

# THE MEANING OF CLASS A

Whitepaper Class A

# POWER QUALITY AT A GLANCE

## WHY POWER QUALITY IS IMPORTANT

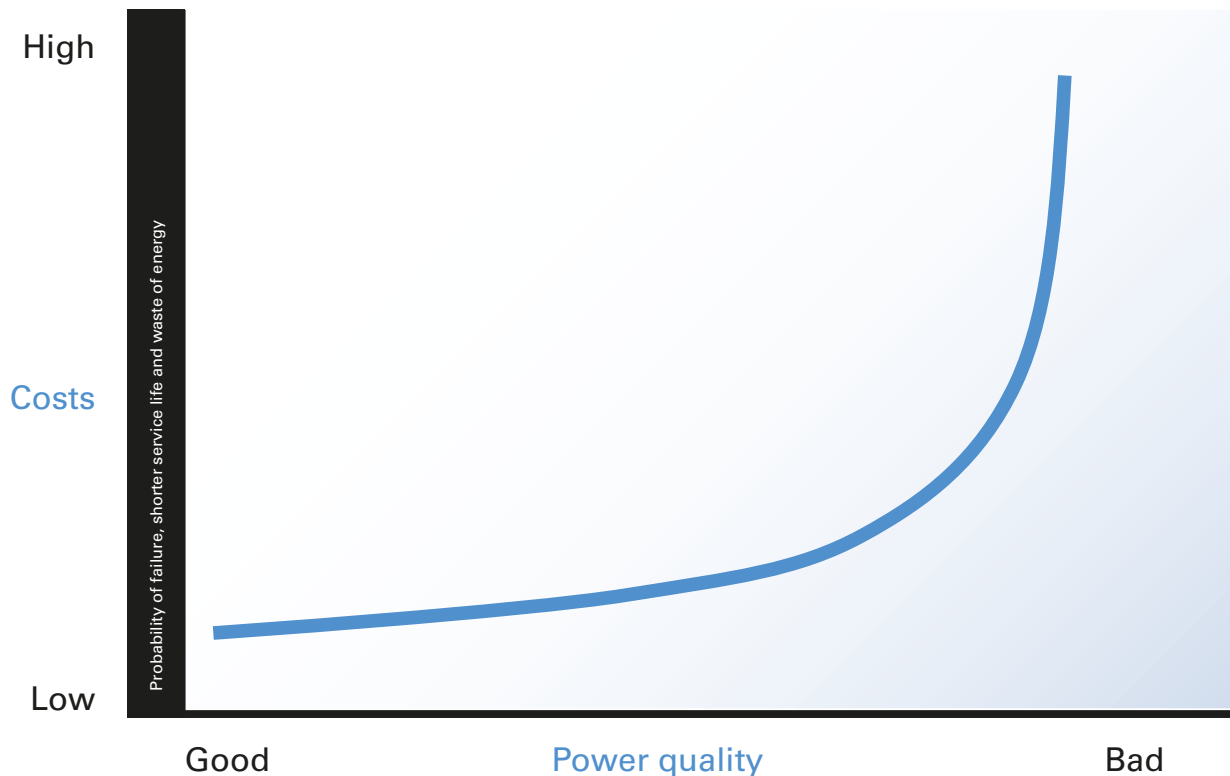
The quality of electrical energy is described by the term "power quality" and ensured by standards and guidelines. Power quality means the reliable power supply to all users with a distortion-free, sinusoidal power supply with constant amplitude and frequency. Power quality can be affected by faults in the supply network (short-term interruptions, voltage dips, voltage swells) or by disturbances (flicker, unbalance, harmonics, voltage variations). This influences the behavior of electrical loads up to the point of endangering people and property, which in turn results in a higher failure rate of devices, higher operating costs and higher energy consumption. In order to reduce energy costs, avoid equipment breakdown and ensure personal safety, it is, therefore, relevant to integrate energy meters into the systems that measure, analyze and monitor the power quality.

Janitza offers in-house manufactured products and solutions that are both perfectly matched and coordinated to provide optimum protection for your system.

### Poor voltage quality leads to:

- a higher device failure rate
- higher operating costs
- higher maintenance costs
- higher fire risk
- a shorter lifetime of equipment
- higher energy consumption
- reduced plant availability
- reduced warranty and guarantee claims
- residual currents
- possible fines or claims

Janitza's permanently installed measurement systems (hardware plus network visualization software) facilitate to record and analyze the level and quality of your energy flows. Companies that simultaneously keep an eye on their energy consumption and power quality can sustainably reduce their costs and increase energy efficiency.



## WHY JANITZA?

Rely on a strong partner with many years of comprehensive experience and a considerable range of services. From planning, commissioning and training up to a wide range of support and maintenance services during operation, Janitza supports you during every lifecycle phase of your system. Whether industrial plants, building services engineering or mechanical and plant engineering, Janitza will help you detect disruptive network disturbances and reduce them to assure operational safety.

Janitza electronics GmbH is an international, family-owned company headquartered in the central Hessian town of Lahnau. Janitza is one of the leading suppliers of complete solutions in the field of energy management. The innovative company concentrates on the development and production of high-quality measurement devices with the GridVis® software and a comprehensive range of services. Janitza offers its customers energy management, power quality monitoring and residual current monitoring (RCM) in a system environment.

## THE KEY TO SUCCESS FOR ENSURING THE HIGH AVAILABILITY OF YOUR PLANT:

### MEASUREMENT, ANALYSIS AND CORRECTION

#### MEASUREMENT:

Janitza produces power quality energy measuring devices for data acquisition and monitoring

#### ANALYSIS:

The in-house GridVis® network visualization software offers clear analysis options and reports (e.g. PQ report)

#### CORRECTIONS:

Janitza's active harmonic filter compensates harmonics, imbalances and resonances

## THE MEANING OF CLASS A

Power quality measurement is a relatively new field that is constantly evolving. Different measurement device manufacturers use different measuring methods. The considerable differences between the measurement devices often cause measurement engineers to spend more time on the functions and measurement algorithms of the various models than on the actual power quality test.

The new IEC 61000-4-30 Class A standard can be used to eliminate uncertainties when selecting a network analyzer.

The IEC 61000-4-30 Class A standard defines the necessary parameters, appropriate measurement methods, accuracy and ranges that a power quality analyzer must meet. This ensures reliable, reproducible and comparable results. In addition, it also provides a reliable reference in case of disputes, for documenting the power quality for final consumer, for documentation at the power supply company, for supervisory authorities or for detailed fault analysis in case of power quality problems in the energy supply.

### The standard IEC 61000-4-30 Class A standardizes the following measurements:

- Supply voltage level
- Mains frequency
- Voltage dips and voltage overloads
- Flicker, harmonics, interharmonics (partly by reference to other standards)
- Voltage imbalance
- Ripple control signals
- Supply disruptions
- Fast voltage changes

The technician can reliably classify events with internationally recognized measurement uncertainty using a Class A certified instrument.

This is particularly relevant when the results of different instruments are to be compared in order to verify conformity.

## EXAMPLES OF CLASS A REQUIREMENTS:

■ The measurement uncertainty is maximum 0.1% of the specified input voltage  $U_{in}$ . Simple PQ measurement devices with an deviation exceeding 1% will incorrectly evaluate voltage dips of -9%. The threshold value is -10%. With a device that is certified according to Class A, technicians can reliably certify events with internationally recognized measurement uncertainty. This is particularly relevant when an evidence provided by third parties is required.

■ Dips, excesses and interruptions must be recorded from values for grid periods that are updated at each half period. The instruments combine the high time resolution of the half period values with the accuracy of the effective values of the period.

■ Aggregation intervals – the measurement data of power quality instruments – are summarized over specific time intervals. Class A equipment must offer the following aggregations:

- 10/12 cycles (200 ms) at 50/60 Hz, the exact interval length varies with the current mains frequency
- 150/180 cycles (3 s) at 50/60 Hz, the exact interval length varies with the current mains frequency
- Harmonics must be measured in 200-ms intervals according to the latest standard IEC 61000-4-7:2002. The old standard defined 320-ms intervals, which, however, cannot be synchronized to the 200-ms aggregation intervals of other class A measurements

The 200-ms intervals result in the synchronous calculation of the harmonics with all other parameters, such as effective values, THD and unbalance.

By defining the FFT algorithm for harmonics, all Class A instruments provide equal values for the harmonics. Totalling the harmonics and the interharmonics to 5 Hz lines according to precisely defined rules makes the results of class A devices comparable and consistent.

■ In order to ensure a precise correlation of measurement data from certain instruments, an external time synchronization is essential to ensure accurate time stamps. The accuracy is set to  $\pm 20$  ms at 50 Hz and  $\pm 16.7$  ms at 60 Hz.

- 10-minute intervals are synchronized to the absolute time
- 2-hour intervals are synchronized to the absolute time

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## COMPANY PROFILE

We are based in Lahnau, a Hessian town located between Wetzlar and Gießen, where we develop and manufacture for the German and international market. For more than half a century, our hardware and software products have always remained a little ahead of their time. We introduce new technologies and combine existing applications into convincing, intelligent products and solutions. We serve different market segments in 60 countries with a network

of competent sales partners who support our customers directly at their location.

### Our portfolio

Janitza's extensive product portfolio ranges from current transformers to measurement devices, from communication equipment and IT environments through to software solutions and data analyses.



*Company headquarters Lahnau*



*Managing Director Markus Janitza*

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## IMPORTANT NOTICE

Janitza electronics GmbH® offers a collection of application reports with in-depth know-how on the subjects power quality monitoring (PQM), power management (PM) and power quality solutions (PQS). Case studies and reference projects are also addressed. These application reports are intended to train our worldwide distributors and representatives as well as our own sales staff and to impart the necessary basic knowledge. They are also to quickly answer repetitive questions and to communicate new trends in a technically sound manner. Each individual issue covers a self-contained application topic, a specific solution or a technical topic of general interest.

Janitza electronics GmbH® intends to use its experts broad application know-how, which was established worldwide over a long period of time with partners from the fields of PQM, PM and PQS.

Some parts of this publication may contain statements regarding the application, use or usability in specific areas or applications. These statements are based on our experience, typical uses and typical requirements in connection with specific applications. However, the customer or user is responsible for checking whether a product from Janitza electronics GmbH® with its specifications and specified standards can be used for the respective application. We may amend or update this application report without further notice. This is indicated by the document number on the back. Our products are specified in detail in our catalogs and operating instructions.

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