

Mains Supply Voltage Problems - Symptoms, Causes & Solutions

Definition and Explanation

Sags: are short duration decreases in the mains supply voltage which generally last for several cycles.

Formal Definition – Voltage below 80 to 85% of rated RMS voltage for 2 or more cycles.

Typical symptoms - Sensitive equipment can lock or hang causing data loss and system resets.

Common Causes – Heavy equipment turned on, starting large electrical motors, switching of the mains supply.

Brownouts: are long term sags in the mains supply voltage which can last up to several days.

Formal Definition – A steady state of RMS voltage under nominal by a relatively constant percentage.

Typical Symptoms -Equipment can reset or even shutdown.

Common Causes – Heavy equipment turned on, starting large electrical motors, switching of the mains supply or just low voltage output from the generating source.

Over-Voltage & Surges: are short duration increases in the mains supply voltage which generally last several cycles.

Formal Definition – Voltage above 110% of the rated voltage for 1 or more cycles.

Typical Symptoms - When surges occur equipment can suffer from premature failure. The high voltage causes wear and tear and general component degradation. This is often unnoticeable until failure occurs. Unusual heat output can be an early sign of problems ahead.

Common Causes – Heavy equipment being turned off.

Electrical Noise: this is a high frequency noise either common or normal mode.

Formal Definition – Electrical noise is high frequency interference on the incoming mains supply.

Typical Symptoms - Processing errors, computer lock-up, burned circuit boards, degradation of electrical insulation and equipment damage.

Common Causes – Electric motors, relays, motor control devices, broadcast transmission and microwave radiation.

High Voltage Spikes: these are very fast high energy surges or spikes in voltage lasting only a few milliseconds.

Formal Definition – Rapid Voltage peak up to 6,000 volts with a duration of 100msec to ½ a cycle.

Typical Symptoms - Equipment can lock or hang, crash and even suffer damage which inevitably causes data loss and corruption.

Common Causes - Switching of equipment, especially heavy inductive loads, arcing faults or atmospheric electrical disturbance, such as lightning strikes and static discharges.

Blackout and Mains Failures: when the mains supply fails completely this is known as a total mains failure or blackout.

Formal Definition – Loss of incoming mains supply

Typical Symptoms - Complete disruption of equipment operation. A break in the mains supply of only several milliseconds is sufficient enough to crash, lock or reset many of the components that make up a typical data or voice processing IP network, such as PC, terminal, console, server, PBX, printer, modem, hub or router.

Common Causes - Storms, lightning, wind and utility equipment failure. Typically occurs as a result of loss of power, a mechanical failure, or overloading by consumers.