TECHNICAL GUIDE

EN

MASTERYS GP4

10 to 40 kVA/kW

SUPERIOR
Unrivalled power performance

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

96.5% EFFICIENCY

kW = kVA

Safety tested Production monitored TÜV SÜD tuv-sud.com/ps-cert

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Innovative Power Solutions

1. OBJECTIVES

The aim of these specifications is to provide:

- the information required to choose the correct uninterruptible power supply for a specific application.
- 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 load(s) must be implemented 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 circuit breaker (or two, if there is a separate bypass line) of an appropriate rating for the power drawn at full load.

If an external manual bypass is required, only the model supplied by the manufacturer must be installed.

We recommend fitting two metres of unanchored flexible cable between the UPS terminals and the cable anchor (wall or cabinet). This makes it possible to move and service the UPS.

For detailed information, see the installation and operating manual.

3. ARCHITECTURE

3.1. Range

MASTERYS GP4 is a full range of high performing UPS systems designed to:

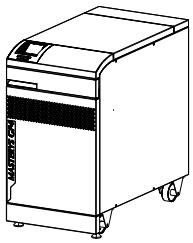
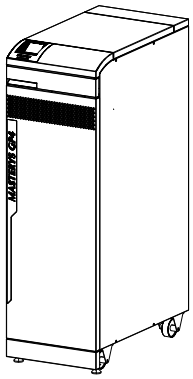
- ensure 24/7/365 availability and business continuity for datacentre infrastructure,
- avoid data losses and downtime of company operations,
- reduce the electrical infrastructure's total cost of ownership,
- adopt a sustainable development approach.

MODELS					
Rated power (kVA)	10	15	20	30	40
MASTERYS GP4 3/1	•	•	•		
MASTERYS GP4 3/3	•	•	•	•	•
Matrix table for model and kVA power rating					

Each family has been specifically designed to meet the demands of loads in specific application contexts, in order to optimise product features and facilitate integration within the system.

4. FLEXIBILITY

4.1. Power ratings from 10 to 40 kVA/kW

DIMENSIONS				
Cabinet type		Width (W) [mm]	Depth (D) [mm]	Height (H) [mm]
	**S4**	444	800	800
	**M4**	444	800	1400

The equipment has been designed with a minimum net and gross footprint (the actual space occupied by the unit and the space required around it for maintenance, ventilation and access to operating mechanisms and communication devices).

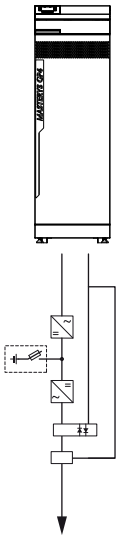
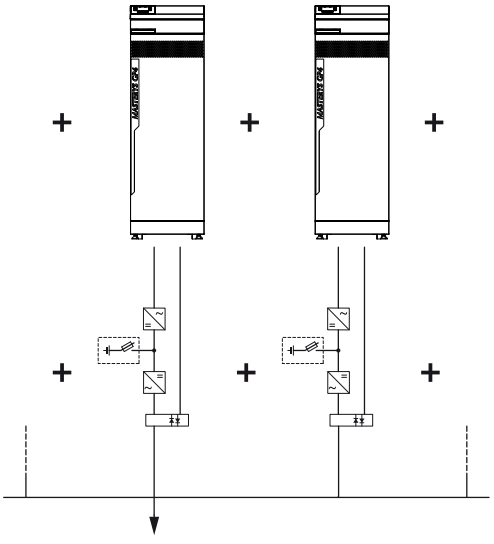
All of the control mechanisms and communication interfaces are located in the upper front section.

The intelligent design also provides easy access for maintenance and installation.

The air inlet is on the front, with outflow to the rear.

4.2. Parallel

MASTERYS GP4 enables 2 configurations of UPS systems in the same range.

	
Single unit configuration	Parallel UPS configuration (up to 6 units)

4.3. Reliability

Reliability is the most critical factor for any UPS solution designed to protect and manage the continuity of activities and services.

MASTERYS GP4 MTBF exceeds the market standard, and Socomec officially declares its MTBF data.

4.4. Seismic resistant

The 4th generation MASTERYS units (with SEISMIC option installed) have successfully passed extensive tests to verify resistance to withstand seismic events.

Tests have been performed by accredited laboratories according to the standards covering zones with the highest level of seismic activity: Zone 4.

The test requires that the UPS system, working at full load and provided with floor fixing devices, must resist the stresses and accelerations defined by the test protocol. When the test has been completed, the UPS must be intact and working perfectly.

4.5. Flexible back-up time

Different back-up times are possible by using models with internal battery or external battery cabinets.

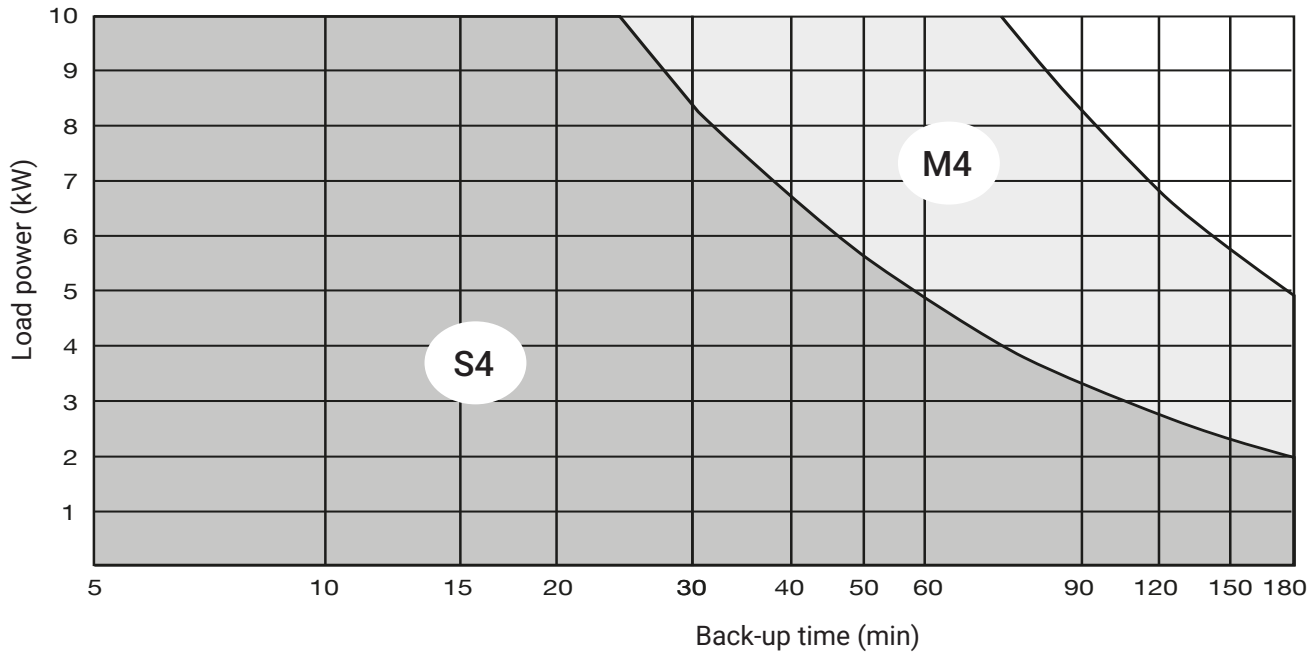
Batteries are installed on acid-proof trays and connected by means of polarised connectors to facilitate their maintenance.

To guarantee maximum back-up time availability and battery life, the MASTERYS GP4 series is equipped with an EBS (Expert Battery System).

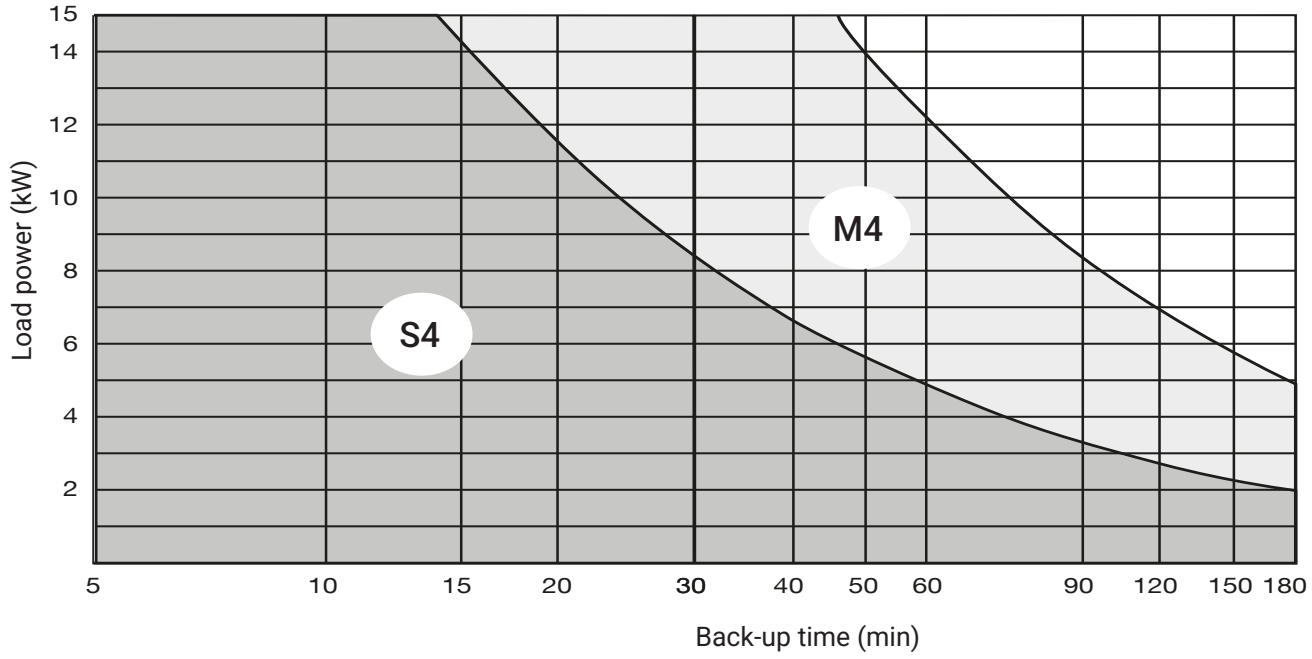
For external battery cabinets use size **S4**.

For internal batteries, use the following charts to select the model (**S4/M4**) in relation to power and back-up time.

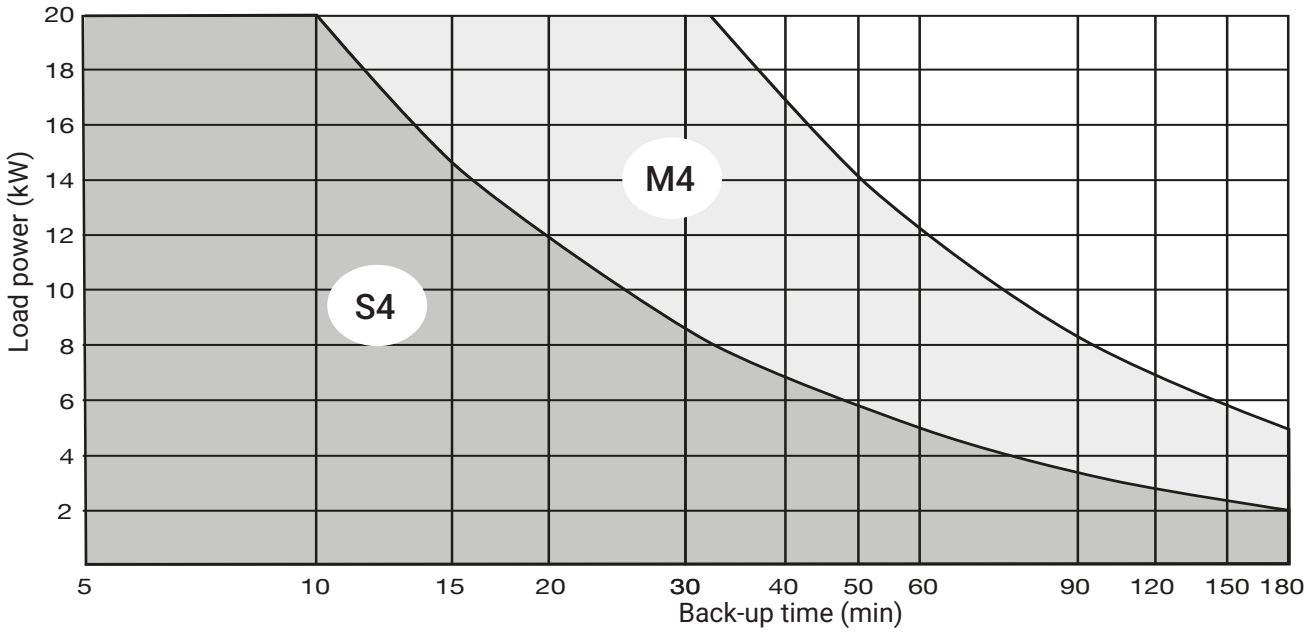
10 kVA



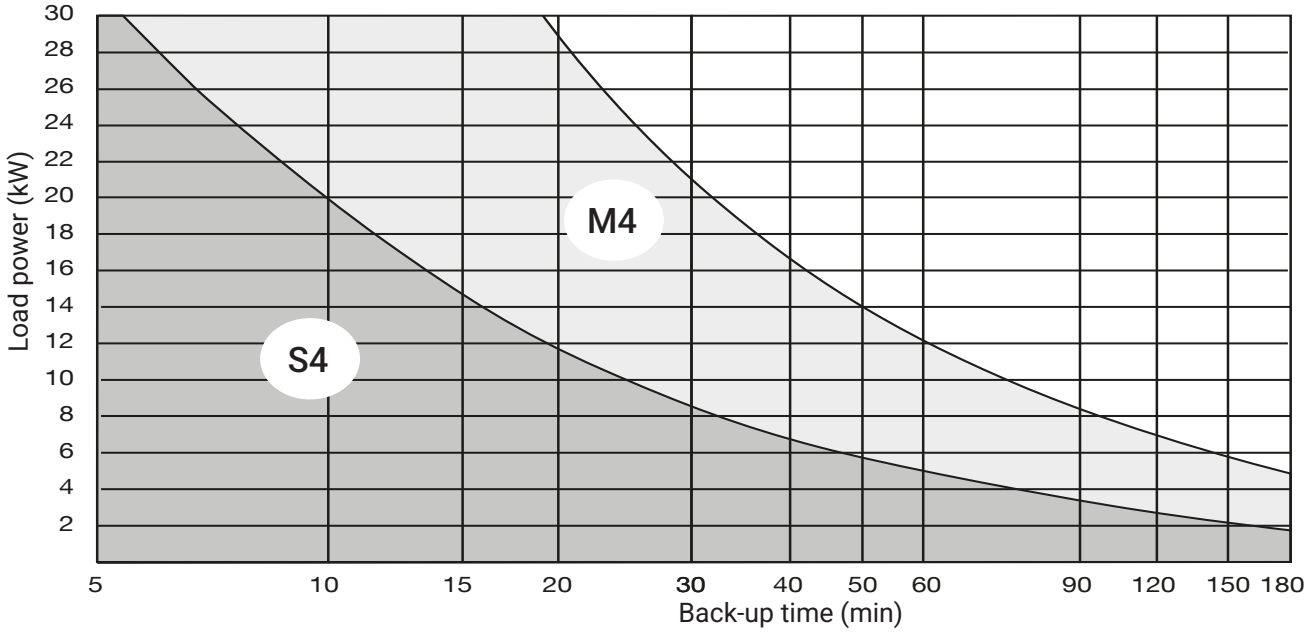
15 kVA



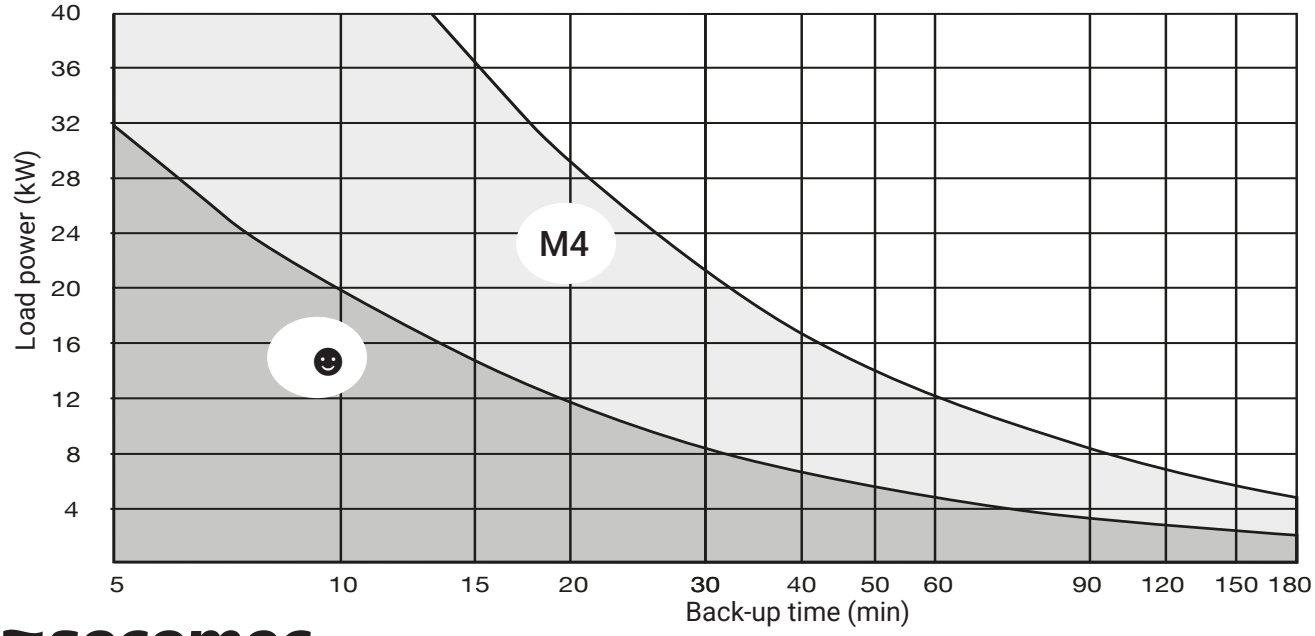
20 kVA



30 kVA



40 kVA



5. STANDARD FEATURES AND OPTIONS

AVAILABILITY	
●	Factory-installed option
○	Available as option

Features	MASTERYS GP4		Notes
	10-15-20 kVA	30-40 kVA	
BATTERY OPTION			
Additional charger	●○	●○	⚠ ⊘ Kit for Rectifier Neutral creation
COMMUNICATION OPTION			
ACS card (Automatic Cross Synchronisation)	●○	●○	
ADC+SL card (Advanced Dry Contact + Serial Link)	○	○	
External temperature sensor	○	○	⚠ ❗ ADC+SL card
7' touch-screen colour graphic display	●	●	
Remote touchscreen display	○	○	⚠ ❗ ADC+SL card
Modbus TCP interface card	○	○	
Net Vision card (professional WEB/SNMP interface for UPS monitoring)	○	○	
EMD (Environmental Monitoring Device: temperature, humidity, 2 dry contacts)	○	○	⚠ ❗ Net Vision card
ELECTRICAL OPTION			
Parallel card	●○	●○	
External maintenance bypass	○	○	
Kit for TN-C / Neutral-Ground connection	○	○	
Internal Backfeed isolation device	●	●	
Kit For Common Mains	○ (3/3)	○	
Kit for Rectifier Neutral creation	●	●	⚠ ⊘ Kit for TN-C / Neutral-Ground connection ⊘ Kit For Common Mains ⊘ Additional charger
Redundant Bypass Ventilation	●	●	
Cold Start	●	●	
MECHANICAL OPTION			
Ramp for unloading UPS	○	○	
Kit for Front and Lateral Cover	○	○	
Kit for IP21	○	○	
Seismic adaptation	●	●	

❗ Required option
⊘ Incompatible option

6. SPECIFICATIONS - MASTERYS GP4

6.1. Installation parameters

INSTALLATION PARAMETERS										
Rated power (kVA)			10	15	20	10	15	20	30	40
Phase in/out			3/1			3/3				
Active power		kW	10	15	20	10	15	20	30	40
Rated/maximum rectifier input current (EN 62040-3)		A	15/22	23/30	31/39	15/22	23/30	31/39	46/55	62/73
Rated bypass input current		A	48	72	96	16	24	32	48	64
Inverter output current @ 230 V		A	43	65	87	14	22	29	43	58
Maximum air flow		m3/h	240							360
Sound level		dBA	< 50							< 58
Power dissipation in nominal conditions[1]		W	440	665	905	440	665	905	1485	2090
		kcal/h	378	572	778	378	572	778	1277	1797
		BTU/h	1501	2269	3088	1501	2269	3088	5067	7131
Power dissipation (max) in the worst conditions[2]		W	490	750	1050	490	750	1050	1550	2445
		kcal/h	421	645	903	421	645	903	1333	2102
		BTU/h	1672	2559	3582	1672	2559	3582	5288	8342
Dimensions **S4 / M4**	Width	mm	444 / 444							
	Depth	mm	800 / 800							
	Height	mm	800 / 1400							
Single unit Clearances	Operational	mm	Rear ≥ 200; Lateral 0							
	Maintenance	mm	Front ≥ 1500 Top ≥ 800							
Weight without batteries **S4 / M4**		kg	89 / 116							95 / 122
Weight with batteries **S4** (depending on number of batteries)		kg	191 / 288							197 / 294
Weight with batteries **M4** (depending on number of batteries)		kg	430 / 527 / 624							436 / 533 / 630

(1) Considering nominal input current (400 V, battery charged) and rated output active power.
(2) Considering maximum input current (low input voltage) and rated output active power.

6.2. Electrical characteristics

ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT								
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Rated mains supply voltage	400 V 3ph + N							
Voltage tolerance	480 V to 340 V (up to 240 V with load linear decrease from 100% Pn to 70% Pn)							
Rated frequency	from 40 Hz to 70 Hz							
Power factor (input at full load and rated voltage)	≥ 0.99							
Total harmonic distortion (THDi)	< 3%	< 2.5%		< 3%	< 2.5%		< 2%	
Max inrush current at start-up	< In (no overcurrent)							
Power walk-in(from battery to normal mode)	4 seconds (settable parameters)							

ELECTRICAL CHARACTERISTICS - BYPASS										
Rated power (kVA)			10	15	20	10	15	20	30	40
Phase in/out			3/1			3/3				
Bypass frequency variation speed			1 Hz/s (settable up to 3 Hz/s)							
Bypass rated voltage			Nominal output voltage ±15%							
Bypass rated frequency			50/60 Hz (selectable)							
Bypass frequency tolerance			±2% (configurable from 1% to 10%)							

ELECTRICAL CHARACTERISTICS - INVERTER										
Rated power (kVA)			10	15	20	10	15	20	30	40
Phase in/out			3/1			3/3				
Rated output voltage phase neutral (selectable)			220/230/240 V 208 V (@ 95% Pn)							
Output voltage tolerance			Static: ±1% Dynamic: VFI-SS-111 (EN62040-3) compliant							
Rated output frequency			50/60 Hz (selectable)							
Output frequency tolerance			±0.01%							
Load crest factor			≥ 2.7							
Voltage harmonic distortion			±1% with linear load							
Overload tolerated by the inverter	10 min	kW	12.5	18.75	25.0	12.5	18.75	25.0	37.5	50.0
	1 min	kW	15	22.5	30	15	22.5	30	45	60

ELECTRICAL CHARACTERISTICS - EFFICIENCY									
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Double conversion efficiency (normal mode - @ full load)	up to 96.2%							
Efficiency in EcoMode	up to 99.3%							

ELECTRICAL CHARACTERISTICS - ENVIRONMENT								
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Storage temperatures	-5 to +50 °C (15 to 25 °C for better battery life)							
Working temperature	0 to +40 °C (15 to 25 °C for better battery life) Max +50°C @ 70% Sn for a limited time							
Maximum relative humidity (non-condensing)	95%							
Maximum altitude without derating	1000 m (3300 ft)							
Degree of protection	IP20 (IP21 as option)							
Portability	ASTM D999-08, ASTM D-880, AFNOR NF H 00-042							
Colour	RAL 7016							

ELECTRICAL CHARACTERISTICS - BATTERY									
Rated power (kVA)		10	15	20	10	15	20	30	40
Phase in/out		3/1			3/3				
Maximum recharge current	A	5							
Battery connection (UPS in parallel)		Distributed or shared battery							

6.3. Recommended protection

RECOMMENDED PROTECTION DEVICES - RECTIFIER(1)								
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
C curve circuit breaker (A)	25	32	40	25	32	40	63	80
gG fuse (A)	25	32	40	25	32	40	63	80

RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS(1)								
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Maximum I^2t supported by the bypass (A^2s)	16000			8000			15000	
Max Ipk supported by the Bypass	2400			1200			1700	
C curve circuit breaker (A)	63	100	125	25	32	40	63	80
gG fuse (A)	63	100	125	25	32	40	63	80

RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER(2)								
Rated power (kVA)	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Input residual current circuit breaker	0.5 A Selective							

RECOMMENDED PROTECTION DEVICES - OUTPUT(3)									
Model		10	15	20	10	15	20	30	40
Phase in/out		3/1			3/3				
Short-circuit inverter current (A) (when AUX MAINS is not present)	0 to 40 ms	120	177	237	40	59	79	117	156
	40 to 100 ms	99	147	198	33	49	66	98	130
C curve circuit breaker(3) (A)		≤ 10	≤ 16	≤ 20	≤ 4	≤ 4	≤ 6	≤ 10	≤ 13
B curve circuit breaker(3) (A)		≤ 20	≤ 32	≤ 40	≤ 6	≤ 10	≤ 16	≤ 20	≤ 25

CABLES - MAXIMUM CABLE SECTION								
Model	10	15	20	10	15	20	30	40
Phase in/out	3/1			3/3				
Rectifier terminals (flexible cable)/(rigid cable) mm^2	25						50	
Bypass terminals (flexible cable)/(rigid cable) mm^2	50			25			50	
Battery terminals (flexible cable)/(rigid cable) mm^2	25						50	
Output terminals (flexible cable)/(rigid cable) mm^2	50			25			50	

(1) Rectifier protection should only be considered in the event of separate inputs. The bypass protection is given by recommendation. When the bypass and rectifier inputs are combined (common input), the general input protection rating must be whichever is the highest (bypass or rectifier).
(2) Must be selective with residual current circuit breakers downstream of the UPS connected to the UPS output. If the bypass network is separate from the rectifier circuit, or in the event of a parallel UPS configuration, use a single residual current circuit breaker upstream of the UPS.
(3) Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present). The rating of the protection can be increased by "n" times downstream of a parallel UPS system, with "n" equal to the number of parallel modules.

6.4. AVAILABILITY

The primary goal of every UPS system is to ensure power availability.

Availability is defined for all repairable systems as

Availability = 1 - MTTR / MTBF

To achieve maximum system availability, it is necessary to deliver high reliability (high MTBF) and reduce repair times (short MTTR) as much as possible.

MTBF (Mean Time Between Failure) is a measure of UPS Reliability, being the reciprocal of Failure Rate:

MTBF = 1 / Failure Rate

Reliability is the most critical factor in the design and manufacture of any UPS.

The end result is a combination of know-how, quality material, and a design created with expertise throughout the production process.

The higher the MTBF, the lower the failure rate, making the UPS more reliable.

MEAN TIME BETWEEN FAILURE		
MTBFVFI(1)	> 350 000 h	Failure inside the UPS, but application still supplied in Bypass Mode
MTBFUPS	> 10 000 000 h	Critical failure inside the UPS, causing a load cut

(1) VFI (Voltage and Frequency Independent) also called Normal Mode or Double Conversion Mode is the only UPS working-mode that ensures total load protection against all possible mains quality problems.

Even though high reliability limits the likelihood of failure, it is essential to respond quickly to unforeseen events in order to guarantee continuity and minimise the risk of downtime.

MTTR is the Mean Time To Restore the UPS after a failure i.e. the sum of Intervention Time and Repair Time:

MTTR = Intervention Time + Repair Time

The proximity of a service technician is vital to ensure rapid repair.

Furthermore, both UPS design and construction are critical success factors when it comes to serviceability and performance.

MASTERYS GP4 has been specifically engineered for safe and fast maintenance by front access advanced brick replacement - with on-site repair time 5x faster than standard UPS systems and enhanced First Time Fix Rate.

7. REFERENCE STANDARDS AND DIRECTIVES

7.1. 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 harmonisation legislation:

LVD 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.

EMC 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.

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

7.2. Standards

7.2.1. 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)

7.2.2. Electromagnetic compatibility

EN 62040-2	Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (tested and verified by third party)
IEC 62040-2	Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

7.2.3. Test and performance

EN 62040-3	Uninterruptible power systems (UPS). Methods of specifying the performance and test requirements

7.2.4. ENVIRONMENTAL

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

7.3. 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.

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