MODULYS GP

25 to 200 kW

Redundant Modular UPS

ULTIMATE

Fault tolerant power
without compromise

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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.

1. ARCHITECTURE

1.1 RANGE AND FLEXIBILITY

Modulys GP 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 8 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+0 up to N+R, it is strongly recommended to use N+1 to benefit from all the great advantages of redundancy.

1.1.1 FLEXIBLE RATED POWER

POWER MODULES									
Number of Power Modules	1	2	3	4	**5**	**6**	**7**	8	
N+1 redundant System Power (kW)	25 + 0(1)	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0(1)

(1) No Power redundancy

1.1.2 FLEXIBLE CABLING

The standard solution has bottom cabling configuration.

As an option they can also accept top cabling and mixed top-bottom cabling.

1.1.3 FLEXIBLE GROUNDING COMPATIBILITY

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

1.2 FLEXIBLE BACK-UP TIME

Different extended back-up times are possible by using: (1) the internal battery; (2) a modular battery cabinet; (3) a high capacity battery cabinet. The latter two occupy minimum floor space.

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

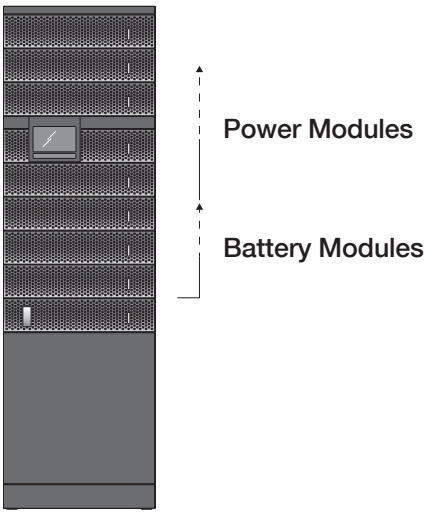
Each Power Module has a powerful embedded battery charger able to provide up to 8 A (without derating).

A special Power Module with double battery charger inside is available when very long back-up times are required.

1.2.1 INTERNAL HOT-SWAP BATTERY

A standard UPS cabinet can house both Power Modules and Battery Boxes, thus providing a compact solution with a small footprint and optimised costs.

Each battery box has its own independent protection and it is hot-swappable.



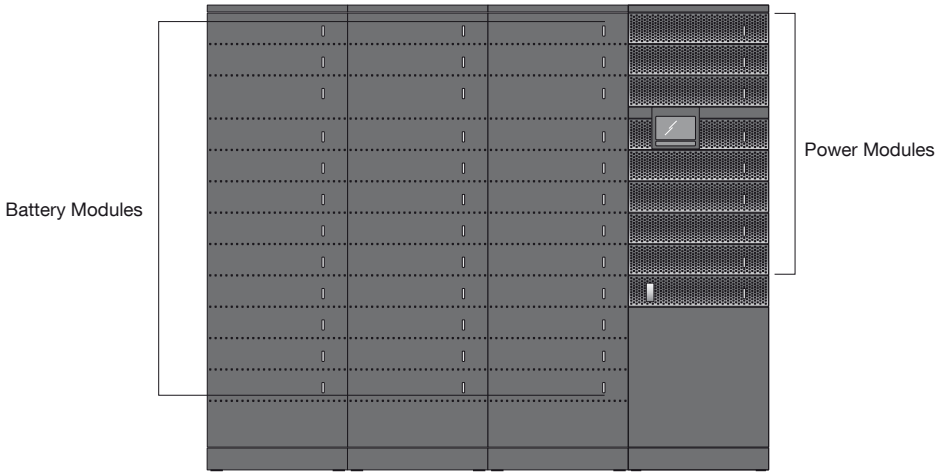
INTERNAL HOT-SWAP BATTERY CABINET BACK UP TIMES IN MINUTES @ 75% OF RATED LOAD											
Number of Power Modules				1	2	3	4	**5**	**6**	**7**	8
N+1 redundant System Power (kW)				25 + 0[(1)]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[(1)]
Number of String	1	Cumultative Ah	5	/	/	/	/	/	/	/	/	/
	2		10	6	6	/	/	/	/	/	/	/
	3		15	11	11	/	/	/	/	/	/	/
	4		20	16	16	6	/	/	/	/	/	/
	5		25	21	21	8	/	/	/	/	/	/
	6		30	26	26	/	/	/	/	/	/	/
	7		35	34	34	/	/	/	/	/	/	/

(1) No Power redundancy

1.2.2 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 of hot-swap long life battery packs.

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



DIMENSIONS AND WEIGHT

	Number of 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)	950																																			
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 to 12 battery strings per cabinet.

Horizontal modularity provides very high and scalable back-up.

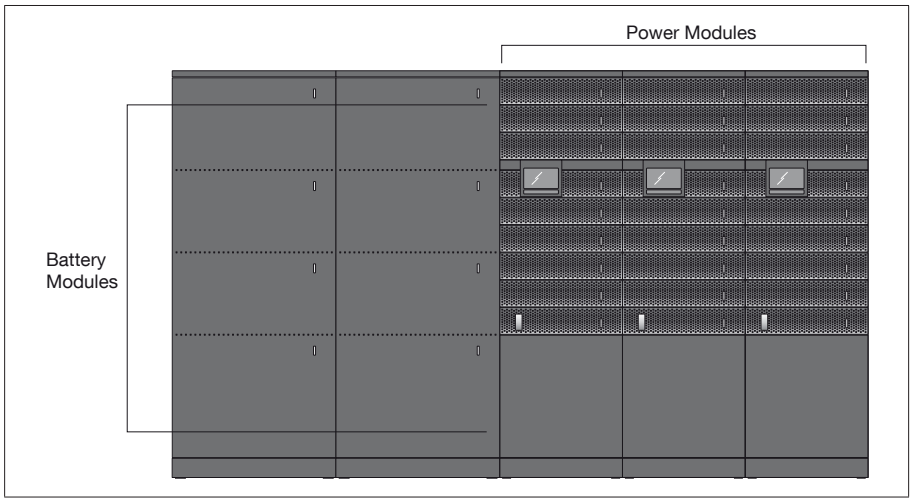
A standard temperature sensor optimises the battery recharging parameters according to the ambient operating temperature to extend battery life.

MODULAR HOT-SWAP BATTERY CABINET - MEDIUM CAPACITY
BACK-UP TIMES IN MINUTES @75% OF RATED LOAD

Number of Power Modules						1	2	3	4	**5**	**6**	**7**	8	
N+1 redundant System Power (kW)						25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Number of battery cabinets	Numer of battery strings		Cumultative Ah											
	1	1		9		5	5							
		2		18		15	15	5						
		3		27		23	23	9	5					
		4		36		34	34	15	8	5				
		5		45		44	44	19	11	7	5			
		6		54		57	57	23	15	9	6	5		
		7		63		68	68	28	18	12	8	6	5	
		8		72		80	80	34	20	15	11	8	6	5
		9		81		92	92	40	23	17	13	9	7	6
		10		90		103	103	44	26	19	15	11	9	7
		11		99		116	116	51	30	21	17	13	10	8
		12		108		129	129	57	34	23	18	15	12	9
	2	13		117		141	141	63	38	25	20	16	13	11
		14		126		151	151	68	41	28	22	18	15	12
		15		135		163	163	73	44	31	23	19	16	14
		16		144		177	177	80	48	34	25	20	17	15
		17		153		190	190	86	53	37	27	22	18	16
		18		162		206	206	92	57	40	29	23	19	17
		19		171		221	221	98	61	42	32	25	21	18
		20		180		235	235	103	65	44	34	26	22	19
		21		189		249	249	109	68	47	37	28	23	20
		22		198		261	261	116	71	51	39	30	25	21
		23		207		272	272	123	75	54	41	32	26	22
		24		216		282	282	129	80	57	43	34	27	23
	3	25		225		294	294	135	84	60	44	36	29	24
		26		234		310	310	141	88	63	46	38	31	25
		27		243		326	326	146	92	66	49	40	33	26
		28		252		341	341	151	96	68	52	41	34	28
		29		261		354	354	156	99	71	55	43	36	30
		30		270		367	367	163	103	73	57	44	38	31
		31		279		383	383	170	107	76	59	46	39	33
		32		288		402	402	177	111	80	62	48	41	34
		33		297		419	419	183	116	83	64	51	42	36
		34		306		436	436	190	120	86	66	53	43	37
		35		315		451	451	197	125	89	68	55	44	39
		36		324		466	466	206	129	92	70	57	46	40

(1) No Power redundancy

1.2.3 MODULAR BATTERY CABINET - HIGH CAPACITY



DIMENSIONS AND WEIGHT		
Number of Strings	0	1
Height (mm)	1990	
Depth (mm)	890	
Width (mm)	810	
Weight (kg)	220	1792

High-capacity modular battery cabinets are designed for long back-up times (BUT) 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						1	2	3	4	**5**	**6**	**7**	8	
N+1 redundant System Power (kW)						25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Number of battery cabinets	1	Number of battery strings	1	Cumulative Ah	92	119	119	56	33	21	15	-	-	-
	2		2		184	279	279	119	75	56	45	33	25	21
	3		3		276	447	447	201	119	84	66	56	49	41
	4		4		368	654	654	279	170	119	89	75	62	56
	5		5		460	-	-	378	226	154	119	92	81	70
	6		6		552	-	-	-	279	201	146	119	96	84

(1) No Power redundancy

2. SPECIFICATIONS

2.1 INSTALLATION PARAMETERS

DIMENSIONS AND WEIGHT								
Number of Power Modules	1	2	3	4	5	6	7	8
Height (mm)	1990							
Depth (mm)	890							
Width (mm)	600							
Weight (kg)	286	319	352	385	418	451	484	517

RATED CURRENT AND MAX CURRENT									
Number of Power Modules	1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)	25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Rated rectifier input current (A) (EN 62040-1)	38	75	113	151	189	226	264	302	
Maximum rectifier input current (A) (EN 62040-3)	45	90	135	180	225	270	315	360	
Nominal Inverter output current (A)	36	72	109	145	181	217	253	290	
Maximum bypass input current (A) (EN 62040-3)	320								
Maximum battery current (A)	80	160	240	320	400	480	560	640	

(1) No Power redundancy

COOLING										
Number of Power Modules		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Maximum air flow	(m3/h)	400	800	1200	1600	2000	2400	2800	3200	
Power Dissipation under nominal conditions[2]	(W)	1140	1140	2280	3420	4560	5700	6840	7980	9120
	(kcal/h)	980	980	1961	2941	3922	4902	5882	6863	7843
	(BTU/h)	3891	3891	7782	11672	15563	19454	23345	27236	31127
Power Dissipation (maximum) under worst-case conditions[3]	(W)	1350	1350	2650	3950	5250	6550	7850	9150	10450
	(kcal/h)	1161	1161	2279	3397	4515	5633	6751	7869	8987
	(BTU/h)	4608	4608	9044	13481	17918	22355	26792	31229	35666

(1) No Power redundancy

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

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

ACOUSTIC NOISE								
Number of Power Modules	1	2	3	4	5	6	7	8
N+1 redundant System Power (kW)	25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Acoustic noise at 1m (dBA) [2]	51	53	54	55	56	57	58	59	

(1) No Power redundancy

(2) at 70% nominal load.

2.2 ELECTRICAL CHARACTERISTICS

2.2.1 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)

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

(1) Consult us

ELECTRICAL CHARACTERISTICS - BYPASS OVERLOAD AND SHORTCIRCUIT		
Number of Power Modules		1 → 8
Bypass overload (A)	Nominal	290
	Continuous	320
	10'	362
	1'	450
	1"	510
Bypass Max short-circuit current ITSM (A)		9000
Bypass I^2t (A^2s)		40000

ELECTRICAL CHARACTERISTICS - SYSTEM SHORTCIRCUIT SAFETY PERFORMANCE	
Number of Power Modules	1 → 8
Short-circuit current withstand (Icw)	10 kA
Conditional short-circuit current (Icc)	50 kA

2.2.2 ELECTRICAL CHARACTERISTICS DEPENDENT ON THE NUMBER OF MODULES

ELECTRICAL CHARACTERISTICS - INVERTER OVERLOAD AND SHORT-CIRCUIT										
Number of Power Modules		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Inverter overload (kW)[2]	10 min	31,2	62,4	94	125	157	188	219	250	
	5 min	33,3	66,5	100	133	166	200	233	266	
	1 min	37,5	75,0	113	150	188	225	263	300	
Inverter short-circuit (A) Ik1 = Ik2 = Ik3	40 ms	100	200	300	400	500	600	700	800	
	40 to 100 ms	80	160	240	320	400	480	560	640	

(1) No Power redundancy

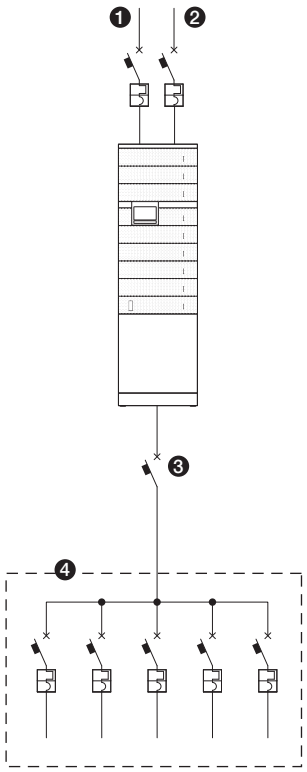
(2) Conditions: Initial Pout ≤ 80% Pn, Vin nominal

ELECTRICAL CHARACTERISTICS - BATTERY CHARGER MAX CURRENT									
Number of Power Modules	1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)	25 + 0[1]	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0[1]
Standard Maximum Current (A)	8	16	24	32	40	48	56	64	64
Enhanced Battery Charger Maximum current (A)	16	32	48	64	80	96	112	128	128

(1) No power redundancy

2.3 RECOMMENDED PROTECTION

2.3.1 SYSTEM FROM 25 TO 200 kW



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 → 8
Rectifier terminals (mm^2)	Flexible	2 x 150
	Rigid	2 x 150
Bypass terminals (mm^2)	Flexible	2 x 150
	Rigid	2 x 150
Battery terminals (mm^2)	Flexible	2 x 150
	Rigid	2 x 150
Output terminals (mm^2)	Flexible	2 x 150
	Rigid	2 x 150

M10 terminals

Tightening torque 20 Nm

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		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0(1)	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0(1)
Circuit breaker with Im ≤ 10 x In (A)	Minimum	50	100	160	200	250	320	400	400	
	Maximum	400	400	400	400	400	400	400	400	

(1) No Power redundancy

A circuit breaker switch is recommended with magnetic intervention threshold ≥10 In.

It is necessary to use a circuit breaker with Im ≤ 20 x In (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 system can accept the maximum value of protection, regardless of the number of modules installed, in order to enable future scalability, while the minimum value depends on the size of the power cables in the installation. A protection value of less than the maximum shall be used when the mains grid structure cannot support the full power load, and shall be chosen between the minimum and maximum values (as per the table above) according to mains grid 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		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0(1)	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0(1)
Circuit breaker with Im ≤ 10 x In (A)	Minimum	50	100	160	200	250	320	400	400	
	Maximum	400	400	400	400	400	400	400	400	

(1) No Power redundancy

A circuit breaker switch is recommended with magnetic intervention threshold ≥10 In.

It is necessary to use a circuit breaker with Im ≤ 20 x In (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 (Icc) 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		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0(1)	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0(1)
Residual Current Detection (A)	Minimum	0.5								

(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 tripping of the RCD switch.

OUTPUT SELECTIVITY ON BATTERY MODE (AUX MAINS NOT PRESENT)										
Number of Modules		1	2	3	4	5	6	7	8	
N+1 redundant System Power (kW)		25 + 0(1)	25 + 25	50 + 25	75 + 25	100 + 25	125 + 25	150 + 25	175 + 25	200 + 0(1)
Circuit breaker with Im ≤ 5 x In (A)	Maximum	13	25	40	50	63	80	100	100	
Circuit breaker with Im ≤ 10 x In (A)	Maximum	6	13	20	25	32	40	50	50	

(1) No Power redundancy

3. REFERENCE STANDARDS AND DIRECTIVES

3.1 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.

2014/35/EU

Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation 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.

2014/30/EU

Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

2011/65/EU

Directive 2011/65/EU 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.

3.2 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(1) - EAC(1) - CMIM(1) - UKCA(1)
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.