

MODULYS XL

200 kW to 4.8 MW
Ultimate modular UPS



ULTIMATE

Fault tolerant power
without compromise



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1. OBJECTIVES

The aim of these specifications is to provide the information required to prepare the system and installation site.

The specifications are intended for:

- Installation engineers.
- Design engineers.
- Engineering consultants.

2. INSTALLATION REQUIREMENTS AND PROTECTION

Connection to the mains power supply and to the load(s) must be made using cables of suitable size, in accordance with current standards. If not already present, an electrical control station which can isolate the network upstream of the UPS must be installed. This electrical control station must be equipped with a protection (or two, if there is a separate bypass line) of an appropriate rating for the power draw at full load.

For detailed information, see the installation and operating manual.

1. ARCHITECTURE

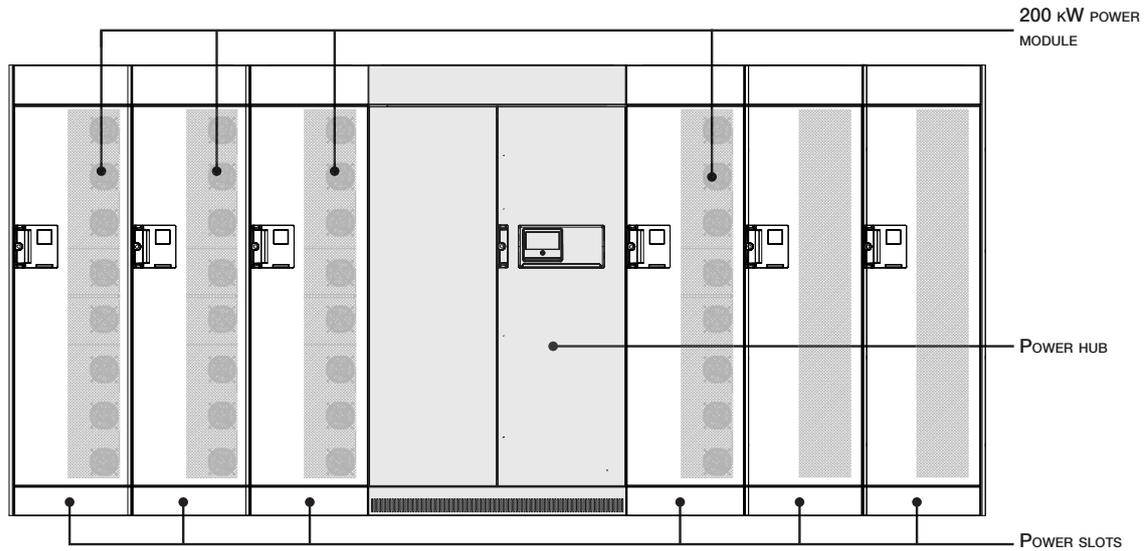
1.1. Range

MODULYS XL is a modular UPS system designed to provide high performance and power scalability.

Power scalability can be by adding power blocks of 200 kW (Power module) to extend the system up to 1200 kW or less, according to the maximum power requirement. Systems can be parallelised to increase the rated power up to 4,8 MW

As the system has been designed to allow the power module to be hot-swappable, the load can be fully protected by on-line double conversion during system extension or maintenance.

Manufactured in Europe, MODULYS XL is a modular system including an individual Socomec switching system for each power block enabling easy and safe coupling and disconnection.



Power HUB for the UPS Unit

- All input(s) - output and battery connections to the UPS unit.
- Full rated centralized static switch on bypass line
- Remote communication interfaces
- User interface (HMI)
- 63A-3Ph plug for advanced maintenance services

Power SLOT for Power MODULE plug-in

- built-in bus bars for interconnection together with others Power SLOTS and to the Power HUB
- Preconnected communication bus

Power MODULE rated for 200 kVA/kW permanent operating

- Single and full rated Rectifier - Inverter & Battery charger
- Double conversion's side bypass device
- Selective disconnection at input and output stages for complete isolation (contactors and fuses)
- Local battery disconnection switch - to isolate the module from the Battery bus
- Plug-in system (power and control) to connect on the Unit

1.2. Rated power

The rated power is related to the number of installed Power modules. The number of Power slots installed at the beginning defines maximum power that can be reached through Hot-scalability at each UPS UNIT level.

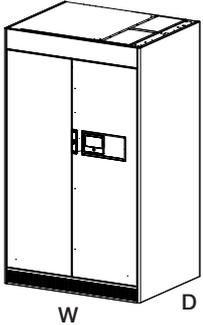
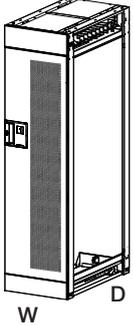
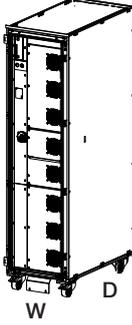
RATED POWER PER UPS UNIT																		
Number of Power Slots	3			4				5					6					
Number of power module (200 kW)	1	2	3	1	2	3	4	1	2	3	4	5	1	2	3	4	5	6
Power (kW) N configuration at 40°C	200	400	600	200	400	600	800	200	400	600	800	1000	200	400	600	800	1000	1200
Power (kW) N+1 configuration at 40°C		200	400		200	400	600		200	400	600	800		200	400	600	800	1000
Parallel units	up to 4 units (200-1200kVA/kW) in parallel																	

1.3. The BRICKS

MODULYS XL is built on a flexible brick concept. The UPS can be built by associating the bricks according to the requirements.

1. Select the Power HUB
2. Specify the number of Power slots according to the maximum power and the redundancy level which is required to protect the load at the final stage.
3. Specify the number of Power modules needed to protect the load at the initial stage; Power Modules are plugged into installed Power Slots.

Unused Power slots are ready for later Power module hot plug-in, when needed.

DIMENSIONS AND WEIGHT						
Section	View	Rated power (kVA/kW)	Width [W] (mm)	Depth [D] (mm)	Height [H] (mm)	Weight (kg)
Power HUB		Up to 1200	1200	975	2120	750
Power slots		200	550	975	2120	110
Power module		200	500	950	1940	460

The design allow flexible power slot number and position- up to 3 on each side

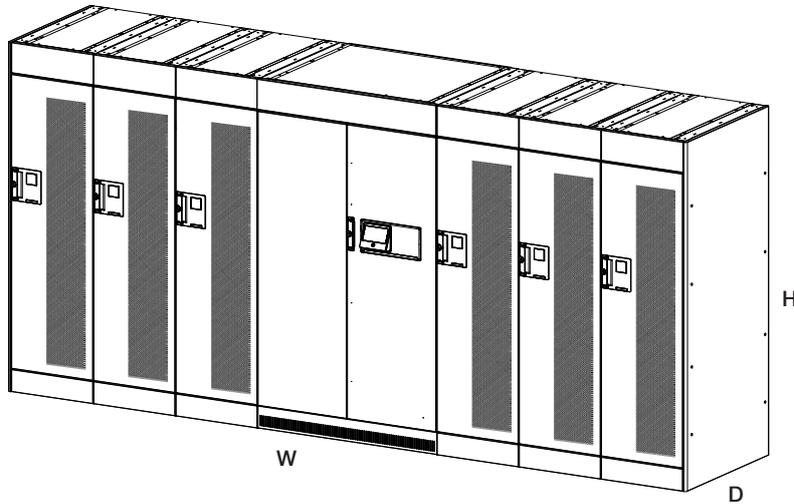
3 Power slots	4 Power slots	5 Power slots	6 Power slots

The UPS Unit can be defined as per required.

Slots installed at initial stage are ready to hot plug Power modules.

Power modules can be plugged into power slot without any constrain of position or number.

UNIT dimensions



UNIT DIMENSIONS						
Number of Power slots			3	4	5	6
Maximum power (kW)			600	800	1000	1200
UNIT size	Width [W] ⁽¹⁾	mm	2890	3440	3990	4540
	Depth [D]	mm	975			
	Height [H]	mm	2120			
Weight	kg		2500	3100	3650	4250
Single unit Clearances		mm	No rear or lateral clearance, Top = 400 mm			
Access for maintenance		mm	Front only (≥ 1200 mm free space for Module extraction)			

(1) Width is including left and right side panels.

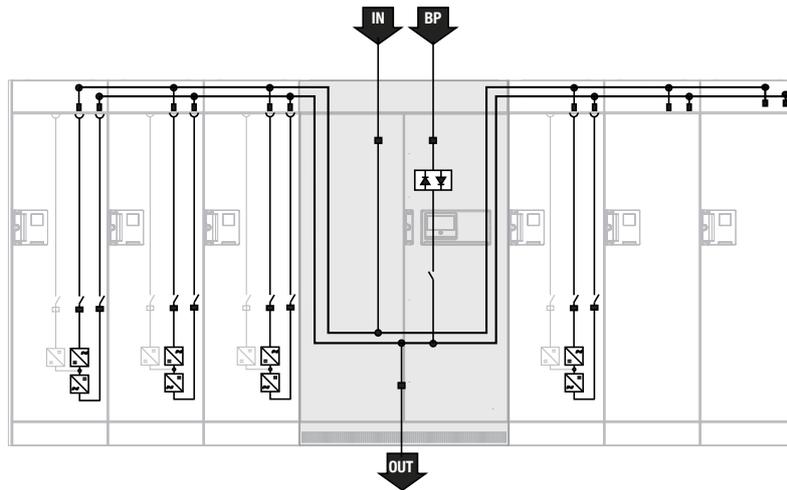
1.4. System architectures

MODULYS XL's design simplifies the connection to the upstream and downstream switchboards resulting in a simpler, faster and safer unit than a traditional UPS solution. All connections to the electrical infrastructure are performed on the system, without any modification to the site installation when power module(s) are added.

For full adaptation to all types of infrastructure and environments, MODULYS XL can be:

- set with common or separated inputs.
- top and bottom entry UPS connection
- energy storage flexibility (Distributed, Shared or Mixed).

1.4.1. Bypass architecture

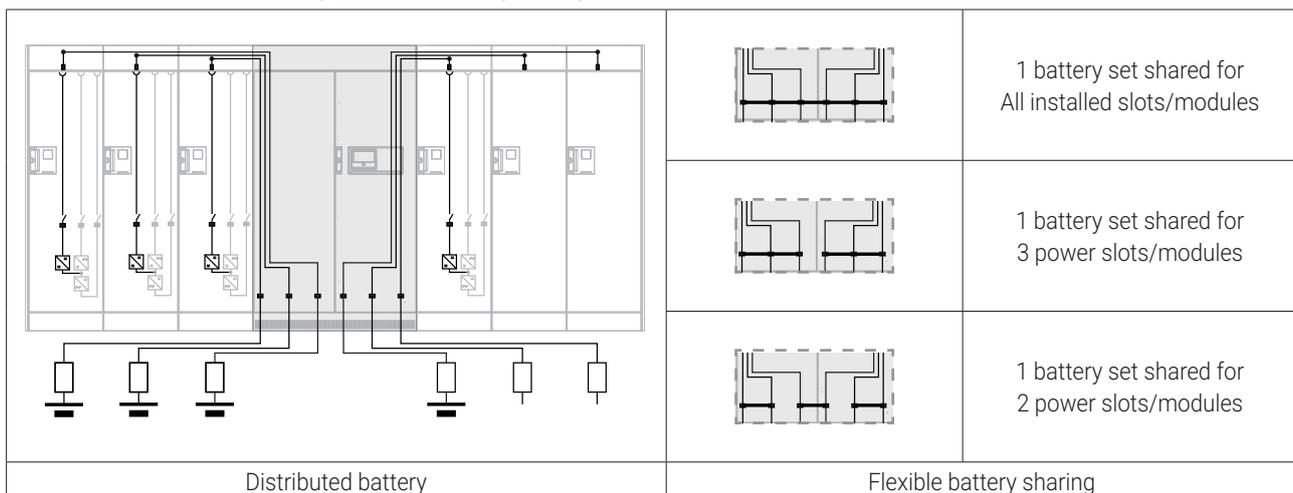


By-pass architecture for each UPS UNIT

The above drawings show simplified diagrams for separated inputs (Rectifier / Bypass).

1.4.2. Battery connection

Modulys XL provides full flexibility in regards to the batteries connection. This permits to address all different needs in term of availability, cost and footprint optimization.



The battery switch in the module allows to connect / disconnect it from the battery bus without the need to remove the entire battery set (ie Shared battery).

For a full hot scalability during a battery set extension, 2 solutions are available with Modulys XL :

- The future battery protection can be directly prewired to the Power HUB
- or
- An additional power slot can be installed to provide a full front access to the future battery set.

For parallel systems, each system can have its own battery coupling design.

2. STANDARD AND OPTIONAL EQUIPMENTS

2.1. FLEXIBLE UPS UNIT ARCHITECTURE

- Hot-scalable or Cold-scalable power.
- Adjustable redundancy level.
- Common or separated rectifier and bypass mains.
- Compatible with different energy storage technologies (e.g. VLRA, Li-Ion, Ni-Cd...).

2.2. Standard electrical features.

- Separated inputs (rectifier, bypass).
- Top or bottom cable entry.
- Backfeed protection: detection circuit.
- Full redundant cooling system.
- Distributed batteries (1 per module).
- Battery room temperature sensor.
- Module heat run test.
- Full system heat run test.
- 63 A three-phase plug for extracted module testing.
- External switches position management
- Firmware and parameter auto-alignment
- Energy Saver mode

2.3. Electrical options.

- Input, output and maintenance bypass switches.
- 3-wires bypass and output distribution kit.
- PEN kit for TN-C grounding system.
- Shared batteries (1, 2 or 3 per unit).
- Reinforced battery charger.
- Battery tripping kit.
- Additional battery temperature sensors.
- Redundant electronic power supplies.
- BCR (Battery Capacity Re-injection).
- Smart Conversion Mode.
- ACS synchronisation system.
- Cold start.

2.4. Standard communication features.

- User-friendly 7" touch-screen multilingual color graphic display (Power Hub).
- Tricolour display with number for Power Module status (Power Slot)
- 4 Com-Slots for communication options.
- USB port to download UPS report and log file.
- Ethernet port for service purpose.

2.5. Communication options.

- Dry-contact interface (configurable Volt-free contacts).
- MODBUS RTU RS485 or TCP
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs
- Remote View Pro supervision software.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- Remote touch-screen panel.

2.6. REMOTE MONITORING AND CLOUD SERVICES.

- SoLink: Socomec 24/7 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

3. SPECIFICATIONS

3.1. Installation parameters

SYSTEM INSTALLATION												
Unit Rated power (kVA)		200	400	600	800	1000	1200	200	400	600	800	1000
System configuration		N configuration						N+1 redundant configuration				
Number of Power module (200 kW)		1	2	3	4	5	6	1+1	2+1	3+1	4+1	5+1
Active power	(kW)	200	400	600	800	1000	1200	200	400	600	800	1000
Rated rectifier input current	(A)	302	604	906	1208	1510	1812	302	604	906	1208	1510
Maximum rectifier input current	(A)	340	680	1020	1360	1700	2040	680	1020	1360	1700	2040
Rated input bypass current	(A)	289	577	866	1155	1443	1732	289	577	866	1155	1443
Maximum rated bypass current	(A)	1732										
Rated output current @ 400 V	(A)	289	577	866	1155	1443	1732	289	577	866	1155	1443
Maximum air flow	(m ³ /h)	2100	4200	6300	8400	10500	12600	4200	6300	8400	10500	12600
Power dissipation in nominal conditions ⁽¹⁾	(kW)	8.5	17.0	25.5	34.0	42.5	51.0	8.5	17.0	25.5	34.0	42.5
	(kcal/h) x1000	7.3	14.6	21.9	29.2	36.5	43.8	7.3	14.6	21.9	29.2	36.5
	BTU/h x1000	29	58	87	116	145	174	29	58	87	116	145
Power dissipation (max) in the worst conditions ⁽²⁾	(kW)	10.4	20.8	31.2	41.6	52.1	62.5	10.2	21.2	32.6	44.3	55.7
	(kcal/h) x1000	8.9	17.9	26.8	35.8	44.8	53.7	8.8	18.2	28	38.1	47.9
	BTU/h x1000	35.5	71	106	142	178	213	34.8	72.3	111	151	190

3.2. Electrical characteristics

ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT ⁽³⁾	
Rated mains supply voltage	400 V 3ph
Voltage tolerance	200 V to 480 V ⁽⁴⁾
Rated frequency	50/60 Hz
Frequency tolerance	45 to 65 Hz
Power factor	> 0.99 ⁽⁵⁾
Total harmonic distortion (THDi)	< 2.5% ⁽⁵⁾
Max inrush current at start-up	< I _n (no overcurrent)
Soft start (Power walk-in)	Configurable from 1A/s to 1000A/s per module

ELECTRICAL CHARACTERISTICS - BATTERY	
Battery Type	VRLA – Lithium Ion - Ni-Cd
Number of poles	2 wires (+/-)
Battery Voltage range	Up to 700V
Lithium Ion communication with UPS	Basic (Dry contact) / Smart (Modbus)
Min/Max number of VRLA battery cells with load PF=1	258
Min/Max number of VRLA battery cells with load PF ≤ 0.9	234
Min/Max number of VRLA battery cells with load PF ≤ 0.8	222
Battery AC ripple current	< 3% C10
Battery AC ripple voltage	< 1% on the battery bloc
Battery charger	40A per module (standard) 120A per module (optional)

ELECTRICAL CHARACTERISTICS - STATIC BYPASS		
Bypass rated voltage	Nominal output voltage	
Bypass voltage tolerance	±15% (settable)	
Bypass rated frequency	50/60 Hz (selectable)	
Bypass frequency tolerance	±2% (from ±1% to ±5% (operation with generator unit))	
Bypass frequency variation speed follow up	1 Hz/s settable from 1 to 3 Hz/s	
Semiconductors characteristics	I ² t (A ² s)	Up to 10 400 000
	Is/c (A peak)	Up to 45 500
Overload tolerated on the bypass mains	60 min	110% of the installed apparent power
	10 min	125% of the installed apparent power
Short-circuit withstanding (I _{cw})	kA	100 (symmetrical) without fuses

ELECTRICAL CHARACTERISTICS - INVERTER							
Number of installed Power module (200 kVA/kW)	1	2	3	4	5	6	
Rated output voltage (selectable)	400 V 3ph						
Output voltage tolerance	static load <1%, dynamic load VFI-SS-111 compliant						
Rated output frequency	50/60 Hz (selectable)						
Autonomous frequency tolerance	±0.01 Hz on mains power failure						
Harmonic voltage distortion	ThdU ≤ 1 % with rated linear load						
Overload tolerated ⁽⁶⁾ by the inverter	1h	220 kW	440 kW	660 kW	880 kW	1100 kW	1320 kW
	10 min	250 kW	500 kW	750 kW	1000 kW	1250 kW	1500 kW
	1 min	300 kW	600 kW	900 kW	1200 kW	1500 kW	1800 kW

ENVIRONMENT CHARACTERISTICS	
UPS storage conditions	-20 to +70 °C under ≤70% condensation free RH
UPS start-up and working conditions	0 to +50 °C under ≤95% condensation free RH
Air inlet	Front
Air outlet	Top
Operating relative humidity (non-condensing)	≤ 95%
Power module efficiency in double conversion (VFI)	up to 97%
Acoustic noise	< 75 dBA
Maximum altitude without derating	1000 m (3,300 ft)
Degree of protection	IP 20 (IP30 top grids)
Colour	RAL 7016

(1) Nominal input current and rated output active power (PF1). Losses for N+1 configuration is considering the worst case (Redundancy lost).

(2) Dissipation that may be generated temporary, considering: Low input voltage, battery recharge and rated output active power (PF1).

(3) IGBT rectifier.

(4) Conditions apply.

(5) At full load and rated input voltage (THDV < 1%).

(6) The tolerated output overload corresponds to the inverter capability only. The output overload performance is incremented by the static bypass capability (when available)

3.3. Recommended system protections

3.3.1. INPUT PROTECTIONS FOR SINGLE UNIT CONFIGURATION

RECOMMENDED PROTECTION DEVICES – RECTIFIER INPUT ⁽⁷⁾ Ax				
	Configuration N		Configuration N+1	
Max power (kVA)	Number of Power slots	Protection rating (A)	Number of Power slots	Protection rating (A)
400	2	800	3	1250
600	3	1250	4	1600
800	4	1600	5	2000
1000	5	2000	6	2500*
1200	6	2500*		

* Maximum input current can be configured to fit with a 2000A circuit breaker (please consult us)

RECOMMENDED PROTECTION DEVICES – BYPASS INPUT MAIN ⁽⁷⁾ Bx				
	Configuration N		Configuration N+1	
Max power (kVA)	Number of Power slots	Protection rating (A)	Number of Power slots	Protection rating (A)
400	2	800	3	800
600	3	1000	4	1000
800	4	1250	5	1250
1000	5	1600	6	1600
1200	6	2000		

All recommended protection are considering the number of Power slots planned to be installed, at initial stage or later.

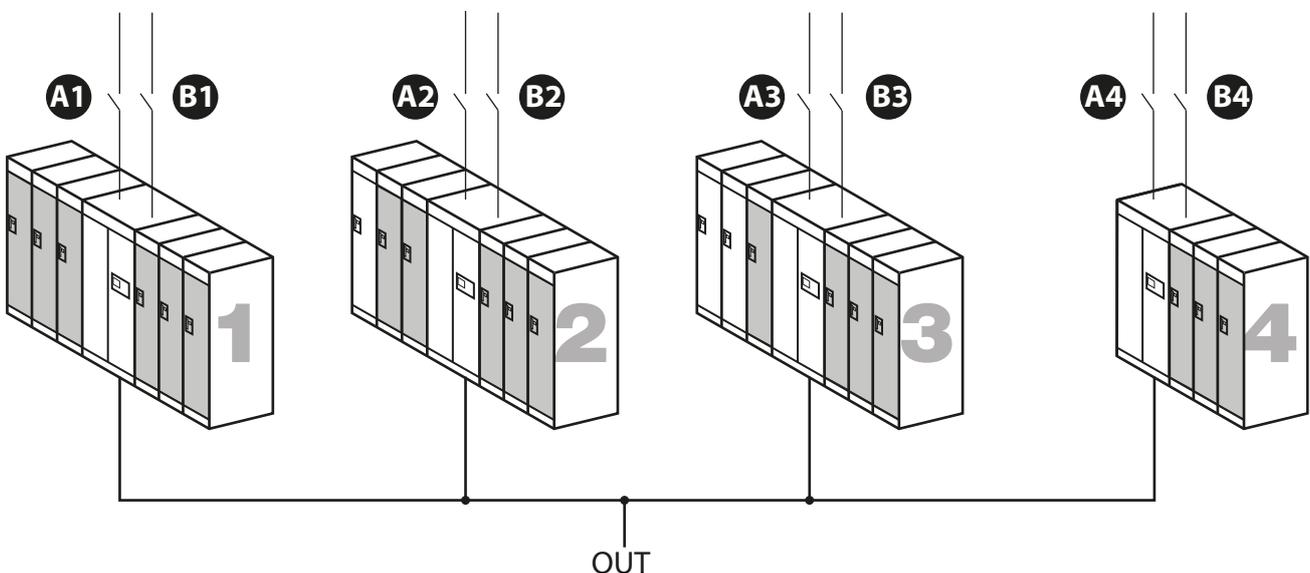
3.3.2. INPUT PROTECTIONS FOR PARALLEL UNITS CONFIGURATION

For parallel Units, protection devices upstream to each UPS UNIT are recommended as per the following guidelines:

Rectifiers: Each UNIT's input can be protected according to the number of installed Power Slots - Refer to the recommended protection for a Single Unit.

Bypass: Each UNIT's input feeders protection and cables section shall be properly sized according to the UNIT having the highest number of installed Power Slots - Refer to the recommended protection for a Single Unit.

Bx = Max **B1** - **B2** - **B3** - **B4**



3.3.3. OUTPUT PROTECTIONS

RECOMMENDED PROTECTION DEVICES – OUTPUT ⁽⁸⁾							
Number of Power module (200 kVA/kW)		1	2	3	4	5	6
Inverter short-circuit current ⁽⁹⁾ (A) (when AUX MAINS is not present)	0 to 20 ms	820A	1640A	2460A	3280A	4100A	4920A
	20 to 100 ms	650A	1300A	1950A	2600A	3250A	3900A
Output protection rating (A)		≤ 80	≤ 160	≤ 200	≤ 250	≤ 400	≤ 400

On parallel system, selectivity can be calculated by using short-circuit current of a Power module X number of Power modules

3.3.4. CABLES CONNECTION

AC CABLES CONNECTION – POWER HUB ⁽¹⁰⁾			
Maximum number of cable according the size (Others on demand)			
Rectifier terminals 3PH ⁽¹¹⁾	6 x 240 mm ² per pole	5 x 300 mm ² per pole	4 x 400 mm ² per pole
Bypass terminals 3PH+N ⁽¹²⁾	6 x 240 mm ² per pole	5 x 300 mm ² per pole	4 x 400 mm ² per pole
Output terminals 3PH+N ⁽¹²⁾	6 x 240 mm ² per pole	5 x 300 mm ² per pole	4 x 400 mm ² per pole

DC CABLES CONNECTION – POWER HUB ⁽¹⁰⁾		
Cables entry	Battery connection	Max section per pole
bottom entry	Distributed	Up to 6 batteries with max 1 x 240mm ² per battery
	Shared all Power SLOT enclosures	Max 10 x 240mm ² for the battery
	Shared 2 Power SLOT enclosures	Up to 3 batteries with max 2 x 240mm ² each group
	Shared 3 Power SLOT enclosures	Up to 2 batteries with max 4 x 240mm ² each group
top entry	Distributed	Up to 6 batteries with max 1 x 240mm ² per battery
	Shared all Power SLOT enclosures	Max 8 x 240mm ² for the battery
	Shared 2 Power SLOT enclosures	Up to 3 batteries with max 2 x 240mm ² each group
	Shared 3 Power SLOT enclosures	Up to 2 batteries with max 4 x 240mm ² each group

- (1) Applicable to separate inputs by respecting the installation rules regarding cables lengths. The bypass protection is given as a recommendation (trip curves setting and distribution sizing shall be defined according to the rated load current and the UPS overload capability). The protection shall be settable according the number of installed power blocks, its setting range shall be from 0.4 to 1 x rated current. When the bypass and rectifier inputs are combined (common input), the general input protection rating must be at least equivalent to the highest between Ax and Bx (bypass or rectifier).
- (2) Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present). This must be selective with residual current circuit breakers connected downstream of the UPS.
- (3) Average Peak Current
- (4) Based on 90° HO7 RN or R2V cable type; for other please consult us
- (5) Neutral is not required at the rectifier input. If however distributed, consult us to ensure it is allowed by installation standards.
- (6) On demand, the Unit can supply a 3 wires distribution (without input and output neutral).

4. REFERENCE STANDARDS AND DIRECTIVES

4.1. Overview

The equipment, installed, used and serviced in accordance with its intended use, its regulations and standards, its manufacturer instructions and rules, is in compliance with the relevant Union harmonization legislation:

LVD 2014 / 35 / EU

DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

EMC 2014 / 30 / EU

DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonization of the laws of the Member States relating to electromagnetic compatibility.

RoHS 2011/65/EU

Directive 2011/65 of the European parliament and of the council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

4.2. Standards

4.2.1. Safety

EN 62040-1 Uninterruptible Power System (UPS) - Part 1: General and safety requirements

IEC 62040-1 Uninterruptible Power System (UPS) - Part 1: Safety requirements (CB scheme by TÜV)

4.2.2. Electromagnetic compatibility

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (tested and verified by LCIE BUREAU VERITAS)

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (tested and verified by LCIE BUREAU VERITAS)

4.2.3. TEST and performance

EN 62040-3 Uninterruptible Power System (UPS) - Part 3: Method of specifying the performance and test requirements (tested and verified by TÜV)

4.2.4. ENVIRONMENTAL

IEC 62040-4 Uninterruptible Power System (UPS) - Part 4: Environmental aspects - Requirements and reporting

4.3. SYSTEM AND INSTALLATION GUIDELINES

When carrying out electrical installation, all the above standards must be observed. All national and international standards (e.g. IEC60364) applicable to the specific electrical installation including batteries must be observed. For further information, refer to 'Technical specifications' chapter in the user manual.



ELITE UPS: a mark of efficiency

Socomec, as CEMEP UPS manufacturer member, has signed a Code of Conduct put forward by the Joint Research Centre of the European Commission (JRC), to ensure the protection of critical applications and processes ensuring 24/7 continuous high quality supply. The JRC commits to mitigating energy losses and gas emissions caused by UPS equipment, therefore maximising UPS efficiency.