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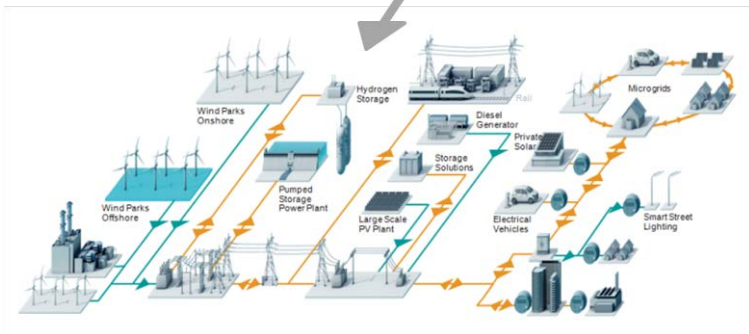
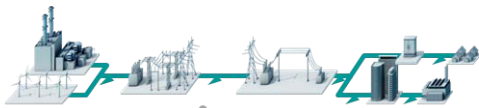
SICAM Q200

Line conducted emissions in the frequency range from 2 kHz to 150 kHz

www.siemens.com/sicam

Supraharmonics – a new theme of power quality

The classical power-supply structure generation-transmission-distribution-consumer with centralized generation and current flow only in one direction changes towards distributed and bidirectional network structures.



The large number of distributed renewable energy sources with their fluctuating power infeed can have an increasingly negative influence on the electricity-supply system. The high-frequency emissions in our future grids and the connected consumers will therefore increase. New IEC standards for limiting values of supraharmonics in low-voltage power systems will be published in the near future.

High-frequency emissions, known as "supraharmonics" (2 kHz to 150 kHz), can highly affect neighboring devices and influence them. The sensitive devices include smart meter gateways, dimmers for lamps, and PLC communication. This can also be the cause of failures of touch-controlled operator elements.

Facts about high frequency

- The increasing number of renewable energy sources (photovoltaic fields, wind farms, and energy storage units) increases the influence by required optimal switching frequencies of converters. Typical switching capacity of semiconductors in converters:
1 kW to 100 kW in the range from 20 kHz to 100 kHz
>100 kW in the range from 9 kHz to 20 kHz
- Increasing requirements and standards for energy-efficient drives result in an increasing number of converters
- The grid "of the future" increasingly requires the use of communication (PLC communication, building automation)

Possible consequences of emissions in the frequency range from 2 kHz to 150 kHz

- Increasing capacitive currents can damage the power supply, increase the neutral current and thus increase the safety risk
- More failures in touch-controlled operator elements and dimmers for lamps
- Reduces the service life of LED lamps
- Causes communication problems (for example, PLC communications)
- Can lead to overheating of capacitor banks and transformers
- Can cause failures in protection devices

Recording and logging

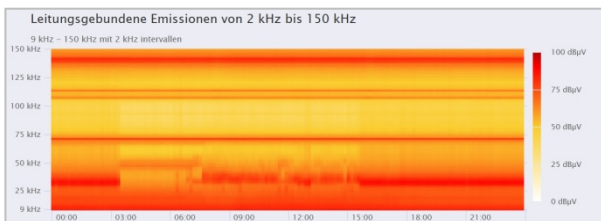
Monitoring of power quality with Siemens

Improves the knowledge with respect to the correlation between power fluctuation and power quality. Supports the development of standards up to optimal possible solutions:

- Supporting the measurements to understand the effect of converters on the power-supply quality, caused by the integration of renewable energies.
- Identification of potential weak points in the power supply.
- Continuous monitoring of the impact of new technologies on loads and energy consumers.

Customer benefits

- Taking suitable counter measures to avoid problems during operation and to avoid down times, failures and equipment damage.
- Improved availability, safety and quality of the power – 24/7.
- Creating transparent energy flows to support energy management systems in determining potential savings.

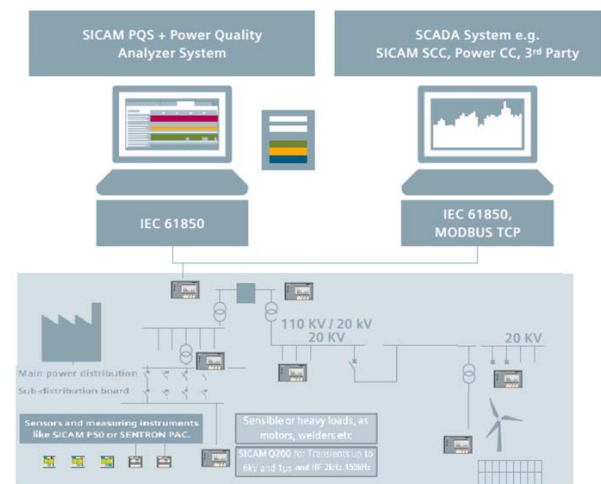


Emissions measurement with SICAM Q200

Siemens – everything from a single source

- Our PQ systems comply with international standards for power quality measurement and represent a professional system to assure adequate power-supply quality.
- Siemens can also provide you with support services regarding power-supply quality: for example analysis of measured data and evaluation of the power-supply quality, suggestions for improvement and recommendations for adaptations for substation operators, risk mitigation measures and not least high frequency studies.

The new SICAM Q200 measures emissions in the frequency range from 2 kHz to 150 kHz caused by renewable energies.



Overview of supply networks in various environments



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This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (www.openssl.org) and cryptographic software written by Eric Young (ey@cryptsoft.com).