



## 9 Power Issues and UPS Technology Overview

UPS systems are designed to provide a regulated supply of mains power to your critical load and to protect and ensure continuity of operations in time of power failure.

There are 9 main issues which can affect your equipment, here we will look at them and also give explanation to the 3 main UPS topologies and how they protect against each of the power issues.

### The 9 common power issues and their meaning



#### 1. Power Failure

Typically caused by lightning strike or fault with the power company's equipment. Without a UPS, this will cause a hard shutdown, putting data at risk.



#### 2. Power Sag

Short-term voltage reduction, often caused by start-up of nearby large loads. Power sags can cause equipment crashes and hardware damage.



#### 3. Power Surge

Short-term high voltage, usually caused by lightning strike nearby. Spikes very often lead to data loss and/or hardware damage.



#### 4. Undervoltage

Reduced supply voltage lasting from minutes to days. Typically occurs when supply network is overloaded. Can lead to computers behaving unpredictably.



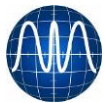
#### 5. Overvoltage

Increased supply voltage lasting from minutes to days. Often triggered by rapid reductions in power demands, overvoltage can damage hardware.



#### 6. Electrical Noise

Interference typically from radio transmitters, welding equipment etc. Noise can cause hard-to-find intermittent problems.



#### 7. Frequency Variation

Changes in supply frequency, usually only found on supplies from generators.



#### 8. Switching Transient

Instantaneous Undervoltage, typically lasting a few seconds.



#### 9. Harmonic Distortion

Supply voltage lasting from minutes to days. Typically occurs when supply network is overloaded. Can lead to computers behaving unpredictably.



## The 3 main UPS technologies and how they protect

**Passive Standby** (offline) solutions supply power to the application directly from the mains, filtered but without active conversion. The battery is charged from the mains. In the event of a power cut or fluctuation, the UPS delivers stable power from the battery.

The advantages of this topology are low cost and adequacy for office environments. Passive standby solutions are not suitable if the power supply is of low quality (industrial sites) or subject to frequent disruptions.

**Basic protection for the single user and small office environment Provides protection against power issues 1, 2, 3.**

**Line Interactive** topology is used for protecting networks and IT applications against power failure, power sag, power surge, Undervoltage and overvoltage. In normal mode, the device is controlled by a microprocessor that monitors the quality of the supply and reacts to fluctuations. A voltage compensation circuit is enabled to boost or reduce the supply voltage to compensate for the fluctuations. The main advantage of this technology is that it enables compensation of under and overvoltage without using the batteries.

**Increased protection for small to medium networks and telephony Provides protection against power issues 1, 2, 3, 4, 5.**

**Double Conversion** topology (or on-line) is a basis for UPSs designed for continuous power protection of critical equipment against all nine power problems: power failure, power sag, power surge, Undervoltage, overvoltage, switching transient, line noise, frequency variation and harmonic distortion. It ensures a consistent quality of power supply regardless of disturbances in the incoming mains.

The output voltage is entirely regenerated by a sequence of AC to DC conversion followed by DC to AC conversion in order to create power supply without any electrical interference. Double Conversion UPSs can be used with any type of equipment as there are no transients when changing over to battery power.

**Complete protection for server rooms, larger comms rooms and Data Centres Provides protection against power issues 1, 2, 3, 4, 5, 6, 7, 8, 9.**