SIMEAS Q80
Power Quality Recorder

Energy Automation

SR 10.2.1 · 2009

Answers for energy.

SIEMENS

Certificate of Conformity
IEC 61000-4-30 Class A

Siemens SIMEAS Q80
equipped with Garmin GPS18x LVC
(or other GPS receiver with equivalent accuracy and functionality)

IEC 61000-4-30 Ed. 2
230V, 50/60 Hz, L-N U_{din}

61000-4-30 Section	Power Quality Parameter	Class A Compliance	Class S Compliance	Class B Compliance	Remarks
5.1	Power frequency	Yes	Yes	Yes	
5.2	Magnitude of the supply voltage	Yes	Yes	Yes	
5.3	Flicker	Yes	Yes	(N/A)	See Note 1 below
5.4	Supply voltage dips and swells	Yes	Yes	Yes	
5.5	Voltage interruptions	Yes	Yes	Yes	
5.7	Supply voltage unbalance	Yes	Yes	Yes	
5.8	Voltage harmonics	Yes	Yes	Yes	
5.9	Voltage interharmonics	Yes	Yes	Yes	
5.10	Mains signaling voltage	Yes	Yes	Yes	
5.12	Underdeviation and overdeviation	-	-	-	See Note 2 below
4.4	Measurement aggregation intervals	Yes	No	Yes	Class A and Class S are mutually exclusive
4.6	Time-clock uncertainty	Yes	Yes	Yes	
4.7	Flagging	Yes	Yes	(N/A)	
6.1	Transient influence quantities	Yes	(N/A)	(N/A)	See Note 3 below

(N/A) – Not Applicable. There is no requirement in the Standard.
Note 1: Flicker is only defined at 230V, 50Hz and 120V, 60Hz. EUT meets Class A requirements at 230V, 50Hz.
Note 2: Overdeviation and underdeviation parameters are not measured by the Siemens SIMEAS Q80.
Note 3: Transients applied to EUT measuring terminals and power terminals.

This certificate summarizes the results of the PSL IEC 61000-4-30 Power Quality Measurement Methods Compliance Report, document # PSL SIEMENS-009-30, dated 27 August 2009. PSL tested two samples, S/N 140148 and 140149 at 230VAC, 50/60 Hz. Manufacturer states that these samples are representative of the SIMEAS Q80 series.

Siemens SIMEAS Q80

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Statement of IEC 61000-4-30 Compliance

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SIMEAS Q80
Power Quality Recorder

Fig. 1
SIMEAS Q80 Power Quality Recorder

Description

Power quality is a complex issue. The voltage quality is affected by all parties connected in the power system: power utilities of transmission and distribution, power producers and consumers. Inadequate power quality has an adverse effect on the dependability of loads in the power supply system and can have serious consequences.

SIMEAS Q80 is a compact and powerful recorder designed for utilities and industries to monitor the power quality for regulatory (e.g. evaluation against the standards) and explanatory (e.g. wave shape recording) purposes from the generation plant to the last customer in the electrical supply chain.

With SIMEAS Q80, the quality of the power supply system can be continuously monitored. This can be based on the quality criteria defined in the European electricity supply system quality standard EN 50160 or other assessment criteria. Moreover, data that are above or below the defined threshold values are stored and can thus be used for a meaningful overall analysis.

It provides information that enables you to see the whole picture!

Field of application of SIMEAS Q80

- Regulatory power quality application: measurement, comparison, and profiling of power quality parameters at the individual electrical system interfaces: e.g. generation, transmission, subtransmission and distribution systems.
- Explanatory power quality application: disturbance recording (e.g. waveform capture) to understand the causes and consequences of power quality problems.

Benefits

- Customer satisfaction: companies with a suitable power quality monitoring system are proven to be more reliable suppliers and users of energy.
- Asset protection: early identification of disturbances and active response to them. Comprehensive information for enhancing the visibility and control of assets at the edge of the grid.
- In case of negotiations or disputes, power quality monitoring provides evidences to align interests and to support agreements between parts.
- Quality of supply is in the interests of power utilities, regulators, consumers, and the environment.

Function overview

Measurement of continuous phenomena and disturbances according to the necessary accuracy requirements, as stipulated in IEC 61000-4-15, IEC 61000-4-7 and IEC 61000-4-30 (Class A).

Recording and analyzing

- Voltage frequency: frequency deviation
- Slow voltage variation: detection and monitoring of supply interruption
- Rapid voltage variations: voltage dips, voltage swells, rapid voltage changes and voltage fluctuations (flicker)
- Power line signaling superimposed on the supply voltage
- Voltage wave shape: harmonics (up to the 50th harmonic) and up to 10 interharmonics
- Flexible value limit and event definition
- Fault recording triggered by waveform and binary values
- Comparison and reporting of power quality profile according to EN 50160 or your local standards.

Features

- Suitable for monitoring single-phase, 3- and 4-wire power systems (up to 1000 V_{rms})
- 4 voltage, 4 current
- 4 inputs, 4 outputs
- Sampling rate 10 kHz for network analysis
- Measurement accuracy 0.1 % of the range
- Power line signaling voltage measurement and recording
- High local storage capability: removable compact flash (standard delivery 2 GB)
- Enhanced data compression process (power quality data)
- Automatic notification in case of a fault or violations by e-mail, SMS, and fax
- Flexible reporting with export functions
- Ethernet and modem communication interfaces for parameterization, remote monitoring, and polling
- GPS / NTP (planned) for synchronization
- Network trigger system
- Simple operation, compact and robust design

Power quality

Supply quality

Quality is generally recognized as an important aspect of any electricity supply service. Customers care about high quality just as much as low prices. Price and quality are complementary. Together, they define the value that customers derive from the electrical supply service.

The quality of the electricity supply provided to final customers results from a range of quality factors, for which different sectors of the electricity industry are responsible. Quality of service in the electrical supply has a number of different dimensions, which can be grouped under three general headings: commercial relationships between a supplier and a user, continuity of supply, and voltage quality.

To avoid the high cost of equipment failures, all customers must make sure that they obtain an electricity supply of satisfactory quality, and that their electrical equipment is capable of functioning as required even when small disturbances occur. In practice, the voltage can never be perfect.

Electrical supply is one of the most essential basic services supporting an industrial society. Electricity consumers require this basic service:

- To be available all the time (i.e. a high level of reliability)
- To enable all consumers' electrical equipment
  to work safely and satisfactorily (i.e. a high level of power quality).

Voltage quality

Voltage quality, also termed power quality (PQ), covers a variety of characteristics in a power system. Chief among these is the quality of the voltage waveform. There are several technical standards defining voltage quality criteria, but ultimately quality is determined by the ability of customers' equipment to perform properly. The relevant technical phenomena are: variations in frequency, fluctuations in voltage magnitude, short-duration voltage variations (dips, swells, and short interruptions), long-duration voltage variations (overvoltages or undervoltages), transients (temporarily transient overvoltages), waveform distortion, etc. In many countries voltage quality is regulated to some extent, often using industry-wide accepted standards or practices to provide indicative levels of performance.

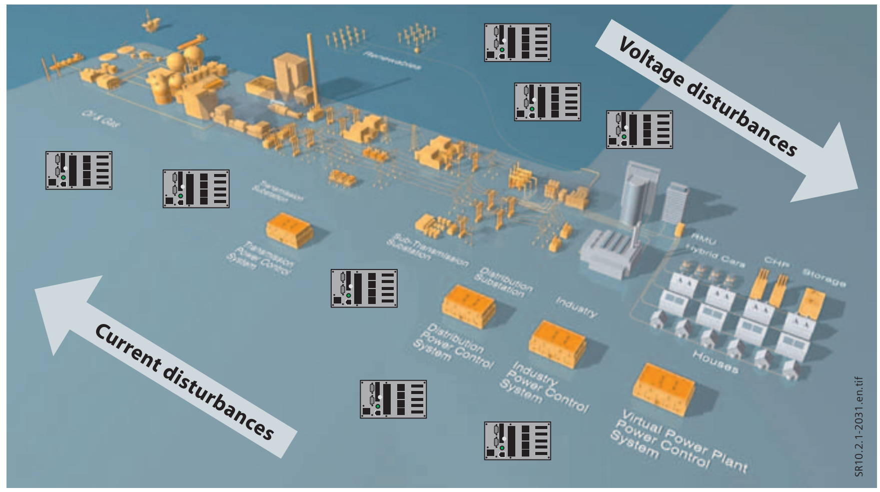


Fig. 2 Power quality monitoring provides value to everyone – to the local utility, to the consumer, to the local economy and to the environment

Everybody is now aware of the effects of poor power quality but few really have it under control. The levels of power quality disturbances need to be monitored weekly, sometimes even daily, in order to trigger appropriate remedial measures before severe consequences occur.

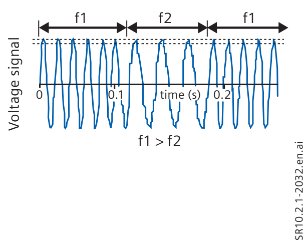
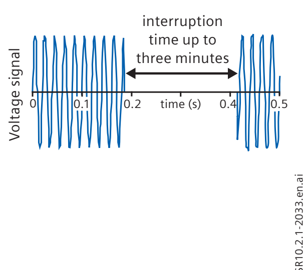
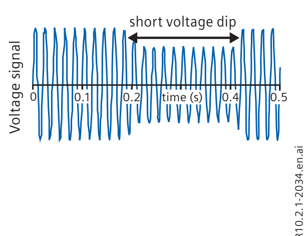
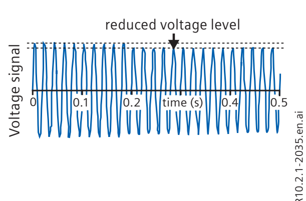
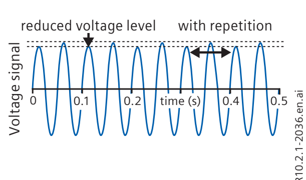
The power utility therefore has an interest in monitoring the power quality, showing that it is acting correctly and improving its know-how about the system. This ensures customer satisfaction by providing electricity with quality and reliability.

The availability and quality of power is of even greater concern to distribution companies. The liberalization of the electricity market has put them in the uncomfortable position of being affected by other players' actions. This situation has been stabilizing and power quality is becoming a top priority issue in the restructuring process. With increasing customer awareness of energy efficiency, it is clear that the quality of supply will be receiving much attention.

Most power quality problems directly concern the end user, or are experienced at this level. End users have to measure the power quality and invest in local mitigation facilities. However, consumers often turn to the utility company, instead, and exert pressure to obtain the required supply quality.

The EN 50160 power quality standard describes the main characteristics of the voltage at the customer's supply terminals in public low, medium, and, in the near future, high-voltage systems, under normal operating conditions.

Power quality

Problem	Description	Cause	Effect
	**Frequency distortions:** A frequency variation involves variation in frequency above or below the normally stable utility frequency of 50 or 60 Hz	• Start-up or shutdown of very large item of consumer equipment, e.g. motor • Loading and unloading of generator or small co-generation sites. • Unstable frequency power sources	• Misoperation, data loss, system crashes and damage to equipment and motor • For certain kinds of motor load, such as in textile mills, tight control of frequency is essential
	**Supply interruption:** Planned or accidental total loss of power in a specific area Momentary interruptions lasting from a half second to 3 seconds Temporary interruptions lasting from 3 seconds to 1 minute Long-term interruptions lasting longer than 1 minute	• Switching operations attempting to isolate an electrical problem and maintain power to your area • Accidents, acts of nature, etc. • Fuses, actions by a protection function, e.g. automatic recloser cycle	• Sensible processes and system shutdown or damages • Loss of computer / controller memory • Production losses or damage
	**Voltage dip / sag or swell:** Any short-term (half cycle to 3 seconds) decrease (sag) or increase (swell) in voltage	• Start-up or shutdown of very large item of consumer equipment, e.g. motor • Short circuits (faults) • Underdimensioned electrical circuit • Utility equipment failure or utility switching	• Memory loss, data errors, dim or bright lights, shrinking display screens, equipment shutdown • Motors stalling or stopping and decreased motor life
	**Supply voltage variations:** Variation in the voltage level above or below the nominal voltage under normal operating conditions	• The line voltage amplitude may change due to normal changing load situations.	• Equipment shutdown by tripping due to undervoltage or even overheating and / or damage to equipment due to overvoltage • Reduced efficiency or life of electrical equipment
	**Flicker:** Impression of unsteadiness of visual sensation induced by a light stimulus, the luminance or spectral distribution of which fluctuates with time	• Intermittent loads • Motor starting • Arc furnaces • Welding plants	• Changes in the luminance of lamps can result in the visual phenomenon called flicker on people, disturbing concentration, causing headaches, etc.

(continued on page 6)

Power quality

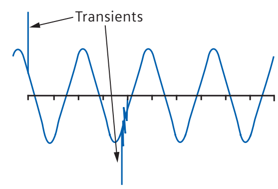
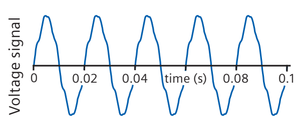
Problem	Description	Cause	Effect
	**Transient:** A transient is a sudden change in voltage up to several thousand volts. It may be of the impulsive or oscillatory type (also termed impulse, surge, or spike) **Notch:** This is a disturbance of opposite polarity from the waveform	Utility switching operations, starting and stopping heavy equipment, elevators, welding equipment static discharges, and lightning	• Processing errors • Data loss • Lock-up of sensitive equipment • Burned circuit boards
	**Noise:** This is an unwanted electrical signal of high frequency from other equipment **Harmonic:** Distortion is alteration of the pure sine wave due to non-linear loads on the power supply	Noise is caused by electromagnetic interference from appliances, e.g. microwave, radio and TV broadcasts, arc welding, heaters, laser printers, thermostats, loose wiring, or improper grounding. Harmonic distortion is caused by non-linear loads	• Noise interferes with sensitive electronic equipment but is usually not destructive • It can cause processing errors and data loss • Harmonic distortion causes motors, transformers, and wiring to overheat • Improper operation of breakers, relays, or fuses

Table 1 Main problems with power quality *(continued from page 5)*

Who is responsible?

An interesting problem arises when the market fails to offer products that meet the customer's power quality needs. If a customer cannot find equipment that is designed to tolerate momentary power interruptions, the customer may, for example, pressure the power supplier and the regulator to increase the power quality of the overall distribution system. It may be in the supplier's interest to help the customer address the power quality and reliability problem locally.

The electrical supply system can be considered a sort of open-access resource: In practice, almost everybody is connected to it and can "freely" feed into it. This freedom is now limited by standards, and / or agreements. In European countries, the EN 50160 European standard is generally used as a basis for the supply quality, often also termed the voltage or power quality. There is currently no standard for the current quality at the point of common coupling (PCC), but only for equipment. The interaction between the voltage and current makes it hard to draw a line between the customer as "receiving" and the network company as "supplying" a certain level of power quality. The voltage quality (for which the network is often considered responsible) and the current quality (for which the customer is often considered responsible) affect each other in mutual interaction.

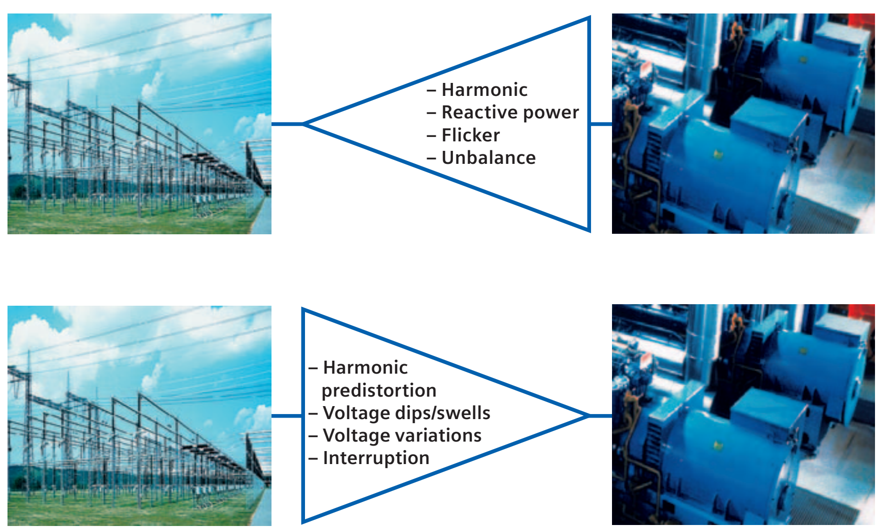


Fig. 3 Utility and industries, both are responsible for voltage quality

Power quality

Power quality monitoring applications

One of the keys to the success of profiling and defining the power quality system is understanding the applications. The following table lists a number of applications based on gathering power quality data.

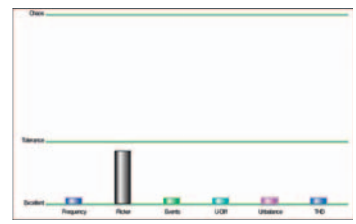
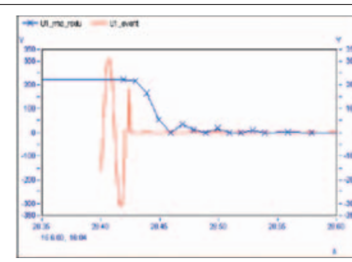
PQ application	Description	Hardware	Measurements	
Regulatory power quality:	Regulative PQ analysis approaches the comparison of the quality of voltage or power with recognized standards (e.g. EN 50160) or with the quality defined in power supply contracts. Periodically produce compliance reports.	Power Quality Recorders (mainly Class A)	Voltage quality parameters (at least) at selected system interfaces and customer supply points (e.g. EN 50160) for: Power system performance Planning levels (i.e. internal objectives) Specific customer contracts	 SR10.2.1-2040.en.tif
Explanatory power quality:	Explanatory PQ analysis to provide an understanding of what is going on in particular cases, such as fault analysis, to support the wider aspects of system stability. It is a process that aims to document selected, observed power quality and maximize the level of understanding, possibly including knowledge of the cause and consequences and possible mitigation of power quality problems.	PQ recorders Class B or A and fault recorder / PMU	U+I_{rms}, waveforms, status of binaries, power swing, MV transformers, busbars and loads	 SR10.2.1-2041.en.tif

Table 2 Power quality applications

Power quality recording steps

Project phases	Defining PQ objectives	System installation and configuration	Start measuring	Evaluation	System improvement and/or counter-measures
Planning activities	Define PQ measurement objectives) (regulative, explanatory, or both) and define the targets	Define measuring points and install devices and system	Automatic notification or systemic system check-up for events or standards violations	Power quality compliance Reporting and/or event evaluation	Analysis of information, controlling, action plan, adaptation to standards, comparison with defined targets
SIMEAS Q80 support		Easy configuration with SIMEAS Q80 Manager	Reliable measurement of defined quantities	Remote access for automatic evaluation	Automatic report generator in case of limit

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Fig. 4 Power quality recording in five steps

Standards

The purpose of power quality indexes and measurement objectives is to characterize power system disturbance levels. Such indexes may be defined as “voltage characteristics” and may be stipulated in a grid code that applies to electrical system interfaces. Power quality grid codes make use of existing standards or guidelines defining voltage and current indexes to be applied to interfaces in low, medium, or high-voltage systems, for example, EN 50160. EN 50160 defines and describes the main characteristics of the voltage at the customer’s supply terminals in public LV and MV electricity distribution systems. There are also many regional or national recommendations. Specialists recommend indexes for HV-EHV that are similar to those defined in EN 50160 for voltage characteristics / site indexes for practical reasons, such as easy comparison of voltage characteristics between LV-MV and HV-EHV and use of common monitoring methods.

All values relevant to power quality are monitored, recorded, and evaluated according to international and national standards for power quality (e.g. the European standard EN 50160).

The end result is fully automated, standard-compliant documentation of all measurements. Calculation of rms values after every half period is the touchstone of a class A measurement device. To define the range of normal voltage states, a hysteresis range is specified for event detection. SIMEAS Q80 meets the precision requirements for a class A measurement device according to the IEC 61000-4-30 standard.

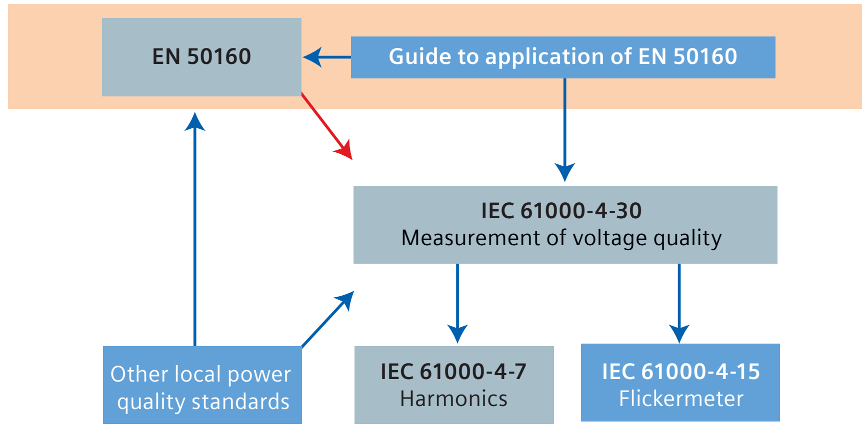

Fig. 5 Overview of international and national standards for power quality

Parameter	Supply voltage characteristics according to EN 50160
Power frequency	LV, MV: mean value of fundamental measured over 10 s ± 1 % (49.5 – 50.5 Hz) for 99.5 % of week – 6 % / + 4 % (47 – 52 Hz) for 100 % of week
Voltage magnitude variations	LV, MV: ± 10 % for 95 % of week, mean 10 minutes rms values (Fig. 6)
Rapid voltage changes	LV: 5 % normal 10 % infrequently Plt ≤ 1 for 95 % of week MV: 4 % normal 6 % infrequently Plt ≤ 1 for 95 % of week
Supply voltage dips	Majority: duration < 1 s, depth < 60 %. Locally limited dips caused by load switching on: LV: 10 – 50 %, MV: 10 – 15 %
Short interruptions of supply voltage	LV, MV: (up to 3 minutes) few tens – few hundreds/year Duration 70 % of them < 1 s
Long interruption of supply voltage	LV, MV: (longer than 3 minutes) < 10 – 50 / year
Temporary, power frequency overvoltages	LV: < 1.5 kV rms MV: 1.7 U_c (solid or impedance earth) 2.0 U_c (unearthed or resonant earth)
Transient overvoltages	LV: generally < 6 kV, occasionally higher; rise time: µs to ms MV: not defined
Supply voltage unbalance	LV, MV: up to 2 % for 95 % of week, mean 10 minutes rms values, up to 3 % in some locations
Harmonic voltage / THD	Harmonics LV, MV: see Table 4 / THD: 8
Interharmonic voltage	LV, MV: under consideration

Table 3 Requirements according to EN 50160

IEC 61000-4-30, Ed. 2, 2008-10:
Power Quality Measurement Methods: This standard defines the methods for measurement and interpretation of results for power quality parameters in AC supply systems.

IEC 61000-4-15:1997 + A1:2003:
Flickermeter, Functional and Design Specifications: This section of IEC 61000 provides a functional and design specification for flicker measuring apparatus intended to indicate the correct flicker perception level for all practical voltage fluctuation waveforms.

IEC 61000-4-7, Ed. 2, 2002-08:
General Guide on Harmonics and Interharmonics: This is a general guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto.

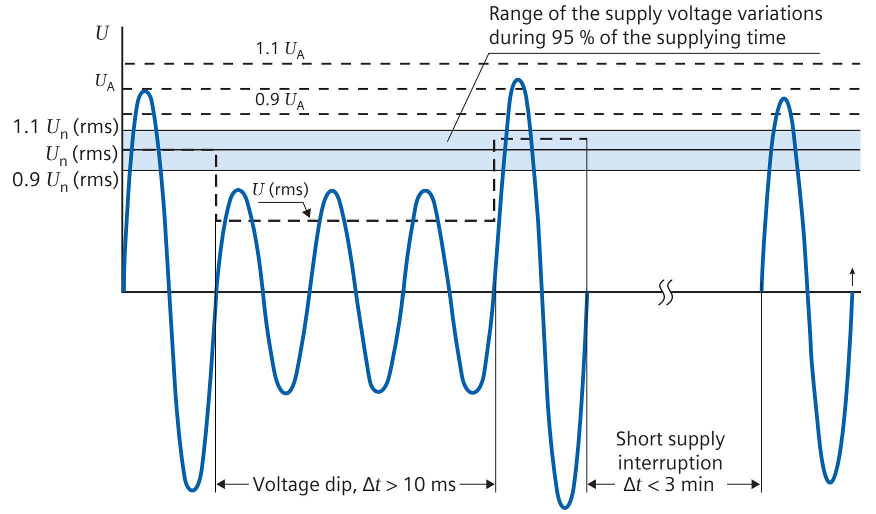

Fig. 6 Illustration of a voltage dip and a short supply interruption, classified according to EN 50160; U_n – nominal voltage of the supply system (rms), U_A – amplitude of the supply voltage, U(rms) – the actual rms value of the supply voltage

Odd harmonics				**Even harmonics**	
Not multiples of 3		Multiples of 3			
Order h	Relative voltage (%)	Order h	Relative voltage (%)	Order h	Relative voltage (%)
5	6	3	5	2	2
7	5	9	1.5	4	1
11	3.5	15	0.5	6 … 24	0.5
13	3	21	0.5		
17	2				
19	1.5				
23	1.5				
25	1.5				

Table 4 Values of individual harmonic voltages at the supply terminals for orders up to 25, given in percent of U_n

Definition of a measuring point and power quality measurement objectives

Power quality measurements address the aspect of power performance by describing the quality of every individual interface in an electrical system and in the networks of its various customers. Identifying, defining, profiling the power quality measurement points are essential tasks in defining a power quality project. However, the electrical system is dynamic by nature, so optimizing the measuring points is a routine that is developed by day-to-day learning. This may not help predict changes, but will permit a more effective response to them.

Identification of measuring points

Measurement points may be located and defined as shown in Table 5.

Measuring power quality requires not only an effective choice of measuring points but also defined objectives for the PQ analysis at the measuring points.

We generally classify "power quality" monitoring as a mixture of data gathering technologies classified by their purpose or application.

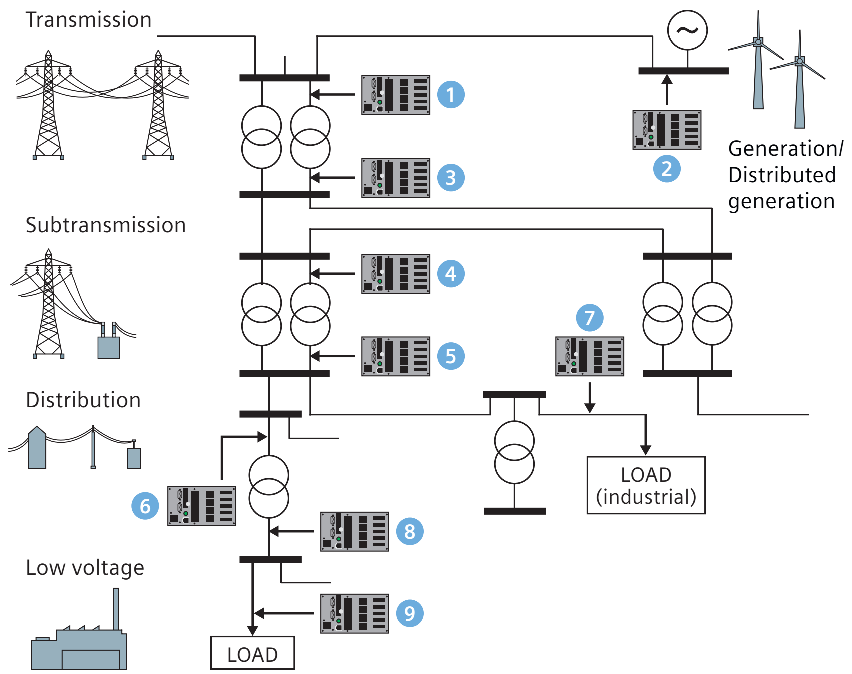

Fig. 7 General system online diagram

No.	Measurement points	Location
1	Transmission feeder (line or transformer)	Possibly busbar
2	Generation station / distributed generation	Busbar, transformer or generator connection
3	Subtransmission, line supply	Busbar (e.g. where the busbar is owned and operated by the transmission company)
4	Subtransmission feeder (line or transformer)	Remote line terminals (e.g. where the lines are owned and operated by the transmission company)
5	Distribution, line supply	Transformer secondary side or cable to neighbor's substation
6	Distribution feeder (line or transformer)	Step-down transformers
7	Distribution load	Step-down transformers, (e.g. where the transformers are owned by the distribution company)
8	LV supply	Transformer of the distribution company
9	LV load	Load or transformer at the customer

Table 5 Measurement points and system location

Functions

SIMEAS Q80 implements the "complete recording" measurement philosophy. This means that all measured quantities are available for subsequent analysis even after the comparison with standards. This ensures that events that do not reach the defined thresholds but that may still contain useful data can still be analyzed.

The "complete recording" principle provides the option of performing more extensive data processing than the completed EN-based measurement, meaning that SIMEAS Q80 has a far wider functional scope than that defined in the EN 50160 standards.

Continuous monitoring

The rms values for the current and voltage are calculated every half cycle (10 ms / 50 Hz or 8.33 ms at 60 Hz) and using algorithms, as described in the IEC 61000-4-30 standard.

Fast changes in the rms value of the voltage and the current are recorded as plot curves (see Fig. 9). This is done using a patented data reduction method. Within the tolerance range of a 5 % deviation from the measuring range, data reduction works with 1.5 % accuracy by default, while outside the tolerance range, twice the precision, namely 0.75 %, is used. These values can be parameterized in the software. The method is defined and parameterized to achieve a reduction factor of down to 1:20,000 without loss of relevant information, such as voltage dips, despite the fact that recording is continuous.

The advantage is that no thresholds have to be adjusted and there is no loss of information.

Fig. 8
SIMEAS Q80 Power Quality Recorder

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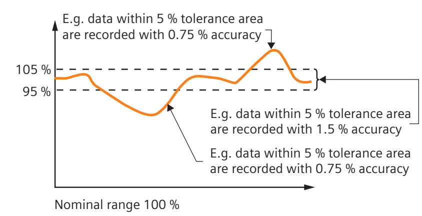

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Fig. 9 Example of the the compression algorithm for continuous recording, e.g. for 5 % of the measurement range

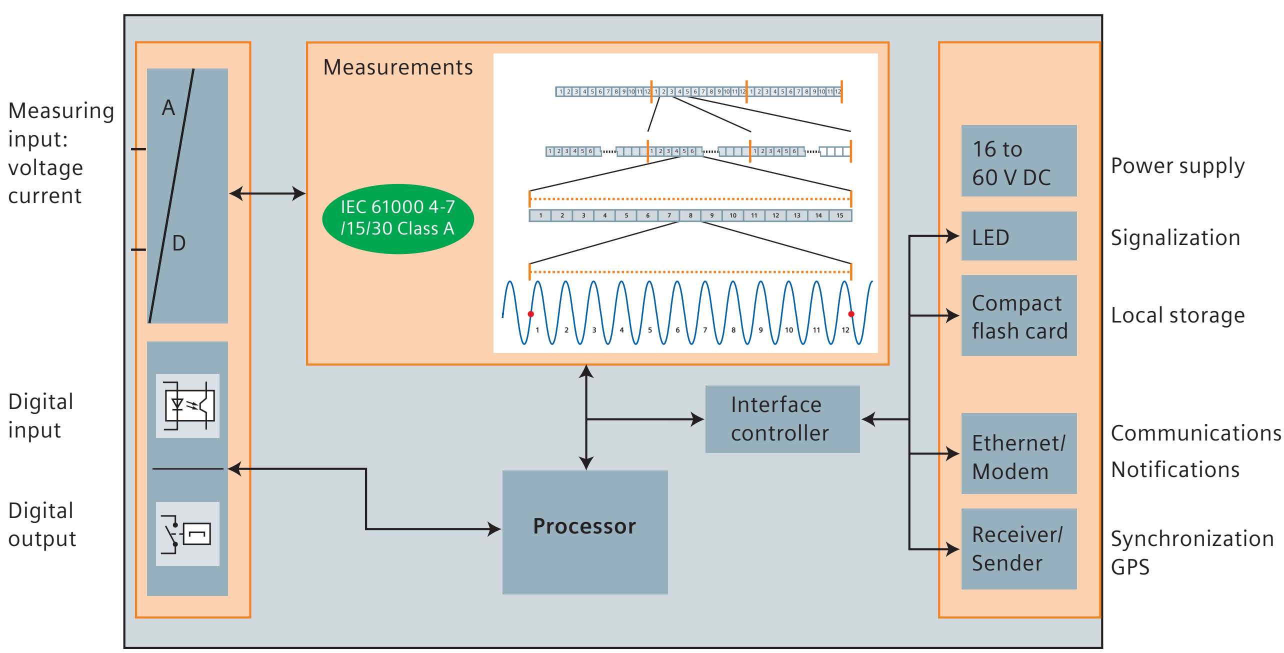

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Fig. 10 Block diagram data recording and online processing of SIMEAS Q80

Events

The plots of the rms value curves are the basis for capturing events. A deviation of the rms in one direction results in a new data point in the reduced curves; an event is characterized and bounded by two transitions: one from the normal to the faulty voltage level and one from the faulty level back to the normal level. The normal-to-fault and back-to-normal transitions are defined as a standard ± difference from a definable hysteresis voltage.

The duration of the event is measured between the two transitions. The depth of the result is determined from the minimum or maximum of the amplitude in the region affected by the fault. This assumes that the amplitude remains almost constant during the fault. According to the currently valid standard, every deviation >10 % of the nominal voltage counts as an event. Depending on the duration and amplitude, further distinctions are made into dips and short / long interruptions.

Harmonics and interharmonics

The frequencies in the voltage, current, and therefore also in the power are calculated by means of Fast Fourier Transform (FFT). The FFT is calculated seamlessly with a square window over each group of 10 periods. This corresponds to the specifications for measuring harmonics and interharmonics in power supply networks defined in EN 61000-4-7.

Flicker

Low-frequency amplitude fluctuations in the network, in turn, cause the luminous density in lamps to fluctuate. This is perceptible as flickering. Above a certain threshold of perceptibility, this is considered a nuisance. Such fluctuations can be measured using a flickermeter.

The flicker is calculated with a sampling rate of 100 Hz according to the description of a flickermeter in the EN 61000-4-15 standard.

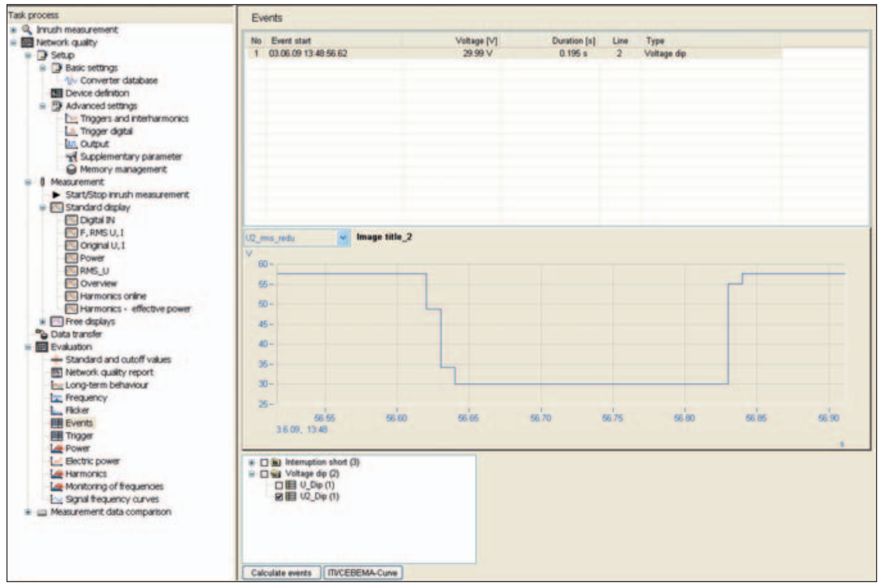

Fig. 11 Voltage dip

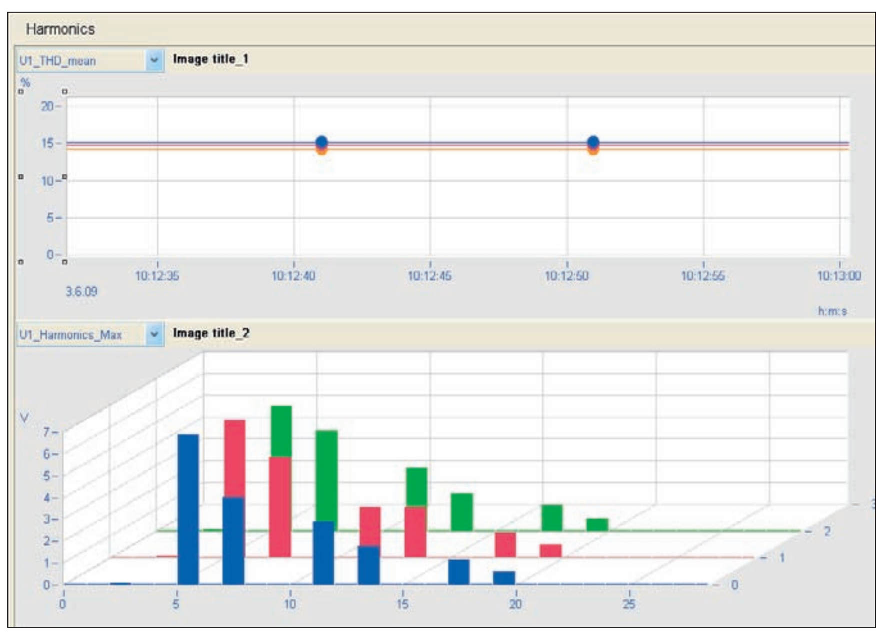

Fig. 12 Harmonics overview

Events

Triggers

Along with the conventional trigger mechanisms, responding to signals exceeding settable cutoff values, it is also possible to set triggering conditions depending on the signal deviating significantly from the expected waveform. For example, any sudden signal deviations occurring during long-term monitoring due to harmonics or brief voltage fluctuations (spikes) can be captured even if the magnitude of the deviation is much smaller than the nominal value itself.

The recording duration after and before an occurrence of a trigger event is configurable. The recording time from 10 ms to 60 s and pre-trigger 100 ms to 30 s. Unlike in normal recording, triggered raw data recording uses a time resolution of 100 µs. There is also a trigger for signal frequencies. In this case, the input signal is band-pass-filtered before triggering. This enables visualization of the signal, whose amplitude is modulated over a signal frequency. The classic application for this are ripple control telegrams.

Triggers responding to external binaries are also possible.

Ethernet trigger

The SIMEAS Q80 can also send triggers over the Ethernet to other SIMEAS Q80 devices. These are termed network triggers. The other SIMEAS Q80 devices in the network receive this message and respond accordingly, so that an event or a disturbance at one network node results in instantaneous measured values at all other network nodes. This enables simultaneous analysis of the effect of this disturbance on the complete network.

Trigger type	Conditions parameterization
Voltage and current	Curves comparison, threshold
Main signaling frequency (ripple control)	% of voltage, frequency, recording duration
Frequency (threshold value)	Limits in % of power frequency
Digital trigger	Transitions –> 0 to 1 or 1 to 0

Table 6 Trigger type and parameterization conditions

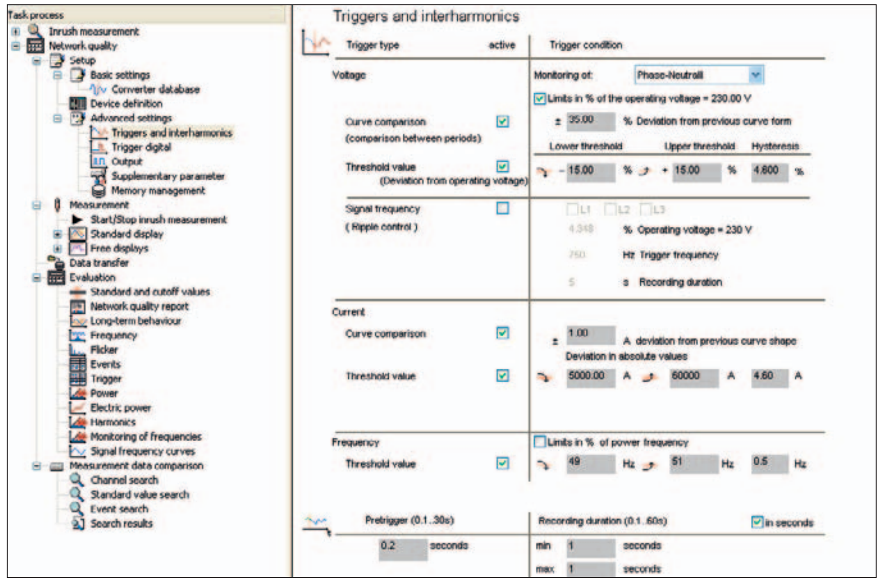

Fig. 13 Trigger parameterization

Notifications

The SIMEAS Q80 supports the transmission of notifications and messages in response to specific events. Such events may include voltage disturbances, lack of available storage space, or cyclic notification. One recipient can be defined for each message. The message types that can be chosen are e-mail, SMS, fax, or any combinations of these.

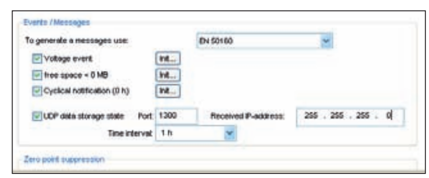

Fig. 14 Notification configuration

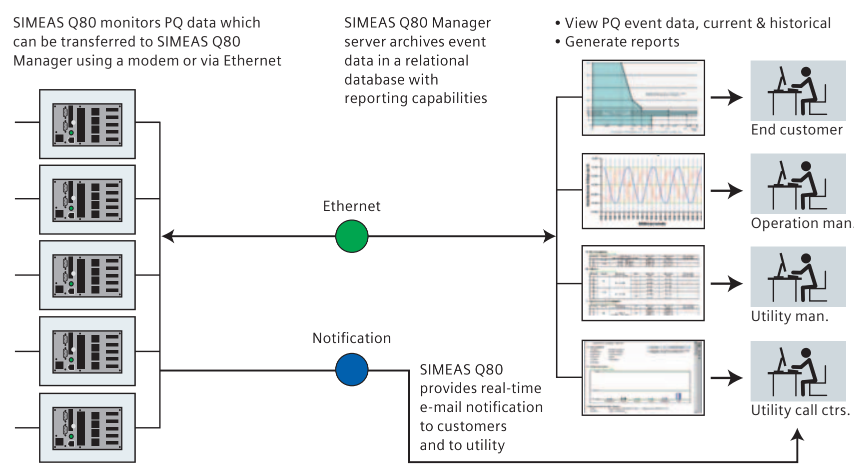

Fig. 15 SIMEAS Q80 – system overview

Measurements overview

All values relevant to power quality are monitored, recorded, and evaluated according to international and national standards for power quality (e.g. the European standard EN 50160).

Measurement standards	**IEC 61000-4-30; IEC 61000-4-15; IEC 61000-4-7**
Standards for voltage quality analysis	Voltage quality in accordance with EN 50160 or according to individually defined criteria
Voltage, current	Curve plots of rms values after every half period (reduced half-period rms values)
Flicker	Short-term (Pst), long-term (Plt), and momentary values (Pf5)
Frequency	40–70 Hz
Harmonics	Voltage, current up to 50th harmonic, THD
Interharmonics	Up to 10 frequencies (5 to 3,000 Hz, resolution 5 Hz)
Symmetry	Zero / positive / negative phase-sequence system / asymmetry
Power calculation as per DIN 40110-1 and Œ2	1-, 2-, 3-phase, total (active, apparent, reactive power)
Phase angle	< 1 ° up to 2.5 kHz
Trigger functionality	For voltage and current: rms trigger, curve form trigger, signal frequency trigger
Transients	Recording of instantaneous release of trigger values at 10 kHz

Table 7 Measurement specification

Time resolution

Many network quality attributes (e.g. voltage dips) require very detailed display while for others (e.g. slow changes), averages over 10 minutes are adequate. There may be five different resolution levels in total, depending on the calculation technique used.

Resolution	Significance	Examples
10 min	Values over the selected averaging interval (default 10 min)	Mean values, flicker
10 – 12 cycles	Values over the selected averaging interval f (default = 10 s)	Frequency
Half cycle	Sample of the demodulated impulse sequence (filter result of the amplitude modulated signal frequency)	Main voltage signaling
10 ms	Rms value every half cycle	Rms values
100 µs	Input samples and derived quantities without data reduction	Recording of instantaneous value (curve shape)

Table 8 Time resolution of data

Measurements overview

Internal memory capacity

The available storage medium is a compact flash card hard drive with a standard capacity of 2 GB. Optionally, compact flash cards can be used with capacities up to 16 GB. Intelligent memory management and effective data reduction enable storage of up to 130 weeks' (2.5 years) worth of data, in compliance with EN 50160.

Fig. 16
Standard supply: 2 GB CF card
(can be upgraded to 16 GB)

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System communication and configuration

The SIMEAS Q80 units are installed at various points to record electrical quantities in order to analyze power quality or event recording. Different connection methods or system configurations are possible, depending on the application and existing infrastructure.

TCP / IP communications that enable flexible network configurations: The networking of single devices enables central parameter setting and administration as well as a complete, accurately timed recording of events and disturbances of all systems defined in the network.

Time synchronization

The SIMEAS Q80 can be synchronized by the GPS real-time clock for absolute time synchronization. It is also possible to synchronize multiple SIMEAS Q80 devices even without a GPS real-time clock and to plot their respective data jointly in the correct chronological relationship.

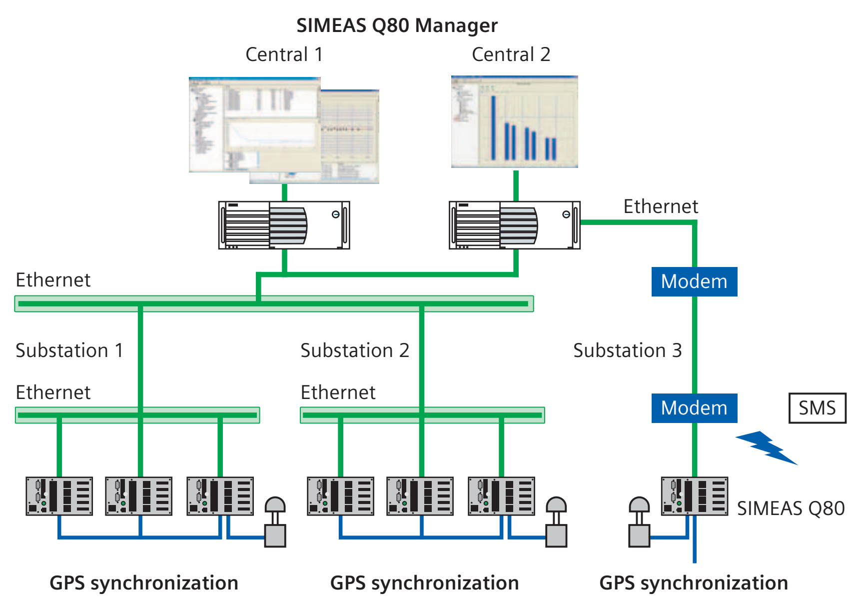

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Fig. 17 Flexible networks with TCP / IP communications

Software

SIMEAS Q80 Manager

The SIMEAS Q80 Manager is a complete software tool for parameterization, extensive evaluations and analyses; it allows the evaluation and analysis of more than 500 data sets from the SIMEAS Q80 Power Quality Recorder. It covers the whole chain of power quality analysis from measurement to the provision of important information, enabling remedial measures to be taken to improve power quality.

The SIMEAS Q80 Manager PC software enables user-friendly operation. Setting and other operations are performed in an intuitive manner. Despite the large number of functions available, the user interface is clearly organized, in a tree structure similar to the familiar Microsoft Explorer® tree structure.

SIMEAS Q80 Manager runs under Microsoft Windows 2000, XP, or Vista.

For operation and analysis by the user, the SIMEAS Q80 Manager software enables central parameter setting of all devices without any special PC knowledge.

The SIMEAS Q80 Manager software is designed to garantee the easy handling of the applications. Conducting measurement according to industry standards requires no special instrumentation or computer skills. Its function and appearance resembles the familiar Windows-Explorer.

The standard software module includes all functions necessary for operation, display, analysis, and documentation.

Defining your own grid code with user-friendly advanced settings

The process of setting up measurements, data analysis, and documentation is streamlined. In SIMEAS Q80, the EN 50160 measurements are predefined and require only very few additional settings, so SIMEAS Q80 is easy to use even for operators without any special know-how or training.

However, the user can freely define and save special measurements, value limits, analyses, and documentation to be reused later if needed.

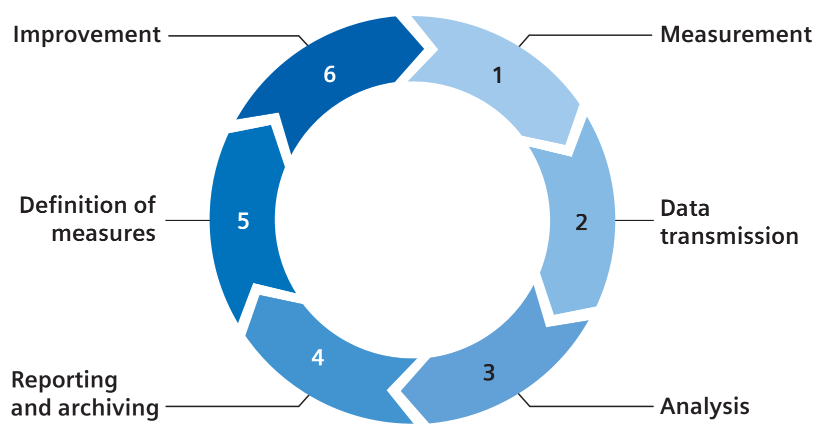

Fig. 18 Power quality cycle

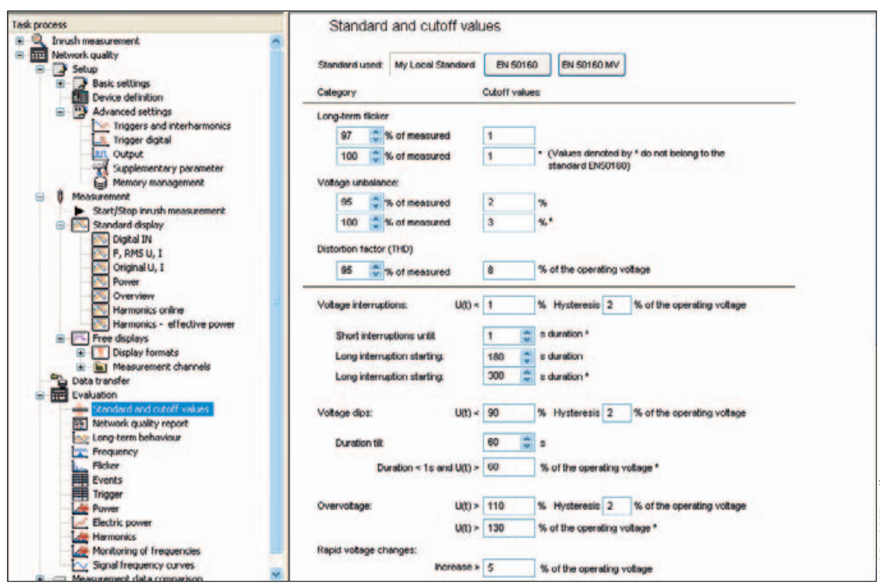

Fig. 19 Standard and cutoff values

Software

Online measurement

SIMEAS Q80 Manager enables connection with a device for the purpose of visualizing and monitoring online measurements over the network from a central PC at any time.

Further possibilities for online display are: representation of currents and voltage in a vector diagram, online voltage and current harmonics, power direction of each phase and in total, progression of rms value, recorded events.

Data evaluation

With the help of the database module, the user can search for any events, measurement channels, or deviations from standards. The data found or chosen can be displayed or compared at the touch of a button.

Limit configuration

The value limits stipulated in the EN 50160 standard serve as the basis for the power quality report. A single form displays all values in relation to the user-selected value limits. Depending on the particular quality demands, they can be changed and saved with names chosen by the user. Either the analysis can be based on user-defined data or default value limits can be selected.

Analysis is followed by fully automated compilation of documentation of the overall measurement, in accordance with industry standards.

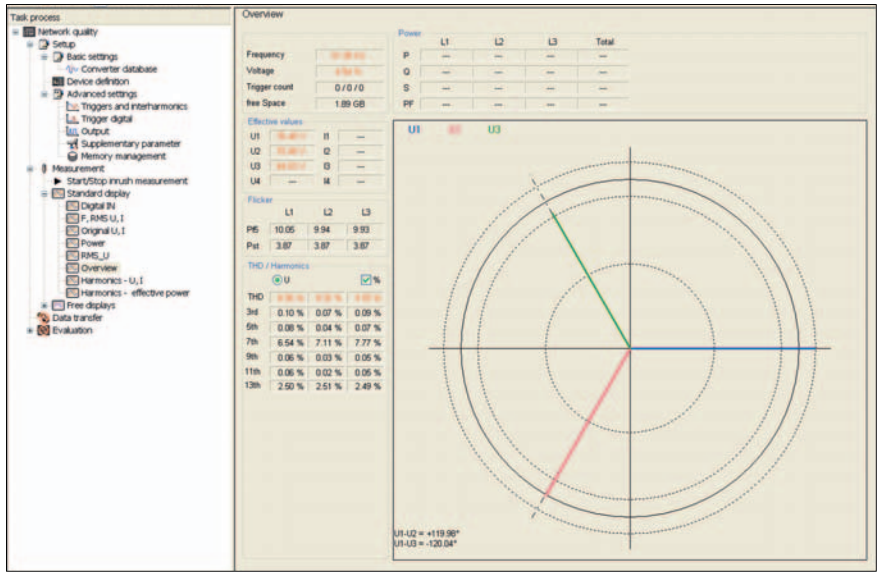

Fig. 20 Online visualization – phaser diagram

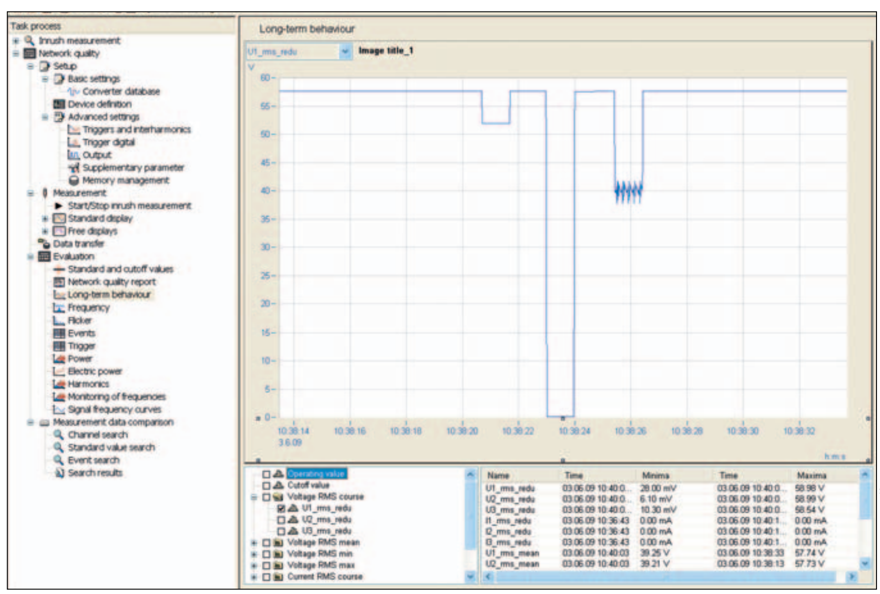

Fig. 21 Long-term behavior

Software

Report generator

The report generator is used to create graphical reports to document the measurement and analysis results. Unlike the print function of the curve window, which prints out the current curve plot, the report can be made up of a layout comprising curve plots, text, tables, and other graphical objects.

The report generator has a multi-document user interface on which multiple reports can be edited at one time. The usual editing operations, such as multiple selection, copy, paste, move, orientation etc. are all provided.

The properties of the objects, such as colors, fonts etc. can be changed in various ways, even in groups. An undo function, seamless zooming, a freely definable grid with a snap-function, and context sensitive online help round off the support tools available to the user for rapid compilation of complex reports.

The report generator can be used to give every report and log its own layout:

- Automation of documentation
- The quick way to get measurement results as a hard copy
- Creation of document templates
- Insertion of measurement plots of any length
- Insertion of measurement value tables
- Insertion of elements via the MS Windows Clipboard
- Text, pixel graphics, vector graphics, OLE objects
- Texts in any font, color or format
- Structural elements
- Lines, frames, fields, arrows
- Grid functions for millimeter-precise layouts (e.g. 1 V corresponds to 10 mm)

Data and information organization

For analysis purposes, over 500 waveforms per measurement are available. To keep the data volume manageable, the data are organized in a tree diagram according to the results. The data belonging to the activated result group can be displayed directly. All other available waveforms can, of course, be added for comparison.

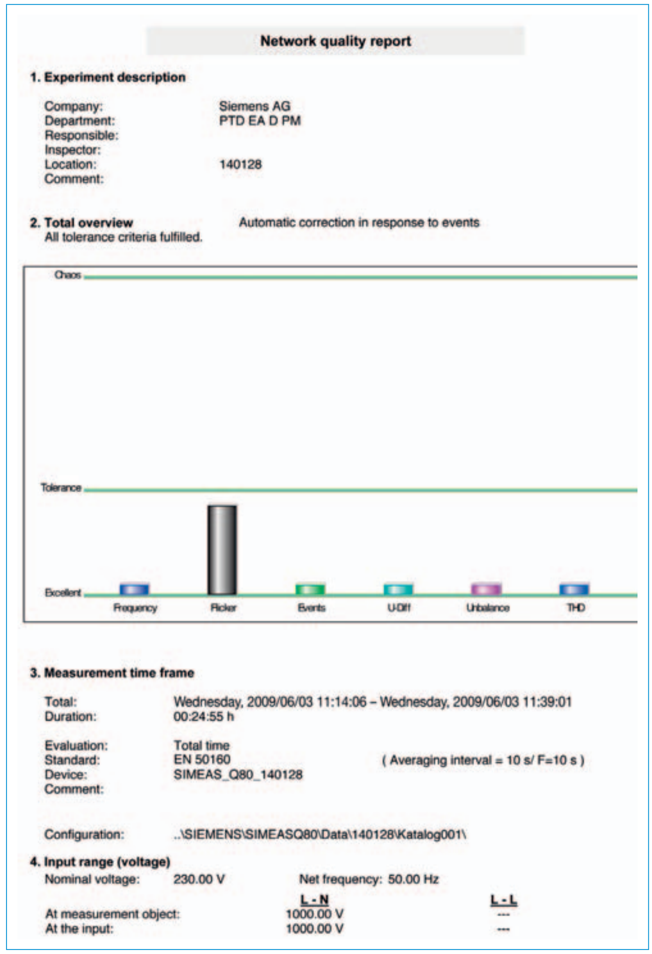

Fig. 22 Network quality report

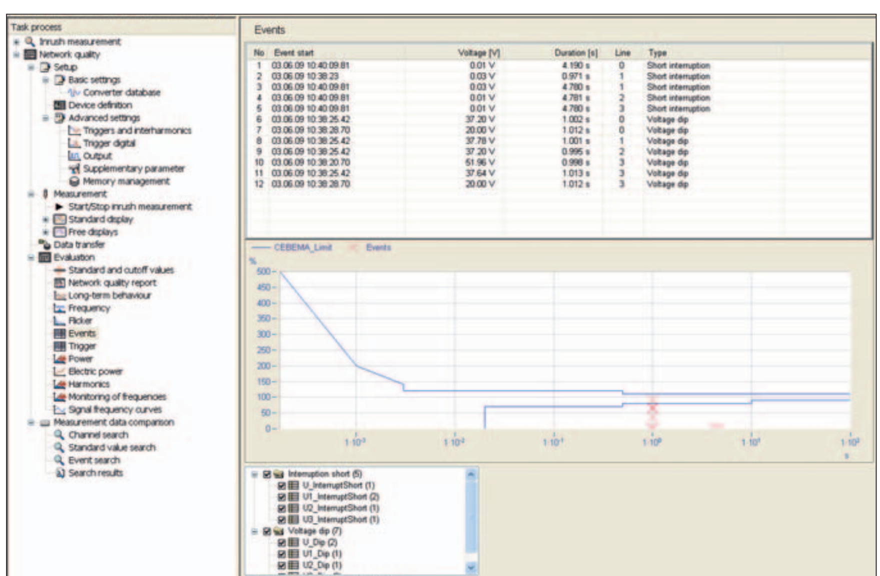

Fig. 23 Voltage dip

Measurement overview

Selection of measuring and metering quantities

Measurement	Measurement intervals and comments	3-phase current 4-wire	3-phase current 3-wire	Single-line
Voltage	3 s, 10 s, 1 min, 5 min, **10 min,** 15 min, 30 min, 1 h, 2 h	■	■	■
$U_{x\_rms\_mean}$	Mean of the voltage rms value	■	■	■
$U_{x\_rms\_min}$	Minimum in the averaging interval	○	○	○
$U_{x\_rms\_max}$	Maximum in the averaging interval	○	○	○
$U_{x\_rms\_redu}$	Reduced time plot (maximum resolution: 10 ms)	■	■	■
$U_{x\_THD\_mean}$	THD (Voltage total harmonic distortion)	■	■	■
$U_{x\_harmn\_mean}$ with x = 1…4; n = 1…50	Voltage harmonics	■	■	■
$U_{x\_frz\_mean}$ with z = 1…10	Monitoring of any fixed frequencies (e.g. interharmonics)	○	○	○
Current	3 s, 10 s, 1 min, 5 min, **10 min**, 15 min, 30 min, 1 h, 2 h	○	○	○
$I_{x\_rms\_mean}$	Mean value of the current rms value	●	●	●
$I_{x\_rms\_min}$	Minimum in the averaging interval	○	○	○
$I_{x\_rms\_max}$	Maximum in the averaging interval	○	○	○
$I_{x\_rms\_redu}$	Reduced time plot	●	●	●
$I_{x\_THD\_mean}$	THD (Current total harmonic distortion)	●	—	●
$I_{x\_harmn\_mean}$ with x = 1…4; n = 1…50	Upper harmonic for current	●	—	●
$I_{x\_frz\_mean}$ with z = 1…10	Monitoring of any fixed frequencies	○	○	○
Frequency	3 s, **10 s**, 30 s, 1 min, 5 min, 10 min	■	■	■
Frequency	System frequency	■	■	■
$Frequency_{\_histogram}$	Frequency histogram	■	■	■
$Frequency_{\_redu}$		■	■	■
Symmetry	3 s, 10 s, 1 min, 5 min, **10 min**, 15 min, 30 min, 1 h, 2 h	■	■	—
$Unbalance_{\_rms}$		■	■	—
$SymmetryZero_{\_rms}$	Zero sequence system	■		—
$SymmetryPositive_{\_rms}$	Positive sequence system	■	■	—
$SymmetryNegative_{\_rms}$	Negative sequence system	■	■	—

■ = always present ● = present if current is measured ○ = can be switched on / off (optional) — = not present

Note: Measurement intervals: the interval written in bold print is to be used for compliance with the EN 50160 standard, e.g. **10 min.**
Specifications refer to a 50 Hz and a 60 Hz system. For all channels, subsequent calculation of a histogram and the cumulative frequency is possible.

Measurement overview

Measurement	Measurement intervals and comments	3-phase current 4-wire	3-phase current 3-wire	Single-line
Flicker	3 s, 10 s, 1 min, 5 min, **10 min**, 15 min, 30 min, 1 h, 2 h			
$U_{x\_rms\_pst}$	Plt computed from 12 Pst values	■	■	■
$U_{x\_rms\_plt}$ with x = 1…3		■	■	■
Power	3 s, 10 s, 1 min, 5 min, **10 min**, 15 min, 30 min, 1 h, 2 h	○	○	○
$P_{\_P\_mean}$	Active power for the overall system	●	●	—
$P_{\_Q\_mean}$	Reactive power for the overall system	●	●	—
$P_{\_S\_mean}$	Apparent power for the overall system	●	●	—
$P_{\_Lambda\_mean}$	Power coeficient	●	●	—
$P_{x\_P\_mean}$	Active power for one channel	●	—	●
$P_{x\_Q\_mean}$	Reactive power for one channel	●	—	●
$P_{x\_S\_mean}$	Apparent power for one channel	●	—	●
$P_{x\_Lambda\_mean}$	Power coeficient for one channel	●	—	●
$P_{x\_P\_harmn\_mean}$	Active power of the harmonics	●	—	●
$P_{x\_Q\_harmn\_mean}$	Reactive power of the harmonics	●	—	●
$P_{x\_S\_harmn\_mean}$	Apparent power of the harmonics	●	—	●
$P_{x\_Phase\_harmn\_mean}$ with: x = 1…4; n = 1…50	Phase power of harmonic	●	—	●
$P_{x\_P\_frz\_mean}$	Active power of the monitored frequencies	○	—	○
$P_{x\_Q\_frz\_mean}$	Reactive power of the monitored frequencies	○	—	○
$P_{x\_S\_frz\_mean}$	Apparent power of the monitored frequencies	○	—	○
$P_{x\_Phase\_frz\_mean}$ with: x = 1…4; z = 1…10	Phase power of monitored frequencies	○	—	○
Trigger	Measurement duration 200 ms Resolution 100 µs	○	○	○
U_{x_event}	Rms trigger	▲	▲	▲
I_{x_event} with: x = 1…4	Curve shape trigger	▲	▲	▲
Signal frequency trigger	Mean values: 3 s, 10 s, 1 min, 5 min, **10 min**, 15 min, 30 min, 1 h, 2 h	○	○	○
$U_{x\_signal\_mean}$	Mean of the voltage	▲	▲	▲
$U_{x\_signal\_redu}$	Rediced time plot	▲	▲	▲
$U_{x\_signal\_event}$	High resolution signal voltage trigger (10 ms)	▲	▲	▲
$P_{x\_P\_signal\_mean}$	Active power	▲●	▲●	▲●
$P_{x\_Q\_signal\_mean}$	Reactive power	▲●	▲●	▲●
$P_{x\_S\_signal\_mean}$	Apparent power	▲●	▲●	▲●
$P_{x\_Phase\_signal\_mean}$ with: x = 1…3	Phase power	▲●	▲●	▲●

■ = always present ● = present if current is measured ▲ = present if the associated trigger was activated ○ = can be switched on / off (optional) — = not present

Note: Measurement intervals: the interval written in bold print is to be used for compliance with the EN 50160 standard, e.g. **10 min.**
Specifications refer to a 50 Hz and a 60 Hz system. For all channels, subsequent calculation of a histogram and the cumulative frequency is possible.

Measurement overview

Measurement	Measurement intervals and comments	3-phase current 4-wire	3-phase current 3-wire	Single-line
Channels during measurement (online monitoring)				
Voltage		■	■	■
U_x	100 µs (no averaging, original signal)	■	■	■
U_{x_rms}	Rms every 10 ms	■	■	■
$U_{x\_FFT\_}$	Voltage harmonics (1^{st} – 50^{th})	■	■	■
Phasing				
$U1–U2$		■	■	■
$U1–U3$		■	■	■
$U_x–I_x$ with: x = 1…3		●	●	●
Current	100 µs	○	○	○
I_x	100 µs (no averaging, original signal)	●	●	●
I_{x_rms}	Rms every 10 ms	●	●	●
I_{x_FFT} with: x = 1…3	Upper harmonics (1^{st} – 50^{th})	●	●	●
$P_{x\_P\_harmonics\_}$ with: x = 1…3	Harmonic real power (1^{st} – 50^{th})	●	●	●
Overview display during measurement				
U_x	Rms over one period	■	■	■
THD	of every 10 periods	■	■	■
U-harmonics (in % of fundamental frequency or V) with: x = 1…3	FFT over 10 periods	■	■	■
I_x	Rms over one period	●	●	●
THD	of every 10 periods	●	●	●
I-harmonics (in % of fundamental frequency or A) with: x = 1…3	FFT over 10 periods	●	●	●
Unsymmetry	of every 10 periods	■	■	■
Instantaneous flicker of U_x with: x = 1…3	of every 10 periods	■	■	■
Power				
P_x, Q_x, S_x, power factor		●	—	●
For the overall system with: x = 1…3		●	●	—
Addtional information	Free storage space in the measurement device	■	■	■
	Number of recorded trigger events	■	■	■

■ = always present ● = present if current is measured ○ = can be switched on / off (optional) — = not present

Note: Measurement intervals: the interval written in bold print is to be used for compliance with the EN 50160 standard, e.g. **10 min.**
Specifications refer to a 50 Hz and a 60 Hz system. For all channels, subsequent calculation of a histogram and the cumulative frequency is possible.

Connection

Connection examples

Four-wire configuration (star circuit)

- U_1, U_2, U_3 –> lines 1, 2, 3, U_4, PE (protection ground)
- N –> Neutral
- I_1, I_2, I_3, I_4 –> connected or unconnected (U_4, I_4 can be measured optionally)

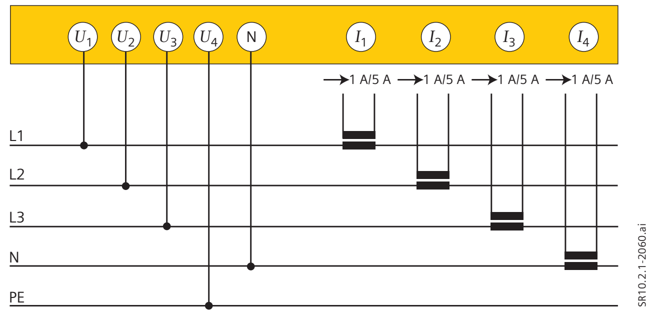

Fig. 24 Four-wire configuration

Three-wire configuration 3 × U / 3 × I or 2 × I (delta connection)

- U_1, U_3 –> Lines 1 and 3
- N –> Line 2
- I_1, I_3 –> Lines 1 and 3
- I_2 –> Line 2 optionally possible

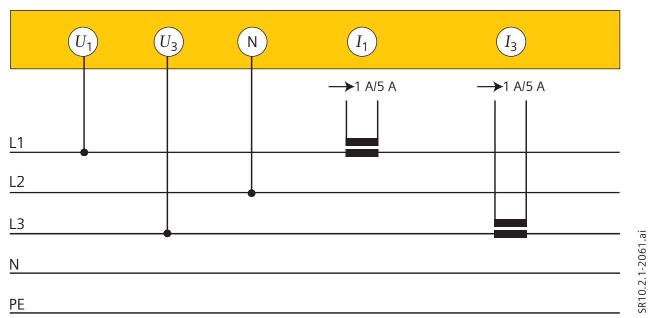

Fig. 25 Three-wire configuration (delta connection)

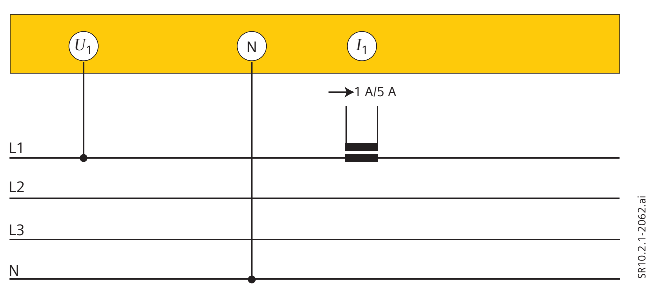

Fig. 26 Single-phase connection

Technical data

General data			
Parameter	**Typical value**	**Min. / max.**	**Test conditions / remarks**
Ambient conditions	The normal ambient conditions according to EN 61010-1 apply (see "Operating conditions")		
Signal inputs	4 x current [*I*] 4 x voltage [*U*]		
Digital input / output	4 relay inputs 4 relay outputs		
Power consumption		< 10 W < 12 W	Permanent operation After power-on (to recharge the UPS)
Power supply		10 to 60 V DC	
UPS Capacitor	Back-up time: ≤ 1 second		Factory settings
EMC Interference immunity / Transient emissions	Class A		According to IEC / EN 61326-1
Protection degree	IP 20		According to EN 60529
Weight	Approx. 1.9 kg		
Dimensions	166 mm × 105 mm × 126 mm		(W × H × D) without mounting rail
Ambient temp. range	10 °C to 55 °C / 50 °F to 131 °F		Without condensation
Storage temperature	– 40 °C to 90 °C / – 40 °F to 194 °F		Within temperatures ≤ 15 °C or > 55 °C / ≤ 59 °F or > 131 °F only for short time
Communication interfaces	Ethernet, Modem		TCP / IP DSUB
Memory capacity	CF card		Standard accessory: 2 GB CF card up to 16 GB possible
Internal clock and external synchronization	± 1 s / day GPS DCF 77 or via other SIMEAS Q80		Battery backed GPS input Sync input

Technical data

Voltage inputs			
Parameter	***Typical value***	***Min./max.***	***Test conditions/remarks***
Input	**4 channels for voltage measurement**		Single end, isolation for each group
Sampling rate per channel		10 kHz ≤ 50 kHz	Network analysis with inrush module Aggregate sampling rate ≤ 400 kHz
Bandwidth		0 to 4.1 kHz	– 3 dB, network analysis
Terminal connections	Screw terminal 0.5 to 6 mm^2 10 to 20 AWG (American Wire Gauge)		Screw terminal for rigid or flexible line with 0.5 to 6mm^2 cross section
Electrical safety		300 V / CAT IV	in accordance with EN 61010-1
Rating			
Measurement category		600 V / CAT III	Voltage inputs U_1 to U_4
Degree of pollution		2	in accordance with IEC 60664
Insulation test voltage		5.4 kV_{rms}	50 Hz, 1min
Measurement ranges	up to 1000 V_{rms}		Automatic range setting
Overload resistance		1.5 kV_{rms}	DC and 50Hz, permanent
Input impedance	2.5 MΩ	± 1 %	Differential
Measurement uncertainty	0.04 %	≤ 0.1 %	of ranges
Drift	± 8 ppm / KTa	± 40 ppm / K × ΔTa	ΔTa = |Ta –25 °C| / ΔTa = |Ta –13 °F| ambient temperature Ta
Isolation suppression		> 110 dB > 71 dB > 47 dB	Isolation voltage 1000 V_{rms} DC 50 Hz 1 kHz
Channel crosstalk		 ≤ 110 dB ≤ 85 dB ≤ 60 dB	Test voltage: 1000 V_{rms} DC 50 Hz 1 kHz
Strain voltage (RTI)	20 mV_{rms}		± 100 V, bandwidth: 0.1 Hz to 10 kHz

Technical data

Current inputs

Parameter	Typical value	Min. / max.	Test conditions / remarks
Input	**4 channels for current measurement**		Differential, isolated
Terminal connection	Screw terminal 0.25 to 2.5 mm^2 14 to 24 AWG (American Wire Gauge)		Screw terminal for rigid or flexible line with 0.25 to 2.5 mm^2 cross-section
Electrical safety Rating Measurement category Degree of pollution		300 V / CAT IV 600 V / CAT III 2	in accordance with EN 61010-1 Current inputs I_1 to I_4 in accordance with IEC 60664
Insulation test voltage		5.4 kV_{rms}	50 Hz, 1 min
Measurement ranges	> 1 A ≤ 1 A		5 A connection 1 A connection
Bandwidth		0 to 4.1 kHz	–3 dB, network analysis
Sampling rate per channel		10 kHz ≤ 50 kHz	Network analysis with inrush module aggregate sampling rate ≤ 400 kHz
Overmodulation limit		145 % of range	
Overload strength 5 A terminal 1 A terminal		 ≤ 20 A ≤ 100 A ≤ 10 A ≤ 100 A	 Continuous 1 s Continuous 1 s
Input impedance 5 A terminal 1 A terminal		 ≤ 10 mΩ ≤ 20 mΩ	 Differential
 Measurement uncertainty	0.06 % ± 8 ppm / K × ΔTa	≤ 0.1 % ± 60 ppm / K × ΔTa	of input range ΔTa = |Ta –25 °C| / ΔTa = |Ta –13 °F| ambient temperature Ta
Phase uncertainty		0 to 2.5 kHz	< ± 1 °

Technical data

Digital inputs

Parameter	Typical value	Min./max.	Test conditions/remarks
Channels/bits	**4 digital inputs**		Each isolated
Terminal connections	Screw terminal 0.25 to 2.5 mm² 14 to 24 AWG (American Wire Gauge)		Screw terminal for rigid or flexible line with 0.25 to 2.5 mm² cross section
Electrical safety			
Rating	250 V / CAT III		in accordance with EN 61010-1
Measurement category			
Degree of pollution	2		in accordance with IEC 60664
Insulation test voltage	3.6 kV_{rms}		50 Hz, 10 sec Between channels and chassis
Max. input level ue		≤ 600 V	Peak-to-peak or DC voltage
Nom. input level ue	230 V_{rms} / 350 V DC		
Switching level Us			Schmitt-Trigger-characteristics
Unipolar low	< 16 V	> 14 V	Hysteresis 0.04 V typ.
Unipolar high	> 16.8 V	> 18 V	
Current input	280 µA	< 500 µA	ue = – 600 V to + 600 V
Circuit time			
Low –> high	70 µs	< 180 µs	
High –> low	23 µs	< 40 µs	

Digital outputs

Parameter	Typical value	Min./max.	Test conditions/remarks
Channel/bits	**4 digital outputs**		Mechanical closer
Terminal connection	screw terminal 0.25 to 2.5 mm² 14 to 24 AWG (American Wire Gauge)		Screw terminal for rigid and flexible lines with 0.25 to 2.5 mm² cross-section
Electrical safety			in accordance with EN 61010-1
Rating	250 V / CAT III		
Measurement category			
Degree of pollution	2		in accordance with IEC 60664
Insulation test voltage	3.6 kV_{rms}		Between channels and chassis
Switching time	5 ms	< 8 ms	
Max. switching power		< 1000 VA	
Switching voltage	> 1 V DC	< 250 V_{rms}	Min. switching voltage at 1 mA
Max. switching current		< 1 A < 4 A	250 V AC cos φ = 1.0 to 0.4 250 V AC cos φ = 1.0
Contact impedance		< 50 mΩ	
Fuse protection			
Nominal current (I_n)	5 A	I_n 2 I_n	t_{fuse} ≥ 4 h 30 s > t_{fuse} > 1 s

Technical data

Calibration conditions

Parameter	Typical value	Test conditions / remarks
Temperature	25 °C / 77 °F	± 5 °C / ± 41 °F
Humidity	40 %	± 30 %
Power supply	24 V	60 W power adapter
Input signal	± 1,000 V_{rms} / sine 50 Hz ± 1 A_{rms} / sine 50 Hz	Voltage inputs Current inputs

Evaluations according to standards

Standard specification	Voltage quality per EN 50160	IEC 61000-4-30 IEC 61000-4-15 IEC 61000-4-7 Power calculation per DIN 40110-1 and -2
	Data search and data comparison across multiple measurements	Optional software module

Synchronization and time base

Parameter	Typical value	Min. / max.	Remarks
Time base per device without external synchronization			
Not balanced (default)		± 50 ppm	at 25 °C / 77 °F (= accuracy of internal time base)
Drift	± 20 ppm	± 50 ppm	
Aging		± 10 ppm	at 25 °C / 77 °F, 10 years
Accuracy of time base with external synchronization			
Synchronized with GPS signal, GPS accuracy Synchronized with DCF 77 signal DCF 77 accuracy			
Synchronization for several devices with DCF 77			
DCF 77 accuracy	1 sample	3 ms (max.)	TTL level, short circuit proof, none isolated
Jitter (max.)	± 8 µs		
Max. cable length		200 m	
Max. number of devices		20	Slaves only
Common mode	0 V		Module ISOSYNC with potential difference
Voltage level	5 V		

Selection and ordering data

Description	Order No.
SIMEAS Q80 Power Quality Recorder	*7KG8080 - 0AA00 - 0AA0*
4 × *U*, 4 × *I*, IEC 61000-4-30, Class A	
2 GB compact flash	
Auxiliar power supply: 10 to 60 V DC	
Ethernet and modem interface	
Operating instructions: English and German	

The SIMEAS Q80 standard power supply is 10 to 60 V DC; 12 W.

For requirements for alternating voltages and continuous voltages higher than 60 V, we recommend, for example, SITOP 6EP1332-1SH12 / 24 V; 2.5 A or compatible.

We suggest the following GPS accessories:

Garmin (18 LVC), or

Meinberg GPS161AHSx (No.: 25150), or

Hopf Receiver 6875-FW7.0: 7XV5664-0CA00 (see SIPROTEC Price list 2009)

Description	Order No.
SIMEAS Q80 Software Manager for	*7KG8081 - 0AA00 - 0AA0*
Device configuration	
Measurement control	
Power quality reports (acc. to EN 50160)	
Database	
Software language: English / German	
System manual: English / German as PDF on DVD	

Description	Order No.
Ethernet patch cable for parameterization	*7KE6000 - 8GE00 - 3AA0*
with double shield (SFTP), cross over connection LAN connector on both sides SIMEAS Q80 <–> PC	

Description	Order No.
Extra printed system manual	*E50417 H10 ☐ ☐ C420 A1*
German	*0 0*
English	*7 6*

Connection diagram

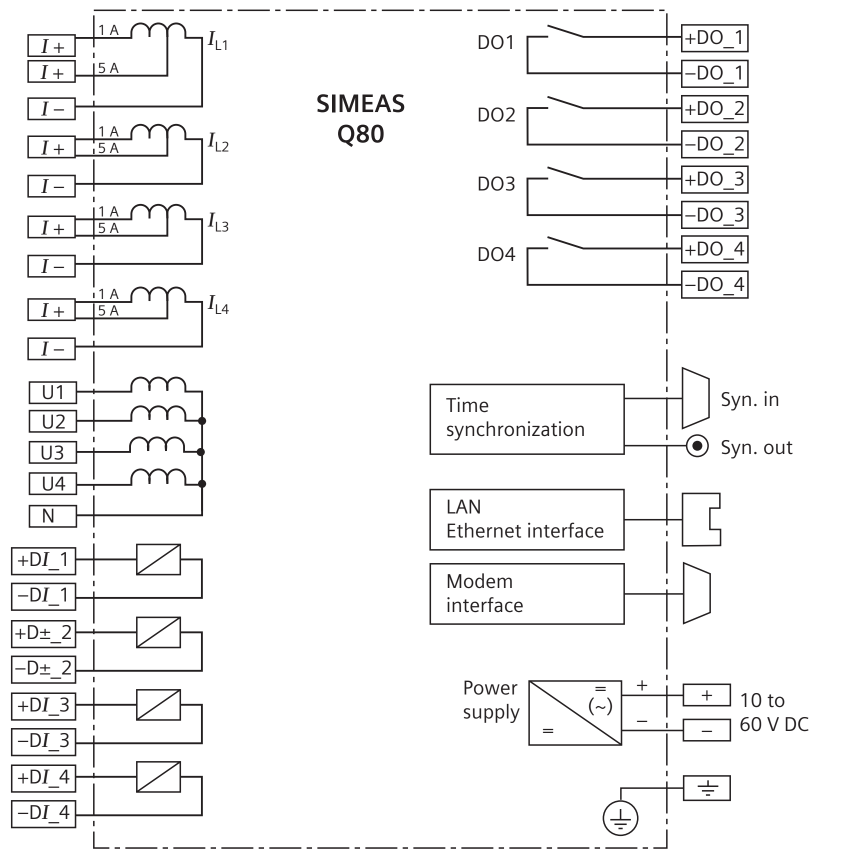

Fig. 27 Connection diagram SIMEAS Q80

Dimension drawings in mm / inch

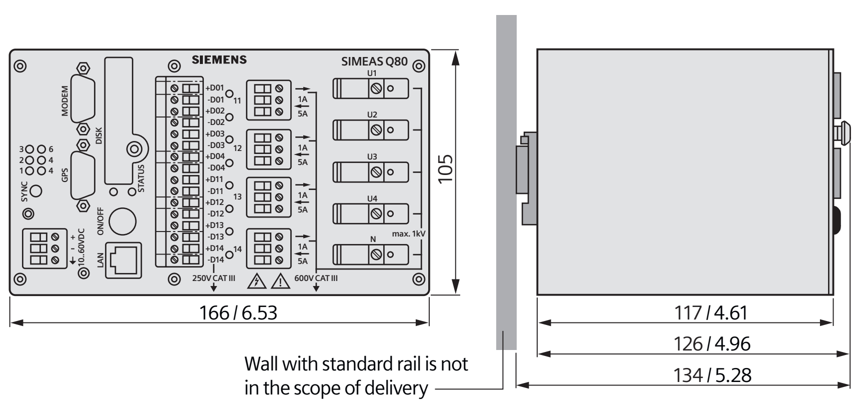

Fig. 28 7KG8080 SIMEAS Q80 – left: front view; right: side view

CE conformity

This product conforms to the directives of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 89/336/EEC) and concerning electrical equipment for use within specified voltage limits (low-voltage directive 73/23/EEC).

This product conforms to the international standard IEC 61000-4 and the European standard EN 50160 for voltage characteristics.

The product is designed for use in an industrial environment acc. to the EMC standard specification acc. IEC 61326-1.

Conformity is proved by tests performed by Siemens AG in line with article 10 of the Council Directives in accordance with the generic standard EN 50160 and IEC 61000-4-30 for Class A measurement.

Certificate of Conformity

IEC 61000-4-30 Class A

Siemens SIMEAS Q80

equipped with Garmin GPS18x LVC
(or other GPS receiver with equivalent accuracy and functionality)

IEC 61000-4-30 Ed. 2

230V, 50/60 Hz, L-N U_{din}

61000-4-30 Section	Power Quality Parameter	Class A Compliance	Class S Compliance	Class B Compliance	Remarks
5.1	Power frequency	Yes	Yes	Yes	
5.2	Magnitude of the supply voltage	Yes	Yes	Yes	
5.3	Flicker	Yes	Yes	(N/A)	See Note 1 below
5.4	Supply voltage dips and swells	Yes	Yes	Yes	
5.5	Voltage interruptions	Yes	Yes	Yes	
5.7	Supply voltage unbalance	Yes	Yes	Yes	
5.8	Voltage harmonics	Yes	Yes	Yes	
5.9	Voltage interharmonics	Yes	Yes	Yes	
5.10	Mains signaling voltage	Yes	Yes	Yes	
5.12	Underdeviation and overdeviation	-	-	-	See Note 2 below
4.4	Measurement aggregation intervals	Yes	No	Yes	Class A and Class S are mutually exclusive
4.6	Time-clock uncertainty	Yes	Yes	Yes	
4.7	Flagging	Yes	Yes	(N/A)	
6.1	Transient influence quantities	Yes	(N/A)	(N/A)	See Note 3 below

(N/A) – Not Applicable. There is no requirement in the Standard.
Note 1: Flicker is only defined at 230V, 50Hz and 120V, 60Hz. EUT meets Class A requirements at 230V, 50Hz.
Note 2: Overdeviation and underdeviation parameters are not measured by the Siemens SIMEAS Q80.
Note 3: Transients applied to EUT measuring terminals and power terminals.

This certificate summarizes the results of the PSL IEC 61000-4-30 Power Quality Measurement Methods Compliance Report, document # PSL SIEMENS-009-30, dated 27 August 2009. PSL tested two samples, S/N 140148 and 140149 at 230VAC, 50/60 Hz. Manufacturer states that these samples are representative of the SIMEAS Q80 series.

Siemens SIMEAS Q80

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Statement of IEC 61000-4-30 Compliance

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