Grid Visualisation Software – GridVis®

Energy data management- & power quality monitoring systems

Janitza®

GridVis® software

An elementary module for energy management and power quality monitoring systems

In the field of energy management it is very important to be able to evaluate and process data measured for both energy usage and power quality. It should be possible to document all important data measured without interruption, in order to determine reasons for production problems, failures or quality deficiencies.

For example, time stamped data for harmonics, voltage fluctuations or black-outs facilitate the identification of root causes of possible production problems. With timely identification of poor power quality it is possible to take steps to avoid the increased wear or destruction of electrical distribution controls and operating equipment and even reduce the risk of fire. Through the analysis of load profiles and electrical loads it is possible to implement measures to improve energy efficiency. Within the framework of energy management, targets can be defined for energy consumption, CO_2 emissions and energy costs. The new standard ISO 50001 has formulated a suitable framework of conditions for an operational energy management system.

When the energy management system has been chosen, Janitza software and hardware components provide the ability for you to view and document your energy supply.

Energy management systems help companies to optimise the use of energy – from purchasing right through to energy consumption – on a systematic, economical and ecological basis.

Customer benefits

- ❑ Reduction of energy costs
- ❑ In Germany, Energy tax relief from 2013 in conjunction with an EnMS
- ❑ Ability to view energy consumption in the individual departments
- ❑ Increase in supply reliability
- ❑ Environmental preservation (ecological thinking)
- ❑ Use of an optimised energy mix, optimisation of the energy contracts
- ❑ Greater awareness of employees with regard to energy efficiency and climate protection
- ❑ Cost centre management
- ❑ Cause-based assignment and accounting of energy costs

GridVis® software:
Versions and applications

With GridVis®, Janitza offers user-friendly software for the configuration of an energy monitoring system and for monitoring power quality. The GridVis®-Basic software, included with all Janitza measurement devices, allows the programming and configuration of grid analysers, universal measuring devices, data loggers and power factor correction controllers. It also provides the means to read, save, display, process, analyse and evaluate the measured data.

GridVis® is a comprehensive and scalable software solution for energy suppliers, industrial applications, facility management, the property market and infrastructure projects.
With GridVis®, technical and commercial management can obtain the data that they require in order to identify energy saving potentials, reduce energy costs, take action to avoid production downtimes or to optimise the utilisation of operating equipment.

Main features

❑ Intuitive operation

❑ Configuration of the measurement system and the UMG measurement devices

❑ Measurement device management

❑ Automatic or manual measured data readouts from the devices

❑ Graphic presentation of online measurement values and historical data

❑ Ready-made PQ report templates, e.g. for EN50160 or EN 61000-2-4

❑ Alarm management and user administration

❑ Statistical evaluations

❑ Comprehensive export functions e.g. in an Excel file

❑ APPs management (customer-specific applications / programs)

❑ Storage of data in a database incl. database management (e.g. MySQL / MS SQL / Derby / Janitza DB)

❑ Topology views (configurable, graphic user interfaces with freely selectable register levels)

❑ Individually adjustable schedules (e.g. report generator)

❑ Use of virtual devices e.g. for totalling values from multiple devices or creating key-figures

❑ Generic modbus device for the integration of "non-Janitza devices"

❑ Report generators enable the setting and configuration of reports (energy costs and power quality)

❑ Exports and reports can be sent by e-mail

Applications

| Industry | Facility management | Data centres | Infrastructure | Energy suppliers |

| Applications in the market segments: Industry, property market, data centres, infrastructure and energy suppliers		
	Energy efficiency and energy costs	Analysis of the energy consumption
		Cost allocation
		Optimisation of the energy consumption
		Load management
		Energy demand figures
		Reactive current compensation
		Automation and control of the energy distribution
	Power quality and supply assurance	Optimisation of the energy distribution
		Power quality analysis and maintenance
		Monitoring and trouble-shooting power quality events
		Alarms and event overview
		Increase in system reliability

System architecture

When configuring monitoring systems it is advisable to apply the "pyramid approach" across three measurement levels.

Measurement level one refers to a few high end quality, class A measurement devices on the supply.
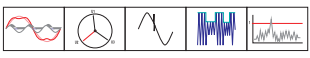
Master measurement devices are positioned in the subsequent stage at the main node points with event logging, Ethernet and Gateway functionality.
The third and final level shows basic meters or field bus devices in the distribution boxes, outlets or directly attached to the machine.
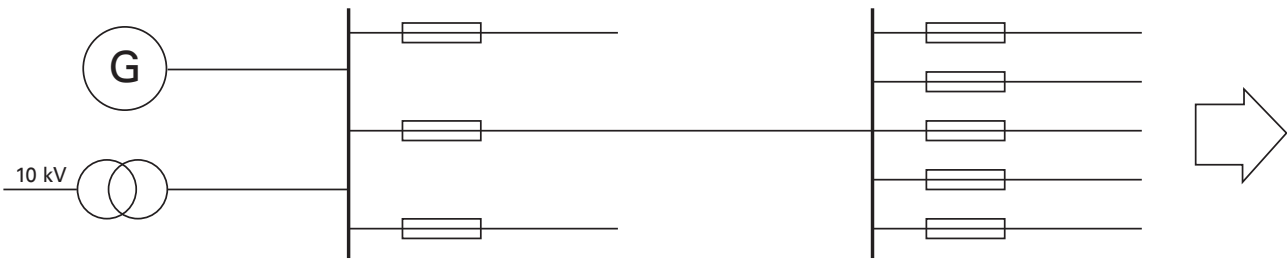
| **PCC / Power feeds and at site generation**	**Switching equipment and main distribution cabinets (e.g. refrigeration,...)**	**Monitoring subfeeders, PFC, machinery level, lighting, tenants, and others**
• Meter for PQ analysis EN 50160 • Class A measurements IEC 61000-4-30 • Short interruptions and transient analysis • Flicker and harmonic analysis up to 63rd • Accuracy 0,1 U/I and 0,2 S for kWh	• Short interruptions and transient analysis • Harmonic analysis up to 40th • Accuracy 0,2 U/I and 0,2 / 0,5 S for kWh • Modbus /TCP / IP gateway function integrated	• Energy consumption, currents, voltages, load profiles, harmonics, ... • High measurement accuracy • Simple system integration
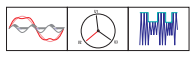
| UMG 512	UMG 605	UMG 508	UMG 604	UMG 103	UMG 104	UMG 96RM

Generic modbus devices
(Modbus RTU, Modbus TCP/IP)

GridVis® offers a range of options for the integration of 3rd party devices. The "generic modbus" function provides a simple integration option for "non-Janitza measurement devices" via Modbus RTU or Modbus TCP/IP. The external devices must support the modbus RTU protocol. The data formats must also comply with the modbus recommendation or with the available formats in GridVis®. The Modbus ASCII protocol is not supported by GridVis®.

The connection of external devices is achieved with a Modbus master UMG, via its RS485 connection or the value can be read out directly with GridVis® via Modbus TCP/IP, using Ethernet.

The external devices are integrated through profiles and managed in GridVis® as templates, which can subsequently be used multiple times per project. It is also possible to export a template. Profiles are created and edited directly in GridVis®.

The measured values read out from the external devices can be used in the topology view and in the GridVis® virtual devices. When using the GridVis®-Service version it is also possible to store the measured values online with mean value formulation. The measured values are cyclically polled here. It is possible to control the communication via an integrated statistics function.
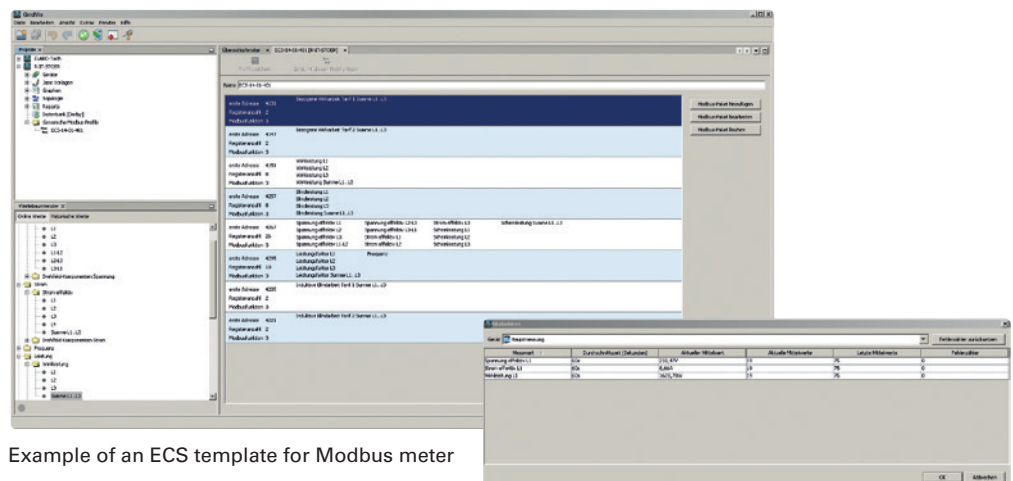
Example of an ECS template for Modbus meter

Communication control via integrated statistics function

Overview of functions

- ❑ Data transfer speed 9.6, 19.2, 38.4, 57.6 ... 115.2 kbps
- ❑ Device integration via RS232, RS485, modbus (Ethernet)
- ❑ Supporting function codes: Read coil status (fc = 1), Read holding registers (fc = 3), Read input status (fc = 2), Read input registers (fc = 4) as well as the formats Floating Decimal Point (32 bit, 64 bit) each per IEEE 754 as Short (16 bit), Unsigned Short (16 bit), Integer (32 bit), Unsigned Integer (32 bit) and Integer (64 bit)
- ❑ Profiles are freely configurable
- ❑ Online storage of the values possible
- ❑ Values: Water, gas, heat, energy, etc.
- ❑ Export and import of the values possible
- ❑ Values are read in blocks

Device configuration

Setting parameters and configuration of measurement devices
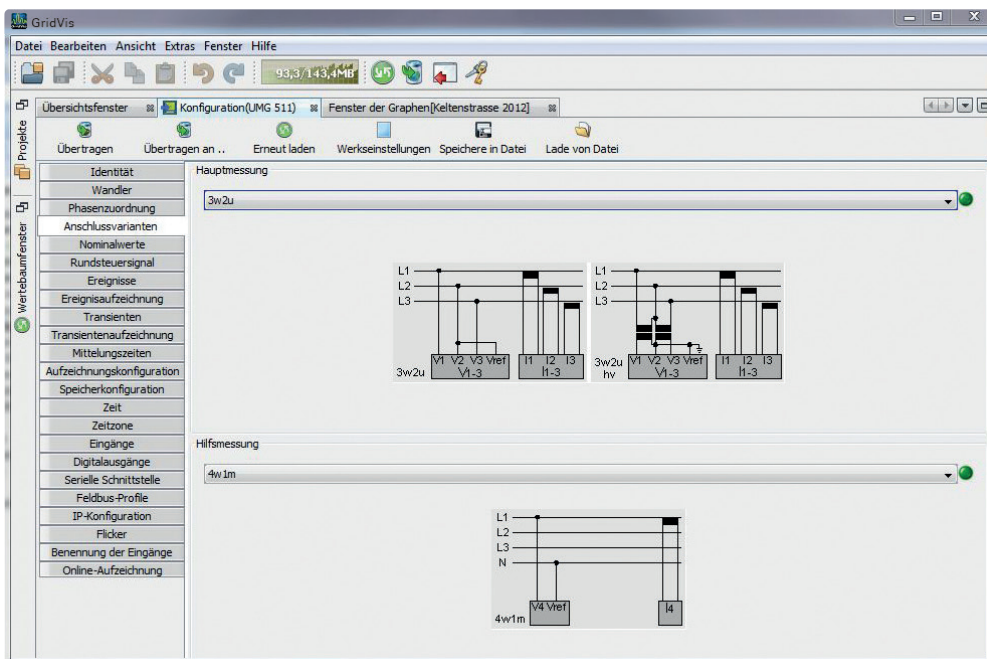
The user-friendly GridVis® software allows integration, and configuration of UMG measurement devices, their parameters can be set and comprehensive settings for custom solutions created.

Trigger values for the measurement of events and transients can be defined as well as the measurement values for storage together with storage intervals. It is possible to program the limit values for the monitoring function of the digital outputs, via comparators or determine pulse values for the digital inputs or outputs.
It is also possible to capture the readings of external temperature sensors for the transformer or ambient temperature.

Connection to time servers (NTP synchronisation) enables time based synchronisation of the measurement values. In this way it is possible to reconcile events at various measurement points simultaneously and identify these accordingly.
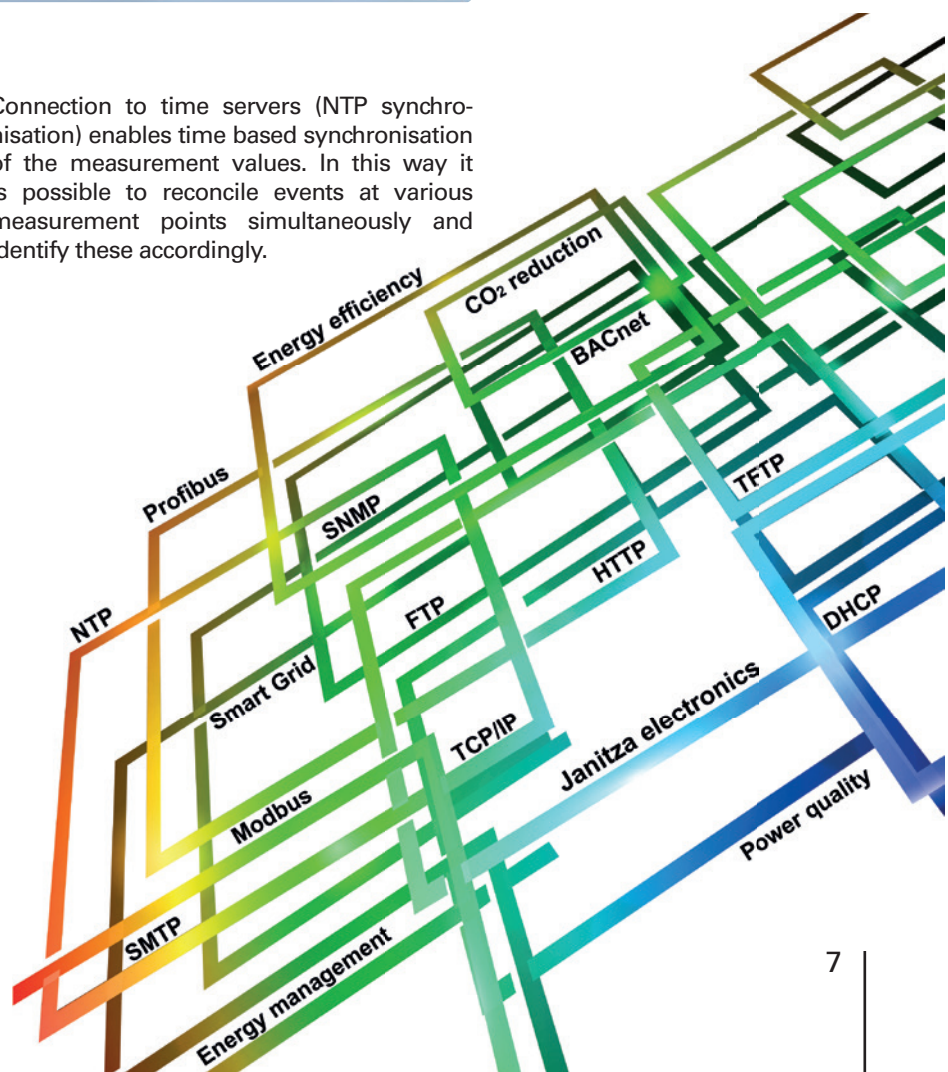
Topology views (visualisation)

The topology view provides a quick overview of the energy distribution system with the option of localising grid failures through a comparison of the individual measurement points and checking the defined tolerances at a glance.

It is quick and easy to create customer-specific solutions by storing graphic files (standard format JPG) with circuit diagrams, production lines or construction plans and integrating the associated measurement devices by means of "dragging and dropping" to their actual location.

Presentation of limit value overruns (e.g. THD-U too high) as well as input and output status is also possible. If parameters are above or below threshold limit values these can be highlighted by means of a change in colour.

It is possible to call up a device view of every measurement device on the system which is online. This view is available directly via the actual display. Furthermore, in the case of some device types remote operation is also possible. All selected measured data for the devices can be presented online simultaneously.

Animation in the topology

Animations — such as a change of views between images — draw attention to important events. For example, through value-dependent display of images, a colour change can be shown when a rated voltage has been exceeded, a red light can be activated, or a circuit breaker can be marked as triggered.

Hyperlinks in the topology

Hyperlinks can also be integrated into the topology view. This allows linking of the URL to any website or to other topology pages. Through these, the user can call up documents or access calibration certificates, operation manuals and Excel evaluations. Even batch jobs or other programs can be launched by hyperlink.


Complete overview of the energy distribution by means of topological views
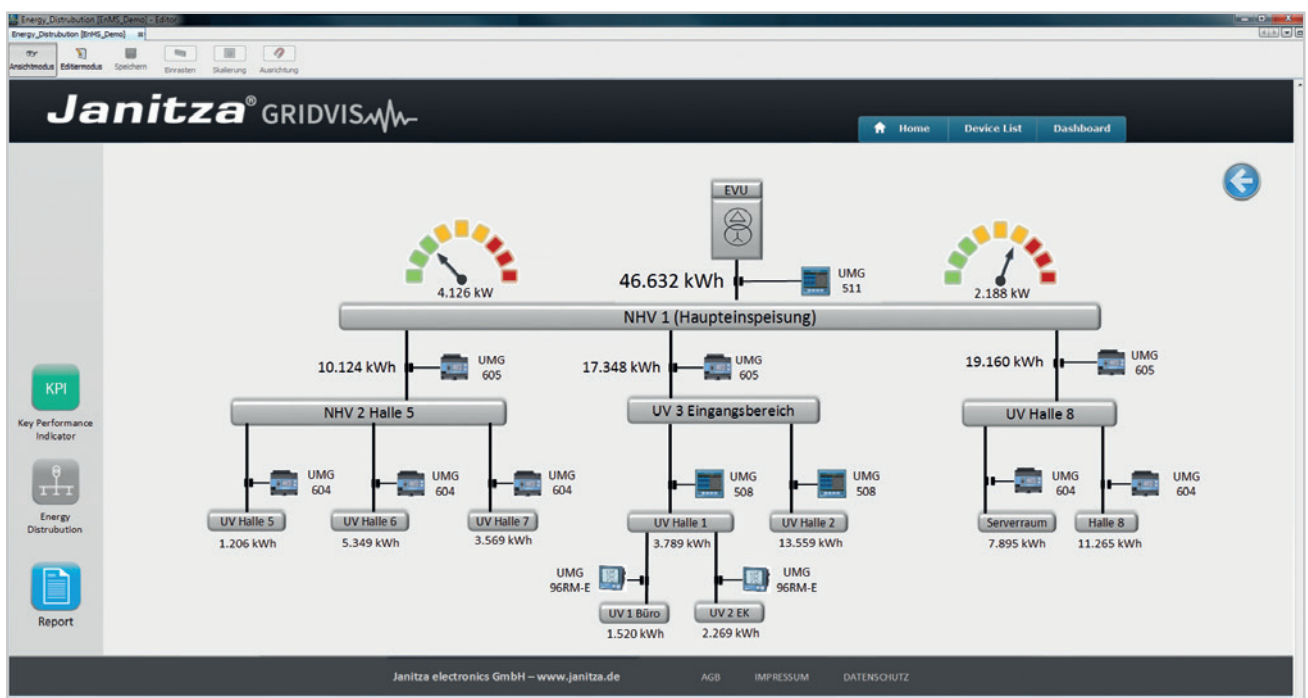
Online and historical measured values

Online data

Online data comprises all measured values that are captured by the measurement devices on a current basis during runtime and constitute the momentary ACTUAL status.

GridVis® enables specific logging, reading and display of online data. The data obtained from various measurement points is collected, stored, prepared, displayed and made available. All measured values are available in the online measurement mode, either as line graphs or bar charts.

The line graphs are always up-to-date with the oldest data being omitted dependent on the measured data quantity setting. It is possible to set two y scales for the measured data of two units, e.g. current and voltage, on a time-synchronous basis. An arbitrary quantity of measured data from multiple measurement devices can be presented on the same graph for each unit. The colours of the graphs can be selected and amended on an individual basis.
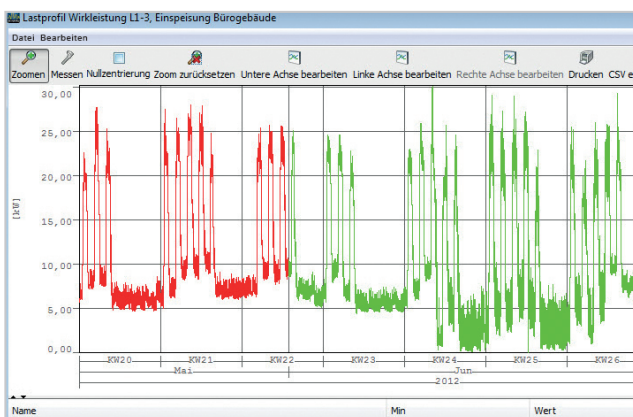
Display of active power L1–L3, load profile as basic instrument for energy management considerations

GridVis® screen with historical evaluations

Historical data

The measured values which are stored – either in the device or read out from the device and saved to a database – and made available in accordance with defined rules and averaging periods are referred to as historical data. Each stored value is given a unique time stamp and the respective device IDs are assigned. The data is stored in the database by parameter, year, month and day. The data can therefore be extracted on a selective basis.

Particularly interesting time frames can be enlarged with the zoom option and measured using the measurement function.

Presentation of the data in the form of bar charts, line graphs or histograms can be appended and printed out with headings and comments. The presentation of transients and events also takes place here in the transients or events browser. The flag browser offers the option to show missing measured data over certain periods, as well as untrustworthy measurement information. For eaxample by analysing historical data it is possible to show load profiles, in order to produce precise requirement analyses for optimised current supply contracts. It is also possible to carry out fault analyses by comparing various parameters with just a few mouse clicks.

Reporting – Power Quality

(EN 50160, EN 61000-2-4, Nequal, IEEE 519, ITIC CBEMA, PQDIF, etc.)

The voltage in our electrical systems today is far from a pure sinusoidal shape. A wide range of "power quality distortion" types such as voltage interruptions, transients, harmonics, flicker and inrush currents alter the sinusoidal character of the currents and therefore also the voltage.

In some instances this results in damage to operating equipment, which is exposed to excessive electrical loads and may exhibit increased thermal losses. A loss of operating equipment or its restricted functionality may cause an associated production failure. A high flicker level can lead to fatigue and discomfort of personnel, whose capabilities are affected. Unacceptably high currents in the protective earth conductor cause voltages in radiators, pipes, etc. Increased currents in underdimensioned neutral lines pose a significant fire hazard. It is therefore advantageous to detect power quality events in a timely manner, and to take corrective action. GridVis® offers all of the tools required for this. At the heart of the system analysis is the reporting system of the GridVis® software. This offers confirmation – at a glance – as to whether the power quality is adequate or not during the period under review. However, further tools are also available for analysis of the supply to help identify root causes of problems.

Funktionen im Überblick

- ❏ Power quality reports according to the following international standards
  - ❏ EN 50160
  - ❏ EN 61000-2-4
  - ❏ NeQual
  - ❏ IEEE 519
  - ❏ ITIC (CBEMA)
    (only online not automatic)
- ❏ Per schedule: Reports are produced according to time
- ❏ Manual reporting in case of specific requirements
- ❏ Automatic report creation
- ❏ Exports and reports by e-mail

Janitza®

Enhanced Power Quality Report

Customer		Tester	
Name:		Name:	
Company:		Company:	
Location:			

Start date:	22.07.2012 03:00
End date:	29.07.2012 02:59
Datum:	04.08.2012 19:45
Software:	GridVis

Measurement Point:	UMG511
UMG Serial Number:	
Device type:	UMG511
EN 61000-4-7 Class:	Class 1
EN 61000-4-30 Class:	Class A
Flicker:	Supported
Events:	Supported
Transients:	Supported

	Minimum	Maximum	Ergebnis
Voltage effective L1, L2, L3	212,64V	239,27V	Passed
Voltage effective L1	213,18V	240,77V	Passed
Voltage effective L2	208,06V	236,87V	Passed
Voltage effective L3	212,64V	239,27V	Passed
Current effective L1, L2, L3	21,94A	81,94A	
THD U L1, L2, L3	1,51%	4,65%	Passed
THD U L1	1,56%	4,43%	Passed
THD U L2	1,65%	4,44%	Passed
THD U L3	1,51%	4,65%	Passed
THD I L1, L2, L3	5,32%	16,65%	
THD I L1	4,05%	16,28%	
THD I L2	4,04%	20,30%	
THD I L3	5,32%	16,65%	
Active Power Sum L1-L3	16,81kW	50,50kW	
Reactive Power Sum L1-L3	-2907,20var	9749,24var	
Apparent Power Sum L1-L3	17,16kVA	51,04kVA	
cos phi(math.) Sum L1-L3	0,96	1,00	
Frequency +-1%	49,83Hz	50,29Hz	Passed
Frequency -6%/+4%	49,83Hz	50,29Hz	Passed
Unbalance Voltage	0,08%	0,89%	Passed
Long term flicker L1(Limit: 1.0)	0,56	1,71	Failed

Enhanced Power Quality Report

# Reporting – Energy management systems

Within the framework of an energy analysis it is necessary to measure and monitor important parameters of the electrical energy supply. The data supplied from the measurement devices is displayed in GridVis® online as momentary values or from the historical values.

The evaluation of this data can take place via the report generator integrated into GridVis®.

The reports can consolidate a range of information depending on the requirements and settings. For example

energy and power-related cost centre reports can be created. This not only facilitates the presentation of electrical energy values from the measurement devices but also the allows evaluation of other media (gas, water, etc). Furthermore, load profile analyses, which are based on a defined time frame, provide an overview of peak demand consumption.

The generation of individual reports can either be automatic via freely definable schedules or can be started manually by the user as a printable report or as an HTML, XML, Excel, Word or PDF file.
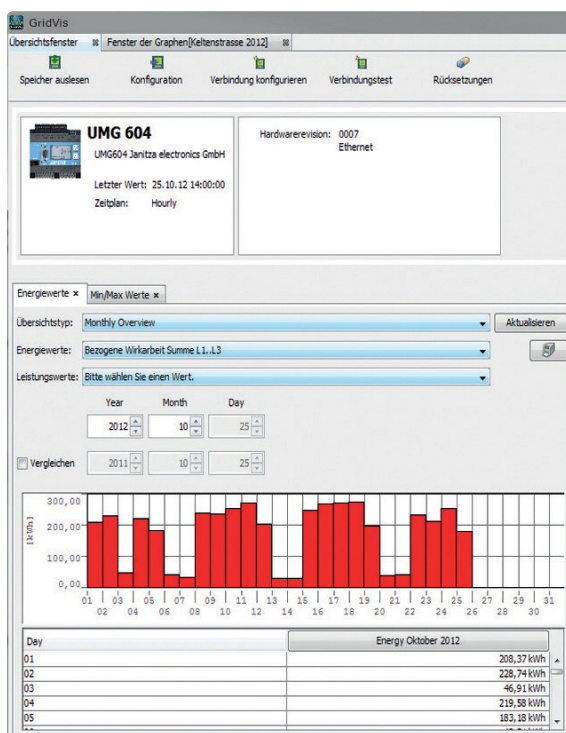
Consumption profile – monthly view

Overview of functions

❑ Energy consumption / power requirement / cost centre reports
❑ Load profile analyses
❑ Automatic report generation
❑ Freely definable schedules
❑ Exports and reports by e-mail

Excel export

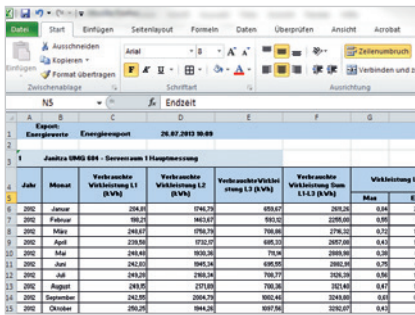Exported data from GridVis® in an Excel file

Manually and automatically via time plans

GridVis® can process multi-sheet Excel documents and fill them with data. This gives the user plenty of freedom to select clean measurement data, pre-calculated data (on energy), or time ranges, for example.
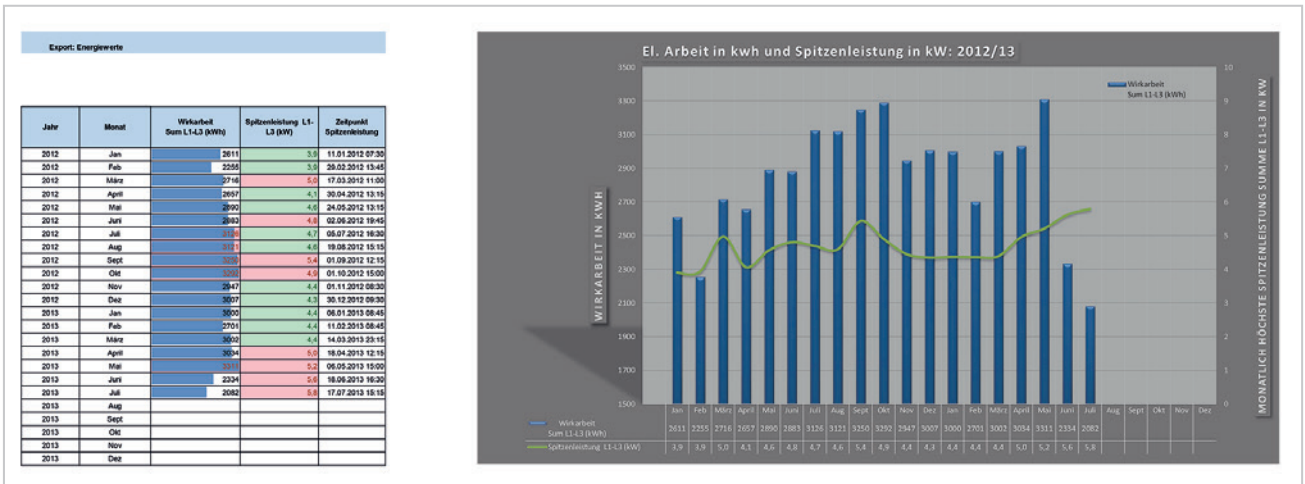
Measurement data can be exported to Excel documents both manually and automatically on a schedule.

For this, three options are available: overwrite existing data, create new data with date or change existing data.

In this way, GridVis® provides user-friendly, customer specific evaluation.

Customer-specific Excel evaluation for el. power and energy based on the automatic Excel report

Janitza DB

Since GridVis® release # 4.1, the Janitza database "Janitza DB" has been in use. It is specially optimized for GridVis®. This database can be selected while setting up a new project and works extremely fast.

Data can be exchanged with other software platforms, home pages etc. through the REST interface (see page 22).

Janitza DB is delivered with all editions of GridVis® to save the user additional

expense. This also applies indirectly to work time, since no additional installation time is needed.

Note: It is not possible for multiple clients to access the Janitza DB! Only one computer or server can connect a GridVis® desktop or GridVis® service to a single Janitza DB.

Database management

Database connection in GridVis® Desktop and Service
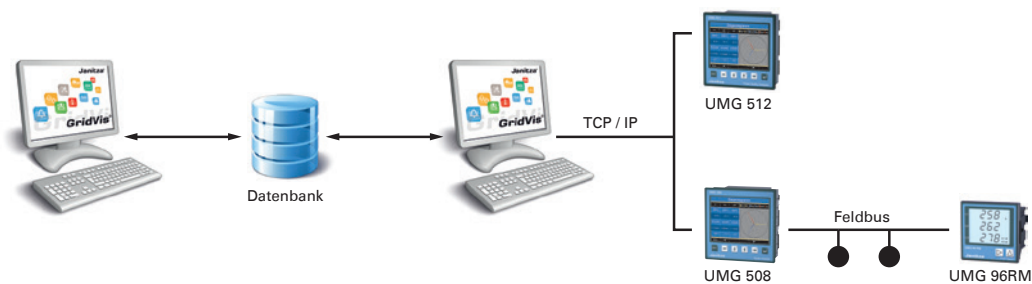

GridVis®-Desktop

Almost every measurement device is equipped with an integrated data storage facility. When this memory is read out, the measured data is backed up to a database. Apache Derby, MySQL and MS SQL databases can be selected. In the case of projects with 5 devices or more we recommend the use of an SQL database.

The possible installation software versions are GridVis®-Desktop, GridVis®-Service and a mix of GridVis®-Desktop / GridVis®-Service.

GridVis®-Desktop can be installed locally on a desktop or centrally on a virtual machine. When reading out data from the measurement devices GridVis® must run as an open, active program. From here it is possible to address, read from or configure devices. All generated data is written to the database associated with the respective GridVis® project.

GridVis®-Service functions in the same way via a system service on a remote server. As servers are rarely switched off, this system service can read out data from the measurement devices on a constant basis in the background, without GridVis® being open on a client computer. This type of service installation can be used by multiple clients in parallel. The configuration of devices and projects takes place via the GridVis®-Desktop program interface. The rights for the devices are subsequently handed over to the GridVis®-Service. This can be configured via a browser. All graphic and statistical evaluations continue to take place via the GridVis®-Desktop.

In general it is possible for any number of GridVis®-Desktop and Service instances to access one and the same database (with the exception of Apache Derby). However, a device, at any one time can be linked only to one GridVis® or one GridVis®-Service.
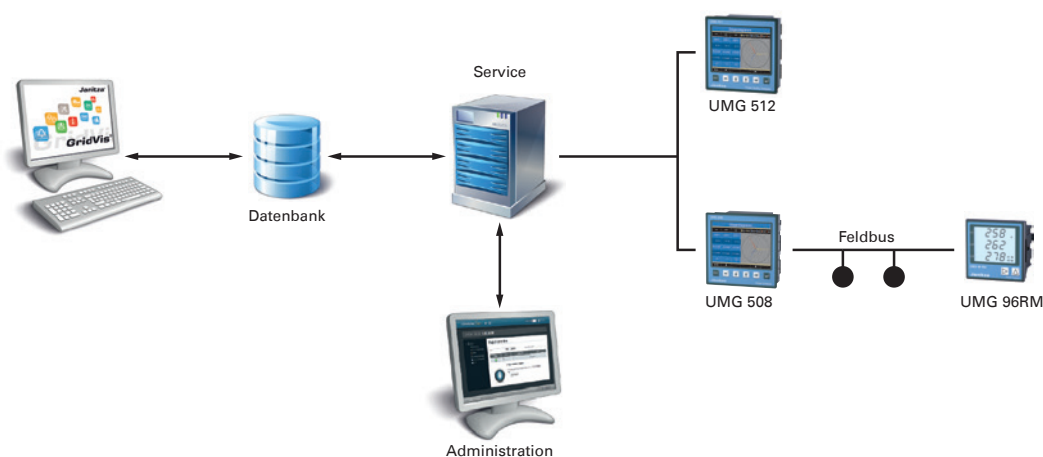
GridVis®-Service

Easy data exchange

Due to numerous interfaces and proto-cols (e.g. Modbus / Profibus / M-Bus), an uncomplicated system connection (energy management system, PLC, SCADA, GLT) is ensured.

In general terms all energy measurement devices can now be networked with each other. Communication between GridVis® and the measurement devices takes place via Modbus RTU or Modbus TCP. Measured data is read out automatically via a field bus and made available for further use via a central data server.

To keep installation costs low (e.g. peripherals for field buses), Ethernet TCP/IP is used increasingly frequently as the backbone of the data communication. Through connection to an existing Ethernet architecture, fast, cost-optimised and reliable communication is usually guaranteed.

Janitza systems essentially offer an extremely open architecture so the Modbus addresses can be accessed directly using PLC, BMS or SCADA software, or alternatively the UMGs can be integrated in a PLC environment via Profibus.

The BACnet protocol plays a significant role in the field of building automation. "BACnet" is a manufacturer-independent data transfer protocol for "open communication" in building automation systems for regulation and control of equipment used within this field.

"BACnet" facilitates communication between equipment in various systems from a range of manufacturers.
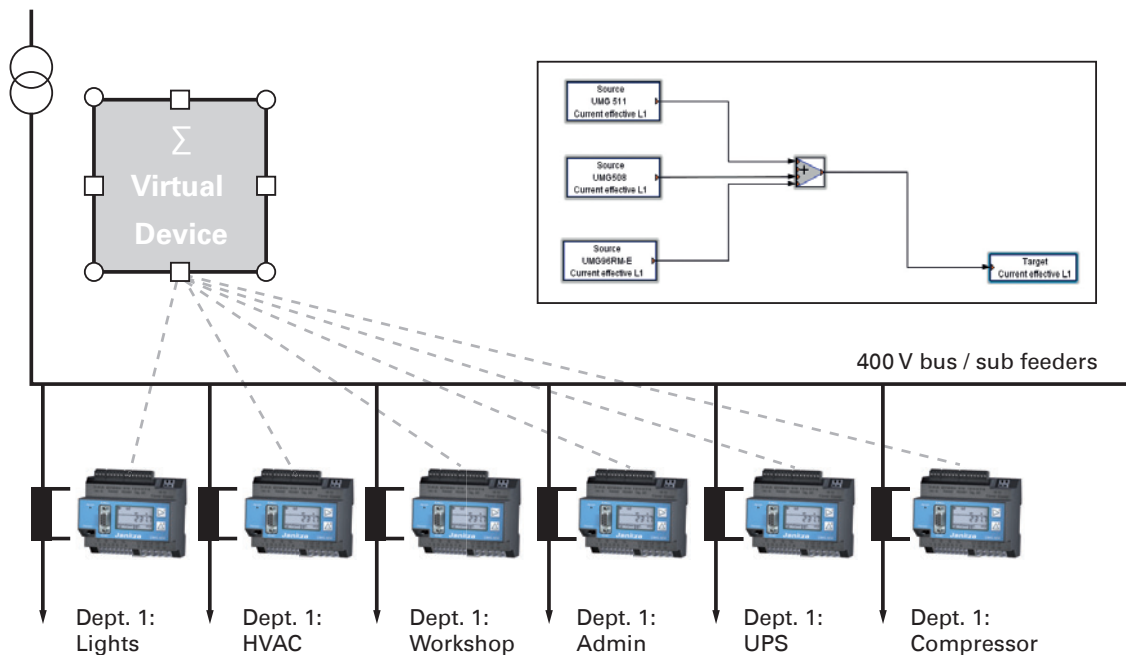
Data exchange options:
– GridVis® software
– UMG device home page
– SQL DB queries
– REST interface
– EXCEL export
– UMG Modbus addresses read directly
– OPC server
– BinFiles over FTP
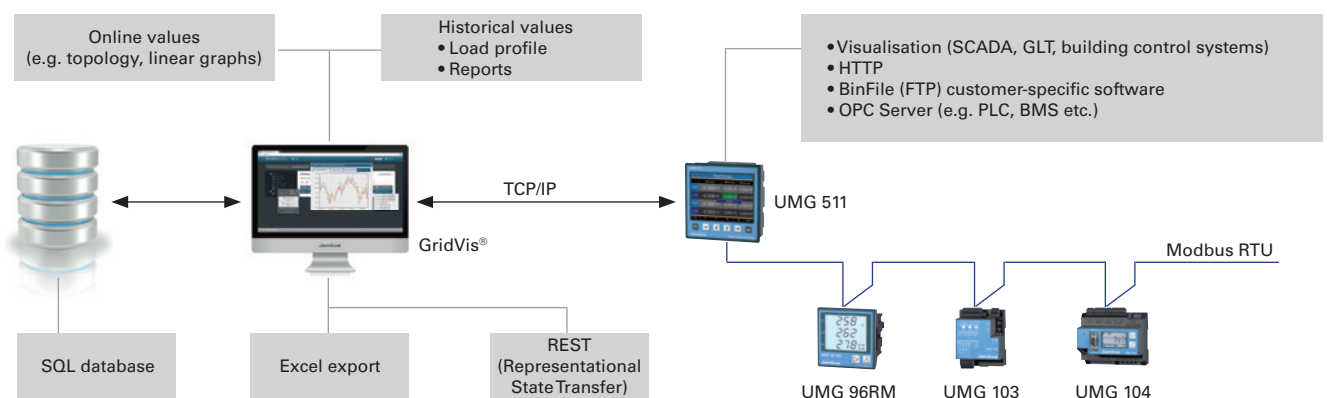
Overview of the multifaceted integration options to superordinate software environments

Virtual measurement devices
(cost centres, key figures)

The virtual measurement device calculates the total consumption in the supply line

"Virtual measurement devices" are available with GridVis® for the purpose of mathematical calculations.
Through the addition of various measurement points it is possible to consolidate entire areas. This function is a useful application in particular for cost centre management.

A further application area is the calculation of key figures. For example, in order to evaluate the energy efficiency in computer centres the calculation of power usage effectiveness (PUE) would be useful. In such calculations the total energy consumed in the computer centre is presented in comparison to the energy consumption of the computers.

Virtual measurement devices can calculate the momentary as well as the historical value where the pertinent basic data exists. The following operations are possible: Addition, division, multiplication and subtraction.

With the aid of numerical constants it is also possible to calculate percentage values. A major advantage of the GridVis® virtual measurement devices is that no additional measured values are stored in the database. Virtual measurement devices carry out calculations during the GridVis® runtime. For the purpose of the graphic display it gains direct access to the source data of the device, calculates the value and displays this in the graphic. Up-to-date measured values from virtual measurement devices are also calculated during the GridVis® runtime.

A range of target data points are available for calculations with non-electrical media. A data logger such as ProData can serve here as a source of these media. The integration of external devices via the generic modbus option of GridVis® is also possible (it may be necessary to carry out an integration test in this case). It is optionally possible to process the measured values of global variables from the measurement devices in the virtual devices.

Jasic and graphic programming

Unlimited programming options

The programming language Jasic® opens up a range of new options. One is no longer bound to the functions specifically integrated in the device alone, but can expand the device to include additional individual functions. The graphic programming allows the generation and configuration of logical links or mathematical functions. It is also possible to describe one's own digital outputs and evaluate digital inputs. Furthermore, the registers of external devices can be analysed and defined via Modbus (licence required).

Messages can be sent via email if limit values are exceeded. Time switching functions or the logging of special values can

be freely configured by means of the graphic programming. The programs, once created, are stored directly in the respective UMG measurement device and run here autonomously.

The possibility of the graphic programming of application programs constitutes a true novelty in the field of power analysers. In addition to the user-friendly graphic programming, the user is also able to program the code directly, via Jasic source code.
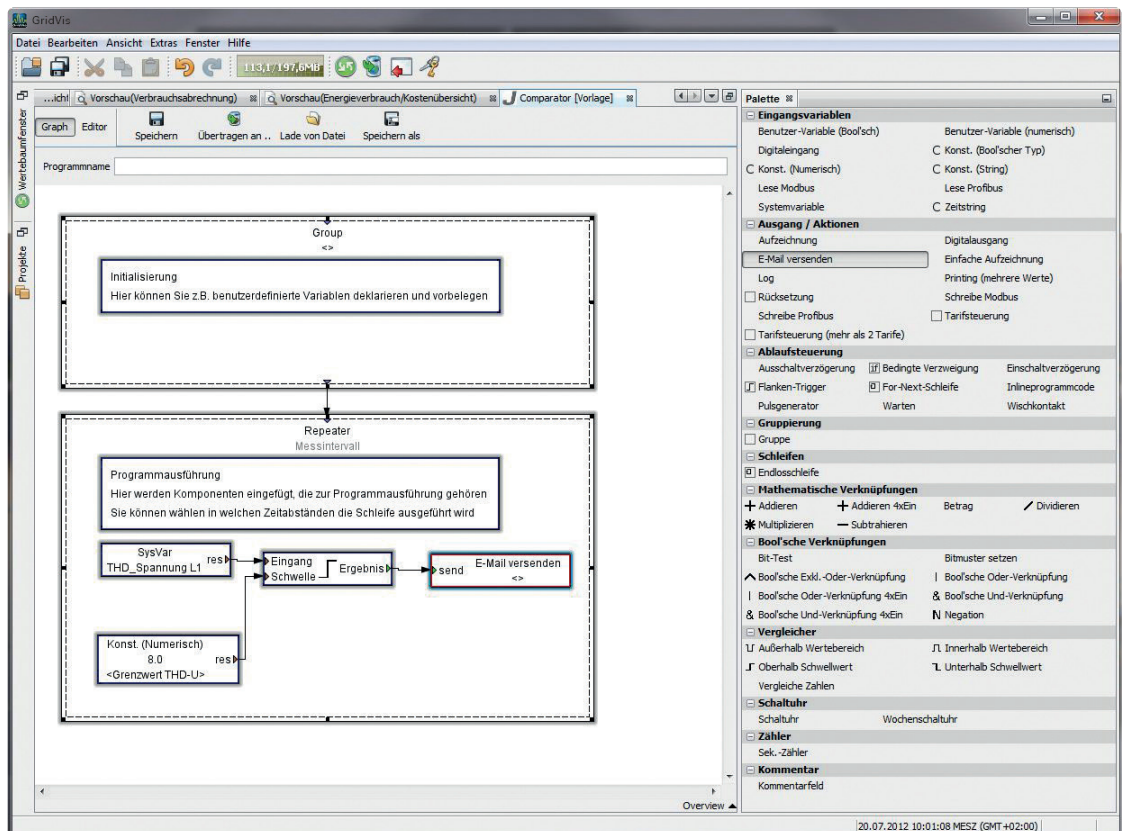
The functional overview offers a wide range of functions, in order to implement graphic program with ease

Analysis of power quality

In parallel with energy monitoring GridVis® also places a principle focus on monitoring the power quality.

The threshold values are issued to the measurement device via GridVis®. System events such as overvoltage, undervoltage, short-term interruptions, overcurrent and transients are accordingly automatically logged with preset cycles before and after the event. Preconfigured parameter lists are available for logging in accordance with EN 50160 and EN 61000-2-4. The power quality is negatively affected by the increasing number of non-linear loads. On the other hand "mains feedback", caused by the trend towards decentralised energy generation and the reduced mains short circuit power frequently associated with it, has a greater effect – mains feedback!

Continuity of supply, system assurance, supply reliability, service and in particular power quality are of primary importance to the customer.

GridVis® delivers a range of features for the analysis of power quality:

- Oscilloscope function of the live values of numerous power quality parameters
- Topology view, with limit value monitoring of online values
- Transients and event overview in the measurement device dashboard
- Graph sets with freely selectable measurement parameters
- Automatic generation of PQ reports according to schedule

- PQ reports for diverse standards: NeQual, EN 50160, EN 61000-2-4, IEEE 519
- Comprehensive statistics functions
- ITIC (CBEMA) curve
- Event browser via lists and graphic presentation for detailed analysis
- Transients browser via lists and graphic presentation for detailed analysis
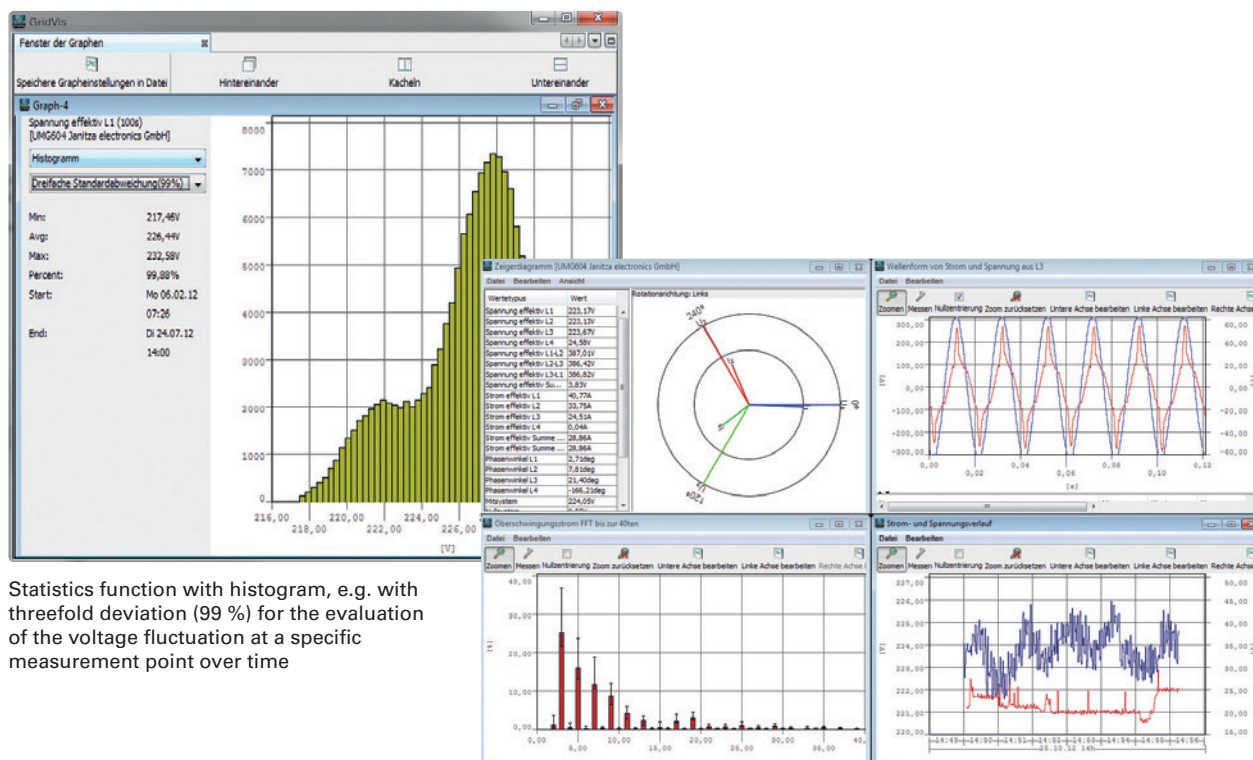
Statistics function with histogram, e.g. with threefold deviation (99 %) for the evaluation of the voltage fluctuation at a specific measurement point over time

Graph set with freely selectable PQ values

Events and transients

The costs of voltage dips (sags) and transients are commonly underestimated!

Events refer to short-term voltage peaks, dips or short-term interruptions, e.g. due to bird strike or a short circuit caused by construction works.

Voltage dips and short-term interruptions can cause major problems. Especially in production and in critical processes, this can result in quality problems and production downtimes. The financial effects of such voltage drips are commonly underestimated.
Short-term interruptions usually incur immediate, often with considerable costs.

It is therefore important to identify and analyse the cause of such power quality fluctuations with user-friendly tools.

With the event and transients browser, GridVis® offers helpful tools through which to ascertain and classify diverse events on the supply system In both procedures the list view reports on the event data. From the list it is possible to call up the respective graph, zoom in or out, print it or export it to a PDF or CSV file. GridVis® optimally utilizes the device capacity. As such, events from a duration of 10 ms and transients from 50 µs can be reliably logged and further processed.
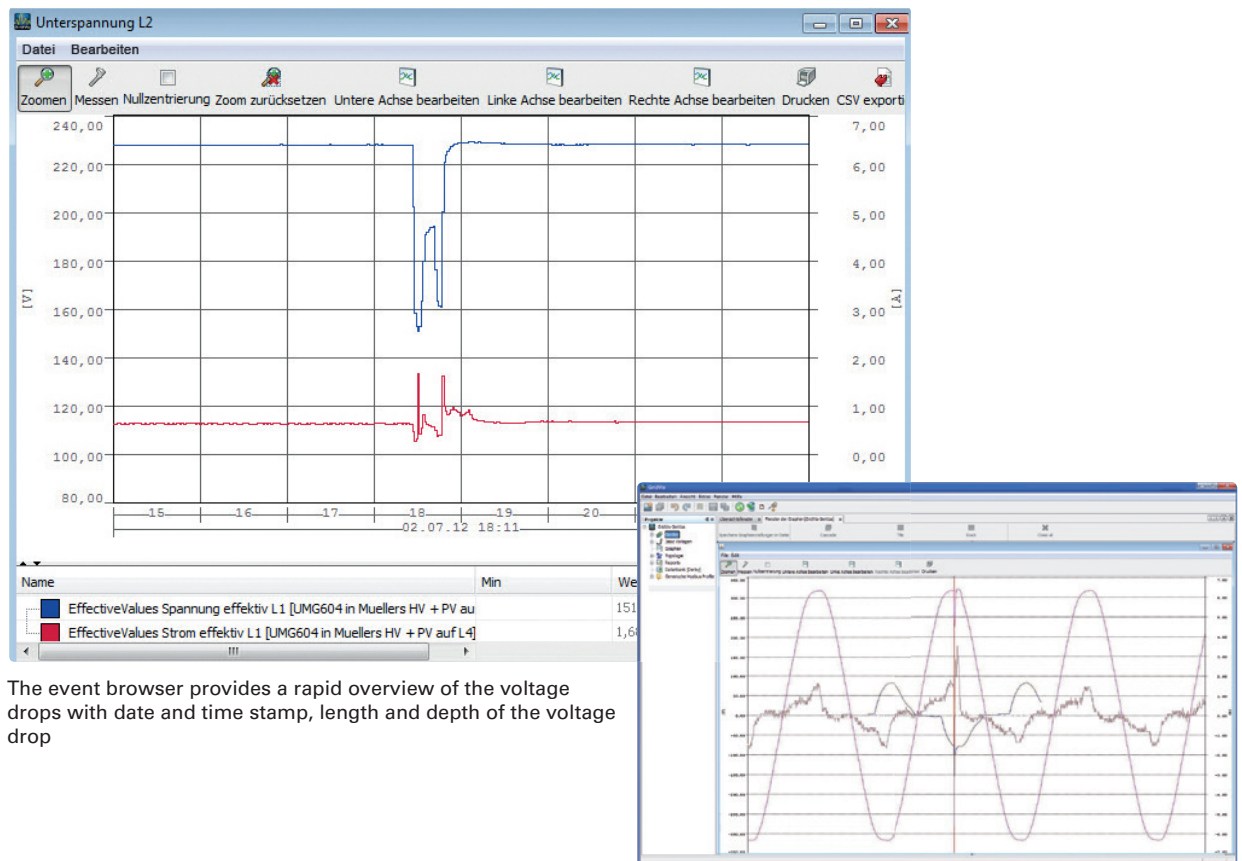
The event browser provides a rapid overview of the voltage drops with date and time stamp, length and depth of the voltage drop


Detailed analysis of a critical voltage drop
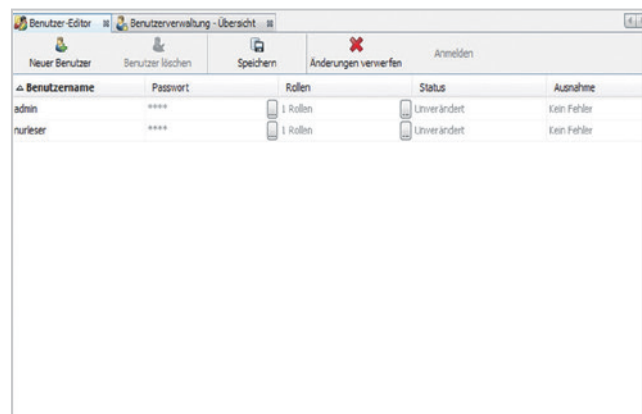
User management

Multifaceted user profiles

Typically, a user (Admin) is defined, who has no restrictions with in the GridVis®. Among other things, the administrator can manage users and add or delete devices/topologies etc. Permits the specific assignment and deletion of each user's rights. Defined access authorisations can be assigned through the rights. This function is also used for setting up users, granting rights and assigning users to groups. User administration can be arranged and set as an active function within a project. Only one user administration can be defined per project. All users, passwords, roles and rights are held in one database (a user directory). Multiple projects can be protected from a user directory. Users' individual rights are compiled in predefined roles (groups of rights). Roles (groups of rights) are cumulative, i.e. the rights of users from various roles are added together. If a project is protected by user administration, login is required for access. In GridVis® 4.0 and above, all editions except GridVis®-Basic offer user administration within the software.
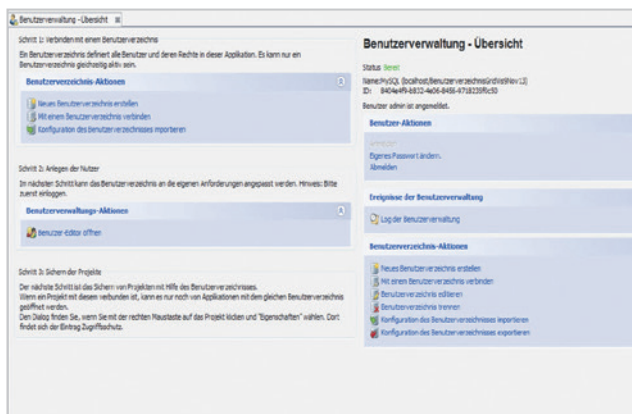
User administration overview

User editor
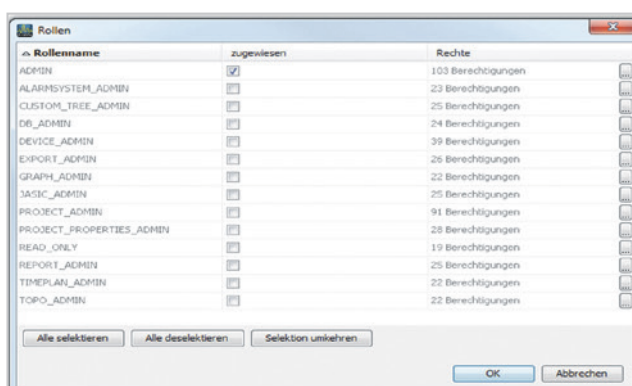
Assignment of roles

Alarm management

Intelligent alarm management system

Alarms are defined as events that require an immediate reaction from the energy manager responsible or from the operation supervisor. Systematic management of alarms is indispensable in monitoring energy and power quality. For this, GridVis® #4.2 and above (Service edition) offers powerful alarm management for monitoring all measurement parameters of UMG measuring devices. It allows rapid, reliable signalling of fault conditions (e.g. disconnected communications equipment between measurement devices and measurement data servers, measured value exceedances, etc.)

Immediate, fully automatic fault reporting can be transmitted through various channels to a multitude of different recipients. Various options allow customization to the operator's needs.

No reports are lost

The GridVis® alarm management system offers user-friendly administration of employees and supervisors. This includes acknowledgement functions and escalation management. It means that if there is no response, another employee is informed. If the second person does not react, a third is informed, etc. Their order can be configured individually. A logbook function provides the user with a list of open and acknowledged alarms. Sorting and filter functions ease evaluation.

Effective monitoring options

With the GridVis® alarm management system, both current (online) and historical threshold values can be monitored (absolute data, consumption data over time, etc.). Monitoring can even include availability of measuring points (UMGs) and the last time data were synchronized.

If there is an alarm, a number of actions can be triggered: Staring a program (such as text message, Twitter, Modbus address, etc.), sending e-mails (text, alarm information), manual and automatic acknowledgement functions, pop-up windows and sound.

More protection against technical hazards

Targeted escalation management guarantees prompt intervention when faults or critical situations occur. If there is no acknowledgement, the alarm is escalated after a defined time. Any number of escalation levels is possible. This helps operating personnel with troubleshooting.

**Helps operating personnel
with troubleshooting
A professional alarm management system can...**

...increase the availability and performance of a monitoring system, reduce the cost of energy and operation, and increase security of supply.

Demands	Measures
Timely	Checking of data and threshold values
Relevant	Deletion of alarms without user activity
Unambiguous	Assure the controllability of alarm rates
Prioritises	Grouping of alarms with the same user activity
Understandable	Provision of clear message texts
Informative	Provision of assistance
Sustainability	Escalation of alarm messages in the event of fault not being rectified in good time
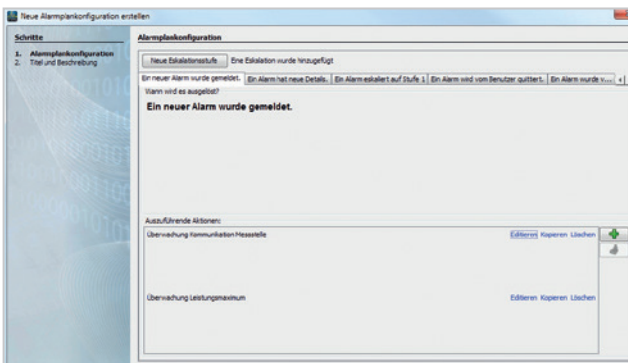
Alarm plan configuration
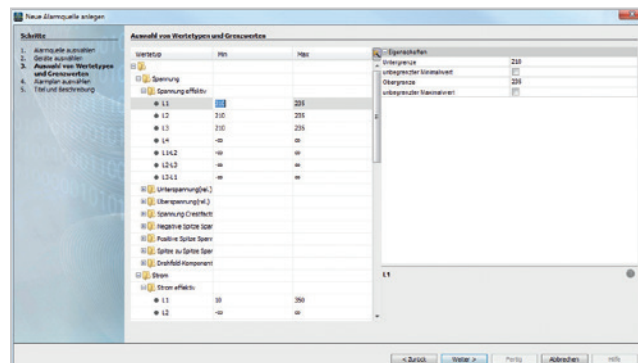
Configuration of alarm sources, selection of value types and threshold values
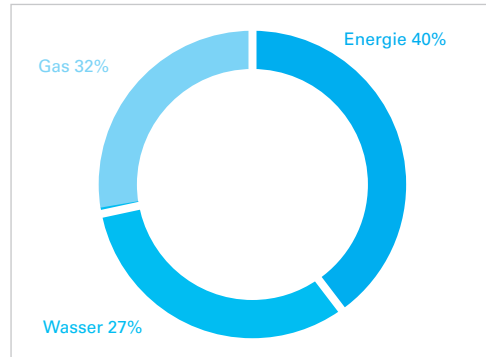
REST interface via GridVis®-Service

Online and historical data are supported

The REST interface (Representational State Transfer) describes a standardised request for measured variables or other information through a URL address. The extraordinarily fast interface allows data to be integrated directly into GridVis® or from GridVis® into other systems. GridVis® has very open system architecture that allows measurement data to be integrated through various paths into external software.

The result of the URL query is page content in JSON/XML with the requested measurement values or information. This is supported both for online and historical data.

The REST interface is extremely useful for integration of measurement data in proprietary software solutions, visualizations and home pages. This allows fast, easy calculation of energy data and further processing of data, such as for creating indicators.
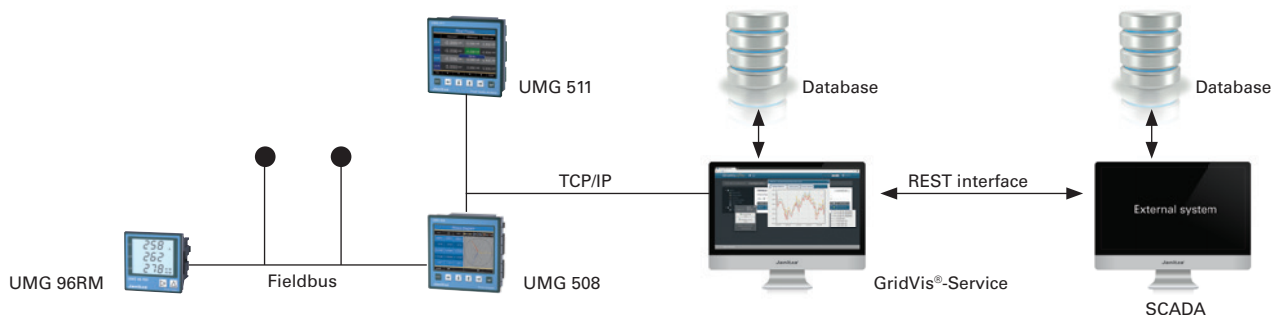
Note: The REST interface is available only with the GridVis® Service edition.

Cost distribution
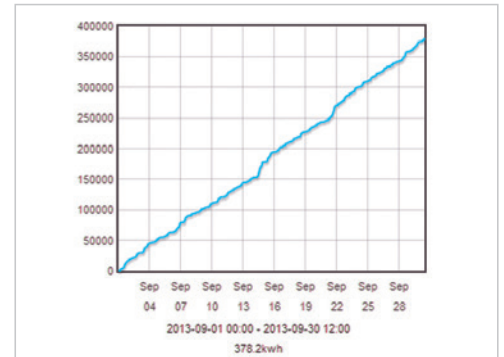
Graphical display of the energy values via the REST interface from GridVis®

Data transfer between GridVis®-Service and an external SCADA system via the REST interface

GridVis®-Energy Web Visualisation

Energy management software in accordance with DIN EN ISO 50001

Janitza®

Log and visualize energy data, reduce costs

With rising energy costs, strict environmental regulations and high competition pressure, energy management is increasingly gaining in significance. Only when energy flows are logged, visualized and evaluated in detail is it possible to reduce consumption and initiate measures to increase efficiency.

GridVis® is a tailor-made energy-management-system software solution, a capable tool that meets the highest standards for transparency and flexibility in allocating your company's resources. By comparing energy data based on Key Performance Indicator or mass flow diagrams, you can optimise your strategy and realise both short-term and long-term targets. The software also offers the opportunity to configure all Janitza measurement devices in comprehensive detail through an easy-to-use interface. GridVis® is part of a comprehensive system for monitoring energy flows and power quality, which puts all of the important tools – from load profile analyses to residual current monitoring (RCM) – in the hands of the user.

The GridVis®-Energy Web Visualisation is part of the GridVis®-Ultimate edition
The individual GridVis® editions allow you to select

functions tailor-made for your particular use case. This brochure shows you the possibilities offered by the new Ultimate edition: alongside the familiar functions, the new GridVis®-Energy web visualisation enables the user to customise the user interface to meet their own expectations.

Customisation of the web pages (dashboards), for example with your company's corporate identity, is extremely simple. On the dashboards, you can use your own images and graphics as well as a wide range of widgets (functions such as graphs, tables, diagrams, key figures, Sankey diagrams and many more) without limitations. The web page configurator allows you to organise the functions as you wish with drag & drop placement. Operating the dashboards is intuitive, saves a great deal of time, and can be learnt in just a few minutes.

Energy and any other measurement data can be called up locally and independently with the GridVis®-Energy web interface. The self-created web pages can be displayed directly on any PC or mobile end device using a web browser.

GRIDVIS-ENERGY

Janitza®

GridVis® editions – a multitude of possibilities
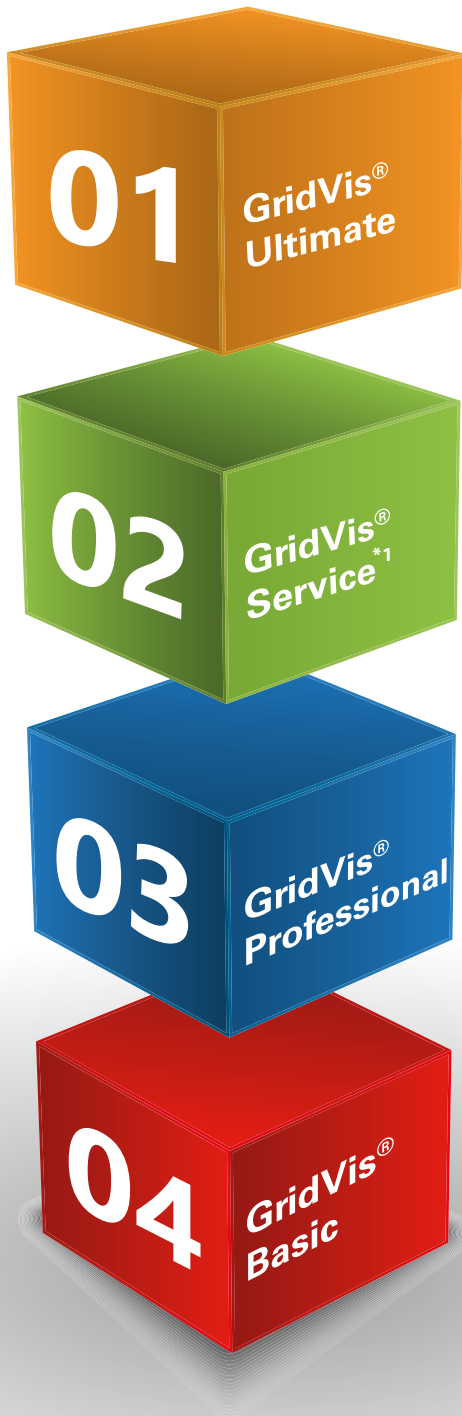
GridVis®-Ultimate   **51.00.190**

As GridVis®-Service, but with the following additional features:
NEW: GridVis®-Energy web interface
- Expanded user management
- Dashboards (customized creation of an unlimited number of pages)
- Widgets
- Key Performance Indicator (KPIs)
- Sankey diagram for energy flow analysis
- Device overview with graph function
- Image manager

GridVis®-Service   **51.00.180**

As GridVis®-Professional, but with the following additional features:
- Service for automatic data logging in the background
- Online logging of measurement data
- REST interface
- Comprehensive alarm management
- Export of measurement data into Excel
- Generic Modbus (third-party devices can be integrated)
- Read/write Modbus programming module
- Automatic report generation
- Cost centres

GridVis®-Professional   **51.00.160**

As GridVis®-Basic, but with the following additional features:
- No restriction in number of measurement devices
- MySQL / MS SQL DB support
- Automatic read-out of the measurement devices
- Virtual measurement devices
- User management (for assigning user rights)

**GridVis®-Basic – Free basic edition**   **51.00.116**

- Maximum of 5 devices
- Comprehensive graph screen
- Manual reports
- Topology view
- Janitza DB

01 GridVis® Ultimate

02 GridVis® Service *1

03 GridVis® Professional

04 GridVis® Basic

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*1   Some functions are only available in conjunction with GridVis® installation on the desktop.

A convincing list of features

Ultimate edition

- Alarm management (automated monitoring and notification tool)

- Report functions (automated & manual), outputs to formats .xls, .csv, .pdf

- Read-out devices (automated & manual)

- Database management (automated & manual)

- Measurement device management (direct access to settings and memory of the measurement devices)

- Cost centre management (virtual devices allow you to view cost centres)

- Power quality monitoring (EN 50160 & EN 61000-2-4)

- Service (background process optimised for server)

- Online logging (log measured values permanently, even for devices with no memory function)

- REST interface (web API for direct access to historical and live values)

- **Web interface**
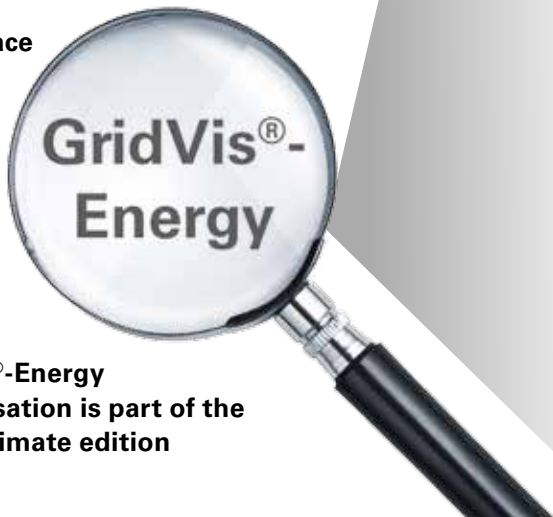
The GridVis®-Energy Web Visualisation is part of the GridVis®-Ultimate edition
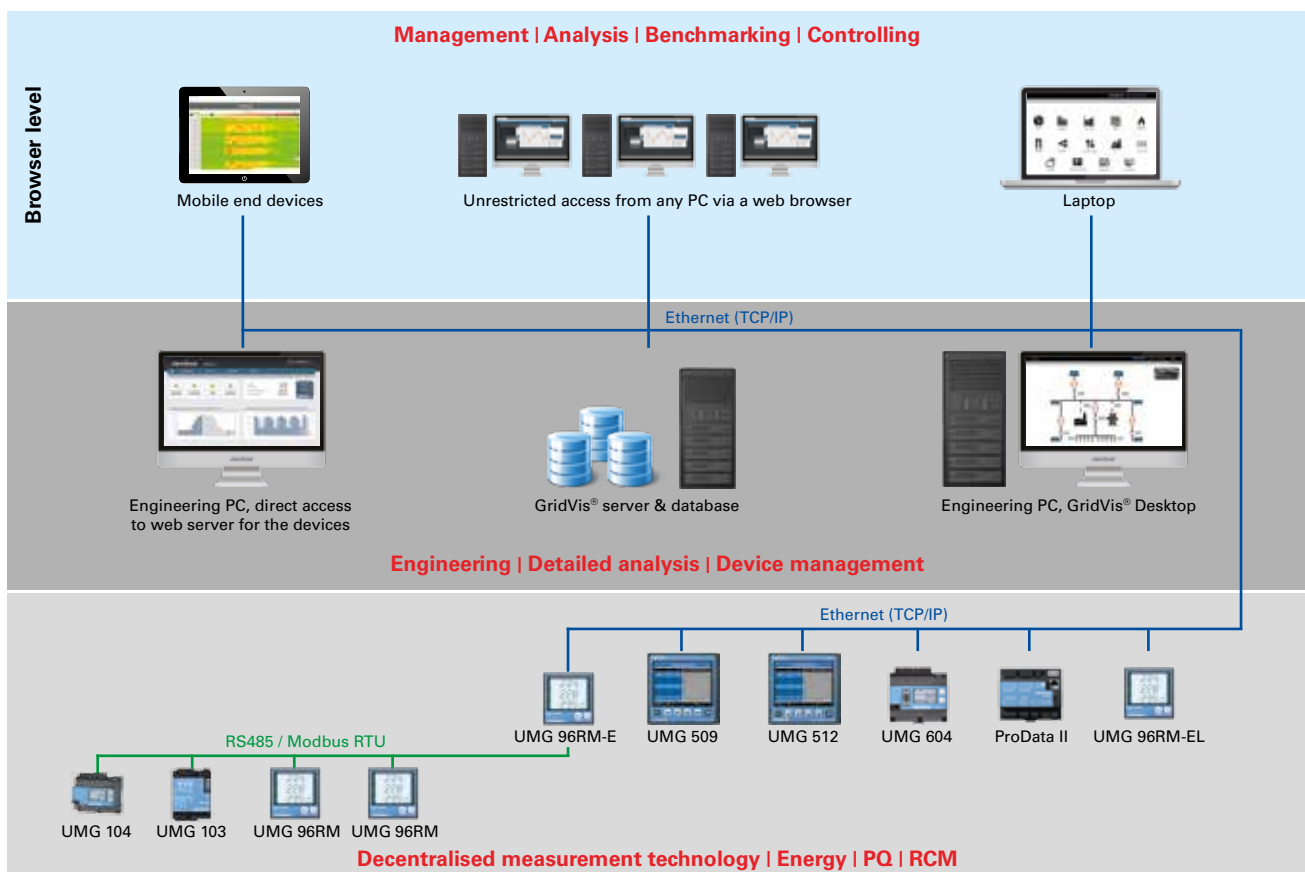
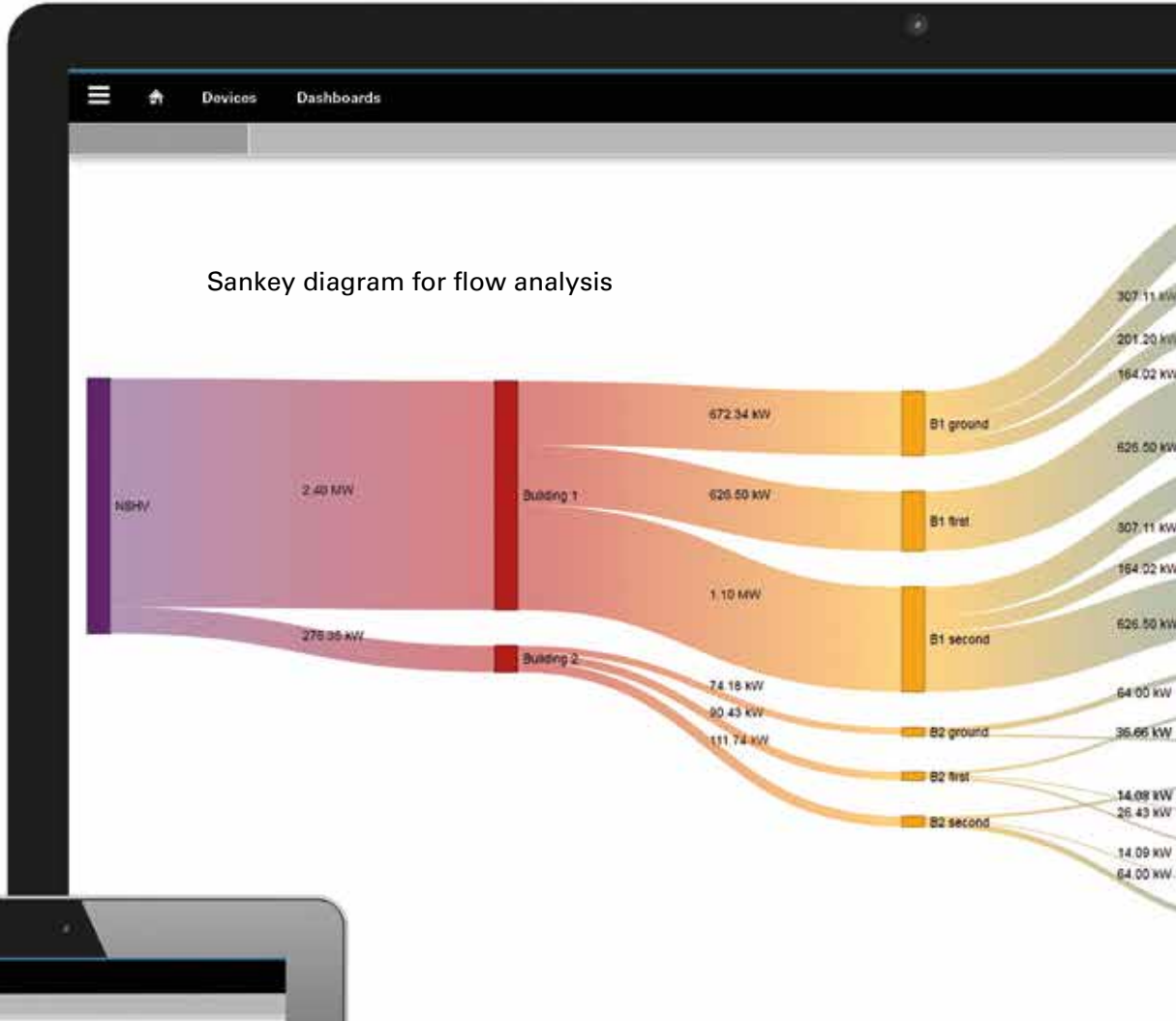## Detailed functional overview GridVis®-Energy web interface

- Web-based visualisation software

- KPIs (key figures & benchmarking)

- Sankey (graphical representation of mass flows)

- TÜV-certified according to ISO 50001 (energy audit & EnMS)

- Comparison & benchmarking of locations & facilities (gauge the potential for optimisations)

- Analysis of energy & measurement data (simple & complex analyses are possible)

- No restriction on data points (free & unlimited access to all measurement data)

- Access your visualisations regardless of location (no client installation necessary, access them directly via a web browser)

- Dashboard configurator (create overviews to meet your own particular demands, clear & simple engineering effort)

- User management (manage user access rights)

- Evaluation of live & historical measured values (direct access to measurement devices & database)

- Animated widgets (charts, diagrams, tables, KPIs, Sankey & many more)

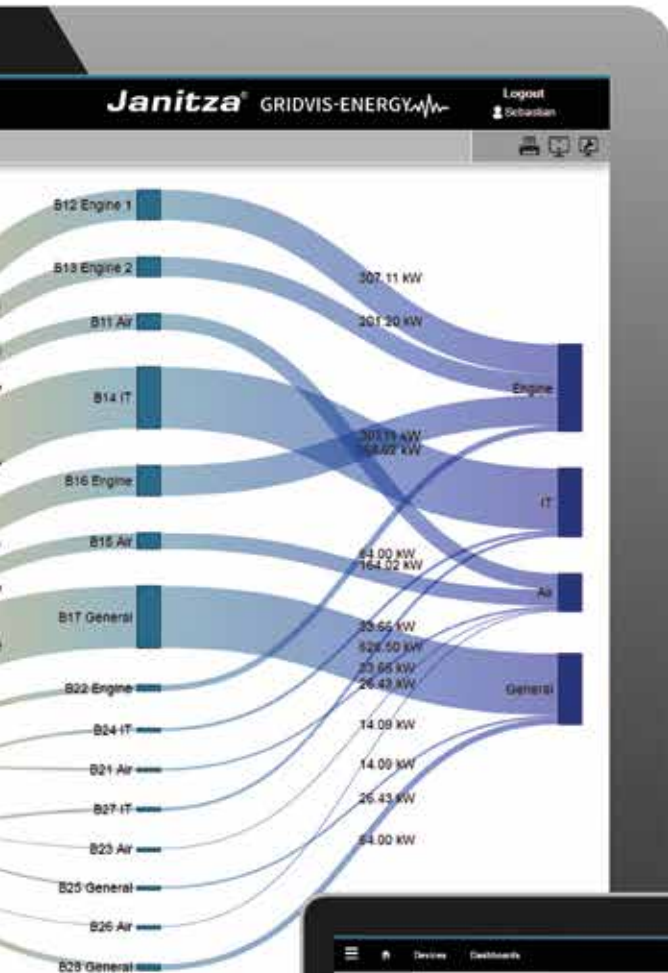- Image manager (simple management of graphics & images)

Benefits of a web solution

The benefits of a web solution are obvious. Presenting your energy and measurement data on your corporate intranet not only enables users from your own corporate network to access the information they require, but also authorised personnel from branches, partners, field sales employees, and external service providers. Web server access is unlimited, however it can be restricted using professional user management functionality. The GridVis® server can be integrated directly into an existing IT infrastructure; however online access is also possible, for instance via a VPN connection. Individual web pages (dashboards) can be assigned to users and personalised. The dashboards allow you to evaluate and clearly represent energy data, such as energy produced and consumed, load profiles, and other measurement data. With KPIs, Sankey diagrams, and chart functions, this is accomplished with particular clarity.

- Central logging of energy data
- Accessible worldwide
- Easy to integrate into existing IT infrastructure
- Present and visualise energy data on the facility or company-level in real time
- Detailed analysis and evaluation right in a web browser
- No time-consuming client installations needed
- User access can be managed and controlled centrally

Management | Analysis | Benchmarking | Controlling

Browser level

Mobile end devices

Unrestricted access from any PC via a web browser

Laptop

Ethernet (TCP/IP)

Engineering PC, direct access to web server for the devices

GridVis® server & database

Engineering PC, GridVis® Desktop

Engineering | Detailed analysis | Device management

Ethernet (TCP/IP)

UMG 96RM-E UMG 509 UMG 512 UMG 604 ProData II UMG 96RM-EL

RS485 / Modbus RTU

UMG 104 UMG 103 UMG 96RM UMG 96RM

Decentralised measurement technology | Energy | PQ | RCM

Sankey diagram for flow analysis

3in1

- Energy management
  (according to DIN EN ISO 50001)

- Power quality monitoring and analysis

- Residual current monitoring
  (RCM)

KPI (Key figures / Benchmarking)

Dashboards

Dashboards provide the opportunity to custom design your web pages as you see fit. A large number of options are available: 17 different widgets can be freely positioned and configured. The Dashboard Editor makes this process clear and simple. Once created, dashboards can be marked as favourites, grouped together, and copied. This allows you to create a structured overview, and to prioritise individual dashboards.

Certain widgets can be linked together or even to other websites, such as to a device home page. The possible range of potential applications uses is also expanded with zoom and print functions. Dashboards can be created to serve effectively as templates. This offers the opportunity to create a web page once and then assign it to various different devices. This saves a lot of additional labour.

- 17 Widgets
- Custom web pages
- Dashboard Editor
- Links
- Zoom
- Print function
- Grouping
- Templates

Dashboard Editor

Dashboard Example

Overview Widgets

The scope of widgets available is comprehensive, and encompasses a wide variety of options. Widgets are functions which can be freely positioned on the dashboard and sized according to the user's individual requirements. Configuring and modifying properties such as colour selection, measured value selection, size, or other details is child's play.

|		
	Charts	Doughnut & pie charts provide the opportunity to represent measured values or consumption data graphically. The area used to represent each data point is proportional to the magnitude of the measurement, and the accompanying values displayed can be either absolute or relative.
	Diagrams	Line diagrams make it possible to represent historical or live measured values, consumption values, or even key figures.
	Bar graphs	Bar graphs are particularly well suited to consumption values. They can be displayed in 2D or 3D.
	Tables	Tables provide a structured representation of consumption or energy values and give a quick, informative overview.
	Sankey	Sankey diagrams are mass flow diagrams, which can also be placed on dashboards in the form of a widget.
	KPI	KPIs provide the opportunity to view and evaluate key figures. They can be represented in tabular or graphical form.
	Heatmaps	A heatmap or also spectral analysis is coloured representation of one measured value or of consumption. At a glance, they allow you to recognise periods with high consumption or high measured values.
	Live values	All existing measured values can be displayed live and digitally. The values can freely placed and integrated into graphics.
	Links	Using links, it is possible to link dashboards to one-another or even to other web pages, such as the measurement device home page of Janitza UMG power quality analysers.
	Text boxes	These allow you to write, configure, and customise your own text. Text boxes provide the opportunity to customise formatting and text colour.
	Indicators	Using indicators, it is possible to display images when a measured value has a certain status. For example, switch positions or other statuses can be visualised with this function.
	Images	You can upload your own images to the system using an image manager, and then position or place them as you see fit. All of the common formats (PNG, JPG, and even SVG) are supported.
	Energy values	This widget provides a structured representation of energy data over a particular period.
	Weather	This can display weather data for a selected location (requires internet access).

User management
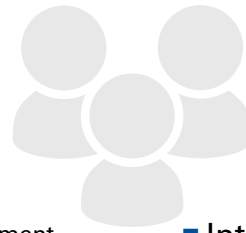
Access rights are simple and intuitive to set via the user management function. Simple user management offers the option of assigning personalised rights to each user. Additionally, the status of the logged-in user is displayed in colour and is clearly indicated in the system. Users can be deactivated or completely deleted from the system. Names, passwords, and other user data can be adjusted and modified by the user or an administrator at any time. The user management functionality works across GridVis, and allows logins to the web interface and GridVis® Desktop.

- ■ Intuitive
- ■ User rights
- ■ User profile
- ■ Status indicator
- ■ User management

User management

Profile settings

Janitza®

Key Performance Indicator (KPIs)
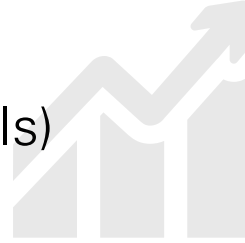
Using Key Performance Indicator, it is possible to compare consumption, economic figures, or quantities. The new KPI Configurator allows you to view your own key figures, and to evaluate then against your particular system of valuation. All key figures can also be used as widgets in dashboards. They can be displayed in a chart, table, or combined format. The chart offers the opportunity to view the key figure and its operands at a glance. Based on the operands, it is possible to pick out the cause of an improvement or deterioration in the key figure immediately, and this is displayed clearly. This allows you to display key figures, trends, evaluation, and the reason for the change – all at a glance.

The KPI Manager provides the opportunity to display all key figures in a structured manner. Key figures can be grouped, adjusted, and even removed from the system again. The KPI Manager can be a useful tool when creating a Balanced Score Card (BSC). It offers a clear representation of KPIs, which have a direct connection to the energy data. In addition, KPIs can be assigned to a user, for example who is responsible for this KPI. KPIs can be monitored with the alarm management function, and a responsible party notified, e.g. by e-mail, if a limit is breached.

- Key Performance Indicator
- Evaluation
- Comparison
- Widget
- Trend

KPI analysis

KPI Manager
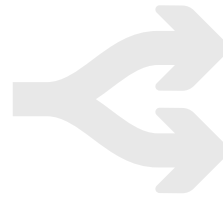
Sankey diagram

Would you like to graphically represent, analyse, and evaluate the energy usage of your company? The Sankey diagram provides the opportunity to represent the mass flows graphically. Consumption data or other measured values can be represented using connected areas proportional to the measured value. The Sankey Configurator allows you to create diagrams simply and intuitively. The configured diagrams can be integrated into each dashboard and evaluated as a widget. The Sankey Manager provides a structured, graphical overview of all Sankey diagrams. The graphical representation is intended both for historical and for live values.

Grouping and colour coding of individual measured values offers a visual highlight. Fixed colours can be allocated to measured values, however colour gradients are also possible. All values can also optionally be displayed with units. The digital representation can be either relative or absolute. Other functions, such as an accompanying value (e.g. a currency value) as well as a loss indication, provide additional information and evaluation possibilities.

- Mass flows
- Freely configurable
- Widget
- Live values
- Historical values
- Accompanying values
- Loss indication

Sankey configuration
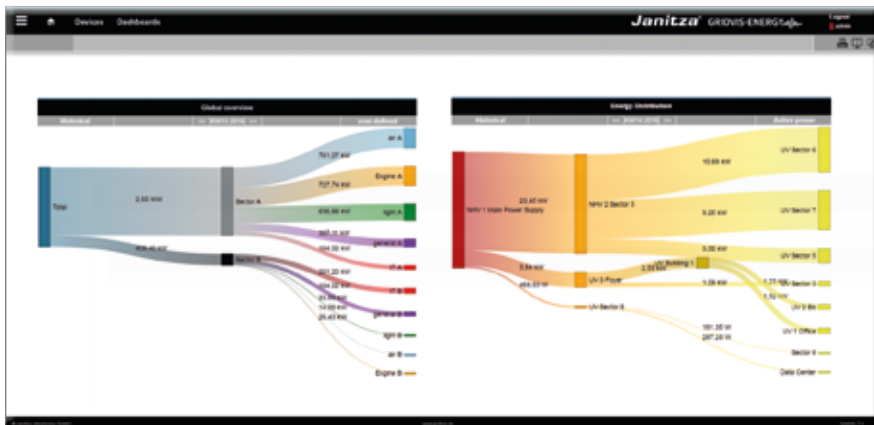
Sankey Widget example
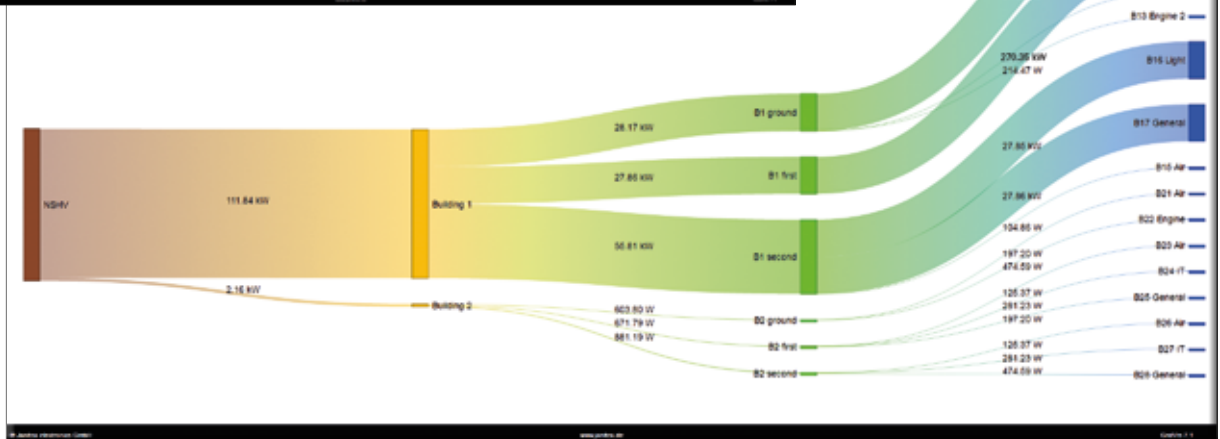
Sankey Widget example

Device overview

The Device Overview lists all measurement devices in a structured table. In addition, information is provided about the connection status, IP address, or the last read-out. Each measurement device can be assigned individual templates, which can be called up on the device with a simple click.

- Structured
- Table
- Information
- Template

Image manager

The right image for every application and overview! With the Image Manager you can upload your own images, icons, or graphics and use these in various dashboards. The system supports all common image formats, notably the useful SVG format. All images are displayed in a clear table format.

- Incorporate your own images, icons and graphics into the application
- All common graphics formats are accepted
- SVG format recommended

Device overview

www.janitza.com   search

Janitza®

Overview of GridVis® editions

Attribute	Basic	Professional	Service	NEW Ultimate
Installations (desktop)	1	3	5	5
Installations (service / virtual server)	0	0	2	2
Number of devices	5	Unlimited	Unlimited	Unlimited
Update period	Unlimited	1 year	1 year	1 year
Telephone support	Unlimited	Unlimited	Unlimited	Unlimited
Graphs	•	•	•*2	•*2
Janitza DB / Derby DB database	•	•	•	•
Manual reports	•	•	•*2	•*2
Graphical programming	•	•	•*2	•*2
Topology	•	•	•*2	•*2
MS SQL / MySQL database support*1	-	•	•	•
Automatic read-out	-	•	•	•
Virtual device	-	•	•	•
User management	-	•	•	•
NEW: Scheduling points in time	-	•	•	•
NEW: CSV data import	-	•	•	•
NEW: RCM report	-	•	•	•
NEW: Scheduling time periods	-	-	•	•
NEW: PQ report	-	-	•	•
Automatic Excel export	-	-	•	•
Generic Modbus	-	-	•	•
Graphical programming module (read / write Modbus)	-	-	•*2	•*2
Automatic reports	-	-	•*2	•*2
Online logging	-	-	•	•
Service	-	-	•	•
Alarm management	-	-	•	•
REST interface	-	-	•	•
GridVis®-Energy web Visualisation	-	-	-	•
Item number	51.00.116	51.00.160	51.00.180	51.00.190
Item number for update extension (per year)	-	51.00.161	51.00.181	51.00.191
Item number for upgrade to next higher suite	-	51.00.162	51.00.182	-

*1 SQL database is not included in the scope of deliverables.
*2 This function is only available in conjunction with GridVis® installation on the desktop.

Number of devices:	Max. number of simultaneously loaded devices (e.g. within the basic version: a project with 5 devices or 5 projects with one device).
Update period:	Time period in which new versions can be installed free of charge.
Automatic read-out:	Device read-out in accordance with freely configurable time plans.
Online logging:	Measurement data from devices without memory will be averaged in the GridVis® software.
Service:	The GridVis® software runs in the background and will be started automatically. Devices can be readout time-independent and automatically. For configuration and data processing the desktop installation is required.

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