TECHNICAL GUIDE

EN

MASTERYS GP4

60 to 250 kVA/kW

SUPERIOR
Unrivalled power performance

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

97.5% EFFICIENCY

96.5% EFFICIENCY

kW = kVA

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

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1. OBJECTIVES

The aim of these specifications is to provide:

- the information required to choose the right 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 to the load(s) must be made using cables of suitable size, in accordance with current standards. If not already present, an electrical distribution panel which can isolate the network upstream of the UPS must be installed. This electrical distribution panel must be equipped with a protection device (or two, if there is a separate bypass line) of an appropriate rating for the power drawn at full load.

For detailed information, see the installation and operating manual.

3. ARCHITECTURE

3.1. Range

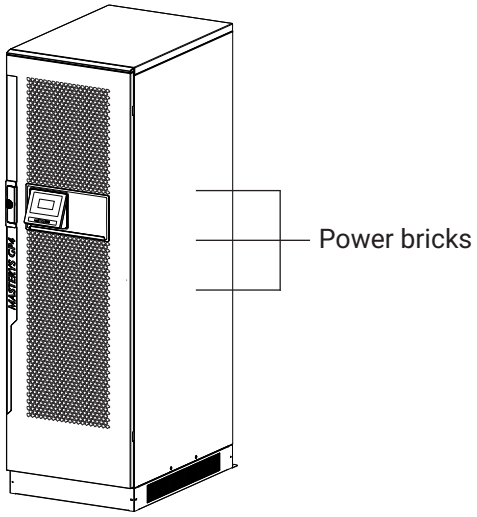
MASTERYS GP4 is a full range of high performing UPS systems designed to:

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

MASTERYS GP4							
Rated power (kVA)	60	80	100	120	160	200	250
MASTERYS GP4 3/3	•	•	•	•	•	•	•
Matrix table for model and kVA power rating							

MASTERYS GP4 has been specifically designed to meet the demands of loads in specific application contexts, in order to optimise the features of the product and facilitate its integration within the system.

Masterys GP4 60-250 kVA feature in standard the intrinsic redundancy



Any potential fault should be isolated inside the affected sub-assemblies, keeping the critical load protected in double conversion mode thanks to the remaining power converters to maximize the Mean Time Between Critical Failure.

The UPS is designed to provide intrinsic double conversion mode redundancy in case of a single power brick is no longer available, to grant a minimum of:

- 50% load for 60 and 80 UPS in double conversion, even in case of a single brick failure;
- 66% load for 100, 120 and 200 UPS in double conversion, even in case of a single brick failure;
- 75% load for 160, 250 and 200HE (high efficiency) UPS in double conversion, even in case of a single brick failure;
- 80% load for 250HE (high efficency) UPS in double conversion, even in case of a single brick failure.

4. FLEXIBILITY

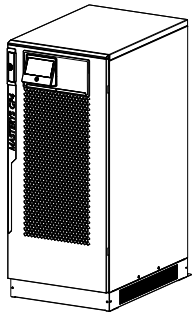
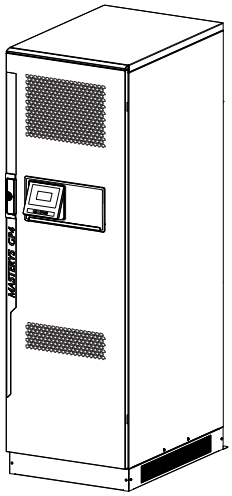
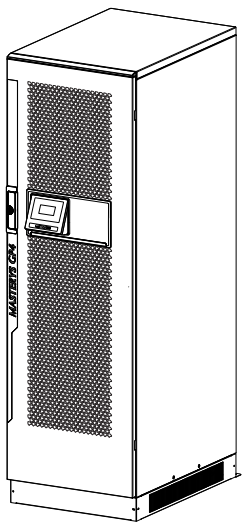
4.1. Power ratings from 60 to 250 kVA/kW

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

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

All of the control mechanisms are located on the front at the bottom and communication interfaces are on the inside of the door.

The air inlet is on the front, with outflow from the rear side; this means other equipment or external battery enclosures can be placed alongside the UPS unit.With specific cabinets it is possible to have solution with a top air outlet

DIMENSIONS			
MASTERYS GP4	Width [mm]	Depth [mm]	Height [mm]
MASTERYS GP4 60 to 120 kVA/kW 	600	855	1400 (100/120 kVA 1930 as option)
MASTERYS GP4 60 to 80 kVA/kW with battery 	600	855	1930
MASTERYS GP4 160 to 250 kVA/kW 	600	855	1930

4.2. Flexible back-up time

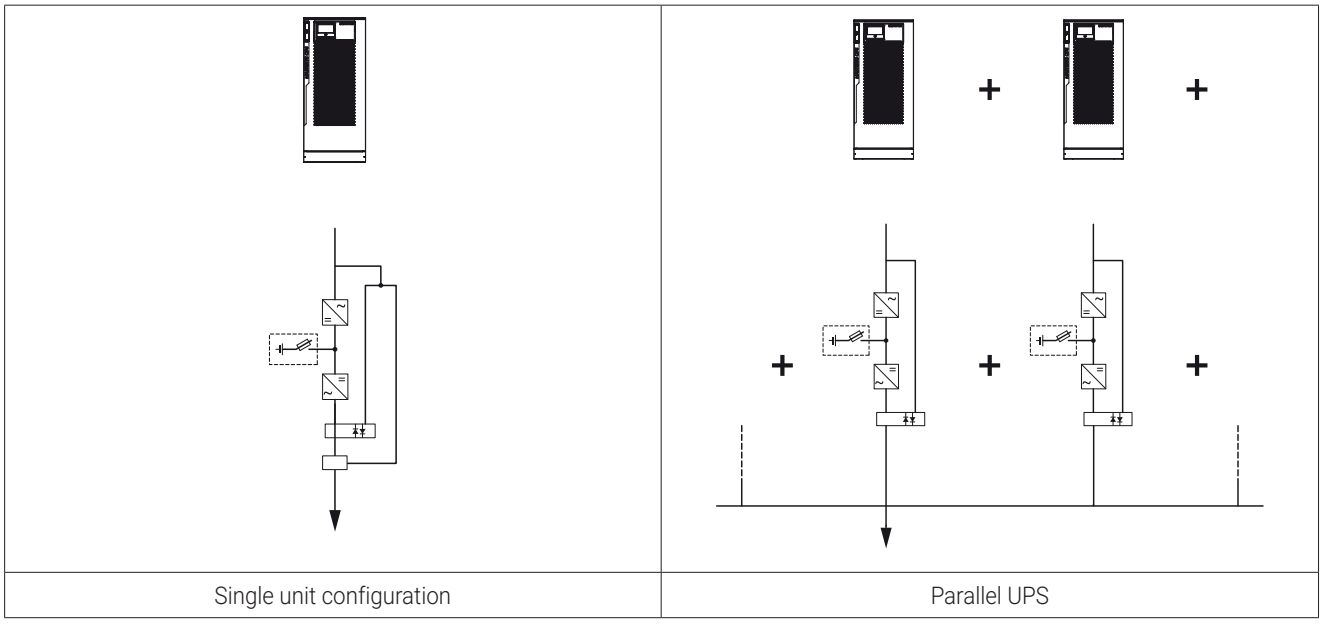
Different extended back-up times are possible by using external battery cabinets, optionally with a enhanced battery charger.

Selection of the back-up time is flexible thanks to the wide range of battery string voltages.

MASTERYS GP4 is setup for Lithium Battery

4.3. Horizontal parallel

MASTERYS GP4 offers 2 UPS configurations in the same range.



Single unit configuration	Parallel UPS

4.4. 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.

4.5. 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.

5. STANDARD AND OPTIONS

AVAILABILITY	
●	Factory-installed option
○	Available as option
–	Not available
STD	Standard feature

Features	MASTERYS GP4 (kVA)					Note
	60-80		100-120	160	200-250	
	External batteries	Internal batteries	External batteries	External batteries	External batteries	
BATTERY OPTION						
Additional charger	●○	–	●○	●○	●○	⚠ ⃠ Kit for Rectifier Neutral creation
COMMUNICATION OPTION						
ACS card (Automatic Cross Synchronisation)	●○	●○	●○	●○	●○	
ADC+SL card (Advanced Dry Contact + Serial Link)	○	○	○	○	○	
LIB-ADC (Lithium Ion Battery interface)	○	○	○	○	○	
Temperature sensor	○	○	○	○	○	⚠ ❗ ADC+SL card
Remote touchscreen display	○	○	○	○	○	⚠ ❗ ADC+SL card
Modbus TCP card	○	○	○	○	○	
Net Vision card	○	○	○	○	○	
EMD (Environmental Monitoring Device)	○	○	○	○	○	⚠ ❗ Net Vision card
ELECTRICAL OPTION						
Parallel card	●○	●○	●○	●○	●○	⚠ ⃠ Cold start
Kit for Parallel Configuration (C7)	–	–	●○	●○	●○	⚠ ❗ Parallel card
External Isolation Transformer	–	–	○	–	–	
IMD (Insulation Monitoring Device)	–	–	○	–	–	⚠ ❗ External Isolation Transformer
External Maintenance Bypass	○	○	○	–	–	
Kit for TN-C / Neutral-Ground connection	●○	●○	●○	●○	●○	⚠ ⃠ Kit for Rectifier Neutral creation
Internal Backfeed Protection	●	●	●	●	–	
Kit For Common Mains	○	○	○	○	○	⚠ ⃠ Kit for Rectifier Neutral creation

Features	MASTERYS GP4 (kVA)					Note
	60-80		100-120	160	200-250	
	External batteries	Internal batteries	External batteries	External batteries	External batteries	
Kit for Rectifier Neutral creation	●	-	●	●	-	⚠ ⃠ Kit for TN-C / Neutral-Ground connection ⃠ Kit For Common Mains ⃠ Additional charger
Redundant Bypass Ventilation	●	●	●	●	STD	
MECHANICAL OPTION						
Option slots 3	●	-	●	STD	STD	
Anti-vermin protection	●	●	●	●	●	
Kit for IP21	○	○	○	○	○	⚠ ⃠ Top air exhaust kit ⃠ Top entry cables
Seismic kit	●	-	●	●	●	⚠ ⃠ Top entry cables
"T" cabinet	-	STD	●	STD	STD	
Top air exhaust kit	-	-	●	●	○	⚠ ! "T" cabinet ⃠ Kit for IP21 ⃠ Top entry cables
Top entry cables	-	-	○	○	○	⚠ ! "T" cabinet ⃠ Seismic kit ⃠ Kit for IP21 ⃠ Top air exhaust kit
OTHER						
Cold start	●○	●○	●○	●○	●○	⚠ ⃠ Parallel card

! Required option
⃠ Incompatible option

6. SPECIFICATIONS

6.1. Installation parameters

INSTALLATION PARAMETERS											
Range			60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)			60	80	100	120	160	200	200	250	250
Phase in/out			3/3								
Active power		kW	60	80	100	120	160	200	200	250	250
Rated/maximum rectifier input current (EN 62040-3)		A	93/110	123/146	154/183	185/219	247/292	304/360	300/356	379/450	375/445
Rated bypass input current (1)		A	96	128	160	191	255	319	319	398	398
Inverter output current @ 400 V Pn		A	87	116	145	174	232	290	290	362	362
Recommended air flow capacity		m3/h	480	720	840	1080	1440	2100	2400	2800	3000
Acoustic Noise @ 70% Pn		dBA	53 ext. batt. 55 int. batt.		55		57	63	55	65	57
								69 with top ventilation			
Power dissipation in nominal conditions (2)		W	2880	3950	4800	5940	8000	9400	7250	11800	9050
		kcal/h	2476	3396	4127	5107	6879	8083	6234	10147	7782
		BTU/h	9833	13486	16388	20280	27297	32074	24738	40263	30880
Power dissipation (max) in the worst conditions (3)		W	3360	4630	5500	6560	9350	11600	9400	14550	11800
		kcal/h	2889	3981	4729	5641	8040	9975	8083	12511	10147
		BTU/h	11471	15807	18778	22397	31904	39581	32074	49646	40263
Dimensions for 60-80 Models (external/internal batteries)	Width	mm	600								
	Depth	mm	855								
	Height	mm	1400		1400 (1930 optional)		1930				
Weight		kg	174	186	228	240	338	310	345	345	380
Weight with internal battery		kg	680-820		-						

(1) Considering nominal bypass current calculated @ 400 V, considering a continous overload of 110%.
(2) Considering nominal input current (400 V, battery charged) and rated output active power (PF1).
(3) Considering maximum input current (low input voltage, battery charged) and rated output active power (PF1).

6.2. Electrical characteristics

ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT										
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Rated mains supply voltage	400 V 3ph + N								
Voltage tolerance	340 to 480 V (-15 +20%)								
Voltage tolerance at derated load	up to 240 V @ 70% of nominal active load								
Rated frequency	from 40 Hz to 70 Hz								
Power factor (at full load and rated voltage)	≥ 0.99								
Current Total harmonic distortion (THDi)	≤ 2%								
Max inrush current at start-up	<In								
Power walk-in (from battery to normal mode)	4 second (settable parameters)								

ELECTRICAL CHARACTERISTICS - BYPASS										
Range		60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)		60	80	100	120	160	200	200	250	250
Bypass frequency variation speed		1 Hz/s (settable up to 3 Hz/s)								
Bypass rated voltage		Nominal output voltage ±15% (selectable ±5-±20%)								
Bypass rated frequency		50/60 Hz (selectable)								
Bypass frequency tolerance		±2% (configurable from ±1% to ±10%)								
Bypass current overload (A)	10 min	109	145	181	218	290	362	362	435	435
	1 min	130	174	217	261	348	453	453	543	543

ELECTRICAL CHARACTERISTICS - INVERTER										
Range		60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)		60	80	100	120	160	200	200	250	250
Rated output voltage (selectable)		380/400/415 V (selectable)					380/400/415 V (selectable) (380V with possible derating)			
Output voltage tolerance		Static: ±1% Dynamic: VFI-SS-11 (EN 62040-3 compliant)								
Rated output frequency (selectable)		50/60 Hz (selectable)								
Output frequency tolerance		±0.01% on mains power failure								
Load crest factor		≥ 2.7					≥ 2	≥ 2.25	≥ 2	≥ 2.25
Voltage total harmonic distortion THDV		< 1% with linear load								
Inverter overload (kW)	10 min	75	100	125	150	200	250	250	312	312
	5 min	79	106	132	158	211	264	264	330	330
	1 min	90	120	150	180	240	300	300	375	375
Short-circuit inverter current (A) (when AUX MAINS is not present)	0 to 40 ms	234	312	390	468	624	585	652	780	815
	40 to 100 ms	196	260	326	390	520	486	520	648	650

ELECTRICAL CHARACTERISTICS - EFFICIENCY									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Double conversion efficiency	up to 96.5%					up to 96.5%	up to 97.5%	up to 96.5%	up to 97.5%
EcoMode efficiency	99.4%								

ELECTRICAL CHARACTERISTICS - ENVIRONMENT									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Storage temperatures	-5 to +50 °C (23 to 122 °F) (15 to 25 °C for better battery life)								
Working temperature	0 to +40 °C (32 to 104 °F) (15 to 25 °C for better battery life) Up to 50 °C @70% Pn 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)								
Colour	RAL 7016								

6.3. Recommended protections

RECOMMENDED PROTECTION DEVICES - RECTIFIER (1)									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
C curve circuit breaker (A)	125	160	250		315	400	400	450	450
gG fuse (A)	125	160	250		315	400	400	450	450

RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS (2)									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Max I2t supported by the bypass (A2s)	120000		400000						
Max Ipk supported by the Bypass(A)	5000		9000						
Conditional short circuit current rating (Icc)	10 kA								
C curve circuit breaker (A)	160	200	250	250	400	400	400	450	450
gG fuse (A)	160	200	250	250	400	400	400	450	450

RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER (3)									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Input residual current circuit breaker	0.5 A Selective type B					1 A Selective type B			

RECOMMENDED PROTECTION DEVICES - OUTPUT (4)									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
B curve circuit breaker (4) (A)	≤ 32	≤ 40	≤ 50	≤ 63	≤ 80	≤ 80	≤ 100	≤ 100	≤ 125
C curve circuit breaker (4) (A)	≤ 16	≤ 20	≤ 25	≤ 32	≤ 40	≤ 40	≤ 50	≤ 50	≤ 63

CABLES - MAXIMUM CABLE SECTION (5)									
Range	60	80	100	120	160	200STD	200HE	250STD	250HE
Rated power (kVA)	60	80	100	120	160	200	200	250	250
Rectifier terminals (4x)	bus bar with holes ø 8 mm 70 mm2 (flexible cable and rigid cable)		bus bar with holes ø 10 mm 2 x 120 mm2 (flexible cable and rigid cable)		bus bar with holes ø 10 mm 2 x 150 mm2 (flexible cable and rigid cable)				
Bypass terminals (4x)									
Battery terminals (3x)									
Output terminals (4x)									

(1) Rectifier protection should only be considered in the event of separate inputs. Recommended values to avoid unwanted tripping with UPS at full power. When the bypass and rectifier inputs are combined (common input), the general input protection rating must be the highest of the two (bypass or rectifier).

(2) Recommended values to avoid unwanted tripping with UPS at full power. A current limiting device has to be used in case of maximum i2t and Ipk of the SCR by-pass is exceeded. When the bypass and rectifier inputs are combined (common input), the general input protection rating must be the highest of the two (bypass or rectifier).

(3) RCD is not necessary when the UPS is installed in a TN-S system. RCD is not permitted on TN-C systems. If a RCD is required a B-type should be used. RCD must be coordinate 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 parallel UPS, use a single residual current circuit breaker upstream of the UPS.

(4) Protection tripping downstream of the UPS with inverter short circuit current (Worst case = AUX MAINS not present). In the Normal case, with AUX MAINS present, fault clearing is determined by the Mains short-circuit capability. The rating of the protection can be increased "n" times downstream of a parallel UPS system, with "n" equal to the number of parallel UPS units.

(5) Use cable with tin-plated eyelets for the connection.

7. REFERENCE STANDARDS AND DIRECTIVES

7.1. 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.

LVD 2014/35/EU

Directive 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 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

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)

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

TEST AND PERFORMANCE

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

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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