PRODUCT TECHNICAL GUIDE

# UPS and Critical Power Solutions

2024

When **energy** matters

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# *Overview*

## The system setup

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# 1. POWER QUALITY ISSUES AND SOLUTIONS

It goes without saying that in order for power to be used by the load, it must be present. A less obvious concept is that the power must have characteristics that make it ideal for use, e.g. it must fall within the tolerances permitted by the electric load or utility.

The concept of Power Quality (PQ) is, therefore, the set of limits which make energy useable and, consequently, the branch of study which defines assessment criteria and methods of measurement, in addition to analysing causes and proposing solutions.

The concept of PQ is not absolute, but always depends on the energy load. For example, in general terms, it can be stated that IT equipment has more stringent PQ requirements than a motor for industrial applications. Normally, PQ requirements and the measures for achieving them, depend on techno-economical considerations and compromises.

Loads, in addition to being sensitive to poor-quality power, are often also the cause of power quality issues. The diffusion of non-linear loads (typically electronic equipment) and the connection of large utilities on weak lines are just some of the many causes. Another cause is atmospheric phenomena.

The most common disturbances that adversely affect the operation of a component or an electrical utility are:

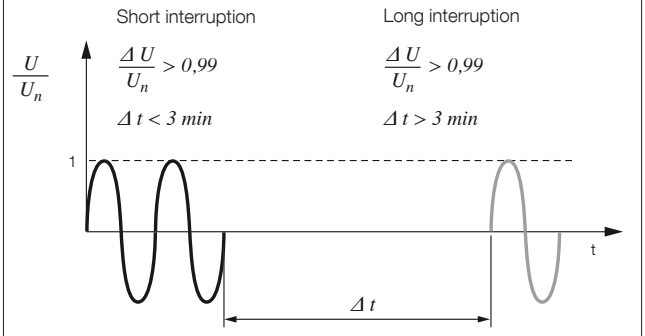
- power sags or outages due to network faults
- short voltage variations due to the connection of heavy loads or the presence of faults in the network
- distortion of currents and voltages due to non-linear loads present in the system or in the systems of other utilities, etc.
- flicker due to large intermittent loads
- asymmetry in the supply voltage system

## 1.1. Power interruptions and voltage dips

All elements in an electrical system are sensitive, in different ways, to power dips or interruptions.

Long interruptions are the result of permanent faults which occur in public distribution networks or within the user's system. The duration may vary from a few minutes to several hours in the most critical cases. By contrast, micro-interruptions are linked to faults which occur in the distributor's networks and normally last for less than a second.

1.1-1 Accidental power interruptions.




## 1.2. Voltage and current distortions

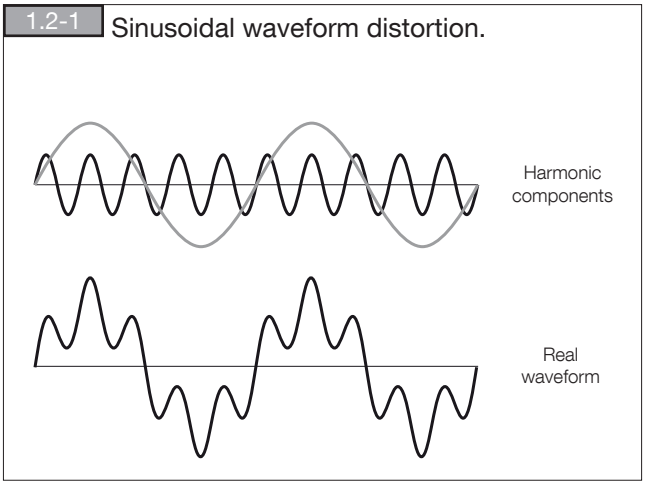
Waveform distortions are mainly caused by non-linear loads which, even if powered using sinusoidal voltages, draw highly distorted currents.

Typical non-linear loads include:

- devices which perform AC/DC and DC/AC conversions (present in all electronic power supplies, for example computers)
- fluorescent lamps
- electric soldering irons
- arc furnaces (also responsible for flicker)
- electrical drives

Any periodic waveform can be represented through Fourier series analysis by a fundamental sinewave and by sinusoidal components of varying amplitude and with multiple frequencies, known as harmonics (Figure 1.2-1).

1.2-1 Sinusoidal waveform distortion.



Harmonic currents circulating in the network cause voltage drops of the same order of magnitude and depending on the line impedance, with resulting voltage distortion.

This means that the magnitude of the disturbance caused at each point of the system (both the user and at the point of delivery) depends not only on the characteristics of the load, but also on the characteristics of the plant itself. All electrical components are affected by waveform distortion.

Harmonic distortion is also known as THD (total harmonic distortion).

The negative consequences of harmonics generally include thermal overloading and sometimes dielectric problems (which can occur in power-factor correction batteries, for example).

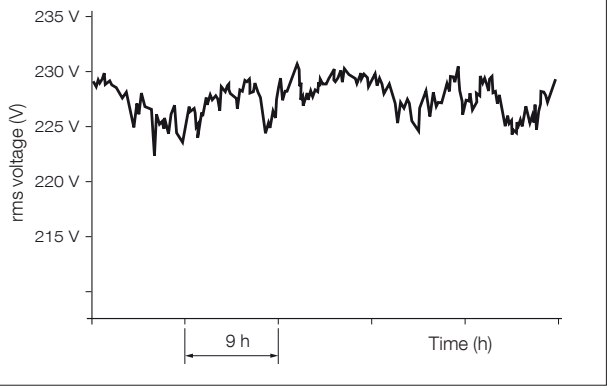
Harmonics typically increase the risk of overheating in system components or nuisance trips.

## 1.3. Flicker

The connection and disconnection of loads in an electrical system generate rapid and repetitive voltage variations. In particular, certain types of consumers such as arc furnaces and soldering irons draw current in an irregular and variable manner during their operating cycle, giving rise to *flicker*.

Loads which are most sensitive to voltage fluctuations are incandescent lamps, as the flicker produced by variations in light flow can cause irritation to those who use them.

1.3-1 Example of fluctuations of voltage RMS value



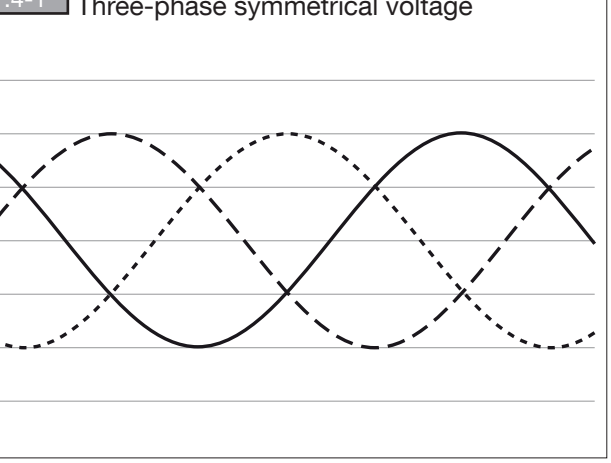

## 1.4. Voltage asymmetry

There are two main causes for asymmetry in the supply voltage system, with the first one being most prevalent:

- Presence of highly unbalanced loads supplied from the same line. This includes high-power single-phase loads which in certain cases may also be intermittent (e.g. high-power single-phase soldering irons). The severity of this phenomenon increases in proportion to the degree of load imbalance and the impedance of the power supply line (length, diameter). The worst affected loads are those located near to or downstream of the unbalanced load.
- Asymmetrical impedance of the power line. This problem is significant in the case of long backbone lines with no transpositions between the conductors along the route.

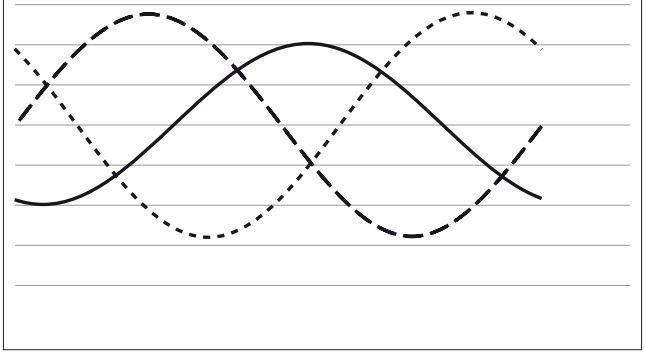
Asymmetrical voltage can create problems especially in rotating synchronous and asynchronous machines such as, for example, overheating windings, reduced starting torque and vibrations.

1.4-1 Three-phase symmetrical voltage



In general, even the nominal power of the transformers and the cable ratings are reduced in the case of significant asymmetry. In fact, the operating limit of these components is determined by the effective value of the total current which, in the case of imbalance, also consists of non-direct sequence currents. This fact must also be taken into account when adjusting the trip thresholds of protection devices which are sensitive to the total current.

1.4-2 Three-phase asymmetrical voltage



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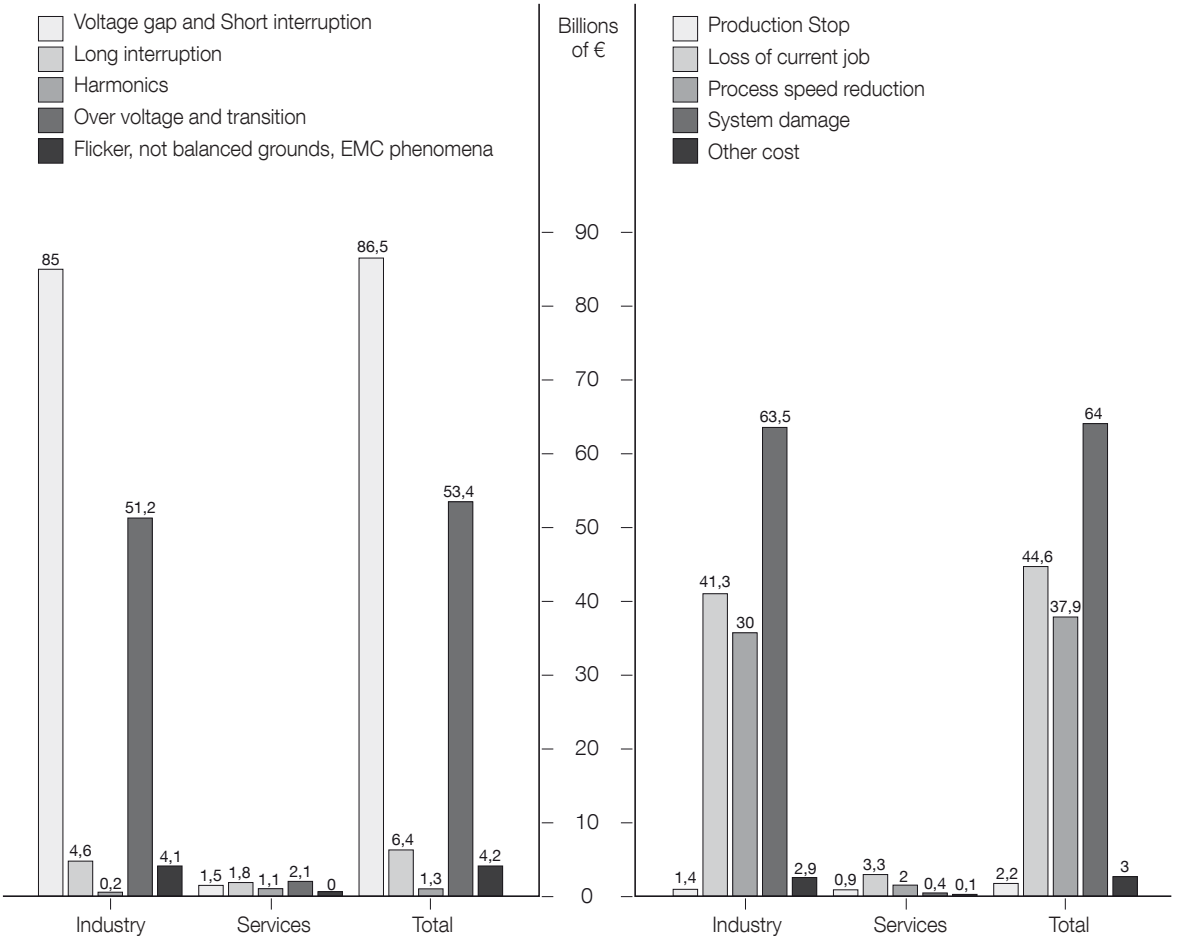
## 1.5. Costs of poor-quality power

The following estimated costs of poor power quality are provided for indication purposes (source: LPQI).

1.5-1 Power quality costs in Europe (billions of €)

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# 2. ELECTRICAL POWER AVAILABILITY

## 2.1. Definition

The general concept of availability (A) refers to the length of time that a system is able to perform its intended function.

Normally, availability is indicated as a value per unit or as a percentage of the system's total lifespan.

Electrical power availability refers to the length of time a load is supplied with high-quality power. More intuitively, it is the length of time the power distribution system performs its intended function without interruptions due to breakdown or [routine] maintenance. In information technology terms, this concept is known as 'uptime' and is the opposite of downtime, e.g. periods when a system is unavailable.

The mathematical definition of availability is:

$$A = \frac{MTBF}{MTBF + MTTR} = 1 - \frac{MTTR}{MTBF + MTTR} \cong 1 - \frac{MTTR}{MTBF}$$

All parameters involved are statistical and describe:

- MTBF: mean time between failure;
- MTTR: mean time to repair.

The approximation derives from the fact that, due to the intrinsic characteristics of standard-compliant power supply systems, MTTR is at least two orders of magnitude less than MTBF.

Availability is always less than 1 or at 100% and is always expressed in nines (99.99..%)

It is self-evident that the availability of an electrical power supply depends on the availability of its constituent components: distribution network, transformers, lines or cables, protection devices, UPS, generator sets, etc.

## 2.2. Availability of parallel or series systems

Below are three examples for comparing availability based on the different topologies. For simplicity, the availability value of both the source and the load are the same and are equal to 0.998.

2.2-1 Single source with single distribution


$A_{tot} = A*A \cong 0.996004$

Statistical annual downtime: 35 hours.

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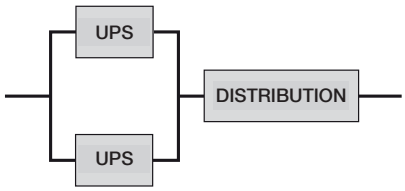
2.2-2 Double source with single distribution




$A_{tot} = A^2 (2-A) \cong 0.997996$

Statistical annual downtime: 17 hours.

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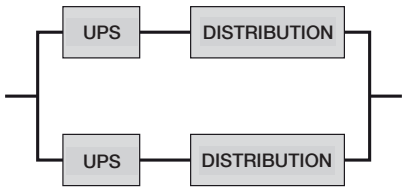
2.2-3 Double source with double distribution




$A_{tot} = A^2 (2- A2) \cong 0.999984$

Statistical annual downtime: 8 minutes.

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## 2.3. Importance of topology

Topology is fundamental. This is demonstrated not only by the previous example but by experience. Human error, fire and flooding are just some of the possible causes of physical damage to equipment. You can imagine the consequences of having two redundant UPS systems installed in the same equipment room or two distribution lines in the same channels or conduits: a vital and expensive redundancy system would be at serious risk due to physical causes.

In view of technical and economic considerations, it is advisable not only to ensure redundancy of the various systems, but also to physically separate them.

# 3. STATIC UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEMS

## 3.1. Definition

Uninterruptible power systems, perhaps more commonly known as UPS, primarily consist of an energy storage system in various forms, on the basis of which an initial classification can be made, and a system for converting this into power.

In a static UPS, energy is stored in an electrochemical form in either special storage batteries or in kinetic form, using flywheels, and reconverted into the desired form using static electronic converters.

In dynamic UPS systems, energy storage is exclusively in kinetic form, and uses a rotary generator for reconversion.

## 3.2. Types

The standard EN 62040-3 was developed in response to the need to classify the various types of static UPS systems currently available on the market. It distinguishes between three major product families, according to the internal schemes adopted:

- VFD - passive standby;
- VI - line-interactive;
- VFI - double conversion.

### 3.2.1. Passive Standby

Utilities are normally powered by the mains supply. At the same time, the mains power supply also supplies the battery charger, which maintains the storage batteries at the maximum load level.

In the event of power loss, a solid-state or electromechanical commutator transfers the load to the inverter, which now activates, supported by the batteries. This mode of functioning continues until ordinary mains power conditions are restored or until the stored energy is exhausted.

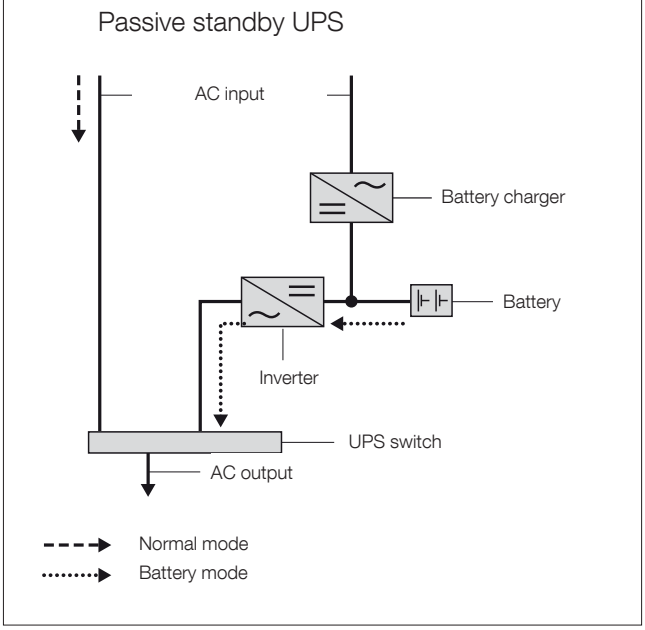
The merits of this solution are essentially in its simple design, which helps to contain the cost of the equipment.

Being the least expensive option, this type of UPS offers extremely limited performance, e.g:

- no decoupling between the upstream distribution system and the load;
- switching times of approximately 10 milliseconds, which are not always compatible with the loads needs;
- no system for regulating the output frequency;

Because of these disadvantages, UPS systems in this category are now used only for loads with low power ratings, typically up to 2kVA.

3.2-1 Operation of passive standby UPS



## 3.2.2. Line-Interactive

This configuration is characterised by the presence of a reversible AC/DC converter which can function both as an inverter and as a battery charger. In ordinary conditions, the load is supplied by the mains power supply through a solid-state breaker, which allows isolation of the system when the inverter is activated, preventing power from being fed back to the mains power supply. The voltage supplied to the load is conditioned by an AVR autotransformer (Automatic Voltage Regulator). In contrast to a passive-standby system, a line-interactive UPS system operates when mains power is available. Owing to its position in parallel with the ordinary power supply line, it guarantees a certain improvement in voltage quality, although this is limited to aspects such as magnitude fluctuations.

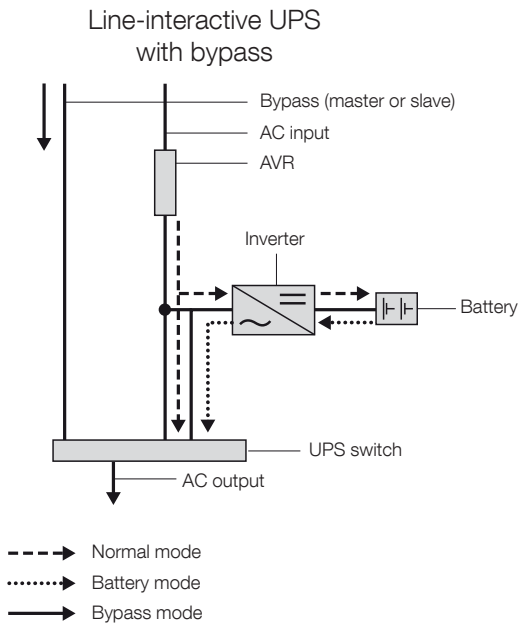
If the mains power is lost, the solid-state breaker is opened automatically, and the load is powered exclusively by the battery

- inverter unit, until ordinary conditions are restored or until the storage batteries are exhausted.

Compared to passive-standby systems, line-interactive UPS provide better waveform conditioning, but with some drawbacks:

- no decoupling between the upstream distribution system and the load;
- no system for regulating the output frequency;
- switching times of a few milliseconds (4-5 ms).

3.2-2 Operation of line-interactive UPS with bypass




## 3.2.3. Double conversion

Unlike the configurations considered above, double-conversion UPS systems constitute true electric generators that are completely isolated - with few exceptions - from the mains network, in which power is supplied by the mains network itself. Since the power to the load is transformed solely by the UPS inverter, without any interaction with the mains network and regardless of whether the power originates from the mains supply or the battery, it is possible to fully exploit the versatility of the static converter, which is able to manipulate the voltage supplied to the load under any condition. In fact, based on the direct current supplied from other components of the UPS such as the rectifier or battery, the inverter control system ensures an output waveform which is totally independent of the input waveform, with an undistorted frequency and amplitude.

The advantages of this type of UPS system are numerous:

- isolation of loads from the upstream distribution network (thereby allowing for precise regulation of the output frequency)
- very wide input voltage tolerance
- instantaneous switching between mains power and battery (more a case of seamless transfer than switching)
- no-break transfer to bypass mode

The efficiency of double conversion UPS, typically 90-96%, is less than that of a *line-interactive* or *passive-standby* system, since the current supplied by the mains power is converted twice by a rectifier and an inverter, each of which are equipped with semiconductors (diodes, SCR, IGBT), which are prone to conduction and commutation losses. Nevertheless, the advantages of maximum-quality power obtained using a double-conversion system compensate for the losses which would otherwise occur on the cables and switches as a result of harmonics or other power quality issues. It is the recommended and most widely used technology for applications with a power rating of 5 kVA or higher.

### 3.2.4. Classification in accordance with EN 62040-3

In addition to the technology, the EN 62040-3 standard classifies UPS systems according to the output waveform and voltage drops, both in clearly defined switching conditions.

Standard EN 62040-3 table D.1 - Type of UPS, additional characteristics and system requirements

a) single

b) multi-module

c) bypass to primary power or backup power

d) AC generator backup power system (if applicable)

e) bypass transfer time (if applicable)

f) galvanic separation between input and/or DC connection and/or output

g) earthing of the input and/or DC connection and/or output

h) bypass circuits for maintenance and other installation requirements, such as UPS disconnectors and connection switches

i) compatibility with the existing power system (for example according to IEC 60364-4)

j) remote shutdown or emergency power-off (EPO) device

## 3.3. Double conversion UPS functional modules

### 3.3.1. Rectifier

When mains power is available, the rectifier converts alternating voltage into direct voltage (AC/DC converter) to power the DC bus.

Different types of rectifier are available according to the electronic components used, the topology and the control system.

The quality of the rectifier is determined by three parameters, namely:

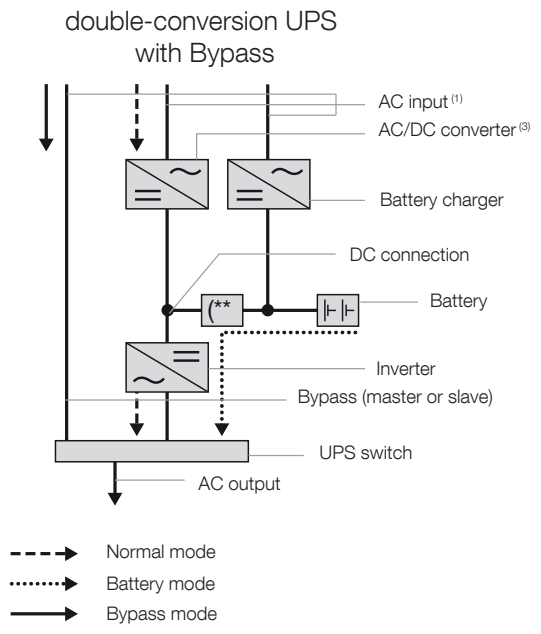
- conversion efficiency;
- input frequency and voltage tolerances;
- input power factor
- generation of harmonics to the mains.

The most widespread types of rectifier and the typical harmonic content of three-phase current absorbed by the mains are:

- 6-pulse SCR: 32%
- 12-pulse SCR: 12%
- Boost: 27%
- Inverter: 4%

From the DC side, the battery charger is unable to supply perfect direct voltage due to residual ripple which causes premature ageing of the batteries.

3.3-1 Operation of double-conversion UPS




*(1) AC input can be combined.*

*(2) Blocking diode or switch.*

*(3) The converter could be a rectifier, a phase shift rectifier or a mix of rectifier and DC/DC converter.*

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### 3.3.2. DC bus

The DC bus is the part of the UPS power circuit in DC voltage.

A high-quality automatic bypass typically has a wide range of tolerable DC voltages: it therefore provides greater flexibility in the number of batteries based on the required back-up time.

### 3.3.3. Battery charger

The battery charger is the DC/DC converter which decouples the battery voltage from the DC bus voltage.

The advantage of this is twofold:

- the battery voltage is independent of the DC bus voltage;
- elimination of output *ripple* from the rectifier

### 3.3.4. Inverter

Converts direct current from the rectifier into sinewave current of perfectly stable magnitude and frequency. The inverter is therefore a DC/AC converter.

The quality of the rectifier is determined by three parameters, namely:

- conversion efficiency;
- ability to supply leading power factor loads;
- ability to withstand overloads and short-circuits;
- quality of the voltage waveform in the presence of distorting loads.

### 3.3.5. Transformers

The transformer is not an obligatory component and is the source of an informal classification which divides UPS systems into "*trafoless*" (transformer-less) and "trafo" systems It is necessary to determine whether the transformer is present as a functional component of the UPS system or whether its purpose is to manage the neutral.

In UPS units with a transformer on the inverter output, the output neutral, when available, is bonded to the bypass neutral downstream of the transformer, whereas in *trafoless* systems, the rectifier neutral and bypass neutral are common even inside the unit.

The insertion of a transformer on the static UPS line guarantees the galvanic isolation of the system and a single neutral system downstream of the UPS, in any operating condition.

In any case, it it important to bear in mind that the built-in UPS transformer does not permit the neutral state to be changed.

Advantages of *trafo* technology compared to *trafoless* technology:

- high short-circuit capacity, therefore greater flexibility in the choice of protection devices;
- no DC components in the output voltage.

Disadvantages of *trafo* technology compared to *trafoless* technology:

- higher weight;
- larger footprint.

In any case, technical and economic factors should be considered on a case-by-case basis, making selection straightforward and unambiguous.

### 3.3.6. Automatic bypass

Switches the UPS output to the auxiliary network in the event of an overload or fault in the inverter module.

The network bypass circuit is formed by a SCR module and directly connects the network with the load.

The quality of the automatic bypass is mainly determined by its ability to withstand overloads and short-circuits.

In the case of separate input power supplies, it's common to use a *bypass input* or *back-up input* (to distinguish it from the *rectifier input*), an input which is dedicated exclusively to the *bypass* with the aim of minimising the probability of the *rectifier supply* and *bypass supply* failing at the same time. The *bypass supply* can be a different power line to that of the *inverter input* or generator. If there is no separation of the power supplies, this is referred to as a *common input*.

## 3.3.7. Maintenance bypass

The manual or maintenance bypass module is not necessary for operation of the UPS and therefore it is not always supplied in the standard configuration.

The aim of this module is to enable routine or non-routine maintenance to be carried out without interrupting the power supply.

## 3.3.8. Storage systems

The storage system is the power source which supplies the inverter during a mains power outage, preventing power interruptions to the connected applications.

- Batteries.

  Batteries are the most common means of storing energy. They are electrochemical devices and are therefore sensitive to operating conditions: temperature, charge and discharge cycles. The most commonly used batteries for this purpose are sealed, lead-acid maintenance-free batteries, open-vented or nickel-cadmium.

  Battery performance is expressed in terms of design life and the type of discharge permitted. Excellent performance is provided by long-life batteries (10-12 years) with high-rate discharge.

  Battery life is theoretical. In practice, it depends on the charge/discharge cycles and the temperature of the place of installation.

  To illustrate how temperature affects battery life, EUROBAT (Association of European Storage Battery Manufacturers) states that the expected service life is halved for every 10°C above 25°C. This means that batteries with a "10-12 year" design life which are installed in places within an ambient temperature of 35°C or 45°C will last no longer than 5-6 years and 2.5-3 years respectively.

  The place where the batteries are installed must be equipped with adequate ventilation and air conditioning to guarantee the correct operation of the batteries and the safety of the installation. To this effect the following formula can be applied in accordance with Standard EN 50272, which aims to keep the concentration of hydrogen in the room below the threshold of 4%vol.

$$Q = v \cdot q \cdot s \cdot n \cdot I_{gas} \cdot C_{rt} \cdot 10^{-3} \ [m^3/h]$$

  where:

  Q = ventilation air flow in $m^3/h$

  v = necessary hydrogen dilution factor

  q = 0.42 x 10-3 $m^3$/Ah hydrogen generation

  s = 5, general safety factor

  n = number of battery cells

  $I_{gas}$ = current producing gas expressed in mA/Ah of assigned capacity, for float charging current or for boost charging current

  $C_{rt}$ = C10 capacity for lead-acid cells

  (Ah), Uf = 1.80 V/cell at 20°C or C5 for nickel-cadmium cells (Ah), Uf = 1.00 V/cell at 20°C.

  By combining the constants the formula is simplified to:

$$Q = 0.05 \cdot n \cdot I_{gas} \cdot C_{rt} \cdot 10^{-3} \ [m^3/h]$$

  Unless otherwise specified by the battery manufacturer:

| $I_{gas}$ | Open cells of lead-acid batteries | VRLA cells of lead-acid batteries | Open cells of nickel-cadmium batteries |
|---|---|---|---|
| During float charge | 5 | 1 | 5 |
| During boost charge | 20 | 8 | 50 |

### Protection against power micro-interruptions.

Flywheel and batteries can also be used simultaneously in UPS units, with the advantage of increased battery life. This is possible because the flywheel, in parallel with the batteries, ensures protection during brief interruptions, therefore preserving the capacity of the batteries for longer outages and improving their lifecycle.

The service life of flywheels is over four times longer than batteries. They are also stable, reliable and require minimal maintenance. Furthermore, unlike batteries, they are not subject to significant fluctuations in the cost of lead.

### Control.

The brain of the UPS is its control system. The best architectures are based on digital signal processing (DSP) microprocessors which are able to perform complex calculations and algorithms. Architectures enable the machine to respond to different events and to report states and events via communication interfaces.

## 3.4. Backfeed protection

*Backfeed protection* prevents voltage from returning to the mains power supply. This issue is governed by standard EN 62040-1-1.

Backfeed protection is mandatory in fixed and mobile installations. In the case of fixed installations, the backfeed protection can be external to the UPS unit when indicated by a suitable warning label.

## 3.5. UPS sizing

Choosing the power rating of a UPS unit is a process which involves taking into account various elements, both functional and regulatory.

The main elements to be considered may include:

- two of the following parameters regarding the loads to be supplied:
  - Active Power (PRL);
  - Apparent Power (SRL);
  - Power Factor (PF).
- type of load power supply (voltage, frequency, number of phases);
- load coincidence factor;
- required back-up time;
- type of mains power supply (voltage, frequency, number of phases).

In the event of a particular load, which for example requires a high inrush current, this current value must be taken into account. Once the following parameters are known:

- $\hat{I}_{UPS}$ - maximum current of the UPS;
- $t_{UPS}$ - the time for which $\hat{I}_{UPS}$ is sustainable;
- $\hat{I}_L$ - overload current required by the load;
- $S_L$ - apparent power of the load

the apparent power rating, in case of load crest factor 3:1, is

$$S_{UPS} = S_L \cdot \frac{\hat{I}_L}{\hat{I}_{UPS}}$$

If the load is also strongly non-linear, as is the case with electronic equipment for example, and if the crest factor is higher than that tolerated by the UPS, it is advisable to consider a derating factor.

## 3.6. Temperature control in the place of installation

Normally, uninterruptible power systems can function at nominal powers for ambient temperatures up to 40 °C, heating the environment in which they are installed due to electrical losses dissipated in the form of heat. These losses cause the natural temperature to increase (ΔT) and are normally indicated by UPS manufacturers. The temperature of a room, which is 25 °C with the UPS switched off, may increase by up to 15 °C before it is necessary to derate the equipment. Room ventilation or air conditioning may enable these limits to be respected.

For ventilation, the following empirical formula is provided:

$$Q\left[m^3/h\right] = \frac{P\left[kcal/h\right]}{0{,}288 \cdot \Delta T\left[W\right]} = \frac{P\left[W\right]}{0{,}248 \cdot \Delta T\left[K\right]}$$

where:

Q = Air flow rate

P = Power dissipated in the enclosure

ΔT = Difference between maximum air temperature permitted in the enclosure and the maximum temperature of air used for cooling

In terms of temperature difference, degrees Kelvin (°K) and Centigrade (°C) are equal (this does not apply to absolute values).

For ventilation, see also the paragraph "Batteries" regarding safety in the battery room.

Meanwhile as regards air conditioning, you are recommended to contact the equipment supplier with the characteristics of the place of installation and the electrical losses of the UPS. It is advisable to consider the worst-case operating conditions: typically at midday in summer.

## 3.7. Central power supply systems (CPSS)

Central power supply systems (CPSS) provide a centralized, independent energy supply to essential safety equipment such as emergency escape lighting, electrical circuits of automatic fire extinguishing systems, paging systems and signalling safety installations, smoke extraction equipment and carbon monoxide warning systems for specific buildings (e.g. in high-risk areas).

An uninterruptible power supply, when used to power essential safety systems such as those listed above, must comply not only with the requirements of the EN 62040 series of product standards, but also with the additional requirements of system standard EN 50171.

The main additional characteristics which the system must have can be summarised as follows:

- the enclosures must be resistant to specific thermal stresses (glow wire tests)
- the input voltage must be in conformity with HD472 S1, with frequency within ±2% of the nominal value
- specifically the batteries must be:
  - protected against total discharge
  - long-life batteries
  - protected against polarity inversion of the connection cables
  - quick charging

In order for the power supply system to be effective, suitable precautions must be taken with respect to all of its component parts (protection devices, lines, etc.).

Note that other national requirements may exist in addition to those specified here.

## 3.8. Generator sizing

When the power source of the uninterruptible power supply includes a generator, in determining the latter it is necessary to take into account the voltage drop in the series impedance of the generator set due to harmonic variations.

The most suitable parameter for this calculation is the subtransitory reactance of the alternator, calculated for each frequency involved.

The subtransitory reactance value is provided in the generator set data sheets and is normally indicated with $X''_d$.

$$\Delta V_{\%} = \sqrt{\frac{\sum_i X''_d I_i^2}{I_n^2}}$$

The criteria is to choose the generator set which, given the current harmonics of the UPS, has a harmonic voltage drop, and therefore distortion, within the tolerance limit permitted by the line.

## 3.9. Protection devices

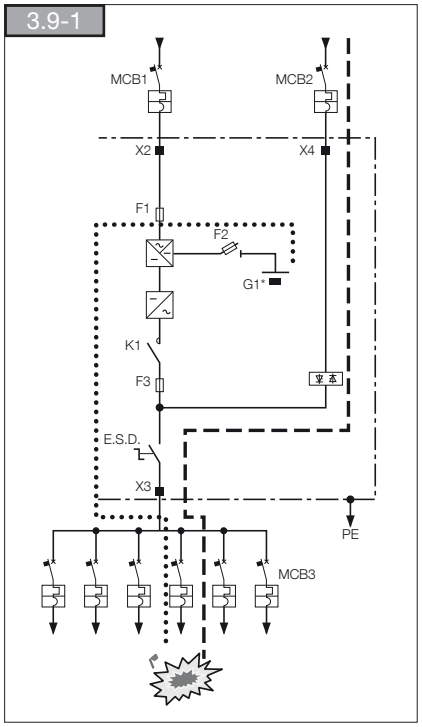
### 3.9.1. Definitions

- Total selectivity: is guaranteed for all types of fault (overload, short-circuit, earth fault) and for all overcurrent values, between the trip threshold of the upstream device and the prospective short-circuit current at the point where the downstream device is installed.
- Partial selectivity: is guaranteed up to a certain overcurrent limit Is (selectivity limit current).

### 3.9.2. Selecting and co-ordinating devices to protect against overloads and short-circuits

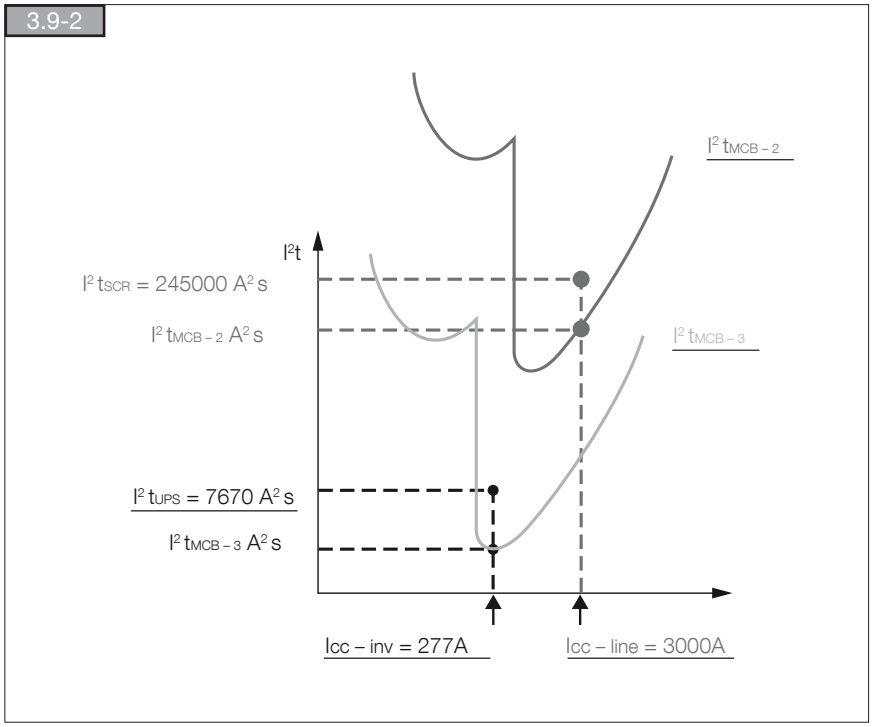
- **Overload selectivity**: for breaker trip times from several hours to several seconds (overcurrents up to 6-8 times the nominal current), the co-ordination curves (breaker time-current curves) must never overlap. In the event of overload, the UPS continues normal operation by switching to the bypass when the thermal limits of the inverter are reached. Consequently, this transfer must be taken into account during co-ordination of the various protection devices. The UPS data sheets normally indicate the overload currents "per unit" or "as a percentage" and the corresponding tolerance time.
- **Short-circuit selectivity**: short-circuit currents can be very high, so the protection devices must be tripped within a few milliseconds to prevent burn-out of the cables. The time-current curves used as criteria for selecting overload protection are not valid when considering short-circuit protection, on account of the short trip times. In this case, the breakers must be sized based on the Joule integral curves of the devices. In practice, for a given prospective short-circuit current value, the minimum I2t let-through of the upstream device must be greater than the maximum I2t let-though of the downstream device.

3.9-1




TBK000012

3.9-2




TBK000013

In the case of short-circuit of one of the loads connected downstream of the UPS, two cases must be distinguished:

- **The bypass (back-up supply) upstream of the UPS is available.**

  For an output short-circuit, the UPS will transfer the load onto the bypass after a delay dependent on the individual model. The thermal-magnetic breakers of the bypass (MCB2) and output which protect the short-circuited load line (MCB3) are positioned in series (short-circuit marked in the diagram by means of the dashed line). For proper co-ordination, the output switch (MCB3) must open before the main input switch (MCB2). Then, the $I^2t$ let-through of MCB3 must be lower than the let-through of MCB2 (at the prospective short-circuit current value): $I^2t_{MCB3} < I^2t_{MCB2}$.

  Furthermore, it is necessary to verify the selectivity between the bypass input thermal-magnetic switch and the maximum power tolerated by the bypass SCRs (in the example 245000 $A^2s$) at the prospective short-circuit (line) current (in the example 3000 A), e.g. $I^2t_{SCR} > I^2t_{MCB2}$.

In this case, the line impedance for estimating the short-circuit is that which takes into account the routing of power via the bypass. In the case of a back-up supply provided by a generator set, it is the short-circuit current of the generator set that must be used to correctly co-ordinate the protection devices.

- **The bypass (back-up supply) upstream of the UPS is unavailable.**

  Since the load cannot be transferred to the bypass (which is unavailable), the short-circuit energy is supplied entirely by the inverter and batteries. The downstream protection devices must be triggered before the electronic activation of the UPS protection in order to prevent healthy loads being switched off.

  The example (in the figure the short-circuit is represented by the dotted line), considers the three-phase short-circuit current from a 277 A battery for a maximum time of 100ms .

  The output short-circuit energy supplied by the UPS is: $I^2t_{UPS} = (277\ A)^2 \times 0.1\ s = 7672\ A^2s$

  At the short-circuit current value, in this case is not prospective but actual and coinciding with the short-circuit current value of the UPS, for correct selectivity it must be verified that $I^2t_{MCB3} < I^2t_{UPS}$.

  This second case (short-circuit without upstream supply) is nevertheless highly unlikely. In fact the absence of the upstream supply presupposes that a fault has occurred, and it is unlikely that a second fault (output short-circuit) would occur during the period of the power outage, which is usually short. In general, this period coincides with the time that the battery is supplying power (if the rectifier and the bypass do not have separate power supplies) or with the MTTR of the fault by an operator (if the UPS rectifier and the bypass have two different power supplies, as in this example).

  In the case of short-circuit without bypass supply, the current will be distorted to a square waveform.

### 3.9.3. Selecting and sizing differential breakers

There is no hard and fast rule since the behaviour of the mains supply to faults essentially depends on the neutral system used, the UPS filters (which divert certain harmonic components to earth) and the point of the fault.

Note.
The presence of isolation transformers can change the neutral system upstream or downstream of the UPS.

Generally speaking it is advisable to use:

- a single differential in the case of parallel UPS;
- type A differentials for single-phase in, single-phase out UPS;
- type B differentials for three-phase in, single-phase out UPS and three-phase in, three-phase out UPS.

### 3.9.4. Overvoltage protection devices

In conformity with IEC requirements, UPS systems are equipped with overvoltage protection. Unless otherwise required, the most common protection devices are Class 2. Usually, when the units are installed on the customer's premises, it is not necessary to increase the overvoltage protection class of the device. Nevertheless, if the units are installed in a transformer cabinet, the overvoltage protection class of the connection must be analysed and, if necessary, increased by installing additional protection devices.

## 3.10. Maintenance

In order to maximise uptime, it is advisable to perform periodic maintenance on components subject to wear:

- Capacitors;
- Fans;
- Batteries:

It is important that the maintenance is performed by expert personnel authorised by the UPS manufacturer.

## 3.11. Directives and Standards

### 3.11.1. Directives

- Low Voltage Directive 2006/95/EC
- Electromagnetic Compatibility Directive 2004/108/EC.

### 3.11.2. Safety Standards

- EN 62040-1-1 "Uninterruptible power systems (UPS) Part 1-1: General and safety requirements for UPS used in operator access areas"
- EN 62040-1-2 "Uninterruptible power systems (UPS) Part 1-2: General and safety requirements for UPS used in restricted access locations".

### 3.11.3. Electromagnetic Compatibility Standards

EN 62040-2 "Uninterruptible power systems (UPS) Part 2: Electromagnetic compatibility (EMC) requirements"

### 3.11.4. Performance

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

### 3.11.5. Other standards

- IEC 60364-X-X "Electrical installations in buildings";
- IEC 60439-1 "Low-voltage switches";
- IEC 60529 "Degrees of protection provided by enclosures"
- EN 50272-2 "Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries".

# 4. STATIC TRANSFER SYSTEMS (STS)

## 4.1. Definition

Static Transfer Systems (STS) are intelligent units which, in the event that the primary power source does not return the tolerance values permitted by the load, transfer the load to an alternative source). This ensures "high availability" of the power supply for sensitive or critical installations.

The purpose of STS devices is to:

- ensure the redundancy of the power supply to critical installations by means of two independent power sources;
- increase power supply reliability for sensitive installations;
- facilitate the design and expansion of installations that guarantee a high-availability power supply.

STS systems incorporate reliable and proven solid-state switching technologies (SCR), enabling them to perform fast, totally safe automatic or manual switching without interrupting power to the supplied systems.

The use of high-quality components, fault-tolerant architecture, the ability to determine the location of the fault, management of faults and loads with high inrush currents: these are just some of the characteristics that make STS systems the ideal solution for achieving maximum power availability.

## 4.2. Performance (IEC 62310-3 definition)

Standard IEC 62310-3 establishes a code that clearly defines the performance of a STS:

| XX | YY | B | TS |
|---|---|---|---|

where:

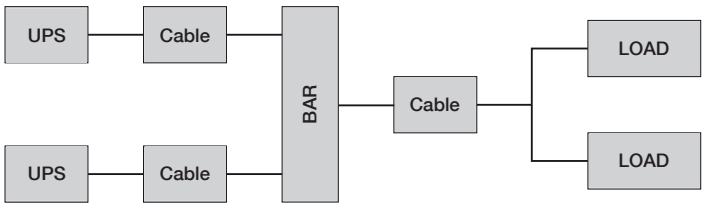
- **XX** characterises the management of the fault current:
  - which can be CB (STS is capable of withstanding specific short-circuit currents, which incorporates overvoltage protection devices)
  - PC (STS capable of withstanding specific short-circuit currents, which does not incorporate overvoltage protection devices).
- **YY** refers to the neutral management characteristics:
  - 00: no neutral management;
  - NC: both input neutrals are combined;
  - NS: separation of the two input neutrals by switching;
  - NI: neutral separation by isolation transformer (typically external to the machine).
- **B** are the transfer characteristics:
  - B: break-before-make (open transition transfer), there is no conduction path between the two sources during switching;
  - M: make-before-break (closed transition transfer), conduction possible between the two sources during switching.
- **TS** characteristics of the voltage limits permitted by the critical load:
  - T: total transient time to the terminals of the load, including switching time;
  - S: voltage tolerance before the transfer process is activated.

## 4.3. STS usage examples

Comparison between availability estimates between two architectures respectively with and without STS.

It is advisable to install the STS device as close as possible to the load, so as to ensure redundancy of the upstream distribution and to keep the single fault point (the conductor between STS and load) as short as possible.

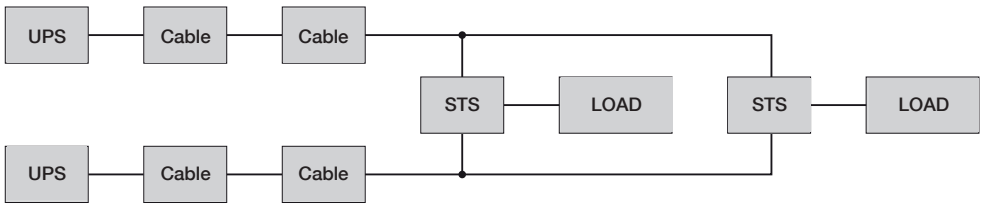
4.3-1 N+1 without STS




Estimated availability: 0.99749 (22 hours of downtime).

TBK000014

4.3-2 2N with STS



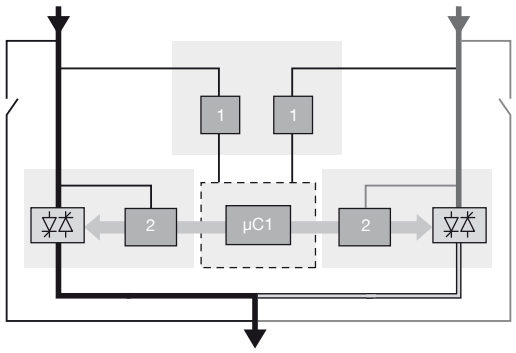

Estimated availability: 0.99991 (0.8 hours of downtime).
The double cable upstream of the STS serves to cover the same physical distance as the previous case (UPS and STS installed near to the load).

TBK000015

## 4.4. Functional modules

The aim of the STS is to increase the overall system availability. To achieve this it must be *fault-tolerant*: the load must be supplied even in the event of an internal fault.

4.4-1




TBK000016

### 4.4.1. SCR modules

Silicon-controlled rectifiers are solid-state switches which control the flow of current to the load. The SCR is only able to interrupt the current as it passes through zero. In a sinusoidal steady-state, this implies switching times of between 0ms and a semi-period.

### 4.4.2. Power supply module

Module which draws power from the *primary or* alternative source, or from both sources, to supply all of the control electronics. It could be redundant allowing an higher fault tollerance.

### 4.4.3. Control

- **Control logic**: the brain of the STS is a microcontroller where all of the decision-making logic is located.
- **SCR control modules**: components which translate the control signal received by the logic into commands to the SCR.

It could be redundant allowing an higher fault tollerance.

### 4.4.4. Maintenance bypass

Normally built into the STS, the aim of the bypass is to enable routine and non-routine maintenance to be carried out. When the bypass is in operation, switching is not possible in case the conducting source exceeds the tolerance limits permitted by the load.

The STS device must be designed and operate so the two sources cannot be directly connected, not even in the event of human error.

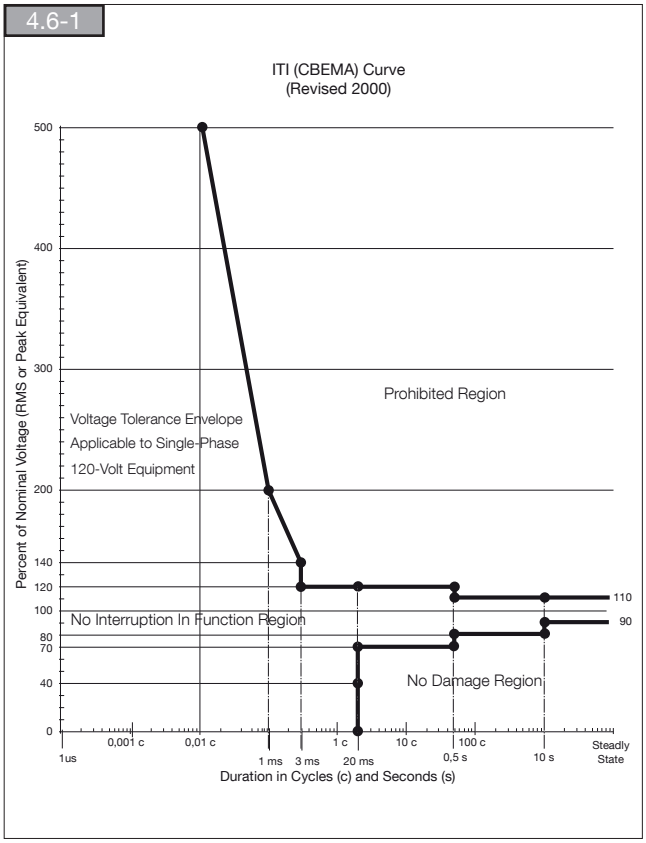
## 4.5. Backfeed protection

Product standard IEC 62310 establishes a minimum requirement that the STS must control upstream breakers that trip to prevent power flowing from one source to the other.

## 4.6. Selecting a STS

The STS must be sized on the basis of the system diagram, the currents of the loads supplied by the STS, the distribution network and the power dips admitted by the load. With regard to the power failure tolerance of loads, the Information Technology Industry Council has published a guideline curve which helps users to determine the power supply conditions which can be tolerated by IT loads.

4.6-1




Firstly, it is necessary to identify the rating characteristics of the electrical system and the neutral:

- Voltage and frequency;
- Single or three-phase;
- With or without distributed neutral;
- Neutral condition (TN-C, TN-S, IT, TT);
- Sources (line/line, UPS/generator, UPS/UPS, etc).

Next it is necessary to determine whether the neutral must be switched (broken). In this respect, SOCOMEC offers the following advice:

- TN-C: no switching (regulatory requirement);
- TN-S: switching (requirement if sources provided with differential protection);
- IT: switching.
- TT: switching.

It is then necessary to determine the total current that must pass through the STS device as the sum of the nominal currents of the various downstream loads.

It is also important to verify the installation of loads such as transformers or electric motors downstream of the STS, in order to prevent nuisance trips due to high inrush currents when switching between sources, or residual downstream voltage which impairs power failure detection. If such loads are installed, this must be taken into account during selection and configuration of the STS.

## 4.7. Protection devices

### 4.7.1. Selecting and coordinating thermal-magnetic breakers

In order to select the right overload or short-circuit protection devices, it is important to consider the STS system's behaviour in the event of overloads. Normally, the conducting branch of the STS withstands the overload/short-circuit for a time depending on the intensity of the currents, before the STS switches to the other branch. If the two networks have different impedances or short-circuit capacities, these must be taken into account. If the values are insufficient to trigger the breakers within the time limit permitted by the STS, the STS will interrupt the power supply upstream, resulting in all downstream loads being switched off.

### 4.7.2. Selecting and sizing differential breakers

When present, the neutral between the two sources can be combined and switched or otherwise (see paragraph Choosing an STS). In the case of a TN-C system, the neutral acts as an earth conductor and therefore cannot be broken. In the case of a TN-S system, the installation depends on what type of downstream STS has been selected. If the device does not switch the neutral, any neutral currents could be divided between the two parallel networks by means of the earth connection in the cabinet. The installation of differential breakers is not recommended due to the high probability of them tripping.

By contrast, if the STS device switches the neutral, this will avoid any unexpected current between both sources and earthing.

Differential protection may be installed.

Each IT systems has his own IMD (Insulation Measurement Device). Therefore every neutral has to be switched to avoid any mutual disturbances between the IMDs.

TT systems are typically used in residential or civil applications. This implies the use of differential protection and therefore a STS system which switches the neutral.

## 4.8. Maintenance

In order to maximise uptime, it is advisable to perform periodic maintenance on the fans (since they are components subject to wear). It is important that maintenance is performed by expert personnel authorised by the STS system manufacturer.

## 4.9. Directives and Standards

EEC 73/23 "Low-Voltage Directive"

EEC 89/336 "Electromagnetic Compatibility Directive"

IEC 62310-1 "Static Transfer Systems: general and safety requirements"

IEC 62310-2 "Static Transfer Systems: electromagnetic compatibility (EMC) requirements"

IEC 62310-3 "Static Transfer Systems: Method for specifying performance and test requirements"

IEC 60364-4 "Electrical installations of buildings"

IEC 60950-1 "Safety of IT. equipment"

IEC 60529 "Degrees of protection provided by enclosures (IP)"

IEC 60439-1 "Low-voltage switchgear and control gear assemblies"

# 5. COMMUNICATION

## 5.1. Protocols

- SMTP: communication protocol for email transmission, supported by all email clients;
- SNMP: protocol used to monitor networked devices; requires compatible software;
- HID: Human Interface Device, a protocol included in Windows and MAC OSx operating systems;
- JBUS/MODBUS: the most commonly available communications protocol for connecting industrial electronic devices;
- PROFIBUS & PROFINET: protocol for industrial and process automation, used by Siemens;
- TCP/IP: a suite protocols used to transmit information over the Ethernet;
- http: protocol used to transfer web pages in HTML format.

## 5.2. Physical supports

Physical infrastructures which convey information using communication protocols.

- USB: serial communication standard which enables various peripherals to be connected to a computer;
- Ethernet: interface for local area networks (LAN);
- RS 232: low-speed serial interface for data exchange between digital devices, suitable for distances of up to 10 m;
- RS 485: serial interface for data exchange between digital devices, suitable for distances of up to 1000 m;
- Dry contacts. interface with contacts which have no electrical potential and which can be NO (normally open) or NC (normally closed).

## 5.3. Remote services

UPS and STS systems must be able to remotely communicate their operating statuses, electrical / environmental parameters and fault alarms. Furthermore, certain commands should be possible for remote control of the equipment.

Some remote monitoring services operate 24 hours a day, 365 days a year, enabling equipment to be installed in places where human supervision is limited (to working hours) or absent. The rapid notification of abnormal events allows for prompt intervention by the technical support service, resulting in reduced risk and MTTR.

# 6. TOTAL COST OF OWNERSHIP (TCO)

## 6.1. Definition

Total Cost of Ownership (TCO) includes all of the direct and indirect costs over the lifetime of the equipment. It defines:

- CAPEX: cost of the equipment, its installation, system modifications if required and operator training;
- OPEX: costs of running the equipment, e.g. power consumption, cost of installation space (for example, the share of building rent proportional to the area occupied by the equipment), as well as routine and non-routine maintenance.

## 6.2. Impact of UPS or STS systems on the TCO

### 6.2.1. THDi and cosφ input

Valid only for UPS.

High harmonic content of the input current and low cos φ imply the use of harmonic filters, overrating of cables and protection devices as well as the risk of nuisance trips. In economic terms, this means higher project, system and installation costs and higher costs due to system downtime. Optimum situation: low harmonic content and high cos φ.

### 6.2.2. Footprint

The floor space occupied by the equipment. Can be net or gross, plan dimensions of the equipment and plan dimensions plus space required for operation and maintenance respectively.

UPS and STS systems do not generate value, but their purpose is to protect equipment which does generate value (servers, industrial processes). Therefore the space occupied is not available to the actual production process itself. In the case of *data centres*, it is the space where it is not possible to install the servers. Optimum situation: minimal footprint.

### 6.2.3. Performance

Efficiency refers to the proportion of input energy available to the load. Indirectly it is the measurement of losses, e.g. energy paid for but not used. Given that fossil fuels can be used to produce electrical energy (releasing gases that cause the greenhouse effect in the atmosphere), energy losses also entail unnecessary gas emissions and their corresponding impact on the environment.

Optimum situation: high efficiency.

### 6.2.4. Front access and ventilation

An equipment unit with front access notably simplifies routine and non-routine maintenance operations, leading to a considerable reduction in repair times (MTTR) compared to equipment which must be moved in order to gain access to the sides or rear.

Furthermore, equipment with front access only, incorporating a front air inlet and top air outlet, allows for wall-mounted installation and therefore a reduced gross footprint.

### 6.2.5. Ease of use

In its popular publication *Tier Classifications define site infrastructure performance*, the Uptime Institute states that 70% of downtime is caused by human error (mistakes in checking and routine maintenance).

Equipment which is easy to use reduces these risks, lowers downtime costs and requires shorter, less intensive training for operators.

### 6.2.6. Communication systems

Remote monitoring and control enable time and human resources to be streamlined while reducing maintenance and repair times in the event of abnormal situations. For this reason, the equipment must be capable of being integrated into Building Management Systems (BMS).

# 7. ENVIRONMENTAL COMPATIBILITY

## 7.1. RoHS and WEEE directives

The official stance of CEMEP (Comité Européen de Constructeurs de Machines Electriques et d'Electronique de Puissance - European Committee of Manufacturers of Electrical Machines and Power Electronics) is that the RoHS and WEEE directives do not apply to UPS.

## 7.2. Performance

The only reference for efficiency performance is given by the European Code of Conduct (http://re.jrc.ec.europa.eu/energyefficiency/html/AC%20UPS-ParticipantsCoC.htm). Manufacturers can adhere to it on a voluntary basis by committing to the minimum efficiency requirements of the code.

# 8. DIRECT ENERGY IMPACT



The energy efficiency of an equipment unit is defined as:

$$\eta = \frac{P_{out}}{P_{in}}$$

where:

- Pin is the input power
- Pout is the output power, which in the case of the UPS coincides with the Pn (nominal power).

Using simple calculations we can determine heat loss (Perd) as follows:

$$P_{erd} = P_n \left[ \frac{1-\eta}{\eta} \right]$$

Approximately 0.61kg of carbon dioxide is generated per kWh of energy lost (http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2report.html#electric), with the resulting environmental consequences and an average energy cost in Europe of 0.12€.

$$P_{erd\,93\%} = 150\ kW \left[ \frac{1-0,93}{0,93} \right] \cdot 24 \cdot 365 = 98,9\ MWh \longrightarrow 60\ t_{CO2} + 11800\ €$$

$$P_{erd\,96\%} = 150\ kW \left[ \frac{1-0,96}{0,96} \right] \cdot 24 \cdot 365 = 54,7\ MWh \longrightarrow 33\ t_{CO2} + 6600\ €$$

On a load-for-load basis, the UPS with 96% efficiency achieves an annual saving of 5200€ and 27t of carbon dioxide for air conditioning alone, the same output as a car manufactured in 2005 with 170,000km on the clock. (http://en.wikipedia.org/wiki/European_emission_standards).

# 9. IMPACT ON AIR CONDITIONING

Electrical losses are dispersed, in the form of heat, into the environment. In applications where the temperature must be controlled and the heat capacity of the environment is insufficient, measures must be taken to cool the environment. There are different ways of doing this: from simple ventilation, e.g. the movement of air masses of the desired temperature which are already available in the vicinity of the installation, to air conditioning, e.g. the cooling and circulation of air masses.

There are also technologies based on the use of water as a heat transfer fluid, but this is less common.

Air conditioning is the most frequently used technology. The parameter which measures the electrical energy needed to release energy in the form of heat is Coefficient of Performance (COP). When talking about electricity, we normally refer to power instead of energy, consequently the definition of COP. becomes:

$$C.O.P. = \frac{P_t}{P_e}$$

where:

- Pt: the thermal power to be released;
- Pe is the electric power needed to do it.

With close approximation, 3 can be considered as a typical COP value.

This means that for every 3 kW of thermal power dissipated, 1 electrical kW is needed.

This means that the efficiency rating of plant equipment is only partly able to quantify heat dissipation, since it does not take into account the energy needed to achieve it.

By way of indication, below are the annual air conditioning costs in relation to the example given in the previous paragraph (two different UPS with respective efficiency ratings of 93% and 96%, considering an average annual energy cost in Europe of 0.12 €/kWh).

$$HVAC_{93\%} = \frac{98{,}9\ MWh}{3} \cong 33\ MWh \longrightarrow 20\ t_{CO2} + 4000\ €$$

$$HVAC_{96\%} = \frac{54{,}7\ MWh}{3} \cong 11\ MWh \longrightarrow 11\ t_{CO2} + 2200\ €$$

On a load-for-load basis, the UPS with 96% efficiency achieves an annual saving, for air conditioning alone, of 1800 € and 9 t of carbon dioxide. Taking into account direct heat loss, the savings increase to 7200 € and 36 t of $CO_2$.

| | |
|---|---|
| Standard 200 kVA UPS emissions | **72.100 $CO^2$ kg** |
| Green Power 200 kVA UPS emissions | **40.400 $CO^2$ kg** |

PRIME

Trustworthy power

# MASTERYS BC+

10 to 40 kVA

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

95% EFFICIENCY


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

Socomec Resource Center
To download, brochures, catalogues and technical manuals

socomec
Innovative Power Solutions

# 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.

# 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.

# 1. ARCHITECTURE

## 1.1 RANGE

MASTERYS BC+ is a full range of high performing UPS designed to protect critical and sensitive appliances in “business critical” applications such as data servers.

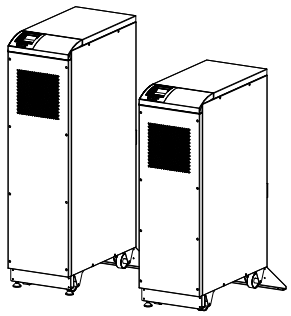
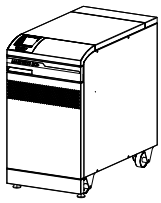
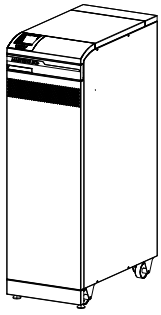
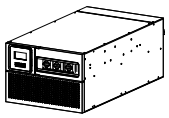
| MODELS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| | 3/1 | | | 3/3 | | | | |
| MASTERYS BC+ B3 / M3 | • | • | • | • | • | • | | |
| MASTERYS BC+ S4 | | | | | | | • | • |
| MASTERYS BC+ M4 | • | • | • | • | • | • | • | • |
| MASTERYS BC+ FL | • | • | • | • | • | • | • | • |

*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.

# 2. FLEXIBILITY

## 2.1 POWER RATINGS 10 TO 40 KVA

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Cabinet type | | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | B3 | 370 | 770 | 1190 |
| | M3 | 370 | 770 | 1375 |
|  | S4 | 444 | 800 | 800 |
|  | M4 | 444 | 800 | 1400 |
|  | FL | 442 | 830 | 305 |

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 operating mechanisms and communication devices).

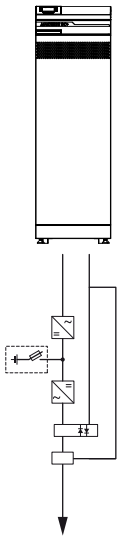
All of the control mechanisms and communication interfaces are located in the upper front section and can be accessed from the first panel with the red surround (for B3 and M3, they are accessible from the back of the UPS).

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

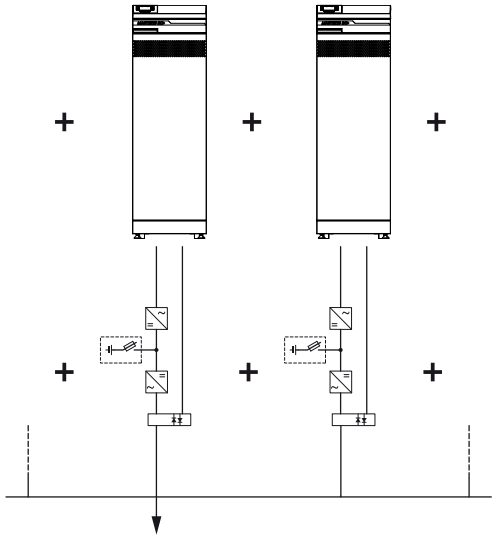
The air inlet is on the front, with outflow to the rear.

## 2.2 PARALLEL

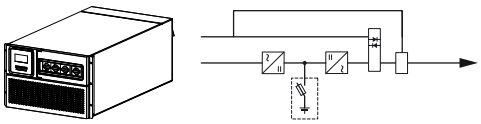
MASTERYS BC+ enables 2 configurations of UPS systems in the same range



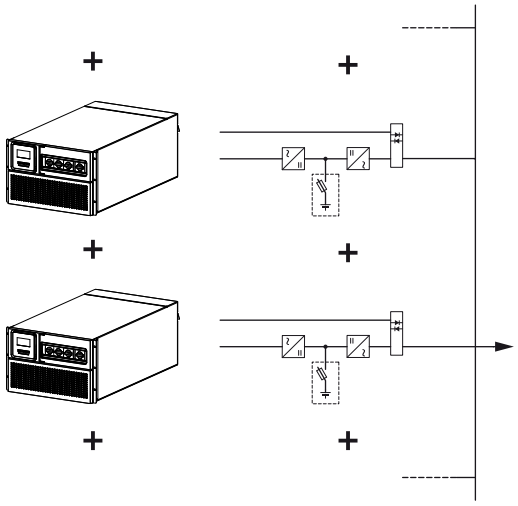
Single unit configuration



Parallel UPS configuration
(up to 4 units for B3 and M3,
up to 6 units for S4, M4)



Single unit configuration



Parallel UPS configuration
(up to 6 units)

## 2.3 FLEXIBLE BACK-UP TIME

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

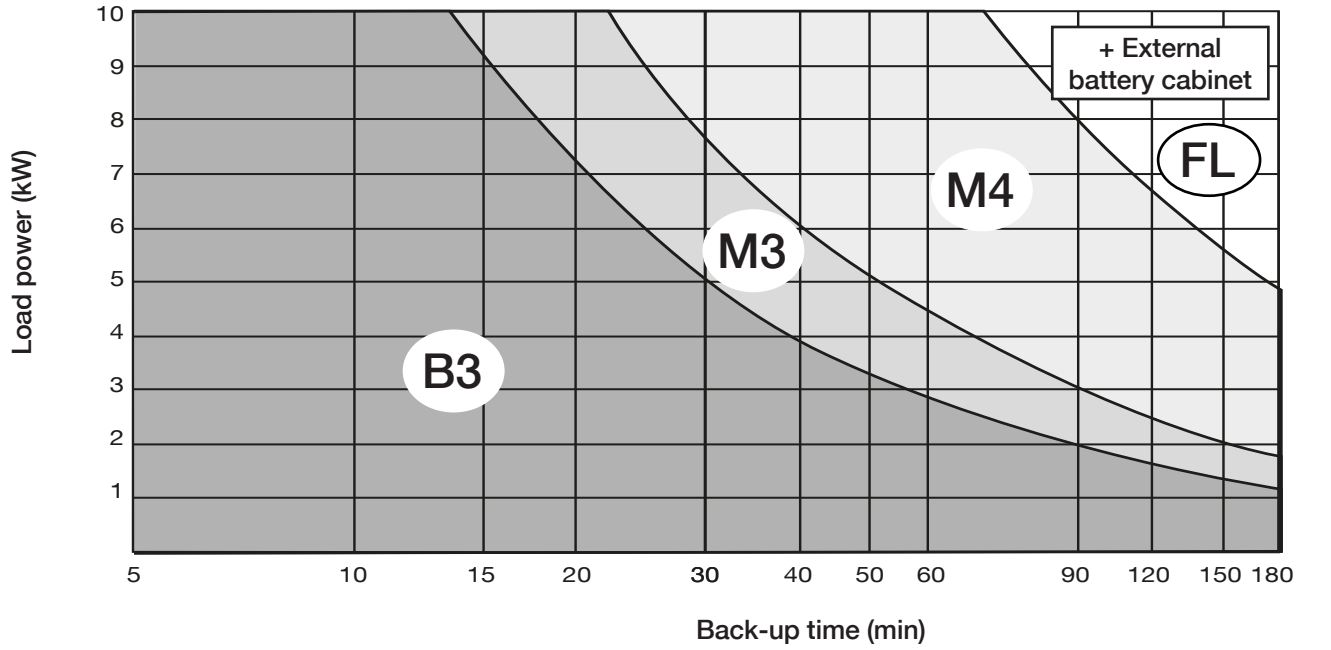
Batteries are installed on acid-proof trays and connected by means of polarised connectors to facilitate their maintenance.

To guarantee maximum back-up time availability and battery life, the MASTERYS BC+ 10-40 series is equipped with an EBS (Expert Battery System).

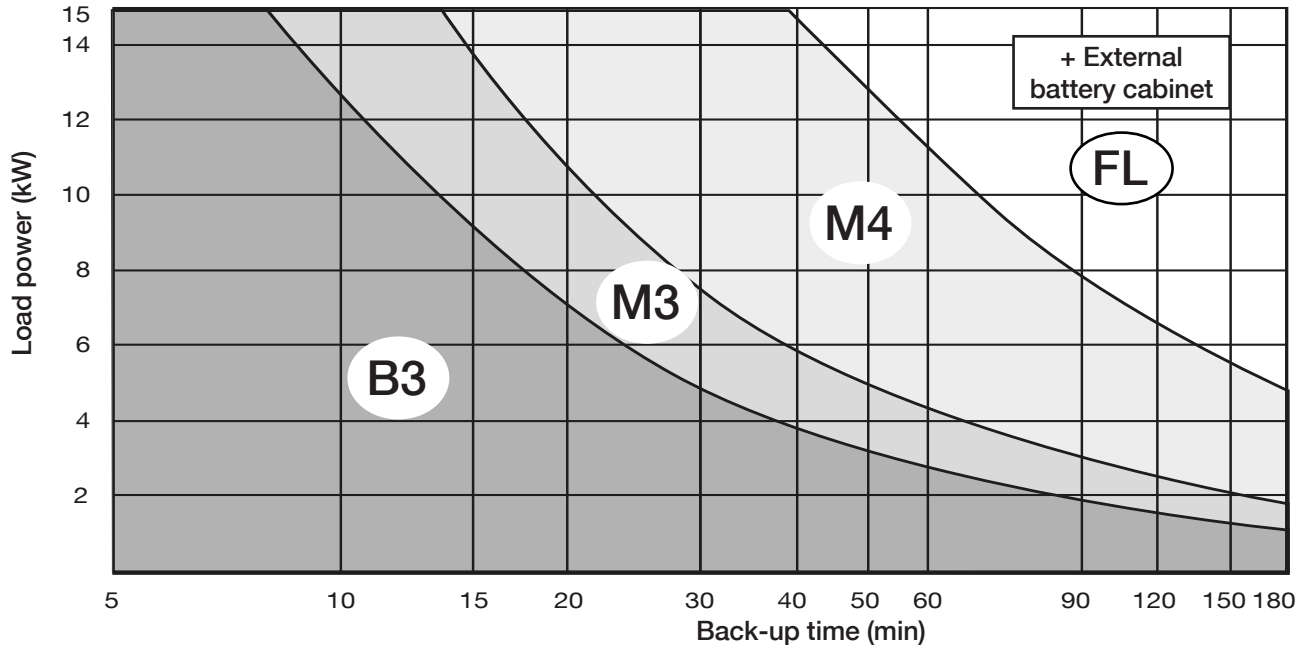
For external battery cabinets use model FL.

For internal batteries, use the following charts to select the model (B3, M3, S4 or M4) in relation to power and back-up time.

**10 kVA**



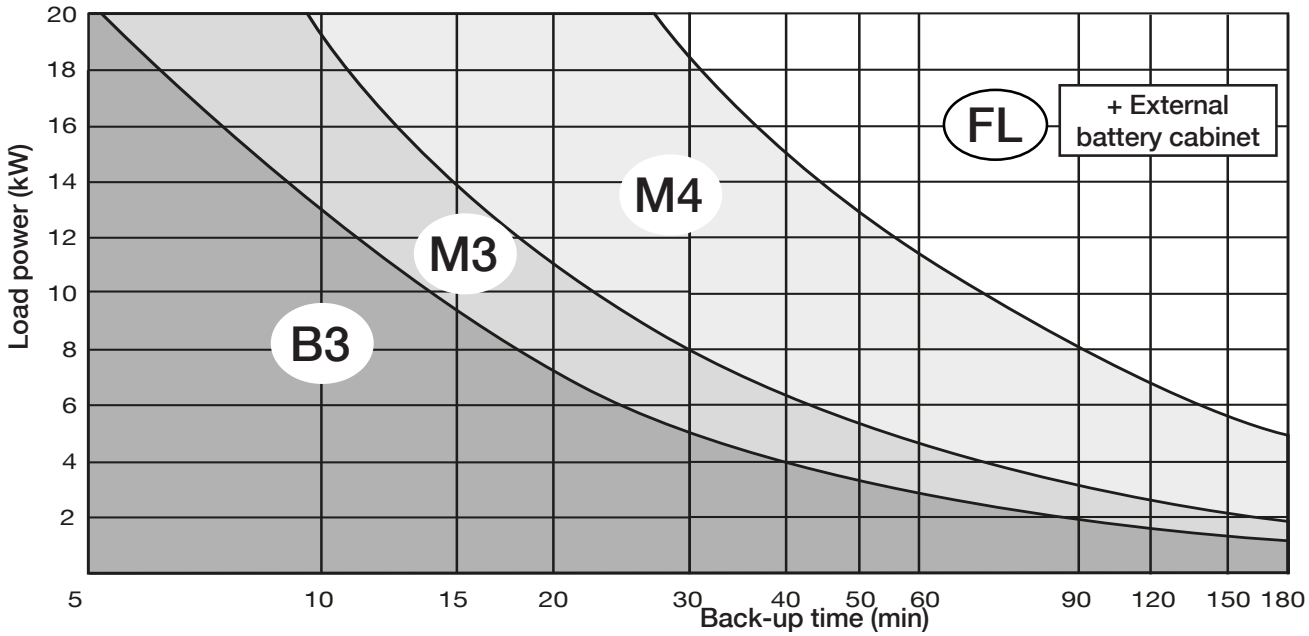

**15 kVA**



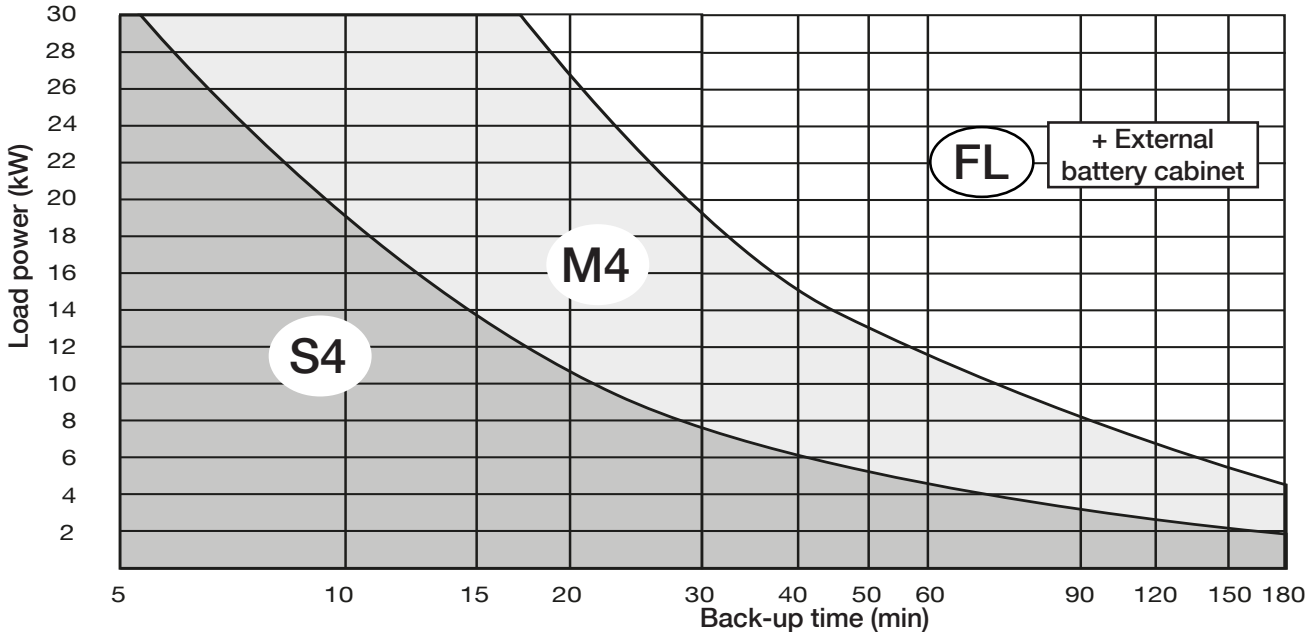



socomec
Innovative Power Solutions

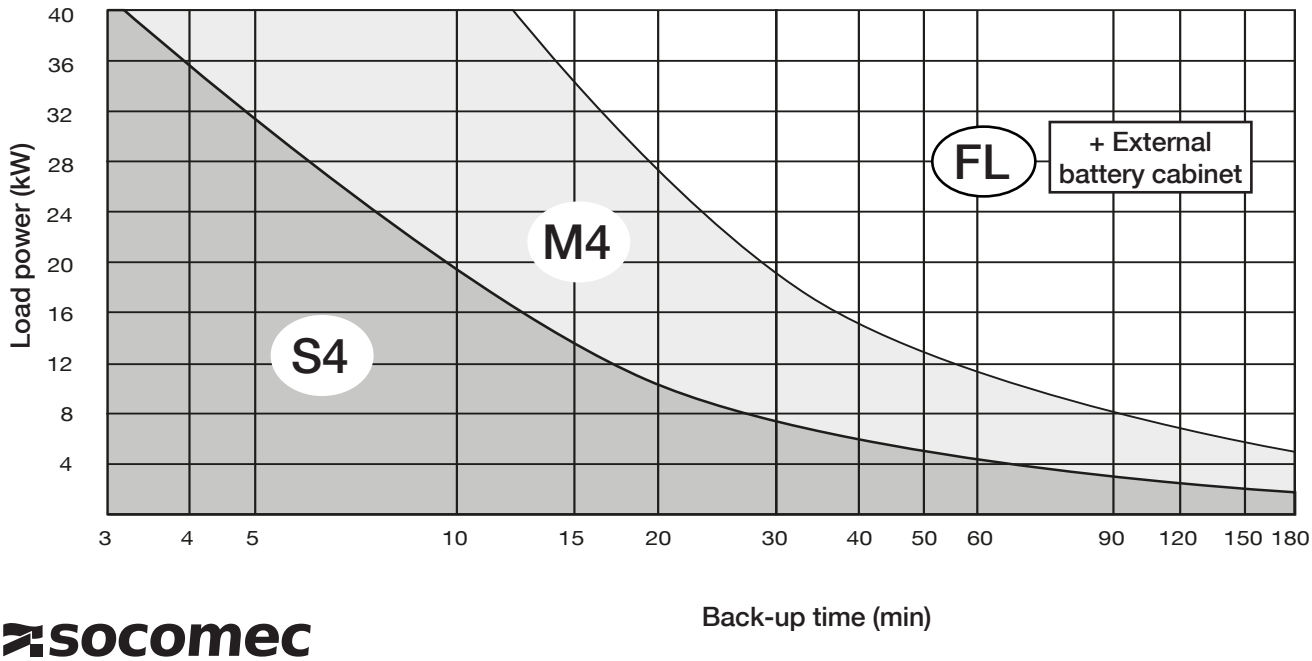
## 20 kVA




## 30 kVA




## 40 kVA



# 3. STANDARD FEATURES AND OPTIONS

| Availability | |
|---|---|
| ● | *Factory-installed option* |
| ○ | *Available as option (installation on site)* |
| STD | *Standard feature* |

| FEATURES | MASTERYS BC+ | | | | | Notes |
|---|---|---|---|---|---|---|
| | B3 M3 | S4 M4 | | FL | | |
| | 10-15-20 kVA | 10-15-20 kVA | 30-40 kVA | 10-15-20 kVA | 30-40 kVA | |
| **Battery Option** | | | | | | |
| Additional charger | | ●○ | ●○ | ●○ | ●○ | |
| **Communication Option** | | | | | | |
| Standard web pages | STD | | | | | |
| ACS card *(Automatic Cross Synchronisation)* | | ●○ | ●○ | ●○ | ●○ | |
| ADC+SL card *(Advanced Dry Contact + Serial Link)* | ○ | ○ | ○ | ○ | ○ | |
| External temperature sensor | ○ | ○ | ○ | ○ | ○ | ⚠ ! ADC+SL card |
| Remote touchscreen display | ○ | ○ | ○ | ○ | ○ | ⚠ ! ADC+SL card |
| BACnet/IP interface 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 | ○ | ○ | ○ | ○ | ○ | |
| External maintenance bypass width adapter kit | | | | ○ | ○ | |
| Kit for TN-C / Neutral-Ground connection | ○ | ○ | ○ | ○ | ○ | |
| Internal Backfeed isolation device | ● | ● | ● | ● | ● | |
| Kit For Common Mains | STD (3/3) | STD (3/3) | ○ | STD (3/3) | ○ | |
| Kit For Separate Mains | STD (3/1) ● (3/3) | STD (3/1) ● (3/3) | STD | STD (3/1) ● (3/3) | STD | |
| **Mechanical Option** | | | | | | |
| Ramp for unloading UPS | ○ | ○ | ○ | | | |
| Kit for Front and Lateral Cover | | ○ | ○ | | | |
| Kit for IP21 | ○ | ○ | ○ | | | |
| Kit for Free Standing | *(Tower Mounted)* | | | ○ | ○ | |
| Kit for Top Mounted width adaptation | *(Socomec Battery Cabinet)* | | | ○ | ○ | |
| | *(Non-Socomec Battery Cabinet)* | | | ○ | ○ | |

! *Required option*

⊘ *Incompatible option*

# 4. SPECIFICATIONS BC+ 10-20 KVA COMPACT B3 M3

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | | 3/1 | | | 3/3 | | |
| Active power | | kW | 10 | 15 | 20 | 10 | 15 | 20 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 16/21 | 23/30 | 31/39 | 16/21 | 23/30 | 31/39 |
| Rated bypass input current | | A | 44 | 65 | 87 | 15 | 22 | 29 |
| Inverter output current @ 230 V | | A | 44 | 65 | 87 | 15 | 22 | 29 |
| Maximum air flow | | $m^3/h$ | 408 | 816 | | 408 | 816 | |
| Sound level | | dBA | 48 | 50 | | 48 | 50 | |
| Power Dissipation in nominal conditions (1) | | W | 604 | 841 | 1164 | 593 | 825 | 1142 |
| | | kcal/h | 517 | 720 | 996 | 507 | 706 | 977 |
| | | BTU/h | 2060 | 2869 | 3971 | 2023 | 2814 | 3895 |
| Power Dissipation (max) in worst conditions (2) | | W | 684 | 900 | 1253 | 672 | 883 | 1230 |
| | | kcal/h | 585 | 770 | 1072 | 575 | 755 | 1052 |
| | | BTU/h | 2333 | 3070 | 4274 | 2292 | 3012 | 4196 |
| Dimensions (with standard back-up time) | Width | mm | 370 | | | | | |
| | Depth | mm | 770 | | | | | |
| | Height | mm | 1190/1375 | | | | | |
| Single unit clearances | Operational | mm | Rear ≥ 200 | | | | | |
| | Maintenance | mm | Front ≥ 1500; Top ≥ 800 | | | | | |
| Weight, without batteries | | kg | 95 | 104 | 104 | 93 | 93 | 93 |
| Weight, with batteries | | kg | 152/290 | 160/299 | 225/299 | 138/286 | 153/288 | 198/288 |

*1) Considering nominal input current (400 V, battery charged) and rated output active power.*

*2) Considering maximum input current (low input voltage, battery recharged) and rated output active power.*

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - INPUT | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | 3/1 | | | 3/3 | | |
| Rated mains supply voltage | 400 V 3ph + N | | | | | |
| Voltage tolerance | 3Ph+N 400 V -15% +20% (up to -40% @70% of nominal load) | | | | | |
| Rated frequency | 50/60 Hz (selectable) | | | | | |
| Frequency tolerance | 40-70 Hz | | | | | |
| Power factor (input at full load and rated voltage) | ≥ 0.99 | | | | | |
| Total harmonic distortion (THDi)(3) | ≤ 3% | | | | | |
| Max inrush current at start-up | < In (no overcurrent) | | | | | |

*3) measured with the UPS supplied with a voltage source of negligible distortion (input source THDv ≤ 1% - 50Hz).*

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| 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 8%) | | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | 3/1 | | | 3/3 | | |
| Rated output voltage (selectable) | | 220/230/240 V | | | 380/400/415 V | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-111 | | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | | |
| Output frequency tolerance | | ±0.01% (on mains power failure) | | | | | |
| Load crest factor | | ≥ 2.7:1 | | | | | |
| Voltage harmonic distortion | | < 1% with linear load | | | | | |
| Overload tolerated by the inverter | 10 min (kW) | 12.5 | 18.8 | 25 | 12.5 | 18.8 | 25 |
| | 1 min (kW) | 15 | 22.5 | 30 | 15 | 22.5 | 30 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | 3/1 | | | 3/3 | | |
| Double conversion efficiency (normal mode) - full load | | Up to 95% | | | | | |
| Efficiency in Eco-Mode | | 98% | | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| 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 +35 °C (15 to 25 °C for better battery life)<br>Max +50 °C @ 40% 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 front E150HVF | | | | | |

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | | 3/1 | | | 3/3 | | | | |
| Standard max. current | A | 4 | | | | | | | |
| Battery connection in parallel configuration | | UPS work with distributed battery | | | | | | | |

## 4.3 RECOMMENDED PROTECTIONS

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

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS[1] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | 3/1 | | | 3/3 | | |
| Max $I^2t$ supported by the bypass ($A^2s$) | | 38920 | | | 4325 | | |
| Max Ipk supported by the Bypass (A) | | 2790 | | | 930 | | |
| C curve circuit breaker (A) | | 80 | 100 | 125 | 25 | 32 | 40 |
| gG fuse (A) | | 63/80 | 80/100 | 100/125 | 20/25 | 25/32 | 32/40 |

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

| RECOMMENDED PROTECTION DEVICES - OUTPUT[3] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | 3/1 | | | 3/3 | | |
| Short-circuit inverter current (A) (when AUX MAINS is not present) | 0 to 40 ms | 120 | 180 | 240 | 40 | 60 | 80 |
| | 40 to 100 ms | 97 | 146 | 195 | 32 | 48 | 65 |
| C curve circuit breaker[3] (A) | | 8 | 10 | 16 | 3 | 4 | 6 |
| B curve circuit breaker[3] (A) | | 16 | 25 | 32 | 6 | 8 | 10 |

| CABLES - MAXIMUM CABLE SECTION | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 |
| Phase in/out | | 3/1 | | | 3/3 | | |
| Rectifier terminals | | 25 $mm^2$ | | | | | |
| Bypass terminals | | 25 $mm^2$ | | | | | |
| Output terminals | | 25 $mm^2$ | | | | | |

*(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 parallel UPS configurations, 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.*

# 5. SPECIFICATIONS1 BC+ 10-40 KVA

S4 M4

## 5.1 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 | | $m^3/h$ | 240 | | | | | | | 360 |
| Sound level | | dBA | 50 | | | | | | | 58 |
| Power Dissipation in nominal conditions (1) | | W | 500 | 770 | 1050 | 500 | 770 | 1050 | 1600 | 2330 |
| | | kcal/h | 430 | 662 | 903 | 430 | 662 | 903 | 1427 | 2003 |
| | | BTU/h | 1706 | 2627 | 3583 | 1706 | 2627 | 3583 | 5664 | 7950 |
| Power Dissipation (max) in worst conditions (2) | | W | 610 | 890 | 1220 | 610 | 890 | 1220 | 1780 | 2780 |
| | | kcal/h | 524 | 765 | 1049 | 524 | 765 | 1049 | 1530 | 2390 |
| | | BTU/h | 2081 | 3037 | 4163 | 2081 | 3037 | 4163 | 6074 | 9485 |
| Dimensions (with standard back-up time) | Width | mm | 444 | | | | | | | |
| | Depth | mm | 800 | | | | | | | |
| | Height | mm | 1400 | | | | | | 800 / 1400 | |
| Single unit Clearances | Operational | mm | Rear ≥ 200; Lateral 0 | | | | | | | |
| | Maintenance | mm | Front ≥ 1500; Top ≥ 800 | | | | | | | |
| Weight, with batteries | | kg | 430 / 624 | | | | | | 333 / 624 | 339 / 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.*

## 5.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - 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 | 3Ph+N 400 V -15% +20% (up to -40% @70% of nominal load) | | | | | | | |
| Rated frequency 50/60 Hz = nominal frequency | from 40 Hz to 70 Hz | | | | | | | |
| Frequency tolerance | ±10% | | | | | | | |
| Power factor (input at full load and rated voltage) | ≥ 0.99 | | | | | | | |
| Total harmonic distortion (THDi) | ≤ 4% | ≤ 3% | | | | | ≤ 2.5% | ≤ 2% |
| Max inrush current at start-up | < In (no overcurrent) | | | | | | | |
| Power walk-in (from battery to normal mode) | fixed delay of 15 s in switching | | | | | | | |

| 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 6 Hz/s) | | | | | | | |
| Bypass rated voltage | | Nominal output voltage ±15% | | | | | | | |
| Bypass rated frequency | | 50/60 Hz (selectable) | | | | | | | |
| Bypass frequency tolerance | | ±8% in operation with generator | | | | | | | |

| 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) | | 208/220/230/240 V | | | 208/220/230/240 V | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-11 | | | | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | | | | |
| Output frequency tolerance | | ±0.01% (on mains power failure) | | | | | | | |
| Load crest factor | | ≥ 2.7 | | | | | | | |
| Voltage harmonic distortion | | ± 1% with linear load | | | | | | | |
| Overload tolerated by the inverter kW | 10 min | 12.5 | 18.7 | 25 | 12.5 | 18.7 | 25 | 37.5 | 56.2 |
| | 1 min | 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 95% | | | | | | | |
| Efficiency in Eco-Mode | | 99% | | | | | | | |

| 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 +35 °C [1] (15 to 25 °C for better battery life)<br>Max +45 °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 front E150HVF | | | | | | | |

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | | 3/1 | | | 3/3 | | | | |
| Standard max. current | A | 5 | | | | | | | |
| Battery connection in parallel configuration | | UPS work with distributed battery | | | | | | | |

*(1) Condition apply.*

## 5.3 RECOMMENDED PROTECTIONS

| 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 | | | | |
| Max $I^2t$ supported by the bypass ($A^2s$) | 45000 | | | 8000 | | | 15000 | |
| Max Ipk supported by the Bypass | 2120 | | | 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] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 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) | de 0 à 40 ms | 120 | 177 | 237 | 40 | 59 | 79 | 117 | 156 |
| | de 40 à 100 ms | 99 | 147 | 198 | 33 | 49 | 66 | 98 | 130 |
| C curve circuit breaker[3] (A) | | ≤ 8 | ≤ 10 | ≤ 16 | ≤ 3 | ≤ 4 | ≤ 6 | ≤ 8 | ≤ 10 |
| B curve circuit breaker[3] (A) | | ≤ 16 | ≤ 25 | ≤ 32 | ≤ 6 | ≤ 8 | ≤ 10 | ≤ 16 | ≤ 20 |

| CABLES - MAXIMUM CABLE SECTION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | 3/1 | | | 3/3 | | | | |
| Rectifier terminals | 25 | 25 | 25 | 25 | 25 | 25 | 50 | 50 |
| Bypass terminals | 50 | 50 | 50 | 25 | 25 | 25 | 50 | 50 |
| Output terminals | 50 | 50 | 50 | 25 | 25 | 25 | 50 | 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 parallel UPS configurations, 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 units.*

# 6. SPECIFICATIONS BC+ FLEX 10-40 KVA

FL

## 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 | | $m^3/h$ | 240 | | | | | | | 360 |
| Sound level | | dBA | 50 | | | | | | | 58 |
| Power Dissipation in nominal conditions (1) | | W | 500 | 770 | 1050 | 500 | 770 | 1050 | 1600 | 2100 |
| | | kcal/h | 430 | 662 | 903 | 430 | 662 | 903 | 1427 | 2003 |
| | | BTU/h | 1706 | 2627 | 3583 | 1706 | 2627 | 3583 | 5664 | 7950 |
| Power Dissipation (max) in worst conditions (2) | | W | 610 | 890 | 1220 | 610 | 890 | 1220 | 1780 | 2780 |
| | | kcal/h | 524 | 765 | 1049 | 524 | 765 | 1049 | 1530 | 2390 |
| | | BTU/h | 2081 | 3037 | 4163 | 2081 | 3037 | 4163 | 6074 | 9485 |
| Dimensions (with standard back-up time) | Width | mm | 442 | | | | | | | |
| | Depth | mm | 830 | | | | | | | |
| | Height | mm | 305 | | | | | | | |
| Single unit Clearances | Operational | mm | Rear ≥ 200; Lateral 0 | | | | | | | |
| | Maintenance | mm | Front ≥ 1500 Top ≥ 800 | | | | | | | |
| Weight, without batteries | | kg | 71 | | | | | | | 77 |

*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 - 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 | 3Ph+N 400 V -15% +20% (up to -40% @70% of nominal load) | | | | | | | |
| Rated frequency<br>50/60 Hz = nominal frequency | from 40 Hz to 70 Hz | | | | | | | |
| Frequency tolerance | ±10% | | | | | | | |
| Power factor<br>(input at full load and rated voltage) | ≥ 0.99 | | | | | | | |
| Total harmonic distortion (THDi) | ≤ 4% | ≤ 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 | | ±8% in operation with generator | | | | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | | 3/1 | | | 3/3 | | | | |
| Rated output voltage (selectable) | | 208/220/230/240 V | | | 208/220/230/240 V | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-11 | | | | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | | | | |
| Output frequency tolerance | | ±0.01% (on mains power failure) | | | | | | | |
| Load crest factor | | ≥ 2.7 | | | | | | | |
| Voltage harmonic distortion | | < 1% with linear load | | | | | | | |
| Overload tolerated by the inverter kW | 10 min | 12.5 | 18.7 | 25 | 12.5 | 18.7 | 25 | 37.5 | 50 |
| | 1 min | 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 95% | | | | | | | |
| Efficiency in Eco-Mode | 99% | | | | | | | |

| 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 +35 °C (1) (15 to 25 °C for better battery life)<br>Max +45°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 front E150HVF | | | | | | | |

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | | 3/1 | | | 3/3 | | | | |
| Standard max. current | A | 5 | | | | | | | |
| Battery connection in parallel configuration | | UPS work with distributed battery | | | | | | | |

*(1) Condition apply.*

## 6.3 RECOMMENDED PROTECTIONS

| 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 | | | | |
| Max $I^2t$ supported by the bypass ($A^2s$) | 45000 | | | 8000 | | | 15000 | |
| Max Ipk supported by the Bypass | 2120 | | | 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] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 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) | | ≤ 8 | ≤ 10 | ≤ 16 | ≤ 3 | ≤ 4 | ≤ 6 | ≤ 8 | ≤ 10 |
| B curve circuit breaker[3] (A) | | ≤ 16 | ≤ 25 | ≤ 32 | ≤ 6 | ≤ 8 | ≤ 10 | ≤ 16 | ≤ 20 |

| CABLES - MAXIMUM CABLE SECTION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 10 | 15 | 20 | 30 | 40 |
| Phase in/out | 3/1 | | | 3/3 | | | | |
| Rectifier terminals | 25 | 25 | 25 | 25 | 25 | 25 | 50 | 50 |
| Bypass terminals | 50 | 50 | 50 | 25 | 25 | 25 | 50 | 50 |
| Battery terminals | 25 | 25 | 25 | 25 | 25 | 25 | 50 | 50 |
| Output terminals | 50 | 50 | 50 | 25 | 25 | 25 | 50 | 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 parallel UPS configurations, use a single residual current circuit breaker upstream of the UPS.*

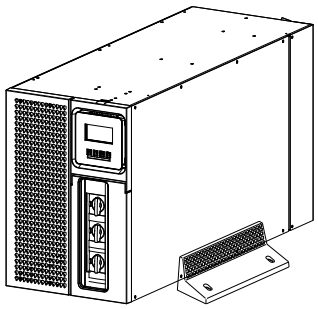
*(3) Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present). The rating of the protection can be increased by "n" times downstream a parallel UPS system, with "n" equal to the number of parallel modules.*

# 7. FLEX UPS

Choose the perfect configuration at the last minute - on-site - with Flex-UPS, the first device that adapts to the environment rather than

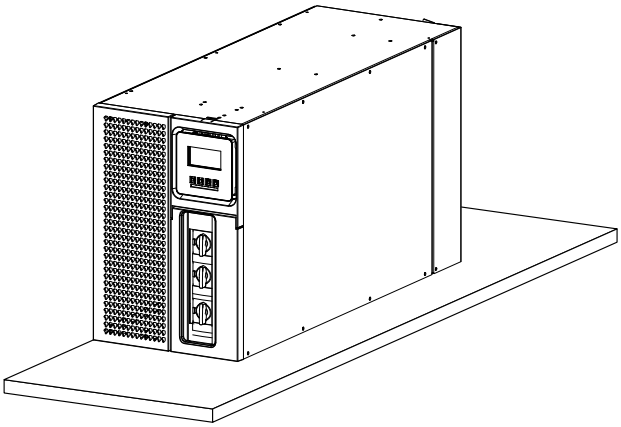
requiring the environment to adapt to the device. Three positioning choices are available depending upon the technical room space and the

type of battery frame. Flex-UPS delivers a unique freedom to get building UPS and battery solution.



Free standing configuration:

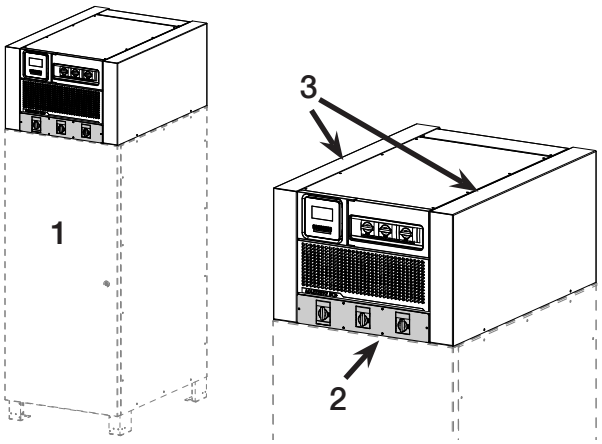
the unit can be installed in vertical position and kept in place with lateral support.



Wall mounted configuration:

Masterys BC+ Flex can be installed vertically or horizontally on a shelf; the display can be rotated accordingly

Solution compatible with existing shelves




Installation on top of battery cabinets:

The UPS can be installed on top of battery cabinet (Socomec or not) selecting the compatible kit.

The UPS is supplied as stand alone, according to the needs you can add:

1: battery cabinets

2: external manual bypass

3: lateral covers

# 8. REFERENCE STANDARDS AND DIRECTIVES

## 8.1 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

## 8.2 STANDARDS

### 8.2.1 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)

### 8.2.2 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

### 8.2.3 TEST AND PERFORMANCE

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

### 8.2.4 ENVIRONMENTAL

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

## 8.3 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.

PRIME

Trustworthy power

# MASTERYS BC+

From 60 to 160 kVA

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

95% EFFICIENCY


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

Socomec Resource Center
To download, brochures, catalogues and technical manuals

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 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.

# 1. ARCHITECTURE

## 1.1 RANGE

MASTERYS BC+ is a full range of high performing UPS system 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 BC+ | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| MASTERYS BC+ 3/3 | • | • | • | • | • |
| Matrix table for model and kVA power rating | | | | | |

MASTERYS BC+ 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.

# 2. FLEXIBILITY

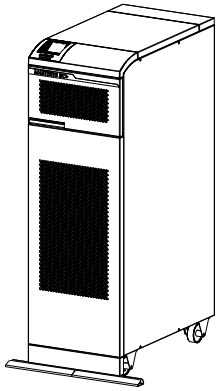
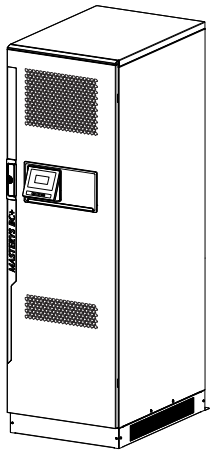
## 2.1 POWER RATINGS FROM 60 TO 160 KVA

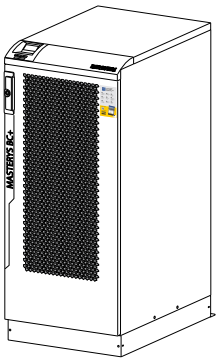
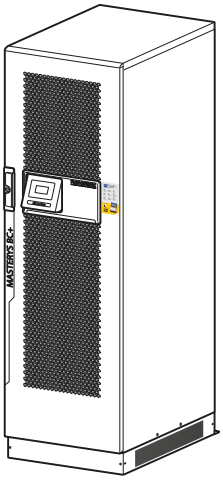
The equipment has been designed with a minimum direct and indirect footprint (the actual space occupied by the unit and the space required around it for maintenance, ventilation and access to the operating mechanisms and communication devices).

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.

| DIMENSIONS | | | |
|---|---|---|---|
| Masterys BC+ | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
| MASTERYS BC+ 60 to 80 kVA  | 444 | 800 | 1400 |
| MASTERYS BC+ 60 to 80 kVA with internal battery  | 600 | 855 | 1930 |

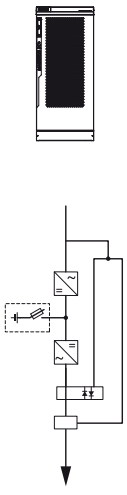
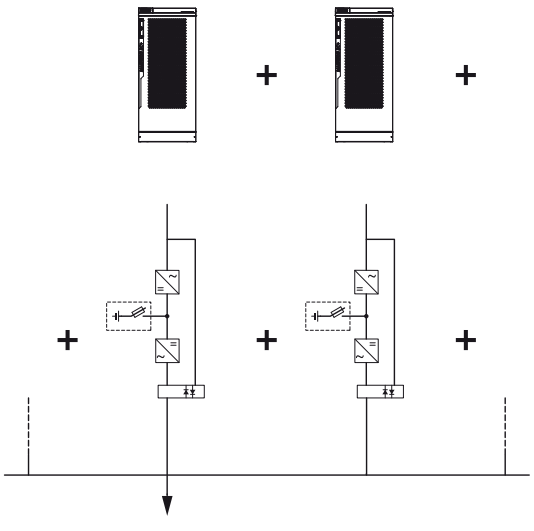
| DIMENSIONS | | | |
|---|---|---|---|
| Masterys BC+ | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
| MASTERYS BC+ 100 to 120 kVA  | 600 | 855 | 1400 |
| MASTERYS BC4 160 kVA  | 600 | 855 | 1930 |

## 2.2 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.

## 2.3 HORIZONTAL PARALLEL

MASTERYS BC+ offers 2 UPS configurations in the same range.

| | |
|---|---|
|  |  |
| Single unit configuration | Parallel UPS |

# 3. STANDARD FEATURES AND OPTIONS

| Availability | |
|---|---|
| ● | *Factory-installed option* |
| ○ | *Available as option (installation on site)* |
| STD | *Standard feature* |

| MASTERYS BC+ | 60-80 kVA | | 100-120 kVA | 160 kVA | Notes |
|---|---|---|---|---|---|
| | External battery | Internal battery | | | |
| **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 |
| Remote touchscreen display | ○ | ○ | ○ | ○ | ⚠ ! ADC+SL card |
| BACnet/IP interface 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 |
| PROFIBUS protocol interface | ○ | ○ | ○ | ○ | ⚠ ! ADC+SL card |
| **Electrical Option** | | | | | |
| Parallel card | ●○ | ●○ | ●○ | ●○ | |
| 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 isolation device | ● | ● | ● | ● | |
| Kit For Common Mains | ○ | ○ | ○ | ○ | |
| Kit for Rectifier Neutral creation | ● | ● | ● | ● | ⚠ ⊘ Kit for TN-C / Neutral-Ground connection<br>⊘ Kit For Common Mains<br>⊘ Additional charger |
| **Mechanical Option** | | | | | |
| Anti vermin protection | ● | STD | ● | ● | |
| Kit for IP21 | ○ | ○ | ○ | ○ | |
| Kit for Lateral Cover | ○ | ○ | - | - | |

! *Required option*

⊘ *Incompatible option*

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | | 60 | 80 | 100 | 120 | 160 |
| Phase in/out | | | 3/3 | | | | |
| Active power | | kW | 60 | 72 | 90 | 108 | 144 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 93/110 | 111/128 | 138/165 | 166/201 | 222/268 |
| Rated bypass input current (1) | | A | 96 | 128 | 160 | 191 | 255 |
| Inverter output current @ 400 V Pn | | A | 87 | 115 | 145 | 174 | 232 |
| Recommended air flow capacity | | $m^3/h$ | 480 | 600 | 720 | 960 | 1320 |
| Acoustic noise @ 70% Pn | | dBA | 53 ext. batt. / 55 int. batt. | | 53 | | 57 |
| Power dissipation in nominal conditions (2) | | W | 3120 | 3800 | 4700 | 5600 | 7500 |
| | | kcal/h | 2683 | 3267 | 4041 | 4815 | 6449 |
| | | BTU/h | 10646 | 12965 | 16037 | 19108 | 25591 |
| Power dissipation (max) in the worst conditions (3) | | W | 3540 | 4300 | 5200 | 6200 | 8300 |
| | | kcal/h | 3044 | 3697 | 4471 | 5331 | 7137 |
| | | BTU/h | 12079 | 14671 | 17743 | 21155 | 28321 |
| Dimensions *(for 60-80 Models: external/internal batteries)* | Width | mm | 444 / 600 | | 600 | | |
| | Depth | mm | 800 / 855 | | 855 | | |
| | Height | mm | 1400 / 1930 | | 1400 | | 1930 |
| Single unit Clearances | Operational | mm | Rear ≥ 200 | | | | |
| | Maintenance | mm | Front ≥ 1500; Top ≥ 800 | | | | |
| Weight | | kg | 151 | 157 | 220 | 232 | 333 |
| Weight with internal battery | | kg | 290-814 | | - | | |

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

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| 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 | | | | |
| Frequency tolerance | ±10% | | | | |
| Power factor (at full load and rated voltage) | ≥ 0.99 | | | | |
| 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 | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| 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 |
| | 1 min | 130 | 174 | 217 | 261 | 348 |

| ELECTRICAL CHARACTERISTICS -INVERTER | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Rated output voltage | | 360/380/400/415 V (selectable) | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-11 (EN 62040-3 compliant) | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | |
| Output frequency tolerance | | ±0.01% on mains power failure | | | | |
| Load crest factor | | ≥ 2.7 | | | | |
| Voltage total harmonic distortion THDV | | < 1% with linear load | | | | |
| Inverter overload (kW) | 10 min | 75 | 90 | 112.5 | 135 | 180 |
| | 5 min | 79.2 | 95 | 118.8 | 142.6 | 190 |
| | 1 min | 90 | 108 | 135 | 162 | 216 |
| Short-circuit inverter current (A) (when AUX MAINS is not present) | 0 to 40 ms | 234 | 273 | 351 | 429 | 574 |
| | 40 to 100 ms | 196 | 228 | 294 | 358 | 478 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Double conversion efficiency | | up to 95% | | | | |
| EcoMode efficiency | | 99.4% | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Storage temperatures | | -5 to +50 °C (15 to 25 °C for better battery life) | | | | |
| Working temperature | | 0 to +40 °C | 0 to +40 °C (1) (15 to 25 °C for better battery life)<br>Max +45°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) | | | | |
| Colour | | RAL 7016 (door metallized grey E150HVF) | | | | |

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Standard max. recharge current | A | 10 | | 16 | | 32 |
| Battery connection in parallel configuration | | UPS work with distributed battery | | | | |

*(1) Condition apply.*

## 4.3 RECOMMENDED PROTECTIONS

| RECOMMENDED PROTECTION DEVICES - RECTIFIER [1] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| C curve circuit breake | A | 125 | 160 | 250 | 250 | 315 |
| gG fuse | A | 125 | 160 | 250 | 250 | 315 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS [2] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Maximum $I^2t$ supported by the bypass | $A^2s$ | 120000 | | | | 400000 |
| Max Ipk supported by the Bypass | A | 5000 | | | | 9000 |
| Conditional short circuit current rating (Icc) | kA | 10 | | | | |
| C curve circuit breaker | A | 125 | 160 | 250 | | 400 |
| gG fuse | A | 125 | 160 | 250 | | 400 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT (RCD) BREAKER [3] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Input residual current circuit breaker | A | 0.5 A Selective type B | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT [4] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| C curve circuit breaker [3] | A | ≤ 16 | ≤ 20 | ≤ 25 | ≤ 32 | ≤ 40 |
| B curve circuit breaker [3] | A | ≤ 32 | ≤ 40 | ≤ 50 | ≤ 63 | ≤ 80 |

| CABLES - MAXIMUM CABLE SECTION [5] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 - 80 External battery | 60 - 80 Internal battery | 100 | 120 | 160 |
| Rectifier terminals (4x) | 50 $mm^2$ | bus bar with holes ø 8 mm 70 $mm^2$ (flexible cable and rigid cable) | bus bar with holes ø 10 mm 2x120 $mm^2$ (flexible cable and rigid cable) | | bus bar with holes ø 10 mm 2x150 $mm^2$ (flexible cable and rigid cable) |
| Bypass terminals (4x) | | | | | |
| Output terminals (4x) | | | | | |
| Battery terminals (3x) | 95 $mm^2$ [6] | | | | |

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 $i^2t$ 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 an RCD is required a B-type should be used. 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 UPSs, 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.*
6. *Not available for internal battery version.*

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 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

## 5.2 STANDARDS

### 5.2.1 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)

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 TEST AND PERFORMANCE

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

### 5.2.4 ENVIRONMENTAL

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

## 5.3 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.

PRIME

Trustworthy power

# DELPHYS BC

## 200 to 300 kVA

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

95% EFFICIENCY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# 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

DELPHYS BC is a full range of high performing UPS designed to protect critical and sensitive appliances in “business critical” applications such as data centres.

| MODELS | | |
|---|---|---|
| Rated power (kVA) | 200 | 300 |
| DELPHYS BC 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 200 TO 300 kVA

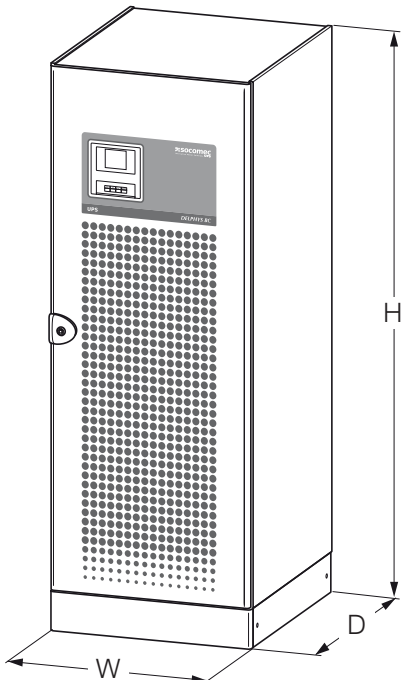
The equipment has been designed with a minimum direct and indirect footprint (the actual space occupied by the unit and the space required around it for maintenance, ventilation and access to the operating mechanisms and communication devices).

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

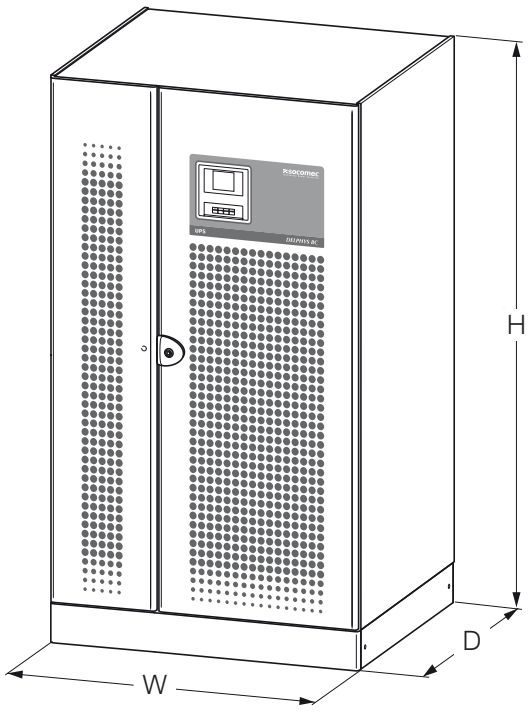
All of the control mechanisms are located in the front bottom side, while the communication interfaces in the internal upper side of the door.

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

| DIMENSIONS | | | |
|---|---|---|---|
| | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
| DELPHYS BC 200 kVA | 700 | 800 | 1930 |
| DELPHYS BC 300 kVA | 1000 | 950 | 1930 |




DELPHYS BC 200 kVA



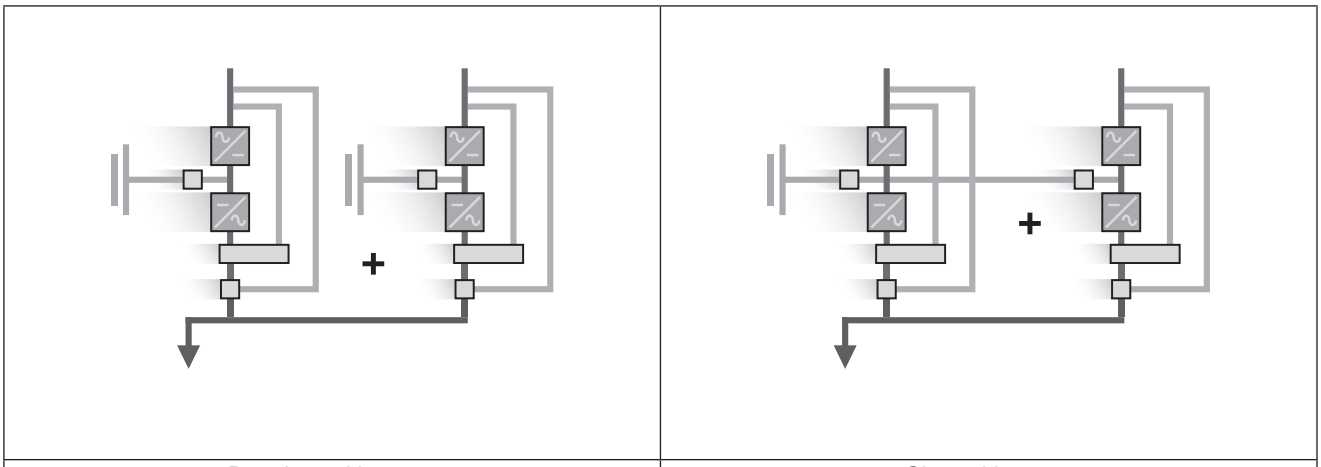

DELPHYS BC 300 kVA

## 2.2 BATTERY MANAGEMENT

Available with distributed batteries, DELPHYS BC allows to optimise the batteries size thanks to a shared battery operation. This reduces the overall system footprint, the weight of the required batteries, the battery monitoring system, the amount of wiring needed and the amount of lead.

To guarantee maximum back-up time availability and battery life, DELPHYS BC includes:

- EBS (Expert Battery System), smart battery charging management.
- Distributed or shared battery for energy storage optimization on parallel systems.

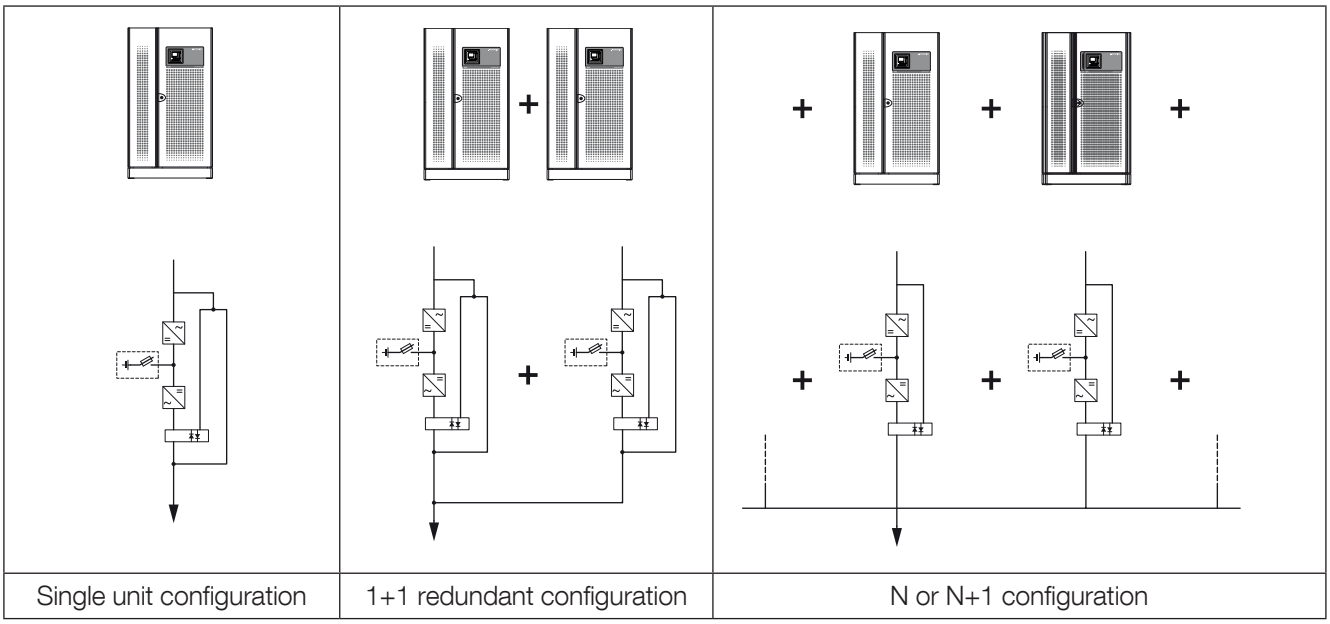


| Distributed battery | Shared battery |
|---|---|

## 2.3 HORIZONTAL AND VERTICAL PARALLEL

DELPHYS BC offers 3 “configurations” of UPS in the same range:

- Stand alone (Single unit configuration with rectifier, battery, inverter, static bypass and maintenance bypass)
- 1+1 redundant system (with built-in maintenance by-pass in each unit)
- Parallel system up to 6 modules working in parallel (n or n+1)



| Single unit configuration | 1+1 redundant configuration | N or N+1 configuration |
|---|---|---|

# 3. STANDARD AND OPTIONS

## 3.1 STANDARD ELECTRICAL FEATURES

- Dual input mains.
- Integrated maintenance bypass (single and 1+1 redundant units).
- Backfeed protection: detection circuit.
- EBS (Expert Battery System) for battery management.
- Battery temperature sensor.

## 3.2 ELECTRICAL OPTIONS

- External battery cabinet.
- External temperature sensor.
- Additional battery chargers.
- Shared battery.
- Galvanic isolation transformer.
- Parallel kit.
- ACS synchronization system.

## 3.3 STANDARD COMMUNICATION FEATURES

- User-friendly 7’ touch-screen multilingual color graphic display.
- 2 Com-Slots for communication options.
- USB port to download UPS report and log file.
- Ethernet port for service purpose.

## 3.4 COMMUNICATION OPTIONS

- Dry-contact interface (configurable volatge-free contacts).
- MODBUS RTU RS485 or TCP.
- PROFIBUS / PROFINET gateway.
- BACnet/IP interface.
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs.
- Remote View Pro supervision software.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- Remote touch-screen panel.

## 3.5 REMOTE MONITORING AND CLOUD SERVICES

- SoLink: Socomec 24/7 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | |
|---|---|---|---|
| Rated power (kVA) | | 200 | 300 |
| Phase in/out | | 3/3 | |
| Active power (kW) | kW | 180 | 270 |
| Rated/maximum rectifier input current (A) | A | 278/340 (1) | 417/436 (1) |
| Rated bypass input current | A | 290 | 433 |
| Inverter output current @ 400 V P/N | A | 290 | 433 |
| Maximum air flow | $m^3/h$ | 2250 | 2700 |
| Sound level | dB(A) | < 68 | < 71 |
| Power dissipation in nominal conditions(2) | W | 11200 | 17000 |
| | kcal/h | 9630 | 14617 |
| | BTU/h | 38215 | 58006 |
| Power dissipation (max) in the worst conditions(3) | W | 13100 | 17700 |
| | kcal/h | 11263 | 15219 |
| | BTU/h | 44699 | 60394 |
| Dimensions | W (mm) | 700 | 1000 |
| | D (mm) | 800 | 950 |
| | H (mm) | 1930 | 1930 |
| Weight | kg | 500 | 830 |

*(1) At minimum input mains*

*(2) Considering nominal input current (400 V, battery charged) and rated output active power (PF 0.9).*

*(3) Considering maximum input current (low input voltage, battery recharge) and rated output active power (PF 0.9).*

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER(1) INPUT | | |
|---|---|---|
| Rated power (kVA) | 200 | 300 |
| Rated mains supply voltage | 400 V 3ph | |
| Voltage tolerance | 240 to 480 V(2) | |
| 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% | |
| Max inrush current at start-up | <In (no overcurrent) | |

*(1) IGBT rectifier. (2) Conditions apply.*

| ELECTRICAL CHARACTERISTICS - BYPASS | | | |
|---|---|---|---|
| Rated power (kVA) | | 200 | 300 |
| Bypass frequency variation speed | | 1.5 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 | | from ±1% to ±8% (operation with generator unit) | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | |
|---|---|---|---|
| Rated power (kVA) | | 200 | 300 |
| Rated output voltage (selectable) | | 380/400/415 V | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-111 | |
| Rated output frequency (selectable) | | 50/60 Hz (selectable) | |
| Output frequency tolerance | | ±0.01% on mains power failure | |
| Load crest factor | | 3:1 | |
| Voltage harmonic distortion | | < 1.5% with linear load | |
| Overload tolerated by the inverter - 25 °C | 1 min | 270 kW | 311 kW |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Rated power (kVA) | 200 | 300 |
| Double conversion efficiency (normal mode) - full load | up to 95% | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Rated power (kVA) | 200 | 300 |
| Storage temperatures | -5 to +45 °C (23 to 113 °F) (15 to 25 °C for better battery life) | |
| Working temperature | 0 to +40(1) °C (32 to 104 °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 | IP20 | |
| Colour | RAL 7012, silver grey frontal door | |

*(1) Conditions apply.*

## 4.3 RECOMMENDED PROTECTIONS

| RECOMMENDED PROTECTION DEVICES - RECTIFIER[1] | | | |
|---|---|---|---|
| Rated power (kVA) | | 200 | 300 |
| D curve circuit breaker (A) | | 400 | 630 |
| gG fuse (A) | | 400 | 630 |
| **RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS[1]** | | | |
| Rated power (kVA) | | 200 | 300 |
| Semiconductors characteristics | $I^2t$ ($A^2s$) | 320000 | |
| | Is/c (A peak) | 8000 | |
| D curve circuit breaker (A) | | 400 | 630 |
| gG fuse (A) | | 400 | 630 |
| **RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER[2]** | | | |
| Rated power (kVA) | | 200 | 300 |
| Input residual current circuit breaker | | 3 A | |
| **RECOMMENDED PROTECTION DEVICES - OUTPUT[3]** | | | |
| Rated power (kVA) | | 200 | 300 |
| Short-circuit inverter current (A) - (0 to 100 ms) (when AUX MAINS is not present) | | 720 A | 900 |
| C curve circuit breaker[3] (A) | | ≤ 63 A | ≤ 80 |
| B curve circuit breaker[3] (A) | | ≤ 125 A | - |
| High-speed fuse[3] (A) | | ≤ 160 A | |
| **CABLES CONNECTION - MAXIMUM CAPABILITY PER POLE** | | | |
| Rated power (kVA) | | 200 | 300 |
| Rectifier terminals | | 2 x 150 $mm^2$ | 2 x 240 $mm^2$ |
| Bypass terminals | | 2 x 150 $mm^2$ | 2 x 240 $mm^2$ |
| Battery terminals | | 2 x 240 $mm^2$ | 2 x 240 $mm^2$ |
| Output terminals | | 2 x 150 $mm^2$ | 2 x 240 $mm^2$ |

*(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.*

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 OVERVIEW

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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

## 5.2 STANDARDS

### 5.2.1 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

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 ENVIRONMENTAL

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

## 5.3 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.


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# MASTERYS GP4

SUPERIOR

Unrivalled power performance

10 to 40 kVA/kW

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

96.5% EFFICIENCY

kW = kVA


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# OBJECTIVES

The aim of these specifications is to provide:

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- the information required to prepare the system and installation site.

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- engineering consultants.

# 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.

# 1. ARCHITECTURE

## 1.1 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.

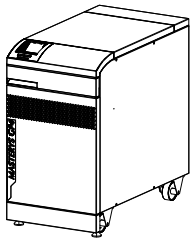
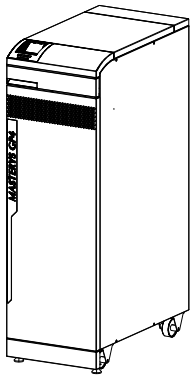
| MODELS | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 30 | 40 |
| MASTERYS GP4 3/1 | • | • | • | | |
| MASTERYS GP4 3/3 | • | • | • | • | • |

*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.

# 2. FLEXIBILITY

## 2.1 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).

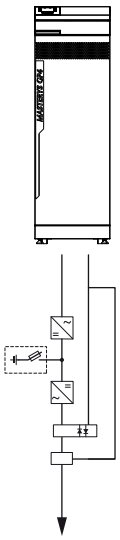
All of the control mechanisms and communication interfaces are located in the upper front section.

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

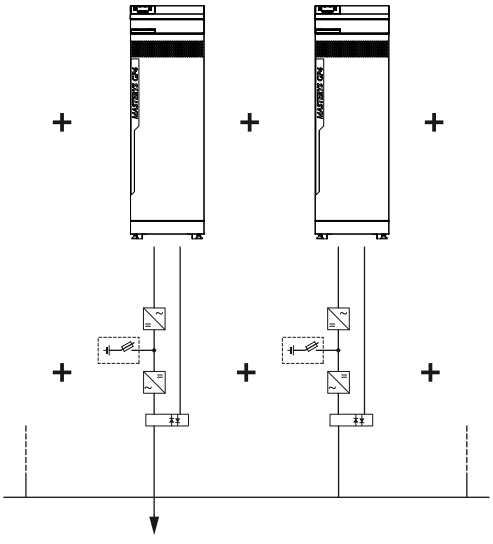
The air inlet is on the front, with outflow to the rear.

## 2.2 PARALLEL

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



Single unit configuration



Parallel UPS configuration (up to 6 units)

## 2.3 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.

## 2.4 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.

## 2.5 FLEXIBLE BACK-UP TIME

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

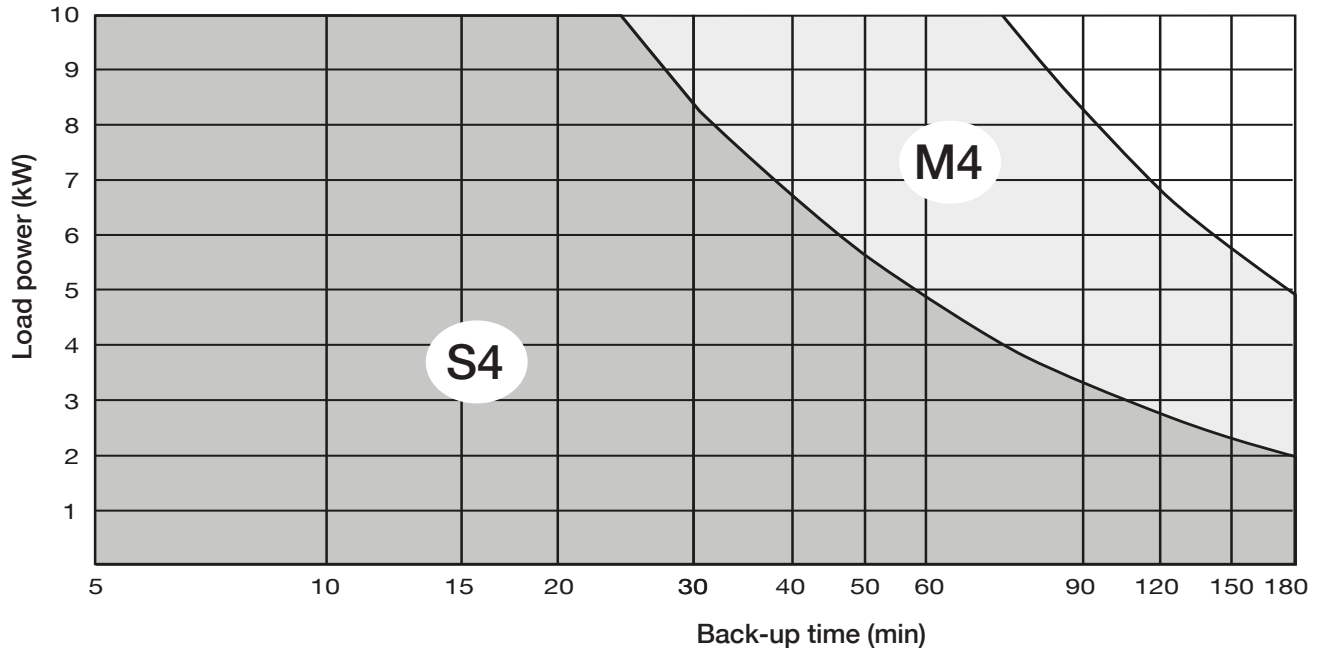
Batteries are installed on acid-proof trays and connected by means of polarised connectors to facilitate their maintenance.

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

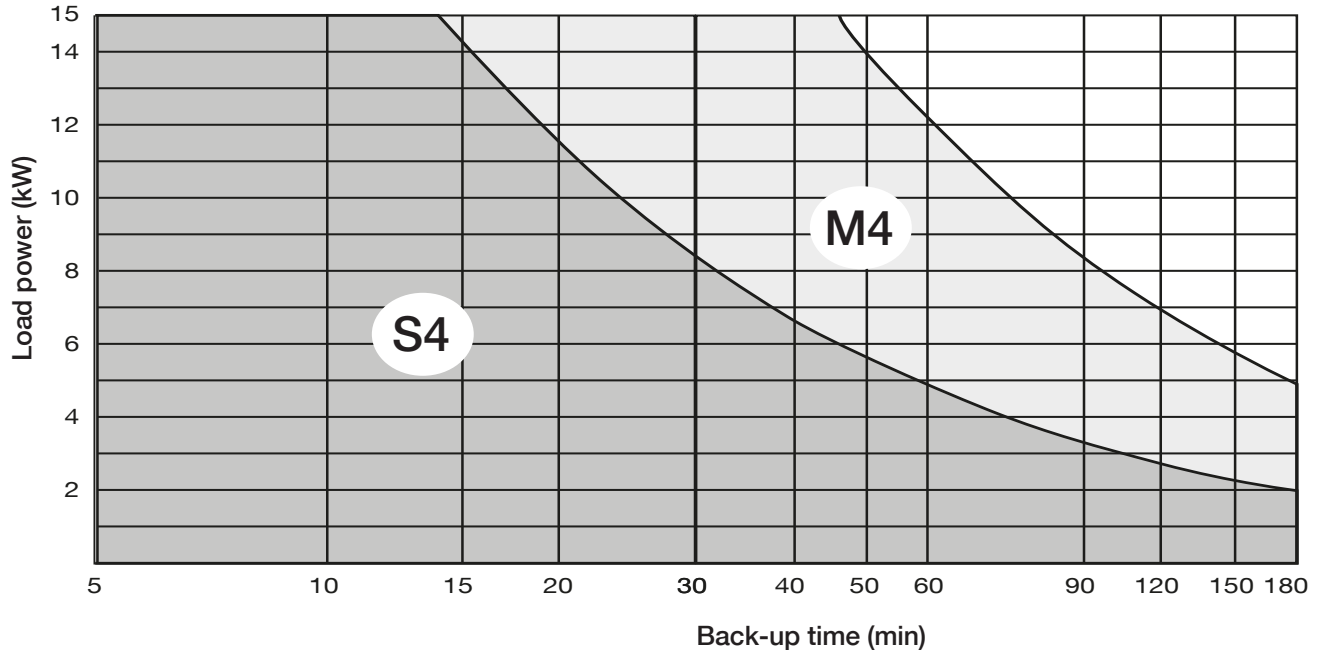
For external battery cabinets use size S4.

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**



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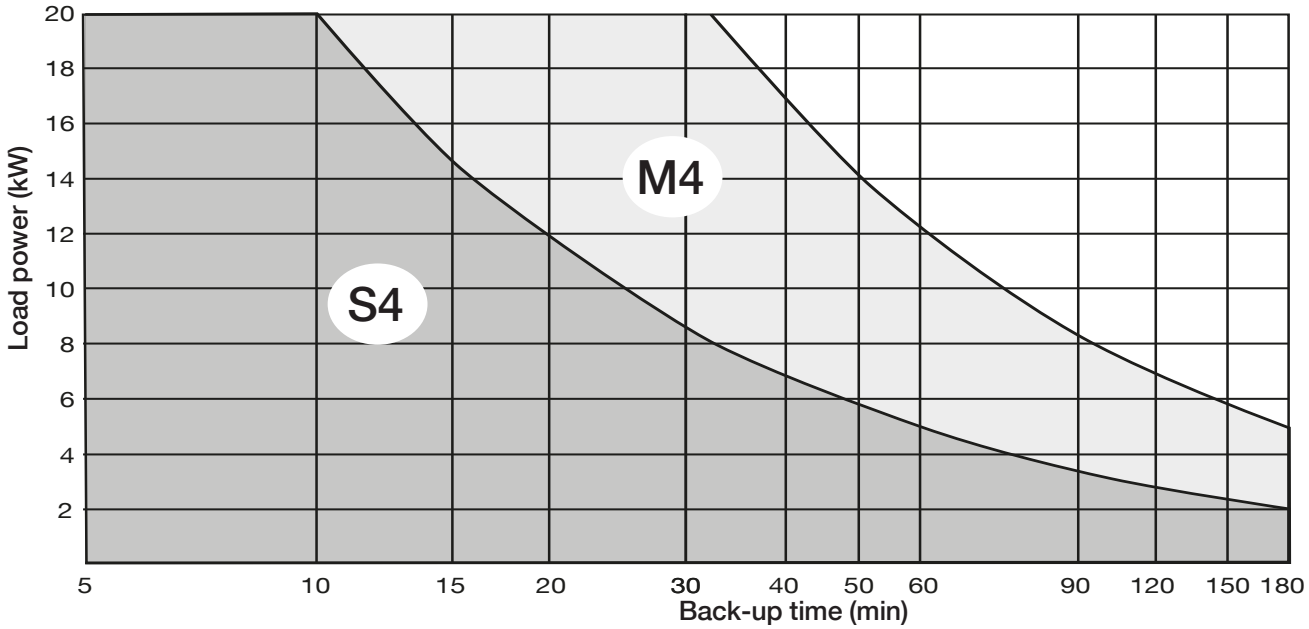
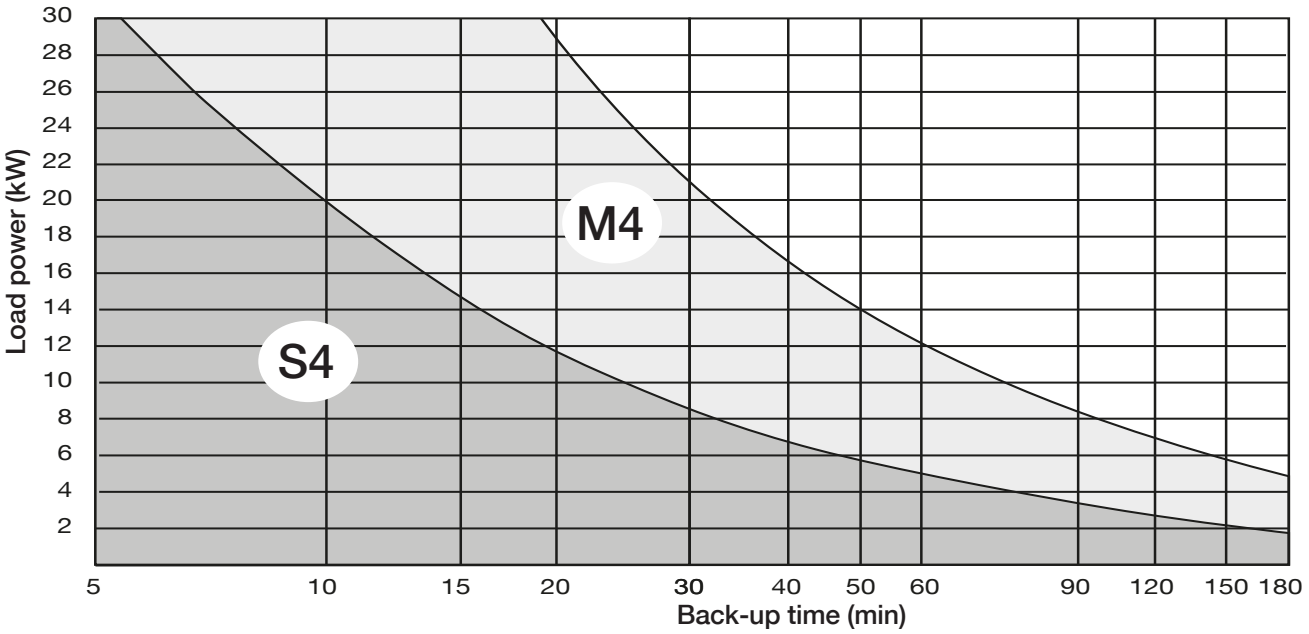
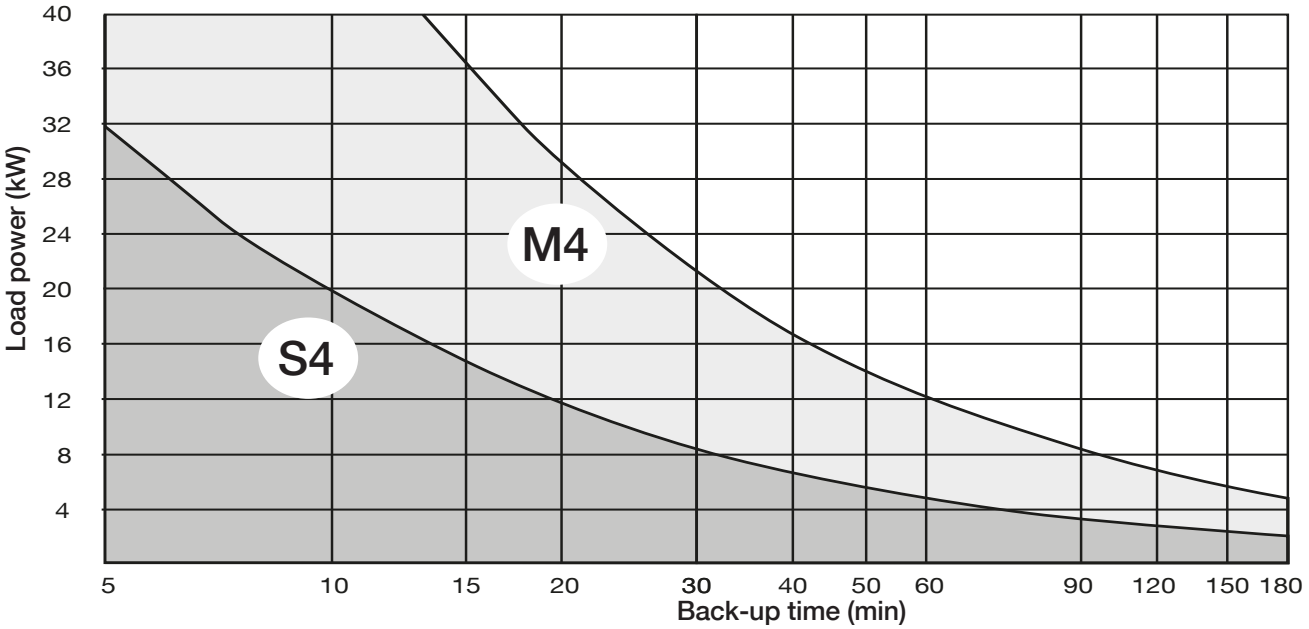
## 20 kVA




## 30 kVA




## 40 kVA



# 3. 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 |
| BACnet/IP interface 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<br>⛔ Kit For Common Mains<br>⛔ 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

# 4. SPECIFICATIONS - MASTERYS GP4

## 4.1 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.*

## 4.2 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<br>phase neutral (selectable) | | | 220/230/240 V<br>208 V (@ 95% Pn) | | | | | | | |
| Output voltage tolerance | | | Static: ±1%<br>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<br>(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)<br>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 | | | | | | | |

## 4.3 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.*

## 4.4 AVAILABILITY

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

Availability is defined for all repairable systems as

$$\text{Availability} = 1 - \text{MTTR} / \text{MTBF}$$

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:

$$\text{MTBF} = 1 / \text{Failure Rate}$$

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 | | |
|---|---|---|
| $MTBF_{VFI}$ (1) | > 350 000 h | Failure inside the UPS, but application still supplied in Bypass Mode |
| $MTBF_{UPS}$ | > 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:

$$\text{MTTR} = \text{Intervention Time} + \text{Repair Time}$$

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.

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 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

## 5.2 STANDARDS

### 5.2.1 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)

### 5.2.2 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

### 5.2.3 TEST AND PERFORMANCE

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

### 5.2.4 ENVIRONMENTAL

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

## 5.3 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.

# MASTERYS GP4 RK

SUPERIOR

Unrivalled power performance

10 to 40 kVA/kW

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

96.5% EFFICIENCY

kW = kVA


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

Socomec Resource Center
To download, brochures, catalogues and technical manuals

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Innovative Power Solutions

# 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.

# 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.

For detailed information, see the installation and operating manual.

# 1. ARCHITECTURE

## 1.1 RANGE

MASTERYS GP4 is a full range of high performing UPS 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.

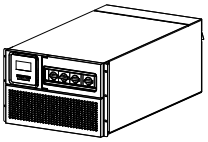
| MODELS | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 20 | 30 | 40 |
| MASTERYS GP4 RK 3/1 | • | • | • | | |
| MASTERYS GP4 RK 3/3 | • | • | • | • | • |

*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 its integration within the system.

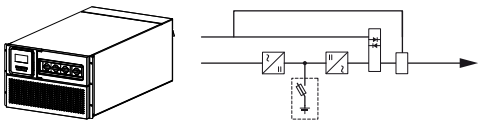
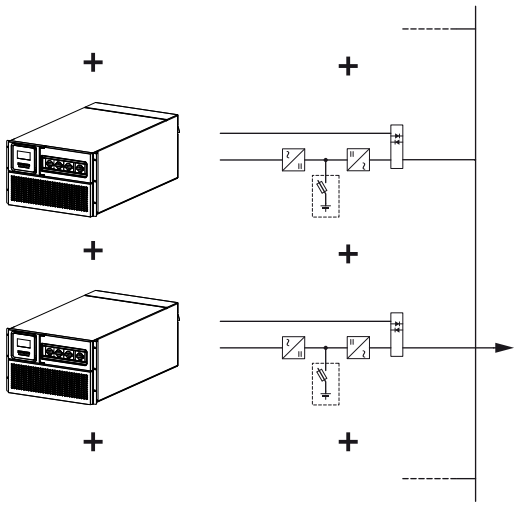
# 2. FLEXIBILITY

## 2.1 POWER RATINGS FROM 10 TO 40 kVA/kW

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Cabinet type | | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | **RK** | 442 (Suitable for 19” rack cabinet) | 820 | 305 (7U) |

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.

## 2.2 PARALLEL

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

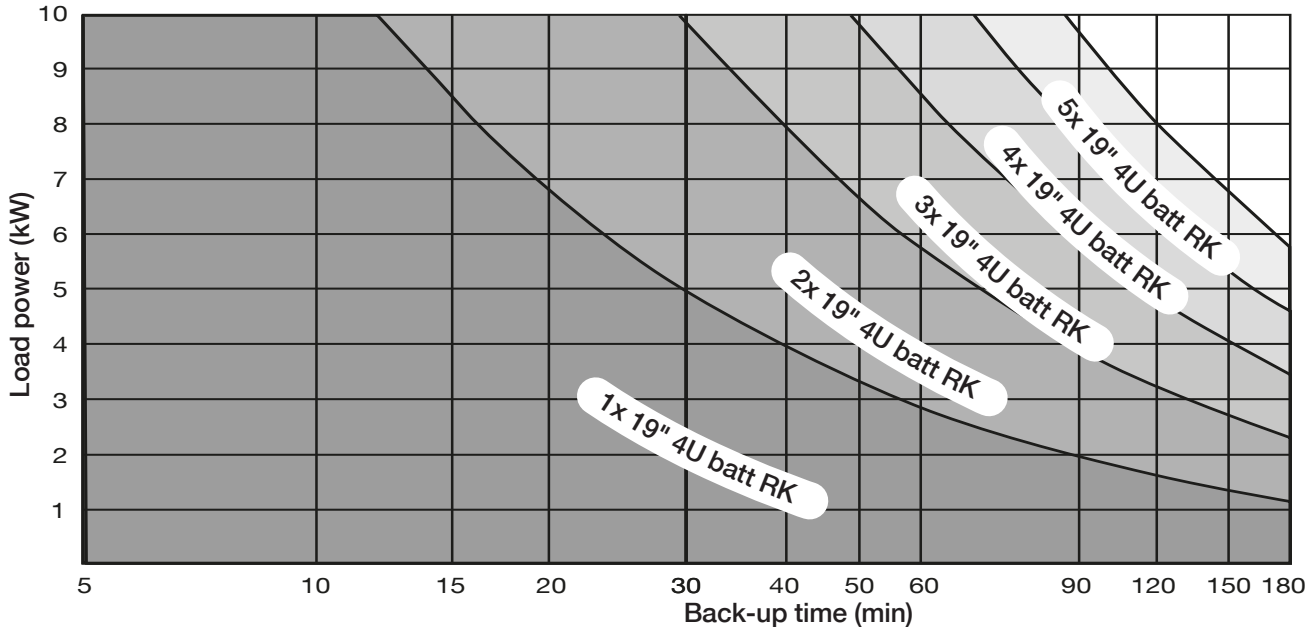
## 2.3 FLEXIBLE BACK-UP TIME

Different extended back-up times are possible by using the standard 19" battery rack or an external battery cabinet.

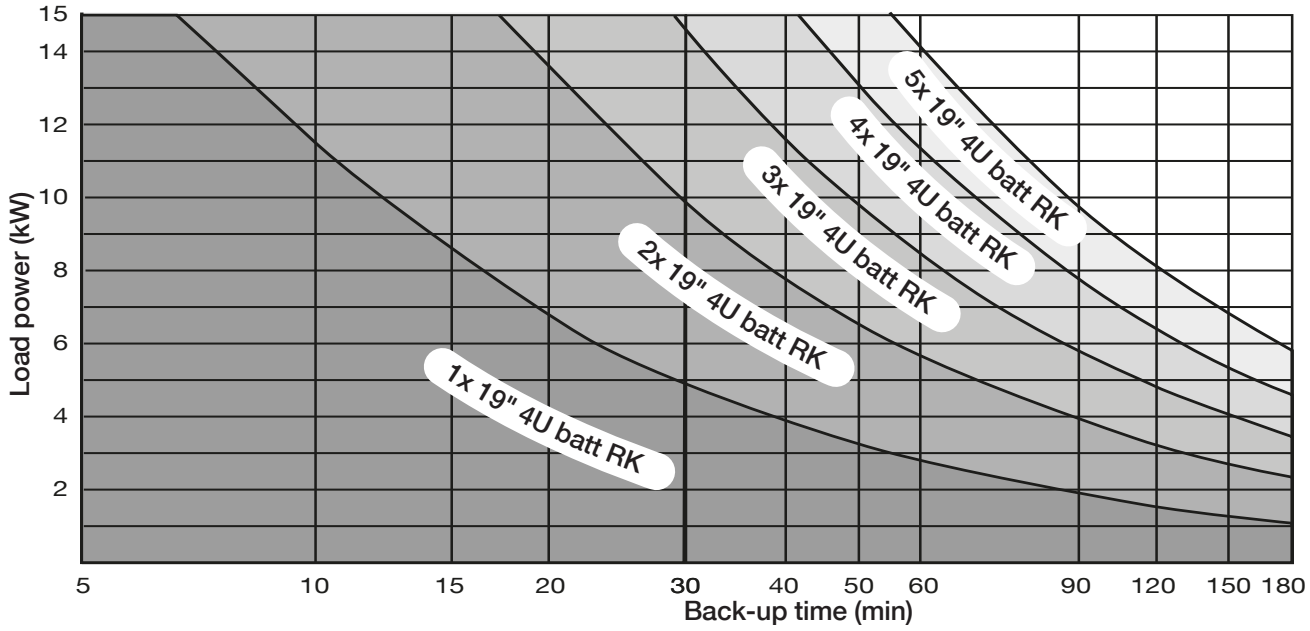
Batteries are installed on acid-proof trays and connected by means of polarised connectors to facilitate their maintenance.

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

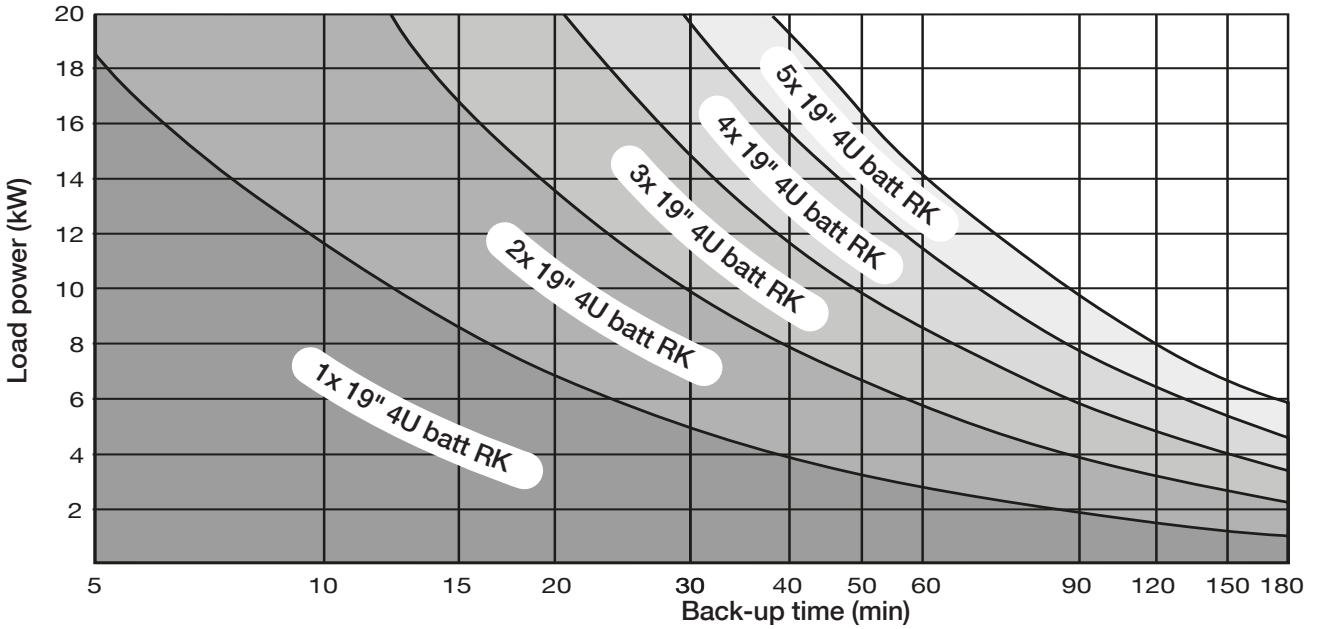
**10 kVA**



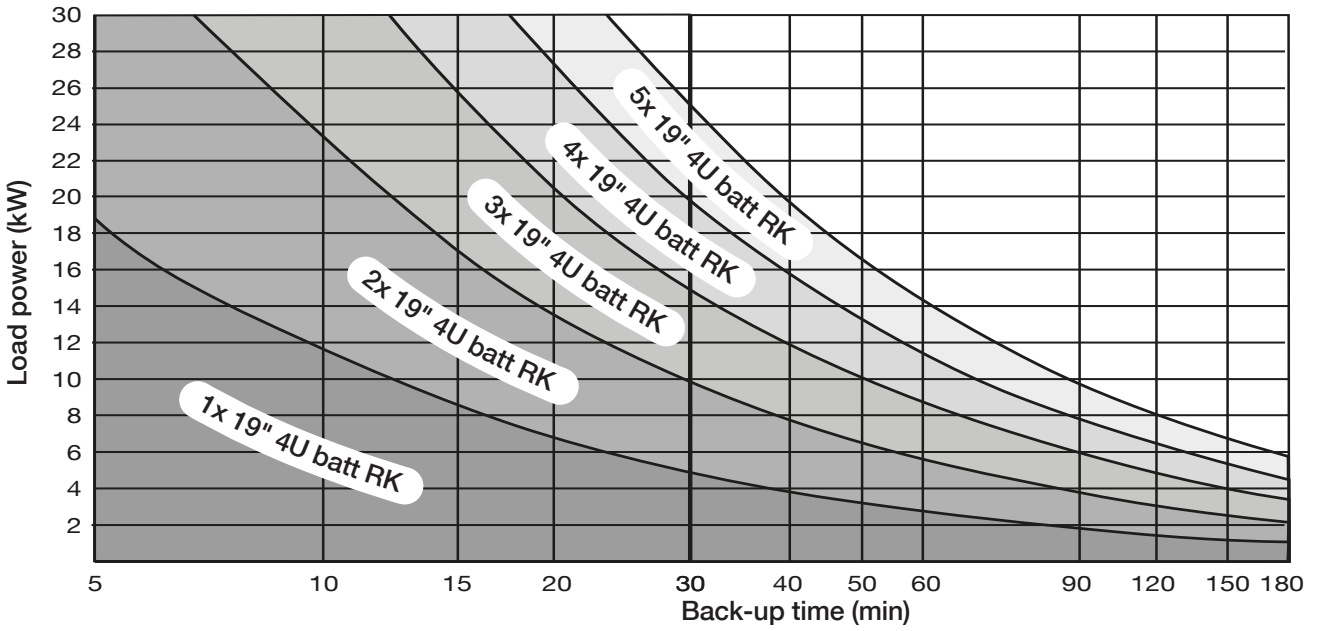

**15 kVA**



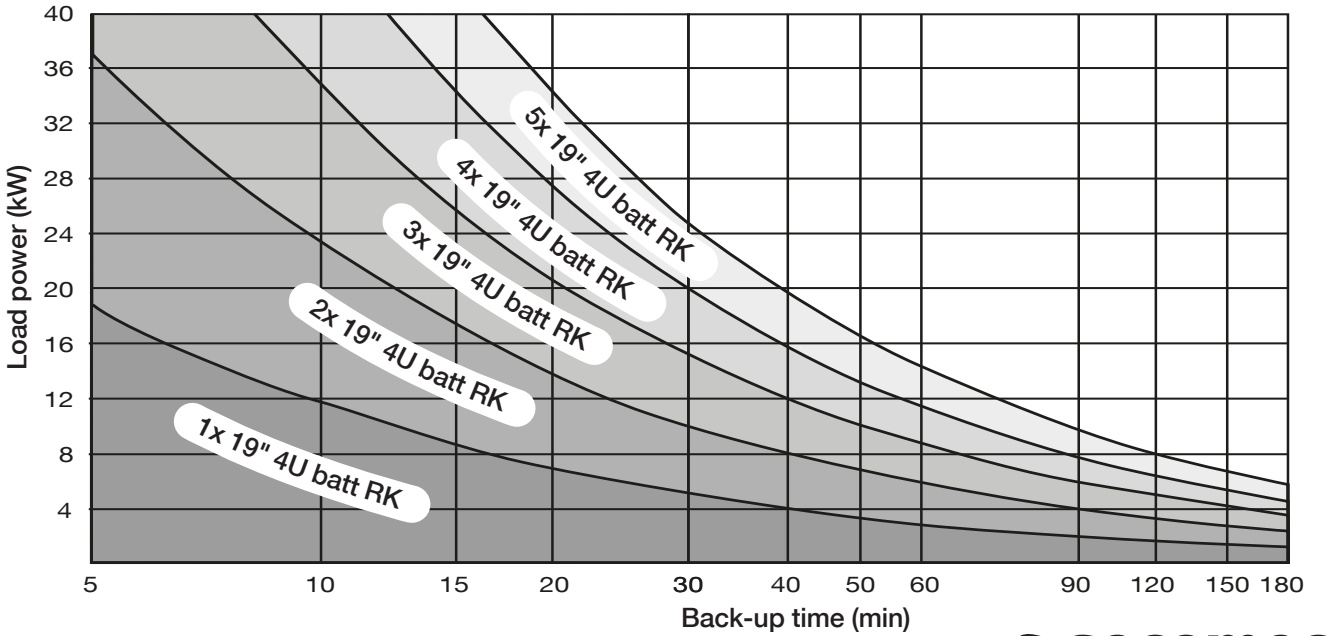
## 20 kVA




## 30 kVA




## 40 kVA



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# 3. STANDARD FEATURES AND OPTIONS

| Availability | |
|---|---|
| ● | *Factory-installed option* |
| ○ | *On site installed option* |

| FEATURES | MASTERYS GP4 RACK | | NOTES |
|---|---|---|---|
| | 10-15-20 kVA | 30-40 kVA | |
| **Battery Option** | | | |
| Additional charger | ●○ | ●○ | |
| 19" 4U Battery Rack | ○ | ○ | |
| **Communication Option** | | | |
| ACS card *(Automatic Cross Synchronisation)* | ●○ | ●○ | |
| ADC+SL card *(Advanced Dry Contact + Serial Link)* | ○ | ○ | |
| External temperature sensor | ○ | ○ | ⚠ ❗ "ADC+SL card" |
| Remote touchscreen display | ○ | ○ | ⚠ ❗ "ADC+SL card" |
| BACnet/IP interface 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** | | | |
| 19" 2U External Maintenance Bypass | ○ | ○ | |
| Parallel card | ●○ | ●○ | |
| Kit for TN-C / Neutral-Ground connection | ○ | ○ | |
| Internal Backfeed isolation device | ● | ● | |
| Kit For Common Mains | ○ (3/3) | ○ | |
| Redundant Bypass Ventilation | ● | ● | |
| Cold Start | ● | ● | |

❗ *Required option*

# 4. SPECIFICATIONS - MASTERYS GP4 RK

## 4.1 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 (with standard back-up time) | Width | mm | 442 | | | | | | | |
| | Depth | mm | 820 | | | | | | | |
| | Height | mm | 305 | | | | | | | |
| Weight without batteries | | kg | 72 | | | | | | | 78 |

*1) Considering nominal input current (400 V, battery charged) and rated output active power (PF1).*

*2) Considering maximum input current (low input voltage) and rated output active power (PF1).*

## 4.2 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 | 480V to 340 V<br>(up to 240 V with load linear decrease from 100% Pn to 70% Pn) | | | | | | | |
| 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% | < 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<br>phase neutral (selectable) | | | 220/230/240 V<br>208 V (@ 95% Pn) | | | | | | | |
| Output voltage tolerance | | | Static: ±1%<br>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<br>(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)<br>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 | | | | | | | |

## 4.3 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 (A) | 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 parallel UPS configurations, 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.*

## 4.4 AVAILABILITY

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

Availability is defined for all repairable systems as

$$\text{Availability} = 1 - \text{MTTR} / \text{MTBF}$$

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:

$$\text{MTBF} = 1 / \text{Failure Rate}$$

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 | | |
|---|---|---|
| $MTBF_{VFI}$ (1) | > 500,000 h | Failure inside the UPS, but application still supplied in Bypass Mode |
| $MTBF_{UPS}$ | > 12,000,000 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:

$$\text{MTTR} = \text{Intervention Time} + \text{Repair Time}$$

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 RK 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 an enhanced First Time Fix Rate.

# 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.

**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

## 5.2 STANDARDS

### 5.2.1 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)

### 5.2.2 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

### 5.2.3 TEST AND PERFORMANCE

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

### 5.2.4 ENVIRONMENTAL

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

## 5.3 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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# MASTERYS GP4

60 to 160 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

Socomec Resource Center
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# 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 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.

# 1. ARCHITECTURE

## 1.1 RANGE

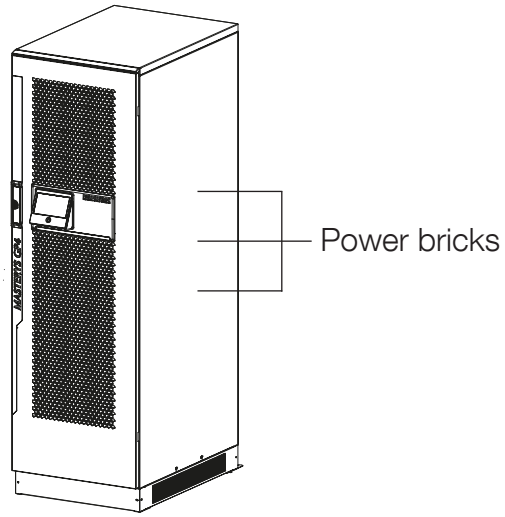
MASTERYS GP4 is a full range of high performing UPS systems designed to:

- 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 |
| 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 60-160 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 will be 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 kVA/kW UPS in double conversion, even in case of a single brick failure;
- 50% load for 80 kVA/kW UPS in double conversion, even in case of a single brick failure;
- 60% load for 100 kVA/kW UPS in double conversion, even in case of a single brick failure;
- 66% load for 120 kVA/kW UPS in double conversion, even in case of a single brick failure;
- 75% load for 160 kVA/kW UPS in double conversion, even in case of a single brick failure.

# 2. FLEXIBILITY

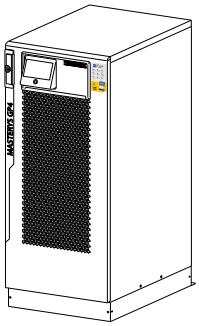
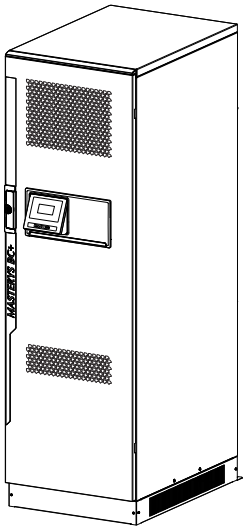
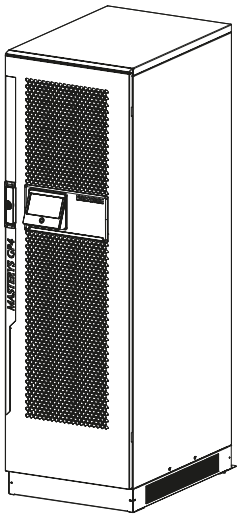
## 2.1 POWER RATINGS FROM 60 TO 160 kVA/kW

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 kVA/kW  | 600 | 855 | 1930 |

## 2.2 FLEXIBLE BACK-UP TIME

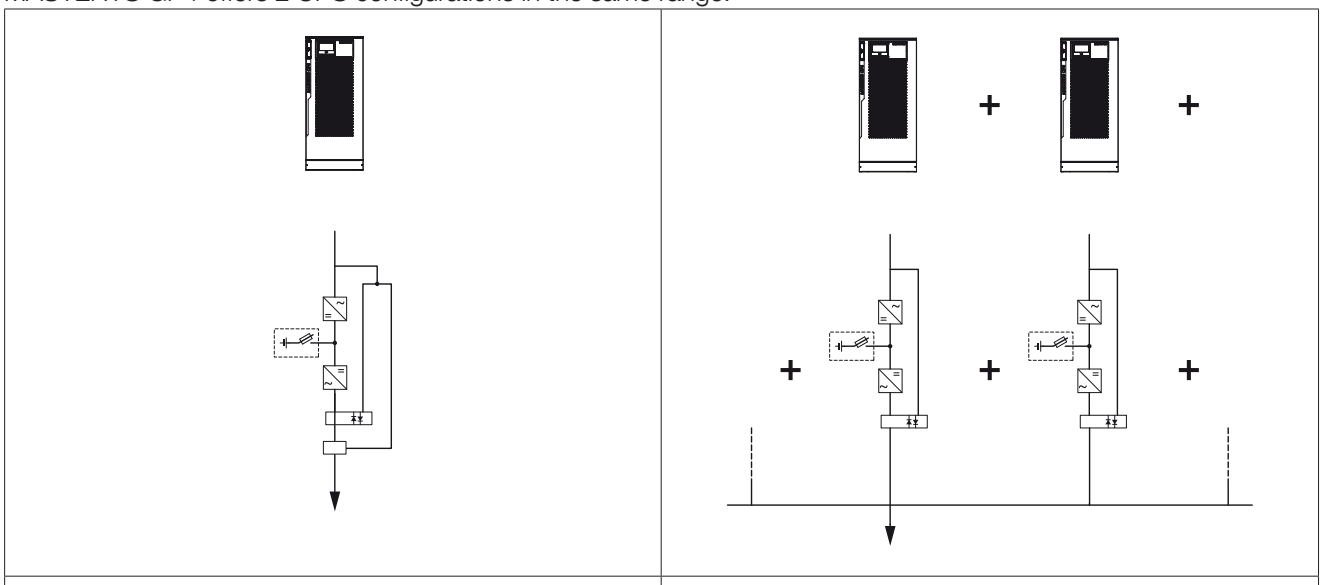
Different extended back-up times are possible by using external battery cabinets, optionally with a enhanced battery charger.

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

MASTERYS GP4 is setup for Lithium Battery

## 2.3 HORIZONTAL PARALLEL

MASTERYS GP4 offers 2 UPS configurations in the same range.



| Single unit configuration | Parallel UPS |
|---|---|

## 2.4 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.

## 2.5 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.

# 3. STANDARD AND OPTIONS

| Availability | |
|---|---|
| ● | *Factory-installed option* |
| O | *Available as option* |
| – | *Not available* |
| STD | *Standard feature* |

| FEATURES | MASTERYS GP4 | | | | NOTE |
|---|---|---|---|---|---|
| | 60-80 kVA | | 100-120 kVA | 160 kVA | |
| | External batteries | Internal batteries | External batteries | External batteries | |
| **Battery Option** | | | | | |
| Additional charger | ●O | – | ●O | ●O | ⚠ "Kit for Rectifier Neutral creation" |
| **Communication Option** | | | | | |
| ACS card *(Automatic Cross Synchronisation)* | ●O | ●O | ●O | ●O | |
| ADC+SL card *(Advanced Dry Contact + Serial Link)* | O | O | O | O | |
| Temperature sensor | O | O | O | O | ⚠ "ADC+SL card" |
| Remote touchscreen display | O | O | O | O | ⚠ "ADC+SL card" |
| BACnet card | O | O | O | O | |
| Modbus TCP card | O | O | O | O | |
| Net Vision card | O | O | O | O | |
| EMD *(Environmental Monitoring Device)* | O | O | O | O | ⚠ "Net Vision card" |
| PROFIBUS protocol interface | O | O | O | O | ⚠ "ADC+SL card" |

| FEATURES | MASTERYS GP4 | | | | NOTE |
|---|---|---|---|---|---|
| | 60-80 kVA | | 100-120 kVA | 160 kVA | |
| | External batteries | Internal batteries | External batteries | External batteries | |
| **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" |
| Kit for Rectifier Neutral creation | ● | – | ● | ● | ⚠ ⊘ "Kit for TN-C / Neutral-Ground connection"<br>⊘ "Kit For Common Mains"<br>⊘ "Additional charger" |
| Redundant Bypass Ventilation | ● | ● | ● | ● | |
| **Mechanical Option** | | | | | |
| Option slots 3 | ● | – | ● | "STD" | |
| Anti-vermin protection | ● | ● | ● | ● | |
| Kit for IP21 | ○ | ○ | ○ | ○ | ⚠ ⊘ "Top air exhausted"<br>⊘ "Top entry cables" |
| Seismic adaptation | ● | – | ● | ● | ⚠ ⊘ "Top entry cables" |
| "T" cabinet | – | "STD" | ● | "STD" | |
| Top air exhausted | – | – | ● | ● | ⚠ ! ""T" cabinet"<br>⊘ "Kit for IP21"<br>⊘ "Top entry cables" |
| Top entry cables | – | – | ○ | ○ | ⚠ ! ""T" cabinet"<br>⊘ "Seismic adaptation"<br>⊘ "Kit for IP21"<br>⊘ "Top air exhausted" |
| **Other** | | | | | |
| Cold start | ●○ | ●○ | ●○ | ●○ | ⚠ ⊘ "Parallel card" |

! *Required option*

⊘ *Incompatible option*

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | | 60 | 80 | 100 | 120 | 160 |
| Phase in/out | | | 3/3 | | | | |
| Active power | | kW | 60 | 80 | 100 | 120 | 160 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 93/110 | 123/146 | 154/183 | 185/219 | 247/292 |
| Rated bypass input current (1) | | A | 96 | 128 | 160 | 191 | 255 |
| Inverter output current @ 400 V Pn | | A | 87 | 116 | 145 | 174 | 232 |
| Recommended air flow capacity | | $m^3/h$ | 480 | 720 | 840 | 1080 | 1440 |
| Acoustic Noise @ 70% Pn | | dBA | 53 ext. batt. / 55 int. batt. | | 55 | | 57 |
| Power dissipation in nominal conditions (2) | | W | 2880 | 3950 | 4800 | 5940 | 8000 |
| | | kcal/h | 2476 | 3396 | 4127 | 5107 | 6879 |
| | | BTU/h | 9833 | 13486 | 16388 | 20280 | 27297 |
| Power dissipation (max) in the worst conditions (3) | | W | 3360 | 4630 | 5500 | 6560 | 9350 |
| | | kcal/h | 2889 | 3981 | 4729 | 5641 | 8040 |
| | | BTU/h | 11471 | 15807 | 18778 | 22397 | 31904 |
| Dimensions *for 60-80 Models (external/internal batteries)* | Width | mm | 600 | | | | |
| | Depth | mm | 855 | | | | |
| | Height | mm | 1400 / 1930 | | 1400 (1930 optional) | | 1930 |
| Weight | | kg | 174 | 186 | 228 | 240 | 338 |
| Weight with internal battery | | kg | 680-820 | | - | | |

1. *Considering nominal bypass current calculated @ 400 V, considering a continuos 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).*

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| 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 | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| 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 |
| | 1 min | 130 | 174 | 217 | 261 | 348 |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 60 | 80 | 100 | 120 | 160 |
| Rated output voltage (selectable) | | 380/400/415 V (selectable) | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-111 (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 | | | | |
| Voltage total harmonic distortion THDV | | < 1% with linear load | | | | |
| Inverter overload (kW) (1) | 10 min | 75 | 100 | 125 | 150 | 200 |
| | 5 min | 79 | 106 | 132 | 158 | 211 |
| | 1 min | 90 | 120 | 150 | 180 | 240 |
| Short-circuit inverter current (A) (when AUX MAINS is not present) | 0 to 40 ms | 234 | 312 | 390 | 468 | 624 |
| | 40 to 100 ms | 196 | 260 | 326 | 390 | 520 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| Double conversion efficiency | up to 96.5% | | | | |
| EcoMode efficiency | 99.4% | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| 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)<br>*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 | | | | |

## 4.3 RECOMMENDED PROTECTIONS

| RECOMMENDED PROTECTION DEVICES - RECTIFIER [1] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| C curve circuit breaker (A) | 125 | 160 | 250 | | 315 |
| gG fuse (A) | 125 | 160 | 250 | | 315 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS [2] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| Max $I^2t$ supported by the bypass ($A^2s$) | 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 | | 400 |
| gG fuse (A) | 160 | 200 | 250 | | 400 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER[3] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| Input residual current circuit breaker | 0.5 A Selective type B | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT [4] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| C curve circuit breaker [3] (A) | ≤ 16 | ≤ 20 | ≤ 25 | ≤ 32 | ≤ 40 |
| B curve circuit breaker [3] (A) | ≤ 32 | ≤ 40 | ≤ 50 | ≤ 63 | ≤ 80 |

| CABLES - MAXIMUM CABLE SECTION [5] | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 60 | 80 | 100 | 120 | 160 |
| Rectifier terminals (4x) | bus bar with holes ø 8 mm 70 $mm^2$ (flexible cable and rigid cable) | | bus bar with holes ø 10 mm 2x120 $mm^2$ (flexible cable and rigid cable) | | bus bar with holes ø 10 mm 2x150 $mm^2$ (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 $i^2t$ 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*

# 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.

**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

## 5.2 STANDARDS

### 5.2.1 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)

### 5.2.2 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

### 5.2.3 TEST AND PERFORMANCE

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

### 5.2.4 ENVIRONMENTAL

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

## 5.3 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.

SUPERIOR

Unrivalled power performance

# DELPHYS GP

## *Green Power 2.0* range

160 to 1000 kVA/kW

RoHS COMPLIANT

3 LEVEL TECHNOLOGY

96% EFFICIENCY

kW = kVA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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

DELPHYS GP is a full range of high performing Green Power 2.0 UPS designed to:

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

| GREEN POWER 2.0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| DELPHYS GP 3/3 | • | • | • | • | • | • | • | • | • |

*Matrix table for model and kVA power rating*

DELPHYS GP 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

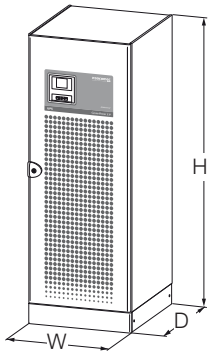
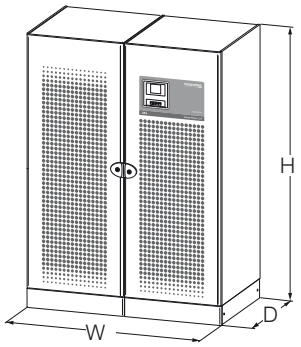
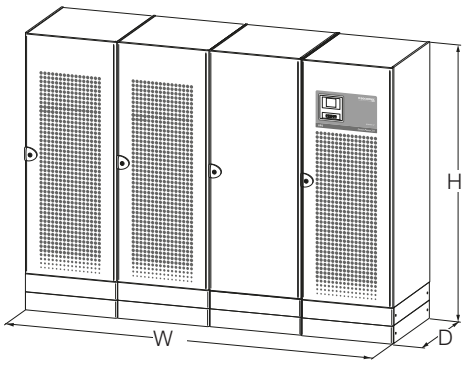
## 2.1 POWER RATINGS FROM 160 TO 1000 kVA/kW

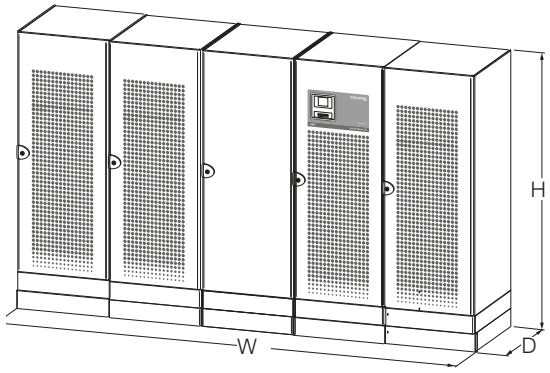
The equipment has been designed with a minimum direct and indirect footprint (the actual space occupied by the unit and the space required around it for maintenance, ventilation and access to the operating mechanisms and communication devices).

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

All of the control mechanisms and communication interfaces are located in the front side and can be accessed from a door provided with handle and lock.

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

| DELPHYS GP - DIMENSIONS | | | | |
|---|---|---|---|---|
| | | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | 160 kVA/kW | 700 | 800 | 1930 |
| | 200 kVA/kW | | | |
|  | 250 kVA/kW | 1000 | 950 | 1930 |
| | 300 kVA/kW | | | |
| | 400 kVA/kW | 1400 | 800 | |
| | 500 kVA/kW | 1600 | 950 | |
|  | 600 kVA/kW | 2810 | 950 | 2060 |

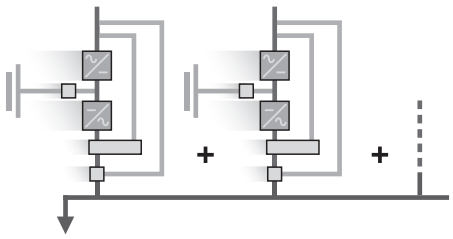
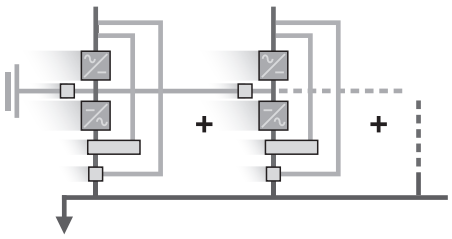
| DELPHYS GP - DIMENSIONS | | | | |
|---|---|---|---|---|
| | | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | 800 kVA/kW | 3510 | 950 | 2060 |
| | 1000 kVA/kW | 3910 | | |

## 2.2 BATTERY MANAGEMENT

Available with distributed batteries, DELPHYS GP allows to optimise the batteries size thanks to a shared battery operation. This reduces the overall system footprint, the weight of the required batteries, the battery monitoring system, the amount of wiring needed and the amount of lead.

To guarantee maximum back-up time availability and battery life, DELPHYS GP includes:

- EBS (Expert Battery System), smart battery charging management.
- Distributed or shared battery for energy storage optimization on parallel systems.
- Capability to discharge the battery at a programmable power (“BCR” option), without any load bank and keeping the load protected by online double conversion.

| | |
|---|---|
|  |  |
| Distributed battery | Shared battery |

## 2.3 UPS AND SYSTEM ARCHITECTURES

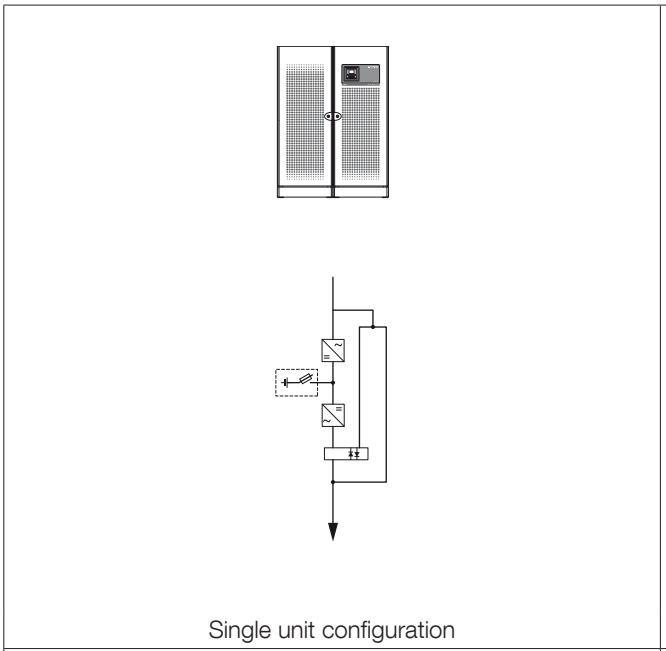
DELPHYS GP units (rectifier, battery, inverter and bypass) can be connected in parallel with distributed or central bypass:

- up to 8 units (160, 200, 250, 300 and 500 kVA/kW)
- up to 6 units (400 kVA/kW)
- up to 4 units (600 and 1000 kVA/kW)
- up to 3 units (800 kVA/kW)

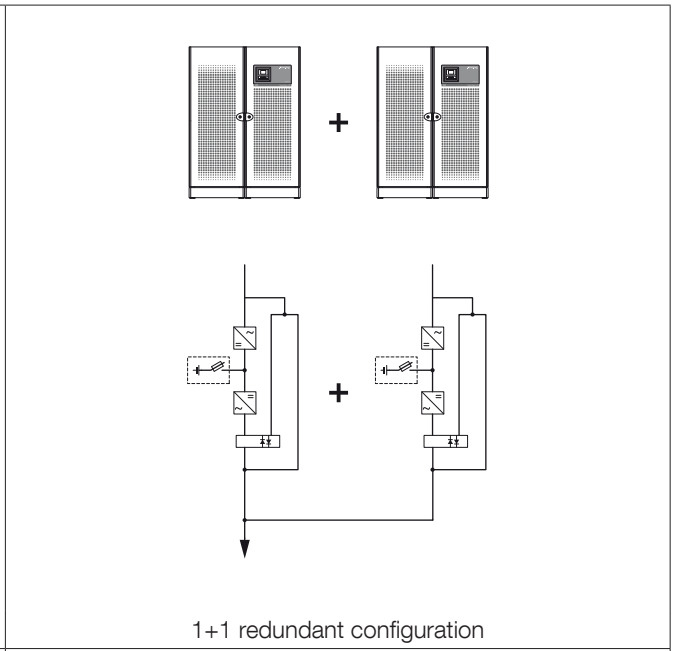
This solution, which is ideally suited for N+1 redundancy, offers flexible power upgrading and enables stand-alone UPS units to be expanded.

Each single UPS unit has a built-in maintenance bypass (single unit or 1+1 distributed bypass).

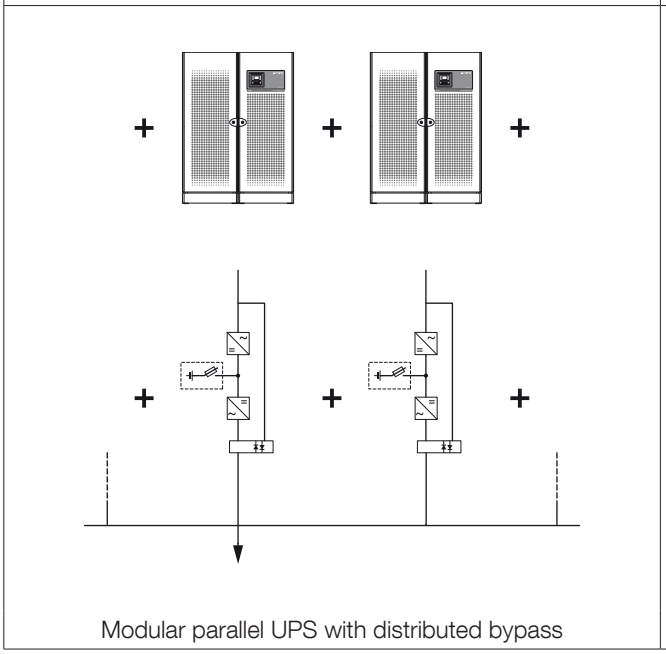
It is possible to add an external maintenance bypass, common to all of the UPS units, for maintenance access. A central bypass configuration has a common maintenance bypass for the complete system.



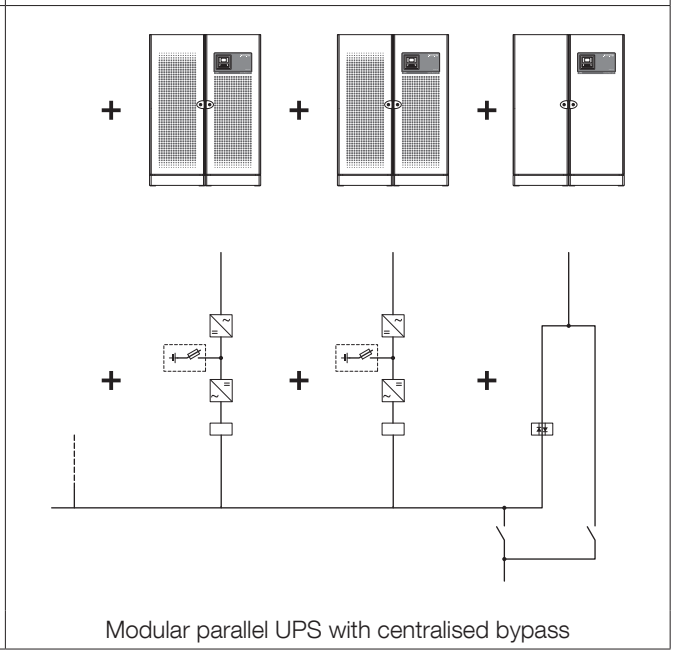
Single unit configuration



1+1 redundant configuration



Modular parallel UPS with distributed bypass



Modular parallel UPS with centralised bypass

# 3. STANDARD AND OPTIONS

## 3.1 STANDARD ELECTRICAL FEATURES.

- Integrated maintenance bypass (single and 1+1 redundant units).
- Backfeed protection: detection circuit.
- EBS (Expert Battery System) for battery management.
- Redundant cooling.
- Battery temperature sensor.

## 3.2 ELECTRICAL OPTIONS.

- Separated or common input mains.
- External maintenance bypass.
- Extended battery charger capability.
- Shared battery.
- Lithium batteries.
- Galvanic isolation transformer.
- Backfeed isolation device.
- ACS synchronisation system.
- BCR (Battery Capacity Re-injection).
- FAST ECOMODE.

## 3.3 STANDARD COMMUNICATION FEATURES.

- User-friendly 7’ touch-screen multilingual color graphic display.
- 2 Com-Slots for communication options.
- USB port to download UPS report and log file.
- Ethernet port for service purpose.

## 3.4 COMMUNICATION OPTIONS.

- Dry-contact interface (configurable volatge-free contacts).
- MODBUS RTU RS485 or TCP.
- PROFIBUS / PROFINET gateway.
- BACnet/IP interface.
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs.
- Remote View Pro supervision software.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- Remote touch-screen panel.
- Addional Com-Slot extension.

## 3.5 REMOTE MONITORING AND CLOUD SERVICES.

- SoLink: Socomec 24/7 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

# 4. INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Phase in/out | | 3/3 | | | | | | | | |
| Active power (kW) | | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Rated/maximum rectifier input current (A) | | 244/290 | 305/340 | 380/425 | 455/520 | 610/680 | 760/850 | 916/1020 | 1220/1360 | 1520/1700 |
| Rated bypass input current (A) | | 231 | 289 | 361 | 433 | 578 | 722 | 866 | 1155 | 1444 |
| Inverter output current @ 230 V (A) P/N | | 231 | 289 | 361 | 433 | 578 | 722 | 866 | 1155 | 1444 |
| Maximum air flow ($m^3/h$) | | 2250 | | 2700 | | 4500 | 5400 | 6750 | 9000 | 10800 |
| Sound level (dBA) | | ≤ 65 | ≤ 67 | ≤ 70 | | | ≤ 72 | | ≤ 73 | ≤ 74 |
| Power dissipation in nominal conditions[1] | W | 7900 | 10400 | 12800 | 15200 | 22000 | 24300 | 33600 | 43000 | 54675 |
| | kcal/h | 6797 | 8948 | 11013 | 13078 | 18929 | 20908 | 28890 | 36970 | 47020 |
| | BTU/h | 26956 | 35486 | 43675 | 51864 | 75066 | 82914 | 114650 | 146720 | 217060 |
| Power dissipation (max) in the worst conditions[2] | W | 10000 | 13000 | 15000 | 18000 | 26000 | 30000 | 42000 | 53800 | 66000 |
| | kcal/h | 8604 | 11185 | 12906 | 15490 | 22370 | 25812 | 36100 | 46260 | 56760 |
| | BTU/h | 34121 | 44358 | 51182 | 61420 | 88716 | 102364 | 143310 | 183570 | 262020 |
| Dimensions | W mm | 700 | | 1000 | | 1400 | 1600 | 2810 | 3510 | 3910 |
| | D mm | 800 | | 950 | | 800 | 950 | 950 | | |
| | H mm | 1930 | | | | | | 2060 | | |
| Weight (kg) | | 470 | 490 | 850 | 900 | 1000 | 1500 | 2300 | 2800 | 3800 |

*1) Considering nominal input current (400 V, battery charged) and rated output active power (PF1).*

*2) Considering maximum input current (low input voltage, battery recharge) and rated output active power (PF1).*

## 4.1 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER[1] INPUT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Rated mains supply voltage (V) | 400 3ph | | | | | | | | |
| Voltage tolerance | 200 V to 480 V[2] | | | | | | | | |
| Rated frequency | 50/60 Hz | | | | | | | | |
| Frequency tolerance | 42 to 65 Hz | | | | | | | | |
| Power factor | > 0.99 | | | | | | | | |
| Total harmonic distortion (THDi) (at full load and rated voltage) | < 2.5%[3] | | | | | | | | |
| Max inrush current at start-up | < In (no overcurrent) | | | | | | | | |
| Soft start A/sec (settable) | 50 | | | | 100 | | 150 | 200 | |

*1) IGBT rectifier.*

*2) Conditions apply.*

*3) With input THDV < 1%.*

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Min/Max number of battery cells with load PF=1 (1) | 216/258 | 258/258 | 252/258 | 258/258 | 258/258 | 252/258 | 258/258 | 258/258 | 252/258 |
| Min/Max number of battery cells with load PF ≤ 0,9 (1) | 216/258 | 234/258 | 234/258 | 252/258 | 234/258 | 234/258 | 252/258 | 234/258 | 234/258 |
| Min/Max number of battery cells with load PF ≤ 0,8 (1) | 216/258 | 216/258 | 216/258 | 234/258 | 216/258 | 216/258 | 234/258 | 216/258 | 216/258 |
| Battery AC ripple current | < 3% C10 | | | | | | | | |
| Battery AC ripple voltage | < 1% on the battery bloc | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Bypass frequency variation speed | 1.5 Hz/s settable from 1 to 3 Hz/s | | | | | | | | |
| Bypass rated voltage | Nominal output voltage ±15% (settable) | | | | | | | | |
| Bypass rated frequency | 50/60 Hz (selectable) | | | | | | | | |
| Bypass frequency tolerance | ±2% (from ±1% to ±8% (operation with generator unit)) | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Rated output voltage (selectable) (V) | | 400 3ph + N (380/415 configurable) | | | | | | | | |
| Output voltage tolerance | | static load ±1%, dynamic load VFI-SS-111 compliant | | | | | | | | |
| Rated output frequency (Hz) | | 50/60 Hz (selectable) | | | | | | | | |
| Autonomous frequency tolerance | | ±0.02% on mains power failure | | | | | | | | |
| Load crest factor | | 3:1 | | | | | | | | |
| Harmonic voltage distortion | | ThdU ≤ 1,5 % with rated linear load | | | | | | | | |
| Overload tolerated by the inverter - 25 °C | 10 min | 200 kW | 225 kW | 280 kW | 337 kW | 450 kW | 560 kW | 675 kW | 900 kW | 1120 kW |
| | 1 min | 240 kW | 270 kW | 312 kW | 405 kW | 540 kW | 625 kW | 810 kW | 1080 kW | 1250 kW |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Double conversion efficiency (normal mode - VFI) | up to 96% | | | | | | | | |
| Fast EcoMode | up to 99% | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| UPS storage conditions | -20 to +70 °C under ≤70% condensation free RH (2) | | | | | | | | |
| UPS working conditions | 0 to +40 °C under ≤95% condensation free RH (1) (2) | | | | | | | | |
| Maximum altitude without derating | 1000 m (3,300 ft) | | | | | | | | |
| Degree of protection | IP 20 (other IP as option) | | | | | | | | |
| Portability | EN 60068-2 | | | | | | | | |
| Colour | cabinet: RAL 7012, door: silver grey | | | | | | | | |

*1) Conditions apply.*

*2) 10°C minimum to start the UPS. 15 to 25 °C suggested for the associated battery.*

## 4.2 RECOMMENDED PROTECTIONS

| RECOMMENDED PROTECTION DEVICES - RECTIFIER[1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Circuit breaker (A) | 315 | 400 | 630 | | 800 | 1000 | 1250 | 1600 | 2000 |
| gG fuse (A) | 315 | 400 | 630 | | 800 | 1000 | 1250 | 1600 | 2000 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS [1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Semiconductors characteristics | $I^2t$ ($A^2s$) | 320000 | | | | 780000 | 1050000 | 1750000 | 3100000 | 2700000 |
| | Is/c (A peak) | 8000 | | | | 12500 | 14500 | 18700 | 25000 | 23000 |
| Circuit breaker (A) | | 400 | | 630 | | 800 | | 1000 | 1250 | 1600 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER [2] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Phase in/out | 3/3 | | | | | | | | |
| Input residual current circuit breaker | 3 A | | | | | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT [3] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Short-circuit inverter current Ik1=Ik2=Ik3[4] (A) - (0 to 100 ms) (when AUX MAINS is not present) | 760 | | 900 | 1100 | 1500 | 1800 | 2200 | 3000 | 3600 |
| C curve circuit breaker (A) | ≤ 63 | | ≤ 80 | ≤ 100 | ≤ 160 | | ≤ 200 | ≤ 250 | ≤ 300 |
| B curve circuit breaker (A) | ≤ 125 | | - | | | | | | |

| CABLES CONNECTION - MAXIMUM CAPABILITY PER POLE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 160 | 200 | 250 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Rectifier terminals ($mm^2$) | 2 x 150 | | 2 x 240 | | 3 x 300 | | 4 x 300 | | |
| Bypass terminals ($mm^2$) | 2 x 150 | | 2 x 240 | | 3 x 300 | | 4 x 300 | | |
| Battery terminals ($mm^2$) | 2 x 240 | | 2 x 240 | | 2 x 300 | 3 x 300 | 4 x 300 | | |
| Output terminals ($mm^2$) | 2 x 150 | | 2 x 240 | | 3 x 300 | | 4 x 300 | | |

*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 connected downstream of the UPS. 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) Ik1: phase to neutral, Ik2: phase to phase, Ik3: three-phase to neutral.*

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 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

## 5.2 STANDARDS

### 5.2.1 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

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 ENVIRONMENTAL

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

## 5.3 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.

PRIME

Trustworthy power

# DELPHYS MP Elite+

80 to 200 kVA


Socomec Resource Center
To download, brochures, catalogues and technical manuals

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

DELPHYS MP *elite* + is a high performing transformer based UPS designed to secure power supply to critical industrial applications. It is the ideal solution for grouping with generator sets without using an excessively large generator.

The isolation transformer installed on the inverter output ensures complete galvanic isolation between DC circuit and load output.

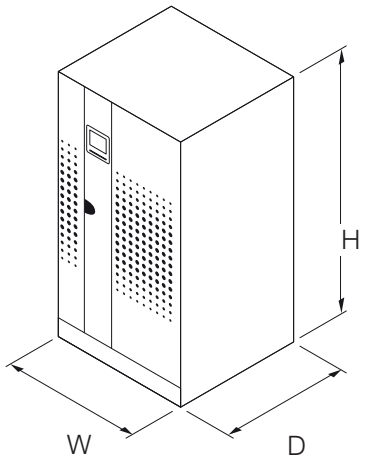
| MODELS | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| DELPHYS MP elite + 3/3 | • | • | • | • | • |

*Matrix table for model and kVA power rating*

DELPHYS MP *elite* + 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 80 TO 200 KVA

| DIMENSIONS | | | |
|---|---|---|---|
| Cabinet type | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | 1000 | 800 | 1930 |

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 and can be accessed in the front part,*
- *the air inlet is on the front, with outflow from the upper side; this means other equipment or external battery enclosures can be placed alongside the UPS unit.*

## 2.2 FLEXIBLE BACKUP TIME

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 backup times.

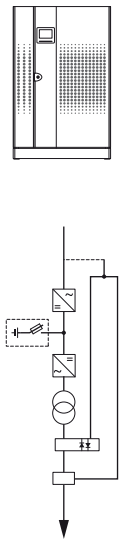
## 2.3 UPS AND SYSTEM ARCHITECTURES

DELPHYS MP *elite* + UPS units (rectifier, battery, inverter and bypass) can be connected in parallel (up to 6 units) with distributed or central bypass.

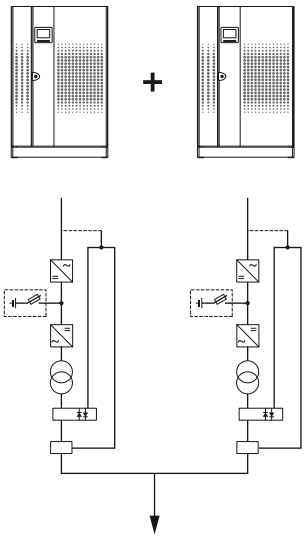
This solution, which is ideally suited for N+1 redundancy, offers flexible power upgrading and enables stand-alone UPS units to be expanded.

Each single UPS unit has a built-in maintenance bypass (single unit or 1+1 redundant configuration).

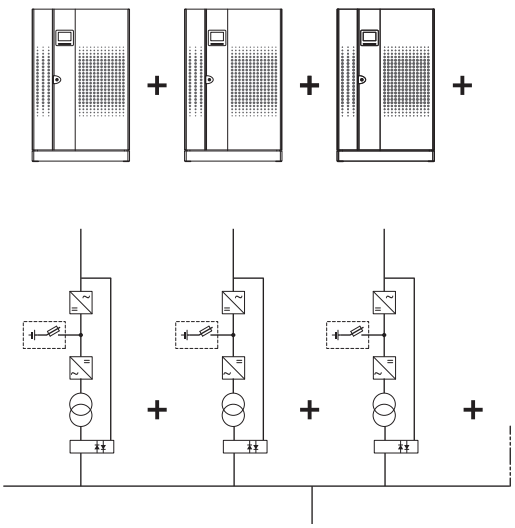
It is possible to add an external maintenance bypass, common to all of the UPS units, for maintenance access. A central bypass configuration has a common maintenance bypass for the complete system.



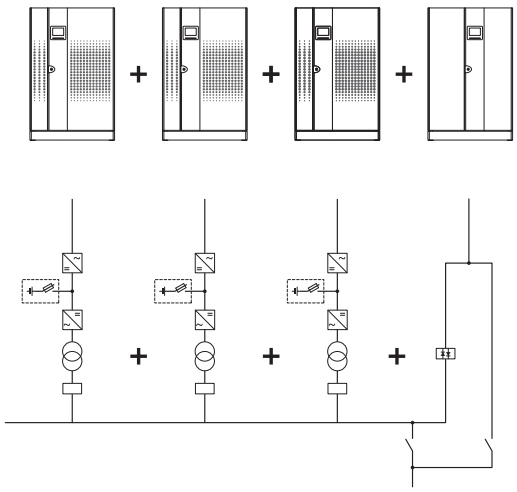
Single unit configuration



1+1 redundant configuration



Modular parallel UPS with distributed bypass



Modular parallel UPS with centralized bypass

# 3. STANDARD AND OPTIONS

## 3.1 PARALLEL SYSTEMS

- Distributed or centralized bypass for parallel architecture up to 6 units.
- Redundant systems (“1+1” and “n+1”).
- “2n” architecture with Static Transfer Systems.

## 3.2 STANDARD ELECTRICAL FEATURES.

- Slots for 3 communication cards.
- Backfeed protection: detection circuit.
- Standard interface:
  - 3 inputs (emergency stop, generating set, battery protection),
  - 4 outputs (general alarm, back-up, bypass, preventative maintenance needs).

## 3.3 ELECTRICAL OPTIONS.

- EBS(1) (Expert Battery System).
- FLYWHEEL compatible.
- ACS synchronisation system.
- Redundant electronic power supplies.
- Hot plug option (increase the power keeping the load supplied in double conversion).
- Long backup time rectifier.

## 3.4 MECHANICAL OPTIONS.

- Dust filters.
- Fan redundancy with failure detection.
- Top entry connection.
- Reinforced IP protection up to IP52.

## 3.5 STANDARD COMMUNICATION FEATURES.

- Multilanguage graphic display.
- Embedded dry contacts.

## 3.6 COMMUNICATION OPTIONS.

- GTS (Graphic Touch Screen).
- ADC interface (configurable voltage-free contacts).
- MODBUS RTU RS485 or TCP.
- PROFIBUS.
- BACnet/IP interface.
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- 3 extra slots for communication cards

## 3.7 REMOTE MONITORING SERVICE.

- SoLink: Socomec 24/7 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

*(1) Conditions apply*

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 80 | 100 | 120 | 160 | 200 |
| Phase in/out | | 3/3 | | | | |
| Active power (kW) | | 72 | 90 | 108 | 144 | 180 |
| Rated/maximum rectifier input current (A) @400V | | 129/159 | 162/197 | 196/235 | 257/301 | 297/366 |
| Rated bypass input current (A) | | 116 | 144 | 174 | 231 | 290 |
| Inverter output current @230V (A) P/N | | 116 | 144 | 174 | 231 | 290 |
| Maximum air flow ($m^3/h$) | | 2200 | | | 2400 | |
| Sound level (dBA) | | 65 | | 67 | | |
| Dissipation at rated load (minimum mains power present and batteries charged) | kW | 6.8 | 7.7 | 10.1 | 12.2 | 18.4 |
| | kcal/h | 5850 | 6640 | 8660 | 10470 | 15800 |
| Dimensions (with standard back-up time) | W (mm) | 1000 | | | | |
| | D (mm) | 800 | | | | |
| | H (mm) | 1930 | | | | |
| Weight (kg) | | 740 | 860 | | 1020 | |

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - INPUT | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Phase in/out | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 |
| Rated mains supply voltage | 380/400/415 V (208/220/240 V on request) | | | | |
| Voltage tolerance (ensuring battery recharge) | -10% to +15%(380 V) / ±15% (400 V) / -15% to +10% (415 V) | | | | |
| Rated frequency | 50/60 Hz | | | | |
| Frequency tolerance | ± 5 Hz | | | | |
| Power factor (input at full load and rated voltage) | 0.99 | | | | |
| Total harmonic distortion (THDi) | < 3% | | | | |
| Max inrush current at start-up | <In (no overcurrent) | | | | |
| Soft start | 50 A/sec (settable) | | | | |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Bypass frequency variation speed | 2 Hz/s (settable) | | | | |
| Bypass rated voltage | Rated output voltage ±10% (settable) | | | | |
| Bypass rated frequency | 50/60 Hz (selectable) | | | | |
| Bypass frequency tolerance | ±2 Hz (from 0.2 to 4 Hz settable (operation with generator unit)) | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 80 | 100 | 120 | 160 | 200 |
| Rated output voltage (selectable) | | 380/400/415 V [1] | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: (0-100% Pn) -4% +2% | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | |
| Autonomous frequency tolerance | | 0.02 on mains power failure | | | | |
| Load crest factor | | 3:1 | | | | |
| Voltage harmonic distortion | | < 2% on linear load<br>< 4% with non linear load | | | | |
| Overload tolerated by the inverter (with mains power present) (kW) | 10 min. | 80 | 112.5 | 120 | 180 | 200 |
| | 1 min. | 96 | 135 | 144 | 216 | 240 |

*(1) Other voltages on request.*

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Double conversion efficiency (normal mode) | 93.5% @ full load | | | | |
| Efficiency in Eco Mode | 98% | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Storage temperatures | -20 to +70 °C (-4 to 158 °F) (15 to 25 °C for better battery life) | | | | |
| Working temperature | 0 to +40[1] °C (32 to 104(1) °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 | IP20 (other IP as option) | | | | |
| Portability | EN 60068-2 | | | | |
| Colour | RAL 9006 (Grey Toyo) | | | | |

*(1) Conditions apply*

## 4.3 RECOMMENDED PROTECTION DEVICES

| RECOMMENDED PROTECTION DEVICES - RECTIFIER(1) | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 80 | 100 | 120 | 160 | 200 |
| D curve circuit breaker (A) | | 160 | 200 | 250 | 300 | 400 |
| gG fuse (A) | | 160 | 200 | 250 | 300 | 400 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS(1) | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | | 80 | 100 | 120 | 160 | 200 |
| Semiconductors characteristics | $I^2t$ ($A^2s$) | 80000 | 125000 | | 320000 | |
| | Is/c (A peak) | 4000 | 5000 | | 8000 | |
| D curve circuit breaker (A) | | 160 | 200 | 250 | 400 | |
| gG fuse (A) | | 160 | 200 | 250 | 400 | |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER(2) | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 | |
| Input residual current circuit breaker | 0.5 A | | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT(3) | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Short-circuit inverter current (A) - (0 to 100 ms) (when AUX MAINS is not present) | 485 | 620 | | 1060 | |
| C curve circuit breaker(3) (A) | 40 | 50 | | 100 | |
| High-speed fuse(3) (A) | 80 | 125 | | 250 | |

| CABLES - MAXIMUM CABLE SECTION | | | | | |
|---|---|---|---|---|---|
| Rated power (kVA) | 80 | 100 | 120 | 160 | 200 |
| Rectifier terminals | Copper bar 63 x 4 mm (2x120 mm) | | | | |
| Bypass terminals | | | | | |
| Battery terminals | Copper bar 40 x 5 mm (2x240 mm) | | | | |
| Output terminals | Copper bar 63 x 4 mm (2x120 mm) | | | | |

*(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.*

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 OVERVIEW

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**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

## 5.2 STANDARDS

### 5.2.1 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

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 ENVIRONMENTAL

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

## 5.3 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.

# MASTERYS IP+

10 to 80 kVA

## SUPERIOR

Unrivalled power performance


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# 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 | • | • | • | • | • | • | • |

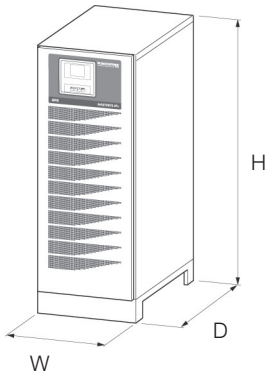
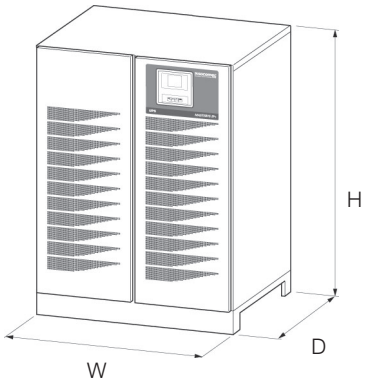
*Matrix table for model and kVA power rating*

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.

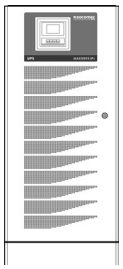
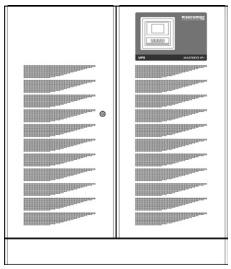
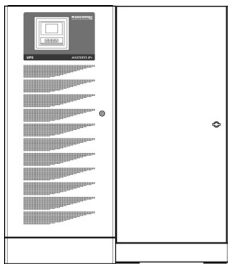
All of the control mechanisms and communication interfaces are located in the front part inside to metal door.

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.

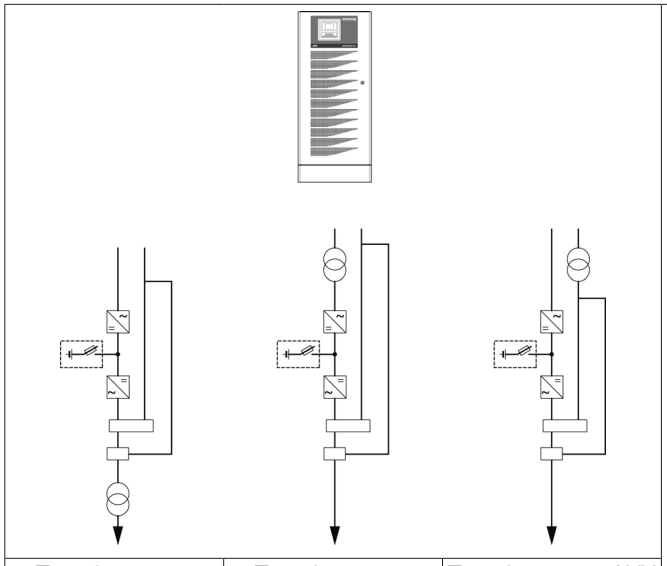
The UPS system's internal batteries consist of distinct strings of battery packs connected in series; each individual pack is connected using polarised connectors to facilitate battery configuration and maintenance.

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.

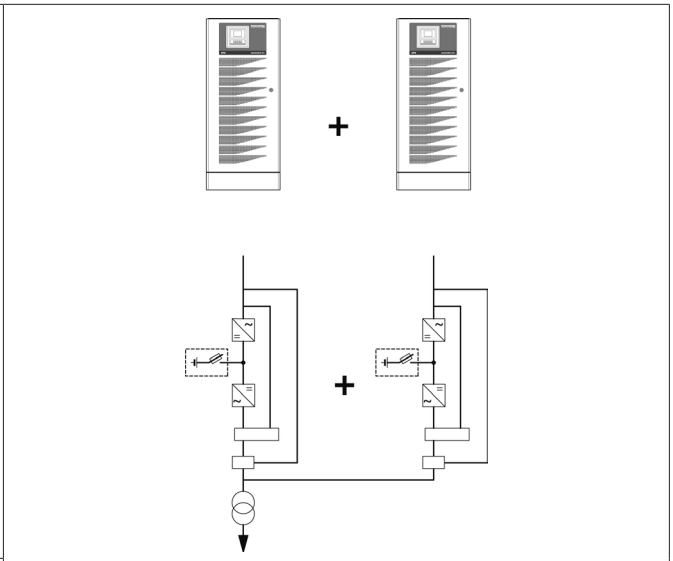
## 2.3 PARALLEL CONFIGURATION.

MASTERYS IP+ offers various configurations.

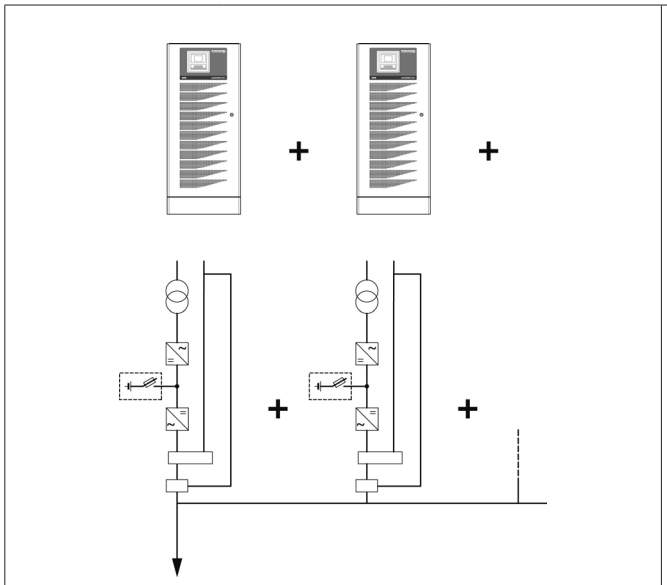


| Transformer on OUTPUT | Transformer on MAINS | Transformer on AUX MAINS |
|---|---|---|

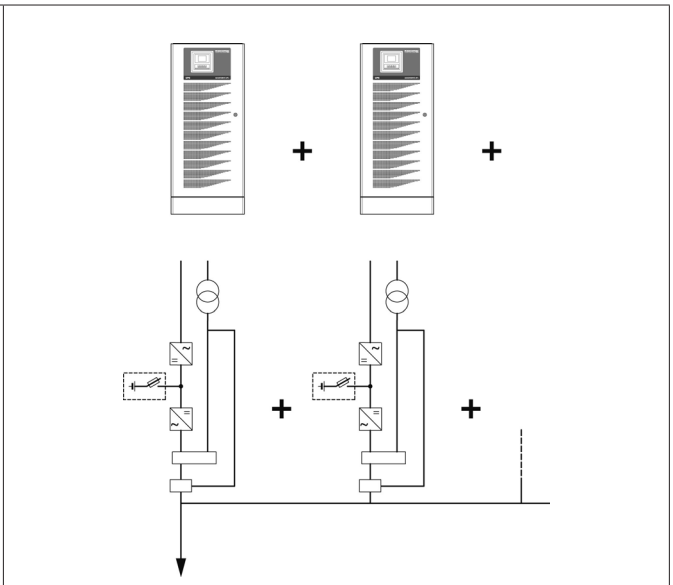
Stand-alone UPS configuration



Parallel 1+1 redundant configuration



Parallel N+1 power configuration (up to 6 UPS) transformer on MAINS



Parallel N+1 power configuration (up to 6 UPS) transformer on AUX MAINS

## 2.4 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.

- SoLink, 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)<br>-20% to +20% (pf 0.8)<br>Up to -40% to 50% of rated power (pf 0.9) | | | | | | | | | -20% to +20% (pf 0.8)<br>-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)<br>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, transfo on the output | 91% | | | | | | | | | 89% | | | |
| Double conversion efficiency (normal mode) at rated load, transfo 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<br>35 mm2 (flexible cable)<br>50 mm2 (rigid cable) | | | | 4x CBD 35<br>35 mm2 (flexible cable)<br>50 mm2 (rigid cable) | | | | | 4x CBD 50<br>50 mm2 (flexible cable)<br>70 mm2 (rigid cable) | | | |
| Bypass terminals | 2x CBD 35<br>35 mm2 (flexible cable)<br>50 mm2 (rigid cable)<br>2x CBD 50<br>50 mm2 (flexible cable)<br>70 mm2 (rigid cable) | | | | | | | | | 2x ACB 120<br>120 mm2<br>(flexible cable)<br>185 mm2<br>(rigid cable) | | 4x CBD 50<br>50 mm2<br>(flexible cable)<br>70 mm2<br>(rigid cable) | |
| Battery terminals | 4x CBD 35<br>35 mm2 (flexible cable)<br>50 mm2 (rigid cable) | | | | | | | | | 4x CBD 70<br>70 mm2 (flexible cable)<br>95 mm2 (rigid cable) | | | |
| Output terminals | 2x CBD 50<br>50 mm2 (flexible cable)<br>70 mm2 (rigid cable) | | | | | | | | | 2x ACB 120<br>120 mm2<br>(flexible cable)<br>185 mm2<br>(rigid cable) | | 4x CBD 50<br>50 mm2<br>(flexible cable)<br>70 mm2<br>(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 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

## 5.2 STANDARDS

### 5.2.1 SAFETY

EN 62040-1 Uninterruptible Power System (UPS) - Part 1: General and safety requirements (certified by TÜV SÜD)

IEC 62040-1 Uninterruptible Power System (UPS) - Part 1: Safety requirements

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (C3 category)

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 TEST AND PERFORMANCE

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

### 5.2.4 DEGREES OF PROTECTION

EN 60529 Degrees of protection provided by enclosures

## 5.3 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.

# DELPHYS MX

250 to 900 kVA

## SUPERIOR

Unrivalled power performance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# OBJECTIVES

The aim of these specifications is to provide:

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- the information required to prepare the system and installation site.

The specifications are intended for:

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- 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

DELPHYS MX is a high performing transformer based UPS designed to secure power supply to critical industrial applications up to 5.4 MVA.

The isolation transformer installed on the inverter output ensures complete galvanic isolation between DC circuit and load output.

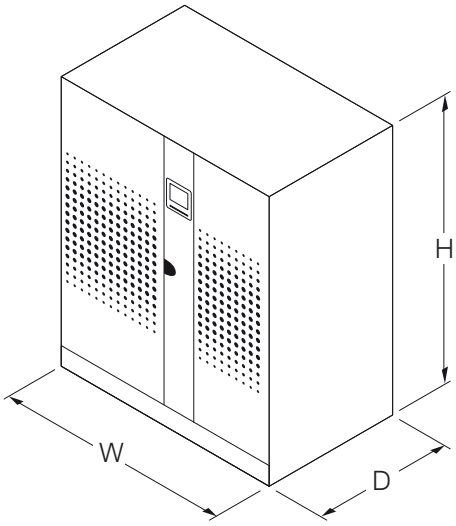
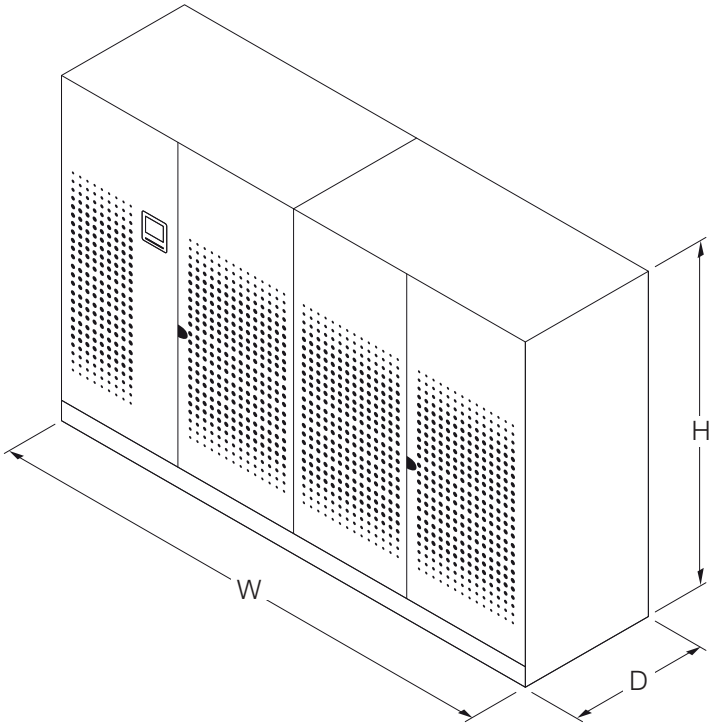
| MODELS | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| DELPHYS MX 3/3 | • | • | • | • | • | • |

*Matrix table for model and kVA power rating*

DELPHYS MX 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 250 TO 900 KVA

| DIMENSIONS | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|---|---|---|---|
|  DELPHYS MX 250 to 500 kVA | 1600 | 995 | 1930 |
|  DELPHYS MX 800 and 900 kVA | 3200 | 995 | 2210 |

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 and can be accessed in the front part,
- the air inlet is on the front, with outflow from the upper side; this means other equipment or external battery enclosures can be placed alongside the UPS unit.

## 2.2 FLEXIBLE BACKUP TIME

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 backup times.

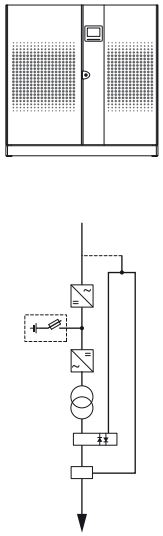
To guarantee maximum back-up time availability and battery life, the DELPHYS MX includes:

EBS (Expert Battery System), smart battery charging management.

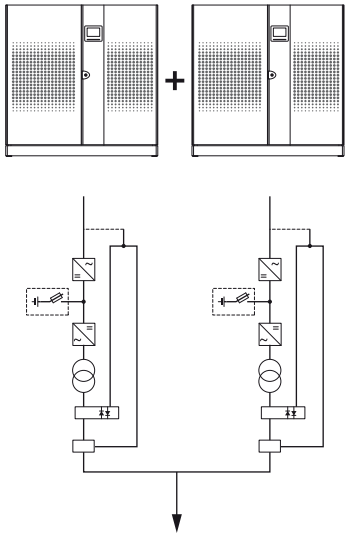
## 2.3 PARALLEL

DELPHYS MX UPS units (rectifier, battery, inverter and bypass) can be connected in parallel (up to 6 units) with distributed or central bypass. This solution, which is ideally suited for 1+1 redundancy, offers flexible power upgrading and enables stand-alone UPS units to be expanded. Each single UPS unit has a built-in maintenance bypass (single unit or distributed bypass).

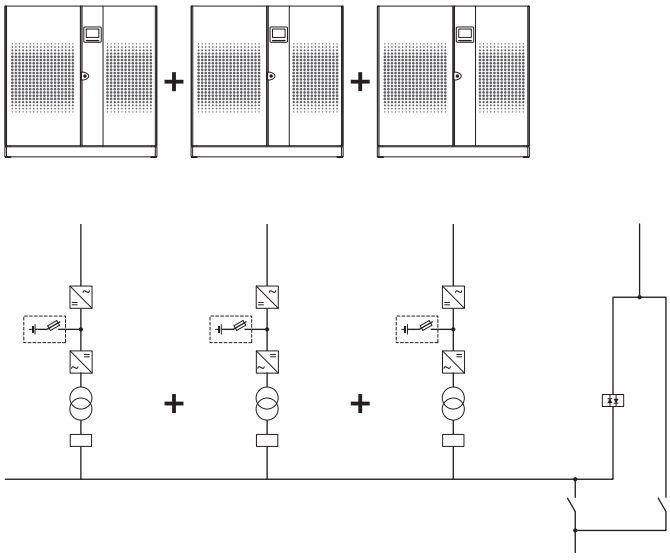
It is possible to add an external maintenance bypass, common to all of the UPS units, for maintenance access.



Single unit configuration



1+1 redundant configuration



Modular parallel UPS with centralized bypass

# 3. STANDARD AND OPTIONS

## 3.1 STANDARD ELECTRICAL FEATURES.

- Backfeed protection: detection circuit.
- Standard interface:
  - 3 inputs (emergency stop, generating set, battery protection),
  - 4 outputs (general alarm, back-up, bypass, preventative maintenance needs).
- EBS (Expert Battery System).

## 3.2 ELECTRICAL OPTIONS.

- EBS (Expert Battery System).
- FLYWHEEL compatible.
- ACS synchronisation system.
- Redundant electronic power supplies.

## 3.3 MECHANICAL OPTIONS.

- Reinforced IP protection degree.
- Ventilation filters.
- Redundant ventilation with failure detection.
- Top entry connection.

## 3.4 STANDARD COMMUNICATION FEATURES.

- Multilanguage graphic display.
- Embedded dry contacts.

## 3.5 COMMUNICATION OPTIONS.

- GTS (Graphic Touch Screen).
- ADC interface (configurable voltage-free contacts).
- MODBUS RTU RS485 or TCP.
- PROFIBUS/PROFINET.
- BACnet/IP interface
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs.
- IoT Gateway for Socomec cloud services and SoLive mobile app.

## 3.6 REMOTE MONITORING SERVICE.

- SoLink: Socomec 27/4 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 250 | 300 | 400 | 500 | 800 | 900 |
| Phase in/out | | 3/3 | | | | | |
| Active power (kW) | | 225 | 270 | 360 | 450 | 720 | 810 |
| Rated/maximum rectifier input current (A) | | 374/478 | 453/543 | 598/705 | 780/889 | 1273/1547 | 1428/1611 |
| Rated bypass input current (A) | | 362 | 433 | 580 | 722 | 1155 | 1300 |
| Inverter output current @230V (A) P/N | | 361 | 433 | 577 | 722 | 1155 | 1300 |
| Maximum air flow ($m^3/h$) | | 6140 | | | | 14600 | |
| Sound level (dBA) | | ≤ 70 | | | ≤ 72 | ≤ 75 | |
| Dissipation at rated load (minimum mains power present and batteries charged) | W | 17200 | 20630 | 27300 | 34000 | 48000 | 53000 |
| | kcal/h | 14800 | 17730 | 23250 | 29260 | 41310 | 45610 |
| | BTU/h | 58730 | 70357 | 92262 | 116111 | 163928 | 180992 |
| Dimensions (with standard back-up time) | W (mm) | 1600 | | | | 3200 | |
| | D (mm) | 995 | | | | 995 | |
| | H (mm) | 1930 | | | | 2210 | |
| Weight | kg | 2500 | | 2800 | 3300 | 5900 | |

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - INPUT | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Phase in/out | 3/3 | | | | | |
| Rated mains supply voltage | 380/400/415 V | | | | | |
| Voltage tolerance (ensuring battery recharge) | 340 to 460 V | | | | 360 to 460 V | |
| Rated frequency | 50/60 Hz | | | | | |
| Frequency tolerance | ± 5% | | | | | |
| Power factor (input at full load and rated voltage) | 0.93 | | | | 0.94 | |
| Total harmonic distortion (THDi) | < 4.5% | | | | < 5% | |
| Max inrush current at start-up | <In (no overcurrent) | | | | | |
| Soft start | 50 A/sec (settable) | | | | | |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Bypass frequency variation speed | 2 Hz/s settable | | | | | |
| Bypass rated voltage | Rated output voltage ±10% | | | | | |
| Bypass rated frequency | 50/60 Hz selectable | | | | | |
| Bypass frequency tolerance | ±2 Hz (from 0.2 to 4 Hz settable (operation with generator unit)) | | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Rated output voltage (selectable) | 380/400/415 V | | | | | |
| Output voltage tolerance | Static: < 1%<br>Dynamic: (0-100% Pn) ±2% | | | | | |
| Rated output frequency | 50/60 Hz (selectable) | | | | | |
| Output frequency tolerance | 0.02 on mains power failure | | | | | |
| Load crest factor | 3:1 | | | | | |
| Voltage harmonic distortion (ThdU) | < 2% on linear load<br>< 4% on distorting load (Ph/N) | | | | < 2% on linear load<br>< 2.5% on distorting load (Ph/N) | |
| Overload tolerated by the inverter (with mains power present) | 125% x 10 min<br>150% x 1 min | | | | | |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Double conversion efficiency (normal mode) | 93.5% at full load | | | | | |
| Efficiency in Eco Mode | 98% | | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Storage temperatures | -20 to +70 °C (-4 to 158 °F) (15 to 25 °C for better battery life) | | | | | |
| Working temperature | 0 to +35 °C (32 to 95 °F)<br>(15 to 25 °C for better battery life) | | | | | 0 to +35 °C (32 to 95 °F)(1)<br>(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 | IP20 (up to IP52 optional) | | | | | |
| Portability | EN 60068-2 | | | | | |
| Colour | RAL 9006 (Grey Toyo) | | | | | |

*(1) Conditions apply.*

## 4.3 RECOMMENDED PROTECTION DEVICES

| RECOMMENDED PROTECTION DEVICES - RECTIFIER[1] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| D curve circuit breaker (A) | 630 | | 800 | 1000 | 1600 | |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS[1] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 250 | 300 | 400 | 500 | 800 | 900 |
| Semiconductors characteristics | I2t (A2s) | 2250000 | | | | 5120000 | |
| | Is/c (A peak) | 14500 | | | | 30000 | |
| D curve circuit breaker (A) | | 630 | | 800 | | 1250 | 1600 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER[2] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Input residual current circuit breaker | 300 mA | | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT[2] | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Short-circuit inverter current (A) - (0 to 100 ms) (when AUX MAINS is not present) | 1600 | | 2000 | 2900 | 4000 | |
| C curve circuit breaker[3] (A) | 160 | | 200 | 250 | 400 | |
| High-speed fuse[3] (A) | 400 | | 500 | 700 | 800 | |

| CABLES - MAXIMUM CABLE SECTION | | | | | | |
|---|---|---|---|---|---|---|
| Rated power (kVA) | 250 | 300 | 400 | 500 | 800 | 900 |
| Rectifier terminals | Copper bar (3x300 mm$^2$) | | | | Copper bar (4x300 mm$^2$) | |
| Bypass terminals | | | | | | |
| Battery terminals | | | | | | |
| Output terminals | | | | | | |

*(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.*

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 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

## 5.2 STANDARDS

### 5.2.1 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

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 5.2.3 ENVIRONMENTAL

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

## 5.3 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.

SUPERIOR

Unrivalled power performance

# DELPHYS XL

## High Power UPS

## from 1 to 4 MW and 1.2 to 4.8 MW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socomec
Innovative Power Solutions

# OBJECTIVES

The aim 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.

# INSTALLATION REQUIREMENTS AND PROTECTION

Connections to the mains power supply and to the load(s) must be implemented using cables of suitable size, in accordance with current standards. If there is no electrical control station present that can isolate the network upstream of the UPS, one must be installed. This electrical control station must be equipped with a protective device (or two, if there is a separate bypass line) with an appropriate rating for the power draw at full load.

For detailed information, see the installation and operating manual.

# 1. ARCHITECTURE

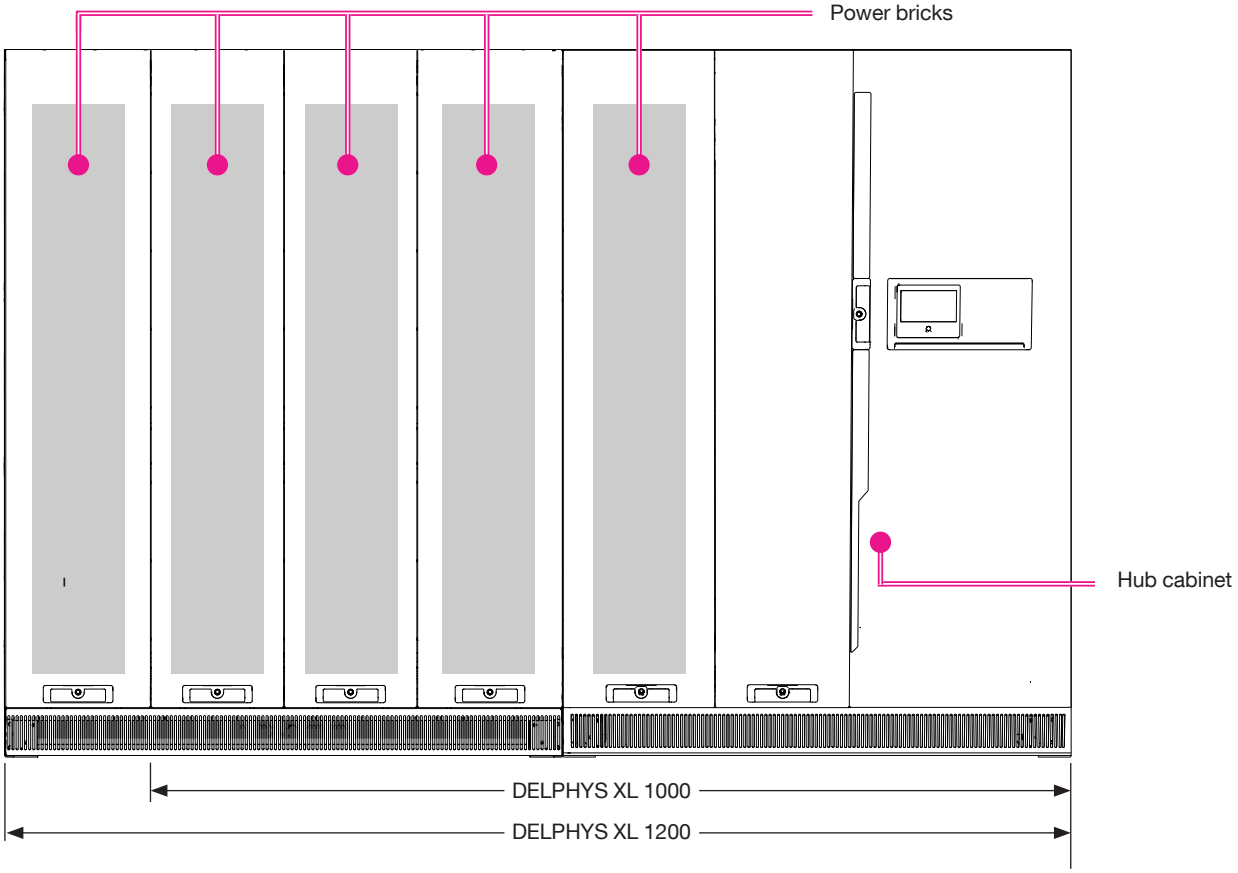
## 1.1 RANGE

Delphys XL is a high performance UPS designed to secure highly critical applications and therefore to ensure business continuity by means of a fully resilient architecture.

The DELPHYS XL can deliver many more benefits than standard monolithic systems, packing 1000/1200 kW into an overall space-saving design, which can be integrated into your environment simply and flexibly.

- Fault tolerant architecture,
- Easy and safe maintenance,
- TCO optimization (best in class efficiency levels),
- Optimized footprint,
- Fast deployment time / Flexible installation.

Delphys XL can sustain these values thanks to its unique architecture and design:




**Hub cabinet** for the UPS Unit:

- All input(s) – outputs and battery connections to the UPS units,
- 1 MW or 1.2 MW centralized static switch on bypass line,
- Local users interface (HMI),
- Remote communications interfaces.

**Power bricks** rated for 1000 or 1200 kW/kVA continuous operation:

- Single and full rated Rectifier, Inverter and Battery charger per power brick,
- Highly efficient & reliable power bricks,
- Selective disconnection to allow electrical isolation of brick when required.

The development and production sites are certified according to ISO 14001 (Environmental management system) and ISO 9001 (Quality management system).

## 1.2 RATED POWER

| RATED POWER PER UPS UNIT | | |
|---|---|---|
| UPS power rating | 1000 kVA | 1200 kVA |
| Power (kW) | 1000 kW (30°C) | 1200 kW (35°C) |
| Parallel units | up to 4 units in parallel | |

## 1.3 SYSTEM ARCHITECTURE

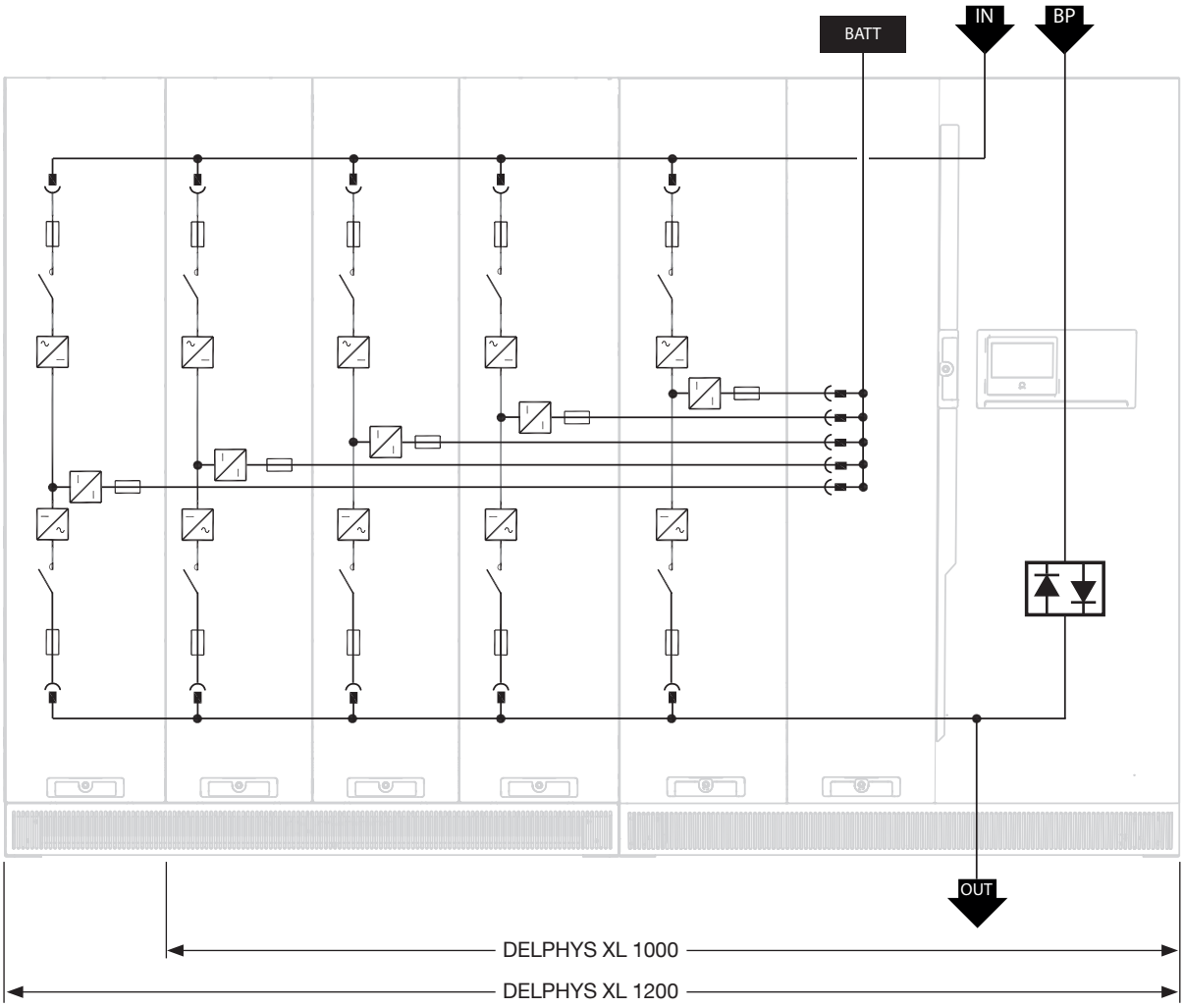
DELPHYS XL is a highly reliable UPS solution based on our field-proven high power XL platform, integrated into a fully redundant architecture that guaranties service continuity for the most critical applications.

The system is composed of several autonomous Power Bricks with advanced selective disconnection and a robust static bypass; Complete mechanical and electrical segregation between the power converters avoids any default propagation inside the system to give the best possible availability.

All the Power conversion bricks and the static switch operate intelligently on a peer-to-peer basis providing a resilient solution with no single point of failure.

Any potential fault is isolated inside the affected sub-assemblies, keeping the critical load protected in double conversion mode by means of the remaining power converters.

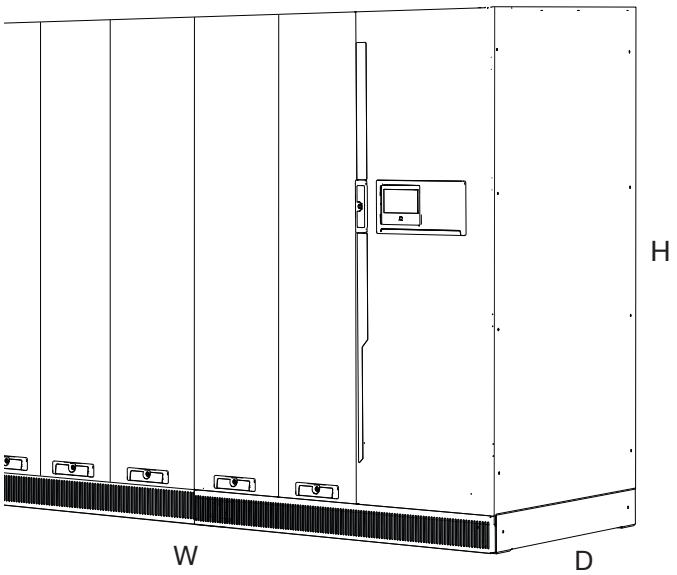
Therefore, DELPHYS XL is a fault tolerant UPS system assuming a complete redundancy up to 75% (Delphys XL 1000) and 80% (Delphys XL 1200) of load rate. This intrinsic redundancy reinforces inherent reliability and eliminates all single points of failure associated with traditional UPS to maximize the Mean Time Between Critical Failure.




The above schematic shows an example of Delphys XL with separated inputs (Rectifier / Bypass).

## 1.4 FOOTPRINT

Delivering far greater benefits than standard monolithic systems, DELPHYS XL packs 1000/1200 kW into an overall space-saving design which can be integrated into your existing architecture simply and flexibly.




| | | | DIMENSIONS (INSTALLATION) | | | |
|---|---|---|---|---|---|---|
| | | | Unit | Hub cabinet | Bricks cabinet | Brick |
| Width [W] | Delphys XL 1000 | (mm) | 2625 | 1405 | 1220 | 378 |
| | Delphys XL 1200 | | 3003 | 1405 | 1605 | |
| Depth [D](1) | Delphys XL 1000 | (mm) | 1000 | 1000 | 1000 | 949 |
| | Delphys XL 1200 | | 1000 | 1000 | 1000 | |
| Height [H] | Delphys XL 1000 | (mm) | 2005 | 2005 | 2005 | 1731 |
| | Delphys XL 1200 | | 2005 | 2005 | 2005 | |
| Weight | Delphys XL 1000 | (kg) | 2600 | 767 + 1 x 363 | 366 + 3 x 363 | 363 |
| | Delphys XL 1200 | | 3200 | 937 + 1 x 363 | 448 + 4 x 363 | |
| Single unit clearances | | | No rear or lateral clearance, Top = 400 mm | | | |
| Access for maintenance and operation | | | Front only (≥ 1200 mm free space for brick extraction) | | | |
| Installation | | | Back to back installation / Against a wall | | | |

(1) Depth not including door handles (+30 mm).

# 2. STANDARD AND OPTIONAL EQUIPMENT

## 2.1 FLEXIBLE UPS UNIT ARCHITECTURE

- Common or Separated rectifier and bypass mains
- Top and Bottom cable entry or Bus bar flanges
- Up to 10 strings DC connection capability without extra coupling cabinet
- Compatible with different energy storage technologies (e.g. VLRA, Li-Ion, Ni-Cd…)

## 2.2 STANDARD FEATURES

- Intrinsic redundancy with selective fault disconnection
- Redundant cooling
- Full system heat run tests
- External breakers position management
- Energy Saver mode
- Backfeed protection: detection circuit
- Battery temperature sensor
- Rails for power brick extraction
- Trolley for power brick cold swap

## 2.3 ELECTRICAL OPTIONS

- Input, output and maintenance bypass switches
- PEN kit for TN-C grounding system
- Reinforced battery charger
- battery protection tripping kit
- Smart conversion Mode
- BCR (Battery Capacity Re-injection)
- ACS synchronization system
- Cold start
- Maintenance Station with spare Power conversion brick
- Advanced GenSet management

## 2.4 STANDARD COMMUNICATION FEATURES

- User-friendly 7’ touch-screen with multilingual color graphic display (Hub cabinet).
- 4 Com-Slots for communication options.
- USB port to download UPS report and log file.
- Ethernet port for service purpose.

## 2.5 COMMUNICATION OPTIONS

- Dry-contact interface (configurable voltage-free contacts).
- MODBUS RTU RS485 or TCP
- BACnet/IP interface.
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs
- Remote View Pro supervision software.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- Remote touch-screen panel.

## 2.6 REMOTE MONITORING AND CLOUD SERVICES*

- SoLive: Real-time cloud monitoring app to supervise any Socomec UPS via smartphone
- SoLink: 24/7 cloud remote surveillance service by manufacturer specialists for any Socomec UPS
- Remote operations: on-demand remote connection by Socomec experts to perform diagnosis and troubleshooting directly on UPS

* Please check the service availability in your Country.

# 3. SPECIFICATIONS

## 3.1 INSTALLATION PARAMETERS

| SYSTEM INSTALLATION | | | |
|---|---|---|---|
| Unit Rated power (kVA) | | 1000 | 1200 |
| Active power | (kW) | 1000 | 1200 |
| Rated rectifier input current @ 400V | (A) | 1510 | 1812 |
| Maximum rectifier input current | (A) | 1560 | 1950 |
| Rated bypass input current @ 400V | (A) | 1443 | 1732 |
| Rated output current @ 400 V | (A) | 1443 | 1732 |
| Maximum air flow | ($m^3$/h) | 8000 | 10000 |
| Power dissipation in nominal conditions[1] | (kW) | 46 | 55 |
| | (kcal/h) x1000 | 39.6 | 47 |
| | BTU/h x1000 | 157 | 188 |
| Power dissipation (max) under the worst conditions[2] | (kW) | 50.5 | 62.5 |
| | (kcal/h) x1000 | 43.4 | 53.7 |
| | BTU/h x1000 | 172 | 213 |

## 3.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT[3] | | |
|---|---|---|
| Rated mains supply voltage | | 380/400/415 V 3ph |
| Voltage tolerance | | 200 V to 480 V[4] |
| Rated frequency | | 50/60 Hz |
| Frequency tolerance | | 45 to 65 Hz |
| Power factor | | > 0.99[5] |
| Total harmonic distortion (THDi) | | < 2.5%[5] |
| Max inrush current at start-up | | < In (no overcurrent) |
| Genset compatibility | Soft start (Power walk-in) | Configurable from 5A/sec to immediate (no ramp) |
| | Advanced Genset Management | Smart power sharing between GenSet/battery upon load steps |

| ELECTRICAL CHARACTERISTICS - BATTERY | | 1000 | 1200 |
|---|---|---|---|
| Battery Type | | VRLA – Lithium Ion - Ni-Cd | |
| Number of poles | | 2 wires (+/-) | |
| Lithium Ion communication with UPS | | Basic (dry contact) / Smart (Modbus) | |
| Number of VRLA battery cells with load PF=1[6] | | 258 to 300 | 252 to 300 |
| Number of VRLA battery cells with load PF ≤ 0.9 | | 246 to 300 | 228 to 300 |
| Voltage range for LIB batteries | | Up to 705V | |
| Battery AC ripple current | | < 3% Nominal Capacity (at C10 discharge) | |
| Battery AC ripple voltage | | < 1% on the battery block | |
| Maximum recharge current | standard | 160 A | 200 A |
| | optional | 480 A | 600 A |

| ELECTRICAL CHARACTERISTICS - STATIC BYPASS | | 1000 | 1200 |
|---|---|---|---|
| Bypass rated voltage | | 380/400/415 V 3ph | |
| Bypass voltage tolerance | | ±15% (adjustable) | |
| Bypass rated frequency | | 50/60 Hz (selectable) | |
| Bypass frequency tolerance | | ±2% (from ±1% to ±5% (operation with generator unit)) | |
| Bypass frequency variation speed follow up | | 1 Hz/s adjustable from 1 to 3 Hz/s | |
| Semiconductors characteristics | $I^2t$ ($A^2s$) | Up to 5,615,000 | Up to 10,400,000 |
| | Is/c (A peak) | Up to 33,500 | Up to 45,500 |
| Overload tolerated on the bypass | Permanent | 110% of the rated apparent power | |
| | 10 min | 125% of the rated apparent power | |
| | 1 min | 150% of the rated apparent power | |
| Short-circuit withstanding (Icw) | kA | 65 / 100 (optional) | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | 1000 | 1200 |
|---|---|---|---|
| Rated output voltage (selectable) | | 380/400/415 V 3ph | |
| Output voltage tolerance | | static load <1%, dynamic load VFI-SS-111 compliant | |
| Rated output frequency | | 50/60 Hz (selectable) | |
| Autonomous frequency tolerance | | ±0.01 Hz on mains power failure | |
| Harmonic voltage distortion | | ThdU ≤ 1 % with rated linear load | |
| Overload tolerated by the inverter(7) | 1 h | 1100 kW | 1320 kW |
| | 10 min | 1250 kW | 1500 kW |
| | 1 min | 1440 kW | 1800 kW |

| ENVIRONMENT CHARACTERISTICS | |
|---|---|
| UPS Storage conditions | -20 to +70 °C<br>under ≤70% condensation free RH |
| UPS Start-up and working conditions | 0 to +50 °C<br>under ≤95% condensation free RH |
| Air inlet | Front |
| Air outlet | Top |
| Efficiency in double conversion (VFI) | up to 97% |
| Efficiency in Smart conversion mode | up to 99% |
| Acoustic noise | < 83 dBA |
| Maximum altitude without derating | 1000 m (3,300 ft) |
| Degree of protection | IP 20 (IP30 top grids) |
| Color | RAL 7016 |

*(1) Nominal input current and rated output active power (PF1).*

*(2) Dissipation that may be generated temporarily, considering: Low input voltage, battery recharge and rated output active power (PF1).*

*(3) IGBT rectifier.*

*(4) Conditions apply.*

*(5) At full load and rated input voltage (THDV < 1%).*

*(6) Batteries configurations should be selected according to the back up time and the UPS ambient temperature - please consult us for validation*

*(7) The tolerated output overload corresponds to the inverter capability under defined conditions. The output overload performance is incremented by the static bypass capability (when available).*

## 3.3 RECOMMENDED PROTECTION DEVICES

### 3.3.1 Inputs protections for single unit configuration

| RECOMMENDED PROTECTION DEVICES | 1000 | 1200 |
|---|---|---|
| Unit Rated power (kVA) | 1000 | 1200 |
| Rectifier input[8] (A) | 1600 | 2000 |
| Bypass input main[8] (A) | 1600 | 2000 |

### 3.3.2 Output protections

| RECOMMENDED PROTECTION DEVICES – OUTPUT[9] | | 1000 | 1200 |
|---|---|---|---|
| Unit Rated power (kVA) | | 1000 | 1200 |
| Inverter short-circuit current[10] (A) (when AUX MAINS is not present) | 0 to 20 ms | 3230 | 4100 |
| | 20 to 100 ms | 2390 | 3250 |
| Output protection rating (A) | | ≤ 160 | ≤ 250 |

### 3.3.3 Connecting cables

| CABLES CONNECTION – HUB CABINET [11] | | | |
|---|---|---|---|
| | Maximum number of cables according to size (Others on demand) | | |
| Rectifier terminals 3PH [12] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |
| Bypass terminals 3PH+N [13] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |
| Output terminals 3PH+N [13] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |
| Battery terminals | up to 10 x 240mm² per pole (+/-) | | |

*(8) Applicable by respecting the installation rules regarding cable lengths. The bypass protection is given as a recommendation (trip curves setting and distribution sizing shall be defined according to the rated load current and the UPS overload capability).*

*(9) Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present). This must be selective with residual current circuit breakers connected downstream of the UPS.*

*(10) Average Peak Current*

*(11) Based on 90° HO7 RNF or R2V cable type; for other please consult us*

*(12) Neutral is not required at the rectifier input. If distributed, however, consult us to ensure it is allowed by installation standards.*

*(13) On demand, the Unit can supply a 3 wires distribution (without input and output neutral)*

# 4. REFERENCE STANDARDS AND DIRECTIVES

## 4.1 OVERVIEW

The equipment installed, used and serviced in accordance with its intended use, its regulations and standards, its manufacturer instructions and rules, complies with the relevant Union harmonization legislation:

**LVD 2014 / 35 / EU**
DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits being made available on the market.

**EMC 2014 / 30 / EU**
DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonization 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

## 4.2 STANDARDS

### 4.2.1 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

### 4.2.2 Electromagnetic compatibility

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements
IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

### 4.2.3 Test and performance

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

### 4.2.4 Environmental

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

## 4.3 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.

### 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.

# MODULYS XS

From 2.5 to 20 kVA

## ULTIMATE

Fault tolerant power
without compromise

RoHS COMPLIANT

1 000 000 HOURS MTBF

kW = kVA

PF 1

Socomec Resource Center
To download, brochures, catalogues
and technical manuals

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 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.

# 1. ARCHITECTURE

## 1.1 RANGE

MODULYS XS is a full range of high performing UPS system 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.

| MODULYS XS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Module power | 2.5 (kVA/kW) | | | | 5.0 (kVA/kW) | | | |
| Phase in / phase out | 1/1 | | | | 1/1 and 3/1 | | | |
| Number of power modules | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| System Rated power (kVA/kW) | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
| MC6 | • | • | • | • | • | • | • | • |
| MC9 | • | • | • | • | • | • | • | • |
| RM3 | • | • | • | | • | • | • | |
| RM4 | • | • | • | • | • | • | • | • |
| TC3 | • | • | • | | • | • | • | |
| Matrix table for model and kVA power rating | | | | | | | | |

MODULYS XS 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.

# 2. FLEXIBILITY

## 2.1 POWER RATINGS FROM 2.5 TO 20 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.

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.

| **MODULYS XS MC** | | | | | |
|---|---|---|---|---|---|
| | Dimensions | Width [mm] | Depth [mm] | Height [mm] | weight (kg) |
| MC6 |  | 550 | 635 | 1060 | 90 |
| MC9 |  | 550 | 635 | 1460 | 120 |
| **MODULYS XS RM** | | | | | |
| RM3 |  | 449<br>(19") | 570 | 575 | 44 |
| RM4 |  | 449<br>(19") | 570 | 708 | 50 |

| | Dimensions | Width [mm] | Depth [mm] | Height [mm] | weight (kg) |
|---|---|---|---|---|---|
| **MODULYS XS TC3** | | | | | |
| TC3 |  | 600 | 600 | 1400 | 140 |

## ADDITIONAL MODULE

| | | | | | |
|---|---|---|---|---|---|
| **MODULYS XS POWER MODULE** | | | | | |
| 2.5 kW Power Module |  | 446 | 475 | 131 | 14 |
| 5 kW Module |  | 446 | 475 | 131 | 18 |
| **MODULYS XS BATTERY MODULE** | | | | | |
| Battery Module |  | 446 | 475 | 131 | 10 |
| Battery Pack long life |  | 100 | 330 | 115 | 9 |
| Battery Pack normal life |  | 100 | 330 | 115 | 9 |
| Battery for TC3 100 Ah |  | Mounted inside the TC3 cabinet | | | 145 |

## 2.2 FLEXIBLE BACK-UP TIME

Different extended back-up times are possible by using battery modules with a enhanced battery charger.
Selection of the back-up time is flexible thanks to the wide range of battery packs.

### 2.2.1 MODULYS XS (MC systems)

Back up time in minutes @ typical load

| SYSTEM POWER (KVA/KW) | | 2.5 | 5 | 7.5 | 10 | | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| MODULE RATED POWER | | 2.5 (kVA/kW) | | | | | 5 (kVA/kW) | | | |
| Battery pack number | 2 | 8 | Consult us | | | MC-6/MC-9 | Consult us | | | |
| | 3 | 14 | | | | | | | | |
| | 4 | 21 | 8 | | | | 8 | | | |
| | 5 | 27 | 11 | | | | 12 | | | |
| | 6 | 35 | 14 | 8 | | | 14 | | | |
| | 7 | 42 | 17 | 10 | | | 17 | | | |
| | 8 | 49 | 21 | 12 | 8 | | 21 | 8 | | |
| | 9 | 57 | 24 | 14 | 10 | | 24 | 10 | | |
| | 10 | 65 | 27 | 16 | 11 | | 28 | 12 | | |
| | 11 | 73 | 31 | 18 | 13 | | 31 | 13 | | |
| | 12 | 81 | 35 | 21 | 14 | | 35 | 14 | 8 | |
| | 13 | 90 | 38 | 23 | 16 | | 38 | 16 | 9 | |
| | 14 | 98 | 42 | 25 | 17 | | 42 | 17 | 10 | |
| | 15 | 105 | 46 | 27 | 19 | | 46 | 19 | 12 | |
| | 16 | 114 | 49 | 30 | 21 | | 49 | 21 | 12 | 8 |
| | 17 | 123 | 52 | 32 | 23 | MC-9 | 53 | 23 | 13 | 9 |
| | 18 | 132 | 57 | 35 | 24 | | 57 | 24 | 14 | 10 |
| | 19 | 140 | 61 | 37 | 25 | | 61 | 26 | 16 | 11 |
| | 20 | 148 | 65 | 39 | 27 | | 66 | 28 | 17 | 12 |
| | 21 | 157 | 69 | 42 | 29 | | 69 | 29 | 17 | |
| | 22 | 167 | 73 | 44 | 31 | | 73 | 31 | 19 | |
| | 23 | 176 | 76 | 47 | 33 | | 77 | 33 | 20 | |
| | 24 | 185 | 81 | 49 | 35 | | 81 | 35 | 21 | |
| | 25 | 194 | 86 | 51 | 36 | | 86 | 36 | | |
| | 26 | 202 | 90 | 54 | 38 | | 90 | 38 | | |
| | 27 | 209 | 94 | 57 | 40 | | 94 | 40 | | |
| | 28 | 220 | 98 | 60 | 42 | | 98 | 42 | | |
| | 29 | 229 | 101 | 63 | | | 102 | Consult us | | |
| | 30 | 238 | 105 | 65 | | | 105 | | | |
| | 31 | 248 | 109 | | | | 109 | | | |
| | 32 | 256 | 114 | | | | 114 | | | |
| | 33 | 264 | Consult us | | | | | | | |
| | 34 | 272 | | | | | | | | |

*Typical load = 70% Pn*

## 2.2.2 MODULYS XS (RM systems)

Back up time in minutes @ typical load

| SYSTEM POWER (KVA/KW) | | 2.5 | 5 | 7.5 | 10 | | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| MODULE RATED POWER | | 2.5 (kVA/kW) | | | | | 5 (kVA/kW) | | | |
| Battery pack number | 2 | 8 | | | | RM-3/RM-4 | | | | |
| | 3 | 14 | | | | | | | | |
| | 4 | 21 | 8 | Consult us | | | 8 | | | |
| | 5 | 27 | 11 | | | | 12 | | | |
| | 6 | 35 | 14 | 8 | | | 14 | | | |
| | 7 | 42 | 17 | 10 | | | 17 | | | |
| | 8 | 49 | 21 | 12 | 8 | | 21 | 8 | Consult us | |
| | 9 | 57 | 24 | 14 | | RM-4 | 24 | | | |
| | 10 | 65 | 27 | 16 | | | 28 | | | |
| | 11 | 73 | 31 | Consult us | | | 31 | | | |
| | 12 | 81 | 35 | | | | 35 | | | |
| | 13 | 90 | | | | | | | | |
| | 14 | 98 | | | | | | | | |

*Typical load = 70% Pn*

## 2.2.3 MODULYS XS (TC System)

Back up time in minutes @ typical load

| SYSTEM POWER | | 2.5 | 5 | 7.5 | | 5 | 10 | 15 |
|---|---|---|---|---|---|---|---|---|
| MODULE RATED POWER (KVA/KW) | | 2.5 (kVA/kW) | | | | 5 (kVA/kW) | | |
| Battery Capacity | 100 Ah | 118 | 50 | 28 | | 50 | 19 | 10 |
| | 200 Ah | 271 | 118 | 72 | | 118 | 50 | 28 |

*Typical load = 70% Pn*

# 3. STANDARD FEATURES AND OPTIONS

| Availability | |
|---|---|
| O | *Available as option (installation on site)* |
| STD | *Standard feature* |

| | MC | RM | TC | Notes |
|---|---|---|---|---|
| **Communication Option** | | | | |
| ADC+SL card<br>*(Advanced Dry Contact + Serial Link)* | O | O | O | |
| External temperature sensor | O | O | O | ⚠ ❗ ADC+SL card |
| Remote touchscreen display | O | O | O | ⚠ ❗ ADC+SL card |
| BACnet/IP interface card | O | O | O | |
| Modbus TCP interface card | O | O | O | |
| Net Vision card<br>*(professional WEB/SNMP interface for UPS monitoring)* | O | O | O | |
| EMD<br>*(Environmental Monitoring Device: temperature, humidity, 2 dry contacts)* | O | O | O | ⚠ ❗ Net Vision card |
| **Electrical Option** | | | | |
| Dual Input | STD | STD | STD | |
| Tropicalization | STD | STD | STD | |
| External maintenance bypass | O | O | O | |

❗ *Required option*

# 4. SPECIFICATIONS MC6 / MC9

## 4.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| System Rated power (kVA/kW) | | | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
| Module Rated power (kVA/kW) | | | 2.5 | | | | 5 | | | |
| Number of Modules | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Phase in/out | | | 1/1 | | | | 1/1 or 3/1 | | | |
| Active power | | kW | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 12/15 | 24/30 | 36/44 | 47/59 | 24/30 | 47/59 | 71/87 | 95/118 |
| Rated bypass input current (1) | | A | 11 | 22 | 33 | 44 | 22 | 44 | 65 | 87 |
| Inverter output current @ 230 V Pn | | A | 11 | 22 | 33 | 44 | 22 | 44 | 65 | 87 |
| Recommended air flow capacity | | $m^3/h$ | 160 | 320 | 480 | 640 | 240 | 480 | 720 | 960 |
| Acoustic noise @ 70% Pn | | dBA | 43 | 46 | 49 | 52 | 45 | 48 | 51 | 54 |
| Power dissipation in nominal conditions (2) | | W | 220 | 440 | 660 | 880 | 420 | 840 | 1260 | 1680 |
| | | kcal/h | 189 | 378 | 567 | 757 | 361 | 722 | 1083 | 1445 |
| | | BTU/h | 751 | 1501 | 2252 | 3003 | 1433 | 2866 | 4299 | 5732 |
| Power dissipation (max) in the worst conditions (3) | | W | 250 | 500 | 750 | 1000 | 480 | 960 | 1440 | 1920 |
| | | kcal/h | 215 | 430 | 645 | 860 | 413 | 825 | 1238 | 1651 |
| | | BTU/h | 853 | 1706 | 2559 | 3412 | 1638 | 3276 | 4913 | 6551 |
| Dimensions MC6/MC9 | Width | mm | 550 | | | | | | | |
| | Depth | mm | 635 | | | | | | | |
| | Height | mm | 1060 / 1460 | | | | | | | |
| Single unit Clearances | Operational | mm | Rear 300 lateral 0 | | | | | | | |
| | Maintenance | mm | Front 1000 top 800 | | | | | | | |
| Weight MC6/MC9 | | kg | 90 / 120 | | | | | | | |

1. *Considering nominal bypass current calculated @ 230 V, considering a continuos overload of 110%.*
2. *Considering nominal input current (230 V, battery charged) and rated output active power.*
3. *Considering maximum input current (low input voltage, battery charged) and rated output active power.*

## 4.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| System Rated power (kVA/kW) | | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
| Module Rated power (kVA/kW) | | 2.5 | | | | 5 | | | |
| Number of Modules | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Rated mains supply voltage | V | 230 1ph + N | | | | 230 1ph + N<br>400 3ph + N | | | |
| Voltage tolerance | V | 184 to 276 (±20%) | | | | 184 to 276 (±20%)<br>320 to 480 (±20%) | | | |
| Voltage tolerance at derated load | V | up to 150<br>@ 70% of nominal load | | | | up to 150 1ph + N<br>up to 260 3ph + N<br>@ 70% of nominal load | | | |
| Rated frequency | Hz | 50/60 | | | | | | | |
| Frequency tolerance | | ±10% | | | | | | | |
| Current Total harmonic distortion (THDi) | | ≤ 6% | | | | ≤ 5.4% | | | |
| Power factor (at full load and rated voltage) | | ≥ 0.98 | | | | | | | |
| Max inrush current at start-up | | <In | | | | | | | |

| System Rated power (kVA/kW) | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|---|---|
| Module Rated power (kVA/kW) | 2.5 | | | | 5 | | | |
| Number of Modules | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bypass frequency variation speed | Hz/s | 1 Hz/s | | | | | | | |
| Bypass rated voltage | | Nominal output voltage ±15% | | | | | | | |
| Bypass rated frequency | Hz | 50/60 Hz (selectable) | | | | | | | |
| Bypass frequency tolerance | | ±2% (±8% with genset) | | | | | | | |
| Bypass current overload (A) | 5 min | 13 | 25 | 38 | 51 | 25 | 51 | 77 | 100 |
| | 1 min | 15 | 30 | 44 | 59 | 30 | 59 | 88 | 117 |
| | 20 sec | 19 | 39 | 59 | 79 | 39 | 79 | 117 | 156 |

| ELECTRICAL CHARACTERISTICS -INVERTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated output voltage | V | 208[1]/220/230/240 (selectable) | | | | | | | |
| Output voltage tolerance | | Static: ±3%<br>VFI-SS (EN 62040-3 compliant) | | | | | | | |
| Rated output frequency | Hz | 50/60 Hz (selectable) | | | | | | | |
| Output frequency tolerance | | ±0.1% on mains power failure | | | | | | | |
| Load crest factor | | ≥ 2.3 | | | | | | | |
| Voltage total harmonic distortion THDV | | < 3.5% with linear load | | | | | | | |
| Inverter overload (kW) in normal mode | 5 min | 2.75 | 5.5 | 8.25 | 11 | 5.5 | 11 | 16.5 | 22 |
| | 10 sec | 3.25 | 6.5 | 9.75 | 13 | 6.5 | 13 | 19.5 | 26 |
| Short-circuit inverter current (A) (when AUX MAINS is not present) | 0 to 60 ms | 25 | 50 | 75 | 100 | 50 | 100 | 150 | 200 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Double conversion efficiency | | up to 92.8% |
| EcoMode efficiency | | 99% |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Storage temperatures | °C | -5 to +50 (15 to 25 for better battery life) |
| Working temperature | °C | 0 to +40 (15 to 25 for better battery life) |
| Maximum relative humidity (non-condensing) | | 95% |
| Maximum altitude without derating | m (ft) | 1000 (3300) |
| Degree of protection | | IP20 |
| Colour | | RAL 7016 |

| ELECTRICAL CHARACTERISTICS - BATTERY | | |
|---|---|---|
| Standard max. recharge current | A | 2.4 per Battery Module |

*1. Up to 90% Pn*

## 4.3 RECOMMENDED PROTECTIONS

| System Rated power (kVA/kW) | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|---|---|---|
| Module Rated power (kVA/kW) | 2.5 | | | | 5 | | | |
| Number of Modules | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

| RECOMMENDED PROTECTION DEVICES - RECTIFIER [1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C curve circuit breaker (1ph/3ph) | A | 16 | 32 | 50 | 63 | 32/13 | 63/26 | 100/32 | 125/50 |
| gG fuse (1ph/3ph) | A | 16 | 32 | 50 | 63 | 32/12 | 63/25 | 100/32 | 125/50 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS [2] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Conditional short circuit current rating (Icc) | kA | 10 | | | | 10 | | | |
| C curve circuit breaker | A | 16 | 32 | 40 | 63 | 32 | 63 | 100 | 125 |
| gG fuse | A | 16 | 32 | 40 | 63 | 32 | 63 | 100 | 125 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT (RCD) BREAKER [3] | | |
|---|---|---|
| Input residual current circuit breaker | A | 0.1 A Selective type B |

| RECOMMENDED PROTECTION DEVICES - OUTPUT [4] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C curve circuit breaker [3] | A | 2 | 4 | 6 | 8 | 4 | 8 | 13 | 16 |
| B curve circuit breaker [3] | A | 4 | 8 | 12 | 16 | 8 | 16 | 25 | 32 |

| CABLES - MAXIMUM CABLE SECTION [5] | | |
|---|---|---|
| Rectifier terminals | mm | 50 |
| Bypass terminals | mm | 50 |
| Battery terminals [5] | mm | 2x 95 |
| Output terminals | mm | 50 |

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. 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 an RCD is required a B-type should be used. Must be coordinate with residual current circuit breakers downstream of the UPS connected to the UPS output.*
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.*
5. *Use cable with tin-plated eyelets for the connection*

# 5. SPECIFICATIONS RM3 / RM4

## 5.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **RM3** System Rated power (kVA/kW) | | | **2.5** | **5** | **7.5** | | **5** | **10** | **15** | |
| **RM4** System Rated power (kVA/kW) | | | **2.5** | **5** | **7.5** | **10** | **5** | **10** | **15** | **20** |
| Module Rated power (kVA/kW) | | | 2.5 | | | | 5 | | | |
| Number of Modules | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Phase in/out | | | 1/1 | | | | 1/1 or 3/1 | | | |
| Active power | | kW | 2.5 | 5 | 7.5 | 10 | 5 | 10 | 15 | 20 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 12/15 | 24/30 | 36/44 | 47/59 | 24/30 | 47/59 | 71/87 | 95/118 |
| Rated bypass input current (1) | | A | 11 | 22 | 33 | 44 | 22 | 44 | 65 | 87 |
| Inverter output current @ 230 V Pn | | A | 11 | 22 | 33 | 44 | 22 | 44 | 65 | 87 |
| Recommended air flow capacity | | $m^3/h$ | 160 | 320 | 480 | 640 | 240 | 480 | 720 | 960 |
| Acoustic noise @ 70% Pn | | dBA | 43 | 46 | 49 | 52 | 45 | 48 | 51 | 54 |
| Power dissipation in nominal conditions (2) | | W | 220 | 440 | 660 | 880 | 420 | 840 | 1260 | 1680 |
| | | kcal/h | 189 | 378 | 567 | 757 | 361 | 722 | 1083 | 1445 |
| | | BTU/h | 751 | 1501 | 2252 | 3003 | 1433 | 2866 | 4299 | 5732 |
| Power dissipation (max) in the worst conditions (3) | | W | 250 | 500 | 750 | 1000 | 480 | 960 | 1440 | 1920 |
| | | kcal/h | 215 | 430 | 645 | 860 | 413 | 825 | 1238 | 1651 |
| | | BTU/h | 853 | 1706 | 2559 | 3412 | 1638 | 3276 | 4913 | 6551 |
| Dimensions RM3/RM4 | Width | mm | 449 | | | | | | | |
| | Depth | mm | 570 | | | | | | | |
| | Height | mm | 575 / 708 | | | | | | | |
| Weight | | kg | 44 / 50 | | | | | | | |

1. *Considering nominal bypass current calculated @ 230 V, considering a continuos overload of 110%.*
2. *Considering nominal input current (230 V, battery charged) and rated output active power.*
3. *Considering maximum input current (low input voltage, battery charged) and rated output active power.*

## 5.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **RM3** System Rated power (kVA/kW) | | | **2.5** | **5** | **7.5** | | **5** | **10** | **15** | |
| **RM4** System Rated power (kVA/kW) | | | **2.5** | **5** | **7.5** | **10** | **5** | **10** | **15** | **20** |
| Module Rated power (kVA/kW) | | | 2.5 | | | | 5 | | | |
| Number of Modules | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Rated mains supply voltage | | V | 230 1ph + N | | | | 230 1ph + N<br>400 3ph + N | | | |
| Voltage tolerance | | V | 184 to 276 (±20%) | | | | 184 to 276 (±20%)<br>320 to 480 (±20%) | | | |
| Voltage tolerance at derated load | | V | up to 150<br>@ 70% of nominal load | | | | up to 150 1ph + N<br>up to 260 3ph + N<br>@ 70% of nominal load | | | |
| Rated frequency | | Hz | 50/60 | | | | | | | |
| Frequency tolerance | | | ±10% | | | | | | | |
| Current Total harmonic distortion (THDi) | | | ≤ 6% | | | | ≤ 5.4% | | | |
| Power factor<br>(at full load and rated voltage) | | | ≥ 0.98 | | | | | | | |
| Max inrush current at start-up | | | <In | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **RM3** System Rated power (kVA/kW) | **2.5** | **5** | **7.5** | | **5** | **10** | **15** | |
| **RM4** System Rated power (kVA/kW) | **2.5** | **5** | **7.5** | **10** | **5** | **10** | **15** | **20** |
| Module Rated power (kVA/kW) | 2.5 | | | | 5 | | | |
| Number of Modules | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bypass frequency variation speed | Hz/s | 1 Hz/s | | | | | | | |
| Bypass rated voltage | | Nominal output voltage ±15% | | | | | | | |
| Bypass rated frequency | Hz | 50/60 Hz (selectable) | | | | | | | |
| Bypass frequency tolerance | | ±2% (±8% with genset) | | | | | | | |
| Bypass current overload (A) | 5 min | 13 | 25 | 38 | 51 | 25 | 51 | 77 | 100 |
| | 1 min | 15 | 30 | 44 | 59 | 30 | 59 | 88 | 117 |
| | 20 sec | 19 | 39 | 59 | 79 | 39 | 79 | 117 | 156 |

| ELECTRICAL CHARACTERISTICS -INVERTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated output voltage | V | 208[1]/220/230/240 (selectable) | | | | | | | |
| Output voltage tolerance | | Static: ±3%<br>VFI-SS (EN 62040-3 compliant) | | | | | | | |
| Rated output frequency | Hz | 50/60 Hz (selectable) | | | | | | | |
| Output frequency tolerance | | ±0.1% on mains power failure | | | | | | | |
| Load crest factor | | ≥ 2.3 | | | | | | | |
| Voltage total harmonic distortion THDV | | < 3.5% with linear load | | | | | | | |
| Inverter overload (kW) | 5 min | 2.75 | 5.5 | 8.25 | 11 | 5.5 | 11 | 16.5 | 22 |
| | 10 sec | 3.25 | 6.5 | 9.75 | 13 | 6.5 | 13 | 19.5 | 26 |
| Short-circuit inverter current (A)<br>(when AUX MAINS is not present) | 0 to 60 ms | 25 | 50 | 75 | 100 | 50 | 100 | 150 | 200 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Double conversion efficiency | | up to 92.8% |
| EcoMode efficiency | | 99% |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Storage temperatures | °C | -5 to +50 (15 to 25 for better battery life) |
| Working temperature | °C | 0 to +40 (15 to 25 for better battery life) |
| Maximum relative humidity<br>(non-condensing) | | 95% |
| Maximum altitude without derating | m (ft) | 1000 (3300) |
| Degree of protection | | IP20 |
| Colour | | RAL 7016 |

| ELECTRICAL CHARACTERISTICS - BATTERY | | |
|---|---|---|
| Standard max. recharge current | A | 2.4 per Battery Module |

*1. Up to 90% Pn*

## 5.3 RECOMMENDED PROTECTIONS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **RM3** System Rated power (kVA/kW) | | **2.5** | **5** | **7.5** | | **5** | **10** | **15** | |
| **RM4** System Rated power (kVA/kW) | | **2.5** | **5** | **7.5** | **10** | **5** | **10** | **15** | **20** |
| Module Rated power (kVA/kW) | | 2.5 | | | | 5 | | | |
| Number of Modules | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **RECOMMENDED PROTECTION DEVICES - RECTIFIER (1)** | | | | | | | | | |
| C curve circuit breaker (1ph/3ph) | A | 16 | 32 | 50 | 63 | 32/13 | 63/26 | 100/32 | 125/50 |
| gG fuse (1ph/3ph) | A | 16 | 32 | 50 | 63 | 32/12 | 63/25 | 100/32 | 125/50 |
| **RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS (2)** | | | | | | | | | |
| Conditional short circuit current rating (Icc) | kA | 10 | | | | 10 | | | |
| C curve circuit breaker | A | 16 | 32 | 40 | 63 | 32 | 63 | 100 | 125 |
| gG fuse | A | 16 | 32 | 40 | 63 | 32 | 63 | 100 | 125 |
| **RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT (RCD) BREAKER (3)** | | | | | | | | | |
| Input residual current circuit breaker | A | 0.1 A Selective type B | | | | | | | |
| **RECOMMENDED PROTECTION DEVICES - OUTPUT (4)** | | | | | | | | | |
| C curve circuit breaker (3) | A | 2 | 4 | 6 | 8 | 4 | 8 | 13 | 16 |
| B curve circuit breaker (3) | A | 4 | 8 | 12 | 16 | 8 | 16 | 25 | 32 |
| **CABLES - MAXIMUM CABLE SECTION (5)** | | | | | | | | | |
| Rectifier terminals | mm | 50 | | | | | | | |
| Bypass terminals | mm | 50 | | | | | | | |
| Battery terminals (5) | mm | 2x 95 | | | | | | | |
| Output terminals | mm | 50 | | | | | | | |

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. 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 an RCD is required a B-type should be used. Must be coordinate with residual current circuit breakers downstream of the UPS connected to the UPS output.*
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.*
5. *Use cable with tin-plated eyelets for the connection*

# 6. SPECIFICATIONS TC3

## 6.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMENTERS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| System Rated power (kVA/kW) | | | 2.5 | 5 | 7.5 | 5 | 10 | 15 |
| Module Rated power (kVA/kW) | | | 2.5 | | | 5 | | |
| Number of Modules | | | 1 | 2 | 3 | 1 | 2 | 3 |
| Phase in/out | | | 1/1 | | | 1/1 or 3/1 | | |
| Active power | | kW | 2.5 | 5 | 7.5 | 5 | 10 | 15 |
| Rated/maximum rectifier input current (EN 62040-3) | | A | 12/15 | 24/30 | 36/44 | 24/30 | 47/59 | 71/87 |
| Rated bypass input current [1] | | A | 11 | 22 | 33 | 22 | 44 | 65 |
| Inverter output current @ 230 V Pn | | A | 11 | 22 | 33 | 22 | 44 | 65 |
| Recommended air flow capacity | | $m^3/h$ | 160 | 320 | 480 | 240 | 480 | 720 |
| Acoustic noise @ 70% Pn | | dBA | 43 | 46 | 49 | 45 | 48 | 51 |
| Power dissipation in nominal conditions [2] | | W | 220 | 440 | 660 | 420 | 840 | 1260 |
| | | kcal/h | 189 | 378 | 567 | 361 | 722 | 1083 |
| | | BTU/h | 751 | 1501 | 2252 | 1433 | 2866 | 4299 |
| Power dissipation (max) in the worst conditions [3] | | W | 250 | 500 | 750 | 480 | 960 | 1440 |
| | | kcal/h | 215 | 430 | 645 | 413 | 825 | 1238 |
| | | BTU/h | 853 | 1706 | 2559 | 1638 | 3276 | 4913 |
| Dimensions | Width | mm | 600 | | | | | |
| | Depth | mm | 600 | | | | | |
| | Height | mm | 1400 | | | | | |
| Single unit Clearances | Operational | mm | Rear 300 lateral 0 | | | | | |
| | Maintenance | mm | Front 1000 top 800 | | | | | |
| Weight | | kg | 140 | | | | | |

1. *Considering nominal bypass current calculated @ 230 V, considering a continuos overload of 110%.*
2. *Considering nominal input current (230 V, battery charged) and rated output active power.*
3. *Considering maximum input current (low input voltage, battery charged) and rated output active power.*

## 6.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| System Rated power (kVA/kW) | | 2.5 | 5 | 7.5 | 5 | 10 | 15 |
| Module Rated power (kVA/kW) | | 2.5 | | | 5 | | |
| Number of Modules | | 1 | 2 | 3 | 1 | 2 | 3 |
| Rated mains supply voltage | V | 230 V 1ph + N | | | 230 1ph + N<br>400 3ph + N | | |
| Voltage tolerance | V | 184 to 276 (±20%) | | | 184 to 276 (±20%)<br>320 to 480 (±20%) | | |
| Voltage tolerance at derated load | V | up to 150 V<br>@ 70% of nominal load | | | up to 150 1ph + N<br>up to 260 3ph + N<br>@ 70% of nominal load | | |
| Rated frequency | Hz | 50/60 | | | | | |
| Frequency tolerance | | ±10% | | | | | |
| Current Total harmonic distortion (THDi) | | ≤ 6% | | | ≤ 5.4% | | |
| Power factor<br>(at full load and rated voltage) | | ≥ 0.98 | | | | | |
| Max inrush current at start-up | | <In | | | | | |

| System Rated power (kVA/kW) | 2.5 | 5 | 7.5 | 5 | 10 | 15 |
|---|---|---|---|---|---|---|
| Module Rated power (kVA/kW) | 2.5 | | | 5 | | |
| Number of Modules | 1 | 2 | 3 | 1 | 2 | 3 |

| ELECTRICAL CHARACTERISTICS - BYPASS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bypass frequency variation speed | Hz/s | 1 | | | | | |
| Bypass rated voltage | | Nominal output voltage ±15% | | | | | |
| Bypass rated frequency | Hz | 50/60 (selectable) | | | | | |
| Bypass frequency tolerance | | ±2% (±8% with genset) | | | | | |
| Bypass current overload (A) | 5 min | 13 | 25 | 38 | 25 | 51 | 77 |
| | 1 min | 15 | 30 | 44 | 30 | 59 | 88 |
| | 20 sec | 19 | 39 | 59 | 39 | 79 | 117 |

| ELECTRICAL CHARACTERISTICS -INVERTER | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated output voltage | V | 208[1]/220/230/240 (selectable) | | | | | |
| Output voltage tolerance | | Static: ±3%<br>VFI-SS (EN 62040-3 compliant) | | | | | |
| Rated output frequency | Hz | 50/60 (selectable) | | | | | |
| Output frequency tolerance | | ±0.1% on mains power failure | | | | | |
| Load crest factor | | ≥ 2.3 | | | | | |
| Voltage total harmonic distortion THDV | | < 3.5% with linear load | | | | | |
| Inverter overload (kW) | 5 min | 2.75 | 5.5 | 8.25 | 5.5 | 11 | 16.5 |
| | 10 sec | 3.25 | 6.5 | 9.75 | 6.5 | 13 | 19.5 |
| Short-circuit inverter current (A)<br>(when AUX MAINS is not present) | 0 to 60 ms | 25 | 50 | 75 | 50 | 100 | 150 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Double conversion efficiency | | up to 92.8% |
| EcoMode efficiency | | 99% |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Storage temperatures | °C | -5 to +50 (15 to 25 for better battery life) |
| Working temperature | °C | 0 to +40 (15 to 25 for better battery life) |
| Maximum relative humidity<br>(non-condensing) | | 95% |
| Maximum altitude without derating | m (ft) | 1000 (3300) |
| Degree of protection | | IP20 |
| Colour | | RAL 7016 |

| ELECTRICAL CHARACTERISTICS - BATTERY | | |
|---|---|---|
| Standard max. recharge current | A | 2.4 per Battery Module |

*1. Up to 90% Pn*

## 6.3 RECOMMENDED PROTECTIONS

| System Rated power (kVA/kW) | | 2.5 | 5 | 7.5 | 5 | 10 | 15 |
|---|---|---|---|---|---|---|---|
| Module Rated power (kVA/kW) | | 2.5 | | | 5 | | |
| Number of Modules | | 1 | 2 | 3 | 1 | 2 | 3 |
| **RECOMMENDED PROTECTION DEVICES - RECTIFIER [1]** | | | | | | | |
| C curve circuit breaker (1ph/3ph) | A | 16 | 32 | 50 | 32/13 | 63/26 | 100/32 |
| gG fuse (1ph/3ph) | A | 16 | 32 | 50 | 32/12 | 63/25 | 100/32 |
| **RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS [2]** | | | | | | | |
| Conditional short circuit current rating (Icc) | kA | 10 | | | 10 | | |
| C curve circuit breaker | A | 16 | 32 | 40 | 32 | 63 | 100 |
| gG fuse | A | 16 | 32 | 40 | 32 | 63 | 100 |
| **RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT (RCD) BREAKER [3]** | | | | | | | |
| Input residual current circuit breaker | A | 0.1 A Selective type B | | | | | |
| **RECOMMENDED PROTECTION DEVICES - OUTPUT [4]** | | | | | | | |
| C curve circuit breaker [3] | A | 2 | 4 | 6 | 4 | 8 | 13 |
| B curve circuit breaker [3] | A | 4 | 8 | 12 | 8 | 16 | 25 |
| **CABLES - MAXIMUM CABLE SECTION [5]** | | | | | | | |
| Rectifier terminals | mm | 50 | | | | | |
| Bypass terminals | mm | 50 | | | | | |
| Battery terminals [5] | mm | 2x 95 | | | | | |
| Output terminals | mm | 50 | | | | | |

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. 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 an RCD is required a B-type should be used. Must be coordinate with residual current circuit breakers downstream of the UPS connected to the UPS output.*
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.*
5. *Use cable with tin-plated eyelets for the connection*

# 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 sand safety requirements (certified by TÜV)
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 (LCIE)
IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (LCIE)

### 7.2.3 TEST AND PERFORMANCE

EN 62040-3 Uninterruptible Power System (UPS) - Part 3: Method 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.

# MODULYS GP

25 to 200 kW

Redundant Modular UPS

**ULTIMATE**

Fault tolerant power
without compromise


Socomec Resource Center
To download, brochures, catalogues
and technical manuals

socomec
Innovative Power Solutions

# 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.

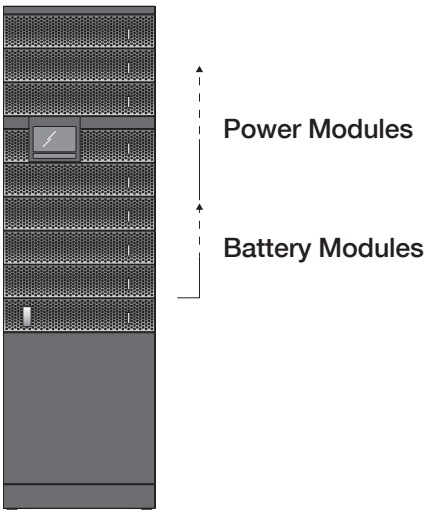
Each Power Module has a powerful embedded battery charger able to provide up to 8 A (without derating).

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.



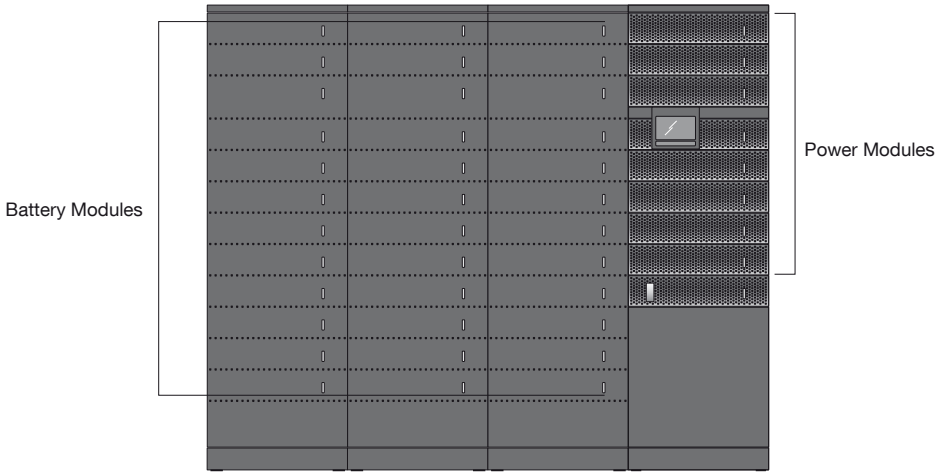

| INTERNAL HOT-SWAP BATTERY CABINET<br>BACK UP TIMES IN MINUTES @ 75% OF RATED LOAD | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Power Modules | | | | 1 | 2 | 3 | 4 | **5** | **6** | **7** | 8 |
| N+1 redundant System Power (kW) | | | | 25 + 0[(1)] | 25 + 25 | 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.

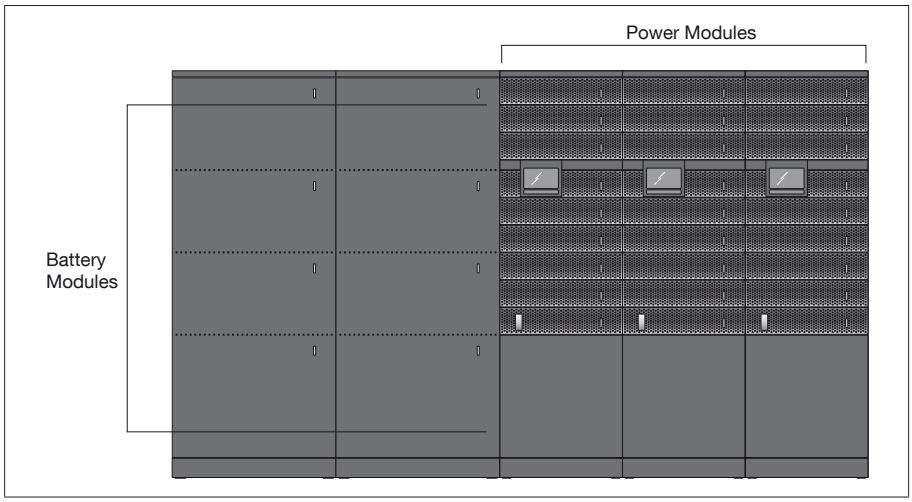
A standard temperature sensor optimises the battery recharging parameters according to the ambient operating temperature to extend battery life.

## 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) | 20 ms | 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

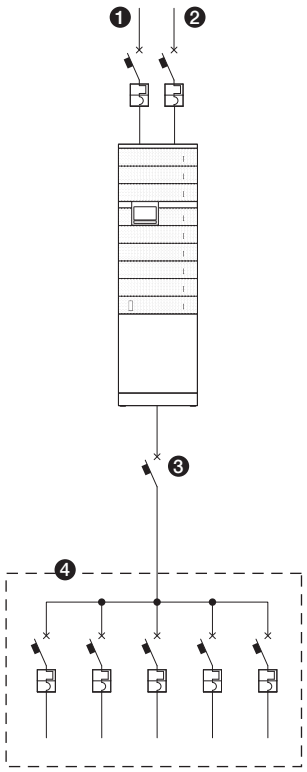
(2) Conditions: Initial Pout ≤ 80% Pn, Vin nominal

| 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.

# MODULYS RM GP

## Rack-mounted modular UPS system

**Green Power 2.0** range

up to 4 x 25 kVA/kW

**ULTIMATE**

Fault tolerant power
without compromise

19" | 3 LEVEL TECHNOLOGY | 96.5% EFFICIENCY | kW = kVA

Socomec Resource Center
To download, brochures, catalogues
and technical manuals

socomec
Innovative Power Solutions

# OBJECTIVES

The aim 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.

Please contact us for further information, or if you would like to receive a full documentation package for detailed product know-how, including schematics, integration instructions, technical data sheets, user's manual, etc.

# 1. ARCHITECTURE

## 1.1 RANGE AND FLEXIBILITY

MODULYS RM GP is a 3-phase modular UPS system designed for 19" rack integration. The product is easy to integrate and install, as well as being very simple to operate and maintain. It provides maximum power availability and protection in a compact design that leaves free space for other rack mounted devices.

MODULYS RM GP:

- provides easy and fully-assured rack integration to meet all requirement across multiple applications, even for existing installations ;
- simplifies and optimises every step of the integration process - from sizing to installation, including the logistics, making project management easy, risk-free and economic ;
- provides reliable power whilst ensuring optimum load protection even during power upgrades or maintenance procedures.

**Pre-cabled rack with maintenance bypass**

| | |
|---|---|
| M4-R-075-82B0 | 15U rack, 4 slots |
| M4-R-050-82B0 | 9U rack, 2 slots |

**Plug-in boards**

| | |
|---|---|
| 1C-CP-OP-ADC+SL | Programmable IN / OUT dry contact + serial link |
| 1C-CP-OP-MODTCP | MODBUS TCP interface |
| NET-VISION7CARD | NET VISION card, WEB / SNMP interface IPV4 / IPV6 |

**Other options**

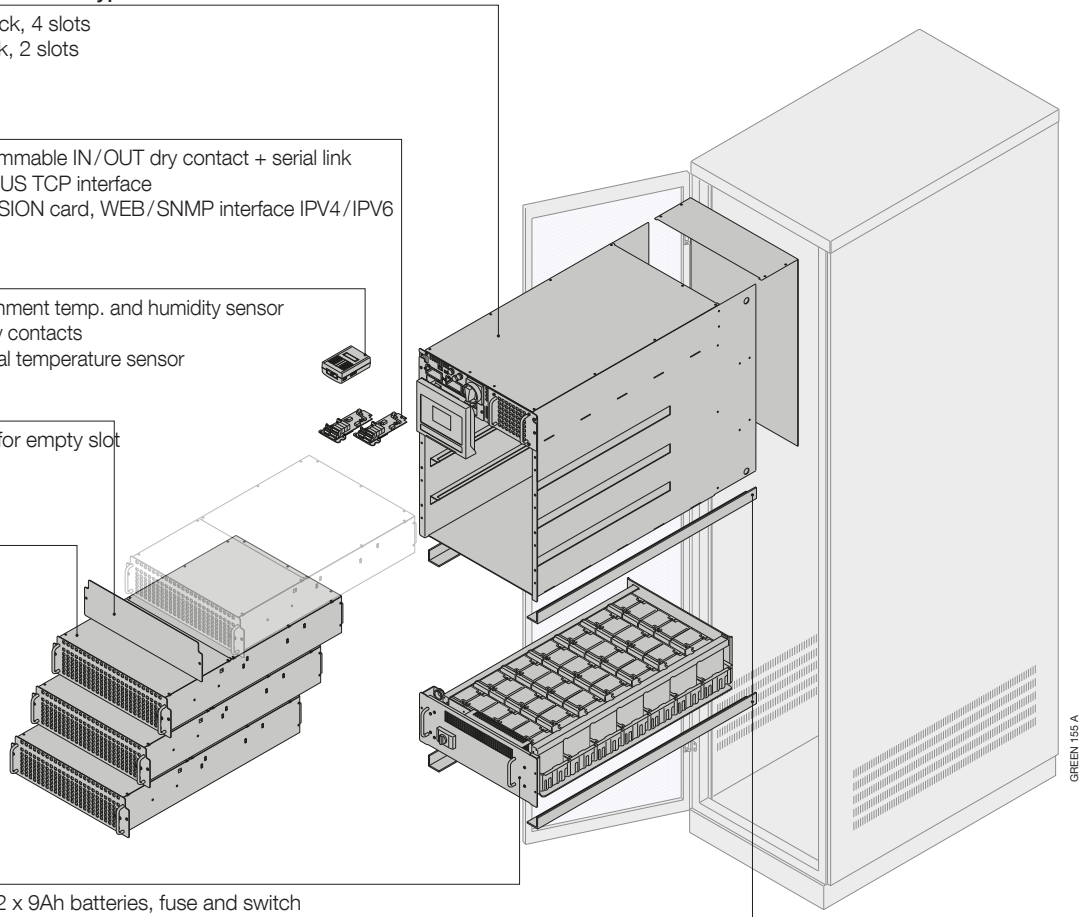
| | |
|---|---|
| NET-VISION-EMD | Environment temp. and humidity sensor + 4 dry contacts |
| 1C-OP-P-TEMP | External temperature sensor |

**Blank panel**

| | |
|---|---|
| M4-OP-SSC | Cover for empty slot |

**Power module - 25 kW**

M4-RI-25

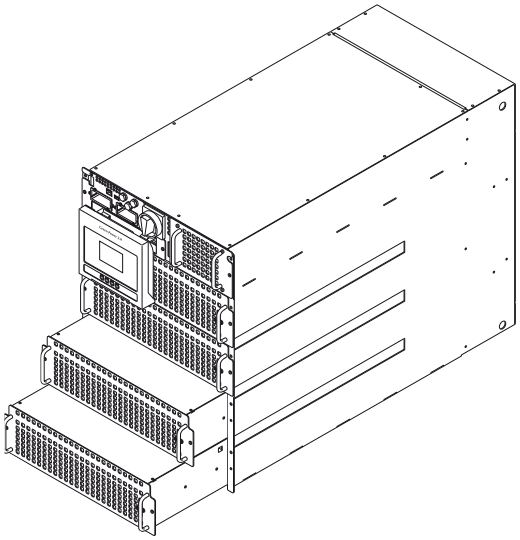


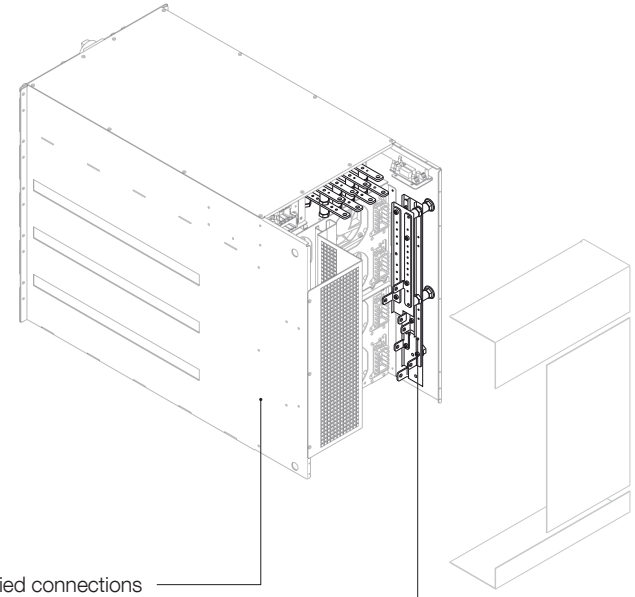

**4U battery rack**

| | |
|---|---|
| M4-BR-009L | With 42 x 9Ah batteries, fuse and switch |
| M4-BR-009L-B | Empty, for 42 x 9Ah batteries, including interconnections, fuses and switch |

**Mounting accessories**

| | |
|---|---|
| M4-RI-OP-RAIL | Adjustable rails for rack mounting support |





Pre-cabled system for simplified connections

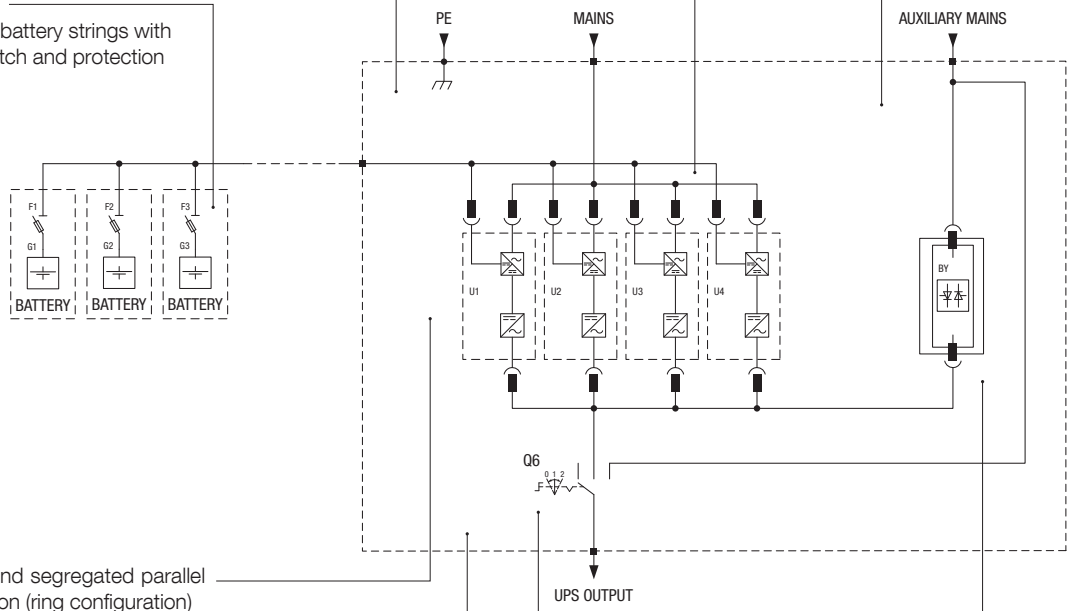
Flexible cabling management for top, bottom and mixed top / bottom entry cable

No centralised control for parallel and load sharing management

Totally independent and self-sufficient hot-swap power modules

Electronics-free (failure-free) sub-rack enclosure

Battery rack
Independent battery strings with individual switch and protection




Redundant and segregated parallel bus connection (ring configuration)

No single point of failure

Embedded manual bypass

Totally segregated, fully sized and centralised hot-swap auxiliary mains bypass



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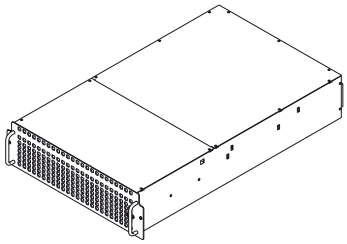
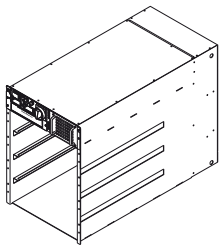
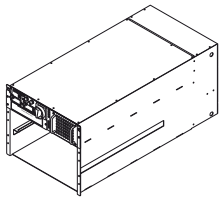
Innovative Power Solutions

| CONFIGURATIONS AND RATED POWER (kW) | | | | | |
|---|---|---|---|---|---|
| | |  | | | |
| | | M4-RI-25 | | | |
| | | Number of power modules | | | |
| | | 1 | 2 | 3 | 4 |
|  M4-R-075-82B0 | N configuration | 25 | 50 | 75 | - |
| | N+1 redundancy | - | 25 | 50 | 75 |
|  M4-R-050-82B0 | N configuration | 25 | 50 | - | - |
| | 1+1 redundancy | - | 25 | - | - |

## 1.2 FLEXIBLE BACK-UP TIME

Different extended back-up times are possible by using: (1) 4U rack-mounted battery modules; (2) a modular battery cabinet; (3) a high capacity battery cabinet.

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

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

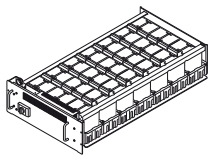
A special Power Module with extra battery charger inside is available when very long back-up times are required.

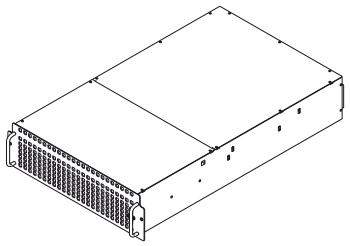
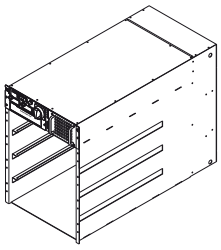
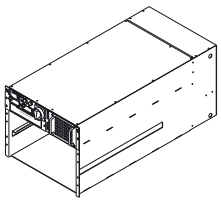
MODULYS RM GP is compatible with different battery technologies.

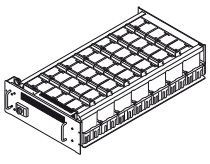
| BATTERY BLOCK DYNAMICS[1] | | |
|---|---|---|
| Sealed lead-acid | Min | 108 + 108 |
| | Max | 144 + 144 |
| Open vented (flooded lead-acid) | Min | 108 + 108 |
| | Max | 144 + 144 |
| Nickel Cadmium | Min | 180 + 180 |
| | Max | 228 + 228 |

*(1) 2 strings / 3 cables configuration (+ N -).*

## 1.2.1 4U RACK-MOUNTED BATTERY MODULES

| DIMENSIONS AND WEIGHT | | |
|---|---|---|
|  | Height (mm) | 175 |
| | Depth (mm) | 920 |
| | Width (mm) | 442 (482) |
| | Weight - empty (kg) | 23 |
| M4-BR-009L | Weight - with batteries (kg) | 136 |

| 4U RACK-MOUNTED BATTERY MODULES<br>BACK UP TIMES IN MINUTES AT RATED LOAD | | | | |
|---|---|---|---|---|
| | |  | | |
| | | M4-RI-25 | | |
| | | Number of power modules | | |
|  | Without redundancy | 1 | 2 | 3 |
| | N+1 redundancy | 2 | 3 | 4 |
| M4-R-075-82B0 | | | | |
|  | Without redundancy | 1 | 2 | - |
| | 1+1 redundancy | 2 | - | - |
| M4-R-050-82B0 | | | | |

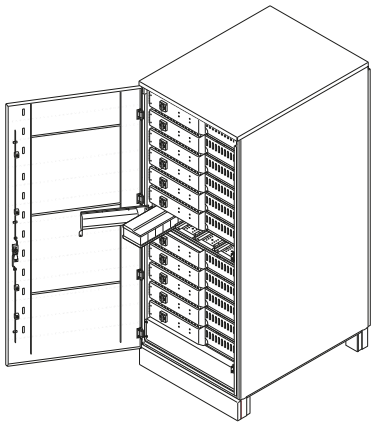
| | Load power (kW) | | | 5 | 10 | 15 | 18 | 20 | 25 | 30 | 36 | 40 | 50 | 54 | 60 | 75 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Number of battery racks | 1 | Cumulative Ah | 9 | 25 | 11 | 6 | 4 | 3 | - | - | - | - | - | - | - | - |
| | | 2 | | 18 | 62 | 26 | 17 | 13 | 11 | 8 | 6 | 4 | 3 | - | - | - | - |
| | | 3 | | 27 | 100 | 44 | 26 | 22 | 19 | 15 | 11 | 8 | 7 | 5 | 4 | 3 | - |
| | | 4 | | 36 | 138 | 64 | 40 | 31 | 26 | 20 | 17 | 13 | 11 | 8 | 7 | 6 | 4 |
| | | 5 | | 45 | 176 | 84 | 51 | 41 | 37 | 26 | 21 | 17 | 15 | 11 | 9 | 8 | 6 |
| M4-BR-009L | | > 5 | | consult us | | | | | | | | | | | | | |

## 1.2.2 MODULAR HOT-SWAP BATTERY CABINET

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

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

**MODULAR HOT-SWAP BATTERY CABINET**



| Number of strings | Item code |
|---|---|
| 0 (empty cabinet) | M4-BH-00S-009L |
| 1 | M4-BH-01S-009L |
| 2 | M4-BH-02S-009L |
| 3 | M4-BH-03S-009L |
| 4 | M4-BH-04S-009L |
| 5 | M4-BH-05S-009L |
| 6 | M4-BH-06S-009L |
| 7 | M4-BH-07S-009L |
| 8 | M4-BH-08S-009L |
| 9 | M4-BH-09S-009L |
| 10 | M4-BH-10S-009L |
| 11 | M4-BH-11S-009L |
| 12 | M4-BH-12S-009L |

**DIMENSIONS AND WEIGHT**

| | Number of battery cabinets | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | | | | | | | | 2 | | | | | | | | | | | | 3 | | | | | | | | | | | |
| | Number of strings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 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) | 260 | 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 |

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

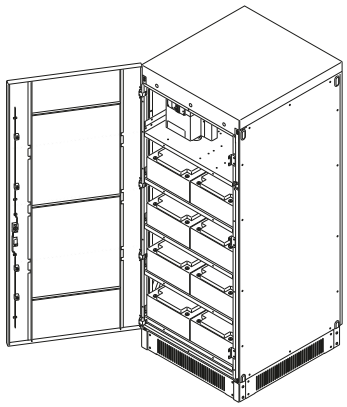
| Number of battery cabinets | | Number of strings | | Cumulative Ah | | Number of power modules | | |
|---|---|---|---|---|---|---|---|---|
| Without redundancy | | | | | | 1 | 2 | 3 |
| N+1 redundancy | | | | | | 2 | 3 | 4 |
| 1 | | 1 | | 9 | | 5 | - | - |
| | | 2 | | 18 | | 15 | 5 | - |
| | | 3 | | 27 | | 23 | 9 | 5 |
| | | 4 | | 36 | | 34 | 15 | 8 |
| | | 5 | | 45 | | 44 | 19 | 11 |
| | | 6 | | 54 | | 57 | 23 | 15 |
| | | 7 | | 63 | | 68 | 28 | 18 |
| | | 8 | | 72 | | 80 | 34 | 20 |
| | | 9 | | 81 | | 92 | 40 | 23 |
| | | 10 | | 90 | | 103 | 44 | 26 |
| | | 11 | | 99 | | 116 | 51 | 30 |
| | | 12 | | 108 | | 129 | 57 | 34 |
| | 2 | 13 | | 117 | | 141 | 63 | 38 |
| | | 14 | | 126 | | 151 | 68 | 41 |
| | | 15 | | 135 | | 163 | 73 | 44 |
| | | 16 | | 144 | | 177 | 80 | 48 |
| | | 17 | | 153 | | 190 | 86 | 53 |
| | | 18 | | 162 | | 206 | 92 | 57 |
| | | 19 | | 171 | | 221 | 98 | 61 |
| | | 20 | | 180 | | 235 | 103 | 65 |
| | | 21 | | 189 | | 249 | 109 | 68 |
| | | 22 | | 198 | | 261 | 116 | 71 |
| | | 23 | | 207 | | 272 | 123 | 75 |
| | | 24 | | 216 | | 282 | 129 | 80 |
| | 3 | 25 | | 225 | | 294 | 135 | 84 |
| | | 26 | | 234 | | 310 | 141 | 88 |
| | | 27 | | 243 | | 326 | 146 | 92 |
| | | 28 | | 252 | | 341 | 151 | 96 |
| | | 29 | | 261 | | 354 | 156 | 99 |
| | | 30 | | 270 | | 367 | 163 | 103 |
| | | 31 | | 279 | | 383 | 170 | 107 |
| | | 32 | | 288 | | 402 | 177 | 111 |
| | | 33 | | 297 | | 419 | 183 | 116 |
| | | 34 | | 306 | | 436 | 190 | 120 |
| | | 35 | | 315 | | 451 | 197 | 125 |
| | | 36 | | 324 | | 466 | 206 | 129 |

| Number of battery cabinets | | Number of strings | | Cumulative Ah | | Number of power modules | |
|---|---|---|---|---|---|---|---|
| Without redundancy | | | | | | 1 | 2 |
| 1+1 redundancy | | | | | | 2 | - |
| 1 | | 1 | | 9 | | 5 | - |
| | | 2 | | 18 | | 15 | 5 |
| | | 3 | | 27 | | 23 | 9 |
| | | 4 | | 36 | | 34 | 15 |
| | | 5 | | 45 | | 44 | 19 |
| | | 6 | | 54 | | 57 | 23 |
| | | 7 | | 63 | | 68 | 28 |
| | | 8 | | 72 | | 80 | 34 |
| | | 9 | | 81 | | 92 | 40 |
| | | 10 | | 90 | | 103 | 44 |
| | | 11 | | 99 | | 116 | 51 |
| | | 12 | | 108 | | 129 | 57 |
| | 2 | 13 | | 117 | | 141 | 63 |
| | | 14 | | 126 | | 151 | 68 |
| | | 15 | | 135 | | 163 | 73 |
| | | 16 | | 144 | | 177 | 80 |
| | | 17 | | 153 | | 190 | 86 |
| | | 18 | | 162 | | 206 | 92 |
| | | 19 | | 171 | | 221 | 98 |
| | | 20 | | 180 | | 235 | 103 |
| | | 21 | | 189 | | 249 | 109 |
| | | 22 | | 198 | | 261 | 116 |
| | | 23 | | 207 | | 272 | 123 |
| | | 24 | | 216 | | 282 | 129 |
| | 3 | 25 | | 225 | | 294 | 135 |
| | | 26 | | 234 | | 310 | 141 |
| | | 27 | | 243 | | 326 | 146 |
| | | 28 | | 252 | | 341 | 151 |
| | | 29 | | 261 | | 354 | 156 |
| | | 30 | | 270 | | 367 | 163 |
| | | 31 | | 279 | | 383 | 170 |
| | | 32 | | 288 | | 402 | 177 |
| | | 33 | | 297 | | 419 | 183 |
| | | 34 | | 306 | | 436 | 190 |
| | | 35 | | 315 | | 451 | 197 |
| | | 36 | | 324 | | 466 | 206 |

For very long BUT, it is recommended to use the power module with 16 A charging current (refer to page 14).

## 1.2.3 MODULAR BATTERY CABINET - HIGH CAPACITY

**MODULAR HOT-SWAP BATTERY CABINET**



M4-BC-01S-92L

**DIMENSIONS AND WEIGHT**

| | Number of strings | |
|---|---|---|
| | 0 | 1 |
| Height (mm) | 1990 | |
| Depth (mm) | 890 | |
| Width (mm) | 810 | |
| Weight (kg) | 220 | 1792 |

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

| | | | | | Number of power modules | | |
|---|---|---|---|---|---|---|---|
| Without redundancy | | | | | 1 | 2 | 3 |
| N+1 redundancy | | | | | 2 | 3 | 4 |
| Number of battery cabinets | 1 | Number of battery racks | 1 | Cumulative Ah 92 | 119 | 56 | 33 |
| | | | 2 | 184 | 279 | 119 | 75 |
| | | | 3 | 276 | 447 | 201 | 119 |
| | | | 4 | 368 | 654 | 279 | 170 |
| | | | 5 | 460 | - | 378 | 226 |
| | | | 6 | 552 | - | - | 279 |

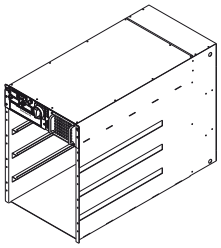
**MODULAR BATTERY CABINET**
**BACK UP TIMES IN MINUTES @ 75% OF RATED LOAD**

| | | | | | Number of power modules | |
|---|---|---|---|---|---|---|
| Without redundancy | | | | | 1 | 2 |
| 1+1 redundancy | | | | | 2 | - |
| Number of battery cabinets | 1 | Number of battery racks | 1 | Cumulative Ah 92 | 119 | 56 |
| | | | 2 | 184 | 279 | 119 |
| | | | 3 | 276 | 447 | 201 |
| | | | 4 | 368 | 654 | 279 |
| | | | 5 | 460 | - | 378 |

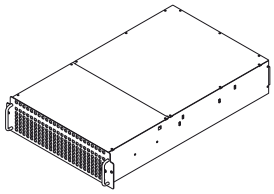
For very long BUT, it is recommended to use the power module with 16 A charging current (refer to page 14).

# 2. SPECIFICATIONS

## 2.1 INSTALLATION PARAMETERS



M4-R-075-82B0

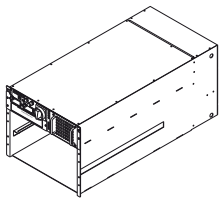


M4-RI-25

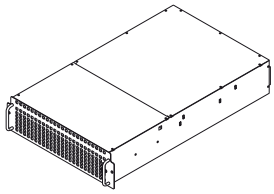
| CONFIGURATIONS AND RATED POWER (KW) | | | | |
|---|---|---|---|---|
| | Number of power modules | | | |
| | 1 | 2 | 3 | 4 |
| N configuration | 25 | 50 | 75 | - |
| N+1 redundancy | - | 25 | 50 | 75 |

| RATED CURRENT AND MAX CURRENT | | | |
|---|---|---|---|
| | Number of power modules | | |
| Without redundancy | 1 | 2 | 3 |
| N+1 redundancy | 2 | 3 | 4 |
| Rated rectifier input current (A) (EN 62040-3) | 37.7 | 75 | 113 |
| Max rectifier input current (A) (EN 62040-3) | 45.0 | 90 | 135 |
| Rated inverter output current (A) | 36.2 | 72 | 109 |
| Maximum bypass input current (A) (EN 62040-3) | 120 | | |
| Max battery current (A) | 80 | 160 | 240 |

| COOLING | | | | |
|---|---|---|---|---|
| | | Number of power modules | | |
| Without redundancy | | 1 | 2 | 3 |
| N+1 redundancy | | 2 | 3 | 4 |
| Maximum air flow | $m^3/h$ | 400 | 800 | 1200 |
| Max dissipation in nominal conditions[1] | W | 1140 | 2280 | 3420 |
| | kcal/h | 980 | 1961 | 2941 |
| | BTU/h | 3891 | 7782 | 11672 |
| Max dissipation in worst conditions[2] | W | 1350 | 2650 | 3950 |
| | kcal/h | 1161 | 2279 | 3397 |
| | BTU/h | 4608 | 9044 | 13481 |



M4-R-050-82B0



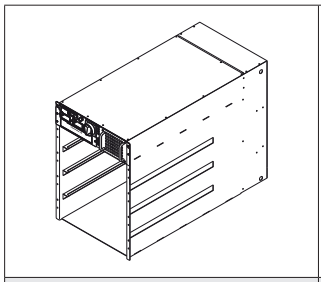
M4-RI-25

| CONFIGURATIONS AND RATED POWER (KW) | | |
|---|---|---|
| | Number of power modules | |
| | 1 | 2 |
| N configuration | 25 | 50 |
| 1+1 redundancy | - | 25 |

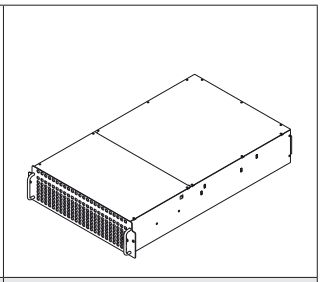
| RATED CURRENT AND MAX CURRENT | | |
|---|---|---|
| | Number of power modules | |
| Without redundancy | 1 | 2 |
| 1+1 redundancy | 2 | - |
| Rated rectifier input current (A) (EN 62040-3) | 37.7 | 75 |
| Max rectifier input current (A) (EN 62040-3) | 45.0 | 90 |
| Rated inverter output current (A) | 36.2 | 72 |
| Maximum bypass input current (A) (EN 62040-3) | 120 | |
| Max battery current (A) | 80 | 160 |

| COOLING | | | |
|---|---|---|---|
| | | Number of power modules | |
| Without redundancy | | 1 | 2 |
| 1+1 redundancy | | 2 | - |
| Maximum air flow | $m^3/h$ | 400 | 800 |
| Max dissipation in nominal conditions[1] | W | 1140 | 2280 |
| | kcal/h | 980 | 1961 |
| | BTU/h | 3891 | 7782 |
| Max dissipation in worst conditions[2] | W | 1350 | 2650 |
| | kcal/h | 1161 | 2279 |
| | BTU/h | 4608 | 9044 |

(1) Nominal input voltage and rated output active power (PF1).
(2) Low input voltage, battery recharge and rated output active power (PF1).



M4-R-075-82B0



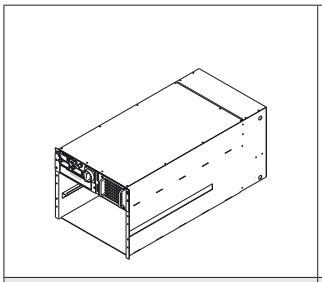
M4-RI-25

| ACOUSTIC NOISE | | | |
|---|---|---|---|
| | Number of power modules | | |
| Without redundancy | 1 | 2 | 3 |
| N+1 redundancy | 2 | 3 | 4 |
| Acoustic noise at 1 m (dBA)(1) | 51 | 53 | 54 |

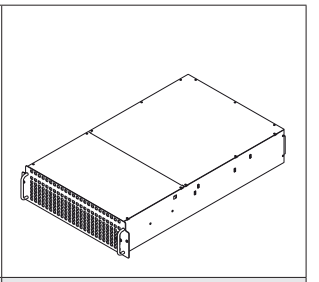
(1) 75 % of nominal load.

| DIMENSIONS AND WEIGHT | | | | |
|---|---|---|---|---|
| | Number of power modules | | | |
| | 1 | 2 | 3 | 4 |
| Height (mm) | 664 | | | |
| Depth (mm) | 920 | | | |
| Width (mm) | 442 (482) | | | |
| Weight - sub-rack (kg) | 49 | | | |
| Weight (kg) | 82 | 115 | 148 | 181 |

| ENVIRONMENT | |
|---|---|
| Storage temperature | -5 to +50 °C |
| Operating temperature | 0 to 40 °C(1)(2) |
| Maximum relative humidity | 95 % condensation-free |
| Degree of protection | IP20 |



M4-R-050-82B0



M4-RI-25

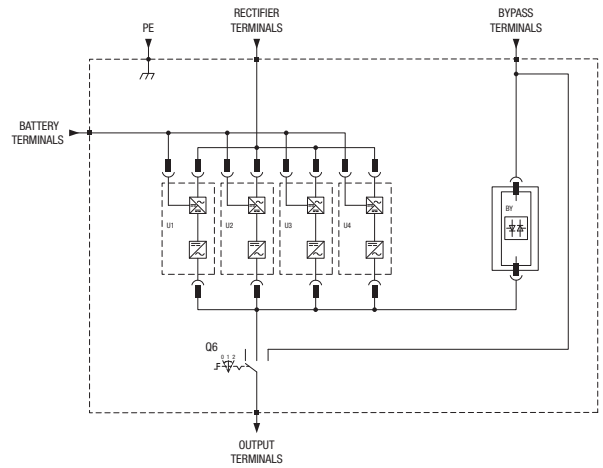
| ACOUSTIC NOISE | | |
|---|---|---|
| | Number of power modules | |
| Without redundancy | 1 | 2 |
| 1+1 redundancy | 2 | - |
| Acoustic noise at 1 m (dBA)(1) | 51 | 53 |

| DIMENSIONS AND WEIGHT | | |
|---|---|---|
| | Number of power modules | |
| | 1 | 2 |
| Height (mm) | 397 | |
| Depth (mm) | 920 | |
| Width (mm) | 442 (482) | |
| Weight - sub-rack (kg) | 43 | |
| Weight (kg) | 76 | 109 |

| ENVIRONMENT | |
|---|---|
| Storage temperature | -5 to +50 °C |
| Operating temperature | 0 to 40 °C(1)(2) |
| Maximum relative humidity | 95 % condensation-free |
| Degree of protection | IP20 |

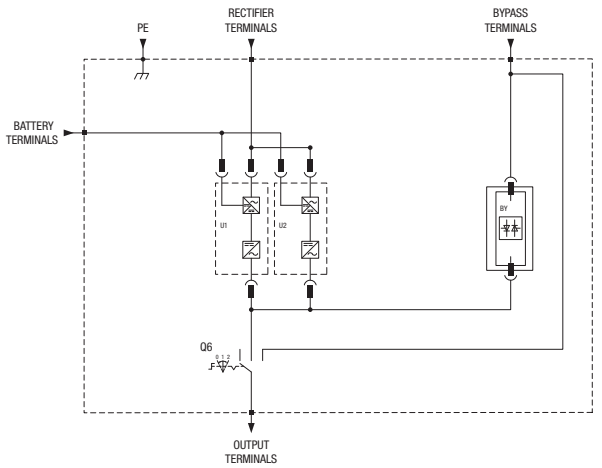
(1) According to EN 62040-3.
(2) For optimum battery lifetime the ideal temperature range is 15 °C - 25 °C

## CABLING SYSTEM AND MAX CABLE SECTION




| | | Number of power modules | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| Rectifier terminals ($mm^2$) | Flexible | 50 | | | |
| | Rigid | 50 | | | |
| Bypass terminals ($mm^2$) | Flexible | 50 | | | |
| | Rigid | 50 | | | |
| Battery terminals ($mm^2$) | Flexible | 70 | | | |
| | Rigid | 70 | | | |
| Output terminals ($mm^2$) | Flexible | 50 | | | |
| | Rigid | 50 | | | |

## CABLING SYSTEM AND MAX CABLE SECTION




| | | Number of power modules | |
|---|---|---|---|
| | | 1 | 2 |
| Rectifier terminals ($mm^2$) | Flexible | 35 | |
| | Rigid | 35 | |
| Bypass terminals ($mm^2$) | Flexible | 35 | |
| | Rigid | 35 | |
| Battery terminals ($mm^2$) | Flexible | 35 | |
| | Rigid | 35 | |
| Output terminals ($mm^2$) | Flexible | 35 | |
| | Rigid | 35 | |

## 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) | 50/60 ±10 % |
| 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 % Sn.

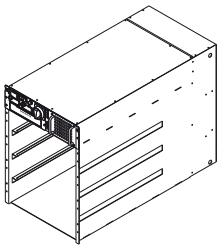
| ELECTRICAL CHARACTERISTICS - BYPASS | |
|---|---|
| Bypass rated voltage (V) | Nominal output voltage ±15 % (±20% if GENSET is used) |
| Bypass rated frequency (Hz) | 50/60 |
| Bypass frequency tolerance (Hz) | ±2 % selectable (±8% if GENSET is used) |
| Bypass frequency variation speed | 50/60 ±10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

| ELECTRICAL CHARACTERISTICS - INVERTER | |
|---|---|
| Rated output voltage (V) | (3ph + N) 380/400/415 selectable |
| Output voltage tolerance (Hz) | ±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) |

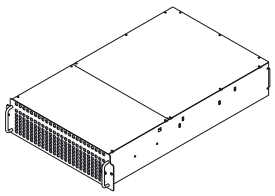
| ELECTRICAL CHARACTERISTICS - STORED ENERGY OPERATING MODE | |
|---|---|
| Number of battery blocks (VRLA) | From 18+18 to 24+24 |

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

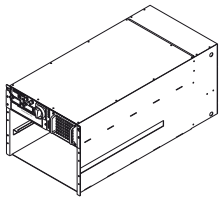
## 2.2.2 ELECTRICAL CHARACTERISTICS DEPENDENT OF THE NUMBER OF MODULES



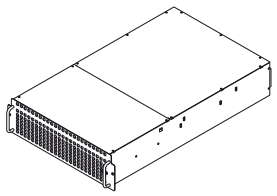
M4-R-075-82B0



M4-RI-25



M4-R-050-82B0



M4-RI-25

**ELECTRICAL CHARACTERISTICS - INVERTER OVERLOAD**

| | | Number of power modules | | |
|---|---|---|---|---|
| | | 1 | 2 | 3-4 |
| Inverter overload (kW)(1) | 10 min | 31.2 | 62.4 | 94 |
| | 5 min | 33.3 | 66.5 | 100 |
| | 1 min | 37.5 | 75.0 | 113 |

| | | Number of power modules | |
|---|---|---|---|
| | | 1 | 2 |
| Inverter overload (kW)(1) | 10 min | 31.2 | 62.4 |
| | 5 min | 33.3 | 66.5 |
| | 1 min | 37.5 | 75.0 |

*(1) Initial condition Pout ≤ 80 % Pn.*

**ELECTRICAL CHARACTERISTICS - INVERTER SHORT-CIRCUIT**

| | | Number of power modules | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| Inverter short-circuit (A) Ik1 = Ik2 = Ik3 | 40 ms | 100 | 200 | 300 | 400 |
| | 40 to 80 ms | 80 | 160 | 240 | 320 |

| | | Number of power modules | |
|---|---|---|---|
| | | 1 | 2 |
| Inverter short-circuit (A) Ik1 = Ik2 = Ik3 | 40 ms | 100 | 200 |
| | 40 to 80 ms | 80 | 160 |

**ELECTRICAL CHARACTERISTICS - BYPASS OVERLOAD AND SHORT-CIRCUIT**

| | | Number of power modules | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| Bypass overload (A) | Nominal | 109 | | | |
| | Continuous | 120 | | | |
| | 30 min | 136 | | | |
| | 10 min | 163 | | | |
| | 1 sec | > 190 | | | |
| Bypass $I^2t$ ($A^2s$) | | 130000 | | | |
| Bypass Max Peak Current (A) | | 5000 | | | |

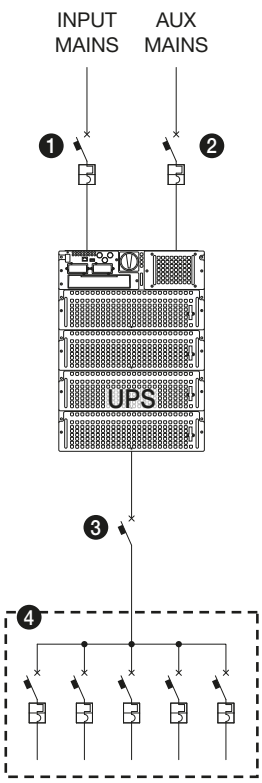
| | | Number of power modules | |
|---|---|---|---|
| | | 1 | 2 |
| Bypass overload (A) | Nominal | 73 | |
| | Continuous | 80 | |
| | 30 min | 91 | |
| | 10 min | 109 | |
| | 1 sec | > 127 | |
| Bypass $I^2t$ ($A^2s$) | | 130000 | |
| Bypass Max Peak Current (A) | | 5000 | |

**ELECTRICAL CHARACTERISTICS - BATTERY CHARGER MAX CURRENT**

| | Number of power modules | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Standard max. current (A) M4-RI-25 | 8 | 16 | 24 | 32 |
| Enhanced battery charger max. current (A) M4-RI-25+CH | 16 | 32 | 48 | 64 |

| | Number of power modules | |
|---|---|---|
| | 1 | 2 |
| Standard max. current (A) M4-RI-25 | 8 | 16 |
| Enhanced battery charger max. current (A) M4-RI-25+CH | 16 | 32 |

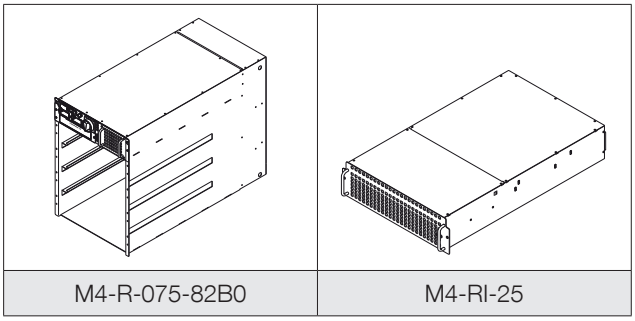
## 2.3 RECOMMENDED PROTECTION DEVICES



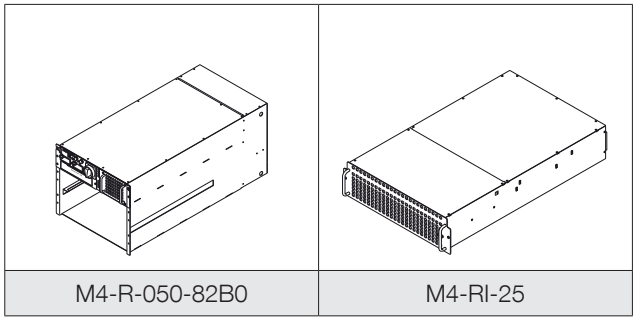

**Key**

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.



| M4-R-075-82B0 | M4-RI-25 |
|---|---|



| M4-R-050-82B0 | M4-RI-25 |
|---|---|

**RECOMMENDED PROTECTION DEVICES - RECTIFIER**

| | | Number of power modules | | |
|---|---|---|---|---|
| Without redundancy | | 1 | 2 | 3-4 |
| N+1 redundancy | | 2 | 3 | 4 |
| C curve circuit breaker (A) | Min | 50 | 100 | 160 |
| | Max | 160 | | |
| Gg fuse (A) | Min | 50 | 100 | 160 |
| | Max | 160 | | |

| | | Number of power modules | |
|---|---|---|---|
| Without redundancy | | 1 | 2 |
| 1+1 redundancy | | 2 | - |
| C curve circuit breaker (A) | Min | 50 | 100 |
| | Max | 160 | |
| Gg fuse (A) | Min | 50 | 100 |
| | Max | 100 | |

A circuit breaker switch is recommended with a magnetic tripping threshold of ≥ 10 In (curve C). A D curve selective breaker should be fitted 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 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 the recommended 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 below) according to the 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 power modules | | | |
| | | 1 | 2 | 3 | 4 |
| C curve circuit breaker (A) | Min | 50 | 100 | 160 | 200 |
| | Max | 200 | | | |
| Gg fuse (A) | Min | 50 | 100 | 160 | 200 |
| | Max | 200 | | | |

If an optional external transformer is used, a D curve selective breaker should be used.

Auxiliary mains 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 - INPUT RESIDUAL CURRENT CIRCUIT BREAKER | | | | |
|---|---|---|---|---|
| | Number of power modules | | | |
| | 1 | 2 | 3 | 4 |
| Input residual current circuit breaker (A) | 0.5 | | | |

An RCD is not necessary when the UPS is installed in 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 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 operating with the definitive load, so as to prevent the sudden activation of the RCD switch.

| OUTPUT SELECTIVITY ON BATTERY MODE (AUX MAINS NOT PRESENT) | | | | |
|---|---|---|---|---|
| | Number of power modules | | | |
| | 1 | 2 | 3 | 4 |
| B curve circuit breaker (A) | ≤ 20 | ≤ 40 | ≤ 50 | ≤ 80 |
| C curve circuit breaker (A) | ≤ 10 | ≤ 20 | ≤ 25 | ≤ 40 |

Selectivity of distribution downstream of UPS with downstream short-circuit (AUX MAINS not present).

# 2.4 COMMUNICATION OPTIONS

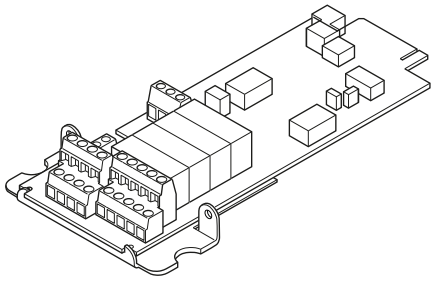
## 2.4.1 PROGRAMMABLE IN/OUT DRY CONTACT CARD WITH SERIAL LINK

The board is plug&play: the UPS is able to recognize its presence and configuration.

Up to 4 standard operating modes can be selected simply using two jumpers; the selected operating mode manages the ADC outputs and the inputs accordingly.

It is also possible to create a custom operation mode (consult us).

**PROGRAMMABLE IN/OUT DRY CONTACT CARD WITH SERIAL LINK**



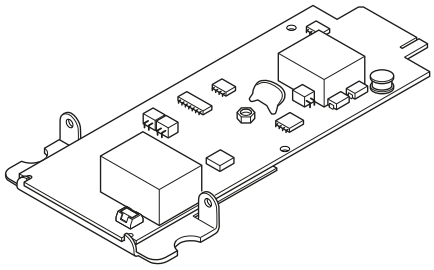
CP-OP-ADC+SL

| | |
|---|---|
| • *4 relays for external device activation (can be set as normally closed or normally open)* | - general alarm,<br>- back-up operation,<br>- bypass operation,<br>- preventive maintenance request. |
| • *3 free inputs to report external contacts to UPS* | - emergency stop devices (ESD),<br>- operation with generating set,<br>- battery protection status. |

- *1 connector for external temperature sensor (optional)*
- *RS485 insulated serial link providing MODBUS RTU protocol*
- *2 LEDs to display the board status*

## 2.4.2 MODBUS TCP CARD FOR CONNECTION WITH BMS SYSTEM

**MODBUS TCP – IDA INTERFACE (MODBUS TCP CARD)**



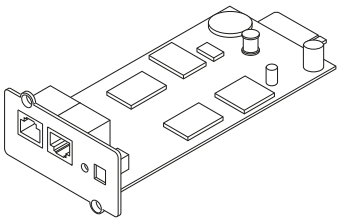
CP-OP-MODTCP

Detailed information on the MODBUS protocol serial link or Ethernet network for MODULYS RM GP is available in the Modbus TCP User Manual.

## 2.4.3 NET VISION CARD FOR INTERFACE WITH IT INFRASTRUCTURE

Net Vision is a network adapter for the professional monitoring and remote control of MODULYS RM GP. The Net Vision network adaptor allows the UPS to be connected directly to the Ethernet network allowing secure management of the UPS over the network using a web browser, a TELNET interface or NMS application via SNMP. The protocols used for connection are independent of the platform and operating system, therefore Net Vision is extremely flexible and suitable for all systems. In addition to monitoring and control, the Net Vision interface is able to provide a high level of protection for servers powered by the UPS. In critical conditions, up to 250 devices powered by the UPS can be switched off in an orderly sequence whilst ensuring data integrity. The remote shutdown is provided by a client shutdown to be installed on all computers that require this automatic function. Some clients for Net Vision are native to certain operating systems, otherwise a universal shutdown client (JNC) can be used.

**NET VISION**



NET-VISIONxCARD

NET VISION FUNCTIONS

- UPS monitoring via HTML pages and synoptic
- UPS control
- UPS event notification via email
- SNMP TRAP notification to NMS system (NET VISION and RFC1628 TRAP from version 6.1 and above)
- Server Shutdown (using JNC and VIRTUAL-JNC software agent on servers)
- Events and measurements log
- Multi-language capabilities

## 2.4.4 EMD (Environment Monitoring Device)

The EMD monitors temperature, humidity and other conditions in the room's environment and also offers 2 digital input connections for external dry contacts to monitor water, fire and smoke security alarms. All information is processed by MODULYS RM GP for a complete monitoring of external conditions and alarms. Easy connection to Net Vision card using standard CAT5 cables with straight through wiring.

**EMD (ENVIRONMENT MONITORING DEVICE)**

Net Vision EMD

EMD FUNCTIONS

- External temperature monitoring
- External humidity monitoring
- 2 digital input connections for external dry contacts (for instance to monitor security alarms like fire, smoke, etc.)

## 2.4.5 EXTERNAL TEMPERATURE SENSOR

The temperature sensor can be used to monitor the battery temperature should the battery cabinet be provided by another supplier by Socomec (all battery cabinets provided by Socomec are fitted with the temperature sensor as standard). The sensor should be connected to the ADC-SL board, using the relative connector. MODULYS RM GP uses the temperature measured by this sensor to correctly set the battery charge profile.

# 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.

### 2006/95/EC

Council Directive 2006/95/EC, dated 16 February 2007, on the reconciliation of legislation within Member States regarding electrical materials for use within specific voltage ranges.

### 2004/108/EC

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

## 3.2 STANDARDS - TESTS, VERIFICATIONS AND CERTIFICATIONS

| STANDARDS | | |
|---|---|---|
| Safety | IEC 62040-1 | |
| EMC | IEC 62040-2 (C2) | |
| Performance(1) | IEC 62040-3 (VFI-SS-111) | |
| Power module efficiency(2) | IEC 62040-3 | up to 96,5 % |
| Power module MTBF(3) | IEC 62380 | 1.000.000 h |
| Degree of protection | IEC 60529 | IP20 |
| Product certification | CE | |

*(1) EMC performances are tested and verified by CREI VEN.*

*(2) Power module efficiency is tested and verified by TÜV SÜD.*

*(3) Power Module MTBF is calculated and tested by SERMA ELECTRONICS.*

## 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.

# MODULYS XM

50 to 250 + 50 kW

Redundant Modular UPS

**ULTIMATE**

Fault tolerant power
without compromise


Socomec Resource Center
To download, brochures, catalogues
and technical manuals

socomec
Innovative Power Solutions

# 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 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 6 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.

### 1.1.1 FLEXIBLE RATED POWER

| POWER MODULES | | | | | | |
|---|---|---|---|---|---|---|
| Number of Power Modules | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |

*(1) No Power redundancy*

### 1.1.2 FLEXIBLE SHORT-CIRCUIT PERFORMANCE

| SYSTEM CONFIGURATIONS | | |
|---|---|---|
| | Standard | High Short-circuit |
| System description | Short-circuit safety performance according to IEC/EN62040-1 requirements | - Extra-rugged system for enhanced short-circuit safety performance (beyond IEC/EN 62040-1 requirements)<br>- Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability |
| Number of Bypass Modules | 1 | 1 + 1(1) |
| Number of Power Modules | 1 → 6 | 1 → 6 |

*(1) Extra Bypass*

See § 2.2.1.

### 1.1.3 FLEXIBLE CABLING

The standard solution and high short-circuit solution have bottom cabling configuration.

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

### 1.1.4 FLEXIBLE GROUNDING COMPATIBILITY

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

## 1.2 FLEXIBLE BACK-UP TIME

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

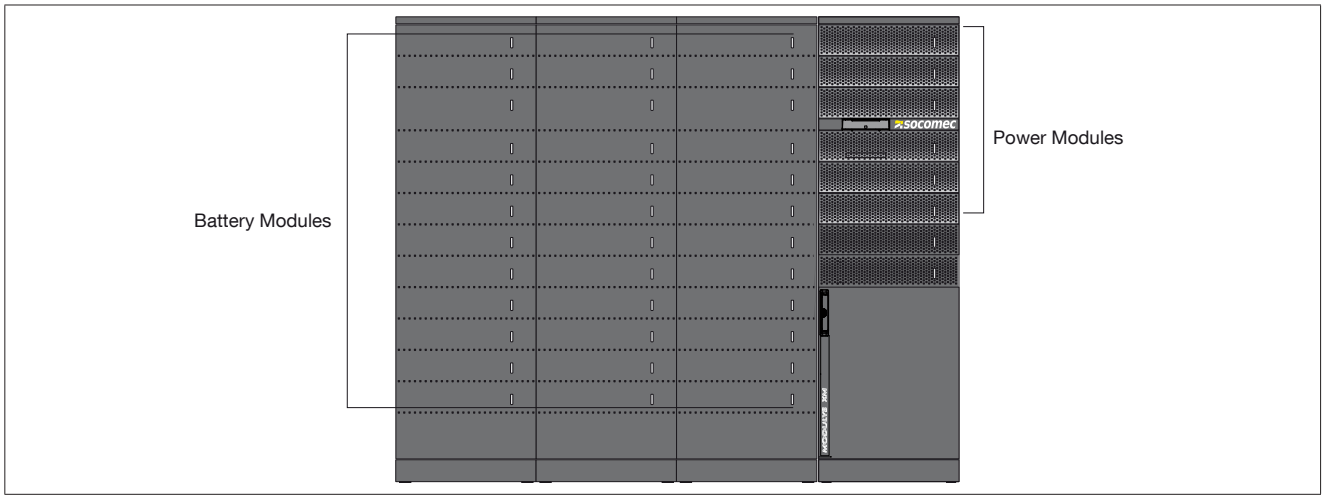
Each battery pack has an acid-proof container designed to prevent damage in the event of acid leakage.

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

### 1.2.1 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 9 Ah - 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 up to 12 battery strings per cabinet.

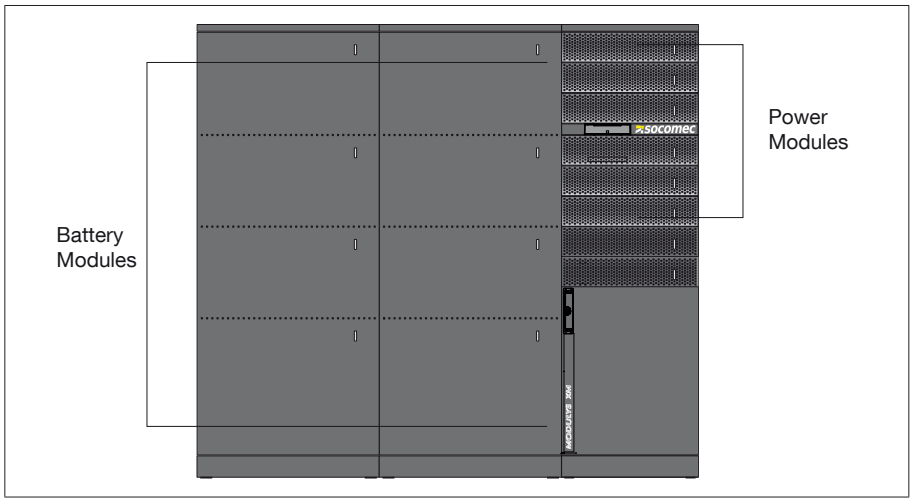
Horizontal modularity provides very high and scalable back-up.

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

| MODULAR HOT-SWAP BATTERY CABINET<br>BACK UP TIMES IN MINUTES @ 75% OF RATED LOAD | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Power Modules | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | | | | | | 50 + 0[1] | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Number of Modular battery cabinets | 1 | Number of strings | 2 | Cumultative Ah | 18 | 5,5 | 5,5 | | | | |
| | | | 3 | | 27 | 10,8 | 10,8 | | | | |
| | | | 4 | | 36 | 15,4 | 15,4 | 5,5 | | | |
| | | | 5 | | 45 | 18,6 | 18,6 | 8,1 | | | |
| | | | 6 | | 54 | 23,7 | 23,7 | 10,8 | 5,5 | | |
| | | | 7 | | 63 | 31 | 31 | 13,2 | 7,3 | | |
| | | | 8 | | 72 | 36 | 36 | 15,4 | 9,1 | 5,5 | |
| | | | 9 | | 81 | 42 | 42 | 17,2 | 10,8 | 6,9 | |
| | | | 10 | | 90 | 48 | 48 | 18,6 | 12,3 | 8,1 | 5,5 |
| | | | 11 | | 99 | 55 | 55 | 21 | 14 | 9,5 | 6,7 |
| | | | 12 | | 108 | 62 | 62 | 23,7 | 15,4 | 10,8 | 7,6 |
| | 2 | | 13 | | 117 | 69 | 69 | 27,4 | 16,6 | 11,9 | 8,7 |
| | | | 14 | | 126 | 74 | 74 | 31 | 17,7 | 13,2 | 9,8 |
| | | | 15 | | 135 | 79 | 79 | 34 | 18,6 | 14,3 | 10,8 |
| | | | 16 | | 144 | 86 | 86 | 36 | 20,1 | 15,4 | 11,7 |
| | | | 17 | | 153 | 93 | 93 | 39 | 22 | 16,3 | 12,7 |
| | | | 18 | | 162 | 99 | 99 | 42 | 23,7 | 17,2 | 13,6 |
| | | | 19 | | 171 | 104 | 104 | 45 | 26,2 | 17,9 | 14,5 |
| | | | 20 | | 180 | 112 | 112 | 48 | 28,5 | 18,6 | 15,4 |
| | | | 21 | | 189 | 119 | 119 | 51 | 31 | 19,7 | 16,1 |
| | | | 22 | | 198 | 127 | 127 | 55 | 33 | 21 | 16,8 |
| | | | 23 | | 207 | 133 | 133 | 59 | 35 | 22,4 | 17,5 |
| | | | 24 | | 216 | 140 | 140 | 62 | 36 | 23,7 | 18,1 |
| | 3 | | 25 | | 225 | 146 | 146 | 66 | 38 | 25,6 | 18,6 |
| | | | 26 | | 234 | 151 | 151 | 69 | 40 | 27,4 | 19,4 |
| | | | 27 | | 243 | 158 | 158 | 72 | 42 | 29,1 | 20,5 |
| | | | 28 | | 252 | 166 | 166 | 74 | 44 | 31 | 21,6 |
| | | | 29 | | 261 | 173 | 173 | 77 | 46 | 32 | 22,6 |
| | | | 30 | | 270 | 181 | 181 | 79 | 48 | 34 | 23,7 |
| | | | 31 | | 279 | 188 | 188 | 83 | 50 | 35 | 25,2 |
| | | | 32 | | 288 | 196 | 196 | 86 | 52 | 36 | 26,7 |
| | | | 33 | | 297 | 202 | 202 | 89 | 55 | 38 | 28,1 |
| | | | 34 | | 306 | 212 | 212 | 93 | 58 | 39 | 29,4 |
| | | | 35 | | 315 | 221 | 221 | 96 | 60 | 40 | 31 |
| | | | 36 | | 324 | 229 | 229 | 99 | 62 | 42 | 32 |

*(1) No Power redundancy*

## 1.2.2 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<br>BACK-UP TIMES IN MINUTES @75% OF RATED LOAD** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Power Modules | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | | | | | | 50 + 0[1] | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Number of battery cabinets | 1 | Number of battery strings | 1 | Cumulative Ah | 92 | 49 | 49 | 19.8 | 0 | 0 | 0 |
| | 2 | | 2 | | 184 | 115 | 115 | 49 | 29.1 | 19.8 | 14.3 |
| | 3 | | 3 | | 276 | 184 | 184 | 82 | 49 | 34 | 25.3 |
| | 4 | | 4 | | 368 | 255 | 255 | 115 | 71 | 49 | 37 |
| | 5 | | 5 | | 460 | 329 | 329 | 148 | 93 | 66 | 49 |
| | 6 | | 6 | | 552 | 407 | 407 | 184 | 115 | 82 | 62 |

*(1) No Power redundancy*

# 2. SPECIFICATIONS

## 2.1 INSTALLATION PARAMETERS

| DIMENSIONS AND WEIGHT | | | | | | |
|---|---|---|---|---|---|---|
| Number of Power Modules | 1 | 2 | 3 | 4 | 5 | 6 |
| Height (mm) | 1990 | | | | | |
| Depth (mm) | 890 | | | | | |
| Width (mm) | 600 | | | | | |
| Weight (kg) | 289 | 325 | 361 | 397 | 433 | 469 |

| RATED CURRENT AND MAX CURRENT | | | | | | |
|---|---|---|---|---|---|---|
| Number of Power Modules | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Rated rectifier input current (A) (EN 62040-1) | 75 | 75 | 150 | 226 | 301 | 376 |
| Maximum rectifier input current (A) (EN 62040-3) | 90 | 180 | 270 | 360 | 450 | 450 |
| Nominal Inverter output current (A) | 72 | 72 | 144 | 217 | 289 | 361 |
| Maximum bypass input current (A) (EN 62040-3) | 398 | | | | | |
| Maximum battery current (A) | 114 | 228 | 342 | 456 | 570 | 684 |

*(1) No Power redundancy*

| COOLING | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of Power Modules | | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Maximum air flow | (m3/h) | 600 | 1200 | 1800 | 2400 | 3000 | 3600 |
| Power Dissipation under nominal conditions(2) | (W) | 2240 | 1920 | 3950 | 6080 | 8110 | 10680 |
| | (kcal/h) | 1920 | 1650 | 3390 | 5220 | 6970 | 9180 |
| | (BTU/h) | 7640 | 6550 | 13470 | 20740 | 27670 | 36440 |
| Power Dissipation (maximum) under worst-case conditions(3) | (W) | 2580 | 2140 | 4390 | 6910 | 9430 | 12060 |
| | (kcal/h) | 2220 | 1840 | 3780 | 5950 | 8110 | 10370 |
| | (BTU/h) | 8810 | 7310 | 14980 | 23580 | 32180 | 41160 |

*(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 | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Acoustic noise at 1m (dBA) (2) | 50 | 49 | 50 | 55 | 56 | 57 |

*(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 | | | |
|---|---|---|---|
| Solution type | | Standard | High Short-circuit (*) |
| Number of Bypass Modules | | 1 | 1 + 1(1) |
| Number of Power Modules | | 1 → 6 | |
| Bypass overload (A) | Nominal | 362 | 362 |
| | Continuous | 398 | 398 |
| | 10' | 453 | 453 |
| | 1' | 543 | 543 |
| | 1" | 634 | 634 |
| Bypass Max short-circuit current ITSM (A) | 20 ms | 15000 | 28000 |
| Bypass I2t (A2s) | | 1125000 | 3920000 |

(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 | 1 | 1 or 1 + 1(1) |
| Number of Power Modules | 1 → 6 | |
| Short-circuit current withstand (Icw) | 10 kA | 25 kA up to 50 kA(2) |
| Conditional short-circuit current (Icc) | | 65 kA |

*(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 saferty performance (beyond IEC/EN 62040-1 requirements)*
- *Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability*

## 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 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Inverter overload (kW)(2) | 10 min | 62.5 | 125 | 187 | 250 | 312 | 312 |
| | 5 min | 66 | 132 | 198 | 264 | 330 | 330 |
| | 1 min | 75 | 150 | 225 | 300 | 375 | 375 |
| Inverter short-circuit (A) Ik1 = Ik2 = Ik3 | 40 ms | 195 | 390 | 585 | 780 | 975 | 1170 |
| | 40 to 100 ms | 162 | 324 | 486 | 648 | 810 | 972 |

(1) No Power redundancy

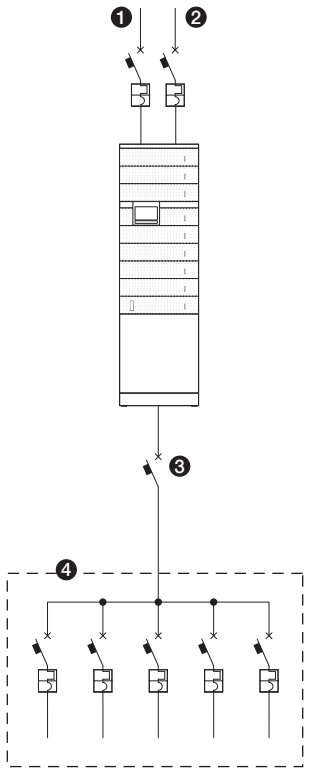
(2) Conditions: Initial Pout ≤ 80% Pn, Vin nominal

| ELECTRICAL CHARACTERISTICS - Battery Charger Max Current | | | | | | |
|---|---|---|---|---|---|---|
| Number of Power Modules | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Maximum Current (A) | 20 | 40 | 60 | 80 | 100 | 120 |

(1) No power redundancy

## 2.3 RECOMMENDED PROTECTION

### 2.3.1 SYSTEM FROM 50 TO 250 + 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 → 6 |
| 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 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Circuit breaker with Im ≤ 10 x In (A) | Minimum | 100 | 200 | 320 | 400 | 450 | 450 |
| | Maximum | 450 | 450 | 450 | 450 | 450 | 450 |

(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 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 operational with the definitive load, to prevent the RCD tripping.

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 network 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 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 | | 1 | 2 | 3 | 4 | 5 | 6 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Circuit breaker with Im ≤ 10 x In (A) | Minimum | 100 | 200 | 320 | 400 | 400 | 400 |
| | Maximum | 450 | 450 | 450 | 450 | 450 | 450 |

*(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 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| 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 |
| N+1 redundant System Power (kW) | | 50 + 0(1) | 50 + 50 | 100 + 50 | 150 + 50 | 200 + 50 | 250 + 50 |
| Circuit breaker with Im ≤ 5 x In (A) | Maximum | 25 | 50 | 80 | 100 | 125 | 125 |
| Circuit breaker with Im ≤ 10 x In (A) | Maximum | 13 | 25 | 40 | 50 | 63 | 80 |

(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.

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.

## 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.

# MODULYS XM

100 to 600 + 50 kW

Redundant Modular UPS

## ULTIMATE

Fault tolerant power
without compromise


Socomec Resource Center
To download, brochures, catalogues
and technical manuals

socomec
Innovative Power Solutions

# 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 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.

### 1.1.1 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(1) | 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*

### 1.1.2 FLEXIBLE SHORT-CIRCUIT PERFORMANCE

| SYSTEM CONFIGURATIONS | | |
|---|---|---|
| | Standard | High Short-circuit |
| System description | Short-circuit safety performance according to IEC/EN62040-1 requirements | - Extra-rugged system for enhanced short-circuit safety performance (beyond IEC/EN 62040-1 requirements)<br>- Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability |
| Number of Bypass Modules | 2 | 2 + 1(1) |
| Number of Power Modules | 2 → 13 | 2 → 13 |

*(1) Extra Bypass*

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

### 1.1.3 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.

### 1.1.4 FLEXIBLE GROUNDING COMPATIBILITY

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

## 1.2 FLEXIBLE BACK-UP TIME

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

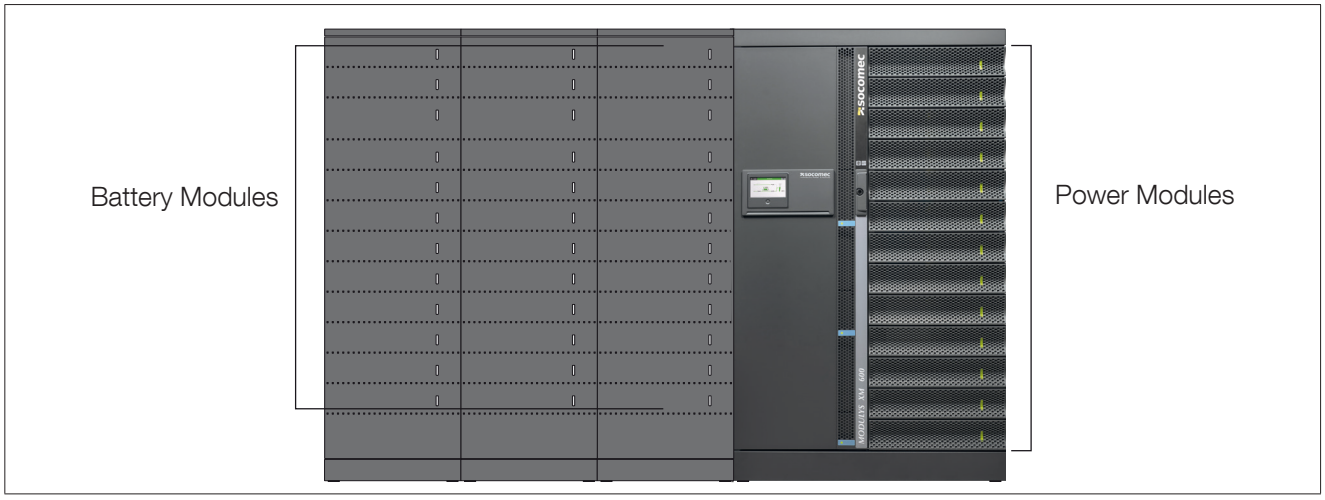
Each battery pack has an acid-proof container designed to prevent damage in the event of acid leakage.

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

### 1.2.1 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) | 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 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[1] | 100+50 | 150+50 | 200+50 | 250+50 | 300+50 | 350+50 | 400+50 | 450+50 | 500+50 | 550+50 | 600+50 |
| Power (kW) | | Number of strings | | Cumultative Ah | | | | | | | | | | | | | |
| | 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*

## 1.2.2 MODULAR BATTERY CABINET - HIGH CAPACITY


| DIMENSIONS AND WEIGHT | |
|---|---|
| Height (mm) | 1990 |
| Depth (mm) | 890 |
| Width (mm) | 810 |
| Weight (kg) | 1792 |

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<br>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[1] | 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 | Numer of battery strings | 1 | Cumulative Ah | 90 | 49 | 19,8 | | | | | | | | | | |
| | 2 | | 2 | | 180 | 115 | 49 | 29,1 | 19,8 | 14,3 | | | | | | | |
| | 3 | | 3 | | 270 | 184 | 82 | 49 | 34 | 25,3 | 19,8 | 15,4 | | | | | |
| | 4 | | 4 | | 360 | 255 | 115 | 71 | 49 | 37 | 29,1 | 23,9 | 19,8 | 16,3 | 14,3 | | |
| | 5 | | 5 | | 450 | 329 | 148 | 93 | 66 | 49 | 39 | 32 | 26,6 | 23,1 | 19,8 | 16,8 | 14,9 |
| | 6 | | 6 | | 540 | 407 | 184 | 115 | 82 | 62 | 49 | 41 | 34 | 29,1 | 25,3 | 22,5 | 19,8 |

*(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 | 9 | 10 | 11 | 12 | 13 |
| Height (mm) | 1990 | | | | | | | | | | | | |
| Depth (mm) | 890 | | | | | | | | | | | | |
| 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(1) | 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(1) | 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 | (m3/h) | 1200 | 1800 | 2400 | 3000 | 3600 | 4200 | 4800 | 5400 | 6000 | 6600 | 7200 | 7800 |
| Power Dissipation under nominal conditions(2) | (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(3) | (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(1) | 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) (1) | 53 | 50 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 |

*(1) 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) |

*(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(1) |
| 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) | 20 ms | 28000 | 40000 |
| Bypass I2t (A2s) | | 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(1) |
| Number of Power Modules | 2 → 13 | |
| Short-circuit current withstand (Icw) | 20 kA | 35 kA up to 65 kA(2) |

*(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 saferty performance (beyond IEC/EN 62040-1 requirements)*
- *Ready for +1 extra Bypass Module (option) for higher Bypass short-circuit capability*

## 2.2.2 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[1] | 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)[2] | 10 min | 125 | 187,5 | 250 | 312,5 | 375 | 437,5 | 500 | 562,5 | 625 | 687,5 | 750 | 750 |
| | 5 min | 132 | 198 | 264 | 330 | 396 | 462 | 528 | 594 | 660 | 726 | 792 | 792 |
| | 1 min | 150 | 225 | 300 | 375 | 450 | 525 | 600 | 675 | 750 | 825 | 900 | 900 |
| Inverter short-circuit (A) Ik1 = Ik2 = Ik3 | 40 ms | 390 | 585 | 780 | 975 | 1170 | 1365 | 1560 | 1755 | 1950 | 2145 | 2340 | 2535 |
| | 40 to 100 ms | 324 | 486 | 648 | 810 | 972 | 1134 | 1296 | 1458 | 1620 | 1782 | 1944 | 2106 |

*(1) No Power redundancy*

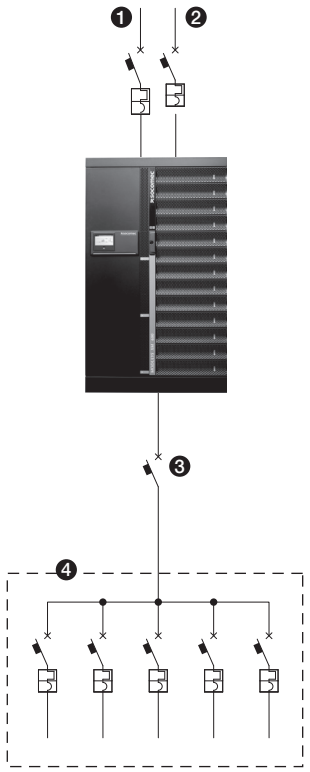
*(2) Conditions: Initial Pout ≤ 80% Pn, Vin nominal*

| 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[1] | 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*

## 2.3 RECOMMENDED PROTECTION

### 2.3.1 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 ($mm^2$) | Flexible | 3 x 240 |
| | Rigid | 3 x 240 |
| Bypass terminals ($mm^2$) | Flexible | 3 x 240 |
| | Rigid | 3 x 240 |
| Battery terminals ($mm^2$) | Flexible | 3 x 240 |
| | Rigid | 3 x 240 |
| Output terminals ($mm^2$) | 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(1) | 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 tipping over.*

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 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 then 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(1) | 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 | 1000 |
| | Max | 1250 | 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 ≥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 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| N+1 redundant System Power (kW) | | 100+0(1) | 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(1) | 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 Im ≤ 5 x In (A) | Max | 50 | 80 | 100 | 125 | 125 | 200 | 200 | 250 | 250 | 250 | 250 | 250 |
| Circuit breaker with Im ≤ 10 x In (A) | Max | 25 | 40 | 50 | 63 | 80 | 100 | 100 | 125 | 125 | 160 | 160 | 160 |

*(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.

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.

## 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.

# MODULYS XL

Ultimate modular UPS

200 kW to 4.8 MW

**ULTIMATE**

Fault tolerant power
without compromise

3 LEVEL TECHNOLOGY

97% EFFICIENCY

kW = kVA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Innovative Power Solutions

# OBJECTIVES

The aim 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.

# 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 protection (or two, if there is a separate bypass line) of an appropriate rating for the power draw at full load.

For detailed information, see the installation and operating manual.

# 1. ARCHITECTURE

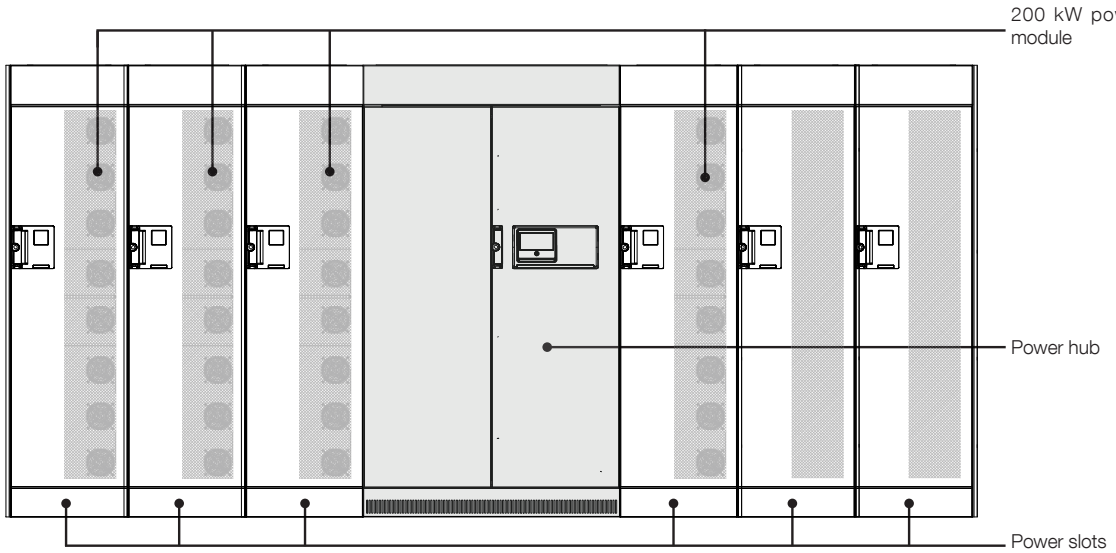
## 1.1 RANGE

MODULYS XL is a modular UPS system designed to provide high performance and power scalability.

Power scalability can be by adding power blocks of 200 kW (Power module) to extend the system up to 1200 kW or less, according to the maximum power requirement. Systems can be parallelised to increase the rated power up to 4,8 MW

As the system has been designed to allow the power module to be hot-swappable, the load can be fully protected by on-line double conversion during system extension or maintenance.

Manufactured in Europe, MODULYS XL is a modular system including an individual Socomec switching system for each power block enabling easy and safe coupling and disconnection.




**Power HUB** for the UPS Unit

- All input(s) - output and battery connections to the UPS unit.
- Full rated centralized static switch on bypass line
- Remote communication interfaces
- User interface (HMI)
- 63A-3Ph plug for advanced maintenance services

**Power SLOT** for Power MODULE plug-in

- built-in bus bars for interconnection together with others Power SLOTs and to the Power HUB
- Preconnected communication bus

**Power MODULE** rated for 200 kVA/kW permanent operating

- Single and full rated Rectifier - Inverter & Battery charger
- Double conversion's side bypass device
- Selective disconnection at input and output stages for complete isolation (contactors and fuses)
- Local battery disconnection switch - to isolate the module from the Battery bus
- Plug-in system (power and control) to connect on the Unit

## 1.2 RATED POWER

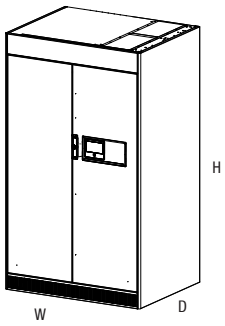
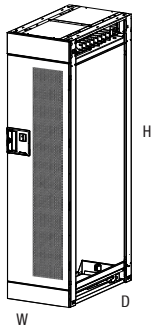
The rated power is related to the number of installed Power modules. The number of Power slots installed at the beginning defines maximum power that can be reached through Hot-scalability at each UPS UNIT level.

| RATED POWER PER UPS UNIT | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of *Power Slots* | 3 | | | 4 | | | | 5 | | | | | 6 | | | | | |
| Number of power *module* (200 kW) | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 6 |
| Power (kW) N configuration at 40°C | 200 | 400 | 600 | 200 | 400 | 600 | 800 | 200 | 400 | 600 | 800 | 1000 | 200 | 400 | 600 | 800 | 1000 | 1200 |
| Power (kW) N+1 configuration at 40°C | | 200 | 400 | | 200 | 400 | 600 | | 200 | 400 | 600 | 800 | | 200 | 400 | 600 | 800 | 1000 |
| Parallel units | up to 4 units (200-1200kVA/kW) in parallel | | | | | | | | | | | | | | | | | |

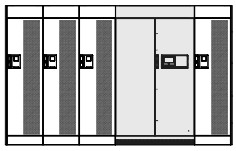
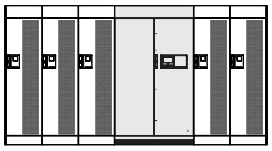
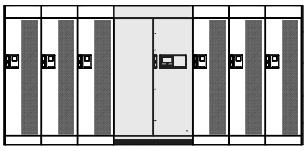
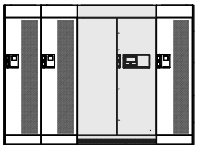
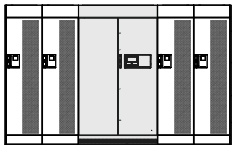
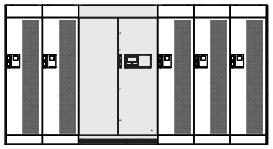
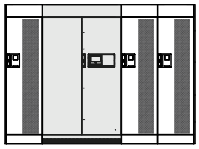
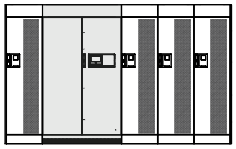
## 1.3 THE BRICKS

MODULYS XL is built on a flexible brick concept. The UPS can be built by associating the bricks according to the requirements.

1. *Select the Power HUB*
2. *Specify the number of Power slots according to the maximum power and the redundancy level which is required to protect the load at the final stage.*
3. *Specify the number of Power modules needed to protect the load at the initial stage; Power Modules are plugged into installed Power Slots. Unused Power slots are ready for later Power module hot plug-in, when needed.*

| DIMENSIONS AND WEIGHT | | | | | | |
|---|---|---|---|---|---|---|
| Section | View | Rated power (kVA/kW) | Width [W] (mm) | Depth [D] (mm) | Height [H] (mm) | Weight (kg) |
| Power HUB |  | Up to 1200 | 1200 | 975 | 2120 | 750 |
| Power slots |  | 200 | 550 | 975 | 2120 | 110 |
| Power module |  | 200 | 500 | 950 | 1940 | 460 |

## THE DESIGN ALLOW FLEXIBLE POWER SLOT NUMBER AND POSITION- UP TO 3 ON EACH SIDE

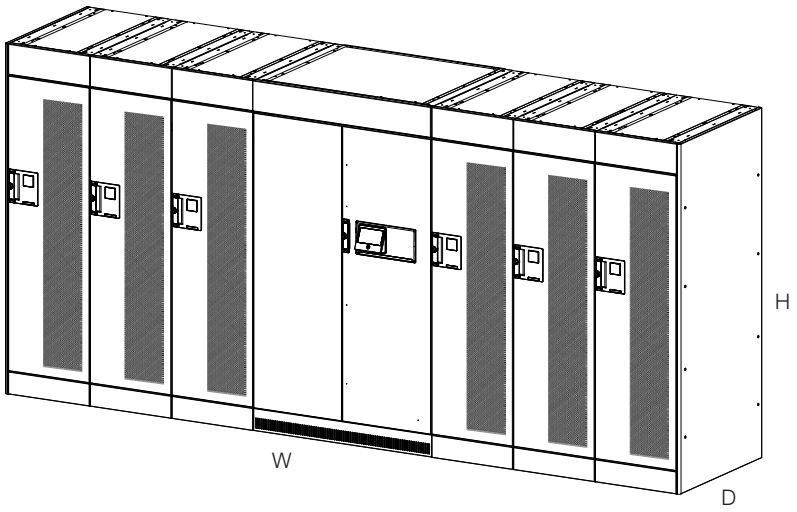
| 3 *Power* slots | 4 *Power* slots | 5 *Power* slots | 6 *Power* slots |
|---|---|---|---|
|  |  |  |  |
|  |  |  | |
|  |  | | |
|  | | | |

The UPS Unit can be defined as per required.

Slots installed at initial stage are ready to hot plug Power modules.

Power modules can be plugged into power slot without any constrain of position or number.

## UNIT DIMENSIONS




| **UNIT DIMENSIONS** | | | | | | |
|---|---|---|---|---|---|---|
| Number of **Power slots** | | | 3 | 4 | 5 | 6 |
| Maximum power (kW) | | | 600 | 800 | 1000 | 1200 |
| **UNIT** size | Width [W] (1) | mm | 2890 | 3440 | 3990 | 4540 |
| | Depth [D] | mm | 975 | | | |
| | Height [H] | mm | 2120 | | | |
| Weight | | kg | 2500 | 3100 | 3650 | 4250 |
| Single unit Clearances | | mm | No rear or lateral clearance,Top = 400 mm | | | |
| Access for maintenance | | mm | Front only (≥ 1200 mm free space for Module extraction) | | | |

*(1) Width is including left and right side panels.*

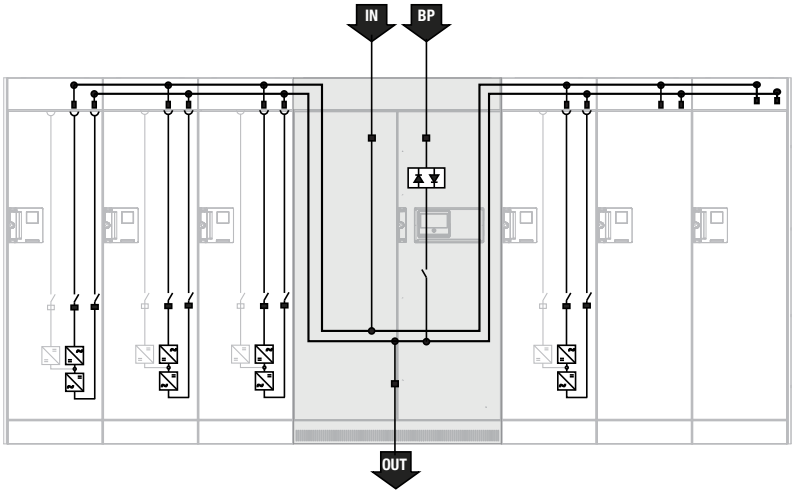
## 1.4 SYSTEM ARCHITECTURES

MODULYS XL's design simplifies the connection to the upstream and downstream switchboards resulting in a simpler, faster and safer unit than a traditional UPS solution. All connections to the electrical infrastructure are performed on the system, without any modification to the site installation when power module(s) are added.

For full adaptation to all types of infrastructure and environments, MODULYS XL can be:

- set with common or separated inputs.
- top and bottom entry UPS connection
- energy storage flexibility (Distributed, Shared or Mixed).

### 1.4.1 BYPASS ARCHITECTURE

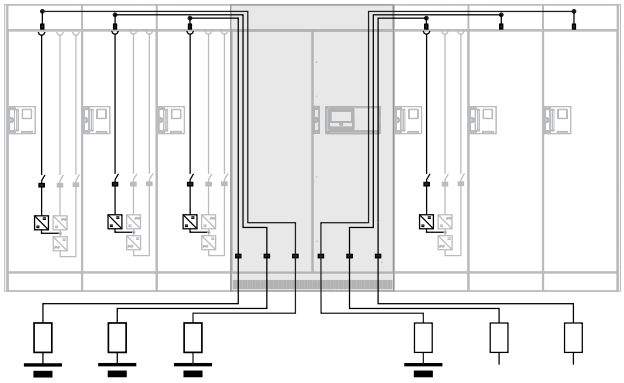



By-pass architecture for each UPS UNIT

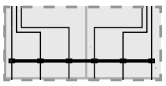
The above drawings show simplified diagrams for separated inputs (Rectifier / Bypass).

### 1.4.2 BATTERY CONNECTION

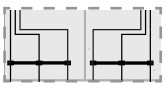
Modulys XL provides full flexibility in regards to the batteries connection. This permits to address all different needs in term of availability, cost and footprint optimization.



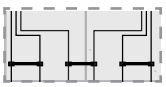
Distributed battery



1 battery set shared for
All installed slots/modules



1 battery set shared for
3 power slots/modules



1 battery set shared for
2 power slots/modules

Flexible battery sharing

The battery switch in the module allows to connect / disconnect it from the battery bus without the need to remove the entire battery set (ie Shared battery).

For a full hot scalability during a battery set extension, 2 solutions are availbale with Modulys XL :

- The future battery protection can be directly prewired to the Power HUB

or

- An additionnal power slot can be installed to provide a full front access to the future battery set.

For parallel systems, each system can have its own battery coupling design.

# 2. STANDARD AND OPTIONAL EQUIPMENTS

## 2.1 FLEXIBLE UPS UNIT ARCHITECTURE

- Hot-scalable or Cold-scalable power.
- Adjustable redundancy level.
- Common or separated rectifier and bypass mains.
- Compatible with different energy storage technologies (e.g.VLRA, Li-Ion, Ni-Cd...).

## 2.2 STANDARD ELECTRICAL FEATURES.

- Separated inputs (rectifier, bypass).
- Top or bottom cable entry.
- Backfeed protection: detection circuit.
- Full redundant cooling system.
- Distributed batteries (1 per module).
- Battery room temperature sensor.
- Module heat run test.
- Full system heat run test.
- 63 A three-phase plug for extracted module testing.
- External switches position management
- Firmware and parameter auto-alignment
- Energy Saver mode

## 2.3 ELECTRICAL OPTIONS.

- Input, output and maintenance bypass switches.
- 3-wires bypass and output distribution kit.
- PEN kit for TN-C grounding system.
- Shared batteries (1, 2 or 3 per unit).
- Reinforced battery charger.
- Battery tripping kit.
- Additional battery temperature sensors.
- Redundant electronic power supplies.
- BCR (Battery Capacity Re-injection).
- Smart Conversion Mode.
- ACS synchronisation system.
- Cold start.

## 2.4 STANDARD COMMUNICATION FEATURES.

- User-friendly 7’ touch-screen multilingual color graphic display (Power Hub).
- Tricolour display with number for Power Module status (Power Slot)
- 4 Com-Slots for communication options.
- USB port to download UPS report and log file.
- Ethernet port for service purpose.

## 2.5 COMMUNICATION OPTIONS.

- Dry-contact interface (configurable Volt-free contacts).
- MODBUS RTU RS485 or TCP
- PROFIBUS / PROFINET gateway.
- BACnet/IP interface.
- NET VISION: professional WEB/SNMP Ethernet interface for secure UPS monitoring and remote automatic shutdown.
- NET VISION EMD: Environment Temperature and Humidity sensor with 2 inputs
- Remote View Pro supervision software.
- IoT Gateway for Socomec cloud services and SoLive mobile app.
- Remote touch-screen panel.

## 2.6 REMOTE MONITORING AND CLOUD SERVICES.

- SoLink: Socomec 24/7 Remote Monitoring Service connecting your installation to the nearest Socomec Service Centre.
- SoLive: Mobile app taking the surveillance of all your UPS systems into your smartphone.

# 3. SPECIFICATIONS

## 3.1 INSTALLATION PARAMETERS

| SYSTEM INSTALLATION | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit Rated power (kVA) | | 200 | 400 | 600 | 800 | 1000 | 1200 | 200 | 400 | 600 | 800 | 1000 |
| System configuration | | N configuration | | | | | | N+1 redundant configuration | | | | |
| Number of *Power m*odule (200 kW) | | 1 | 2 | 3 | 4 | 5 | 6 | 1+1 | 2+1 | 3+1 | 4+1 | 5+1 |
| Active power | (kW) | 200 | 400 | 600 | 800 | 1000 | 1200 | 200 | 400 | 600 | 800 | 1000 |
| Rated rectifier input current | (A) | 302 | 604 | 906 | 1208 | 1510 | 1812 | 302 | 604 | 906 | 1208 | 1510 |
| Maximum rectifier input current | (A) | 340 | 680 | 1020 | 1360 | 1700 | 2040 | 680 | 1020 | 1360 | 1700 | 2040 |
| Rated input bypass current | (A) | 289 | 577 | 866 | 1155 | 1443 | 1732 | 289 | 577 | 866 | 1155 | 1443 |
| Maximum rated bypass current | (A) | 1732 | | | | | | | | | | |
| Rated output current @ 400 V | (A) | 289 | 577 | 866 | 1155 | 1443 | 1732 | 289 | 577 | 866 | 1155 | 1443 |
| Maximum air flow | ($m^3$/h) | 2100 | 4200 | 6300 | 8400 | 10500 | 12600 | 4200 | 6300 | 8400 | 10500 | 12600 |
| Power dissipation in nominal conditions[1] | (kW) | 8.5 | 17.0 | 25.5 | 34.0 | 42.5 | 51.0 | 8.5 | 17.0 | 25.5 | 34.0 | 42.5 |
| | (kcal/h) x1000 | 7.3 | 14.6 | 21.9 | 29.2 | 36.5 | 43.8 | 7.3 | 14.6 | 21.9 | 29.2 | 36.5 |
| | BTU/h x1000 | 29 | 58 | 87 | 116 | 145 | 174 | 29 | 58 | 87 | 116 | 145 |
| Power dissipation (max) in the worst conditions[2] | (kW) | 10.4 | 20.8 | 31.2 | 41.6 | 52.1 | 62.5 | 10.2 | 21.2 | 32.6 | 44.3 | 55.7 |
| | (kcal/h) x1000 | 8.9 | 17.9 | 26.8 | 35.8 | 44.8 | 53.7 | 8.8 | 18.2 | 28 | 38.1 | 47.9 |
| | BTU/h x1000 | 35.5 | 71 | 106 | 142 | 178 | 213 | 34.8 | 72.3 | 111 | 151 | 190 |

## 3.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER INPUT[3] | |
|---|---|
| Rated mains supply voltage | 400 V 3ph |
| Voltage tolerance | 200 V to 480 V[4] |
| Rated frequency | 50/60 Hz |
| Frequency tolerance | 45 to 65 Hz |
| Power factor | > 0.99[5] |
| Total harmonic distortion (THDi) | < 2.5%[5] |
| Max inrush current at start-up | < In (no overcurrent) |
| Soft start (Power walk-in) | Configurable from 1A/s to 1000A/s per module |

| ELECTRICAL CHARACTERISTICS - BATTERY | |
|---|---|
| Battery Type | VRLA – Lithium Ion - Ni-Cd |
| Number of poles | 2 wires (+/-) |
| Battery Voltage range | Up to 700V |
| Lithium Ion communication with UPS | Basic (Dry contact) / Smart (Modbus) |
| Min/Max number of VRLA battery cells with load PF=1 | 258 |
| Min/Max number of VRLA battery cells with load PF ≤ 0.9 | 234 |
| Min/Max number of VRLA battery cells with load PF ≤ 0.8 | 222 |
| Battery AC ripple current | < 3% C10 |
| Battery AC ripple voltage | < 1% on the battery bloc |
| Battery charger | 40A per module (standard)<br>120A per module (optional) |

| ELECTRICAL CHARACTERISTICS - STATIC BYPASS | | |
|---|---|---|
| Bypass rated voltage | | Nominal output voltage |
| Bypass voltage tolerance | | ±15% (settable) |
| Bypass rated frequency | | 50/60 Hz (selectable) |
| Bypass frequency tolerance | | ±2% (from ±1% to ±5% (operation with generator unit)) |
| Bypass frequency variation speed follow up | | 1 Hz/s settable from 1 to 3 Hz/s |
| Semiconductors characteristics | $I^2t$ ($A^2s$) | Up to 10 400 000 |
| | Is/c (A peak) | Up to 45 500 |
| Overload tolerated on the bypass mains | 60 min | 110% of the installed apparent power |
| | 10 min | 125% of the installed apparent power |
| Short-circuit withstanding (Icw) | kA | 100 (symmetrical) without fuses |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of installed *Power mo*dule (200 kVA/kW) | | 1 | 2 | 3 | 4 | 5 | 6 |
| Rated output voltage (selectable) | | 400 V 3ph | | | | | |
| Output voltage tolerance | | static load <1%, dynamic load VFI-SS-111 compliant | | | | | |
| Rated output frequency | | 50/60 Hz (selectable) | | | | | |
| Autonomous frequency tolerance | | ±0.01 Hz on mains power failure | | | | | |
| Harmonic voltage distortion | | ThdU ≤ 1 % with rated linear load | | | | | |
| Overload tolerated[6] by the inverter | 1h | 220 kW | 440 kW | 660 kW | 880 kW | 1100 kW | 1320 kW |
| | 10 min | 250 kW | 500 kW | 750 kW | 1000 kW | 1250 kW | 1500 kW |
| | 1 min | 300 kW | 600 kW | 900 kW | 1200 kW | 1500 kW | 1800 kW |

| ENVIRONMENT CHARACTERISTICS | |
|---|---|
| UPS storage conditions | -20 to +70 °C<br>under ≤70% condensation free RH |
| UPS start-up and working conditions | 0 to +50 °C<br>under ≤95% condensation free RH |
| Air inlet | Front |
| Air outlet | Top |
| Operating relative humidity (non-condensing) | ≤ 95% |
| Power module efficiency in double conversion (VFI) | up to 97% |
| Acoustic noise | < 75 dBA |
| Maximum altitude without derating | 1000 m (3,300 ft) |
| Degree of protection | IP 20 (IP30 top grids) |
| Colour | RAL 7016 |

1. *Nominal input current and rated output active power (PF1). Losses for N+1 configuration is considering the worst case (Redundancy lost).*
2. *Dissipation that may be generated temporary, considering: Low input voltage, battery recharge and rated output active power (PF1).*
3. *IGBT rectifier.*
4. *Conditions apply.*
5. *At full load and rated input voltage (THDV < 1%).*
6. *The tolerated output overload corresponds to the inverter capability only. The output overload performance is incremented by the static bypass capability (when available)*

## 3.3 RECOMMENDED SYSTEM PROTECTIONS

### 3.3.1 INPUT PROTECTIONS FOR SINGLE UNIT CONFIGURATION

| RECOMMENDED PROTECTION DEVICES – RECTIFIER INPUT[7] Ax | | | | |
|---|---|---|---|---|
| | Configuration N | | Configuration N+1 | |
| Max power (kVA) | Number of *Power* slots | Protection rating (A) | Number of *Power* slots | Protection rating (A) |
| 400 | 2 | 800 | 3 | 1250 |
| 600 | 3 | 1250 | 4 | 1600 |
| 800 | 4 | 1600 | 5 | 2000 |
| 1000 | 5 | 2000 | 6 | 2500* |
| 1200 | 6 | 2500* | | |

* Maximum input current can be configured to fit with a 2000A circuit breaker (please consult us)

| RECOMMENDED PROTECTION DEVICES – BYPASS INPUT MAIN[7] Bx | | | | |
|---|---|---|---|---|
| | Configuration N | | Configuration N+1 | |
| Max power (kVA) | Number of *Power* slots | Protection rating (A) | Number of *Power* slots | Protection rating (A) |
| 400 | 2 | 800 | 3 | 800 |
| 600 | 3 | 1000 | 4 | 1000 |
| 800 | 4 | 1250 | 5 | 1250 |
| 1000 | 5 | 1600 | 6 | 1600 |
| 1200 | 6 | 2000 | | |

All recommended protection are considering the number of Power slots planned to be installed, at initial stage or later.

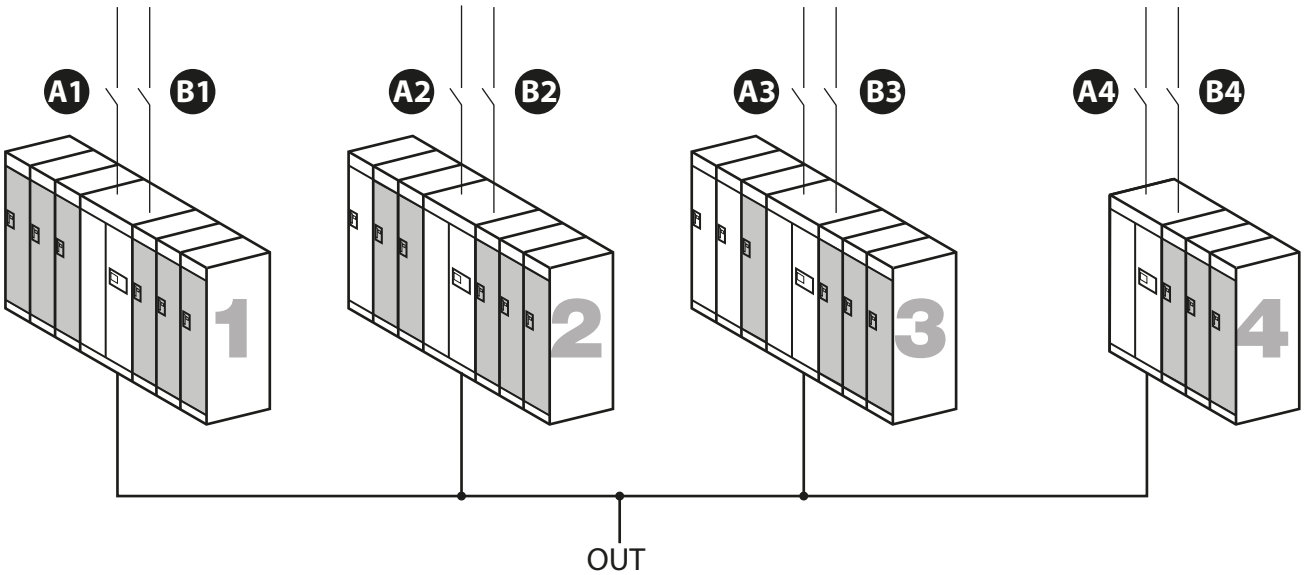
### 3.3.2 INPUT PROTECTIONS FOR PARALLEL UNITS CONFIGURATION

For parallel Units, protection devices upstream to each UPS UNIT are recommended as per the following guidelines:

Rectifiers: Each UNIT's input can be protected according to the number of installed Power Slots - Refer to the recommended protection for a Single Unit.

Bypass: Each UNIT's input feeders protection and cables section shall be properly sized according to the UNIT having the highest number of installed Power Slots - Refer to the recommended protection for a Single Unit.

Bx = Max B1 - B2 - B3 - B4



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## 3.3.3 OUTPUT PROTECTIONS

| RECOMMENDED PROTECTION DEVICES – OUTPUT[8] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of Power module (200 kVA/kW) | | 1 | 2 | 3 | 4 | 5 | 6 |
| Inverter short-circuit current[9] (A) (when AUX MAINS is not present) | 0 to 20 ms | 820A | 1640A | 2460A | 3280A | 4100A | 4920A |
| | 20 to 100 ms | 650A | 1300A | 1950A | 2600A | 3250A | 3900A |
| Output protection rating (A) | | ≤ 80 | ≤ 160 | ≤ 200 | ≤ 250 | ≤ 400 | ≤ 400 |

On parallel system, selectivity can be calculated by using short-circuit current of a Power module X number of Power modules

## 3.3.4 CABLES CONNECTION

| AC CABLES CONNECTION – POWER HUB [10] | | | |
|---|---|---|---|
| | Maximum number of cable according the size (Others on demand) | | |
| Rectifier terminals 3PH [11] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |
| Bypass terminals 3PH+N [12] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |
| Output terminals 3PH+N [12] | 6 x 240 mm² per pole | 5 x 300 mm² per pole | 4 x 400 mm² per pole |

| DC CABLES CONNECTION – POWER HUB [10] | | |
|---|---|---|
| Cables entry | Battery connection | Max section per pole |
| bottom entry | Distributed | Up to 6 batteries with max 1 x 240mm² per battery |
| | Shared all Power SLOT enclosures | Max 10 x 240mm² for the battery |
| | Shared 2 Power SLOT enclosures | Up to 3 batteries with max 2 x 240mm² each group |
| | Shared 3 Power SLOT enclosures | Up to 2 batteries with max 4 x 240mm² each group |
| top entry | Distributed | Up to 6 batteries with max 1 x 240mm² per battery |
| | Shared all Power SLOT enclosures | Max 8 x 240mm² for the battery |
| | Shared 2 Power SLOT enclosures | Up to 3 batteries with max 2 x 240mm² each group |
| | Shared 3 Power SLOT enclosures | Up to 2 batteries with max 4 x 240mm² each group |

7. *Applicable to separate inputs by respecting the installation rules regarding cables lengths. The bypass protection is given as a recommendation (trip curves setting and distribution sizing shall be defined according to the rated load current and the UPS overload capability). The protection shall be settable according the number of installed power blocks, its setting range shall be from 0.4 to 1 x rated current. When the bypass and rectifier inputs are combined (common input), the general input protection rating must be at least equivalent to the highest between Ax and Bx (bypass or rectifier).*
8. *Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present). This must be selective with residual current circuit breakers connected downstream of the UPS.*
9. *Average Peak Current*
10. *Based on 90° HO7 RN or R2V cable type; for other please consult us*
11. *Neutral is not required at the rectifier input. If however distributed, consult us to ensure it is allowed by installation standards.*
12. *On demand, the Unit can supply a 3 wires distribution (without input and output neutral).*

# 4. REFERENCE STANDARDS AND DIRECTIVES

## 4.1 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 harmonization legislation:

**LVD 2014 / 35 / EU**
DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonization 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 harmonization 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

## 4.2 STANDARDS

### 4.2.1 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)

### 4.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (tested and verified by LCIE BUREAU VERITAS)

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (tested and verified by LCIE BUREAU VERITAS)

### 4.2.3 TEST AND PERFORMANCE

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

### 4.2.4 ENVIRONMENTAL

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

## 4.3 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.

PRIME

Trustworthy power

# EMergency CPSS

2 to 200 kVA


Socomec Resource Center
To download, brochures, catalogues and technical manuals

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# 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 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 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

The EMergency CPSS range has been designed to protect the power supply of safety systems.
All our EMergency products are compliant with standard EN 50171:2001.

The EMergency CPSS products are designed to power emergency escape lighting in the event of normal supply failure. Depending on the local legislation, it may be suitable for powering other essential safety equipment, for example:

- electric circuits of automatic fire extinguishing installations;
- paging systems and signalling safety installations;
- smoke extraction equipment;
- carbon monoxide warning systems;
- special safety installations related to specific buildings, e.g. high-risk areas.

CPSS Emergency EM from 2 to 200 kVA

- Designed and manufactured in compliance with standard EN 50171:2001.
- Ensures the power supply to emergency lighting, safety signalling lighting and anti-panic systems.

| MODELS[1][2] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 2 | 6 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 | 160 | 200 |
| EM+ | ITYS 1/1 | • | • | - | - | - | - | - | - | - | - | - | - |
| | MASTERYS 3/1 | - | - | • | • | - | - | - | - | - | - | - | - |
| | MASTERYS 3/3 | - | - | • | • | • | • | • | • | • | • | - | - |
| | DELPHYS 3/3 | - | - | - | - | - | - | - | - | - | - | • | • |

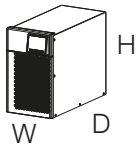
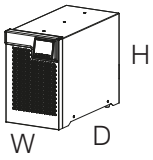
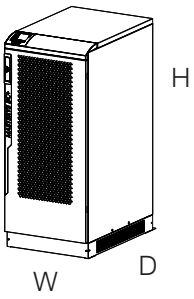
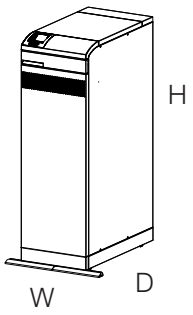
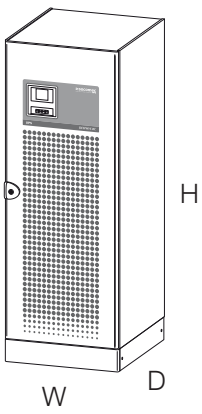
*Matrix table for model and kVA power rating.*

*(1) Check the product availability for your country. (2) Products can be adapted to application and site specifications.*

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 2 TO 200 KVA

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Cabinet type | | Width (W) [mm] | Depth (D) [mm] | Height (H) [mm] |
|  | ITYS EM+ *2* kVA | 192 | 428 | 322 |
|  | ITYS EM+ *6* kVA | 225 | 416 | 354 |
|  | MASTERYS EM+ *10* to *40* kVA | 444 | 800 | 1400 |
|  | MASTERYS EM+ *80* to *120* kVA | 600 | 855 | 1400 |
|  | DELPHYS EM *160* / *200* kVA | 700 | 800 | 1930 |

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 upper front section and can be accessed from the metal door.

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

# 3. STANDARD AND OPTIONS

## 3.1 EMERGENCY CPSS EM FROM 2 TO 200 KVA

The wide range is suitable for all standard requirements.
For non-standard requests, our team of experts is available to adapt products to your needs.

Features

- IP20 metal enclosure compliant with EN 60598-1.
- Battery charging: 80% in 12 h.
- Battery protection against damage due to polarity inversion.
- Battery protection against considerable discharge.
- Battery with 10-year life expectancy(1).
- Designed to withstand 120% of the nominal charge during the entire back-up period.
- Specific remote contacts and notifications.

Options

- Connection to downstream IT system.
- Eco mode to reach up to 98% efficiency.
- Other types of battery available.

(1) not for ITYS EM+ 2 kVA (LPS system).

# 4. SPECIFICATIONS

## 4.1 ITYS EM+

### 4.1.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | |
|---|---|---|---|
| Sn - rated power (kVA) | | 2 | 6 |
| Pn - active power (kW) | | 2 | 6 |
| Pn according to EN 50171:2001 (kW) | | 1.5 | 5 |
| Max withstand power according to EN 50171:2001 (kW) | | 2 | 6 |
| Phase in/out | | 1/1 | |
| Rated/maximum rectifier input current (EN 62040-3) (A) | | 9/16 | 28/42 |
| Inverter output current @ 230 V (A) P/N | | 8.7 | 26 |
| Maximum air flow ($m^3/h$) | | 192 | 230 |
| Sound level (dBA) | | < 50 | |
| Dissipation at rated load (minimum mains power present and battery charging) | W | 135 | 326 |
| | kcal/h | 116 | 280 |
| | BTU/h | 461 | 1112 |
| Dimensions (W x D x H) (mm) | | 192 x 428 x 322 | 225 x 416 x 354 |
| Maximum weight (kg) | | 11 | 13.5 |

### 4.1.2 ELECTRICAL CHARACTERISTICS

| INSTALLATION PARAMETERS | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Phase in/out | 1/1 | |
| Rated mains supply voltage | 230 V (1ph+N) | |
| Voltage tolerance (ensuring battery recharge) | 160 V to 300 V | 160 V to 276 V |
| | (up to 110 V with load linear decrease from 100% Pn to 50% Pn) | |
| Rated frequency | 50/60 Hz (selectable) | |
| Frequency tolerance | ±2% | |
| Power factor (input at full load and rated voltage) | ≥ 0.995 | |
| Total harmonic distortion (THDi) | < 5% | < 3% |
| Max inrush current at start-up | < 8 x In | |

| ELECTRICAL CHARACTERISTICS - BYPASS | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Bypass frequency variation speed | 1 Hz/s - 3 Hz/s | |
| Bypass rated voltage | 187-264 V | |
| Bypass rated frequency (selectable) | 50/60 Hz (selectable) | |
| Bypass frequency tolerance | ±10% (configurable from 1% to 10%) | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Rated output voltage (selectable) | 220/230/240 V | |
| Output voltage tolerance | Static: ±1% | |
| Rated output frequency (selectable) | 50/60 Hz (selectable) | |
| Output frequency tolerance | ±0.1% (on mains power failure) | |
| Load crest factor | < 3:1 | |
| Total voltage distortion | < 1% on linear load | |
| Overload tolerated by the inverter | 110% x 5 min, 130% x 5 sec | |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Double conversion efficiency (normal mode - @ full load) | up to 93% | up to 95% |
| Efficiency in Eco Mode | up to 97% | up to 98% |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| 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) | |
| Maximum relative humidity (non-condensing) | 95% | |
| Maximum altitude without derating | 1000 m (3300 ft) | |
| Degree of protection | IP20 | |
| Portability | ISTA 1H P-164000664 | |
| Colour | RAL 7016 textured | |

## 4.1.3 RECOMMENDED PROTECTION

| RECOMMENDED PROTECTION - RECTIFIER | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Circuit breaker (A) | 20 C curve | 63 D curve |

| RECOMMENDED PROTECTION - INPUT RESIDUAL CURRENT CIRCUIT BREAKER | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Input residual current circuit breaker | 0.03 A Selective Type A | |

| RECOMMENDED PROTECTION - OUTPUT | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| B curve circuit breaker (A) | 4 | 6 |

| CABLES - MAXIMUM CABLE SECTION | | |
|---|---|---|
| Rated power (kVA) | 2 | 6 |
| Rectifier terminals | IEC 320-C20 | 16 $mm^2$ |
| Bypass terminals | - | |
| Battery terminals | Connector | |
| Output terminals | 8x IEC 320-C13 | |

# 4.2 MASTERYS EM+

## 4.2.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sn - rated power (kVA) | | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Pn - active power (kW) | | 10 | 15 | 10 | 15 | 20 | 25 | 27 | 36 | 72 | 108 |
| Pn according to EN50171:2001 (kW) | | 10 | 15 | 10 | 15 | 20 | 25 | 27 | 36 | 72 | 108 |
| Max withstand power (kW) according to EN 50171:2001 | | 12 | 18 | 12 | 18 | 24 | 30 | 32.4 | 43.2 | 86.4 | 129.6 |
| Phase in/out | | 3/1 | | 3/3 | | | | | | | |
| Rated/maximum rectifier input current (EN 62040-3) (A) | | 15/28 | 23/37 | 15/28 | 23/37 | 31/45 | 39/55 | 42/55 | 56/73 | 111/146 | 166/219 |
| Rated bypass input current (A) | | 48 | 72 | 16 | 24 | 32 | 40 | 48 | 64 | 128 | 191 |
| Inverter output current @ 230 V (A) P/N | | 43 | 65 | 14 | 22 | 29 | 37 | 43 | 58 | 115 | 174 |
| Maximum air flow | $m^3/h$ | 240 | | | | | | | 360 | 720 | 1080 |
| Sound level @70% Pn | dBA | ≤ 43 | | | | | | | ≤ 49 | ≤ 53 | ≤ 55 |
| Power dissipation in nominal conditions | W | 440 | 665 | 440 | 665 | 905 | 1135 | 1270 | 1776 | 3550 | 5325 |
| | kcal/h | 378 | 572 | 378 | 572 | 778 | 976 | 1092 | 1526 | 3052 | 4579 |
| | BTU/h | 1501 | 2269 | 1501 | 2269 | 3088 | 3875 | 4335 | 6060 | 12120 | 18180 |
| Power dissipation (max) in the worst conditions | W | 490 | 750 | 490 | 750 | 1050 | 1315 | 1420 | 1930 | 3860 | 5790 |
| | kcal/h | 421 | 645 | 421 | 645 | 903 | 1130 | 1221 | 1660 | 3319 | 4979 |
| | BTU/h | 1672 | 2559 | 1672 | 2559 | 3582 | 4490 | 4848 | 6950 | 13179 | 19768 |
| Dimensions (W x D x H) | mm | 444 x 800 x 1400 | | | | | | | | 600 x 855 x 1400 | |
| Single unit clearances – Opertional | mm | Rear ≥ 200 | | | | | | | | | |
| Single unit clearances – Maintenance | mm | Front ≥1500 top ≥ 800 | | | | | | | | | |
| Weight (without battery) | kg | 89 | | | | | | | 95 | 186 | 240 |
| Weight with internal battery (2/3/4/5 shelf) | kg | 333 / 430 / 527 / 624 | | | | | - | | | | |

## 4.2.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - INPUT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Rated mains supply voltage | 400 V (3ph + N) | | | | | | | | | |
| Voltage tolerance (ensuring battery recharge) | -15% +20% (output load at power factor 1)<br>-20%+20% (output load at power factor 0.9)<br>(up to -40% @70% of nominal active load (linear decrease) | | | | | | | | | |
| Rated frequency | 50/60 Hz (selectable) | | | | | | | | | |
| Frequency tolerance | 45 ÷ 66 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 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 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 (selectable) | | | | | | | | | |
| Bypass frequency tolerance | ±2% (from ±1% to ±8% (operation with generator unit)) | | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | | 3/1 | | 3/3 | | | | | | | |
| Rated output voltage (selectable) | | 220/230/240 V | | | | | | | | | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-111 (EN62040-3) compliant | | | | | | | | | |
| Rated output frequency (selectable) | | 50/60 Hz (selectable) | | | | | | | | | |
| Output frequency tolerance | | ±0.01% (on mains power failure) | | | | | | | | | |
| Load crest factor | | ≥ 2.7 | | | | | | | | | |
| Voltage harmonic distortion | | < 1% on linear load | | | | | | | | | |
| Overload tolerated by the inverter kW | 10 min | 12.5 | 18.7 | 12.5 | 18.7 | 25 | 31.2 | 33.7 | 45 | 90 | 135 |
| | 1 min | 15 | 22.5 | 15 | 22.5 | 30 | 37.5 | 40.5 | 54 | 108 | 162 |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Double conversion efficiency @ full load (normal mode) | up to 96.2 % | | | | | | | | | |
| Efficiency in Eco Mode | ≤ 99.4% | | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Storage temperatures | -5 to +50 °C (23 to 113 °F) (15 to 25 °C for better battery life) | | | | | | | | | |
| Working temperature | 0 to +40 °C(1) (32 to 104 °F)<br>(15 to 25 °C for better battery life)<br>Max +50°C (122°F) @ 70% Sn | | | | | | 0 to +35 °C(1) (32 to 95 °F)<br>(15 to 25 °C for better battery life)<br>Max +45°C (113°F) @ 70% Sn | | | |
| Maximum relative humidity (non-condensing) | 95% | | | | | | | | | |
| Maximum altitude without derating | 1000 m (3300 ft) | | | | | | | | | |
| Degree of protection | IP20 (IP21 optional) | | | | | | | | | |
| Colour | RAL 7016 | | | | | | | | | |

| ELECTRICAL CHARACTERISTICS - BATTERY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Maximum recharge current/with optional extra charger (A) | 5/10 | | | | | 10 | | | 20 | 32 |

*(1) Conditions apply.*

## 4.2.3 RECOMMENDED PROTECTION

| RECOMMENDED PROTECTION DEVICES - RECTIFIER[1] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| C curve circuit breaker (A) | 32 | 40 | 32 | 40 | 63 | 63 | 63 | 80 | 160 | 250 |
| gG fuse (A) | 32 | 40 | 32 | 40 | 63 | 63 | 63 | 80 | 160 | 250 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS[1] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Maximum $I^2t$ supported by the bypass ($kA^2s$) | 16 | | 8 | | | 15 | | | 120 | 400 |
| Max Ipk supported by the bypass (kA) | 2.4 | | 1.2 | | | 1.7 | | | 5 | 9 |
| C curve circuit breaker (A) | 63 | 100 | 25 | 32 | 40 | 63 | 63 | 80 | 200 | 250 |
| gG fuse (A) | 63 | 100 | 25 | 32 | 40 | 63 | 63 | 80 | 200 | 250 |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER[2] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Input residual current circuit breaker | > 0.5 A Selective type B | | | | | | | | | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT[3] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | | 3/1 | | 3/3 | | | | | | | |
| Short-circuit inverter current (A) (when AUX MAINS is not present) | 0 to 40 ms | 120 | 177 | 40 | 59 | 79 | 98 | 106 | 141 | 282 | 423 |
| | 40 to 100 ms | 99 | 147 | 33 | 49 | 66 | 82 | 88 | 117 | 236 | 351 |
| C curve circuit breaker[3] (A) | | 8 | 13 | 3 | 4 | 6 | 6 | 8 | 10 | 20 | 32 |
| B curve circuit breaker[3] (A) | | 16 | 25 | 6 | 8 | 10 | 13 | 16 | 20 | 40 | 63 |

| CABLES - MAXIMUM CABLE SECTION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated power (kVA) | 10 | 15 | 10 | 15 | 20 | 25 | 30 | 40 | 80 | 120 |
| Phase in/out | 3/1 | | 3/3 | | | | | | | |
| Rectifier terminals | 25 | | | | | 50 | | | 70 | 2x120 |
| Bypass terminals | 50 | | | | | 50 | | | 70 | 2x120 |
| Battery terminals | 25 | | | | | 50 | | | 70 | 2x120 |
| Output terminals | 50 | | 25 | | | 50 | | | 70 | 2x120 |

*(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 the two (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 arrangements, 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.*

## 4.3 DELPHYS EM

### 4.3.1 INSTALLATION PARAMETERS

| INSTALLATION PARAMETERS | | | | |
|---|---|---|---|---|
| Rated power (kVA) | | | 160 | 200 |
| Phase in/out | | | 3/3 | |
| Active power (kW) | | | 144 | 180 |
| Pn according to EN 50171 | | | 120 | 150 |
| Rated/maximum rectifier input current (A) | | | 220/290 | 278/340 |
| Rated bypass input current (A) | | | 232 | 290 |
| Inverter output current @ 400 V (A) P/N | | | 232 | 290 |
| Maximum air flow ($m^3$/h) | | | 2250 | |
| Sound level (dBA) | | | < 68 | |
| Power dissipation in nominal conditions[1] | | W | 9200 | 11500 |
| | | kcal/h | 7911 | 9888 |
| | | BTU/h | 31391 | 39239 |
| Power dissipation (max) in the worst conditions[2] | | W | 10600 | 13300 |
| | | kcal/h | 9114 | 11436 |
| | | BTU/h | 36168 | 45380 |
| Dimensions | Width | mm | 700 | |
| | Depth | mm | 800 | |
| | Height | mm | 1930 | |
| Weight | | kg | 480 | 500 |

*(1) Considering nominal input current (400 V, battery charged) and rated output active power (PF 0.9).*

*(2) Considering maximum input current (low input voltage, battery recharge) and rated output active power (PF 0.9).*

### 4.3.2 ELECTRICAL CHARACTERISTICS

| ELECTRICAL CHARACTERISTICS - RECTIFIER[1] INPUT | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Rated mains supply voltage | 400 V 3ph | |
| Voltage tolerance | 240 to 480 V[2] | |
| 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% | |
| Max inrush current at start-up | <In (no overcurrent) | |

*(1) IGBT rectifier. (2) Conditions apply.*

| ELECTRICAL CHARACTERISTICS - BYPASS | | | |
|---|---|---|---|
| Rated power (kVA) | | 160 | 200 |
| Bypass frequency variation speed | | 1.5 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 | | from ±1% to ±8% (operation with generator unit) | |

| ELECTRICAL CHARACTERISTICS - INVERTER | | | |
|---|---|---|---|
| Rated power (kVA) | | 160 | 200 |
| Rated output voltage (selectable) | | 380/400/415 V | |
| Output voltage tolerance | | Static: ±1%<br>Dynamic: VFI-SS-111 compliant | |
| Rated output frequency (selectable) | | 50/60 Hz (selectable) | |
| Output frequency tolerance | | ±0.01% on mains power failure | |
| Load crest factor | | 3:1 | |
| Voltage harmonic distortion | | < 1.5% with linear load | |
| Overload tolerated by the inverter - 25 °C | 1 min | 225 kW | 270 kW |
| | 10 min | 180 kW | 225 kW |

| ELECTRICAL CHARACTERISTICS - EFFICIENCY | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Double conversion efficiency (normal mode) - full load | up to 94% | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Storage temperatures | -5 to +45 °C (23 to 113 °F) (15 to 25 °C for better battery life) | |
| Working temperature | 0 to +40(1) °C (32 to 104 °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 | IP20 | |
| Colour | RAL 7012, silver grey frontal door | |

*(1) Conditions apply.*

## 4.3.3 RECOMMENDED PROTECTION

| RECOMMENDED PROTECTION DEVICES - RECTIFIER[1] | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| D curve circuit breaker (A) | 315 | 400 |
| gG fuse (A) | 315 | 400 |

| RECOMMENDED PROTECTION DEVICES - GENERAL BYPASS[1] | | | |
|---|---|---|---|
| Rated power (kVA) | | 160 | 200 |
| Semiconductor characteristics | $I^2t$ ($A^2s$) | 320000 | |
| | Is/c (A peak) | 8000 | |
| D curve circuit breaker (A) | | 400 | |
| gG fuse (A) | | 400 | |

| RECOMMENDED PROTECTION DEVICES - INPUT RESIDUAL CURRENT CIRCUIT BREAKER[2] | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Input residual current circuit breaker | 3 A | |

| RECOMMENDED PROTECTION DEVICES - OUTPUT[3] | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Short-circuit inverter current (A) - (0 to 100 ms) (when AUX MAINS is not present) | 720 A | |
| C curve circuit breaker[3] (A) | ≤ 63 A | |
| B curve circuit breaker[3] (A) | ≤ 125 A | |
| High-speed fuse[3] (A) | ≤ 160 A | |

| CABLE CONNECTION - MAXIMUM CAPABILITY PER POLE | | |
|---|---|---|
| Rated power (kVA) | 160 | 200 |
| Rectifier terminals | 2 x 150 $mm^2$ | |
| Bypass terminals | 2 x 150 $mm^2$ | |
| Battery terminals | 2 x 240 $mm^2$ | |
| Output terminals | 2 x 150 $mm^2$ | |

*(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 the two (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 arrangements, 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.*

# 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.

**LVD 2014/35/EU**

Directive of the European Parliament and council of 26 February 2014 on the harmonisation of the laws of Member States on making electrical equipment designed for use within certain voltage limits available on the market.

**EMC 2014/30/EU**

Directive of the European Parliament and council of 26 February 2014 on the harmonisation of the laws of Member States on electromagnetic compatibility.

**RoHS 2011/65/EU**

Directive 2011/65 of the European parliament and council of 8 June 2011 on restricting of the use of certain hazardous substances in electrical and electronic equipment

## 5.2 STANDARDS

### 5.2.1 CPSS

EN 50171:2001 General requirements for central power supply systems for an independent energy supply to essential safety equipment

### 5.2.2 SAFETY

EN 62040-1 Uninterruptible Power System (UPS) - Part 1: General and safety requirements (certified by TÜV SÜD)

IEC 62040-1 Uninterruptible Power System (UPS) - Part 1: Safety requirements

### 5.2.3 ELECTROMAGNETIC COMPATIBILITY

EN 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (C3 category) (tested and verified by third party)

IEC 62040-2 Uninterruptible Power System (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements

EN 60529 Degrees of protection provided by enclosures

## 5.3 SYSTEM AND INSTALLATION GUIDELINES

When carrying out electrical installation, all of 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 the '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.

# STATYS XS

16 A / 32 A

**SUPERIOR**

Unrivalled power performance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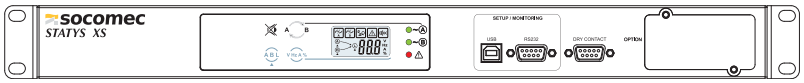
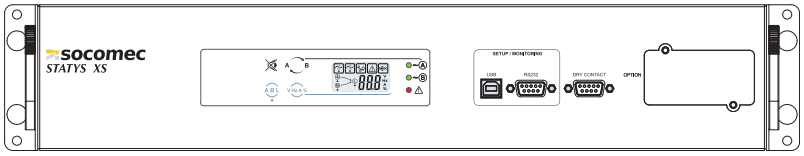
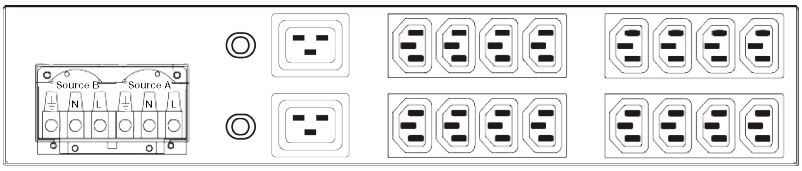
## DIMENSIONS

| | Model | Width [mm] | Depth [mm] | Height [mm] | Weight [kg] |
|---|---|---|---|---|---|
|  | 16 A | 440 (19”) | 285 | 44 (1U) | 4 |
|  | 32 A | | 360 | 88 (2U) | 6 |

## CONNECTIONS

| | Model | INPUT | OUTPUT |
|---|---|---|---|
|  | 16 A | 2x IEC C20 (16 A) | 1x IEC C19 (16 A)<br>8x IEC C13 (10 A) |
|  | 32 A | Terminal 1 x 6P (10 mm²) | 2x IEC C19 (16 A)<br>16x IEC C13 (10 A) |

| ELECTRICAL CHARACTERISTICS | 16 A | 32 A |
|---|---|---|
| Rated mains supply voltage | 200 / 208 / 220 / 230 / 240 V | |
| Input voltage range | 150 Vac to 300 Vac | |
| RMS voltage tolerance | +/-10% (configurable +/-5% to +/-20%) | |
| Rated Frequency | 50 / 60 Hz | |
| Frequency tolerance | +/-10% (configurable +/-5% to +/-20%) | |
| Transfer time | ITIC compliant | |
| Admitted overload | 125% / 1 minutes, 150% / 30 seconds | |

| COMMUNICATION AND OPTIONS | 16 A | 32 A |
|---|---|---|
| Display | LCD + Display | |
| Standard communication features | Slot for optional communication board | |
| | 5 dry contacts (Volt free) - Configurable | |
| | Setting port for configuration tool | |
| Options | SNMP communication board | |
| | RS485 Communication board | |

| ELECTRICAL CHARACTERISTICS - ENVIRONMENT | 16 A | 32 A |
|---|---|---|
| Storage conditions | -5 to 40 °C @ 0 to 90% RH (non-condensing) | |
| Working temperature | -5 to +40 °C | |
| Working relative humidity | 0 - 90% (non-condensing) | |
| Noise | < 25 dBA | |
| Conformity | CE compliant | |
| Directives | 2014/35/UE ; 2014/30/UE | |
| Standards | IEC60950-1 ; CEI/EN 62310-2 | |
| Environmental | WEEE ; ROHS | |

# STATYS

32 to 1800 A

## ULTIMATE

Fault tolerant power
without compromise

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and technical manuals

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Innovative Power Solutions

# OBJECTIVES

The aim of these specifications is to provide:

- the information required to choose the right Static Transfer System (STS) 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 STATYS must be installed. This electrical control station must be equipped with a circuit breaker of an appropriate rating for the power draw at full load.

If an RCD is required a selective B-type should be used. It must be coordinate with residual current circuit breakers downstream of the STATYS connected to the STATYS output.

Potential dispersion of current from utilities downstream of the STS should be added to that discharged from the STATYS, and it should also be noted that current peaks are also reached, albeit very briefly, during transitory phases.

If an external manual bypass is required, only the model supplied by the manufacturer must be installed. For the Integrable Chassis version, STATYS is able to manage the PDU's switches (input/output/maintenances bypasses) in order to protect against users miss-operation.

For detailed information, see the installation and operating manual.

# 1. ARCHITECTURE

## 1.1 RANGE

STATYS is a range of high performing STS designed to protect critical and sensitive appliances applications in the IT, telecom and industrial fields, such as enterprise servers, storage systems, networking equipment, telecommunications systems, diagnostic/medical devices and industrial applications.

| Models | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-phase (A) | | 3-phase (A) | | | | | | | | | | | | |
| | 32 | 63 | 63 | 100 | 200 | 300 | 400 | 600 | 630 | 800 | 1000 | 1250 | 1400 | 1600 | 1800 |
| 19” RACK | • | • | • | • | - | - | - | - | - | - | - | - | - | - | - |
| Integrable Chassis (OEM) | - | - | - | - | • | • | • | • | • | • | • | • | • | • | • |
| Cabinet | - | - | - | - | • | • | • | • | • | • | • | • | • | • | - |
| Matrix table for model and A current 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 CURRENTS FROM 32 TO 1800 A

| Dimensions | | | | | |
|---|---|---|---|---|---|
| Model | | Range | Width (mm) | Depth (mm) | Height (mm) |
| 1 phase | 19" Rack | 32/63 A | 483 (19") | 747(1) | 89 (2U) |
| 3 phases | | 63/100 A | | 648(1) | 400 (9U) |
| | Integrable Chassis (OEM) | 200 A | 400 | 586 | 765 |
| | | 300/400 A | 600 | | |
| | | 600/630 A | 800 | | |
| | | 800/1000 A | 1000 | 950(1) | 1930 |
| | | 1250/1800 A | 910 | 815 | 1955 |
| | Cabinet | 200 A | 500 | 600(1) | 1930 |
| | | 300/400 A | 700 | | |
| | | 600/630 A | 900 | | |
| | | 800/1000 A | 1400 | 950(1) | 1930 |
| | | 1250/1600 A | 2010 | 815 | 1955 |

*(1) Depth does not include handles (+40 mm)*

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).

Please contact us for any other requirement.

## 2.2 NEUTRAL MANAGEMENT

STATYS is well adapted to all electrical environments.

For single-phase units, STATYS is available in 2-pole switching.

For three-phase units, it is available in 3 or 4-poles switching.

Built with fully rated thyristors, STATYS forces a short "make before break" neutral switching principle in order to keep the load reference and reduce the transfer time.

## 2.3 TRANSFORMER MANAGEMENT

In case of downstream transformer and asynchronous power, STATYS handles source switching which prevents untimely protection tripping, thanks to the ATSM system

# 3. STANDARD AND OPTIONS

## 3.1 STANDARD INTERNAL REDUNDANT DESIGN

- Individual driver per SCR paths, with dedicated local power supplies,
- Redundant cooling with fan failure monitoring,
- Real-time SCR fault sensing,
- Separation of main functions to prevent internal fault propagation,
- Robust internal field communication bus,
- Internal monitoring of sensors to ensure maximum system reliability,
- 24/7/365 real-time remote monitoring.

## 3.2 OPTIONAL REDUNDANCY (IN STANDARD FOR STATYS ABOVE 800A)

- Redundant control system, using two microprocessor control boards,
- Redundant power supplies of the control boards,
- Dedicated Redundant power supplies for SCR driver boards

## 3.3 COMPACT DESIGN

- Small footprint and compact units,
- Adjacent or back to back mounting,
- Front access for easy maintenance procedures,
- Compact Hot Swap 19” rack system.

## 3.4 STANDARD FEATURES

- Smart commutation system configurable according to the load.
- Synchronised and non-synchronised sources management (fully settable transfer modes).
- Fuse-free or fuse-protected design.
- Output fault management.
- Double maintenance bypass (rack and cabinet versions).
- Neutral oversizing for non-linear loads compatibility.

## 3.5 STANDARD COMMUNICATION FEATURES

- Ethernet network connection (WEB interface, SNMP and e-mail).
- I/O dry contacts interfaces.
- Flexible Com Slots.
- LCD and 7” Color Touchsreen.
- Full digital configuration and setting.

## 3.6 ADITIONAL OPTIONS

- Additional dry contacts interface board.
- MODBUS RTU.
- Profibus interface.
- Automatic maintenance bypass interlock.
- Voltage adaptation.

## 3.7 REMOTE MONITORING SERVICE

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

# 4. SPECIFICATIONS

## 4.1 INSTALLATION PARAMETERS

**1 phase:**

| Installation paramenters | | | |
|---|---|---|---|
| Model | | 32 | 63 |
| Phase in/out | | 1/1 | 1/1 |
| Rated power (A) | | 32 | 63 |
| Maximum current on neutral(2) | | 32 | 63 |
| Crest factor | | < 3.5 | |
| Minimum air flow ($m^3/h$) | | 26 | |
| Sound level (dBA) | | < 45 | |
| Dissipation at rated load(1) | (W) | 80 | 184 |
| | kcal/h | 69 | 160 |
| | BTU/h | 272 | 628 |
| Dimensions Rack | W (mm) | 483 | |
| | D (mm) | 747 | |
| | H (mm) | 89 | |
| Weight (kg) | | 26 | |

*(1) Worst case:*

- 4 pole switching
- cabinet version with internal input protection
- 4 wires
- no linear load

*(2) Contact us for higher neutral sizing*

**3 phases:**

| Installation paramenters | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | 63 | 100 | 200 | 300 | 400 | 600 | 630 | 800 | 1000 | 1250 | 1400 | 1600 | 1800 |
| Phase in/out | | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 | 3/3 |
| Rated power (A) | | 63 | 100 | 200 | 300 | 400 | 600 | 630 | 800 | 1000 | 1250 | 1400 | 1600 | 1800 |
| Maximum current on neutral(2) | | 126 | 173 | 340 | 630 | | 1000 | 1000 | 800 | 1000 | 1600 | | | 1800 |
| Crest factor | | < 3.5 | | < 3.5 | | | | < 3.3 | < 2.1 | < 1.7 | < 1.7 | | | |
| Minimum air flow ($m^3/h$) | | 60 | | 553 | 642 | | 627 | 627 | 1950 | | 3000 | | | |
| Sound level (dBA) | | < 45 | | 60 | 56 | | 54 | 54 | 61 | | 84 | | | |
| Dissipation at rated load(1) CABINET or Rack | (W) | 340 | 540 | 1330 | 1690 | 2530 | 3730 | 3917 | 4272 | 5597 | 6705 | 7238 | 7905 | |
| | kcal/h | 293 | 464 | 1147 | 1457 | 2181 | 3216 | 3377 | 3674 | 4813 | 5765 | 6224 | 6797 | - |
| | BTU/h | 1160 | 1843 | 4538 | 5766 | 8632 | 12727 | 13364 | 14536 | 19042 | 22829 | 24647 | 26916 | |
| Dissipation at rated load(1) OEM | (W) | - | | 1090 | 1430 | 1990 | 3020 | 3171 | 4133 | 5380 | 6705 | 7238 | 7905 | 8971 |
| | kcal/h | | | 940 | 1233 | 1716 | 2603 | 2734 | 3554 | 4626 | 5765 | 6224 | 6797 | 7714 |
| | BTU/h | | | 3722 | 4883 | 6795 | 10308 | 10824 | 14074 | 18319 | 22829 | 24647 | 26916 | 30547 |
| Dimensions Rack | W (mm) | 483 | | - | | | | | | | | | | |
| | D (mm) | 648 | | | | | | | | | | | | |
| | H (mm) | 400 | | | | | | | | | | | | |
| Dimensions OEM | W (mm) | - | | 400 | 600 | | 800 | | 1000 | | 910 | | | |
| | D (mm) | | | 586 | | | | | 995 | | 815 | | | |
| | H (mm) | | | 765 | | | | | 1930 | | 1955 | | | |
| Dimensions CABINET | W (mm) | - | | 500 | 700 | | 900 | | 1400 | | 2010 | | | - |
| | D (mm) | | | 600 | | | | | 995 | | 815 | | | |
| | H (mm) | | | 1930 | | | | | | | 1955 | | | |
| Weight (kg) Rack | | 58 | | - | | | | | | | - | | | |
| Weight (kg) OEM | | - | | 70 | 105 | | 130 | | 495 | | 570 | | | |
| Weight (kg) Cabinet | | - | | 195 | 270 | | 345 | | 685 | | 1200 | | | - |

## 4.2 ELECTRICAL CHARACTERISTICS

| Electrical characteristics - Operating range | | | |
|---|---|---|---|
| Model | RACK 32 / 63 A | RACK 63 / 100 A | CABINET / OEM |
| Rated mains supply voltage[1] | 120 to 127 V / 220 to 240 V / 254 V (ph+N or ph+ph) | 208 to 220 V / 380 to 415 V (3ph+N or 3ph) | |
| RMS voltage tolerance | ±10% (configurable) | | |
| Tolerance to fast transients | ±25% (configurable) | | |
| Rated Frequency | 50/60 Hz | | |
| Frequency tolerance | ±5% (configurable) | | |
| Admitted Power Factor | no restriction | | |
| Admitted overload | 110% for 60 minutes, 150% for 2 minutes[2] | | |

*(1) Consult us for other voltage requirements.*

*(2) for 630A model only : 105% 60min 150% 1min*

| Electrical characteristics - Environment | | | |
|---|---|---|---|
| Model | RACK 32 / 63 A | RACK 63 / 100 A | CABINET / OEM |
| Storage temperature | -25 to +70 °C (-13 to +158 °F) | | |
| Working temperature | from 0 °C up to 40 °C (32 °F up to 104 °F) up to 50 °C with derating | | |
| Maximum relative humidity (non-condensing) | 95% | | |
| Maximum altitude without derating | 1000 m (3300 ft) | | |
| Degree of protection | IP30 | | IP20 (cabinet), IP20 C (OEM) |
| Colour | Dark grey, door: light grey | | |
| Performance | up to 99% | | |
| Leakage current | <10 mA | <10 mA | <30 mA |

# 5. REFERENCE STANDARDS AND DIRECTIVES

## 5.1 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

## 5.2 STANDARDS

### 5.2.1 SAFETY

EN 62310-1 Static transfer systems (STS) – General and safety requirements

IEC 62310-1 Static transfer systems (STS) – General and safety requirements

### 5.2.2 ELECTROMAGNETIC COMPATIBILITY

EN 62310-2 Static transfer systems (STS) – Electromagnetic compatibility (EMC) requirements

IEC 62310-2 Static transfer systems (STS) – Electromagnetic compatibility (EMC) requirements

## 5.3 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 must be observed. For further information refer to ‘Technical specifications’ chapter in the user manual.

# *Glossary*

## Terms and accessories

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# GLOSSARY

## ACS

Automatic Cross Synchronisation (ACS) is an option which can be integrated into the machine without adding external enclosures and which synchronises the output voltage with an external source or with another stand-alone UPS (single or parallel system, Socomec or other brands).

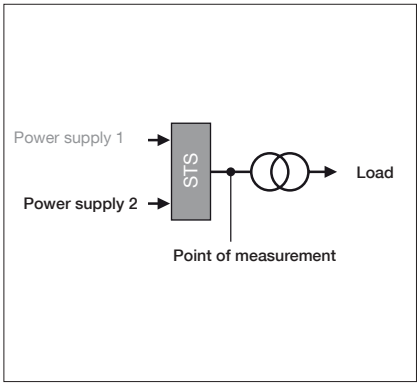
## ADC

The Advanced Dry Contact (ADC) circuit board is an interface fitted with programmable dry contacts. It consists of up to four normally open or normally closed outputs and up to three digital inputs, all fully configurable. Up to four operating modes can be selected.

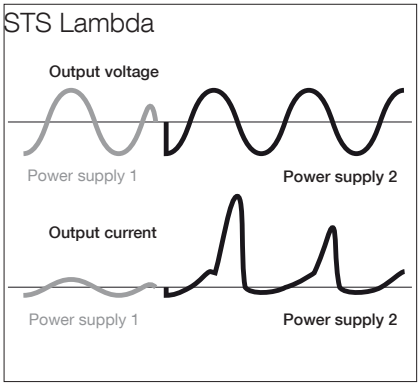
## ADVANCED TRANSFORMER SWITCHING MANAGEMENT (ATSM)

Advanced switching management of downstream transformers for static transfer systems.

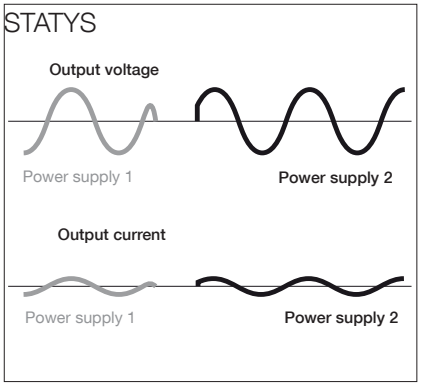
If the upstream network has no distributed neutral cable, two upstream transformers or one downstream transformer can be added to create a neutral reference point at the output. For the downstream solution, STATYS (thanks to ATSM) correctly manages the switching to limit inrush current and avoid the risk of spurious breaks.



STATY_039_A_BW



STATY_042_A_BW



STATY_043_A_BW

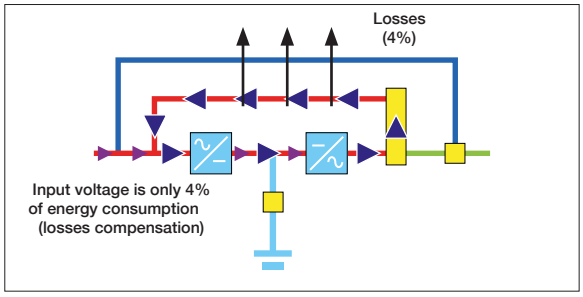
## ADICOM (ADVANCED INTERFACE)

- **User-friendly graphic colour display:** gives a clear view of the UPS subassemblies status and provides the user with a full array of controls for their management.
- **USB connection with front access:** for downloading or uploading of files from a memory key such as reports, custom language, software releases.
- LED status bar: gives the UPS status in 3 colours: green, yellow, or red.
- **Easy procedures for start and shutdown of the UPS:** the display gives operators a step-by-step explanation of the procedures.
- **Wide range of network connections:** extensive communication possibilities are on offer, including: HTML page for remote monitoring, SNMP agent sending TRAP to network management station, email sent according to events selection.
- **Shutdown agent:** allows sending a shutdown command to stand-alone or virtual servers.

GREEN_096_A

## AUTO-LOAD TEST

Available for ***Green Power 2.0*** range, Auto-Load Test feature allows to perform a full power test to rectifier, inverter, bypass, contactors, chokes, capacitors, cables and fuses for validating the performance of the installed UPS with no customer load or dummy load connnected.




AUTO LOAD TEST

## AUTOMATIC RETRANSFER

In case of supply from the alternate sources, when the preferred source is restored, the STS must automatically retransfer the load back after a delay of 3 seconds.

The system must try to retransfer to the preferred source in the best conditions.

For specific operating conditions, the automatic retransfer can be disabled via the user settings. In this case, the transfer has to be performed manually by the operator.

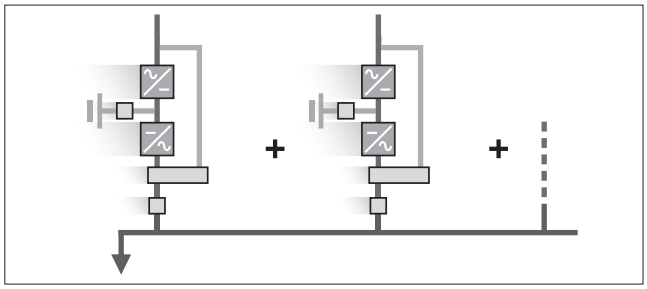
If the alternate source disappears before the manual retransfer, an automatic transfer must switch the load to the preferred source

Automatic retransfer must be activated by default and is configurable by the operator. This function can be delayed by the operator on each device in the case of multiple STS systems.

## BYPASS

**Distributed architecture.**

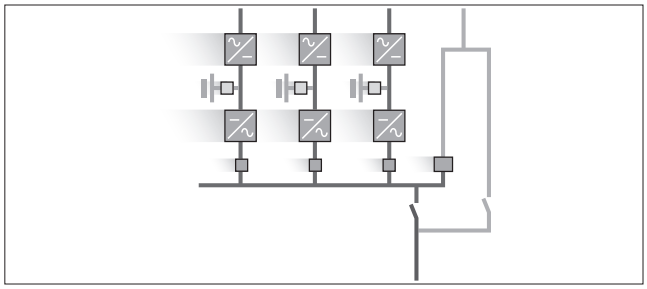
The simplest solution to ensure power supply availability and flexibility in case of unscheduled installation upgrades by means of the parallel configuration of the UPS units, each one incorporating its own bypass. This configuration enables power output to be increased and is suitable for N+1 redundancy. Upgrades can also be performed keeping the load supplied by the system.



DEFYS_093_A_BW

**Centralised architecture.**

The ideal solution for system redundancy and planned power upgrades. The automatic and maintenance bypass functions are centralized. In the event of anomalies inside the UPS or of an overload, the power is automaticaly switched to bypass ensuring the maximum availability. This solution also allows to adapt the bypass size according to the real power and installation short-circuit capability.



DEFYS_094_A_BW

## EBS

Expert Battery System (EBS) is a system which manages the battery charger. It responds to the working temperature to preserve battery life and reduce operating costs. Battery reliability depends on several variables: the working temperature, the installation environment, the number of charge and discharge cycles. Consequently it is important to introduce systems that can manage these variables in order to limit their impact on the UPS life cycle.

Premature ageing causes:

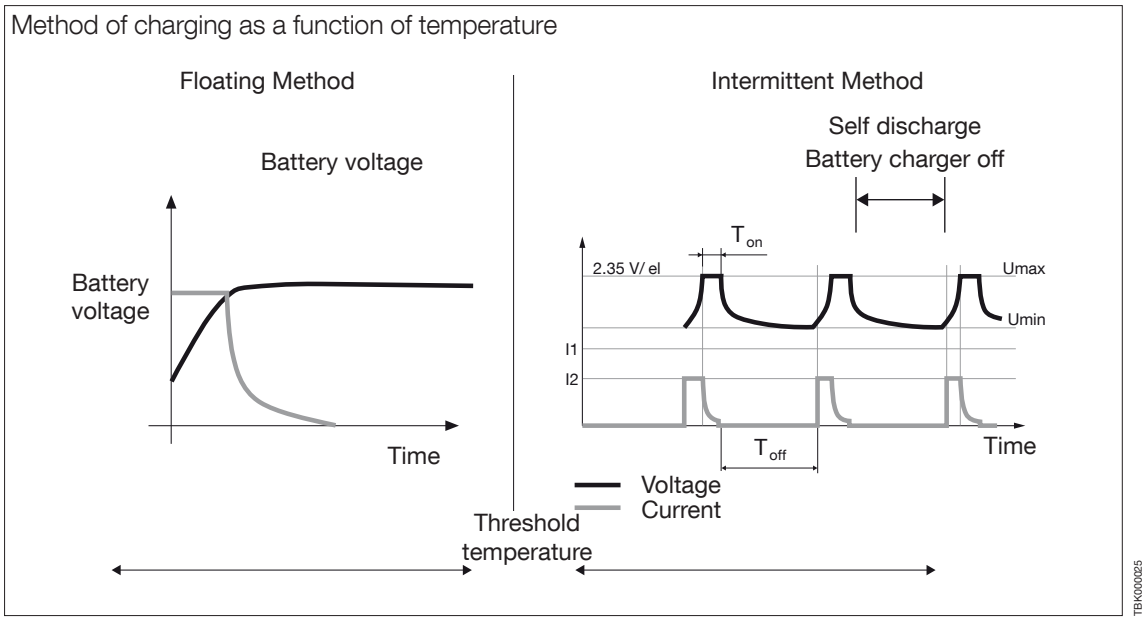
- corrosion: battery overcharge or high working temperature,
- sulfation: low charge voltage or long storage time,
- passivation: frequent charge/discharge cycles (cycling) resulting in capacity loss.

EBS allows for:

- automatic selection of the recharging method according to environmental and battery conditions,
- elimination of overloading due to permanent floating, which accelerates the corrosion of the positive plates,
- isolation of the battery from the DC bus, thanks to the charger function which is separate from the rectifier,
- protection against deep discharge,
- management of different types of batteries (sealed, open lead-acid and nickel-cadmium batteries),
- real-time calculation of the remaining back-up time,
- real-time measurements concerning the battery (voltage, battery current and battery capacity),
- a periodic battery test for monitoring battery efficiency and for programming preventive or corrective maintenance in the case of abnormal situations.

Tests carried out by Socomec on several brands of batteries, together with years of experience, show that battery life can be enhanced by up to 30% with the use of EBS compared to a traditional battery management system.

Method of charging as a function of temperature



## ECOMODE

ECOMODE increases efficiency as under normal operating conditions the utility is supplied directly from the emergency supply via the automatic bypass. The static UPS system remains on standby to replace the supply in the event of a failure.

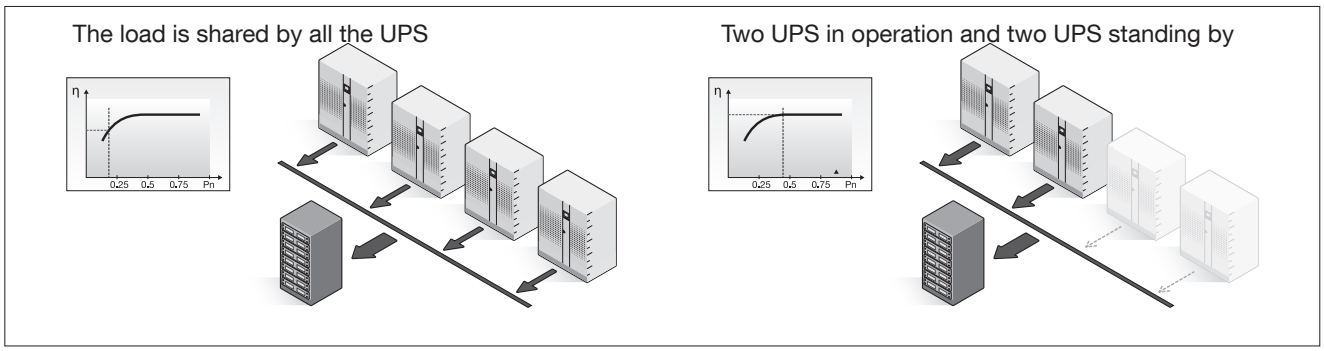
## EMD

Environment Module Device (EMD) is a device to be used in conjunction with NET VISION with the following features:

- temperature and humidity measurements + 2 contact alarms,
- can be managed remotely from 2 to 15 metres,
- alarm thresholds configurable via Web browser,
- notification of environmental alarm via e-mail and SNMP traps.

## ENERGY SAVER

- This function optimizes the efficiency (η) of your UPS in parallel when operating with a partial load.
- Only the UPS needed to supply the energy required by the applications are in operation.
- Redundancy can be ensured by maintaining an additional unit in operation.
- When the power consumed by the applications increases, the UPS units needed to meet the increased power requirements restart instantly.
- This type of operation is perfectly suited to applications subject to frequent variations in power.
- Energy Saver enables the increased efficiency of the whole system to be maintained.



## FAST ECOMODE

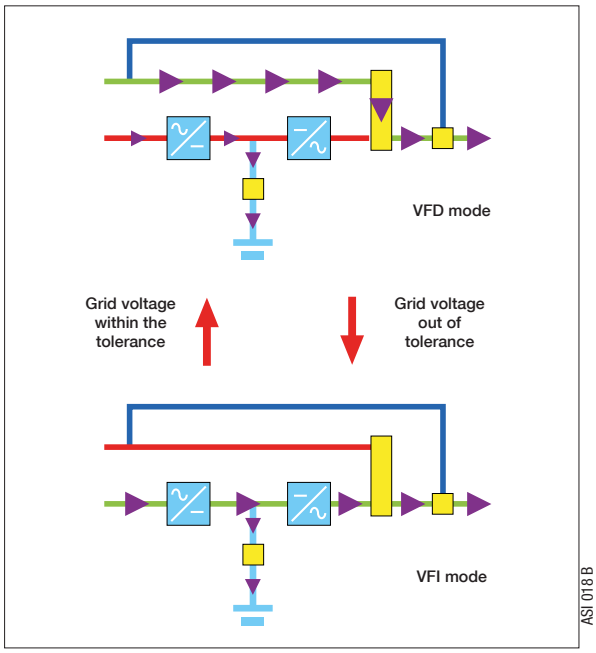
Available as option for GREEN POWER 2.0 160 to 800 kVA/kW, FAST ECOMODE is an automatic operating mode that optimizes the efficiency depending on the quality of the input voltage.

When the input voltage is within the tolerance (value is settable), the load is supplied by the bypss (VFD mode) and the efficiency achived is 99%.

Ultra fast transfer time from bypass to inverter (2 ms) if the input voltage is out of tolerances and automatic transfer back to bypass when the input voltage is restored.

Batteries are permanently maintained under charging, avoiding periodic restarts of the rectifier

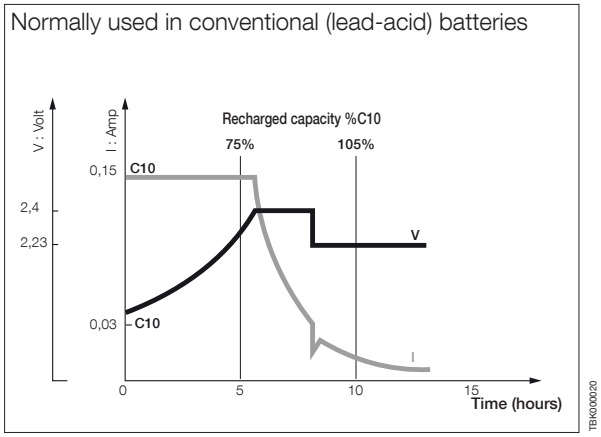
Available both for single and parallel units.



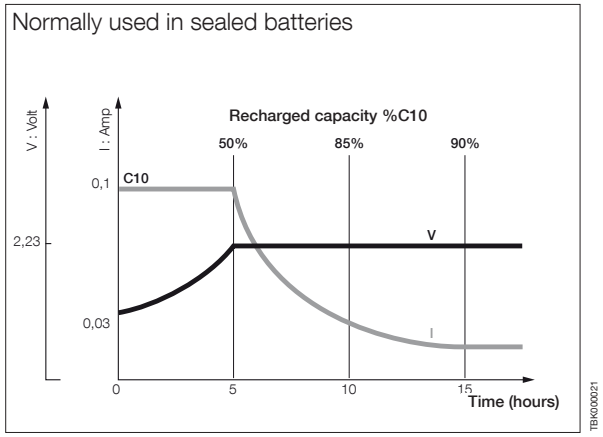

## FLOATING AND TWO-LEVEL CHARGE

Lead-acid, sealed and open-vented batteries are extremely sensitive to the temperatures in which they operate. Charge algorithms exist which reduce the effect of these temperatures. In addition to the EBS system, Socomec offers floating and "two-level" mixed charging. Its characteristics are illustrated below.

Normally used in conventional (lead-acid) batteries




Normally used in sealed batteries



## GRAPHIC TOUCH SCREEN

The colour graphic touch screen, available on request, for DELPHYS MP ELITE and DELPHYS MX, is a user-friendly interface providing both safe operation of the UPS as well as a global system overview. The mimic diagram is interactive and intuitive and provides a quick overview of the whole equipment. Direct access through the mimic panel to the main functions such as the event log, graphic reports and the interactive help menu makes using the controls easier and safer. Remote monitoring is available via LAN connection, and the interface is included in the graphical touch screen.


## GREEN POWER 2.0


**Energy Saving: high efficiency without compromise.**

- Offers the highest efficiency in the market using VFI – Double Conversion Mode, the only UPS working-mode that assures total load protection against all mains quality problems.
- Ultra high efficiency output independently tested and verified by an international certification organization in a wide range of load and voltage operating conditions, to have the value in the real site conditions.
- Ultra high efficiency in VFI mode is provided by an innovative topology (3-Level technology) that has been developed for all the Green Power UPS ranges.

**Full-rated power: kW=kVA**

- No power downgrading when supplying the latest generation of servers (leading or unity power factor).
- Real full power, according to IEC 62040: kW=kVA (unity power factor design) means 25% more active power available compared to legacy UPS.
- Suitable also for leading power factor loads down to 0.9 without apparent power derating.

**Significant cost-saving (TCO)**

- Maximum energy saving thanks to 96% efficiency in true double conversion mode: 50% saving on energy losses compared to legacy UPS gives significant savings in energy bill.
- UPS “self-paying” with energy saving.
- Energy Saver mode for global efficiency improvement on parallel systems.
- kW=kVA means maximum power available with the same UPS rating: no overdesign cost and therefore less €/kW.
- Upstream infrastructure cost optimization (sources and distribution), thanks to high performance IGBT rectifier.
- Extended battery life and performance:
  - long life battery,
  - very wide input voltage and frequency acceptance, without battery use.
- EBS (Expert Battery System) charging management improves battery service life.

## HMI (HUMAN MACHINE INTERFACE)

HMI is a multilanguage Human Machine Interface available on MASTERYS GP which displays information regarding operating status, electrical measurements, allows the access to control functions and configuration parameters and provides a global overview of the system. It includes a colour graphic display and a luminous status bar, and provides access to:

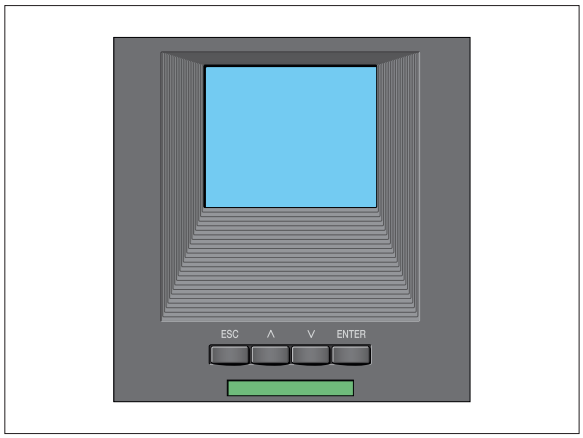
- main functions via the mimic panel,
- measurements, alerts and UPS commands,
- programming battery tests and UPS operating modes,
- assisted startup and switching to maintenance bypass procedures,
- configuration menu,
- event log and alerts.


## JNC

The UPS back-up time might not always be long enough to cover the whole period of outage. In this case the best way to proceed is to save data and correctly shutdown the machines before the complete absence of the supply. The client is a small software application to be installed in the remote computers. It shows data and executes commands sent by Adicom or NetVision via the LAN network. Clients can be native for every single operating system (OS), or multi-OS and with more advanced features such as "JAVA & .NET Shutdown client" (JNC). The latter has been developed by Socomec on a JRE platform.

## LCD SYNOPTIC PANELS

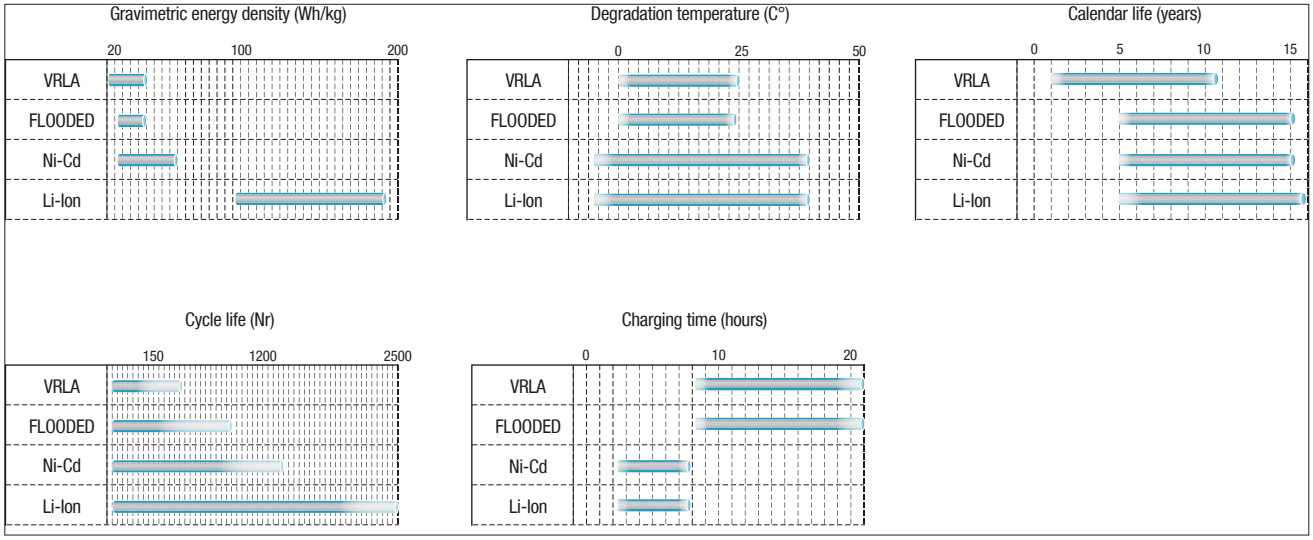
LCD synoptic panels show all items of information relative to operating status, electrical measurements, gives access to control functions and configuration parameters such as input voltage out of tolerance, output voltage present, no mains power, battery circuit broken, battery maintenance voltage fault, battery output operational with mains power present, slow discharge pre-alarm, slow discharge protection alarm, battery charger fault, earth leakage fault (option).




## LIB (LITHIUM-ION BATTERIES)

Recently introduced to batteries for UPS applications, lithium-ion technology clearly differs from conventional lead and nickelcadmium batteries. The most significant features include the considerable reduction in weight and floor space for the same runtime, the possibility of recharging them quickly, and their long cyclic and calendar lifetime.

However, their relatively brief history in highpower applications, and the need to introduce monitoring and equalisation electronics into batteries (which increases the initial cost), are still inhibiting on their widespread use.






socomec
Innovative Power Solutions

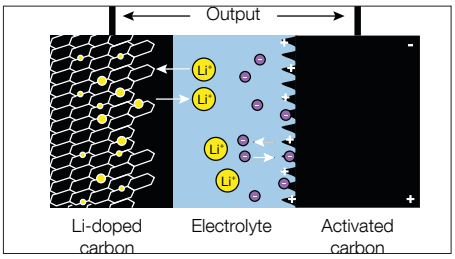
## LIC (LI-ION CAPACITOR)

LI-ION CAPACITOR UPS is the innovative UPS back-up storage solution specifically designed to protect:

- Applications requiring back-up times of a few seconds to several minutes.
- Processes sensitive to frequent micro interruptions.
- Applications working in critical environments where hazardous substances are not allowed.
- Applications with severe ambient conditions.

### LITHIUM-ION CAPACITORS: OPERATING PRINCIPLE

- The activated carbon is a capacitor cathode
- The Li-doped carbon anode is a battery anode, undergoing Li doping during charge and de-doping during discharge
- Hybrid construction creates a capacitor which yields the best performance features of batteries and capacitors



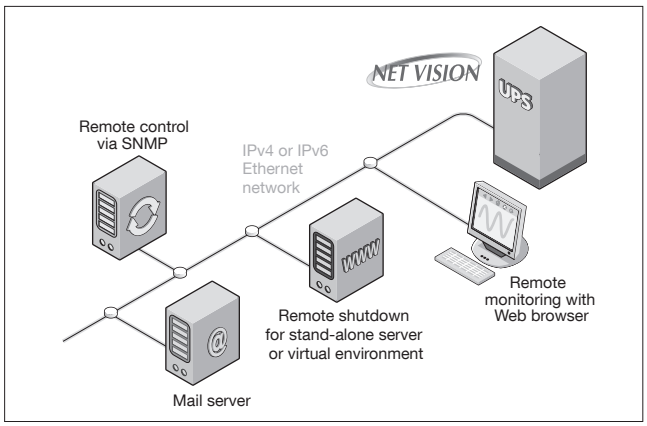

## NET VISION

NET VISION is the most common Ethernet interface for use with Socomec products. It is a communication interface designed for business networks. The UPS behaves exactly like a networked peripheral, it can be managed remotely and allows the shutdown of server-based workstations.

NET VISION allows a direct interface between the UPS and Ethernet network avoiding dependence on the server. It is therefore compatible with all networks and multi-OS since it interacts via the Web browser.

The main specifications and functions are as follows:

- 10 / 100 Mb Ethernet connection (RJ 45),
- UPS monitoring screen via a Web browser,
- remote shutdown of stand-alone server (compatible with JNC) or Virtual environnement (compatible with VIRTUAL-JNC),
- notification of faults via email to up to 8 addresses,
- UPS management via SNMP protocol,
- monitoring of the operating environment (optional EMD temperature and humidity sensor). Configurable alarm trigger, notification via email.



## “ON-THE-FLY” TRANSFER

In STS systems, the “on-the-fly” transfer mode is necessary to allow the operator to perform a synchronous transfer from the control panel when the two power sources are not permanently synchronous and the respective phases slowly diverge.

The “on-the-fly” transfer function must also be usable during automatic retransfer, to revert to the preferred source as soon as it is in better conditions than the alternative source.

The STS must transfer exactly when the source phase shift is below the preset tolerance window (which is adjustable).

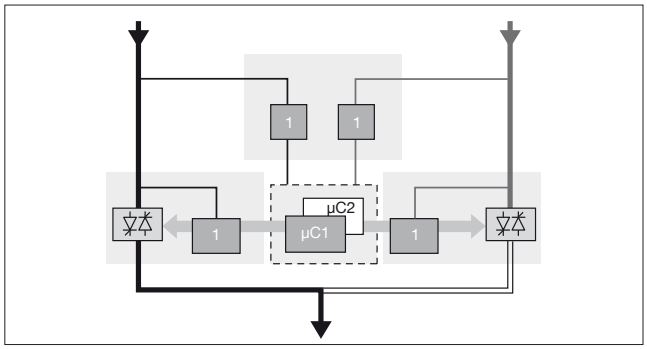
## PARALLEL KIT

Parallel kits contain all of the components necessary for installing equipment units in parallel configurations. This can be anything from a cable to a cabinet, depending on the power and model of the UPS.

Contact Socomec for further details on the different solutions offered.

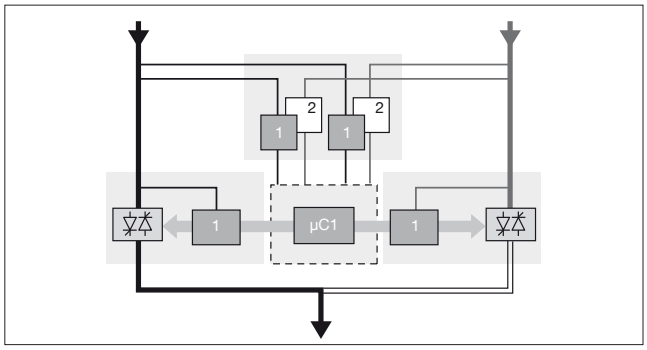
## REDUNDANT MICROPROCESSOR

In the case of mission-critical applications where system availability is fundamental, the equipment and all other components must be redundant intelligent. For the highest availability, even in the event of a control failure, the microprocessor can be redundant so that the system will not interrupt the power supply and full communication capacity will be maintained.




## REDUNDANT SUPPLY AND DUAL REDUNDANT SUPPLY

A Static Transfer System for “redundant supply” is a redundant electronic power supply connected to each source that powers the control boards. The term “dual redundant supply” indicates the presence of a second redundant power supply in addition to the first one described above. If one power supply control board should fail, it enables internal redundancy to be maintained even with a single power source.



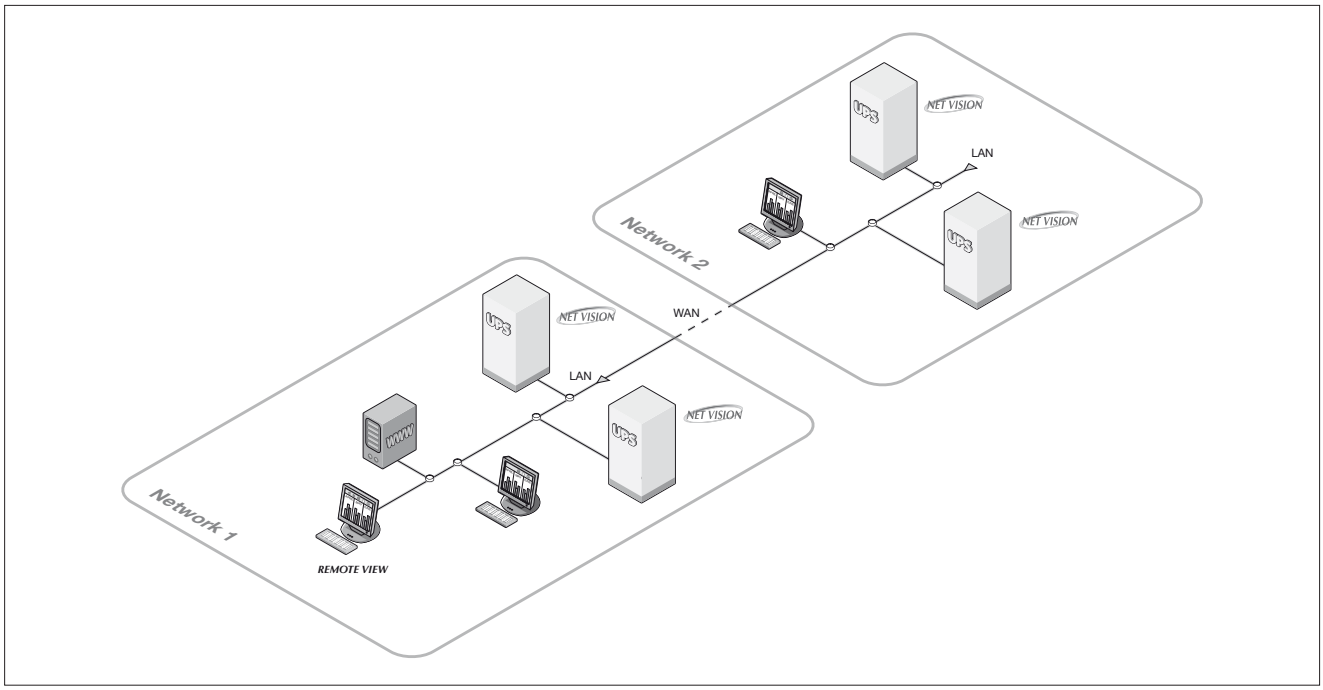
## REMOTE VIEW

In addition to these protocols, another Socomec solution is REMOTE VIEW, a central monitoring programme for UPS systems over an Ethernet network, which is simpler and less expensive than the complex NMS platforms.

REMOTE VIEW is an application able to monitor simultaneously up to 1,024 devices equipped with NET VISION card or box through the Ethernet network. Users are provided with tree-view (hierarchy structure can have up to 8 levels) and list-view. When an alarm is triggered in one or other monitored UPS, (trap event), the icon that represents the UPS will change colour according to the severity level, sending an email to several addressees which have been set the programme configuration dialogue window.

If the programme is running in the background, a pop-up message appears. Input and output voltages, battery capacity and load percentage are continuously monitored by the REMOTE VIEW programme. Plant supervisors and technicians can monitor all the UPS in the same programme window.

REMOTE VIEW runs on Windows® 2000/2003/2008 (R2)/XP/VISTA/7 with administrator rights. REMOTE VIEW software is available from the Socomec's website for free download.




## SVM - DIGITAL SPACE VECTOR MODULATION

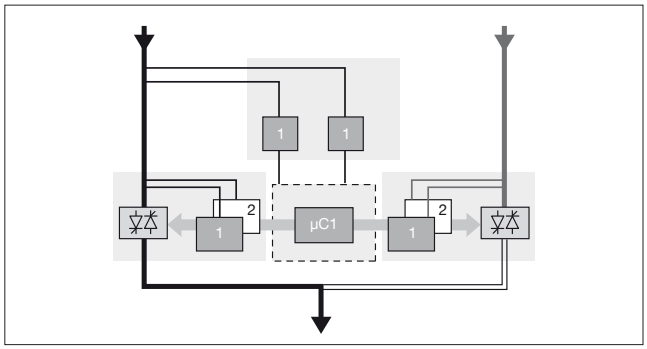
The SVM, digital Space Vector Modulation, along with the isolation transformer installed on the inverter output, provides:

- perfectly sinusoidal output voltage THDV < 2% with linear loads and < 3% with non-linear loads,
- output voltage precision even when load is completely unbalanced between phases,
- an immediate response to major variations in load, without deviating the output voltage (± 2% in less than 5 ms),
- a very high short-circuit capacity up to 4 In (Ph / N) allows selectivity,
- a complete galvanic isolation between DC circuit and load output.
- SVM, the latest high performance components and IGBT power bridges enable the supply of:
- non-linear loads with high crest factor up to 3,
- active power without derating, for loads with a lagging power factor and up to 0.9 leading.

## SCR - INDEPENDENT CONTROL OF THE SILICON CONTROL RECTIFIER

Technology integrated in the Static Transfer System with individual, separate and autonomous control boards on each SCR path, increasing the redundancy and fault tolerance of each SCR path.

Physical separation between source 1 and source 2 SCRs prevents mutual disturbance.

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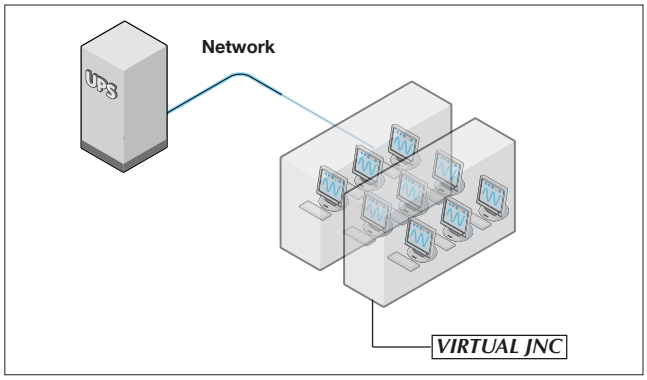
## VIRTUAL JNC

Server virtualisation, which makes it possible to exploit the advantages of IT infrastructure consolidation, is becoming increasingly widespread. As a result, the correct management of virtual machines in the event of a fault with the electric power supply system is an increasingly common requirement. VIRTUAL JNC is the Socomec solution especially for virtual systems. It fully supports virtual machine shutdown, by acting on the physical server to correctly shutdown all virtual machines running on that server.

On Virtual Environment systems it is possible to manage the order of virtual machine shutdown (defining the shutdown as sequential or staggered)) and systems with more than one host (also in a cluster configuration), in a simple, efficient manner. VIRTUAL JNC is compatible with all Socomec UPS systems that support shutdown management via LAN. VIRTUAL JNC is compatible with VMware vCenterTM/vSphere, MicrosoftTM HYPER-V and Citrix XenServer.

VIRTUAL-JNC requires to be installed in a Windows® virtual machine. VIRTUAL-JNC software is available in the Socomec's web site for free download.

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HEAD OFFICE

**SOCOMEC GROUP**
SAS SOCOMEC capital 10 582 640 €
R.C.S. Strasbourg B 548 500 149
B.P. 60010 - 1, rue de Westhouse
F-67235 Benfeld Cedex
Tel. +33 3 88 57 41 41 - Fax +33 3 88 57 78 78
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