

## MODULYS XM

100 to 600 + 50 kW  
Redundant Modular UPS



### ULTIMATE

Fault tolerant power  
without compromise



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# 1. OBJECTIVES

The purpose 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.

For detailed information, see the installation and operating manual.

## 2. ARCHITECTURE

### 2.1. Range and Flexibility

Modulys XM is a modular, scalable and redundant UPS system based on plug-in and hot-swap power modules.

The modularity enables power scalability by simply plugging one or more additional modules into the existing system (up to 13 modules per system).

The modularity also enables redundancy, which is an essential feature to ensure UPS system fault tolerance. The redundant configuration can be set from N+1 up to N+R.

#### 2.1.1. FLEXIBLE AND RATED POWER

POWER MODULES												
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50

(1) No Power redundancy

#### 2.1.2. FLEXIBLE SHORT-CIRCUIT PERFORMANCE

SYSTEM CONFIGURATIONS		
	Standard	High Short-circuit
System description	Short-circuit safety performance according to IEC/EN62040-1 requirements	<ul style="list-style-type: none"> <li>- Extra-rugged system for enhanced short-circuit safety performance (beyond IEC/EN 62040-1 requirements)</li> <li>- Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability</li> </ul>
Number of Bypass Modules	2	2 + 1 <sup>(1)</sup>
Number of Power Modules	2 → 13	2 → 13

(1) Extra Bypass

See § 2.2.1 for detailed information on high short circuit solution.

#### 2.1.3. FLEXIBLE CABLING

With the standard solution it is possible to meet every cabling configuration, without the need of any extra option: top cabling, bottom cabling and mixed top/bottom cabling. Decision can be taken even at last minute, on site.

With the high short-circuit solution, two different configurations (top cabling and bottom / mixed top-bottom cabling) are provided.

#### 2.1.4. FLEXIBLE GROUNDING COMPATIBILITY

Compatible with any grounding system: TN-S, TN-C, TT, IT.

## 2.2. Flexible back-up time

Various extended back-up times are possible by using: (1) a modular battery cabinet; (2) a high-capacity battery cabinet.

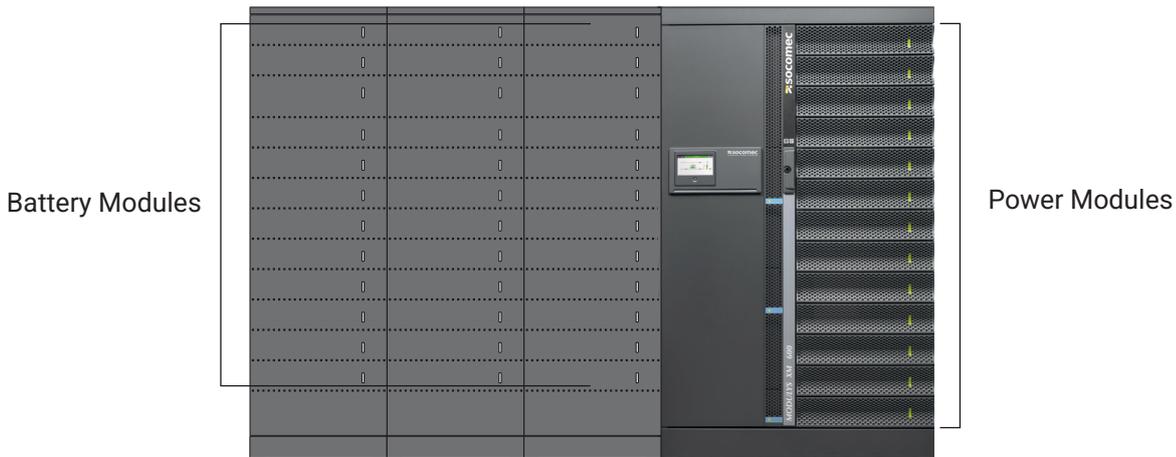
Each battery pack has an acid-proof container designed to prevent damage in the event of acid leakage.

Each Power Module has a powerful embedded battery charger able to provide up to 20 A.

### 2.2.1. Modular hot-swap battery cabinet - medium capacity

The modular battery system is based on vertical and horizontal modularity thanks to independent battery strings connected in parallel, each one made up of hot-swap long life battery packs.

Each battery string has its own independent protection device and its own independent switch for fast and safe maintenance.



DIMENSIONS AND WEIGHT																																					
Number of 9 Ah Modular hot-swap battery cabinets - medium capacity																																					
1												2												3													
Number of battery strings																																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
Height (mm)	1990																																				
Depth (mm)	890																																				
Width (mm)	810												1620												2430												
Weight (kg)	384	508	632	756	880	1004	1128	1252	1376	1500	1624	1748	2132	2256	2380	2504	2628	2752	2876	3000	3124	3248	3372	3496	3880	4004	4128	4252	4376	4500	4624	4748	4872	4996	5120	5244	

Vertical modularity using a modular battery cabinet with hot-swap battery boxes provides scalable power back-up with up to 12 battery strings per cabinet.

Horizontal modularity provides very high and scalable back-up.

A standard temperature sensor optimizes the battery recharging parameters according to the ambient operating temperature to extend battery life.

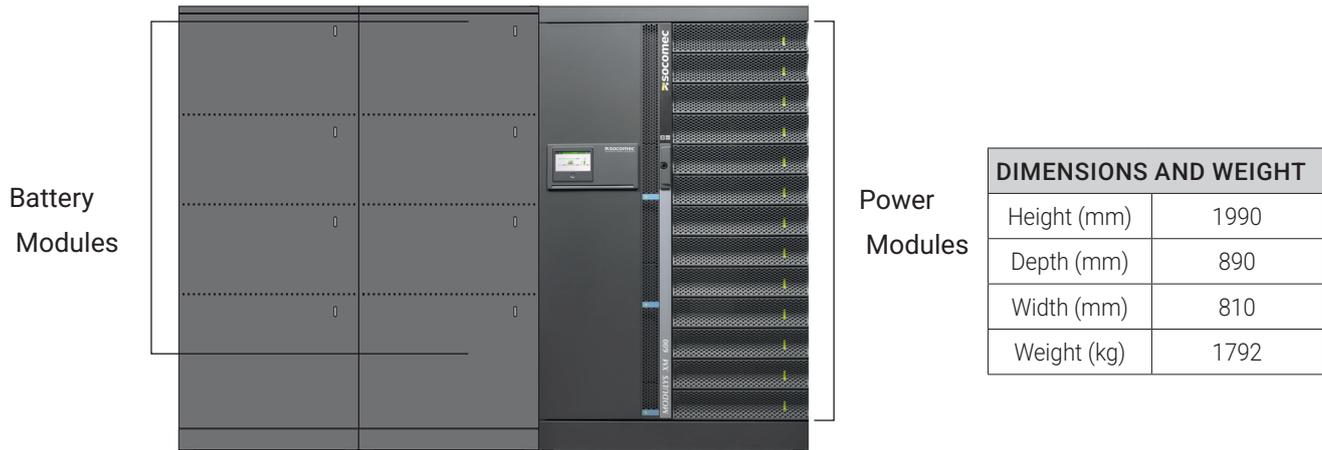
**MODULAR HOT-SWAP BATTERY CABINET**

**BACK UP TIMES IN MINUTES @ 75% OF RATED LOAD**

Number of Power Modules		2	3	4	5	6	7	8	9	10	11	12	13		
N+1 redundant System Power (kW)		100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50		
Power (kW)	1	2	18	5,5											
		3	27	10,8											
		4	36	15,4	5,5										
		5	45	18,6	8,1										
		6	54	23,7	10,8	5,5									
		7	63	31	13,2	7,3									
		8	72	36	15,4	9,1	5,5								
		9	81	42	17,2	10,8	6,9								
		10	90	48	18,6	12,3	8,1	5,5							
		11	99	55	21	14	9,5	6,7							
		12	108	62	23,7	15,4	10,8	7,6	5,5						
		2	13	117	69	27,4	16,6	11,9	8,7	6,5					
	14		126	74	31	17,7	13,2	9,8	7,3	5,5					
	15		135	79	34	18,6	14,3	10,8	8,1	6,4					
	16		144	86	36	20,1	15,4	11,7	9,1	7,1	5,5				
	17		153	93	39	22	16,3	12,7	9,9	7,7	6,3				
	18		162	99	42	23,7	17,2	13,6	10,8	8,6	6,9	5,5			
	19		171	104	45	26,2	17,9	14,5	11,5	9,3	7,5	6,2			
	20		180	112	48	28,5	18,6	15,4	12,3	10,1	8,1	6,8	5,5		
	21		189	119	51	31	19,7	16,1	13,2	10,8	8,9	7,3	6,1		
	22		198	127	55	33	21	16,8	14	11,4	9,5	7,8	6,7	5,5	
	23		207	133	59	35	22,4	17,5	14,7	12	10,2	8,5	7,1	6,1	
	24		216	140	62	36	23,7	18,1	15,4	12,8	10,8	9,1	7,6	6,6	5,5
	3	25	225	146	66	38	25,6	18,6	16	13,5	11,4	9,7	8,1	7	6
		26	234	151	69	40	27,4	19,4	16,6	14,2	11,9	10,2	8,7	7,4	6,5
		27	243	158	72	42	29,1	20,5	17,2	14,8	12,5	10,8	9,3	7,8	6,9
		28	252	166	74	44	31	21,6	17,7	15,4	13,2	11,3	9,8	8,4	7,3
		29	261	173	77	46	32	22,6	18,2	15,9	13,8	11,8	10,3	8,9	7,6
		30	270	181	79	48	34	23,7	18,6	16,5	14,3	12,3	10,8	9,4	8,1
		31	279	188	83	50	35	25,2	19,2	16,9	14,8	12,9	11,2	9,9	8,6
		32	288	196	86	52	36	26,7	20,1	17,4	15,4	13,4	11,7	10,3	9,1
		33	297	202	89	55	38	28,1	21	17,8	15,9	14	12,1	10,8	9,5
		34	306	212	93	58	39	29,4	22	18,2	16,3	14,4	12,7	11,2	9,9
		35	315	221	96	60	40	31	22,8	18,6	16,8	14,9	13,2	11,6	10,4
		36	324	229	99	62	42	32	23,7	19,1	17,2	15,4	13,6	12	10,8

(1) No Power redundancy

## 2.2.2. Modular battery cabinet - high capacity



High-capacity modular battery cabinets are designed for long BUT (Back-up-times) also with higher power.

A standard temperature sensor optimizes the battery recharging parameters according to the ambient operating temperature to extend battery life.

MODULAR BATTERY CABINET																	
BACK-UP TIMES IN MINUTES @75% OF RATED LOAD																	
Number of Power Modules		2	3	4	5	6	7	8	9	10	11	12	13				
N+1 redundant System Power (kW)		100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50				
Number of battery cabinets	1	Number of battery strings	1	Cumulative Ah	90	49	19,8										
					180	115	49	29,1	19,8	14,3							
					270	184	82	49	34	25,3	19,8	15,4					
					360	255	115	71	49	37	29,1	23,9	19,8	16,3	14,3		
					450	329	148	93	66	49	39	32	26,6	23,1	19,8	16,8	14,9
					540	407	184	115	82	62	49	41	34	29,1	25,3	22,5	19,8

(1) No Power redundancy.

## 3. SPECIFICATIONS

### 3.1. Installation parameters

DIMENSIONS AND WEIGHT													
Number of Power Modules	1	2	3	4	5	6	7	8	9	10	11	12	13
Height (mm)	1990												
Depth (mm)	950												
Width (mm)	1200												
Weight (kg)	536	572	608	644	680	716	752	788	824	860	896	932	968

RATED CURRENT AND MAX CURRENT													
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13	
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50	
Rated rectifier input current (A) (EN 62040-1)	75	150	226	301	376	451	526	601	677	752	827	902	
Maximum rectifier input current (A) (EN 62040-3)	180	270	360	450	540	630	720	810	900	990	1080	1080	
Nominal Inverter output current (A)	72	144	217	289	361	433	505	577	650	722	794	866	
Maximum bypass input current (A) (EN 62040-3)	956												
Maximum battery current (A)	228	342	456	570	684	798	912	1026	1140	1254	1368	1482	

(1) No Power redundancy

COOLING													
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13	
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50	
Maximum air flow	(m <sup>3</sup> /h)	1200	1800	2400	3000	3600	4200	4800	5400	6000	6600	7200	7800
Power Dissipation under nominal conditions <sup>(2)</sup>	(W)	1920	3950	6080	8110	10680	12820	15340	17530	19720	21920	24710	26950
	(kcal/h)	1650	3390	5220	6970	9180	11020	13180	15070	16950	18840	21240	23170
	(BTU/h)	6550	13470	20740	27670	36440	43740	52340	59810	67280	74790	84310	91950
Power Dissipation (Maximum) under worst-case conditions <sup>(3)</sup>	(W)	2140	4390	6910	9430	12060	14470	16880	19730	22200	25220	27740	30920
	(kcal/h)	1840	3780	5950	8110	10370	12450	14520	16970	19090	21690	23860	26590
	(BTU/h)	7310	14980	23580	32180	41160	49380	57600	67330	75750	86060	94660	105510

(1) No Power redundancy

(2) nominal input voltage and rated output active power (PF=1)

(3) low input voltage, battery recharge and rated output active power (PF=1)

ACOUSTIC NOISE													
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13	
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50	
Acoustic noise at 1m (dBA) <sup>(1)</sup>	53	50	55	56	57	58	59	60	61	62	63	64	

(1) at 70% nominal load.

## 3.2. Electrical characteristics

### 3.2.1. Electrical characteristics independent of the number of modules

ELECTRICAL CHARACTERISTICS - INPUT	
Rated mains supply voltage (V)	400 V 3-phase+N
Voltage tolerance at full load	340 V to 480 V (+20/-15%)
Voltage tolerance at derated load	up to 240 V @ 50% of nominal load (linear decrease)
Rated frequency (Hz)	40 - 70 Hz
Power factor	> 0.99(1)
Total harmonic input current distortion (THDi)	≤ 3% (@: Pn, Resistive load, Mains THDv ≤ 1%)
Max inrush current at start-up	Power walk-in/ Soft-start (selectable parameters)

(1) Pout ≥ 50% of nominal Power.

ELECTRICAL CHARACTERISTICS - BYPASS	
Bypass rated voltage (V)	Nominal output voltage ±15% (±20% if GENSET is used)
Bypass rated frequency (Hz)	50/60
Bypass frequency tolerance	±2% selectable (±8% if GENSET is used)
Bypass frequency variation speed	50/60 ±10%

ELECTRICAL CHARACTERISTICS - INVERTER	
Rated output voltage (V)	(3ph + N) 400 380/400/415 selectable
Output voltage tolerance (V)	±1%
Rated output frequency (Hz)	50/60 (selectable)
Output frequency tolerance	±0.05% (on battery mode)
Load crest factor	≥ 2.7:1
Total output voltage distortion (THDv)	≤ 1% (Ph/Ph); ≤ 2% (Ph/N) (@: Pn, Resistive load)

ELECTRICAL CHARACTERISTICS - STORED ENERGY OPERATING MODE	
Number of battery blocks (VRLA)	From 18+18 to 24+24 (1)

(1) Consult us

ELECTRICAL CHARACTERISTICS - EFFICIENCY	
Efficiency (on-line mode)	up to 96.5%
Efficiency (eco-mode)	up to 99.3%

ELECTRICAL CHARACTERISTICS - BYPASS OVERLOAD AND SHORTCIRCUIT			
Solution type		Standard	High Short-circuit (*)
Number of Bypass Modules		2	2 or 2 + 1 <sup>(1)</sup>
Number of Power Modules		2 → 13	
Bypass overload (A)	Nominal	362	362
	Continuous	398	398
	10'	453	453
	1'	543	543
	1"	634	634
Bypass Maximum short-circuit current ITSM (A)		28000	40000
Bypass I <sup>2</sup> t (A <sup>2</sup> s)		3920000	8000000

(1) Extra Bypass Module (option) for higher Bypass short-circuit capability

ELECTRICAL CHARACTERISTICS - SYSTEM SHORTCIRCUIT SAFETY PERFORMANCE		
Solution type	Standard	High Short-circuit (*)
Number of Bypass Modules	2	2 or 2 + 1 <sup>(1)</sup>
Number of Power Modules	2 → 13	
Short-circuit current withstand (Icw)	20 kA	35 kA up to 65 kA <sup>(2)</sup>

(1) Extra Bypass Module (option) for higher Bypass short-circuit capability (2) option - contact us

(\*) High short-circuit solution:

- Extra-rugged system for enhanced short-circuit safety performance (beyond IEC/EN 62040-1 requirements)
- Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability

### 3.2.2. Electrical characteristics dependent on the number of modules

ELECTRICAL CHARACTERISTICS - Inverter overload and short-circuit												
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50
Inverter overload (kW) <sup>(2)</sup>	10 min	125	187,5	250	312,5	375	437,5	500	562,5	625	687,5	750
	5 min	132	198	264	330	396	462	528	594	660	726	792
	1 min	150	225	300	375	450	525	600	675	750	825	900
Inverter short-circuit (A) Ik1 = Ik2 = Ik3	40 ms	390	585	780	975	1170	1365	1560	1755	1950	2145	2340
	40 to 100 ms	324	486	648	810	972	1134	1296	1458	1620	1782	1944

(1) No Power redundancy

(2) Conditions: Initial Pout ≤ 80% Pn, Vin nominal

ELECTRICAL CHARACTERISTICS - BATTERY CHARGER MAX CURRENT												
Number of Power Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50
Maximum Current (A)	40	60	80	100	120	140	160	180	200	220	240	260

(1) No power redundancy

### 3.3. Recommended protection

#### 3.3.1. System from 50 to 600 + 50 kVA



#### Key

1. Input mains magneto-thermal switch
2. Auxiliary mains magneto-thermal switch
3. System shutdown switch
4. Distribution

The installation and system should comply with national plant regulations.

The electrical distribution panel should have a sectioning and protection system installed for input and auxiliary mains.

SYSTEM CABLES - MAX SECTION		
Number of Modules		1 → 13
Rectifier terminals (mm <sup>2</sup> )	Flexible	3 x 240
	Rigid	3 x 240
Bypass terminals (mm <sup>2</sup> )	Flexible	3 x 240
	Rigid	3 x 240
Battery terminals (mm <sup>2</sup> )	Flexible	3 x 240
	Rigid	3 x 240
Output terminals (mm <sup>2</sup> )	Flexible	3 x 240
	Rigid	3 x 240

M10 terminals for In, Aux and Out; M12 for battery connections

Tightening torque 20Nm

Maximum cross-section is determined by the size of the terminals.

As specified in EN 62040-3 Appendix 3 (Non-Linear Load Reference), in the event of three-phase non-linear loads connected downstream of the UPS, the neutral current on the load can be 1.5 - 2 times higher than the phase current. This should be taken into account when estimating the correct size of output and auxiliary neutral cables.

RECOMMENDED PROTECTION DEVICES - RECTIFIER													
Number of Modules	2	3	4	5	6	7	8	9	10	11	12	13	
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50	
C Curve circuit breaker (A)	Min	200	320	400	630	630	630	800	1000	1000	1000	1250	1250
	Max	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250

(1) No Power redundancy

(2) Caution! Residual Current Detection (RCD) can only be used with a common input and auxiliary mains (configuration not recommended). It must be placed upstream of the connection between input mains and auxiliary mains. Use type B four-pole selective (S) residual current detectors. Load leakage currents are to be added to those generated by the UPS and during transitory phases (power failures and power returns) short current peaks may occur. If loads with high leakage current are present, adjust the residual current protection. It is advisable in all cases to carry out a preliminary check on the earth current leakage with the UPS installed and operational with the definitive load, to prevent the RCD tripping over.

A circuit breaker switch is recommended with magnetic intervention threshold  $\geq 10 I_n$ .

It is necessary to use a circuit breaker with  $I_m \leq 20 \times I_n$  (A) selective breaker if an optional external transformer is used. The min value depends on the size of the power cables in the installation, while the max value is limited by the UPS cabinet.

The system can accept the max. value of protection, whatever the number of modules installed, in order to allow future scalability, while the min. value depends on the size of the power cables in the installation. A value of protection less than Max shall be used when the mains network structure cannot support the full power load, and shall be chosen between max. and min. values (as per the table above) according to mains network design.

Rectifier protection should be taken into account in the event of separate inputs; when the auxiliary mains and rectifier inputs are combined (common input), the general input protection rating should be higher than both (auxiliary mains or rectifier).

RECOMMENDED PROTECTION DEVICES - AUXILIARY MAINS												
Number of Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50
C Curve circuit breaker (A)	Min	200	320	400	630	630	630	800	1000	1000	1000	1000
	Max	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250

(1) No Power redundancy

A circuit breaker switch is recommended with magnetic intervention threshold  $\geq 10 I_n$ .

It is necessary to use a circuit breaker with  $I_m \leq 20 \times I_n$  (A) selective breaker if an optional external transformer is used. The minimum value depends on the size of the power cables in the installation, while the maximum value is limited by the UPS cabinet.

The conditional short circuit current ( $I_{cc}$ ) according to IEC 62040-1 is 65KA rms, provided that the UPS is protected by a MCCB with adequate breaking capability and current-limiting capability under short-circuit conditions. Contact us for detailed information.

RECOMMENDED PROTECTION DEVICES - UPSTREAM RESIDUAL CURRENT DETECTION CIRCUIT BREAKER												
Number of Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50
Differential input (A)	Min											

(1) No Power redundancy

An RCD is not necessary when the UPS is installed on a TN-S system. RCDs are not allowed on TN-C systems. If an RCD is required, a B type should be used.

Caution! Use four-pole selective (S) residual current detectors (RCDs). Load leakage currents are to be added to those generated by the UPS and short current peaks may occur during transitory phases (power failures and power returns). If loads with high leakage current are present, adjust the residual current protection. It is advisable in all cases to carry out a preliminary check on the ground current leakage with the UPS installed and operating with the definitive load, so as to prevent the tripping of the RCD switch.

OUTPUT SELECTIVITY ON BATTERY MODE (AUX MAINS NOT PRESENT)												
Number of Modules	2	3	4	5	6	7	8	9	10	11	12	13
N+1 redundant System Power (kW)	100+0 <sup>(1)</sup>	100+50	150+50	200+50	250+50	300+50	350+50	400+50	450+50	500+50	550+50	600+50
Circuit breaker with $I_m \leq 5 \times I_n$ (A)	Max	50	80	100	125	125	200	200	250	250	250	250
Circuit breaker with $I_m \leq 10 \times I_n$ (A)	Max	25	40	50	63	80	100	100	125	125	160	160

(1) No Power redundancy

# 4. REFERENCE STANDARDS AND DIRECTIVES

## 4.1. Overview

The construction of the equipment and choice of materials and components comply with all laws, decrees, directives and standards currently in force. In particular, the equipment is fully compliant with all European Directives concerning CE marking.

### 2006/95/EC

Council Directive 2006/95/EC, dated 16 February 2007, on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits..

### 2004/108/EC

On the approximation of the laws of the Member States relating to electromagnetic compatibility.

## 4.2. Standards

STANDARD	
Safety	EN/IEC 62040-1 - AS 62040-1
EMC	EN/IEC 62040-2 - AS 62040-2
Product certification	IECEE CB Scheme
Performance	EN/IEC 62040-3 - AS 62040-3
Product marks	CE - RCM <sup>(1)</sup> - EAC <sup>(1)</sup> - CMIM <sup>(1)</sup> - UKCA <sup>(1)</sup>
Protective class	Protective Class I
Protection level	IP20

(1) Depends on the production site. Consult the data plate on the equipment



### 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.