

TECHNICAL GLOSSARY

Autonomy

Also known as back up or discharge time, battery autonomy is a measure of the time for which the battery will support the critical load during a mains failure. Autonomy is a function of battery charge state, capacity and load size.

Availability

Is a useful measure of downtime per year for systems subject to failure and repair. It is defined as the probability of a system being operational at any given time during its working life:

$$A = \text{MTBF} / (\text{MTBF} + \text{MTTR})$$

Where MTBF = Mean Time Between Failures and MTTR = Mean Time To Repair

Blackout

A total loss of electrical power

Bypass

A power path around a UPS system. An automatic bypass is used by the UPS to switch its load to the mains if it experiences an overload or internal failure. A manual, maintenance or service bypass allows an engineer to isolate, maintain or remove the UPS without interrupting power to the load

Capacity System

Is a parallel system where the total capacity of the UPS modules is enough to fully support the load, but with no redundant provision. The failure of any one module will therefore cause severe overloading on the rest. Alternatively, the load may be switched to raw mains.

Centralized Parallel Architecture (CPA)

Using this system, UPS modules supply their load through a central static switch (CSS) which represents a single point of failure.

Circuit Breaker

A protective device that interrupts the flow of current when it exceeds a specified value.

Decentralized Parallel Architecture (DPA)

All of the UPS modules in a Decentralized Parallel Architecture UPS feed the critical load directly. The system's static switch is the sum of the individual UPS modules static switches and the system's maintenance bypass is typically integrated into the systems switchgear.

Double Conversion

On-line UPS system receives mains AC power, rectifies it into DC for conditioning and battery charging, then inverts it into clean AC to supply the critical load. In the event of mains overvoltage or failure the UPS continues to supply the load from its battery with no transfer delay. Provided the mains power disturbance duration is less than the battery autonomy, the event remains invisible to the load.

Double Conversion Efficiency

The double conversion efficiency figure for a UPS is obtained by comparing the output power to the load with the input mains power applied to the UPS, where both figures are in kW. KW is the unit of active power.

Hot swap

Within UPS installations, the term “hot swap” applies to any UPS module or equipment that can be added to or removed from the UPS system with no interruption of conditioned power to critical load.

Inrush current

The current drawn by any electrical device when power is initially applied. Computer equipment typically draws an inrush current of three to ten times the nominal operating value.

kVA (kilovolt-ampere)

1000 volt-amperes. VA is the unit of apparent power, S

Line-interactive UPS systems

are similar to standby UPS systems but also provide constant monitoring of the integrity of utility power and reduce or provide voltage whenever it should rise too high or fall too low

Load

Any electrical device connected to a power source is a “load”. For a UPS, the load is the amount of current/power required by the attached electronic equipment

Module

A UPS module is a unit that contains all the hardware and software necessary for full system operation. Modules can be paralleled into a redundant solution with no single points of failure.

Modular UPS systems are characterized by their building-block architecture, which allows for space-saving vertical scalability as opposed to (only) horizontal scalability of stand-alone UPS systems

MTBF (mean time between failures)

Is a measure of the average time a device will function before failing. MTBF ratings are measured in hours and indicate the reliability of hardware devices such as UPS equipment.

MTTR (mean time to repair)

Measures the total time in hours from when a device fails until when it is restored to full operation. MTTR includes fault diagnosis time, and any time necessary to obtain replacement parts, as well as the actual repair work time.

Near-zero downtime or outage

The ability to minimize a period of time or a percentage of a time span that a system is unavailable or offline to almost zero. See Availability

N+n redundancy

Describes the configuration and redundant capacity of a parallel redundant system. N represents the number of modules needed to meet the critical load and n is the number of extra, redundant modules, referred to as the coefficient of redundancy.

Online UPS systems = Double Conversion UPS. This is the most suitable UPS topology for critical loads. They ensure clean and regulated voltage to the load by means of a rectifier and inverter.

Power Density

The unit of power density is in Watts/m². The power density of a UPS system is found by dividing its power output in Watts by the floor area it covers, in square meters. A high power density figure is an important feature for UPS systems.

Power Factor

It is a ratio between the Active Power P (in W) and Apparent Power S (in VA). The power factor is determined by the load device and is a combination of load currents phase displacement (cos phi) and distortion (non-linearity).

The closer the power factor is to unity, the smaller are the copper losses at the supplying circuit - thus the greater is the power efficiency of the installation.

Traditional switch mode server loads used to be non-linear, but that has been improved by today's power factor corrected power supplies.

The phase displacement part of the power factor imposed by a load on a UPS system can be either lagging or leading. E.g. the blade servers that actually impose a leading power factor are becoming increasingly popular.

Rectifier/Charger

The part of the UPS system that converts AC input power into DC power for feeding the inverter and for charging the back-up battery.

Redundancy in engineering means duplication of critical components of a system with the intention of increasing reliability. If one component fails the remaining ones can continue the operation.

Scalability

The increase or decrease the performance, e.g. power capacity. In modular UPS system the capacity can be increased by simply adding a UPS module.

Single-phase power

(typically 120 or 230 VAC depending on the country) is carried between two wires, live and neutral. The frequency of AC voltage is 50 or 60 Hz depending on the country

Stand-alone UPS systems

are free-standing systems that operate independently

Standby UPS systems

switch from utility to battery power only when the utility power fails

TCO

Is an abbreviation for Total Cost of Ownership. This is an important consideration because although the initial purchase price of a modular UPS system may be higher than a standalone system of similar capacity, its total cost over the operational life of many years will be lower. This can be shown by comparing costs for installation, power consumption, cooling, repairs and spare part stock over the total operational period.

THDi

Stands for the Total Harmonic Distortion of the current waveform. It is generally accepted that the THDi of the installed equipment should be kept low to avoid excessive current distortion at the point of common coupling within a building due to the cumulative effect of all connected equipment.

Three-phase power

An electrical system possessing three different live voltage lines (phases) with sine wave voltages that are shifted by 120 degrees between each other. The mid-point of the 3 -phases, when present in the system, is called the Neutral.

Transformer

A device used to convert the voltage of AC and/or to galvanically isolate a circuit from its power source

Transformer-based

Traditional UPS technology based on inverter transformer that was used for stepping the inverter voltage up to output voltage.

Transformer-less

Innovative UPS technology without the need for inverter transformer. Transformer free technology allows smaller, lighter and more efficient UPS implementation. Other advantages include a higher input power factor, lower THDi, reduced capital and operation costs and enhance battery life.

UPS – uninterruptible power supply

Protects computers and other electronic equipment from mains failures and power problems. If the mains voltage falls below a minimum level or fails entirely, the UPS battery maintains the power to the load until either the mains is restored or an orderly shutdown sequence is performed. Load protection from mains borne spikes, surges and noise is also provided. In other words, the UPS makes the modern society possible.

VFI (Voltage and Frequency Independent)

The highest performance class of UPS topologies according to UPS performance standard IEC 62040-3. The output of the UPS is independent of any fluctuations of input voltage and frequency. The output variations are maintained within the limits prescribed by the above mentioned standard. An on-line double conversion UPS topology has VFI ranking..