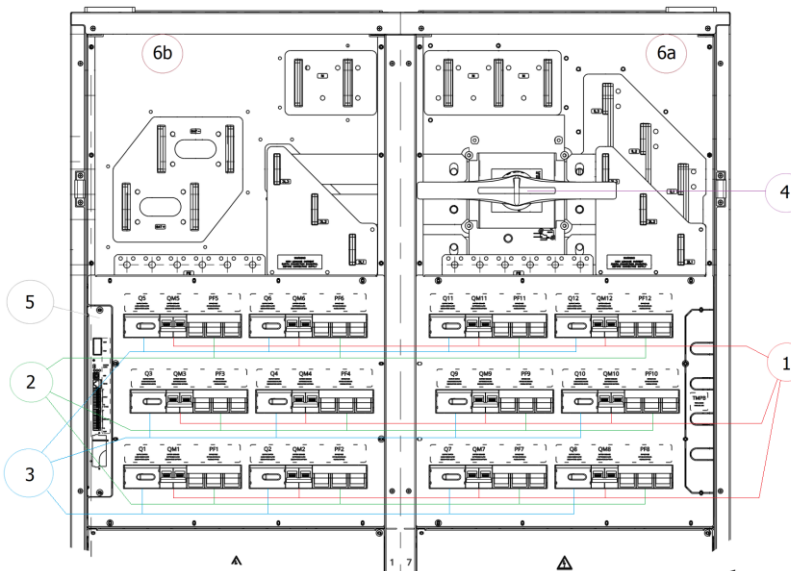
- 1: Per-module Battery Breaker
QM6/QM5/QM4/QM3/QM2/QM1
- 2: Per-module Bypass Fuse Holders
PF6/PF5/PF4/PF3/PF2/PF1
- 3: Per-module Parallel Isolator
Q6/Q5/Q4/Q3/Q2/Q1
- 4: Manual Bypass Switch Q0
- 5: Interfacing Board (see chapter 8)
- 6: Connections and Wiring (see chapter 7.8)
- 7: Multi-cabinet parallel communication

CAB-SP375T-E-6M-AV-K

- 1: Per-module Battery Breaker
QM6/QM5/QM4/QM3/QM2/QM1
- 2: Per-module Bypass Fuse Holders
PF6/PF5/PF4/PF3/PF2/PF1
- 3: Per-module Parallel Isolator
Q6/Q5/Q4/Q3/Q2/Q1
- 4: Manual Bypass Switch Q0
- 5: Interfacing Board (see chapter 8)
- 6: Connections and Wiring (see chapter 7.8)
- 7: Multi-cabinet parallel communication

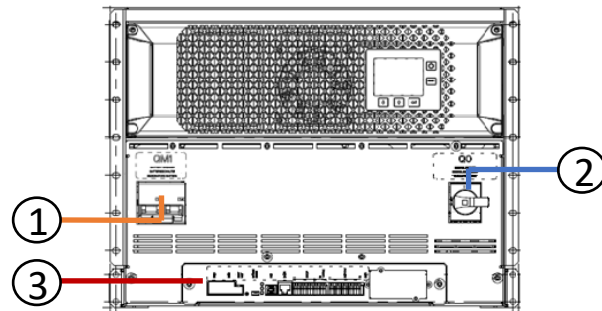
CAB-SP750B-E-12M-AV-2K

- 1: Per-module Battery Breaker:
QM12/QM11/QM10/QM9/QM8/QM7
and QM6/QM5/QM4/QM3/QM2/QM1
- 2: Per-module Bypass Fuse Holders:
PF12/PF11/PF10/PF9/PF8/PF7 and
PF6/PF5/PF4/PF3/PF2/PF1
- 3: Per-module Parallel Isolator:
Q12/Q11/Q10/Q9/Q8/Q7
Q6/Q5/Q4/Q3/Q2/Q1
- 4: Manual Bypass Switch Q0 (optional)
- 5: Interfacing Board (see chapter 8)
- 6: Connections and Wiring
(see chapter 7.9)
- 7: Multi-cabinet parallel
communication

CAB-SP750T-E-12M-AV-2K

- 1: Per-module Battery Breaker:
QM10/QM9/QM8/QM7/QM6 and
QM5/QM4/QM3/QM2/QM1
- 2: Per-module Bypass Fuse Holders:
PF10/PF9/PF8/PF7/PF6 and
PF5/PF4/PF3/PF2/PF1
- 3: Per-module Parallel Isolator:
Q10/Q9/Q8/Q7/Q6
Q5/Q4/Q3/Q2/Q1
- 4: Manual Bypass Switch Q0
- 5: Interfacing Board (see chapter 8)
- 6: Connections and Wiring
(see chapter 7.9)
- 7: Multi-cabinet parallel
communication

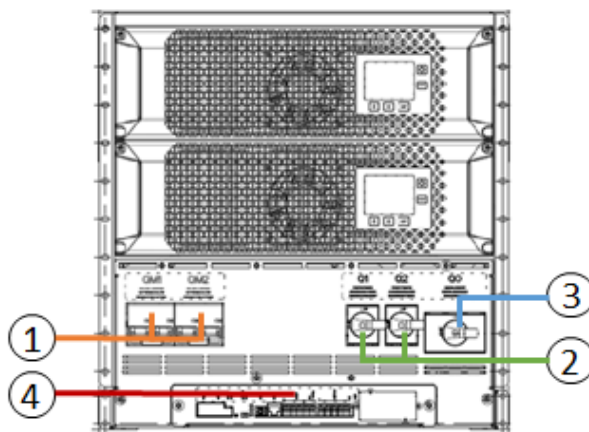
Similar to **CAB-SP750X-E-12M-XX-2K** same structure for **CAB-SP1125X-E-18M-XX-3K** and **CAB-SP1500X-E-24M-XX-4K**

CAB-SR030-E-1S-C0

 1: Module Battery Breaker QM1

 2: Manual Bypass Switch Q0

 3: Interfacing Board (see chapter 8)

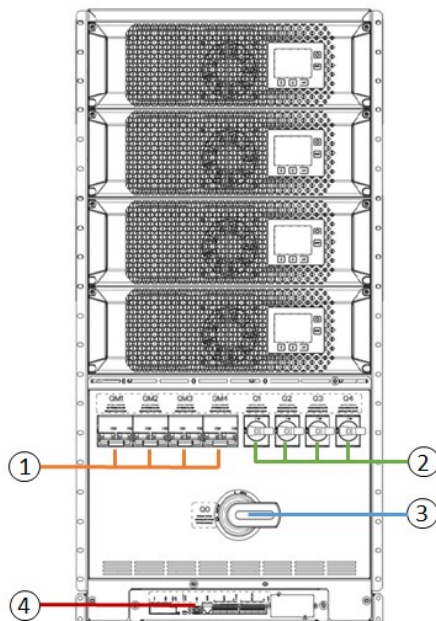
CAB-SR060-E-2S-C0

 1: Per-module Battery Breaker QM1/QM2

 2: Per-module Parallel Isolator Q1/Q2

 3: Manual Bypass Switch Q0

 4: Interface Board (see chapter 8)

CAB-SR120-E-4S-C1

 1: Per-module Battery Breaker
QM1/QM2/QM3/QM4

 2: Per-module Parallel Isolator
Q1/Q2/Q3/Q4

 3: Manual Bypass Switch Q0

 4: Interface Board (see chapter 8)

7 Electrical Installation

7.1 Preparation for Electrical Installation

Warning!

Prior to connecting the power cables, make sure that all the Circuit Breakers and Fuses of the UPS, as well as the protections of the distribution facility and of the external batteries, are open.



The input and output wires connection must be performed by authorized electricians or by qualified technical personnel only.



Mains voltage and frequency shall be in accordance with the values indicated on the nameplate of the UPS (see 5.5.1).

PE (earth) and Neutral connections have to be performed according to local and national electrical codes.



The input values of the UPS shall be within the limits in accordance with IEC 61000-2-2. If the limits exceed the 75% of the specified values, the end user has to receive the approval from the manufacturer before installing the system.



The input of the UPS must be fitted through Fuses or CBs installed in dedicated facilities, as listed in the tables presented in sections 7.2.1 and 7.2.1.1. Usually, the input CB should be 3-poles, with fix Neutral connection.

A 4-poles CB is also allowed, but be aware that when open, the neutral of the UPS and the load will be floating against the ground.



If differential CBs are used, the earth leakage current could exceed 3.5 mA when starting the UPS. Therefore, it is essential to connect the earth terminal before connecting the input wires.



Input neutral is required to operate the UPS.

The UPS has been designed to work with the following AC power distribution systems: TT, TN-C, TN-S. For IT power distribution systems without neutral, it is necessary to install a 3-poles/4-poles converter transformer in order to recreate a reference PEN on the secondary windings connected to the input of the UPS. It is suggested to restart the power distribution in TN-S configuration.

7.2 Cables, Sections and Fuses Ratings

7.2.1 Single Input Feed connection

Single input feed is the most common connection, and it implies the installation of one group of fuses or Circuit Breakers (CBs) in the customer's input distribution facility since only one grid is available. In case of a Mains failure, the only power available will come from the batteries.

Feed	Description	CAB-SP100-1000-25-A1 CAB-SP100-1200-25-A0	CAB-SP120-E-4S- A1	CAB-SP180-E-6S- A0	CAB-SP240-E-8S- A0	CAB-SP370BT1-E-9M- XX-K	CAB-SP435-E-10M-LT- K	CAB-SP70BT1-E-12M- XX-2K	CAB-SP120BT1-E- 18M-XX-3K	CAB-SP180BT1-E-24M- XX-4K
Input voltage 3 x 230/400V	Maximum input current with batteries charging	97A	194A	291A	388A	608A	980A	1216A	1824A	2432A
	Input fuses 3 x 9-9S or CB	100A	200A	315A	400A	630A	1000A	1250A	1800A	2500A
	Input cables (mm ²) (VDE0288)	5 x 25	5 x 70	5 x 150	5 x 240	2 x (5 x 185)	3 x (5 x 240)	4 x (5 x 300)	5 x (5 x 300)	6 x (5 x 300)
Output voltage 3 x 230/400V	Nominal output current (In)	87A	174A	261A	348A	544A	910A	1088A	1630A	2173A
	Output cables (mm ²) (VDE0288)	5 x 25	5 x 70	5 x 150	5 x 240	2 x (5 x 185)	3 x (5 x 240)	4 x (5 x 300)	5 x (5 x 300)	6 x (5 x 300)
	Max battery current for common batteries (A @ min voltage with 40 batt.)	156A	312A	468A	625A	976A	1560A	1952A	2929A	3905A
Battery	Common battery fuses or CB (100% _{IGL})	N/A	315A	500A	630A	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected
	Common battery cables (mm ²)	N/A	3 x 150	2 x (3 x 120)	2 x (3 x 185)	3 x (3 x 240)	5 x (3 x 300)	5 x (3 x 300)	8 x (3 x 300)	10 x (3 x 300)
	Battery cables, separate batteries (50 A @ min voltage with 40 batt.) *Optional	N/A	4 x (3 x 16)	6 x (3 x 16)*	6 x (3 x 16)*	6 x (3 x 50)*	10 x (3 x 50)*	12 x (3 x 50)*	18 x (3 x 50)*	24 x (3 x 50)*

7.2.1.1 Dual Input Feed connection

The dual feed connection, with separate protections, is used with the aim of increasing the safety in case of batteries discharge. It should have two different power supply grids with neutrals connected together.

If the Rectifier Mains fails, the UPS switches over to batteries. As soon as the batteries are fully discharged, the load will be transferred to Bypass without interruption, and it will be continuously supplied by the Bypass Mains until the Rectifier Mains is again available.

If the Bypass Mains fails, the UPS will work as normal, but the Bypass will not be available anymore.

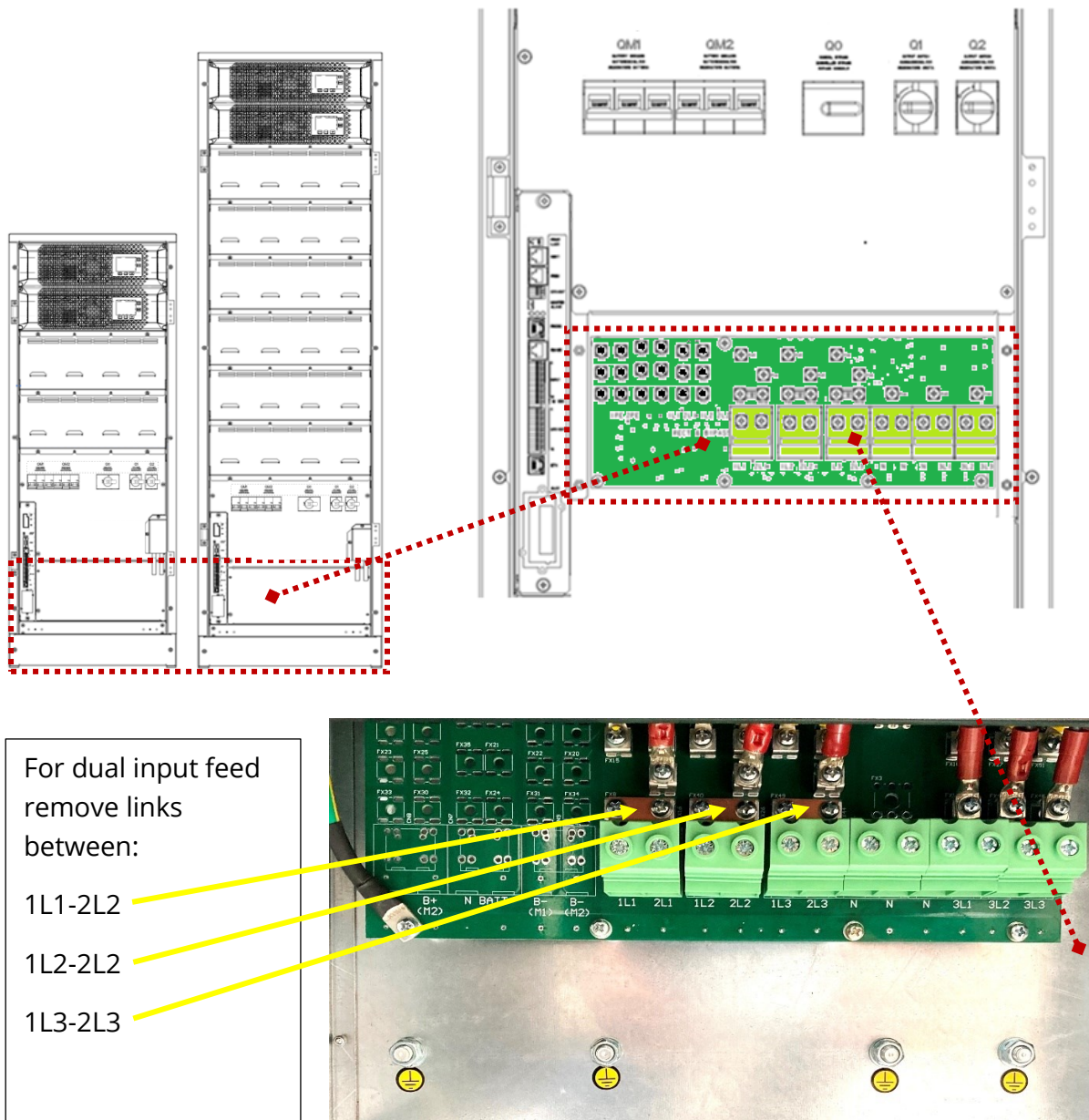
Feed	Description	CAB-SP100-1000-25-A1 CAB-SP100-1240-25-40	CAB-SP100-1320-45- B0	CAB-SP120-E-45- A1	CAB-SP100-E-65- A0	CAB-SP100-E-65- A0	CAB-SP100-E-65- A0	CAB-SP176BT1-E-0M- XX-K	CAB-SP120B-E-10M-LT- K	CAB-SP176BT1-E-12M- XX-2K	CAB-SP120B(T)-E- 18M-XX-3K	CAB-SP1600BT1-E-24M- XX-K
Input rectifier voltage 3 x 230/400V	Maximum input current with batteries charging	97A	194A	194A	291A	388A	608A	980A	1216A	1824A	2432A	
	Input fuses 3 x gG-B or CB	100A	200A	200A	315A	400A	630A	1000A	1250A	1800A	2500A	
	Input cables (mm ²) (VDE 0298)	5 x 25	5 x 70	5 x 70	5 x 150	5 x 240	2 x (5 x 185)	3 x (5 x 240)	4 x (5 x 300)	5 x (5 x 300)	6 x (5 x 300)	
	Input fuses 3 x gG-B or CB	100A	200A	200A	315A	315A	630A	1000A	1250A	2000A	2500A	
Input Bypass 3 x voltage	Input cables (mm ²) (VDE 0298)	5 x 25	5 x 70	5 x 70	5 x 150	5 x 240	2 x (5 x 185)	3 x (5 x 240)	4 x (5 x 300)	5 x (5 x 300)	6 x (5 x 300)	
	Nominal output current (In)	87A	174A	174A	261A	348A	544A	910A	1088A	1630A	2173A	
	Output cables (mm ²) (VDE 0298)	5 x 25	5 x 70	5 x 70	5 x 150	5 x 240	2 x (5 x 185)	3 x (5 x 240)	4 x (5 x 300)	5 x (5 x 300)	6 x (5 x 300)	
	Max battery current for common batteries (A @ min voltage with 40 batt.)	156A	312A	312A	468A	625A	976A	1560A	1952A	2929A	3905A	
Battery	Common battery fuses or CB (1000V _{dc})	N/A	N/A	315A	500A	630A	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected	Each battery string must be separately protected	
	Common battery cables (mm ²)	N/A	N/A	3 x 150	2 x (3 x 120)	2 x (3 x 185)	3 x (3 x 240)	5 x (3 x 300)	5 x (3 x 300)	8 x (3 x 300)	10 x (3 x 300)	
	Battery cables: separate batteries (30 A @ min voltage with 40 batt.)	N/A	N/A	4 x (3 x 16)	6 x (3 x 16)*	6 x (3 x 16)*	6 x (3 x 50)*	10 x (3 x 50)*	12 x (3 x 50)*	18 x (3 x 50)*	24 x (3 x 50)*	
	Optional											

7.3 Electrical Connection **CAB-SP060-I080-2S-A1** and **CAB-SP060-I240-2S-A0**

Notice!

For dual input feed remove links between 1L1 and 2L1, 1L2 and 2L2, 1L3 and 2L3.

Electrical Connection (Screw terminals for 35 mm² conductors. Maximum permitted torque 4.5Nm)



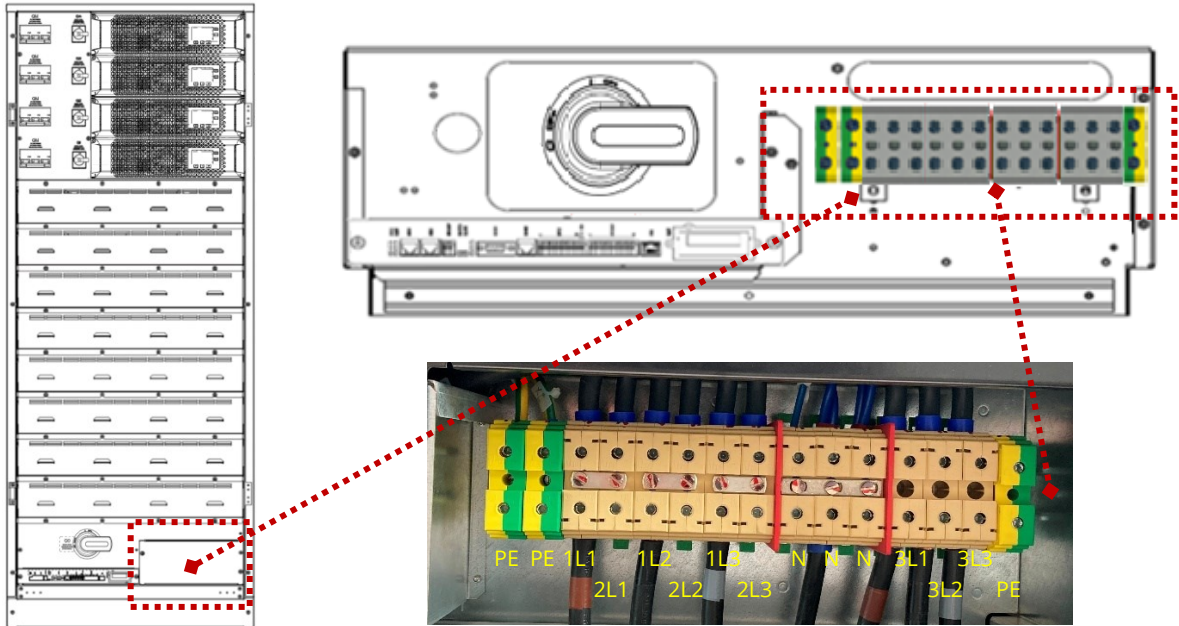
Label	Description	Wires on Terminals
1PE/2PE	Connect earth cable	4 x M6 bolts
Input		
1L1	Input Rectifier L1	Up to 35 mm ² (without ferrule for 50 mm ² wires)
2L1	Input Bypass L1	Up to 35 mm ² (without ferrule for 50 mm ² wires)
1L2	Input Rectifier L2	Up to 35 mm ² (without ferrule for 50 mm ² wires)
2L2	Input Bypass L2	Up to 35 mm ² (without ferrule for 50 mm ² wires)
1L3	Input Rectifier L3	Up to 35 mm ² (without ferrule for 50 mm ² wires)
2L3	Input Bypass L3	Up to 35 mm ² (without ferrule for 50 mm ² wires)
1N	Input Rectifier N	Up to 35 mm ² (without ferrule for 50 mm ² wires)
2N	Input Bypass N	Up to 35 mm ² (without ferrule for 50 mm ² wires)
Output		
3N	Output N	Up to 35 mm ² (without ferrule for 50 mm ² wires)
3L1	Output L1	Up to 35 mm ² (without ferrule for 50 mm ² wires)
3L2	Output L2	Up to 35 mm ² (without ferrule for 50 mm ² wires)
3L3	Output L3	Up to 35 mm ² (without ferrule for 50 mm ² wires)
3PE	Connect earth cable	Up to 35 mm ² (without ferrule for 50 mm ² wires)

7.4 Electrical Connection **CAB-SP120-I320-4S-B0**

Notice!

The link between the Neutral terminals must never be removed.

Electrical Connection (Maximum permitted torque In/Out: 9Nm)



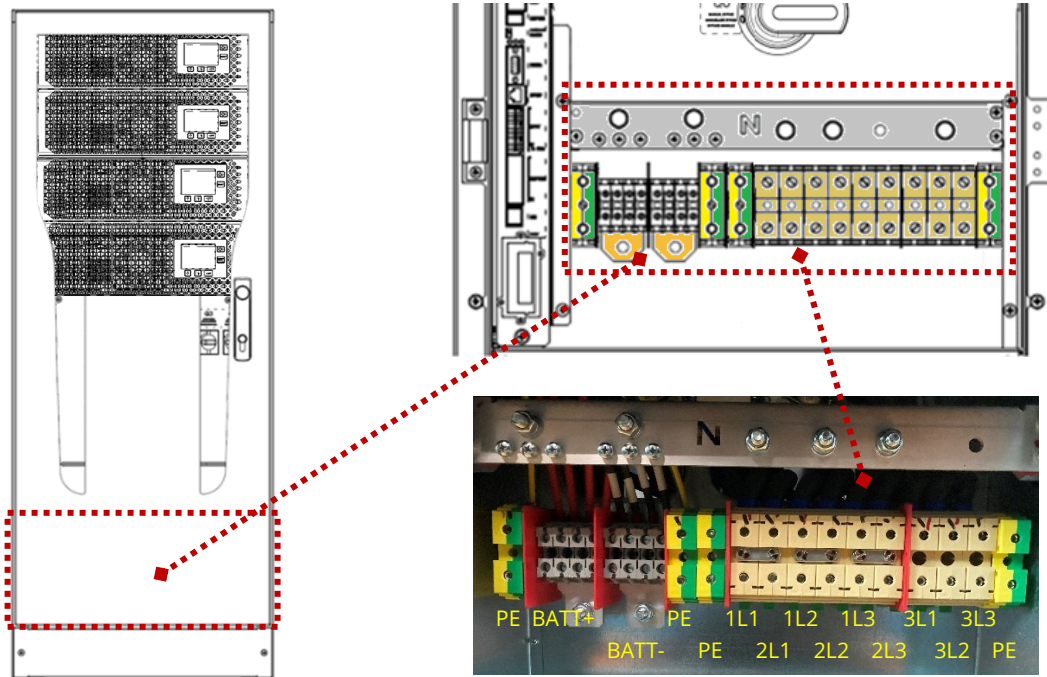
Notice!

Screw terminals for 70 mm² conductors, Input and Output lines.

Label	Description	Wires on Terminals
PE	Connect earth cable	Up to 70 mm ² (max 95 mm ²)
Input		
1L1	Input Rectifier L1	Up to 70 mm ² (max 95 mm ²)
2L1	Input Bypass L1	Up to 70 mm ² (max 95 mm ²)
1L2	Input Rectifier L2	Up to 70 mm ² (max 95 mm ²)
2L2	Input Bypass L2	Up to 70 mm ² (max 95 mm ²)
1L3	Input Rectifier L3	Up to 70 mm ² (max 95 mm ²)
2L3	Input Bypass L3	Up to 70 mm ² (max 95 mm ²)
N	Input Rectifier N	Up to 70 mm ² (max 95 mm ²)
N	Input Bypass N	Up to 70 mm ² (max 95 mm ²)
Output		
N	Output N	Up to 70 mm ² (max 95 mm ²)
3L1	Output L1	Up to 70 mm ² (max 95 mm ²)
3L2	Output L2	Up to 70 mm ² (max 95 mm ²)
3L3	Output L3	Up to 70 mm ² (max 95 mm ²)
PE	Connect earth cable	Up to 70 mm ² (max 95 mm ²)

7.5 Electrical Connection **CAB-SP120-E-4S-A1**

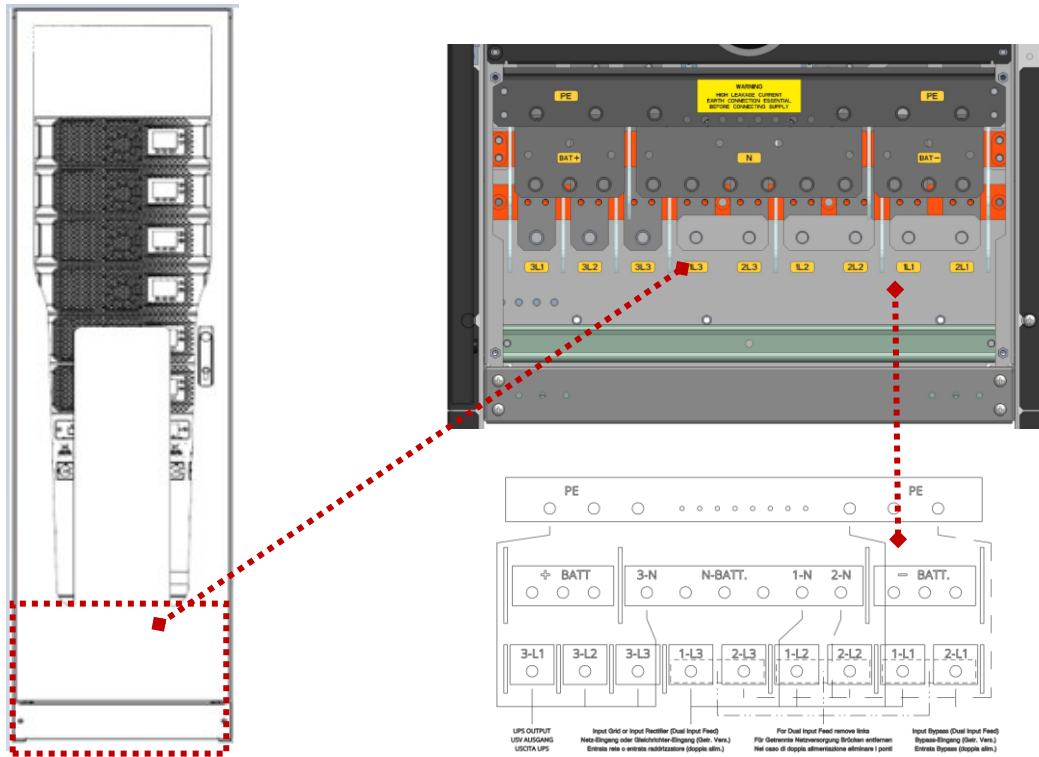
Electrical Connection (Maximum permitted torque In/Out: 9Nm, N and Batt. M8: 20Nm, N Batt. M5: 4Nm, Batt. Terminal: 3Nm)




Label	Description	Wires on Terminals
PE	Connect earth cable	Up to 70 mm ² (max 95 mm ²)
Battery		
(+) for module 1/2/3/4	Common Separate	M8 bolt for common battery Up to 16 mm ² (max 25 mm ² wires)
(-) for module 1/2/3/4	Common Separate	M8 bolt for common battery Up to 16 mm ² (max 25 mm ² wires)
Battery Neutral	Connected to the common neutral bar	2 x M8 bolts for common battery 3 x 2 M5 screws for separate battery
Input		
1L1	Input Rectifier L1	Up to 70 mm ² (max 95 mm ²)
2L1	Input Bypass L1	Up to 70 mm ² (max 95 mm ²)
1L2	Input Rectifier L2	Up to 70 mm ² (max 95 mm ²)
2L2	Input Bypass L2	Up to 70 mm ² (max 95 mm ²)
1L3	Input Rectifier L3	Up to 70 mm ² (max 95 mm ²)
2L3	Input Bypass L3	Up to 70 mm ² (max 95 mm ²)
N	Input Rectifier N	Up to 70 mm ² (max 95 mm ²)
N	Input Bypass N	Up to 70 mm ² (max 95 mm ²)
Output		
N	Output N	Up to 70 mm ² (max 95 mm ²)
3L1	Output L1	Up to 70 mm ² (max 95 mm ²)
3L2	Output L2	Up to 70 mm ² (max 95 mm ²)
3L3	Output L3	Up to 70 mm ² (max 95 mm ²)
PE	Connect earth cable	Up to 70 mm ² (max 95 mm ²)

7.6 Electrical Connection **CAB-SP180-E-6S-A0**

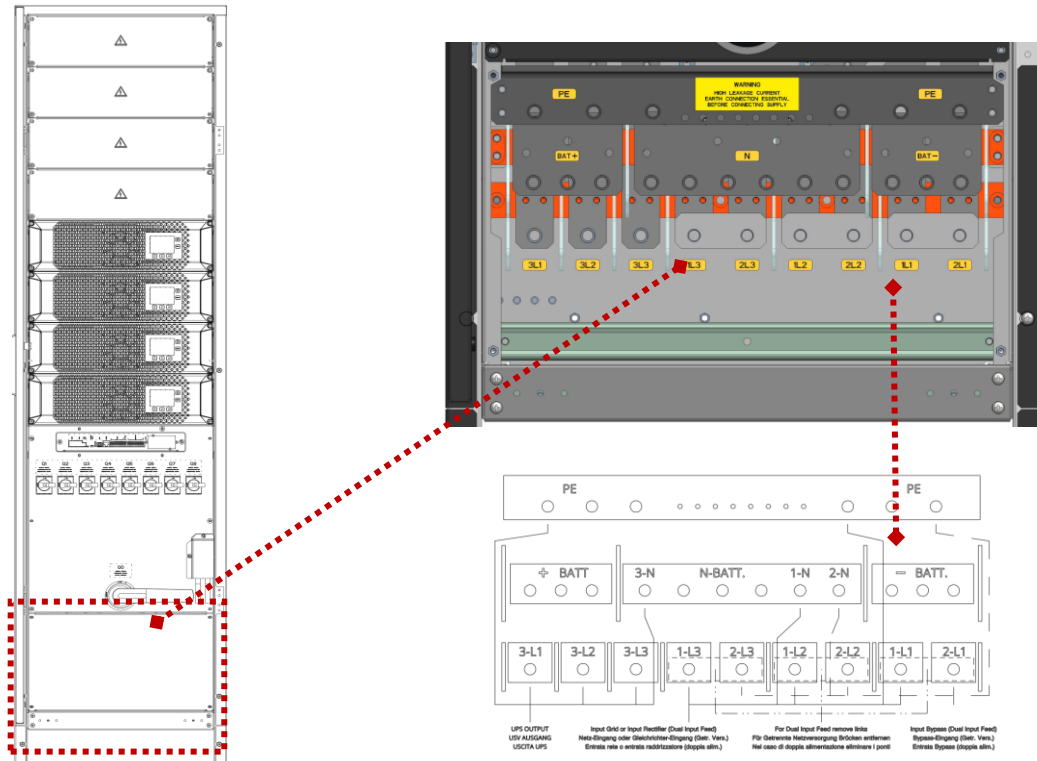
Electrical Connection (Maximum permitted torque for M10: 28Nm)




Label	Description	Wires on Terminals
PE 	Connect earth cable	6 x M10 bolts
Battery		
(+) for modules 1/2/3/4/5/6	Common	3 x M10 bolts
(-) for modules 1/2/3/4/5/6	Common	3 x M10 bolts
Battery Neutral	Connected to the common neutral bar	3 x M10 bolts for common battery
Input		
1L1	Input Rectifier L1	M10 bolt
2L1	Input Bypass L1	M10 bolt
1L2	Input Rectifier L2	M10 bolt
2L2	Input Bypass L2	M10 bolt
1L3	Input Rectifier L3	M10 bolt
2L3	Input Bypass L3	M10 bolt
N	Input Rectifier N	M10 bolt
N	Input Bypass N	M10 bolt
Output		
N	Output N	M10 bolt
3L1	Output L1	M10 bolt
3L2	Output L2	M10 bolt
3L3	Output L3	M10 bolt

7.7 Electrical Connection **CAB-SP240-E-8S-A0**

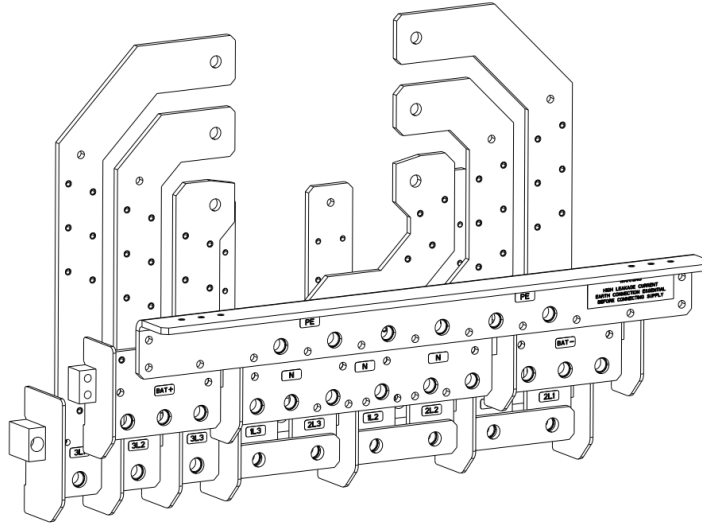
Electrical Connection (Maximum permitted torque for M10: 28Nm)




Label	Description	Wires on Terminals
PE 	Connect earth cable	6 x M10 bolts
Battery		
(+) for modules 1/2/3/4/5/6/7/8	Common	3 x M10 bolts
(-) for modules 1/2/3/4/5/6/7/8	Common	3 x M10 bolts
Battery Neutral	Connected to the common neutral bar	3 x M10 bolts for common battery
Input		
1L1	Input Rectifier L1	M10 bolt
2L1	Input Bypass L1	M10 bolt
1L2	Input Rectifier L2	M10 bolt
2L2	Input Bypass L2	M10 bolt
1L3	Input Rectifier L3	M10 bolt
2L3	Input Bypass L3	M10 bolt
N	Input Rectifier N	M10 bolt
N	Input Bypass N	M10 bolt
Output		
N	Output N	M10 bolt
3L1	Output L1	M10 bolt
3L2	Output L2	M10 bolt
3L3	Output L3	M10 bolt

7.8 Electrical Connection **CAB-SP375B-E-6M-XX-K**

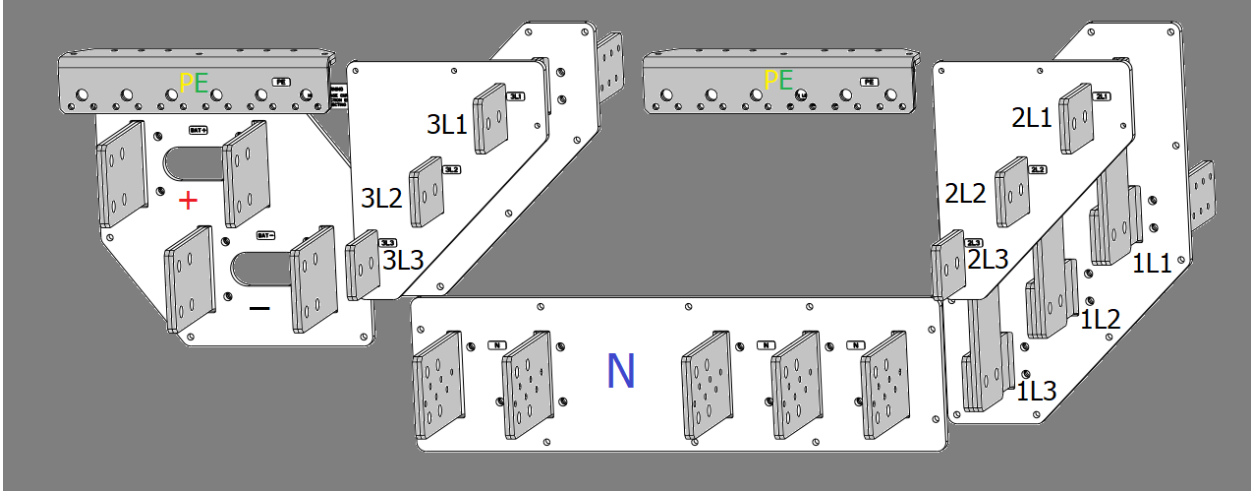
Electrical Connection (Maximum permitted torque for M12: 50Nm). Optional: Sep. Batt. Terminals: 3.5Nm; Batt. neutral nut M6: 8Nm))




Label	Description	Wires on Terminals
	Connect earth cable	6 x M12 bolts+ 9 x M6
Battery		
(+) for modules 1/2/3/4/5/6	Common Separate	3 x M12 bolts Up to 50 mm ² without ferrule
(-) for modules 1/2/3/4/5/6	Common Separate	3 x M12 bolts Up to 50 mm ² without ferrule
Battery Neutral	Connected to the common neutral bar	3 x M12 bolts for common battery 8 x M6 screws for separate battery
Input		
1L1	Input Rectifier L1	M12 bolt
2L1	Input Bypass L1	M12 bolt
1L2	Input Rectifier L2	M12 bolt
2L2	Input Bypass L2	M12 bolt
1L3	Input Rectifier L3	M12 bolt
2L3	Input Bypass L3	M12 bolt
N	Input Rectifier N	M12 bolt
N	Input Bypass N	M12 bolt
Output		
N	Output N	M12 bolt
3L1	Output L1	M12 bolt
3L2	Output L2	M12 bolt
3L3	Output L3	M12 bolt

7.9 Electrical Connection **CAB-SP750B-E-12M-XX-2K**



Electrical Connection (Maximum permitted torque for M12: 50Nm, Optional: Sep. Batt. Terminals: 3.5Nm; Batt. neutral nut M6: 8Nm)



Label	Description	Wires on Terminals
	Connect earth cable	12 x M12 bolts 6 x right, 6 x left
Battery		
(+) for modules 1/2/3/4/5/6/7/8/9/10/11/12	Common <i>Separate</i>	4 x M12 bolts <i>Up to 50 mm² without ferrule</i>
(-) for modules 1/2/3/4/5/6/7/8/9/10/11/12	Common <i>Separate</i>	4 x M12 bolts <i>Up to 50 mm² without ferrule</i>
Battery Neutral	Connected to the common neutral bar	4 x M12 bolts for common battery <i>10 x M5 screws for separate battery</i>
Input		
1L1	Input Rectifier L1	2 x M12 bolts
2L1	Input Bypass L1	2 x M12 bolts
1L2	Input Rectifier L2	2 x M12 bolts
2L2	Input Bypass L2	2 x M12 bolts
1L3	Input Rectifier L3	2 x M12 bolts
2L3	Input Bypass L3	2 x M12 bolts
N	Input Rectifier N	2 x M12 bolts
N	Input Bypass N	2 x M12 bolts
Output		
N	Output N	2 x M12 bolts
3L1	Output L1	2 x M12 bolts
3L2	Output L2	2 x M12 bolts
3L3	Output L3	2 x M12 bolts



7.10 Electrical Connection **CAB-SP1125X-E-18M-XX-3K**

Electrical Connection (Maximum permitted torque for M12: 50Nm, Optional: Sep. Batt. Terminals: 3.5Nm, Batt. neutral nut M6: 8Nm)

Label	Description	Wires on Terminals
	Connected to the common earth bar	6 x M12 bolts
Battery		
(+) for modules 1 to 18	Common <i>Separate</i>	M12 bolt <i>Up to 50 mm2 without ferrule</i>
(-) for modules 1 to 18	Common <i>Separate</i>	M12 bolt <i>Up to 50 mm2 without ferrule</i>
Battery Neutral	Connected to the common neutral bar	2 x M12 bolts for common battery <i>8 x M6 screws for separate battery</i>
Input		
1L1	Input Rectifier L1	M12 bolt
2L1	Input Bypass L1	M12 bolt
1L2	Input Rectifier L2	M12 bolt
2L2	Input Bypass L2	M12 bolt
1L3	Input Rectifier L3	M12 bolt
2L3	Input Bypass L3	M12 bolt
N	Input Rectifier N	M12 bolt
N	Input Bypass N	M12 bolt
Output		
N	Output N	M12 bolt
3L1	Output L1	M12 bolt
3L2	Output L2	M12 bolt
3L3	Output L3	M12 bolt
	Connect earth cable	6 x M12 bolts

7.11 Electrical Connection **CAB-SP1500X-E-24M-XX-4K**

Electrical Connection (Maximum permitted torque for M12: 50Nm, Optional: Sep. Batt. Terminals: 3.5Nm, Batt. neutral nut M6: 8Nm)

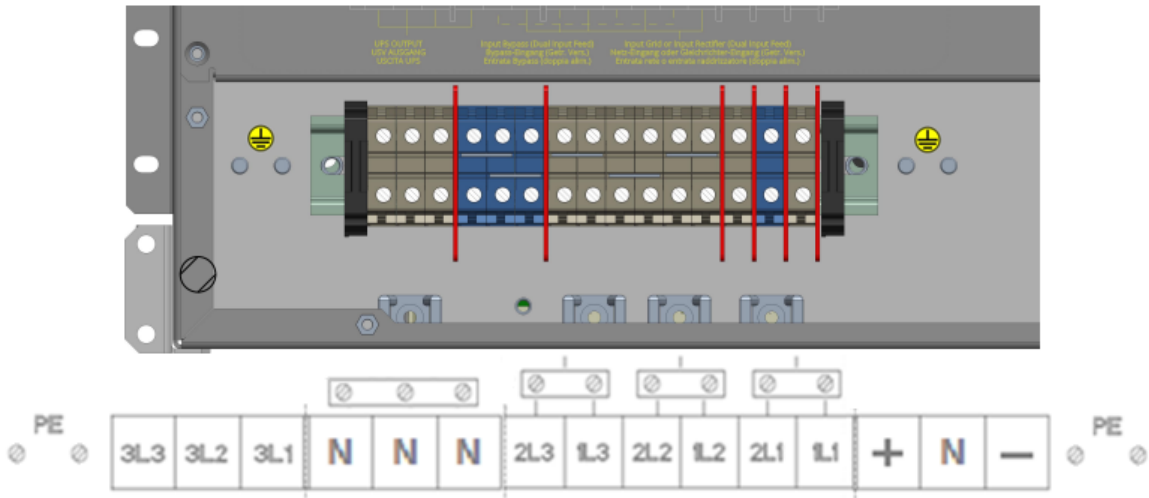
Label	Description	Wires on Terminals
	Connected to the common earth bar	6 x M12 bolts
Battery		
(+) for modules 1 to 24	Common <i>Separate</i>	M12 bolt <i>Up to 50 mm² without ferrule</i>
(-) for modules 1 to 24	Common <i>Separate</i>	M12 bolt <i>Up to 50 mm² without ferrule</i>
Battery Neutral	Connected to the common neutral bar	2 x M12 bolts for common battery 5 x M6 screws for separate battery
Input		
1L1	Input Rectifier L1	M12 bolt
2L1	Input Bypass L1	M12 bolt
1L2	Input Rectifier L2	M12 bolt
2L2	Input Bypass L2	M12 bolt
1L3	Input Rectifier L3	M12 bolt
2L3	Input Bypass L3	M12 bolt
N	Input Rectifier N	M12 bolt
N	Input Bypass N	M12 bolt
Output		
N	Output N	M12 bolt
3L1	Output L1	M12 bolt
3L2	Output L2	M12 bolt
3L3	Output L3	M12 bolt
	Connect earth cable	3 x M12 bolts

7.12 Electrical Connection CAB-SR030-E-1S-C0

Notice!

For dual input feed remove links between 1L1 and 2L1, 1L2 and 2L2, 1L3 and 2L3. (Maximum permitted torque: 1.9Nm). Earth (PE) M6 nuts 8Nm

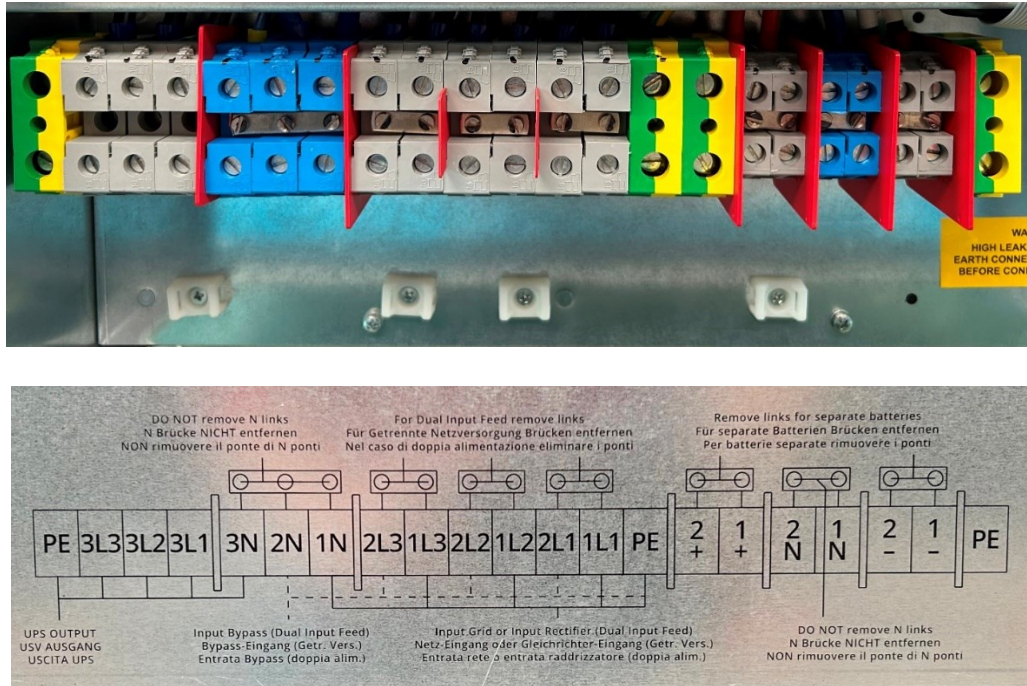
The distribution terminals are located on the back of the SR.



Label	Description	Wires Terminals
PE	Connect earth cable	4 x M6 hex nuts
Input		
1L1	Input rectifier L1	Up to 10 mm ² (max 16 mm ²)
2L1	Input bypass L1	Up to 10 mm ² (max 16 mm ²)
1L2	Input rectifier L2	Up to 10 mm ² (max 16 mm ²)
2L2	Input bypass L2	Up to 10 mm ² (max 16 mm ²)
1L3	Input rectifier L3	Up to 10 mm ² (max 16 mm ²)
2L3	Input bypass L3	Up to 10 mm ² (max 16 mm ²)
1N	Input rectifier N	Up to 10 mm ² (max 16 mm ²)
2N	Input bypass N	Up to 10 mm ² (max 16 mm ²)
Output		
3N	Output N	Up to 10 mm ² (max 16 mm ²)
3L1	Output L1	Up to 10 mm ² (max 16 mm ²)
3L2	Output L2	Up to 10 mm ² (max 16 mm ²)
3L3	Output L3	Up to 10 mm ² (max 16 mm ²)
Battery		
(+)	Positive battery connection	Up to 16 mm ² (max 25 mm ²)
(-)	Negative battery connection	Up to 16 mm ² (max 25 mm ²)
Battery neutral	Middle point battery connection	Up to 16 mm ² (max 25 mm ²)

7.13 Electrical Connection CAB-SR060-E-2S-C0

The distribution terminals are located on the back of the SR.



Notice!

Screw terminals for 35 mm² conductors for Input and Output lines. (Maximum permitted torque: 5Nm). Battery terminals 16 mm² (Maximum permitted torque: 3Nm).

Label	Description	Wires on Terminals
PE	Connect earth cable	Up to 50 mm ² (max 70 mm ²)
Input		
1L1	Input Rectifier L1	Up to 35 mm ² (max 50 mm ²)
2L1	Input Bypass L1	Up to 35 mm ² (max 50 mm ²)
1L2	Input Rectifier L2	Up to 35 mm ² (max 50 mm ²)
2L2	Input Bypass L2	Up to 35 mm ² (max 50 mm ²)
1L3	Input Rectifier L3	Up to 35 mm ² (max 50 mm ²)
2L3	Input Bypass L3	Up to 35 mm ² (max 50 mm ²)
N	N Input Rectifier and B-P	Up to 35 mm ² (max 50 mm ²)
Output		
N	Output N	Up to 35 mm ² (max 50 mm ²)
3L1	Output L1	Up to 35 mm ² (max 50 mm ²)
3L2	Output L2	Up to 35 mm ² (max 50 mm ²)
3L3	Output L3	Up to 35 mm ² (max 50 mm ²)
PE	Connect earth cable	Up to 50 mm ² (max 70 mm ²)

Battery

(+) for modules 1/2	Common Separate	Up to 16 mm ² (max 25 mm ²) (Link On) Up to 16 mm ² (max 25 mm ²)
(-) for modules 1/2	Common Separate	Up to 16 mm ² (max 25 mm ²) (Link On) Up to 16 mm ² (max 25 mm ²)
Battery Neutral	Common Separate	Up to 16 mm ² (max 25 mm ²) (Link On) Up to 16 mm ² (max 25 mm ²)

7.14 Electrical Connection **CAB-SR120-E-4S-C1****Notice!**

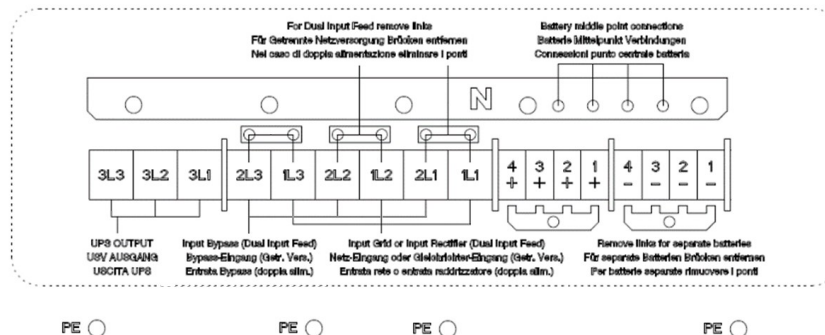
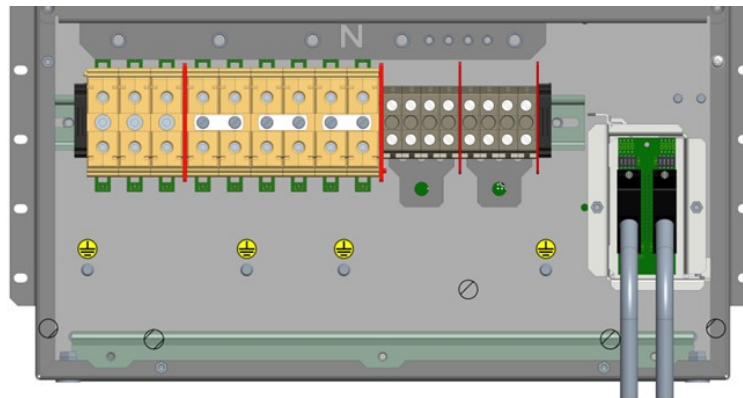
For dual input feed remove links between 1L1 and 2L1, 1L2 and 2L2, 1L3 and 2L3.

Notice!

For separate batteries, remove the links between connections 1/2/3/4 (+) and connections 1/2/3/4 (-).

Electrical Connection (Maximum permitted torque for In/Out terminals: 5Nm, Batt. terminals: 3Nm, Neutral and com. Batt. M8: 20Nm and separate battery M5: 4Nm; earth M8 nuts 20Nm)

The distribution terminals are located on the back of the SR.



Label	Description	Wires on Terminals
PE	Connect earth cable	4 x M8 hex nuts
Battery		
(+) for modules 1/2/3/4	Common Separate	M8 bolt for common battery Up to 16 mm ² (max 25 mm ²)
(-) for modules 1/2/3/4	Common Separate	M8 bolt for common battery Up to 16 mm ² (max 25 mm ²)
Battery Neutral	Connected to the common neutral bar	2 x M8 bolts for common battery 4 x M5 screws for separate battery
Input		
1L1	Input Rectifier L1	Up to 70 mm ² (max 95 mm ²)
2L1	Input Bypass L1	Up to 70 mm ² (max 95 mm ²)
1L2	Input Rectifier L2	Up to 70 mm ² (max 95 mm ²)
2L2	Input Bypass L2	Up to 70 mm ² (max 95 mm ²)
1L3	Input Rectifier L3	Up to 70 mm ² (max 95 mm ²)
2L3	Input Bypass L3	Up to 70 mm ² (max 95 mm ²)
Neutral Input Rectifier and Bypass	Connected to the common neutral bar	3 x M8 bolts
Output		
3L1	Output L1	Up to 70 mm ² (max 95 mm ²)
3L2	Output L2	Up to 70 mm ² (max 95 mm ²)
3L3	Output L3	Up to 70 mm ² (max 95 mm ²)
PE	Connect earth cable	4 x M8 hex nuts
Output Neutral	Connected to the common neutral bar	3 x M8 bolts

7.15 Multi-Cabinet Connection

The multi-cabinet configuration allows the user to connect 30 modules in parallel. Each cabinet is equipped with input and output parallel communication plugs located in the front, for standard frames, and on the back for Universal Racks.

Example: parallel communication wiring for 3 x cabinets and 12 modules:



7.16 Multi-Cabinet Connection (only for SP375B-E-6M and SP750-E-12M)

The multi-cabinet configuration allows the user to connect up to 8 cabinets in parallel respectively up to 4, that is up to 40 modules in parallel. In order to increase the availability, the cabinets are connected to each other by means of a “triple-mode parallel bus©”.

Example: parallel communication wiring for 3 x cabinets and 18 modules:



For the correct connection of the cables and cabinet configuration, please consult the Commissioning Guideline Rev.05 and over.

8 Interfacing

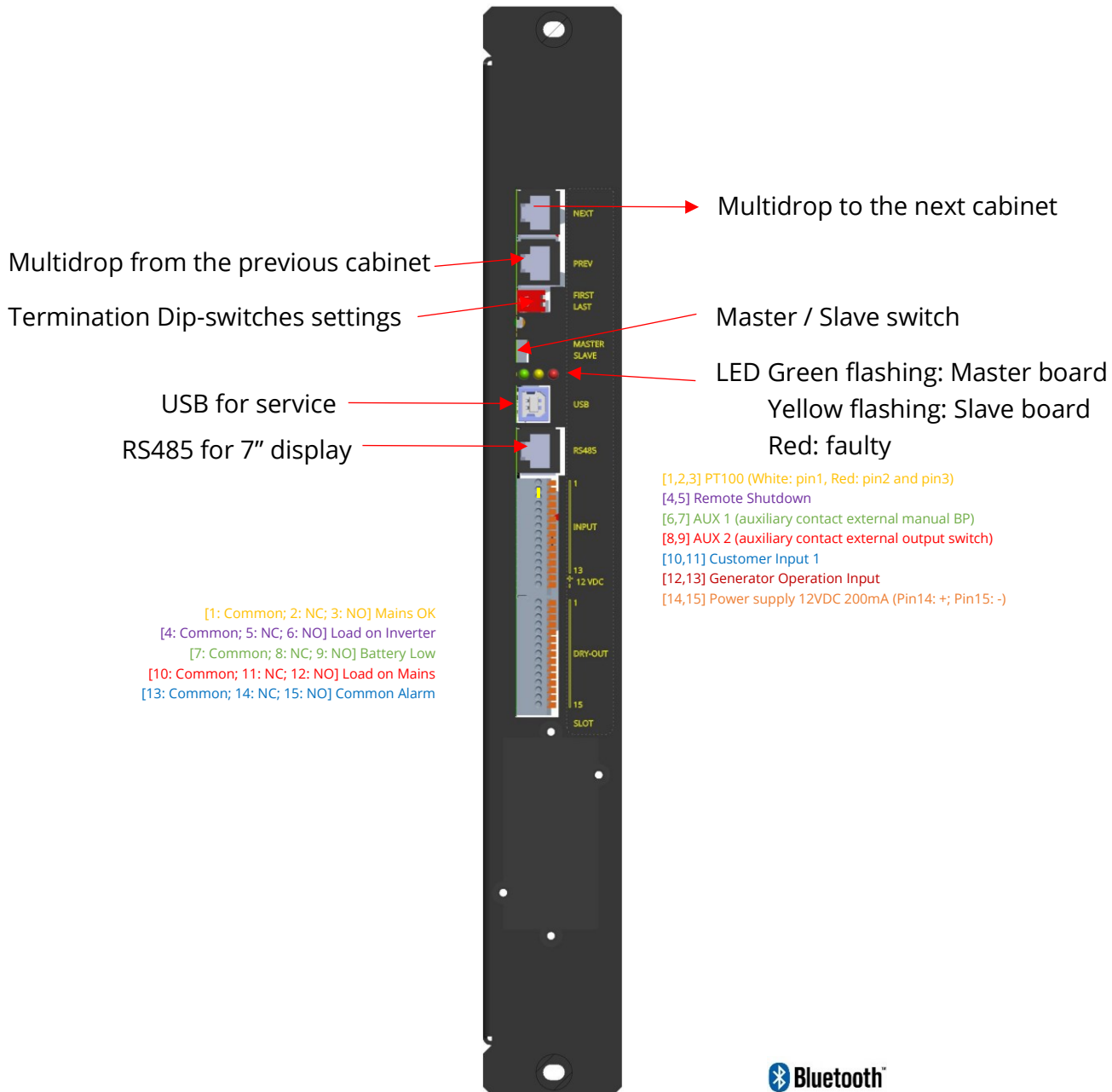
Each UPS cabinet is equipped with a Customer Interface (PC0610), which allows the user to monitor the condition of the system with different communication devices.

The StartusPower™ UPS can be equipped with several options, specific for customer applications.

The available options are:

- Multidrop for parallel multi-cabinet configuration;
- Dry port with NC or NO contact for “MAINS OK”, “LOAD ON INVERTER”, “LOAD ON BYPASS”, “BATTERY LOW” and “COMMON ALARM”;
- Bluetooth communication for iOS/Android mobile devices.
- Battery Temperature Probe (Optional)
- SNMP (Optional)
- Wavemon (Optional)
- 7" TFT system Display (Optional)

Function	Signal	I/O	Connector	PC0610
Programmable Dry Output	RL1	OUT	Spring type	✓
Programmable Dry Output	RL2	OUT	Spring type	✓
Programmable Dry Output	RL3	OUT	Spring type	✓
Programmable Dry Output	RL4	OUT	Spring type	✓
Programmable Dry Output	RL5	OUT	Spring type	✓
Battery Temperature Probe	PT100	IN	Spring type	✓
Voltage Source 12 V (200 mA)	12V	OUT	Spring type	✓
Emergency Power Off	EPO	IN	Spring type	✓
Generator Operation Input	GEN OP	IN	Spring type	✓
Programmable Dry Input	CUST IN1	IN	Spring type	✓
Options Slot	SNMP	I/O	Slot	✓
USB connector	USB	I/O	Type B	✓
AUX_IN1 (Ext Bypass Switch)	AUX1 NO	IN	Spring type	✓
AUX_IN2 (Ext Output Switch)	AUX2 NC	IN	Spring type	✓
Bluetooth	BTLE	I/O		✓
RS485 Channel	DISPLAY	I/O	RJ45	✓
Multidrop (1 x In / 1 x Out)	Mdrop	I/O	RJ45	✓
R Bus Terminator (RS485)	Rclose(RS485)	IN	Dip SW	✓
Master/Slave Configuration	M/Slave	IN	Dip SW	✓

**Notice!**

Input and Dry-Output connectors are provided with spring terminal blocks for a cable section between 0.2 and 1.0 mm².

Note: Refer to the StratusPower Commissioning Guidelines WI-4-00204 for further details.

NO (Normally Open) means the contact is open when at rest and only closes when activated, allowing current to pass.

NC (Normally Closed) means the contact is closed at rest and opens when activated, stopping current flow.

8.1 RS485

This communication port allows the user to get information through the RS485 serial communications standard. The RJ45 connector also provides a 15 V power supply with a maximum current of 200 mA, protected by means of an internal fuse.

8.2 Input Spring Terminal Blocks CN11: 1-15

Terminal	PIN	Signal	Description
CN11	1	_____	PT100 Temperature Measure (PWR)
CN11	2	←_____	PT100 Temperature Measure (MEAS 2)
CN11	3	←_____	PT100 Temperature Measure (MEAS 1)
CN11	4	←_____	Remote Shutdown
CN11	5	_____↓	Remote Shutdown (GND)
CN11	6	←_____	Input AUX_IN1 (External B-P Switch Monitor)
CN11	7	_____↓	Input AUX_IN1 (GND)
CN11	8	←_____	Input AUX_IN2 (External Q_out Switch Monitor)
CN11	9	_____↓	Input AUX_IN2 (GND)
CN11	10	←_____	Customer Input 1
CN11	11	_____↓	Customer Input 1 (GND)
CN11	12	←_____	Generator Operation Input
CN11	13	_____↓	Generator Operation Input (GND)
CN11	14	←_____	Auxiliary + 12 V (max 200 mA)
CN11	15	_____↓	Auxiliary GND

8.2.1 Temperature Probe (PT100)

A Battery Temperature Probe is strongly recommended to avoid degradation of battery life caused by using batteries in environments with varying temperature. The Battery Charger voltage will adapt to the room temperature, guaranteeing a longer battery life.



Battery Temperature Probe order code 00-00013

A recharge floating voltage of 2.275 V/cell is applied to the batteries as standard. The UPS assumes a 25 °C ambient temperature.

When the ambient temperature of the battery or UPS rooms varies from that value, especially when it is higher, it is strongly recommended to install a Battery Temperature Probe.

The recharge floating voltage is compensated according to the sensed temperature by applying the following:

- 2.3 V/cell @ 15 °C linear to 2.23 V/cell @ 35 °C (step of 3.5 mV/cell x °C)

For Battery Cabinets, it is suggested to install the Battery Temperature Probe on top of the cabinet and in case of separate battery room, in the hottest point of the room.

8.2.2 Remote Shutdown

The Remote Shutdown allows the user to remotely turn off the full UPS system by using a linked contact installed in the customer facilities. Typically, and for safety reasons, a NC contact has to be used. This contact must open to operate the shutdown.

8.2.3 Input Auxiliary 1: External Manual Bypass Switch

This port allows the user to connect the auxiliary contact of an **external Manual Bypass Switch**, usually installed in customer facilities. This NO contact will provide to the UPS system the information about the status of the external Manual Bypass Switch. To enable the external Manual Bypass, insert the JP1 link in the PC0131 Parallel Board for 10/20/25/30 kW modules cabinets and in the PC0631 board for 50/62.5 kW modules cabinets. The operation of the external manual Bypass is the same as the one of the manual Bypass located on the UPS cabinet.

8.2.4 Input Auxiliary 2: External Output Breaker

This port allows the user to connect the auxiliary contact of an **external Output Breaker**.

Similar to AUX_IN1, but with NC logic the input has to be enabled by removing JP2 in the PC0131 Parallel Board for 10/20/25/30 kW modules cabinets and in the PC0631 board for 50/62.5 kW modules cabinets.

8.2.5 Customer Input 1

This is a generic input port which can be customized according to customers' needs. Ask the manufacturer for more details.

8.2.6 Generator Operation

This port allows the user to provide information to the UPS system about when it is supplied by the generator. An external normally open (NO) contact, which will close as soon as the UPS is supplied by the gen-set, has to be used. In this operation mode, two options can be selected by means of the control panel in the "Set-up User" menu:

- Block Bypass synchronization: in order to avoid output frequency oscillations caused by the generator, the UPS will not synchronize with input Bypass Mains.
- Block Battery Charger: in order to avoid waste of energy of the generator, the UPS will not charge the batteries when supplied by it.

Notice!

It is recommended to inform the manufacturer about the characteristics of the generator.

8.2.7 Auxiliary 12 V (200 mA)

The Customer Interface provides a 12 V (DC) power supply with a maximum of 200 mA for any customer application.

8.3 Dry-Output Port (CN14)

The interface has a Dry-Output port contact for the information “Common Alarm”. The contact is connected with spring terminal blocks for cable size from 0.2 to 1.0 mm², and it allows maximum 30W(VA) switching power by rated voltage and current of 125VAC/60VDC/1A

Terminal	PIN	Signal	Description	Pos
CN14	1		Mains OK dry port (Common)	
CN14	2		Mains OK dry port (NC)	(RL1)
CN14	3		Mains OK dry port (NO)	
CN14	4		Load on Inverter dry port (Common)	
CN14	5		Load on Inverter dry port (NC)	(RL2)
CN14	6		Load on Inverter dry port (NO)	
CN14	7		Battery Low dry port (Common)	
CN14	8		Battery Low dry port (NC)	(RL3)
CN14	9		Battery Low dry port (NO)	
CN14	10		Load on Mains dry port (Common)	
CN14	11		Load on Mains dry port (NC)	(RL4)
CN14	12		Load on Mains dry port (NO)	
CN14	13		Common Alarm dry port (Common)	
CN14	14		Common Alarm dry port (NC)	(RL5)
CN14	15		Common Alarm dry port (NO)	

8.4 USB connection

The USB (TypeB) port allows the user to connect a PC and to communicate with the Interface Board itself or with every module in the frame.

This port is intended to be used only by service engineers for service purposes.

8.5 LED Functionality Description

The aim of the external visible LED is to provide information about the operating status of the Customer Interface.

LED	Description
Green	The status of the Interface is OK, it is working as Master board
Yellow	The status of the Interface is OK, it is working as Slave board
Red	The Communication Board is blocked, contact service support

8.6 Multidrop Input/Output (CN1/CN2)

Multidrop input and output communication plugs.

They are used for Parallel frames, and they allow the user to communicate through the Master Interface Board with all modules that make up the system

For the installation and the correct settings, please refer to the Commissioning Guideline Rev.05 and over.

8.6.1 Master/Slave Switch for Multidrop Application (SW3)

This switch sets the working behavior of the Communication Board.

Status	Description
Master	The Communication Board is active and can access the UPS modules, collect system information and provide the UPS status through the Dry-Output port or through any other communication channel.
Slave	The Communication Board is in "Active-sleep mode". The board is active and ready to be Master. While in this state, the board does not communicate with the UPS modules, nor does it provide any system status through the Dry-Output port, and it does not collect any Dry-Input information.

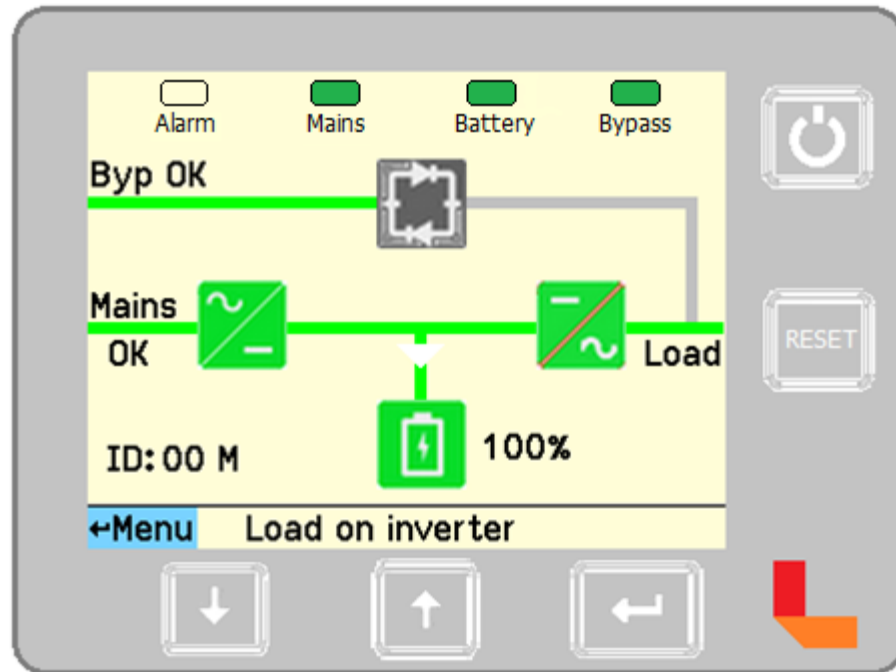
8.7 Bluetooth

The interface can be connected to a device equipped with Bluetooth communication. The communication characteristic will be the same as RS485.

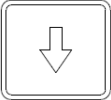

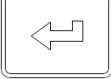


9 Operation

9.1 3" User Interface (Control Panel)

Each module is provided with a 3" graphical color display

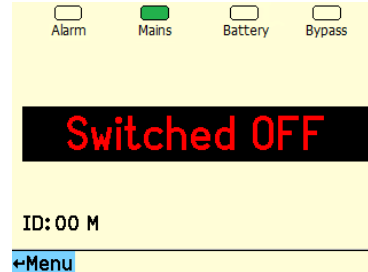


9.1.1 Keyboard Buttons Description

Button	Description
	Navigate the menus DOWN The first press turns the backlight on
	Navigate the menus UP The first press turns the backlight on
	Enter The first press turns the backlight on
	Turn module ON/OFF (To turn off the module, hold the button for 4 seconds)
	Allows the user to silence the buzzer (only if the synoptic is displayed) and to exit the active menu If pressed, the backlight turns on (if there are no active alarms)

9.2 System Operation Modes

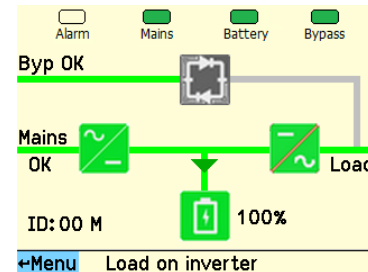
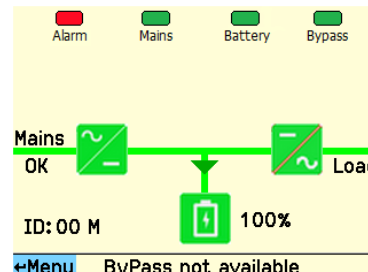
As soon as the Mains power supply is available, the display shows the status of the equipment.

Operation Mode	Display Mimic
UPS is Off	

9.2.1 On-line Operation Mode

In accordance with the classification mode VFI-SS-111.

The Inverter constantly supplies the load, so that it is fully protected from any Mains abnormal event, such as utility disturbances, surges, failures and out-of-tolerance conditions.

Operation Mode	Display Mimic
On-line (VFI-SS-111) Bypass line present	
On-line (VFI-SS-111) Bypass line <u>not</u> present	

9.2.2 Off-line Operation Mode

In accordance with the classification mode VFD-SS-311.

The load is transferred to static Bypass and it is protected from Mains failures and out-of-tolerance (voltage and frequency) conditions according to the technical datasheet. The off-line mode (ECONOMY MODE) is highly efficient, and in case of Mains failure, the UPS is able to transfer the load to the Inverter in a very short time.

Operation Mode	Display Mimic
Off-line (VFD-SS-311)	

9.2.3 Battery Operation Mode

In battery operation mode, the load is supplied through batteries because of Mains Rectifier failure or out-of-tolerance voltage.

In battery mode, the display will show the following mimic:

Operation Mode	Display Mimic
Battery operation with <u>single</u> <u>input feed</u>	
Battery operation with <u>dual input</u> <u>feed</u>	

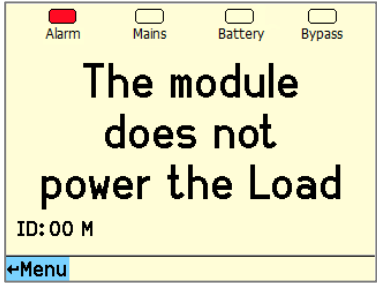
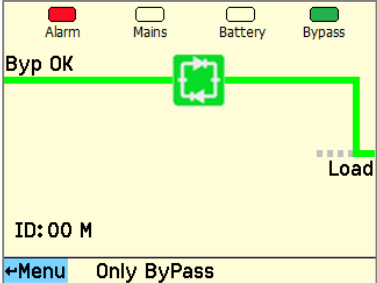


Each input line (Mains Rectifier and Bypass) has its own tolerance controls (see technical specifications for details).

When any of these lines are out of tolerance, the line is declared “unavailable” (the respective LED is turned off, see **Error! Reference source not found.**).

In a system with dual input feed, in the event of Mains Rectifier failure the Bypass line is available (as seen in the mimic shown before).

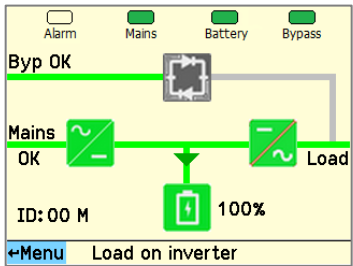
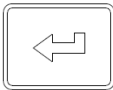
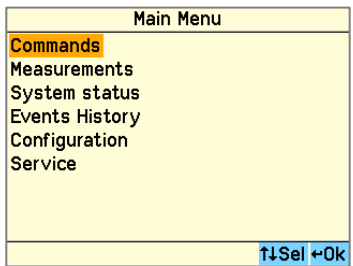
At the end of the battery discharge, the following conditions will be displayed:

Operation Mode	Display Mimic
End of battery discharge with <u>single input feed</u> (the Inverter is off and the load is not supplied)	
End of battery discharge with <u>dual input feed</u> (the load is transferred to Bypass)	

9.3 Display Navigation Overview

The 3" module display shows the operation mode of the system as described in previous chapters. Moreover, it allows the visualization of a series of parameters, commands and configurations of the specific module.

9.3.1 Main Menu

Current View	B. Pressed	Next View
		

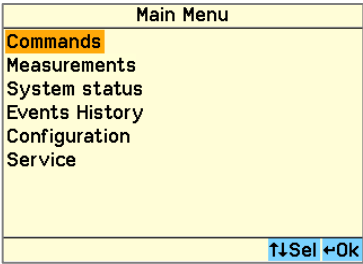
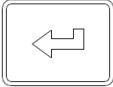
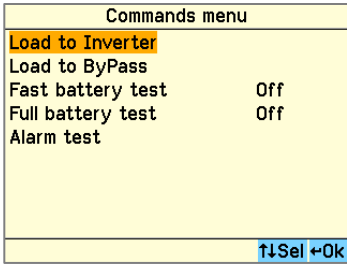
Main Menu	Description
Commands (see 9.3.1.1)	Lists a series of commands to be executed by the UPS
Measurements (see 0)	Visualizes a series of measurements of the UPS
System Status (see 0)	Provides a quick view of the system status
Events History (see 9.3.1.4)	Visualizes the recorded event log
Configuration (see 9.3.1.5)	Is a first level password-protected area reserved for service personnel

Service (see 9.3.1.6)

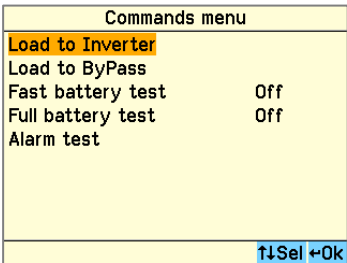
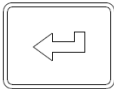
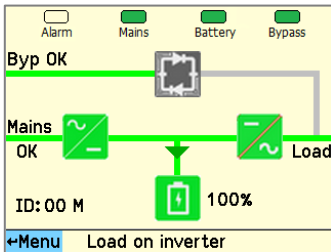
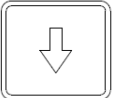
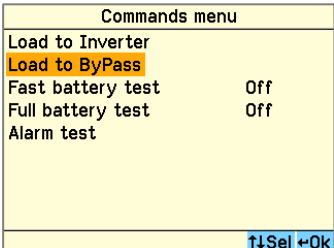
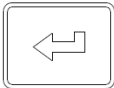
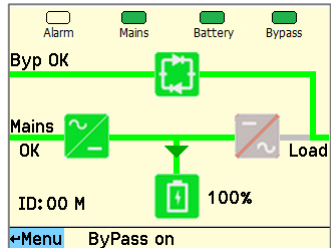
Is a second level password-protected area reserved for service personnel

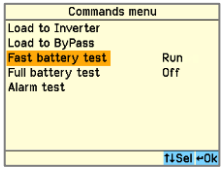
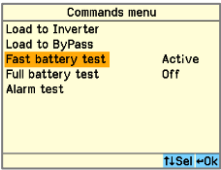
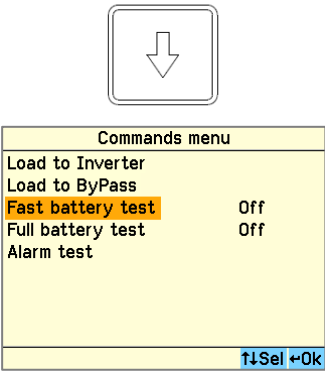
Every sub-menu mentioned before is detailed in the next chapters.

9.3.1.1 Commands Menu

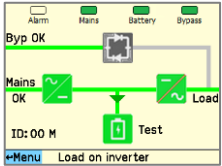
Current View	B. Pressed	Next View
		

Commands Menu	Description
Load to Inverter	Transfers the load from Bypass to Inverter
Load to Bypass	Transfers the load from Inverter to Bypass
Fast Battery Test	Verifies the status of the batteries (1-minute test)
Full Battery Test	Performs a complete battery discharge in order to check the health of the batteries
Alarm Test	Simulates an alarm status in order to verify if the Dry-Output Common Alarm is activated

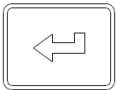
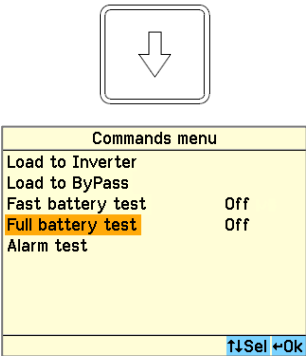
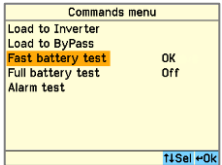
Current View	B. Pressed	Next View
		
		
		




The mimic shows as follows

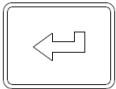
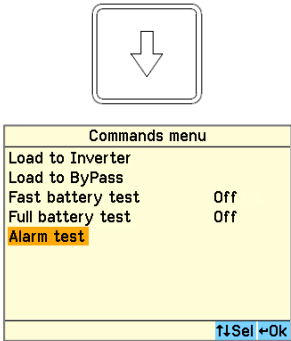



The test result must be verified



The behaviour of the “Full battery test” is similar to the “Fast battery test”, but it can

be stopped at any time by pressing 
Note: If not stopped, the battery will be discharged until the alarm “BattLow 3Min” appears

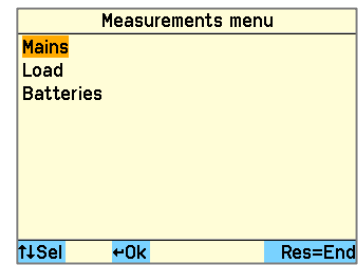
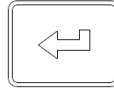
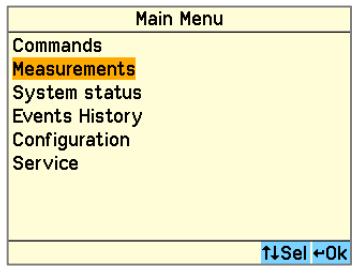
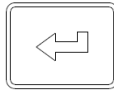
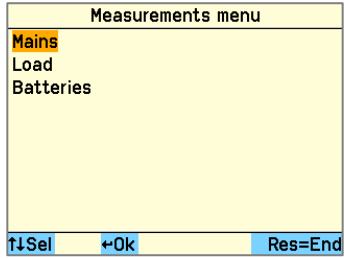


By pressing  the alarm LED and buzzer will be checked only on the module

9.3.1.2 Measurements Menu

Current View	B. Pressed	Next View
--------------	------------	-----------



**Current View****B. Pressed****Next View**

Measures: Mains	
UGridL1	234.9
UGridL2	234.7
UGridL3	234.5
UBypL1	234.9
UBypL2	234.7
UBypL3	234.5
IRectL1	45.5
IRectL2	45.8
IRectL3	45.9

↑Sel Res=End

UGridL1 Mains Input Voltage L1

UGridL2 Mains Input Voltage L2

UGridL3 Mains Input Voltage L3

UBypL1 Bypass Input Voltage L1

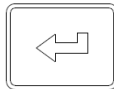
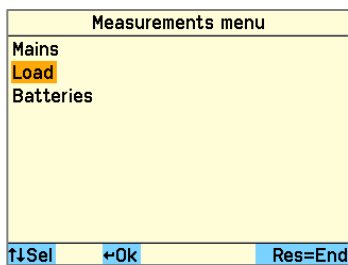
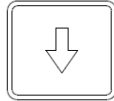
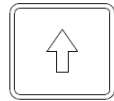
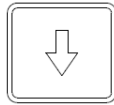
UBypL2 Bypass Input Voltage L2

UBypL3 Bypass Input Voltage L3

IRectL1 Input Rectifier Current L1

IRectL2 Input Rectifier Current L2

IRectL3 Input Rectifier Current L3

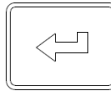
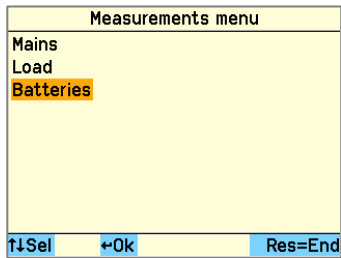
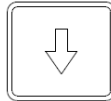
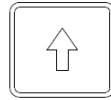
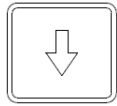


Measures: Load	
ULoadL1	230.2
ULoadL2	230.3
ULoadL3	230.3
ILoadL1	0.0
ILoadL2	0.0
ILoadL3	0.0
PkW L1	0.00
PkW L2	0.00
PkW L3	0.00

↑Sel Res=End

ULoadL1 Output Voltage L1

ULoadL2 Output Voltage L2



Measures: Batteries	
UBatt+	273.0
UBatt-	273.1
IBatt+	0.5
IBatt-	0.4
Charge [%]	100
Autonomy [min]	34
BattTemp [°C]	---

ULoadL3	Output Voltage L3
ILoadL1	Output Current L1
ILoadL2	Output Current L2
ILoadL3	Output Current L3
PkW L1	Output Active Power L1
PkW L2	Output Active Power L2
PkW L3	Output Active Power L3
PkVAL1	Out Reactive Power L1
PkVAL2	Out Reactive Power L2
PkVAL3	Out Reactive Power L3
PkW%L1	Output Load % L1
PkW%L2	Output Load % L2
PkW%L3	Output Load % L3
FreqLoad	Output Frequency (Hz)

UBattPos	Battery Voltage (+)
UBattNeg	Battery Voltage (-)
IBattPos	Charge/Discharge Battery Current (+)
IBattNeg	Charge/Discharge Battery Current (-)
Charge%	Battery Charged %
Autonomy	Autonomy Available
TempBatt	Battery Temperature*

Notice!

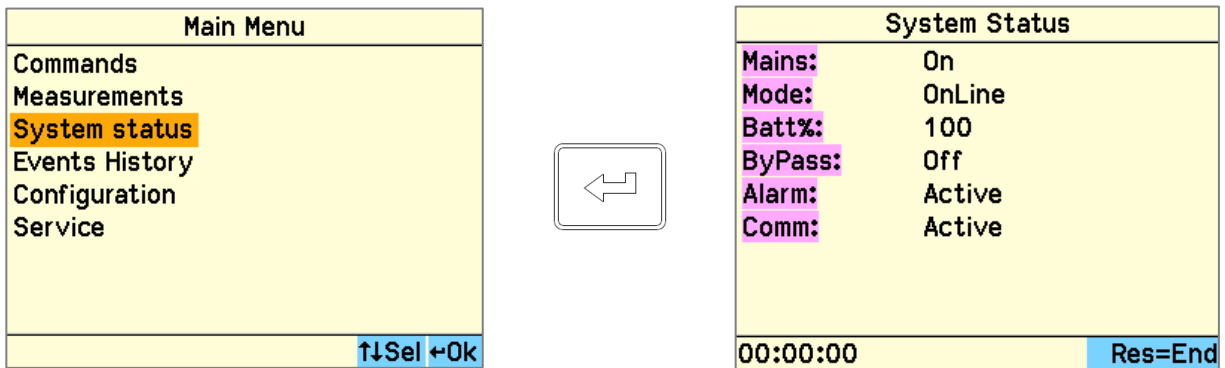
***When the Battery Temperature Probe is not connected, no measurement is shown on the display under "TempBatt".**

9.3.1.3 System Status Menu

Current View

B. Pressed


Next View



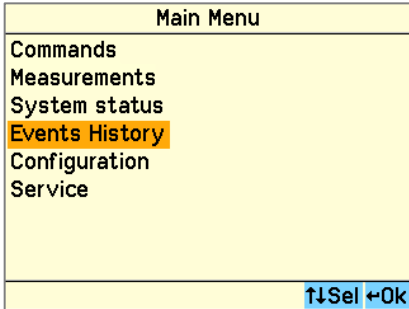
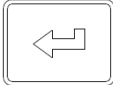
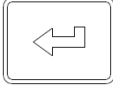

The following table describes the meaning of every parameter in this view:

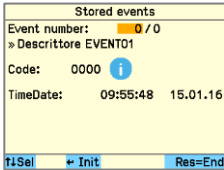
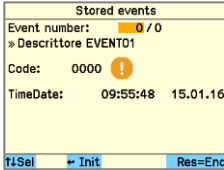
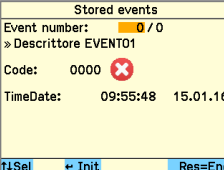
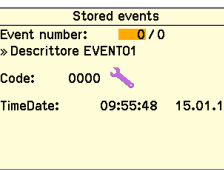
Parameter	Status	Description
Mains	On	Rectifier Input Voltage is present and within tolerances
	Off	Rectifier Input Voltage is out of range or not present
Mode	On-line	UPS is running on Inverter (VFI-SS-111)
	Off-line	UPS is running on Bypass (VFD-SS-311)
Battery	%	Battery Capacity Available
Bypass	On	Bypass Input Voltage is present and within tolerances
	Off	Bypass Input Voltage is out of range or not present
Alarm	Active	An alarm is active and has not been acknowledged
	Off	No alarm is present
Comm	Active	Interface Communication detected and OK
	Off	Interface Communication not detected, verify

9.3.1.4 Events History Menu

As soon you enter in the “Event History” menu and the alarm condition is present (red LED on) the module will show the active alarms (max 9; event 9 is the last). By pressing  you will enter in the “Stored Events” menu where you can explore all detailed information.

If the alarm LED is off you will enter directly in the “Stored Events” menu

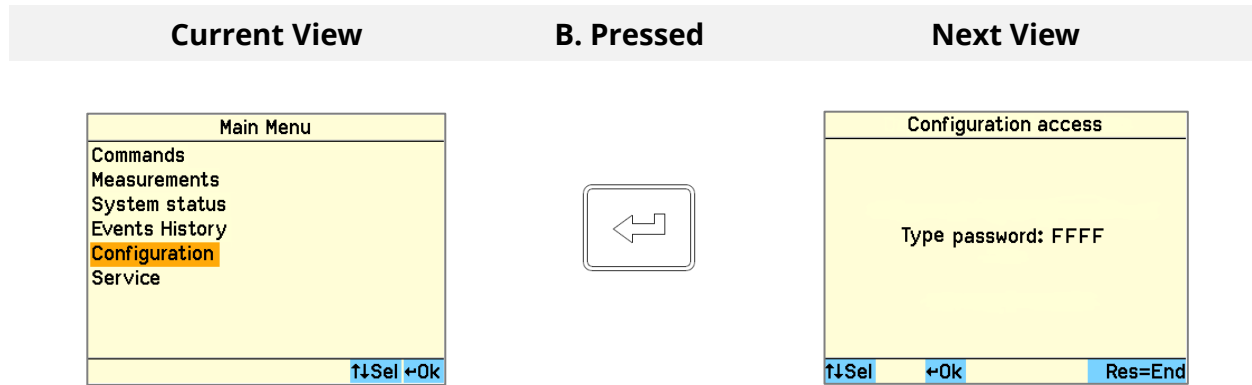
Current View	B. Pressed	Next View
	 If there are no alarms or by pressing Enter again 	

Event Conditions	Description	Action to take
	Information Event	No action required
	Warning Event	Pay attention to the indication
	Alarm Event	Verify troubleshooting
	Technician Intervention required	Call your service provider or manufacturer

9.3.1.5 Configuration Menu

Notice!

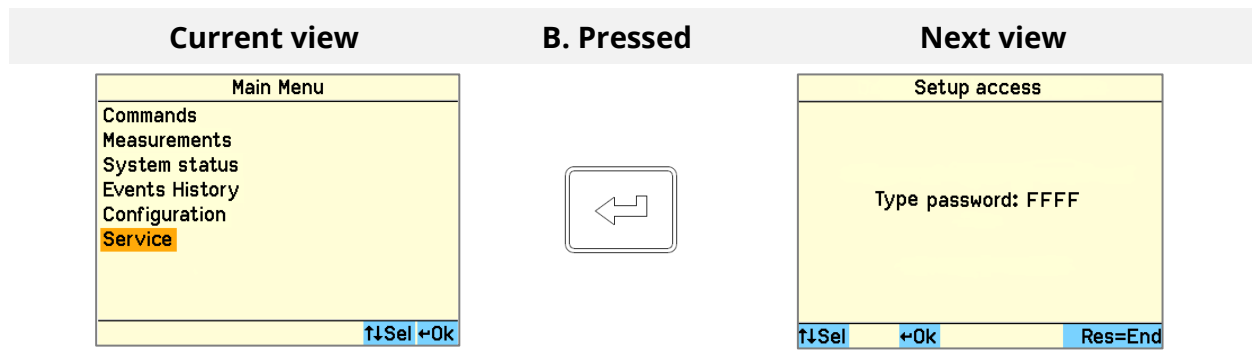
Only service personnel are allowed to access the “Configuration” menu in a first level service, therefore a password is needed.



9.3.1.6 Service Menu

Notice!

Only service personnel are allowed to access the “Service” menu in a second level service, therefore a password is needed.



9.4 Manual System Bypass

Sometimes it is called “Maintenance Bypass Switch”. When the load is transferred to the manual Bypass, **it will not be protected anymore**. Normally, this option is used only during full installation maintenance.



The load transfer to the manual Bypass is a critical operation. The load is not protected anymore. Be sure to inform and have permission from the customer before performing this operation.

10 Operation Procedures

10.1 Start-Up Procedure



The commissioning of the UPS, as well as shutdown, start-up and module replacement, must be performed by authorized service engineers only. Control panel operations can be performed by trained persons only.



Before commissioning the UPS, verify that all electrical facilities, including battery connections and environmental conditions, comply with the instructions reported in this manual.

10.1.1 Preparation for Start-Up Procedure

Make sure that all Bypass Fuses (PF1, PF2, ...), battery CBs (QM1, QM2, ...), Parallel Isolators (Q1, Q2, ...) and the Manual Bypass Switch (Q0) of the UPS are open.

Make sure that all inputs, outputs and Battery Fuses or CBs on customer facilities are open.


10.1.2 Start-Up Procedure

- a) Insert Fuses or close input Circuit Breaker (CB) on customer distribution facilities.
For dual input feed connection close also the bypass fuses or CB.
- b) Verify the correctness of the phase rotation.

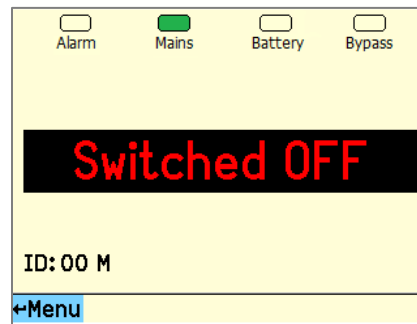


If the phase rotation is wrong, the alarm “Phase sequence error” (Rect. and B-P check separately) will be activated. If switched on, the module does not start up, and the indication “The module does not power the Load” will be displayed.

- c) If the phase rotation is ok, the display will turn on and the “Mains” LED will light up green.

Action Performed	Display Mimic
The module power supply is ON	

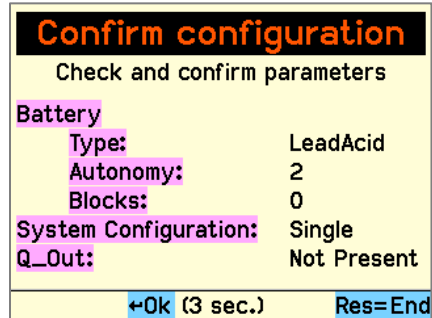
The module completed its own checks and is in OFF condition



First Startup

The module ask to verify the important parameters to avoid strange alarms.

If OK press and hold the ENTER button for 3 seconds and turn on the module



- d) If necessary, close the Manual Bypass Switch (Q0) and verify the maximum current applied on each output phase of the UPS by means of a current probe. If load is not connected no need to close Q0.
- e) While keeping the Parallel Isolators Switch (Q1, Q2, ..., Qn) open, close Bypass Fuses (PF1, PF2, ..., PFn) and turn on the modules one by one, beginning from module 1 to module n. Verify that they work properly. Unexpected alarms should not appear.
- f) Close the Battery Circuit Breakers (QM1, QM2, ..., QMn) and check in the "Measurements" menu the correctness of the Battery Charger current.
- g) Switch off all modules (hold the button for 4 seconds) and close Parallel Isolator switch Q1 of the first module. If Q0 is closed, verify that the indication "Manual Byp Closed" is also listed.

Note: as soon as the Parallel Isolator is handled, the information "Q_out state changed" will appear blinking.

Action Performed

Display Mimic

Qn closed



Whenever closing or opening Q_out, this message MUST appear on the display. Do not turn on the module if the message is not shown. Risk of malfunction.

Q_Out state changed

Hit ← key to RESTART

Q_Out change time: 09:55:48
Q_Out change date: 15.01.16

In this condition, the Inverter of the module is locked. Press ENTER  to unlock it.

- h) Switch on the module, it will start in bypass and the Bypass LED will light on. After few seconds it appears the synoptic (without inverter symbol if Q0 is closed). If necessary, give the order “load to inverter”.
- i) Startup the rest of the modules one by one by closing the Parallel Isolator Switch (Q2, ..., Qn). The indication “The module does not supply the load” will be displayed before the appearance of the synoptic.
- j) When all modules are on, open the Manual Bypass Switch (Q0) if previously closed (on the display the Inverter symbol will appear).
- k) By giving the command “Load to Inverter” on one of the modules, the full system will transfer the load to the Inverter. Verify the correct load sharing between the modules.


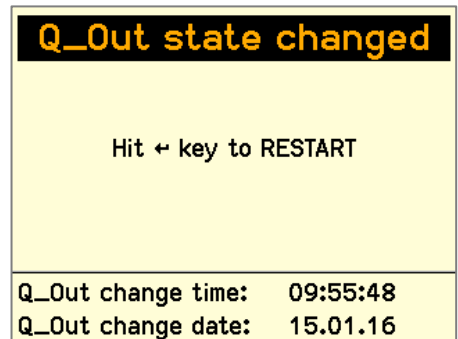
10.2 Shutdown Procedure

If the load does not need power for an extended period of time, the full UPS can be switched off by applying the following procedure:

- a) By giving the command “Load to Bypass” on one module, the full system will transfer the load to static Bypass.
- l) Close the Manual Bypass Switch (Q0). The Inverter symbol will disappear from the display and verify the indication “Manual Byp Closed” on each module.
- b) Turn off each module one by one by pressing the ON/OFF button for 4 seconds, and open the corresponding Parallel Isolator Switch (Q1, Q2, ..., Qn). The information indicating that the output switch has been handled will appear blinking. Press the



key to unlock the Inverter.

Action Performed	Display Mimic
<p>Qn opened</p>  <p>Whenever closing or opening Q_out, this message MUST appear on the display. <u>Do not turn on the module if the message is not shown. Risk of malfunction.</u></p>	

- a) When all modules are off and no any display is blinking anymore, open the Bypass Fuses (PF1, PF2, ..., PFn) and battery Circuit Breaker (QM1, QM2, ..., QMn). Now the full system is off, only the modules power supply is kept on and the remaining load is supplied through manual Bypass.



Beware: the load is not protected anymore since it is supplied directly through manual Bypass. However, the UPS cabinet is still powered and the shock hazard is high.

- b) If for sure no load is connected to the UPS, the input Fuses or CBs on the customer facilities can be opened as well. In this case the UPS will be completely off.

Notice!

To restart the system, please follow the indications described in section 10.1.

10.3 Module Replacement Procedure



The weight of the module reaches 22 kg (e.g. SM30) and 46 kg (e.g. SM62), therefore it has to be handled by two persons. If inappropriately removed, it can fall down, causing serious injuries to persons and damage to the module itself.

Notice!

If your StratusPower™ equipment consists of a single module and it has to be replaced, please begin with the instructions in paragraphs a) to d) of section 10.2 and finish with paragraphs b) to f) described in this section.

If your StratusPower™ equipment consists of an at least N+1 redundancy system and a module must be replaced, proceed as following:

- a) After identifying the faulty module, if still working, switch it off and open the corresponding Parallel Isolator (Q1: for the first slot; Q2: for the second slot and so on).
- b) Remove the fixing screws, pull the module out 10 cm and wait about 5 minutes before dislodging it.
- c) Insert in the slot the replacement module and, as soon as the power supply is on (display on), check if the configuration parameters are equal to the ones of the replaced module.
- d) Put back the fixing screws.
- e) Switch on the module, without closing Qn, and verify if it works properly. No unexpected alarms should be displayed.
- f) Turn off the module and close the Parallel Isolator (Q1, Q2, ..., Qn). The information indicating that the switch has changed the status will appear blinking. Press the key



to unlock the Inverter.

- g) Turn on the module again and as soon as it works in parallel (load on Inverter), compare all measurements with the rest of the modules. All modules shall indicate the same values.

11 Options

11.1 SNMP

The Simple Network Management Protocol (SNMP) is a typical worldwide standardized communication protocol, and it is used to monitor the status of the UPS in the network via simple control language. The SNMP adapter can act as interface for environmental monitoring of devices installed in the UPS room, such as open doors detectors, ambient temperature probes, emergency system controls and so on (PRO version). Typically, it is also used as Remote Console Command Module (RCCMD) for a multi-server shutdown.

The UPS is equipped with a slot allowing for an easy installation of the SNMP card, which may be configured via serial connection, Telnet or HTTP (Web Browser). The SNMP adapter can manage the full parallel system; each single module or the whole system as a stand-alone UPS can be monitored.

Three types of SNMP adapters are available:

- CS141 BDG slot in adapter
- CS141 Professional
- CS141 Professional with MODBUS RS485 and I/O options

Notice!

For SNMP configuration and installation, review the dedicated documentation.

11.1.1 SNMP CS141 BDG

The CS141 BDG includes the UPSMAN server with SNMP agent RFC 1628 with SNMP V and V 3 support, the CS141 Webserver and supports IPv6, HTTP, HTTPS, DNS, NTP, FTP, UPSTCP (UNMS), RADIUS, PPP, SMTP (email client) and MODBUS-over IP server is on board. The full qualified RCCMD server is integrated and cares for the shutdown and messaging on all computers and OS in your network.

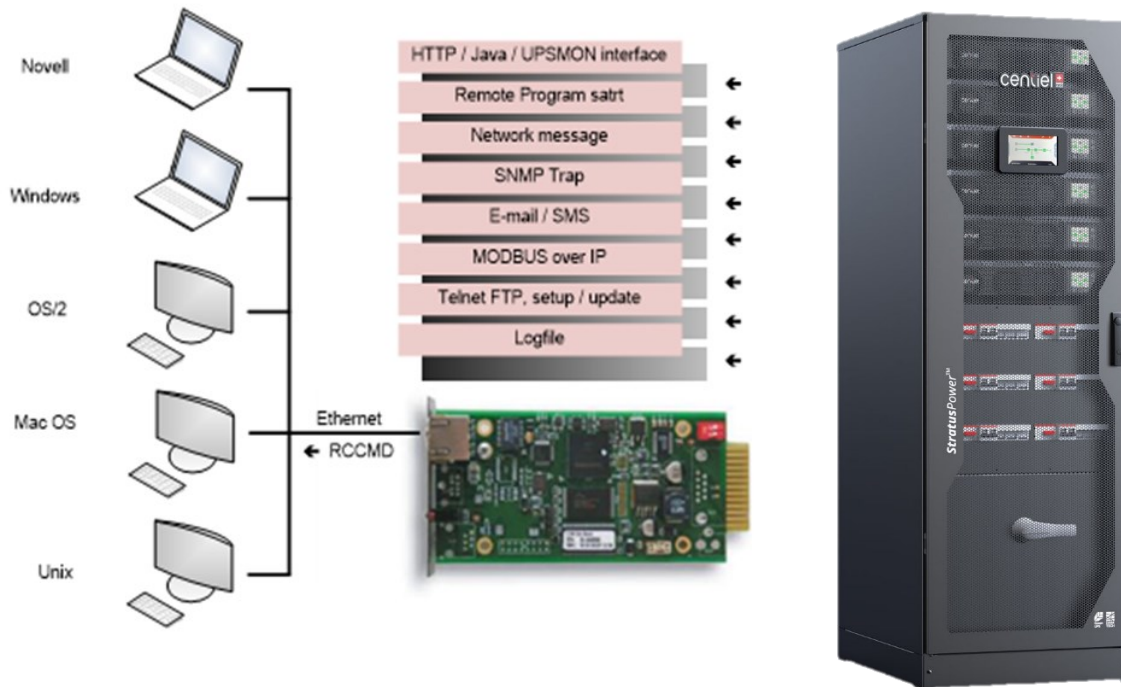


CS141 Basic order code 00-00015

Notice!

CS141 BDG does not support environmental and external sensors.

CS141 BDG



11.1.2 SNMP CS141 Professional

In addition to the features of CS141 BDG, CS141 Professional allows the user to install and control accessories for environmental and building alarm management, such as sensors, actuators and detectors.



CS141 Professional order code 00-00014

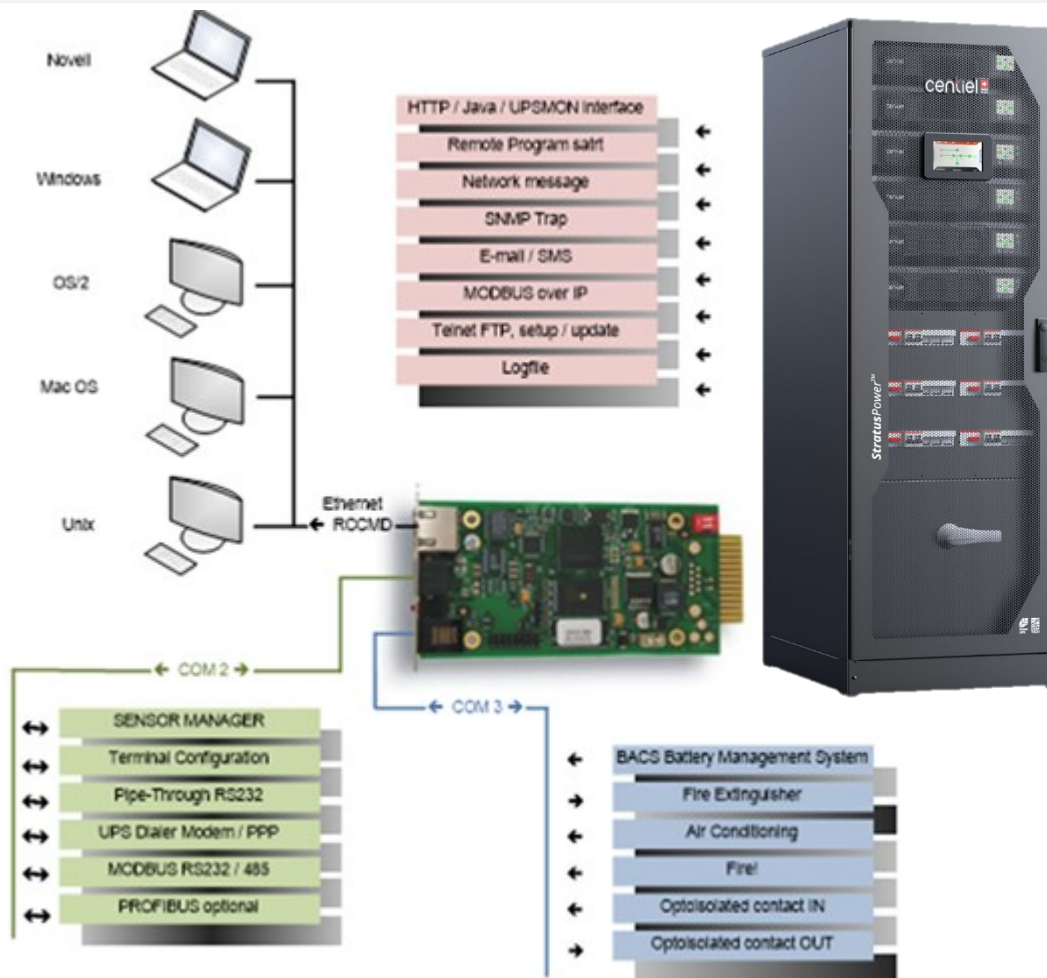
11.1.3 SNMP CS141 Professional with MODBUS RS485

CS141 Professional with MODBUS RS485 with 3-pole screw terminal connectors.



CS141 Professional with MODBUS order code 00-00016

CS141 Professional



11.1.4" TFT Touchscreen System Display



7" TFT Touchscreen system display order code 00-00012

Please refer to the specific TFT User Manual, which will be included together with the UPS User Manual if the system is equipped with this option.

11.2 Battery Temperature Probe

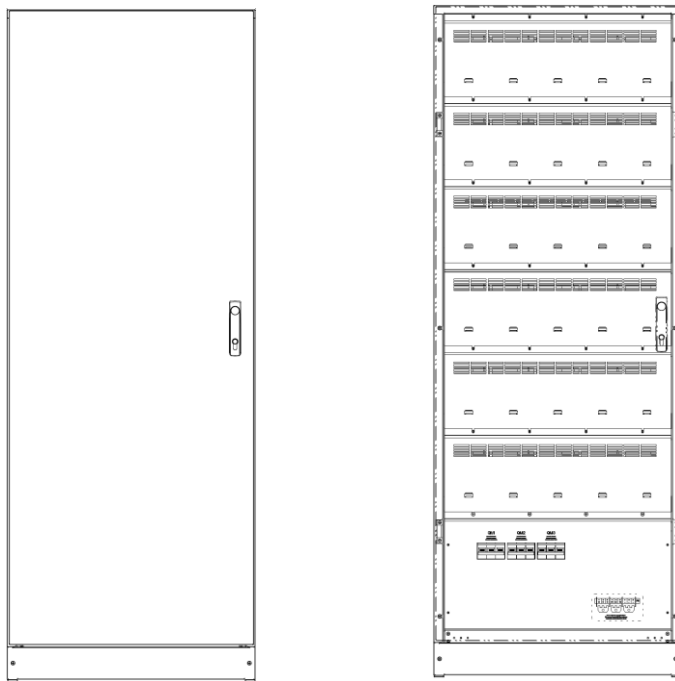
Notice!

See section 8.2.1

11.3 Battery Cabinet

For StratusPower UPS with external battery connection, a battery cabinet is available.

This cabinets, with up to 120 blocks 28Ah batteries, allows the configuration for common or separate battery connection.



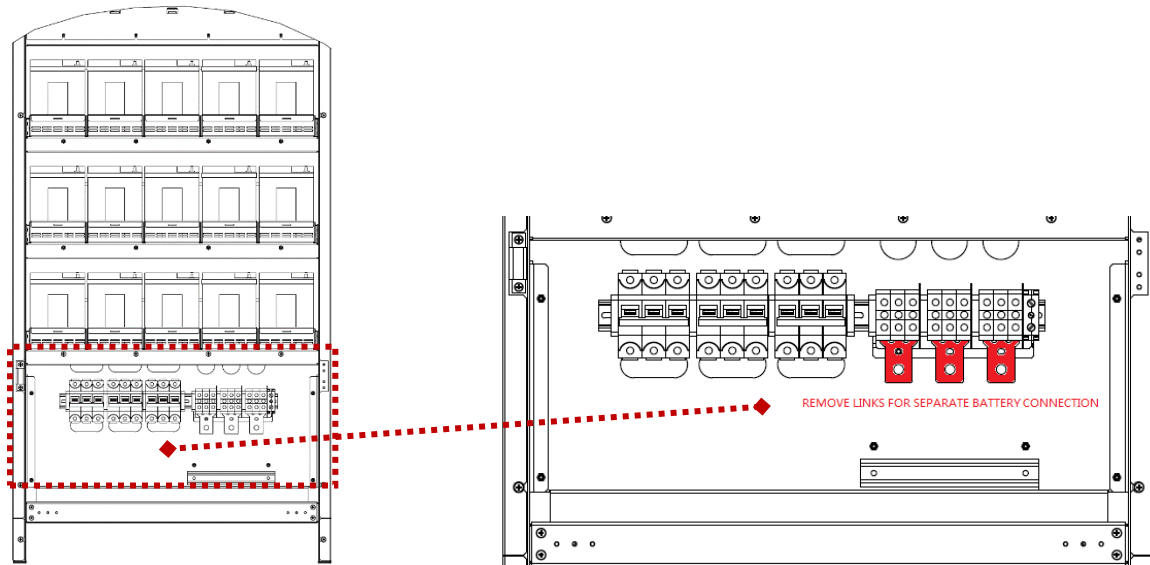
General Data

Dimensions (WxHxD) mm	730 x 1980 x 815
Weight empty frame	190kg
Frame weight with 120 battery blocks (11kg /bloc)	1510kg
Door opening	Left or Right
Colour	RAL 7024 Graphite Grey

Battery

Battery type and dimensions in mm (WxHxD)	VRLA 24 or 28Ah (175 x 168 x 125)
Battery compartment	5 trays per shelf
Number of shelves	6
Number of batteries per tray	4
Maximal number of battery blocks (24 or 28Ah)	120
Maximal strings number	3

11.3.1 Electrical Connection



Distribution

Wires on Terminals

Battery connection common battery

3 x M10 bolts

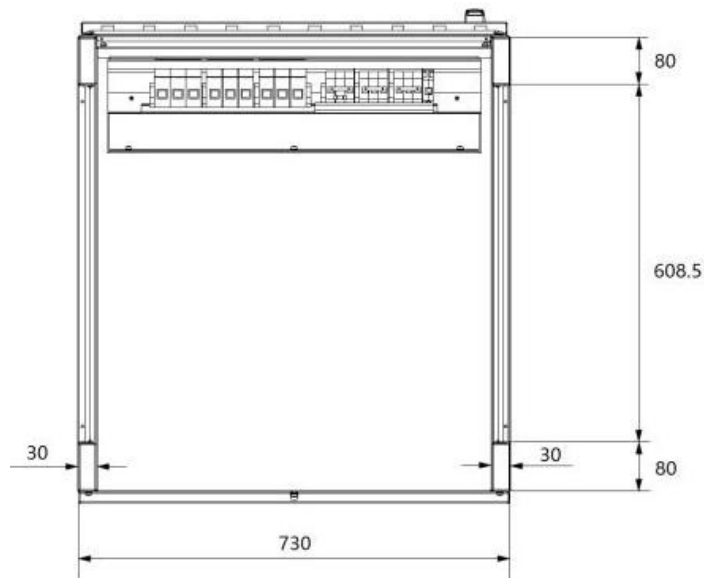
Battery connection separate battery

9 x terminals (up to 50mm² wires)

Fuse Protection

3 x Photovoltaic MCB 125A

11.3.2 Footprint



12 Maintenance

The user is not allowed to carry out any maintenance of the UPS. This will be performed only by authorized service personnel.

The StratusPower UPS shall be installed in an environment condition dry, dust free and with an ambience temperature not exceeding the limits described in this manual. If the UPS is equipped with internal batteries the temperature limits shall not exceed 25°C.

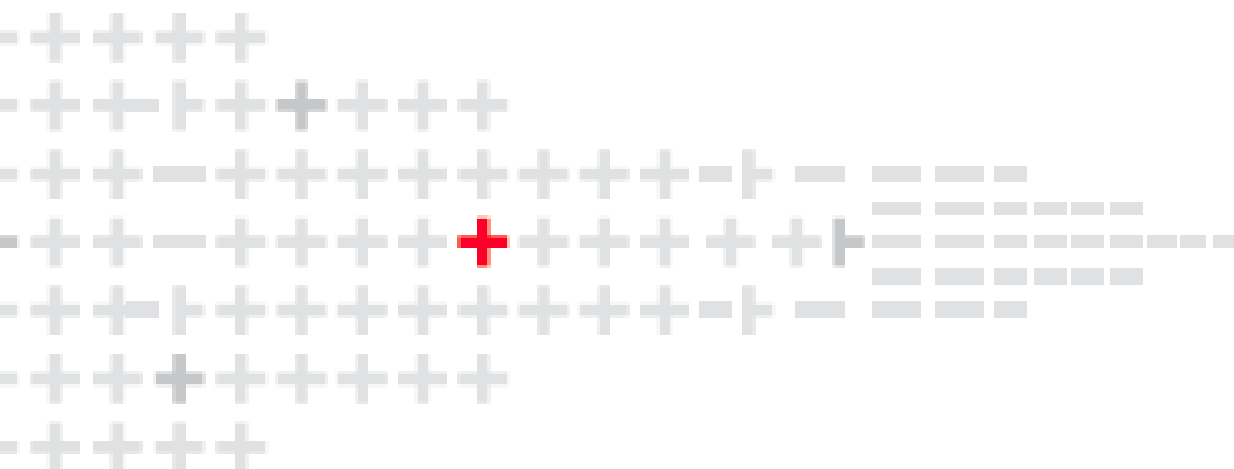
It is recommended to perform annually a maintenance inspection to maintain the reliability and prevent malfunction on the equipment. In this circumstance the status of the batteries must be checked.

As follow the activities suggested for a correct maintenance:

1. Visual inspection of the UPS system and batteries
2. Check the environment of the UPS (dust, humidity, air conditioning, and so on)
3. Verify the “Events history” menu if no strange alarms have been recorded. If Ok delete the events.
4. Verify the status of the fans
5. Battery discharge test
6. If the UPS is dusty use a vacuum cleaner to clean the equipment
7. In this case verify the status of the fans

The UPS has been designed to be maintenance friendly, this means that the AC and DC capacitors as well as the fans can be easily replaced.

The replacement time must be evaluated by the service engineer considering the environmental and load conditions. For further information, please consult the manufacturer.



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Continuous Power Availability

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