



Power Protection  
Systems Ltd

## Power Quality Problems Explained

A basic guide to the various forms of poor power quality.

- UPS
- Generators
- LV Switchgear
- Power Distribution
- Electrical Installations
- Disposals
- Maintenance
- Servicing & Support





## Power Quality Problems Explained

Whilst its complete power failures that tend to grab all the headlines, there are actually lots of other types of power quality issue that can potentially cause problems to electrical users. Understanding these can seem confusing so below, we have offered a brief explanation of the key problems people experience.

### POWER FAILURE

A total loss of utility power can be caused by a number of events such as lightning strikes, downed power lines, grid over-demands, accidents and natural disasters.

### POWER SAG

One of the more common forms of poor power quality, sags occur when the mains power voltage drops below normal levels for short periods. Sags can be triggered by the start-up of large loads, utility switching, lightning and power services not being able to meet demand.

Sags can cause IT Systems to freeze, fail or reboot and commonly, result in higher currents being drawn as affected power supplies strive to compensate by delivering more power.

### SURGES (SPIKES)

High energy bursts, power surges are defined as short term high voltages above 110 per cent of nominal levels. These can be caused by lightning strikes and can cause line voltages to exceed 6,000 volts. Spikes almost always result in data loss or hardware damage.

### UNDER VOLTAGE (BROWNOUTS)

Under voltage is a decrease in voltage below 90% of normal levels and that lasts longer than a minute. Sometimes, utility companies intentionally lower voltages to cope during times of peak demand or due to other network issues. Chronic under voltage can cause excess wear and tear to equipment as devices tend to run hotter whilst the voltage is lower.

### OVERVOLTAGE

This is increased line voltage for periods ranging from a few minutes to a few days. Overvoltage is triggered by a rapid reduction in power loads, heavy equipment being turned off, or by utility switching. Repeated overvoltage can cause excess wear and tear to hardware.

### ELECTRICAL NOISE

Classed as either Common or Normal mode, Electrical Noise is high-frequency noise which disrupts the operation of circuits and equipment, potentially damaging them. Causes can include flickering lights, cable and transformer faults and radio transmitters.

### FREQUENCY VARIATION

A change in frequency stability, frequency variation results from generator or small co-generation sites being loaded and unloaded. Can cause erratic operation, data loss, system crashes and equipment damage.

### SWITCHING TRANSIENT

The term used to describe instantaneous under-voltage (notch). Normally, switching transients are shorter than spikes and generally fall in the range of nanoseconds.

### HARMONIC DISTORTION

Distortion of the normal line waveform, harmonics are generally transmitted by non-linear loads such as switch mode power supplies, variable speed drives, copiers and fax machines. Problems associated with harmonics include voltage distortion, overheating of neutral conductors, wiring circuits, switchgear and the nuisance of tripping breakers.