

The importance of power quality

LED lights are non-linear loads producing harmonic distortion in power grid. Increased harmonics distortions causes higher operation and maintenance costs of the lighting systems.



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What is power quality about?

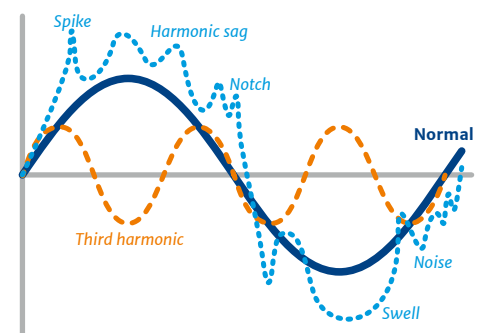
Power quality is defined as the power grid's ability to supply a clean and stable power flow, as a constantly available power supply.

The power flow should have a pure sinusoidal waveform; it should remain within specified voltage, and frequency tolerances.

An adequate power quality guarantees the necessary compatibility between all equipment connected to the grid. It is an important issue for efficient operation of power grids.

The main reason to improve power quality is economic value for utilities, their customers, and suppliers of load equipment.

Common power quality problems



PREVENTING PQ PROBLEMS:

Procure and install components (i.e. luminaires) with power factor ≥ 0.95 .

Perform regular power quality monitoring for timely maintenance of filter, harmonics suppressions.

Dealing with power quality problems

- Power factor **correction** with compensators.
- **Reduction** of harmonics with harmonic filters or reactors.
- **Optimisation** of voltage with voltage stabilising units.
- Lightning and surge **protection** devices against overvoltage and voltage spikes.

See next page for more information ➤



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How LEDfication affects power quality¹

▶ Non-linear nature of the load

Harmonic, especially third harmonic, is generated due to low voltage network as LEDs are non-linear loads.

▶ Conversion of AC to DC

LED Drivers convert AC power into DC power that is appropriate to light a bulb. During this conversion, high frequency current is generated which is the root cause of Harmonics.

▶ Triplen Harmonics

LED lights can cause triplen harmonics and they have to be considered separately as system response to triplen harmonics is different than other harmonics.

▶ Low power factor of LED driver

LED drivers with a low power factor reflect harmonics back to the mains. Increasing number of high-power LED lights increases a risk of electrical pollution across the mains.

▶ Inrush Current

LED lighting with compensated power factor can cause high inrush current. This can cause damage and malfunction of equipment.

How PQ affects lighting systems costs

▶ Increased installation costs

Driven by demand for over-dimensioning of electrical installation, caused by increased energy use and energy losses in system.

▶ Increased O&M costs

Driven by increased energy consumption, lighting system instability and failure rates.

- Higher voltage is harmful to lighting system performance and longevity.
- Lower voltage can cause brown outs and reduced lighting quality.

See also:

¹ www.apqi.org