MASTERYS IP+

10 to 80 kVA

TÜV SÜD
Production monitored
Safety tested

socomec
Innovative Power Solutions

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.

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 circuit breaker (or two, if there is a separate bypass line) of an appropriate rating for the power draw 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 output 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.

1. ARCHITECTURE

1.1 RANGE

MASTERYS IP+ is a full range of high performing UPS designed to provide reliable power supply in harsh operating environments.

Models							
Rated power (kVA)	10	15	20	30	40	60	80
MASTERYS IP+ 3/1	•	•	•	•	•	•	-
MASTERYS IP+ 3/3	•	•	•	•	•	•	•

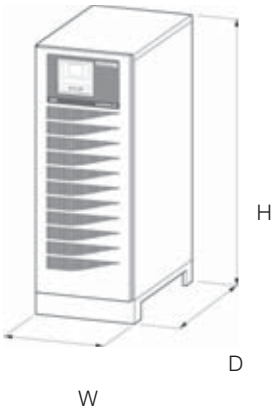
Matrix table for model and kVA power rating

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

2. FLEXIBILITY

2.1 POWER RATINGS FROM 10 TO 80 KVA

The entire range (13 basic products) are compatible with 2 cabinets.

Dimensions				
Model	Cabinet type	Width (W) [mm]	Depth (D) [mm]	Height (H) [mm]
MASTERYS IP+ 10 kVA 3/1-3/3		600	800	1400
MASTERYS IP+ 15 kVA 3/1-3/3				
MASTERYS IP+ 20 kVA 3/1-3/3				
MASTERYS IP+ 30 kVA 3/1-3/3				
MASTERYS IP+ 40 kVA 3/3				
MASTERYS IP+ 40 kVA 3/1		1000	835	1400
MASTERYS IP+ 60 kVA 3/1-3/3				
MASTERYS IP+ 80 kVA 3/1-3/3				

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 careful design also provides easy access for maintenance and installation.

All of the control mechanisms and communication interfaces are located in the front part inside to metal door.

The air inlet is on the front, with outflow to the rear only; this means other equipment or external battery enclosures can be placed alongside the UPS unit.

2.2 FLEXIBLE BACK-UP TIME

Different extended back-up times are possible by using voth UPS cabinet, both of which occupy minimum floor space.

For powers greater than or equal to 40 kVA, or long back-up power periods, an additional cabinet should be used, optionally with a supplementary battery charger.

BACK-UP times in minutes (max @ 70% of load)			
			
	Masterys IP+ 10 to 40 kVA	Masterys IP+ 40 to 80 kVA	UPS with battery cabinet
MASTERYS IP+ 10 3/1	19	-	•
MASTERYS IP+ 15 3/1	11	-	•
MASTERYS IP+ 20 3/1	7	-	•
MASTERYS IP+ 30 3/1	4	-	•
MASTERYS IP+ 40 3/1	-	-	•
MASTERYS IP+ 60 3/1	-	-	•
MASTERYS IP+ 10 3/3	19	-	•
MASTERYS IP+ 15 3/3	11	-	•
MASTERYS IP+ 20 3/3	7	-	•
MASTERYS IP+ 30 3/3	4	-	•
MASTERYS IP+ 40 3/3	-	-	•
MASTERYS IP+ 60 3/3	-	-	•
MASTERYS IP+ 80 3/3	-	-	•

Selection of the back-up time is flexible thanks to the wide range of DC bus voltages.

The batteries are organised internally into racks based on their relative sizes, so as to ensure a compact unit while still guaranteeing substantial back-up times.

The UPS system's internal batteries consist of distinct strings of battery packs connected in series; each individual pack is connected using polarised connectors to facilitate battery configuration and maintenance.

Each pack is sealed in an acid-proof container which is designed to prevent damage in the case of acid leakage.

To guarantee maximum back-up time availability and battery life, the Masterys series is equipped with EBS systems, depending on the model.

2.3 ENERGY STORAGE OPTION: ULTRACAPACITOR

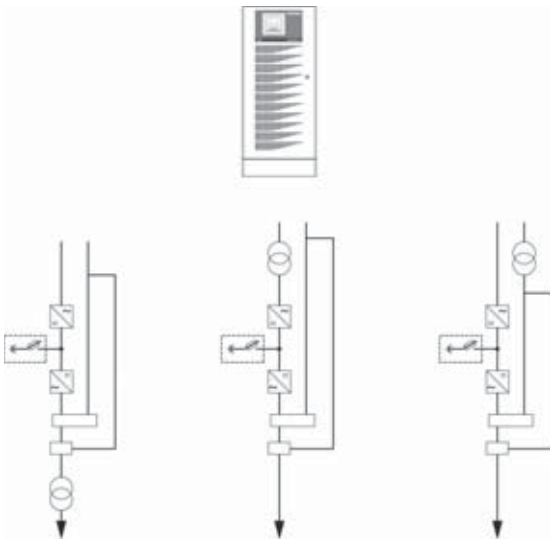
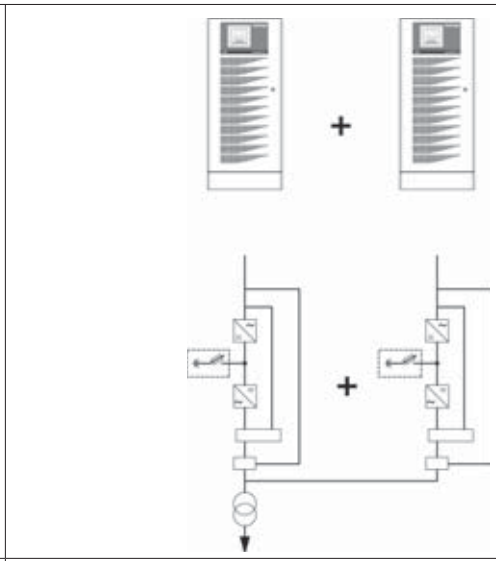
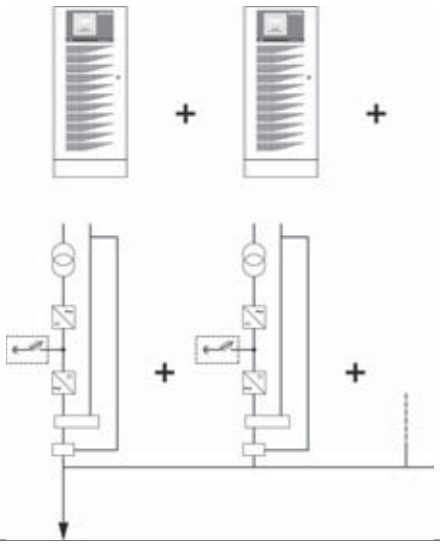
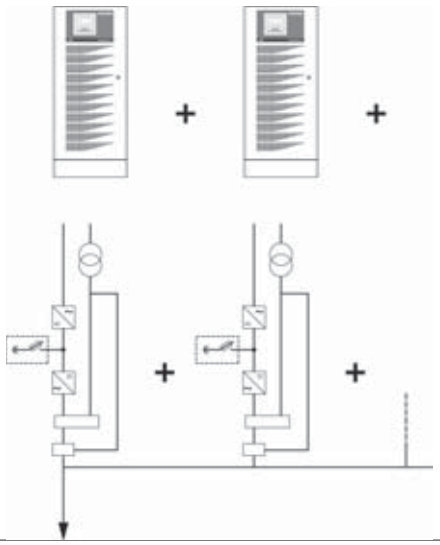
Ultracapacitor could be a suitable battery replacement in special situations where a long back-up time is not required. This solution is targeted specifically to ride-through frequent voltage dips and short power outages, or simply bridge the startup of a generator, or where ambient temperatures could compromise battery lifetime. This would result in a highly reliable energy storage system that would require no maintenance.

Advantages:

- Extremely long lifetime: 15 years with virtually unlimited cycling.
- High-reliability – No maintenance.
- Wide temperature range up to 45 °C.
- Ultra rapid charging.
- Battery-free, lead-free and environment friendly.

2.4 PARALLEL CONFIGURATION.

MASTERYS IP+ offers various configurations.

<table>
<tr><td colspan="3">  </td><td>  </td></tr>
<tr><td>Transformer on OUTPUT</td><td>Transformer on MAINS</td><td>Transformer on AUX MAINS</td><td></td></tr>
<tr><td colspan="3">Stand-alone UPS configuration</td><td>Parallel 1+1 redundant configuration</td></tr>
<tr><td colspan="3">  </td><td>  </td></tr>
<tr><td colspan="3">Parallel N+1 power configuration (up to 6 UPS) transformer on MAINS</td><td>Parallel N+1 power configuration (up to 6 UPS) transformer on AUX MAINS</td></tr>
</table>

2.5 AVAILABILITY, REDUNDANCY AND EFFICIENCY

To increase the availability of the power supply, redundant parallel configurations are becoming increasingly common. Consequently, the overall efficiency of the UPS system risks being reduced due to the low load on each individual machine.

3. STANDARD AND OPTIONS

3.1 FOR INDUSTRIAL LOADS

- 100 % non-linear loads.
- 100 % unbalanced loads.
- 100 % “6-pulse” loads (motor speed drivers, welding equipment, power supplies…).
- Motors, lamps, capacitive loads.

3.2 STANDARD ELECTRICAL FEATURES

- Dual input mains.
- Internal maintenance bypass.
- Backfeed protection: detection circuit.
- EBS (Expert Battery System) for battery management.

3.3 ELECTRICAL OPTIONS.

- Long-life batteries.
- External battery cabinet (degree of protection up to IP32).
- External temperature sensor.
- Additional battery chargers.
- Additional transformer.
- Parallel kit.
- Cold start.
- ACS synchronization system.
- Neutral creation kit for mains without neutral.
- Tropicalization and anti-corrosion protection for electrical boards.

3.4 STANDARD COMMUNICATION FEATURES.

- Multilanguage graphic display.
- Dry contact interface.
- MODBUS RTU.
- Embedded LAN interface (web pages, email).
- 2 slots for communication options.

3.5 COMMUNICATION OPTIONS.

- Profibus.
- MODBUS TCP.
- NET VISION: professional WEB/SNMP interface for UPS monitoring and shutdown management of several operating systems.

3.6 REMOTE MONITORING SERVICE.

- LINK-UPS, remote monitoring service that connects your UPS to your Critical Power specialist 24/7.

4. SPECIFICATIONS

4.1 INSTALLATION PARAMETERS

Installation paramenters														
Rated power (kVA)		10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out		3/1				3/3					3/1		3/3	
Active power (kW)		9	13.5	18	27	9	13.5	18	27	36	32	48	48	64
Rated/maximum rectifier input current (EN 62040-3) (A)		14/ 17(1)	21/ 25(1)	28/ 34(1)	42/ 50(1)	14/ 17	21/ 25	28/ 34	42/ 50	56/ 67	52/ 70(1)	78/ 100(1)	78/ 100	106/ 133
Rated bypass input current (A)		44(1)	65(1)	87(1)	131(1)	15(2)	22(2)	29(2)	44(2)	58(2)	174(1)	261(1)	87(2)	116(2)
Inverter output current @230 V (A) P/N		44	65	87	131	15	22	29	44	58	174	261	87	116
Maximum air flow (m3/h)		440									1810			
Sound level (dB)		50							55		62			
Dissipation at rated load (minimum mains power present and batteries charged)	(W)	890	1335	1780	2670	890	1335	1780	2670	3560	4364	5933	6100	8100
	(kcal/h)	765	1148	1531	2296	765	1148	1531	2296	3062	3753	5102	5250	6970
	(BTU/h)	3035	4553	6071	9106	3035	4553	6071	9106	12141	14880	20230	20820	27650
Dimensions (with standard back-up time)	W (mm)	600									1000			
	D (mm)	800									830			
	H (mm)	1400									1400			
Weight (kg)		230	250	270	330	230	250	270	320	370	490	540	500	550

(1) Input current in bypass mode is single-phase. Consequently, the rated current of the neutral and of the phase common to the bypass is three times higher than the current drawn during normal operation by the rectifier.

(2) In the case of single-phase distorting loads downstream of the UPS, when the bypass is in operation the neutral current can be 1.5-2 times higher than the phase current; this is due to the harmonic current distortion produced by the load itself, which is no longer corrected by the UPS rectifier as occurs in normal operation.

4.2 ELECTRICAL CHARACTERISTICS

Electrical characteristics - Input													
Rated power (kVA)	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Rated mains supply voltage	400 V 3ph + N												
Voltage tolerance	-15% to +20% (pf 0.9) -20% to +20% (pf 0.8) Up to -40% to 50% of rated power (pf 0.9)									-20% to +20% (pf 0.8) -35% to +20% @ 70% of rated power (pf 0.8)			
Rated frequency	50/60 Hz (selectable)												
Frequency tolerance	±10%												
Power factor (input at full load and rated voltage)	≥ 0.99												
Total harmonic distortion (THDi)	< 3%									< 7%			
Max inrush current at start-up	< In (no overcurrent)												

Electrical characteristics - Bypass													
Rated power (kVA)	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Bypass frequency variation speed	1 Hz/s - 3 Hz/s												
Bypass rated voltage	Nominal output voltage ±15%												
Bypass rated frequency (selectable)	50/60 Hz												
Bypass frequency tolerance	±2% (from ±1% to ±8% (operation with generator unit))												

Electrical characteristics - Inverter														
Rated power (kVA)		10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out		3/1				3/3					3/1		3/3	
Rated output voltage (selectable)		208[1]/220/230/240 V (1ph) 380/400/415 V (3ph)												
Output voltage tolerance		Static: ±1%												
Rated output frequency (selectable)		50/60 Hz												
Output frequency tolerance		±0.01% (on mains power failure)												
Load crest factor		3:1												
Voltage harmonic distortion		< 1% with linear load												
Overload tolerated by the inverter[2]	10 min	10 kW	15 kW	20 kW	30 kW	10 kW	15 kW	20 kW	30 kW	40 kW	40 kW	60 kW	60 kW	80 kW
	1 min	12 kW	18 kW	24 kW	36 kW	12 kW	18 kW	24 kW	36 kW	48 kW	48 kW	72 kW	72 kW	96 kW

(1) @ 208 V Pout = 90% Pnom, (2) @ pf 0.9 (10 to 30 kVA 3/1, 10 to 40 kVA 3/3), @ pf 0.8 (40 and 60 kVA 3/1, 60 and 80 kVA 3/3)

Electrical characteristics - Efficiency												
Rated power (kVA)	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Double conversion efficiency (normal mode) at rated load, trafo on the output	91%									89%			
Double conversion efficiency (normal mode) at rated load, trafo on bypass	95%				94%					93%		92%	

Electrical characteristics - Efficiency													
Rated power (kVA)	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Storage temperatures	-5 to +45 °C (23 to 113 °F) (15 to 25 °C for better battery life)												
Working temperature	0 to +50[1] °C (32 to 122 °F) (15 to 25 °C for better battery life)												
Maximum relative humidity (non-condensing)	95%												
Maximum altitude without derating	1000 m (3300 ft)												
Degree of protection	IP31 and IP52								IP31				
Portability	ASTM D999-08, ASTM D-880, AFNOR NF H 00-042												
Colour	RAL 7012												

(1) Conditions apply.

4.3 RECOMMENDED PROTECTION DEVICES

RECOMMENDED PROTECTION DEVICES - Rectifier[1]													
Model IP+	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
D curve circuit breaker (A)	32		40	63	32		40	63	80	80	125	125	160
gG fuse (A)	32		40	63	32		40	63	80	125	160	125	160

RECOMMENDED PROTECTION DEVICES - General bypass[1]													
Model IP+	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Maximum I^2t supported by the bypass (A^2s)	80000			125000	8000			15000		320000	500000	80000	125000
Icc max (A)	4000			5000	1200			1700		8000	10000	4000	4000

RECOMMENDED PROTECTION DEVICES - Input residual current circuit breaker[2]													
Model IP+	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1	3/1	3/1	3/1	3/3	3/3	3/3	3/3	3/3	3/1	3/1	3/3	3/3
Input residual current circuit breaker	> 0.5 A Selective												

RECOMMENDED PROTECTION DEVICES - Output													
Model IP+	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
C curve circuit breaker[3] (A)	< 10	< 16	< 20	< 32	< 4		< 6	< 10	< 13	< 32	< 50	< 20	< 40
B curve circuit breaker[3] (A)	< 20	< 32	< 40	< 63	< 8		< 12	< 20	< 25	< 63	< 100	-	-
High-speed fuse[3] (A)	< 12	< 18	< 24	< 36	< 6		< 10	< 12	< 16	< 40	< 63	< 32	< 25

CABLES - Maximum cable section													
Model IP+	10	15	20	30	10	15	20	30	40	40	60	60	80
Phase in/out	3/1				3/3					3/1		3/3	
Rectifier terminals	4x CBD 35 35 mm2 (flexible cable) 50 mm2 (rigid cable)				4x CBD 35 35 mm2 (flexible cable) 50 mm2 (rigid cable)					4x CBD 50 50 mm2 (flexible cable) 70 mm2 (rigid cable)			
Bypass terminals	2x CBD 35 35 mm2 (flexible cable) 50 mm2 (rigid cable) 2x CBD 50 50 mm2 (flexible cable) 70 mm2 (rigid cable)									2x ACB 120 120 mm2 (flexible cable) 185 mm2 (rigid cable)		4x CBD 50 50 mm2 (flexible cable) 70 mm2 (rigid cable)	
Battery terminals	4x CBD 35 35 mm2 (flexible cable) 50 mm2 (rigid cable)									4x CBD 70 70 mm2 (flexible cable) 95 mm2 (rigid cable)			
Output terminals	2x CBD 50 50 mm2 (flexible cable) 70 mm2 (rigid cable)									2x ACB 120 120 mm2 (flexible cable) 185 mm2 (rigid cable)		4x CBD 50 50 mm2 (flexible cable) 70 mm2 (rigid cable)	

(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 the highest of both (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 parallel UPS, 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 a parallel UPS system, with "n" equal to the number of parallel modules.

(4) Selectivity of distribution after the UPS with inverter short-circuit current (with AUX MAINS not present).

5. REFERENCE STANDARDS AND DIRECTIVES

5.1 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 reconciliation of legislation within Member States regarding electrical material for use within specific voltage ranges.

2004/108/EC

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

5.2 STANDARDS

5.2.1 ELECTROMAGNETIC COMPATIBILITY

“Electromagnetic Compatibility Provisions (EMC)”

EN 62040-2 Electromagnetic compatibility (C2 category for 10-40 kVA 3/3 models, C3 category for all other models)

5.2.2 SAFETY

“General and safety requirements for UPS used in operator access areas”

EN 60950-1	General and safety requirements for equipment used in operator access areas
EN 62040-1	General and safety requirements for UPS used in restricted access locations
EN 50272-2	Safety requirements for secondary batteries and battery installations
EN 60529	Degrees of protection provided by enclosures

5.2.3 TYPE AND PERFORMANCES

“Performance requirements and methods of test”

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

5.3 SYSTEM AND INSTALLATION GUIDELINES

Neutral isolated from input.

On TNS distribution connect the neutral to ground.