CHALLENGE
HIGH AVAILABILITY

ENERGY MONITORING FOR DATA CENTERS

Janitza®

CONTENTS

SECURITY AT
THE HIGHEST LEVEL

Data centers are designed to supply power to IT components without interruption and to ensure IT productivity through appropriate redundancies. Accomplishing this requires the use of complex power supply systems, components such as UPS (uninterruptible power supply) systems and emergency power systems. Multiple feeds provide redundant current paths.
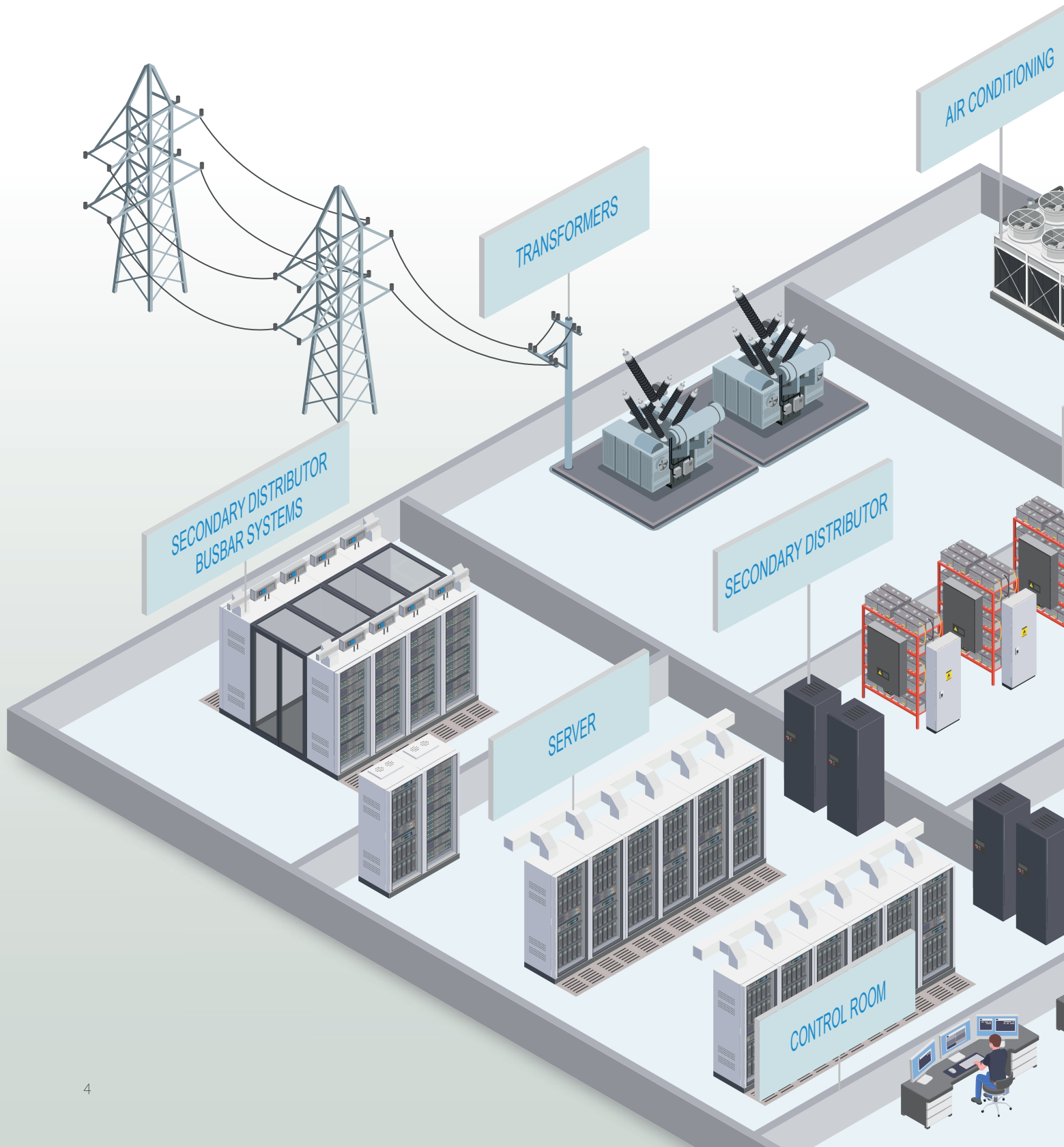
Monitoring systems for the transparency of electrical energy flows are essential to prevent energy bottlenecks at the system-relevant components. Electrical high availability must be monitored proactively and limit violations must be reported quickly. An energy management system in a data center must do far more than just record meter readings. It should be able to evaluate the power quality and identify weak points. To achieve this, in addition to current and voltage, the power factor and – if possible – current and voltage distortions on all phases present and on the neutral conductor must be recorded. Ideally, the measurement devices should also detect residual current and monitor the condition of the 5-wire TN-S system.

The energy management system must record all major energy types at the key nodes. In addition, important parameters for compliance with principles of electrical high availability must be monitored and logged in the background. This requires fast measurement technology that continuously displays and records power quality parameters at high sampling rates. A high-performance alarm management system reports violations of limit values of the respective parameters immediately.

System solutions from Janitza are certified in accordance with DIN EN ISO 50001 and meet all requirements of DIN EN 50600-2-2/4-2, ISO/IEC 22237-3 and ISO/IEC 30134-2 for ensuring energy efficiency and power distribution and calculating the required key performance indicators.

ENERGY DATA ACQUISITION IN DATA CENTERS

AIR CONDITIONING

TRANSFORMERS

SECONDARY DISTRIBUTOR
BUSBAR SYSTEMS

SECONDARY DISTRIBUTOR

SERVER

CONTROL ROOM

HIGH AVAILABILITY

- Monitor high availability
- Provide evidence of power quality
- Monitor redundancies
- Avoid shutdowns

ENERGY EFFICIENCY

- Show losses
- Calculate utilization
- Key performance indicators and forecasts
- Benchmarks
- Monitor sustainability targets

FIRE PROTECTION AND EMC
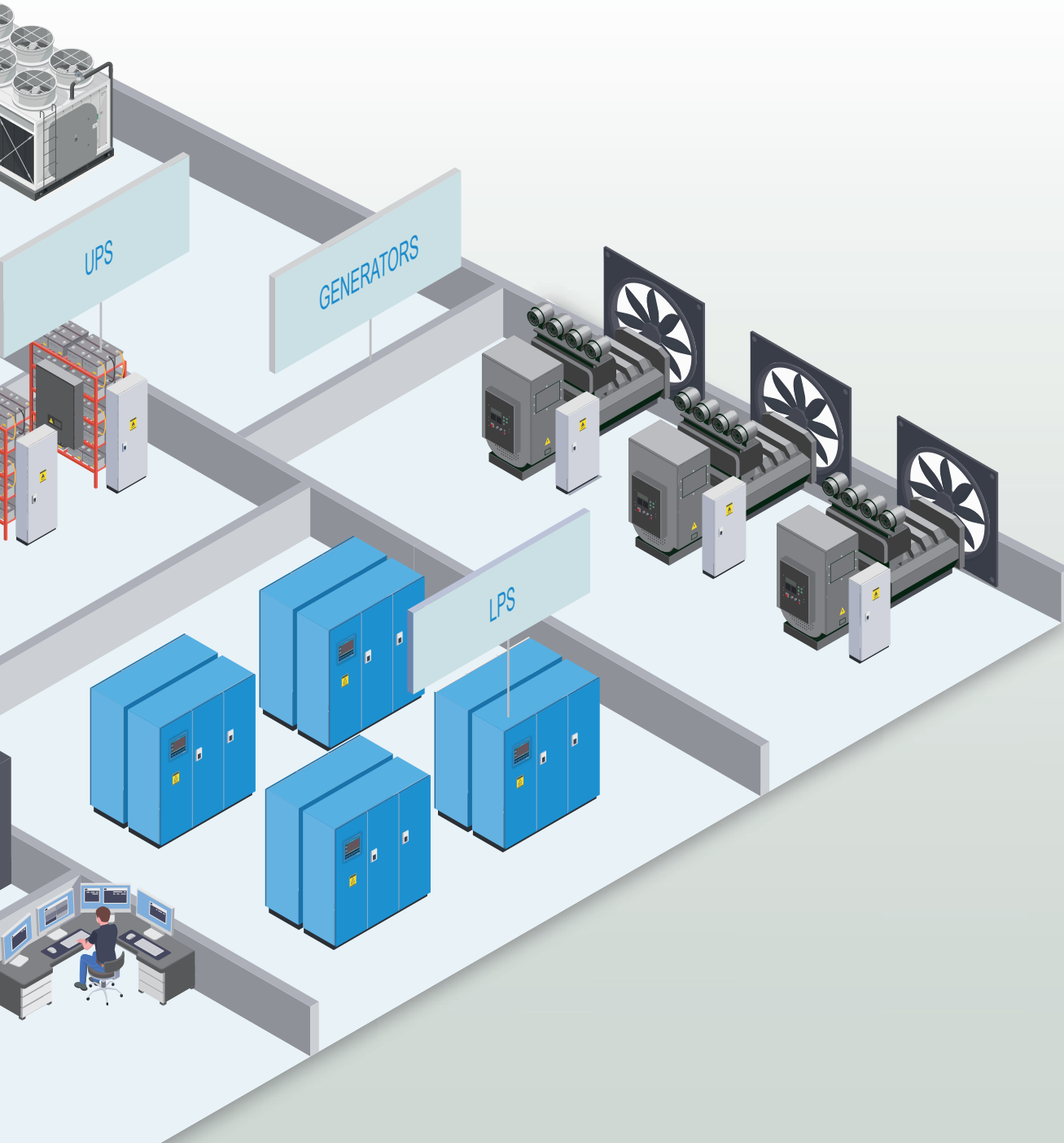
- Monitor residual currents
- Prevent fires and failures before they occur
- Save insulation measurements

COST CENTER MANAGEMENT

- Calculate energy costs
- Energy costs per area or circuit

UPS

GENERATORS

LPS

THE CORRECT MEASUREMENT TECHNOLOGY AT EVERY LEVEL

To ensure optimum energy efficiency and meet legal requirements, the right measurement technology must be used in the right place. Conformity to standards must be observed, since the applicable standards already specify where and how measurements must be made. Harmonized standards DIN EN 50600-2-2 and ISO/IEC 22237-3 define three granularity levels in terms of energy efficiency. They describe the measurement points at which the power consumption is to be recorded. In the range of granularity levels 1-2, the total energy of the data center and the IT is measured and key performance indicators such as PUE (Power Usage Effectiveness) are calculated.

GRANULARITY LEVEL 1

Granularity level 1 describes the use of measurement devices for primary and secondary supply systems as well as at the output of UPS equipment. This is where an incoming goods inspection of the energy takes place. The energy consumption must be recorded with measurement Class 0.5 for active energy and active power on all phases.

As a minimum, the current transformers should comply with EN 61869-2:2012, Class 0.5 and the measurement devices comply with the requirements of EN 62053, Class 0.5S or EN 61557-12:2008, Class 0.5 – or even better to comply with Class 0.2 combined with Class A power quality analyzers such as the UMG 512-PRO or the modular UMG 801 measuring system.

GRANULARITY LEVEL 2

Granularity level 2 describes the use of measurement devices between the primary distribution supply systems and the outputs of the final secondary distribution supply systems. Energy consumption must be measured with measurement Class 1 for active energy and active power on all phases. The current transformers should at least comply with EN 61869-2:2012, Class 1 and the measurement devices with the requirements of EN 62053 or 61557-12:2008 Class 1. For example, the UMG 509-PRO, UMG 96-PA-MID measurement devices or the modular UMG 801/UMG 800 measuring system are eminently suitable.
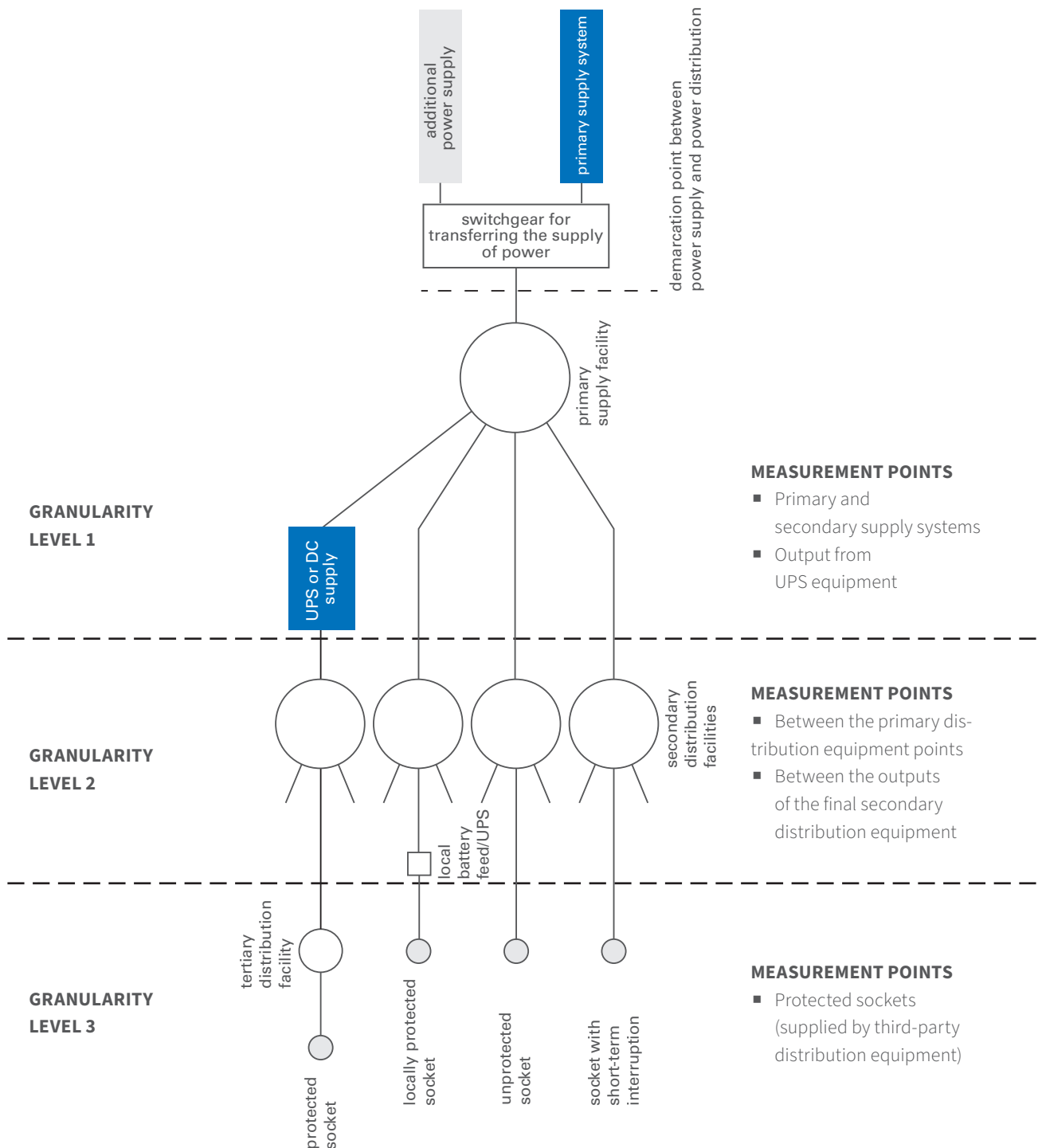
GRANULARITY LEVEL 3

Granularity level 3 describes the use of measurement devices at protected sockets supplied by ancillary distribution equipment. The standard states: "When sockets supplied and protected by tertiary distribution equipment are installed in groups […] serving different types of loads (e.g. IT, fuse or control of environmental conditions), granularity level 3 must support separate measurement of each of the individual load types. The distribution equipment must be selected in a way that the output voltage, current output, and the power factor can be measured on all connected phases on the protected sockets. The equipment employed shall have the following accuracy classes for the parameters measured: for current transformers, EN 61869-2:2012 Class 2, and for measurement devices, EN 62053-21:2003, Class 2. However, higher classes are recommended." The UMG 800 measuring system combined with modular expansion modules is suitable by way of example, and the Janitza MID DIN rail meters is useful for billing purposes.

FULL ENERGY TRANSPARENCY

additional power supply

primary supply system

demarcation point between power supply and power distribution

switchgear for transferring the supply of power

primary supply facility

GRANULARITY LEVEL 1

UPS or DC supply

MEASUREMENT POINTS
- Primary and secondary supply systems
- Output from UPS equipment

secondary distribution facilities

GRANULARITY LEVEL 2

MEASUREMENT POINTS
- Between the primary distribution equipment points
- Between the outputs of the final secondary distribution equipment

local battery feed/UPS

tertiary distribution facility

GRANULARITY LEVEL 3

protected socket

locally protected socket

unprotected socket

socket with short-term interruption

MEASUREMENT POINTS
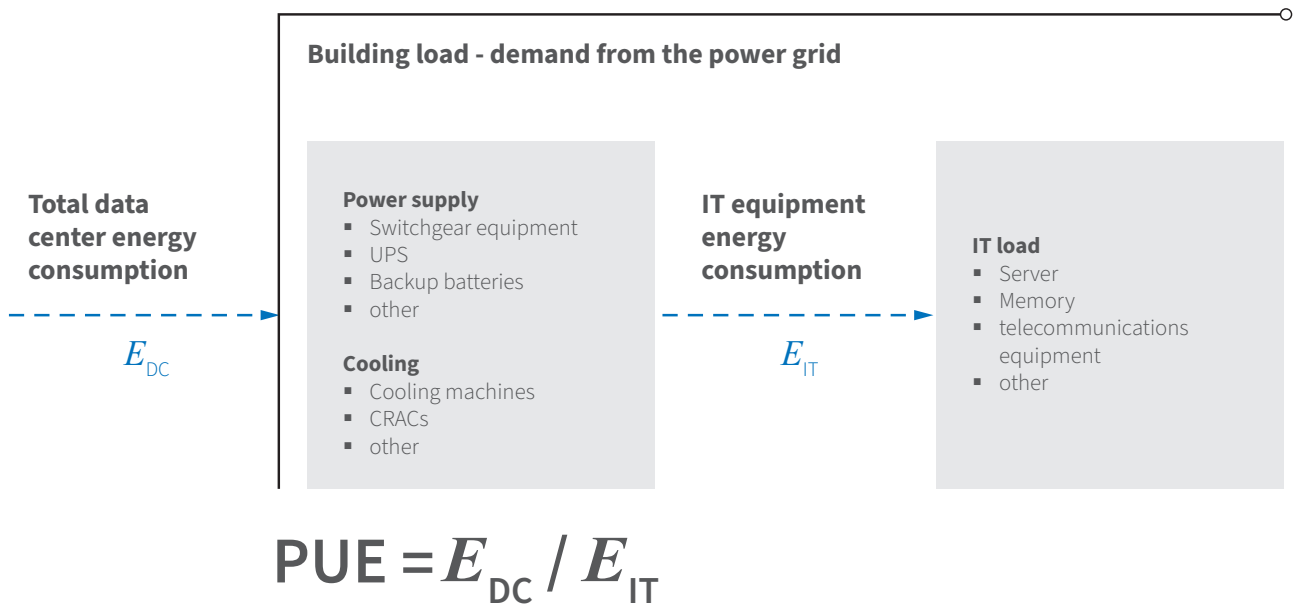- Protected sockets (supplied by third-party distribution equipment)

DETERMINATION OF THE PUE

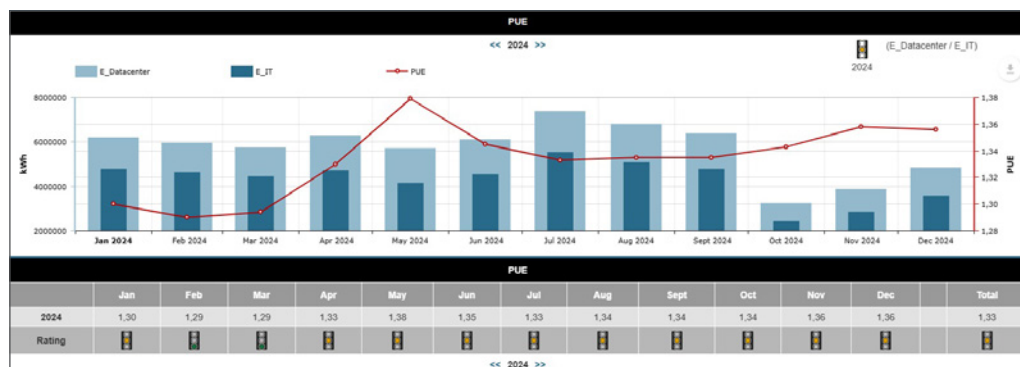## STANDARD-COMPLIANT DETERMINATION OF ENERGY EFFICIENCY

The efficiency of energy usage over a certain period of time is given by the PUE value (key performance indicator for the energy used). The PUE value is the quotient of the total energy consumed in the data center and the energy consumption of the computers. Calculation of the PUE requires the recording and documentation of E_{DC} and E_{IT} over a concurrent twelve-month period. The standard does not specify the frequency with which E_{DC} and E_{IT} are to be measured, since the PUE is calculated on an annual basis. However, the measurement interval used determines the time instant of subsequent PUE calculations on an ongoing annual basis.

The PUE and other characteristics can be most readily evaluated with Janitza's ISO 50001/50006-certified GridVis® power grid monitoring software, such as energy performance indicators (EnPIs) and key performance indicators (KPIs).

Building load - demand from the power grid

Total data center energy consumption

E_{DC}

Power supply
- Switchgear equipment
- UPS
- Backup batteries
- other

Cooling
- Cooling machines
- CRACs
- other

IT equipment energy consumption

E_{IT}

IT load
- Server
- Memory
- telecommunications equipment
- other

$$PUE = E_{DC} / E_{IT}$$

Calculate and evaluate key performance indicators using GridVis®

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2024	1,30	1,29	1,29	1,33	1,38	1,35	1,33	1,34	1,34	1,34	1,36	1,36	1,33
Rating													

ACCURACY OF THE PUE

PUE IN ACCORDANCE WITH EN 50600-4-2 AND ISO/IEC 30134-2

PUE 1 – SIMPLE RESOLUTION

The IT load is measured at the output of the UPS (or equivalent) device(s) and can be read:
- From the UPS display
- From a meter at the UPS output
- In the case of multiple UPS modules from a single meter, on the common UPS output bus

Other categories apply when a UPS, comparable alternate power supply, or processing unit is not available. Changing IT and cooling loads are also taken into account.

PUE 2 – MEDIUM RESOLUTION

The IT load is measured at the output of the PDUs within the data center and is usually read by a meter at the PDU output. If a transformer is present, the measurement point is located after it. The influence of losses associated with PDU transformers and static switches is excluded.

A PUE level 1–2 calculation is absolutely sufficient for typical applications with central cooling, particularly as the measuring accuracy is far higher compared to granularity level 3. Further power loss via the input cables can be neglected on redundant systems.

PUE 3 – ADVANCED RESOLUTION

The IT load is measured at the input within the data center. This can take place either on the socket, via the IT device itself or a rack unit fitted with meters (e.g. a power strip) that monitors a summarized quantity of IT equipment. It should be noted that non-IT loads must be excluded from these measurements. The influence of losses associated with electrical distribution boards and non-IT related devices is excluded. Systems with extremely high rack power such as HPC or AI and local rack cooling, such as water cooling, require level 3 measurement so that characteristics such as WUE/PUE can be calculated locally.

# ENERGY EFFICIENCY OF THE COOLING SYSTEM

CALCULATING THE CER AND WUE

The CER (Cooling Efficiency Ratio) is generally calculated directly from the electrical energy values provided that measuring points for recording the cooling systems ($E_{cooling}$ or $E_{So,a}$) are available. Total IT energy consumption (E_{IT} or $Q_{th,DC,a}$) is divided by the total energy consumption required for refrigeration ($E_{cooling}$ or $E_{So,a}$). E_{IT} corresponds to the waste heat to be dissipated and it can also be used as the basis for calculating the usable waste heat supplied to local heat networks. Alternatively, the CER can be calculated using heat quantity measurements which is often more complicated, but is necessary in cases such as district cooling.

WUE (Water Usage Effectiveness) must be taken into account with water-cooled systems. In this case, granularity level 3 water meters and energy measurements such as with the 800-CT12-SVD-US module or the 800-CT24 are required directly within the rack. Water meters can be readily evaluated as a variable with GridVis® and combined in a KPI along with electrical energy.

$$CER = \frac{Q_{th,DC,a}}{E_{SO,a}}$$

$$WUE = \frac{\text{(annual water usage, L)}}{\substack{\text{(annual IT equipment} \\ \text{energy consumption, kWh)}}}$$
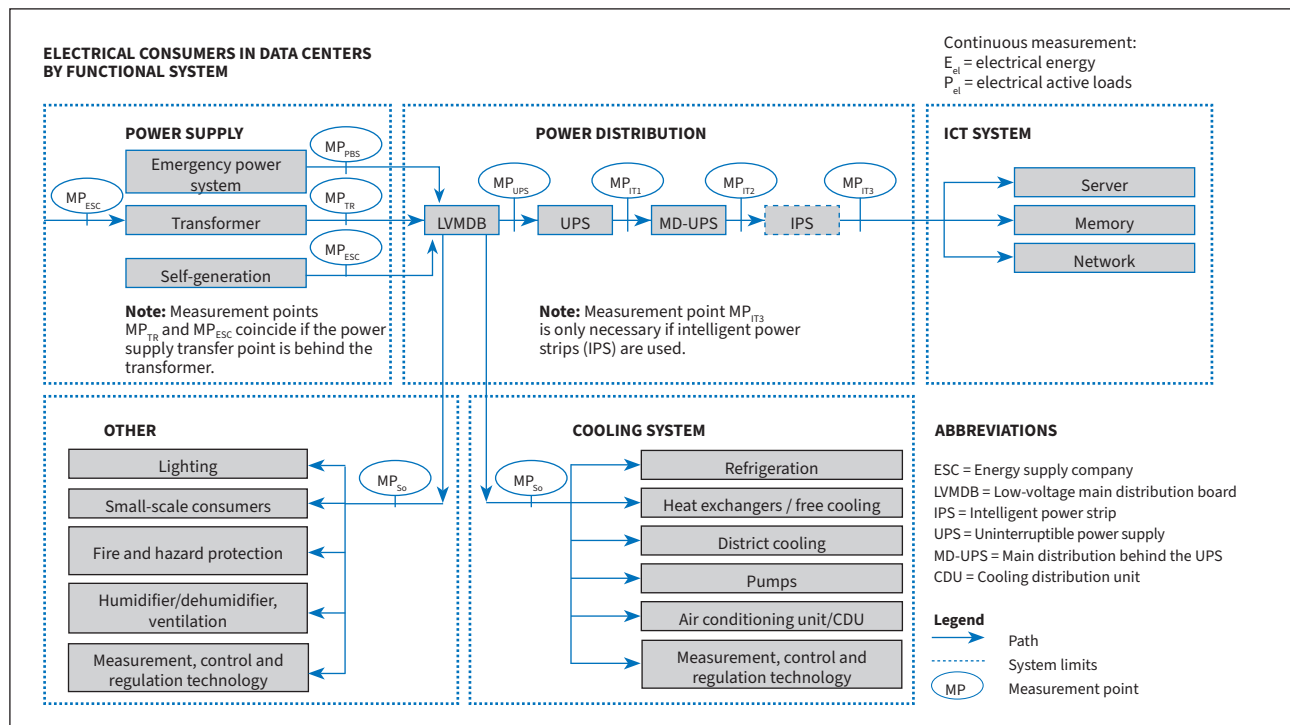
Electrical energy measurement concept (current quantities)
Source: Blue Angel Environmental Label for Data Centers, DE-UZ 228, January 2023 edition.

PRACTICAL TIPS

BRIEF OVERVIEW - RECORDING KEY PERFORMANCE INDICATORS

- Key performance indicators are based on summarized values for total energy (E_{DC}), energy for refrigeration ($E_{cooling}$) and energy for IT (E_{IT}).
- Measuring accuracy requirements as per EN 50600-2-2 must be observed and total energy must be recorded as accurately as possible.
- Ideally, the grid feed measurement for E_{DC} is carried out at medium voltage so that transformer power losses are also taken into account.
  If this is not possible, the measurement is carried out on the low-voltage side of the transformer feeds.
- Measurement of energy quantities must be bidirectional (4-quadrants measurements) as True RMS whilst taking harmonics into account. The supply quantity is relevant for the emergency power systems, whilst the total of grid feed consumed and delivered is relevant for transformers.
- Aggregation of kWh meter readings should take place directly in the measuring instrument to considerably reduce the likelihood of incorrect calculations or gaps in the data.

- Local renewable energy systems are energy suppliers and are added to total energy (E_{DC}).
- Both the power quality and the state of the TN-S system should be continuously monitored alongside the energy so that high availability can be guaranteed at all times.
- PUE should not be calculated based purely on energy, but also on power. Immediate dependencies can be readily recognized via the power value.
- The annual comparison of PUE and CUE, such as over the last two years, is only meaningful when used with the relevant average temperatures. A particularly hot summer has a considerable impact on PUE.
- The WUE must also be taken into account with water cooling, and water meters are required for this.

A clear illustration of the required measurement points, or calculating the key performance indicators is provided by the Blue Angel ecolabel for datacenters (DE-UZ 228).

Examples of sustainability dashboards include, such as for ESG reporting within the EU, the EnEfG, Data Center Sustainability Compliance Reporting, the Energy Efficiency Directive (EED II), California Title 24 (USA), Singapore's Data Center Energy Efficiency Scheme (DCS), Australia's National Built Environment Rating System (NABERS) as well as the Climate Risk Disclosures from the SEC in the USA.

The GridVis® power grid monitoring software can clearly show energy efficiency key performance indicators whilst providing various options for analysis.

ELECTRICAL HIGH AVAILABILITY

NORMATIVE SPECIFICATIONS

Measurement technology plays a crucial role in monitoring high availability. By detecting voltage events in time, the damage and impairments which result from them can be avoided. Consequently, power quality must be monitored according to normative specifications such as EN 50160, EN 61000-2-4, IEEE 519 and ITIC (CBEMA). Depending on which area of the data center you are in, different standards and limit values apply.

The power quality of the primary and secondary supply systems is defined by the EN 50160 standard, which specifies the characteristics of voltage for public electricity supply networks.

The EN 61000-2-4: 2002 standard defines the compatibility level for low-frequency conducted disturbances. Different power quality parameters such as harmonics and transients are described and network compatibility levels are defined. The standard applies for up to 36 kV and is to be used with Class 1 to 2 for the entire data center.

The power quality in the ancillary supply equipment not provided by the power utility must comply with Class 2 according to the EN 61000-2-4: 2002 standard, while Class 1 applies between the UPS and protected sockets. Compliance with the compatibility levels defined in EN 61000-2-4 must be 100 %.

If the levels are exceeded, failures and damage may occur for which the supplier is not responsible. Janitza UMG 509-PRO, UMG 512-PRO, UMG 604-PRO and UMG 605-PRO network analyzers can evaluate the state of the power quality in compliance with the standards and detect critical anomalies in the µs range.

In particular, the UMG 800 as an extremely compact voltage condition monitor can be used for monitoring in accordance with EN 61000-2-4. Both price and design enable usage up to granularity level 3. Due to extremely high rack density in the 100 kW range and high IT hardware costs, particularly by the use of AI, monitoring of power quality can also be expedient at this level.
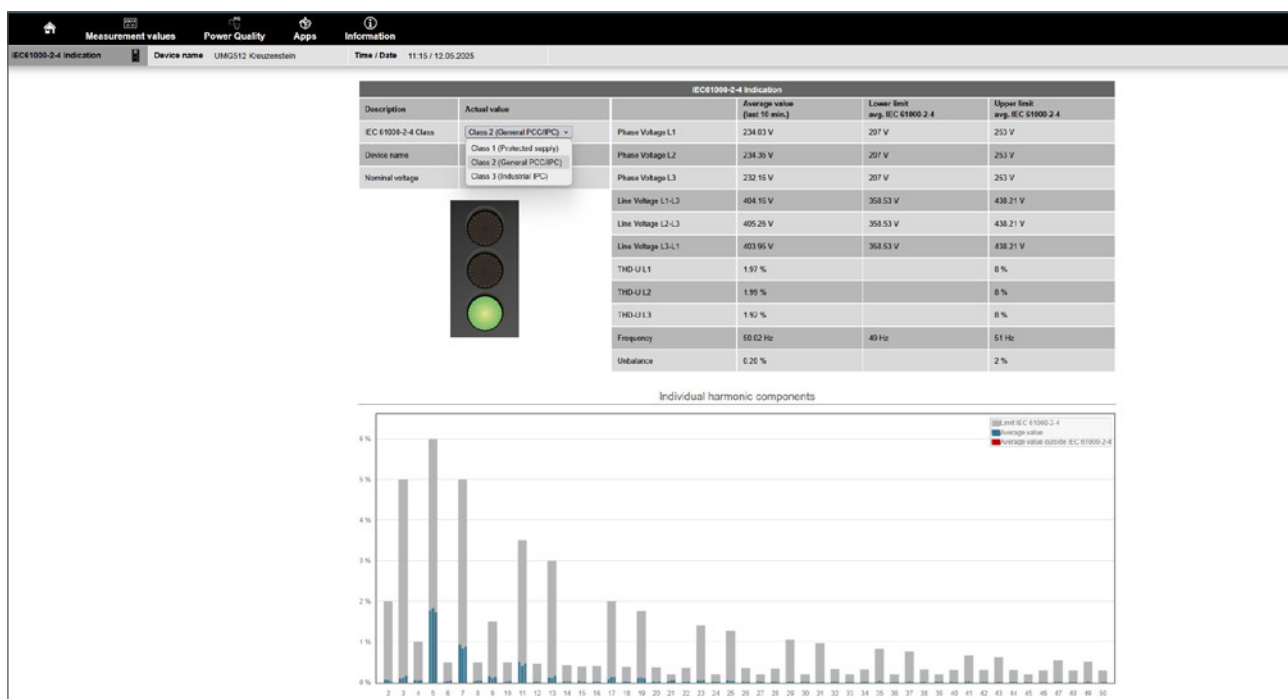

61000-2-4 indicator

POSSIBLE IMPAIRMENTS

FREQUENT POWER QUALITY DISTURBANCES

In addition to detecting defective equipment at an early stage as a result of an accumulation of transients or external events, measurement devices with transient detection provide an ideal basis for checking catcher systems. Catcher systems are systems that need to switch between two paths in a very short time virtually without interruption. They are typically used in data centers. If current path A fails then the catcher

switches to path B within 5 milliseconds so that highly available components are supplied with energy without interruption. The UMG 801 is able to measure two paths simultaneously and count them separately. On the output side, voltage is measured for transients ≥ 18 µs and potential errors during switches are also noted.
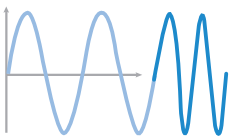
Frequency variations
Frequency variations represent a deviation from the 50/60 Hz fundamental oscillation frequency. These variations can have a negative effect on the operation of electrical devices, such as servers.
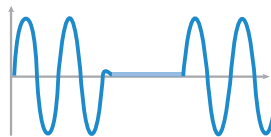
Voltage dips & interruptions
Dips and interruptions are caused by switching operations or disturbances, among other things. The consequences are memory loss, hardware failure or damage, software crashes and data errors.
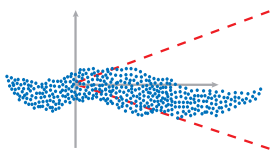
Inductive and capacitive phase shifts
Modern systems make it possible to achieve an optimal power factor (cos phi) when power electronic components are used. These components, in combination with cabling and old compensation equipment, can cause networks to become capacitive.
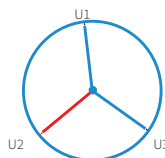
Unbalance
Unbalances are caused by uneven loading of the phase conductors. They cause an additional load on the neutral conductor and can lead to overload and fires. This means the symmetry must be restored quickly and efficiently through applied technological means.
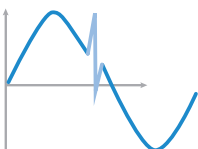
Transients
Transients are unpredictable, non-periodic voltages or currents. They arise, among other things, from equalizing currents and equalizing voltage when the network state changes. High transient overvoltages can lead to insulation damage and the destruction of equipment.
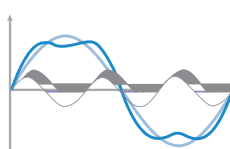
Harmonic loads
Harmonics are currents or voltages whose frequency is a multiple of the fundamental oscillation. Current harmonics are a strain on the network and are the main cause of power quality problems. In addition to enormous costs for repairs and replacement investments, grid distortions can lead to outages.

POWER SUPPLY WITHOUT SHUTDOWNS

$$I_\Delta = I_{sum} - I_1$$
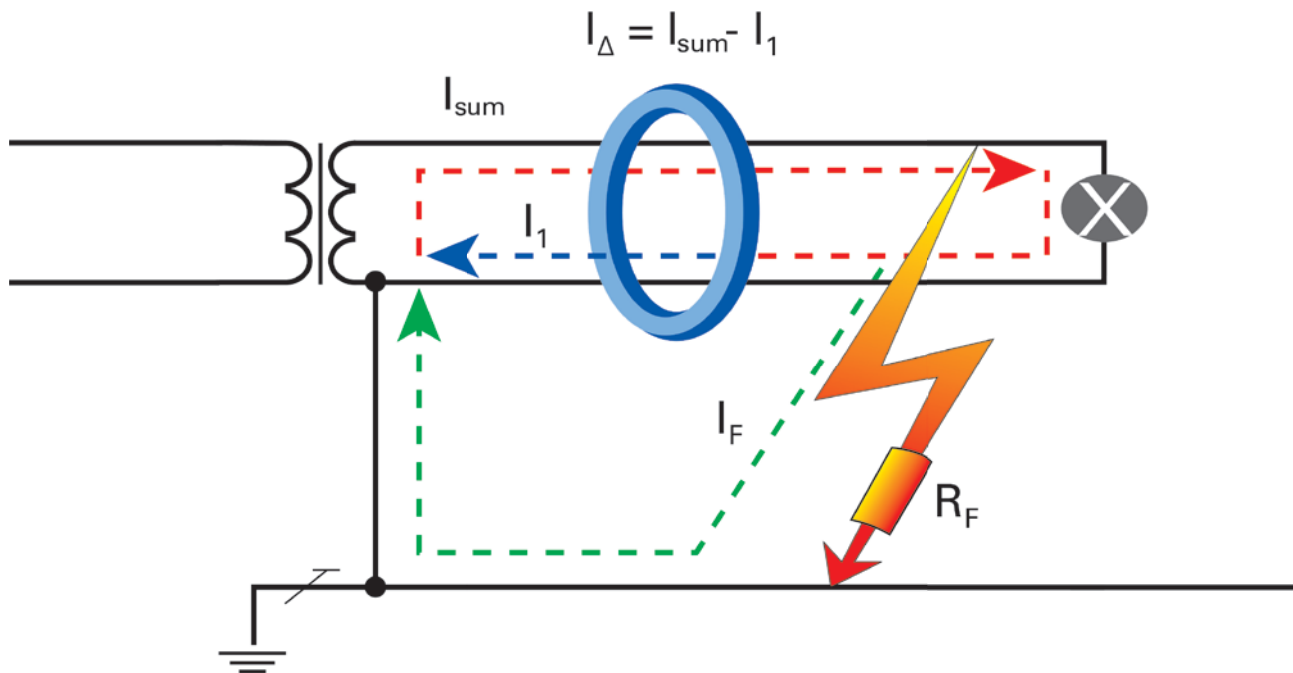

High availability and fire protection

High availability and fire protection are essential in data centers. The functionality of TN-S systems can be monitored and logged using a comprehensive residual current monitoring (RCM) system. Fires and failures can be detected and prevented before they occur.

Principle of operation

In practice, all three phases and the neutral conductor run through the summation current transformer. In systems without a neutral conductor, for example, with controlled drives, only the three phases are fed through the summation current transformer. When the system is in the fault-free state, the summation current is zero or close to zero (within the tolerance range), so that the current induced in the secondary circuit is also zero or close to zero. If, on the other hand, a residual current flows to ground, the current imbalance causes a current in the secondary circuit which is detected and evaluated by the RCM measurement device.

Early reporting instead of switching off

The decisive factor is the detection of any disturbances early on, before fuses or residual current devices (RCDs) of the affected systems or socket power circuits are shut down. In addition, the generally gradual increases in residual currents (e.g. due to insulation faults and excessive operating currents on plant components or consumers) must be monitored, evaluated and reported before outages take place!
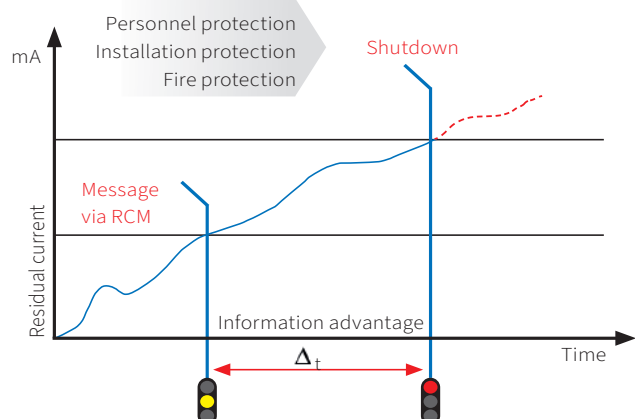
THE MONITORED TN-S SYSTEM

DIN EN 50600-2 and ISO/IEC 22237-3

"Equipment must be installed that is capable of measuring and recording residual currents at the connections between the protective conductors and the neutral conductors of the power supply system of the data center building." – The integrity of the TN-S system must be safeguarded!

Since no residual current circuit breakers can be used in data centers, RCM provides maximum alternative safety by permanently monitoring residual currents. Furthermore, shutdowns for the inspection of electrical systems can be avoided by omitting the insulation measurement. In addition to the measurement equipment, organizational measures must be provided as part of the risk assessment.

Janitza offers multifunctional devices that combine residual current monitoring, energy data acquisition and power quality monitoring according to standards. Janitza GridVis® software acts as a management system for analysis and documentation of measurement data.

RCM AT GRANULARITY LEVEL 1

The UMG 512-PRO or UMG 801 can be used, for example, to check if the TN-S system works properly. It allows comprehensive observation of the power quality and electromagnetic compatibility (EMC) at the feeders. This even allows the initiating phase of a ground fault to be recorded and analyzed. The phase current then increases in parallel to the central grounding point current (CGP). The current at the CGP must always be considered in relation to the total power of the TN-S system and the type of consumers. This means that, on the one hand, operational leakage currents are tolerated and, on the other hand, abnormal deviations at the CGP are reported by the RCM device. For example, a proven leakage current threshold value for IT components is 0.5 mA per A.

RCM AT GRANULARITY LEVEL 2

The powerful UMG 96-PA, UMG 96-PQ-L with module, UMG 96RM-E as well as the UMG 801 and UMG 800 network analyzers detect intermediate points such as primary and final secondary distribution supply systems.

They monitor the phase conductors, neutral conductors and the RCM summation current in the relevant subdistribution panels and can record parameters for evaluating power quality.

RCM AT GRANULARITY LEVEL 3

The RCM 202-AB, UMG 800 and the 20-channel UMG 20CM are ideal for complex electrical installations with a large number of points to be monitored. These measurement devices can be combined via the relevant measured current transformers (e.g. CT-6-20) to continuously record residual, differential and operating currents. The UMG 800 measuring system can even analyze up to 96 RCM channels. This is a perfect match for the requirements involved in measuring socket power circuits for IT.
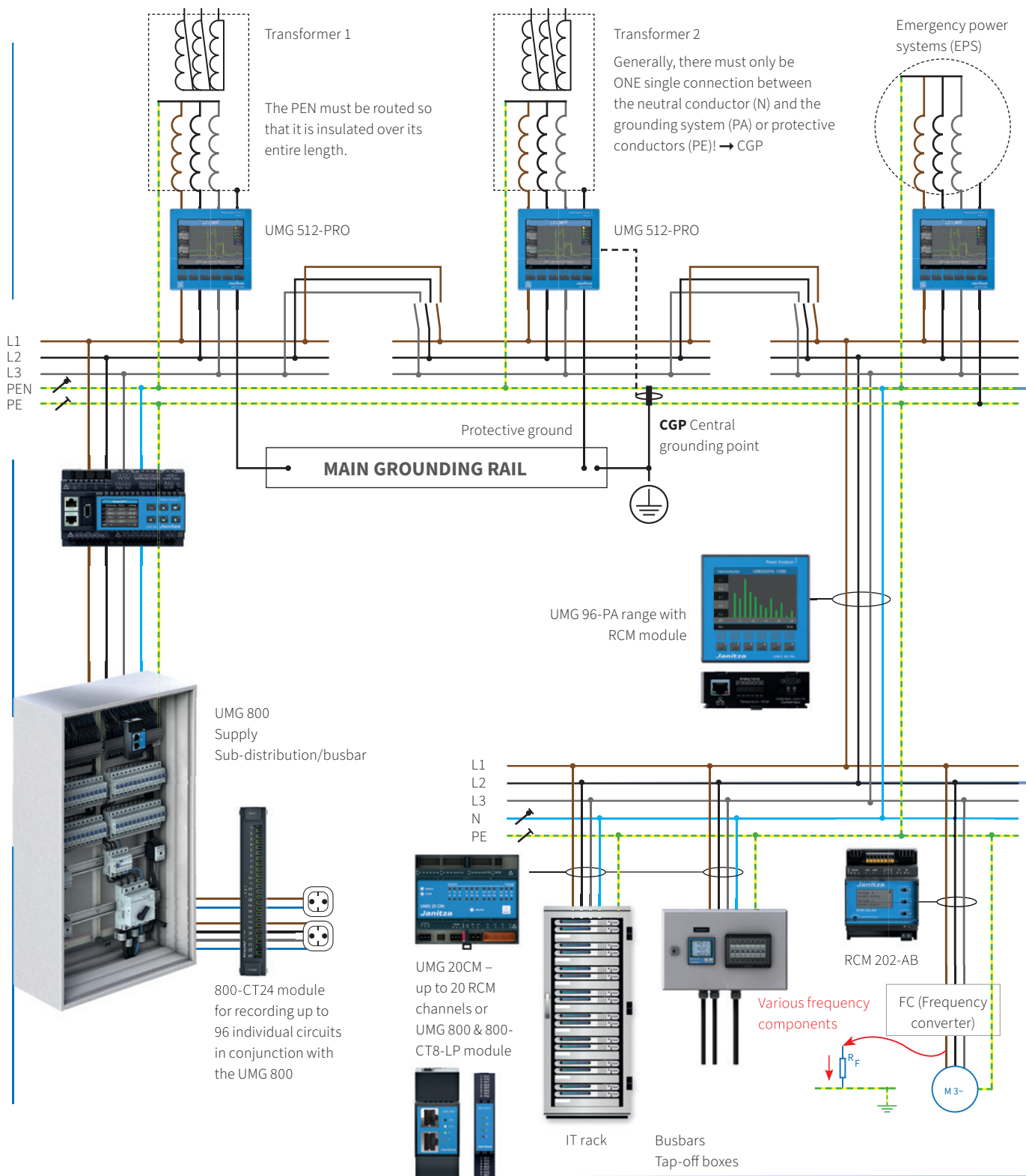
HOLISTIC ENERGY &
RESIDUAL CURRENT MONITORING

MAIN SUPPLY, CGP AND IMPORTANT NODES

Transformer 1

The PEN must be routed so that it is insulated over its entire length.

UMG 512-PRO

Transformer 2

Generally, there must only be ONE single connection between the neutral conductor (N) and the grounding system (PA) or protective conductors (PE)! ➔ CGP

UMG 512-PRO

Emergency power systems (EPS)

L1
L2
L3
PEN
PE

Protective ground

CGP Central grounding point

MAIN GROUNDING RAIL

SECONDARY DISTRIBUTION

UMG 96-PA range with RCM module

UMG 800
Supply
Sub-distribution/busbar

L1
L2
L3
N
PE

END CONSUMERS & FINAL CIRCUITS

800-CT24 module for recording up to 96 individual circuits in conjunction with the UMG 800

UMG 20CM – up to 20 RCM channels or UMG 800 & 800-CT8-LP module

IT rack

Busbars
Tap-off boxes

RCM 202-AB

Various frequency components

FC (Frequency converter)

R F

M 3~

Residual current monitoring

MAIN SUPPLY, CGP AND IMPORTANT NODES

6-CHANNEL OPERATING CURRENT, RESIDUAL CURRENT AND POWER QUALITY

UMG 509-PRO & UMG 512-PRO
- Power quality monitoring valid for legal purposes to class A (only UMG 512-PRO)
- Ideal for feeders
- Monitoring mode for fluctuating and constant loads

UMG 801
- Recording, analyzing and documenting disturbance variables
- Acquisition of transients from 18 µs
- Monitoring 2 paths with one device

SECONDARY DISTRIBUTION

MULTICHANNEL OPERATING AND RESIDUAL CURRENT

UMG 96-PA, UMG 96-PA-MID+ & UMG 96-PQ-L & RCM module
- Modularly upgradeable

RCM 202-AB
- Monitoring of Type A to B+ residual currents

UMG 800 & 800-CT8-LP module
- Modularly expandable
- Low power measurement inputs for space-saving and safe installation

END CONSUMERS & FINAL CIRCUITS

MULTICHANNEL RESIDUAL CURRENT MONITORING

UMG 20CM & 20CM-CT6 module
- Ideal for many outgoing feeders and circuits
- Monitoring mode for constant loads
- Basic device for the 20CM-CT6
- Expandable by up to 96 current channels

20 + 96 RCM channels = 116 channels

MULTICHANNEL OPERATING CURRENT MONITORING

UMG 800 & 800-CT8-LP module
- Can be modularly expanded up to 96 measurement channels
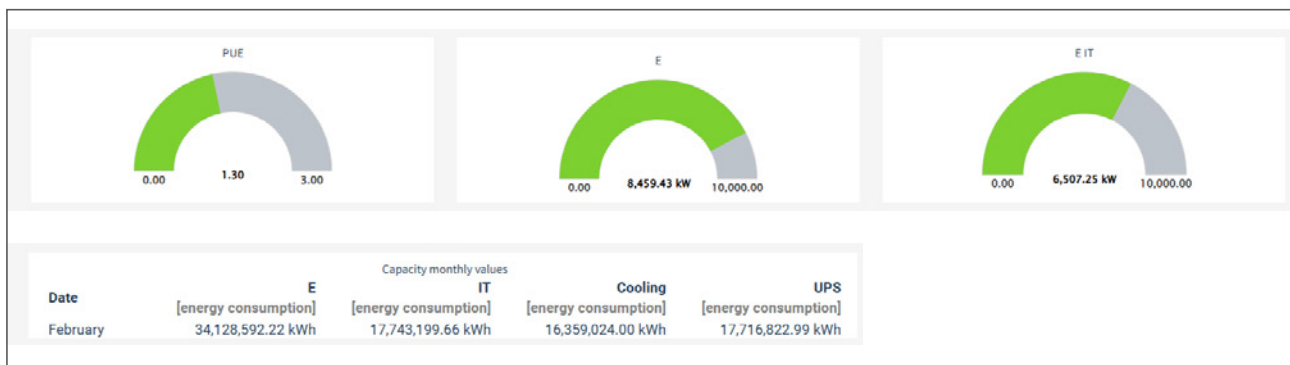- Low power measurement inputs for space-saving and safe installation

GridVis®

THE STRATEGIC POWER GRID MONITORING SOFTWARE FOR ENERGY DATA, POWER QUALITY AND RCM IN ONE SYSTEM
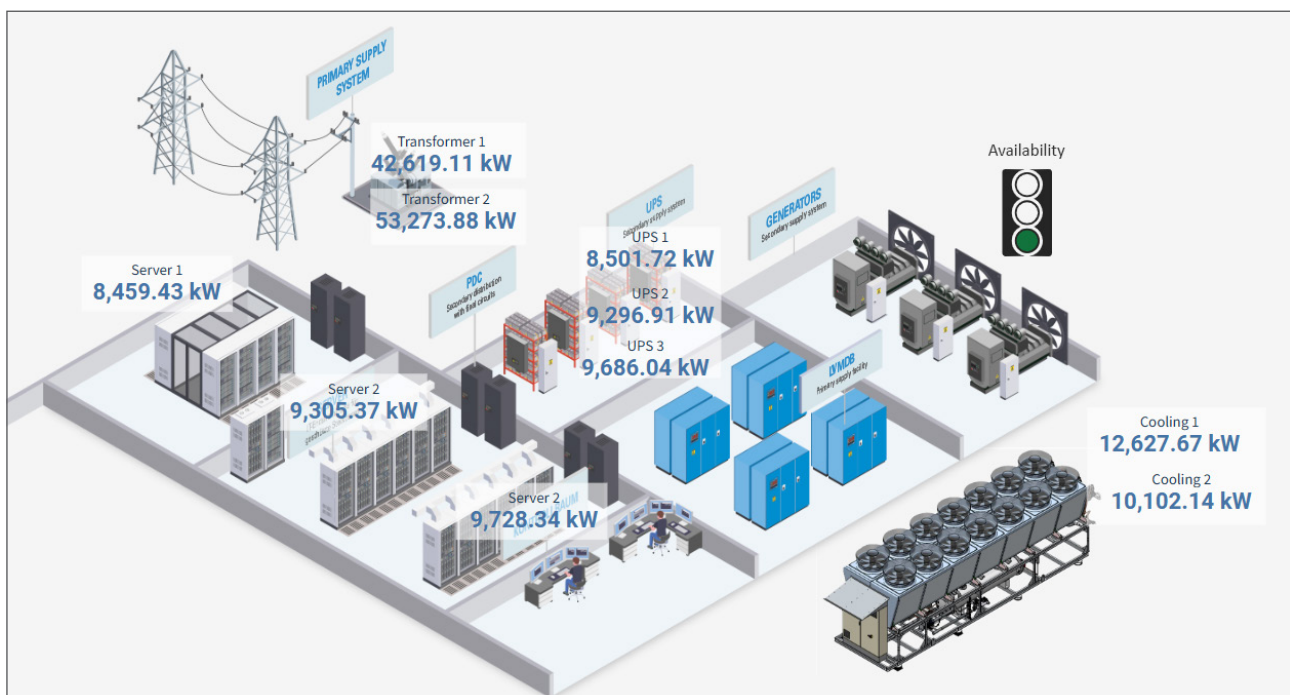
ENERGY MONITORING
FOR DATA CENTERS

An energy monitoring software for data centers can perform a wide range of tasks and is not just restricted to energy efficiency and energy metering. The GridVis® power grid monitoring software provides tools for all major core tasks and actively supports operations with customized functions in day-to-day activities. System solutions from Janitza are certified in accordance with DIN EN ISO 50001 and meet all requirements of DIN EN 50600-2-2/4-2, ISO/IEC 22237-3 and ISO/IEC 30134-2 for ensuring energy efficiency and power distribution and calculating the required key performance indicators.

PUE	E	E IT
0.00 1.30 3.00	0.00 8,459.43 kW 10,000.00	0.00 6,507.25 kW 10,000.00

Date	E [energy consumption]	Capacity monthly values IT [energy consumption]	Cooling [energy consumption]	UPS [energy consumption]
February	34,128,592.22 kWh	17,743,199.66 kWh	16,359,024.00 kWh	17,716,822.99 kWh

Quick overview of key values

Total data center topology

GridVis® power grid monitoring software

A brief overview of the most important functions for the use of GridVis® in data centers can be found below. This is merely an extract. If a specific function is required then a full overview of all GridVis® functions can be found at https://www.janitza.com/en/products/gridvis/editions.

ENERGY EFFICIENCY AND COSTS

Energy efficiency dashboards
- Grid feed consumed/delivered
- Load profile (live values)
- Load profile (historical)
- Consumption analyses
- Customized dashboards
- Complete dashboards with PUE/EUE on request.

Energy efficiency analysis objects
- MIN/MAX considerations*
- KPI charts (E_{IT}, E_{DC}, PUE)
- Sankey and load flow diagrams
- Heatmaps
- CO_2 calculation
- Indicators
- Continuous lines
- Environmental data charts
- Individual topology pages and reports

Cost centers
- Energy bills in PDF/Excel format
- Raw data exports with meter readings
- Metered Services Consumption report message (MSCONS Export)

HIGH AVAILABILITY AND FIRE PROTECTION

General
- Histograms
- Live value analyses
- Harmonics current analyses

Electrical availability*
- High availability report
- CBEMA representation
- Event list with progress and waveform

Power quality reports*
- EN 50160
- EN 61000-3-4
- IEEE 519

Redundancies and nominal currents
- Utilization report
- MIN/MAX considerations*

Fire protection and EMC
- RCM report

* Functions require measurement devices with corresponding functions (high sampling rate, memory, etc.)

Overview of all editions of GridVis®:
https://www.janitza.com/en/products/gridvis/editions

ENERGY EFFICIENCY

Important key performance indicators such as PUE or CER can be readily evaluated via all power supply or heat supply paths. Illustration of summation powers such as E_{DC} or E_{IT} can be readily handled by GridVis® and can be readily visualized with prepared objects. This also makes it easy to demonstrate the goals of energy efficiency guidelines or data center sustainability compliance reporting.
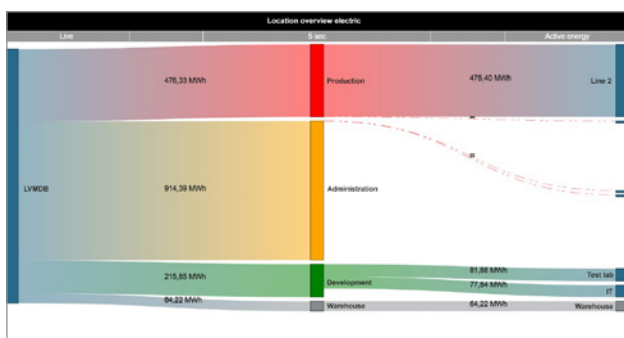
Efficiency features at a glance:
- Prepare customized dashboards and reports
- Individual KPIs as well as a trend and evaluation system for illustrating any changes
- Large range of objects for visualizing KPIs and measured values
- Establish customized topology pages for conclusions to be drawn quickly

POWER SUPPLY
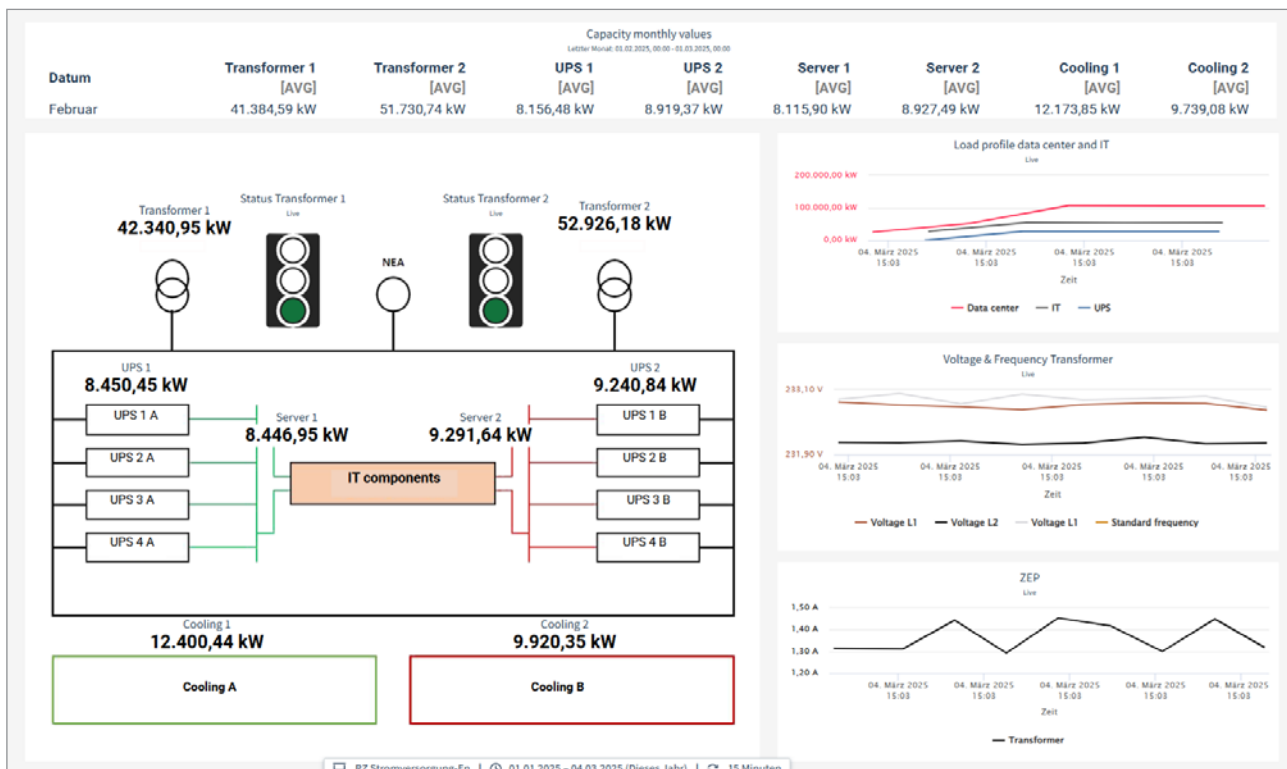
Power supply granularity 1–2

Sankey diagram

Heatmap

COST CENTER MANAGEMENT

In colocation data centers, cost centers must be established and their energy metering values must be provided on a monthly basis. With MID measurement devices such as the UMG 96-PA-MID+ or MID direct meters, the values for individual racks or rental areas can be recorded, charged and assigned to customers by means of cost centers. GridVis® provides prepared reports or flexible raw data exports to this effect.

Cost centers

Several measurement points can also be assigned to one customer via GridVis® and totals calculated using virtual measurement devices. Extensive energy reports and data exports as well as a customized energy bill can also be generated.

**Professional energy bill creation at a glance:**
- Energy bills with an itemized table
- Optional column display with column names
- Addresses, information and labeling fields
- Individual customer logo
- Price groups with additional information
- Output of the extra reactive energy
- Fixed and relative costs
- Bar chart for history and comparison period
- Additional tables for history and comparison period
- Item markers for limit violations
- Energy variable as an area ratio
- XLS, XLSX or PDF files with power values
- (AVG, MAX), electrical energy values and user-defined energy values (e.g. gas, water, oil)

Period: 01.10.2024 - 31.12.2024

Pos	Cost centre	Consumption	Start value	End value	Price	Unit
1	Total performance IT	6.470.020,48 kWh	68.176.998,4 kWh	74.647.019,5 kWh	0,4200	EUR/kWh
2	Total performance RZ	10.068.105,60 kWh	106.348.724,2 kWh	116.416.831,5 kWh	0,4200	EUR/kWh
3	Server 1	2.114.245,12 kWh	22.254.581,8 kWh	24.368.826,4 kWh	0,4200	EUR/kWh
4	Server 2	2.114.245,12 kWh	22.254.581,8 kWh	24.368.826,4 kWh	0,4200	EUR/kWh
5	Server 3	2.241.530,24 kWh	23.667.836,9 kWh	25.909.366,8 kWh	0,4200	EUR/kWh

Cost breakdown in the energy bill
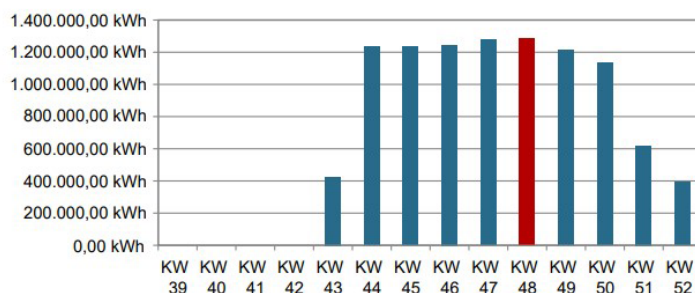
merange	Q4 2024
V 39	0,00 kWh
V 40	0,00 kWh
V 41	0,00 kWh
V 42	0,00 kWh
V 43	425.088,00 kWh
V 44	1.234.716,80 kWh
V 45	1.236.400,00 kWh
V 46	1.245.542,40 kWh
V 47	1.276.835,20 kWh
V 48	1.284.336,00 kWh
V 49	1.215.289,60 kWh
V 50	1.135.763,20 kWh
V 51	620.083,20 kWh
V 52	394.051,20 kWh

Time breakdown in the energy bill

MONITORING ELECTRICAL HIGH AVAILABILITY

By detecting voltage events in time, it is possible to detect weaknesses and avoid unscheduled shutdowns. The combination of Janitza network analyzers and GridVis® provides prepared power quality reports and special tools for evaluating electrical high availability. It is possible to monitor and analyze electrical high availability with GridVis®.

High availability functions at a glance:
- High availability report to analyze all critical nodes in one report
- Voltage availability with absolute downtimes and percentage values

- Clear illustration of voltage, current, and frequency events in the event browser
- Integrated CBEMA/ITIC curve (Computer and Business Equipment Manufacturers Association)
- Alarm management for preparing, configuring and managing alarms
- Power quality reports regarding status and compliance with various standards
- Analysis of phase and neutral conductor currents across the entire power supply from the main supply to the secondary distributors in the utilization report
- Utilization of all selected measurement points as a percentage and with absolute values
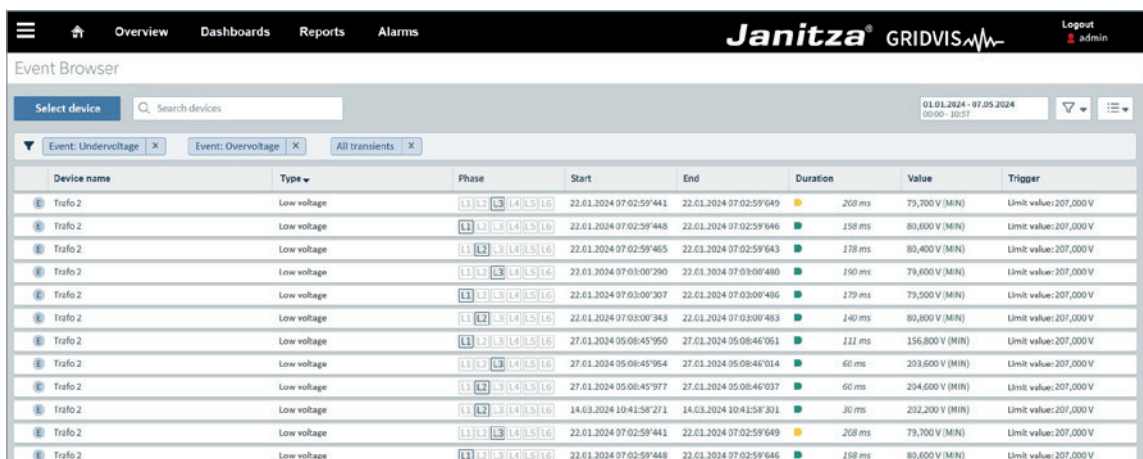

GridVis® high availability report

ANALYZE EVENTS AND TRANSIENTS

Event Browser

The event browser provides a comprehensive overview of the voltage, current and frequency events that have taken place. The precise illustration of processes, combined with key information and measured values, enable the event browser to provide accurate analysis of all events. This provides an ideal foundation for controlling so-called catcher systems, for example. Catcher systems are systems that need to switch between two paths in a very short time virtually without interruption.

The event browser at a glance:
- Clear overview of voltage, current and frequency events
- Graphic evaluation of events and transients
- Recognize and analyze temporal relationships
- Search for event types or measurement points with the search and filter function
- Integrated CBEMA/ITIC curve (Computer and Business Equipment Manufacturers Association)

GridVis® Event Browser

ANALYZE POWER QUALITY

Power quality reports

The power quality in the ancillary supply not provided by the power utility must comply with Class 2 according to the EN 61000-2-4: 2002 standard, while Class 1 applies between the UPS and protected sockets. Compliance with the compatibility levels defined in EN 61000-2-4 must be 100%. GridVis® generates automatic reports that analyze all network compatibility levels in accordance with standards and also describes the quality of the voltage that is provided. These reports include, for example, the voltage distortion, individual harmonics, frequency and voltage.
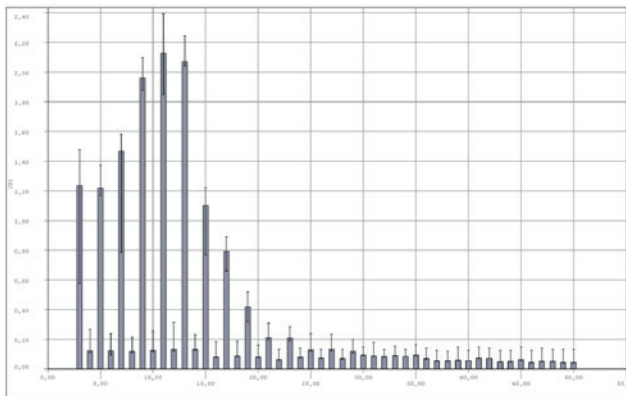
OS spectrum with limit values
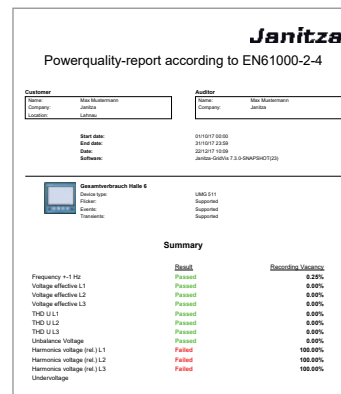
Power quality report according to EN 61000-2-4

PQ objects

The power quality objects provide a quick overview on your dashboard of any events and transients that occurred. The ITIC (CBEMA) object can, for example, be used to compare events that took place with the tolerance thresholds.
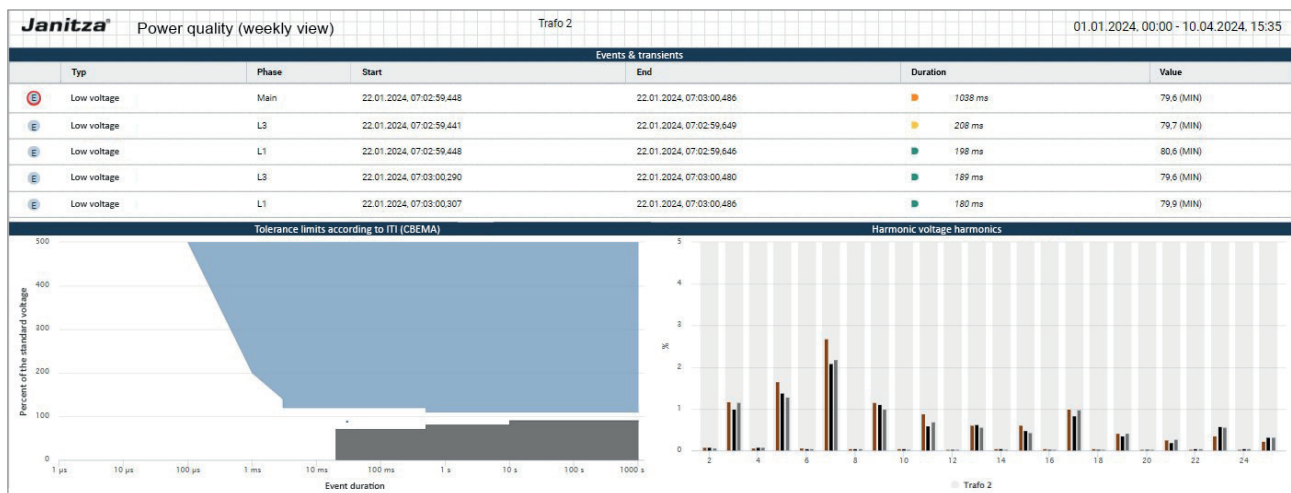
Example objects: CBEMA curve, events and harmonics currents

MONITOR UTILIZATION

Redundancies and nominal currents

The GridVis® utilization report illustrates nominal currents across the entire power supply with primary and final secondary distributors and can be used for analysis of such currents. The report shows, in tabular form, the utilization of all selected measurement points whilst taking the safeguards and MIN/MAX into account.

The utilization report at a glance:

- Phase and neutral conductor currents across the entire power supply from the main supply to the secondary distributors
- Utilization of all selected measurement points as a percentage and with absolute values
- Limit violations, excessive utilization and reserves can be seen at a glance
- Free configuration of related feeds
- Display of redundant pairs and room totals
- Selection and setting of the period
- Currents incl. N, COSPHI, power and energy in a single view
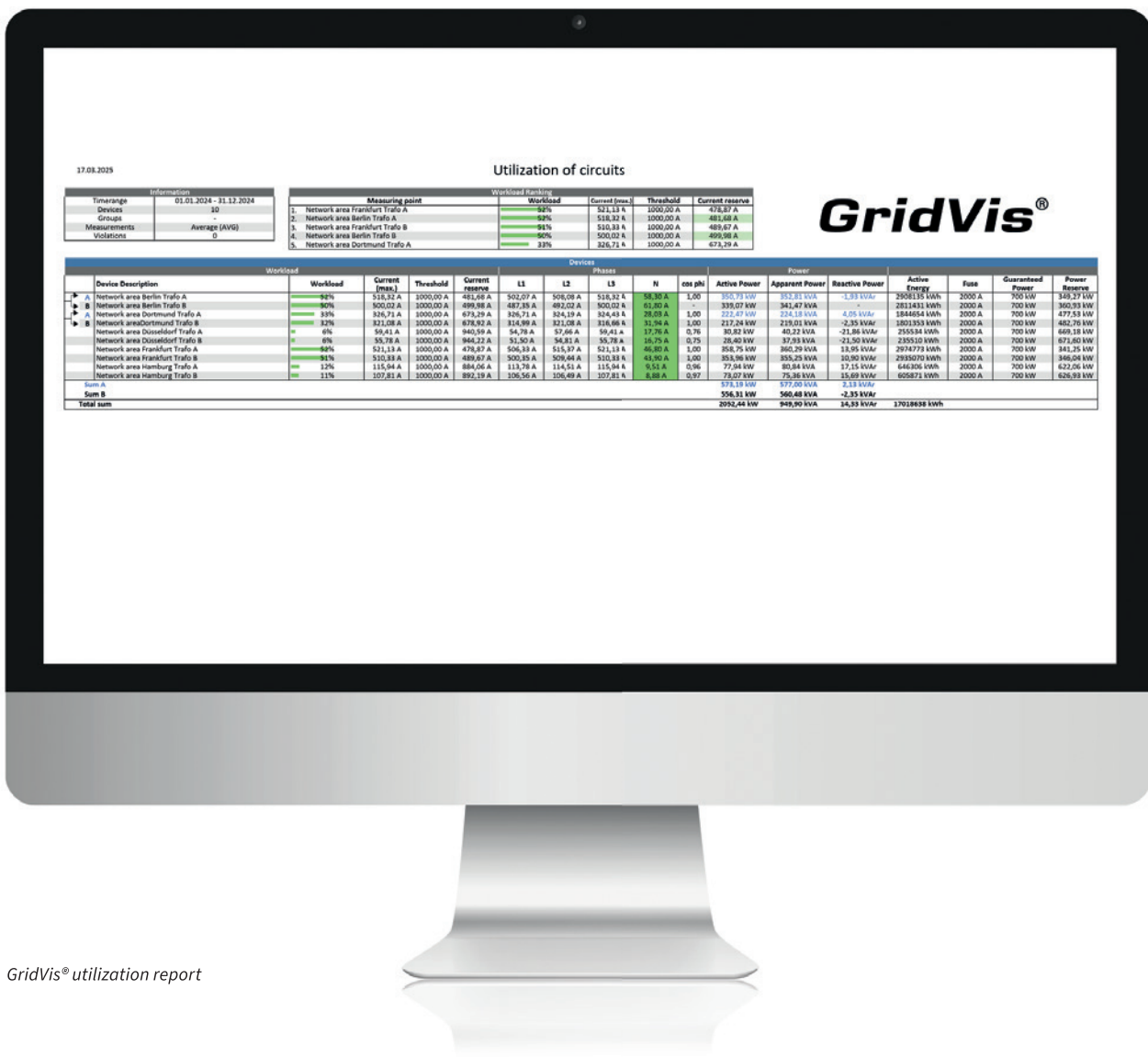
GridVis® utilization report

FIRE PROTECTION AND EMC

In addition to energy transparency and power quality, residual current monitoring (RCM) also plays an important role and is a requirement in standards for data centers.

The functionality of TN-S systems can be monitored and logged using a comprehensive residual current monitoring system. Fires due to insulation faults and failures can be detected and prevented before they occur. Insulation measurements as part of the retest can be omitted and the resulting downtime can be reduced considerably. GridVis® provides a range of options to analyze residual currents in detail.

The RCM report provides a quick overview regarding the state of your power supply and differential currents. The clear color-coding enables quick statements to be made.

In addition, the report is useful when satisfying the need to provide verification. Alongside the standard report, it is also possible to create customized RCM reports such as those with additional evaluations and courses of frequencies, types of residual currents and the power associated with them.

The RCM report at a glance:
- Informative statistics of limit value overshoot due to residual currents and interruptions to operations
- Support for system testing and the obligation to provide verification
- Status overview with signal colors for a general overview
- Status report on the insulation properties of the power supply system

Standard RCM report
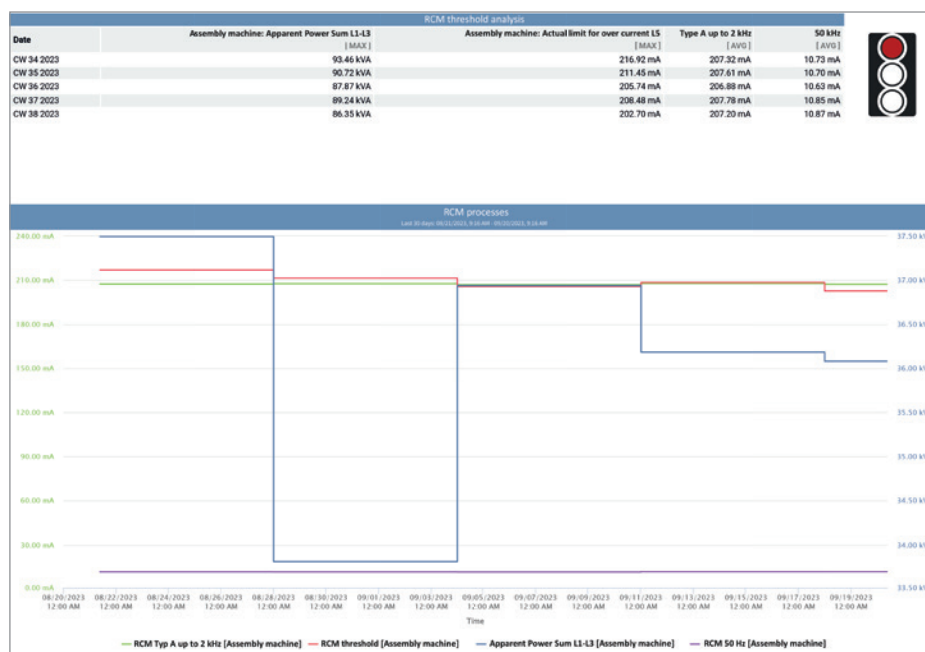
Individual RCM report with 50 Hz, type A, apparent power and threshold value

SERVICES

Alongside the power grid monitoring software, Janitza offers a wide range of supplementary services to help you get the most out of GridVis®.

Overview of the range of services
- Planning advice (new and existing)
- Turnkey visualization and reports on all network levels
- Initial commissioning of the measurement points and software
- Alarms and forwarding to BMS/BSE/DCIM
- Alarm tests

- Calculating key performance indicators (PUE, CER, etc.)
- Power loss and capacity
- Availability calculation and standard reports
- RCM in the TN-S system
- kWh reports or raw data
- Topology pages, level 1-3
- Training courses
- Maintenance of measurement devices and software
- Energy and system check (power audit)
- Continuous support

GridVis® Diagram

Measurement data Database

Users Database

GridVis® Desktop Engineering tool

External system e.g. SCADA, PLC, ERP, etc.

OPC UA Server

OPC UA Server

Local or on an external server

GridVis® Web interfaces

GridVis® Web interfaces

e.g. REST API or OPC UA

GridVis® Collector

GridVis® Service

W-LAN

Ethernet

GridVis® Cloud

via Cloud Connector

Ethernet

UMG Stand Alone

Ethernet

Ethernet

RS485

Ethernet (VPN)

UMG

UMG

External devices and sensors

UMG

Gas, heat, refrigeration, compressed air pulses, etc.

Transformer station

Plant I

Plant II

Extensive connectivity of GridVis®

HIGHLY ACCURATE MEASUREMENT OF POWER QUALITY AND EVENTS

MEASURING CRITICAL NODES AT GRANULARITY LEVELS 1 AND 2

The UMG 509-PRO and UMG 512-PRO power quality analyzers are used at important junctions to monitor the power quality and for energy data management. The Ethernet-capable devices can easily be integrated into higher-order systems such as PLCs and SCADA thanks to various interfaces and IP protocols such as SNMP, BACnet and Modbus. The UMG 509-PRO is suitable for continuous monitoring as well as for the analysis of electrical disturbance variables in the event of network problems. The UMG 512-PRO is a Class A-certified power quality analyzer. It enables a holistic view of power quality, energy consumption and total residual current on the inputs and also records power quality parameters such as harmonics up to the 63rd harmonic and flickers in accordance with Class A. The power quality analyzers comply with EN 61000-2-4 as well as EN 50160* and can be used to create a CBEMA*.

UMG 509-PRO
Part no.: 5226001
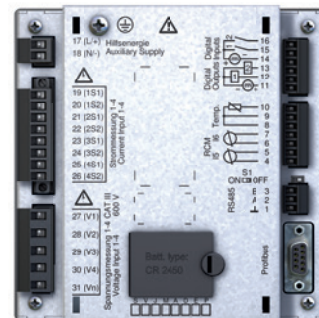
UMG 512-PRO
Part no.: 5217011

- ■ Class A certified according to IEC 61000-4-30 (UMG 512-PRO) and EN 50160*/61000-2-4
- ■ Network compatibility level, total residual currents and energy for higher system availability
- ■ Monitoring of electrical high availability

- ■ Recording of operating and residual currents
- ■ RCM limit values can be optimized for each use case – with a fixed or dynamic limit value
- ■ Monitoring mode for fluctuating and constant loads
- ■ Alarm outputs

- ■ Historical data – long-term monitoring of measured variables
- ■ Dynamic CGP limit values based on the total energy
- ■ Harmonics current up to the 63rd

UMG 512-PRO / UMG 509-PRO

* UMG 509-PRO only as a reference

ACCURATELY RECORD POWER QUALITY

MEASURING CRITICAL NODES AT GRANULARITY LEVELS 1 AND 2

The Janitza UMG 604-PRO and UMG 605-PRO network analyzers can evaluate the state of the power quality in compliance with the standards and detect critical anomalies in the µs range. You are able to support continuous power quality monitoring according to EN 50160* and EN 61000-2-4 as well as to create a CBEMA curve*. The network analyzers have their own device homepages which enable control of the devices – or you may control them directly via the device display. This ensures the data are available at any time without installation of additional software. Numerous interfaces and protocols such as SNMP, BACnet and Modbus also facilitate integration into higher-order systems. The measurement devices can be expanded with apps and are programmable so that your own custom functions can be added.

UMG 605-PRO
Part no.: 5216227

UMG 604-PRO
Part no.: 5216202

- Continuous monitoring of power quality (e.g. EN 50160)
- Overview of events and transients in the network
- Harmonics analysis up to the 63rd harmonic as well as interharmonics

- THD-U/THD-I distortion factor
- Flicker measurement according to DIN EN 61000-4-15
- 4 voltage and measurement inputs
- Ethernet Modbus gateway

- Online data, historical data and much more can be accessed directly via the device homepage
- Programmable
- Functional enhancements through apps are possible

UMG 604-PRO / UMG 605-PRO

* UMG 604-PRO only as a reference

MODULAR MEASUREMENT ON ALL GRANULARITY LEVELS

MODULAR MEASURING SYSTEM ON GRANULARITY LEVEL 1–3

The UMG 801 is able to measure two paths simultaneously and count them separately. On the output side, voltage is measured for transients ≥ 18 µs and potential errors during switches are also noted. Additionally, the power quality is evaluated according to EN 61000-2-4 class 1 and its compliance is analyzed automatically. With the simultaneous measurement of current path A and B, it is immediately apparent which path is currently active and how high the utilization of the phases and the associated neutral conductors is. Parallel to the operating current measurement, a residual current measurement is also taken as a preventive fire protection measurement to detect critical insulation faults. With this feature, the UMG 801 is ideally suited for use on switching devices. All necessary functions are integrated in one device, which significantly reduces acquisition costs and installation effort.

UMG 801
Part no.: 5231003

- Detecting volt age transients ≥ 18 µs and noting errors during switches
- Simultaneous monitoring of 2 paths
- Analysis of power quality as per EN 61000-2-4 Class 1
- Flexible communication via RS-485 and 2 Ethernet connections

- Secure communication with OPC UA and Modbus white-listing
- Accurate measurements with a sampling frequency of 51.2 kHz and a measuring accuracy class of 0.2
- Modular extension of the measurement points using measuring modules

- Multifunction channels can be used flexibly depending on the required application: RCM, temperature or current measurement

UMG 801

THE SOLUTION FOR MANY CRITICAL FINAL CIRCUITS

MODULAR ENERGY MEASUREMENT DEVICE FOR GRANULARITY LEVEL 2–3

The Janitza branch circuit monitoring option combines energy monitoring and the monitoring of individual circuits. The UMG 800 offers several networking options to get the most out of it whilst minimizing the effort needed to integrate it into higher-level systems. The energy analyzer has two Ethernet interfaces for direct wiring and data transmission which can be used simultaneously, as well as a RS-485 interface for reading out the data that is acquired or for setting up a measurement topology.

The UMG 800 can be specifically customized to the application in hand due to a variety of expansion modules. Together with the modules, which offer up to 24 current inputs, an optimal branch circuit monitoring solution can be achieved for fine granular measurement at the third level so that each individual consumer can be captured.

The system includes current transformers for new installations and separable current transformers for existing installations, making it ideal for retrofits. The footprint is very small and optimized for applications with many final circuits.
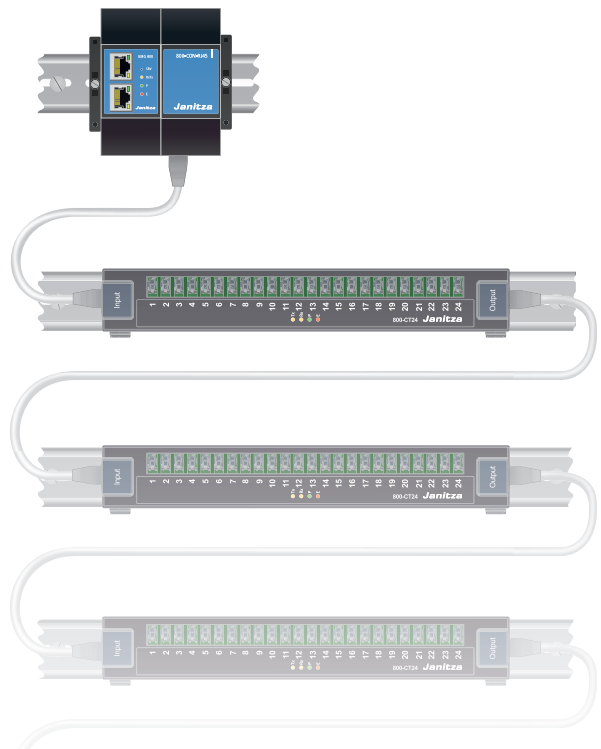
Measurement groups of 3 in a measurement device and module topology with 4 800-CT24 modules result in up to 32 measurement groups

- Modular extension of the measurement points using measuring modules
- Simple expansion of the unit via flexible scaling up to 96 current measuring channels and 14 digital inputs

- Analysis of power quality as per EN 61000-2-4 Class 1
- Power quality parameters such as events and transients
- IPv4, Ethernet and IP addresses

UMG 800
Part no.: 5238001

UMG 800

INDIVIDUAL COMBINATIONS

MODULAR SOLUTIONS FOR GRANULARITY LEVEL 1–3

800-CT8-LP current measuring module
Part no.: 5231234

800-CT8-A current measuring module
Part no.: 5231230

800-CT24 current measuring module
Part no.: 5231247

800-CT12-SVD-US current measuring module
Part no.: 5231301

SECURE & RELIABLE (800-CT8-LP)
- 8 lower power current measurement inputs
- Compatible with cost-effective 333 mV current transformers
- Higher levels of occupational health and safety during installation
- No short-circuit plugs required
- High measuring accuracy (0.2%)

SIMPLE TO EXPAND (800-CT8-A)
- Has 8 current measurement inputs
- Connection of conventional current transformers
- Ideal for existing or new units with integrated transformers
- High measuring accuracy (0.5%)

COMPACT
- Only 1 sub-unit (800-CT8-LP)
- 4 sub-units (800-CT8-A)

MODULE SLOTS
- Requires 1 module slot

MAXIMUM EFFICIENCY
- 24 current measurement inputs per module
- Compatible with 333 mV current transformers (plug connectors)
- Modules can be quickly and easily attached to the DIN rail
- Up to four 800-CT24 modules can be directly connected to each other in series.
- Connection takes place via the module
- 800-CON-RJ45

QUICK & COST-EFFECTIVE
- Current transformers can be readily stacked (plug & play) for quick installation
- Low channel price

MODULE SLOTS
- 3 module slots required

EASILY EXPANDED
- 12 additional current measuring channels
- Contactless voltage recording
- Simple connection with cable bushing

CONVENIENT
- Simple to install on the DIN rail
- Modules can be perfectly inserted into each other for simple installation
- Status display via LEDs for on-site assessment

MODULE SLOTS
- 1.5 module slots required

PERFECTLY CUSTOMIZED TO YOUR NEEDS

800-CON-RJ45 transfer module
Part no.: 5231242

800-CON transfer module
Part no.: 5231210

800-DI14 digital input module
Part no.: 5231214

Remote Display RD 96
Part no.: 5231212

LOW FOOTPRINT REQUIREMENT
- 800-CON module only 1 sub-unit per module
- 800-CON-RJ45 module 2 sub-units per module

MEASUREMENT POINT BRIDGING
- 2 modules connect remote measurement points with each other
- Distances of up to 100 m can be bridged with a cable

CONNECTIVITY
- 800-CON-RJ45 modules have an RJ45 interface and can be connected via a standardized cable
- 800-CON modules are connected via shield clamps to a pair-stranded, shielded data cable

MODULE SLOTS
- No module slots required

DIGITAL INPUTS
- Provides 14 additional digital inputs
- Status recording of, for example, door contacts or status contacts (fans, valves and other equipment)
- Triggering of actions

COMPACT
- Compact 1 sub-unit size

MODULE SLOTS
- Requires 1 module slot

FRONT PANEL CAN BE RETROFITTED
- 96 x 96 mm front panel display for reading off data and on-site operation
- Full operation including configuration of the UMG 800 as well as the modules
- Easy to operate via keys on the front of the display
- Connection via USB interface
- All data available including the module views

MODULE SLOTS
- No module slot required

POWER QUALITY, ENERGY AND RCM IN ONE DEVICE

MEASURING CRITICAL NODES AT GRANULARITY LEVEL 2

The modularly expandable UMG 96-PQ-L network analyzer can ensure complete transparency of the power quality at all levels and helps to avoid failures. Full-wave events and other power quality parameters are displayed directly. The optional RCM module can be used to additionally provide residual current measurement. Residual currents and leakage currents are detected and recorded with reference to ground according to IEC 60755 type A and B. An additional 1/5 A current input is available for neutral conductor monitoring. The modular network analyzers allow monitoring according to EN 61000-2-4 and EN 50160 as well as the creation of a CBEMA curve as of 20 ms with a Class S activation.

UMG 96-PQ-L
Part no.: 5236001, 5236005, 5236021, 5236025

- Harmonics current up to the 65th harmonic
- 20 ms RMS value memory
- Alarm outputs
- Historical data – long-term monitoring of measured variables
- Full-wave events

- RCM limit values can be optimized for each use case – with a fixed or dynamic limit value
- Ethernet connection and integrated thermistor input for thermocouples via the UMG 96-RCM-E module

- Two analog inputs in the module: Optionally as 0 - 20 mA analog inputs or as RCM measurement inputs with cable break detection or additional temperature measurement
- Drag indicator history on the display

UMG 96-PQ-L

ENERGY BILLING WITH MID AND RCM IN ONE DEVICE

MEASURE AND BILL KWH AT GRANULARITY LEVEL 2

The UMG 96-PA-MID+ energy analyzer combines the functions of energy management and power quality monitoring in one device. It has MID certification and is used for standards-compliant recording of cost centers as well as for billing purposes.

The optional RCM module also integrates measurement of residual currents. Residual currents and leakage currents are detected and recorded with reference to ground according to IEC 60755 type A and B. An additional 1/5 A current input is available for neutral conductor monitoring.
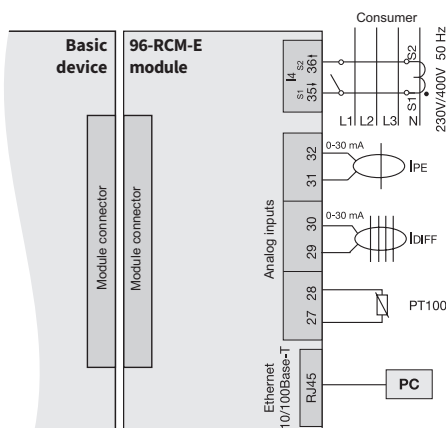
UMG 96-PA-MID+
Part no.: 5232004

- MID measurement: Tamper-proof and legally valid recording of energy data
- Record and bill racks or rental areas and allocate them to cost centers
- Historical data: Long-term monitoring of measured variables

- RCM limit values can be optimized for each use case – with a fixed or dynamic limit value
- Ethernet connection and integrated thermistor input for thermocouples via the UMG 96-RCM-E module
- Alarm outputs

- Harmonics current up to the 40th harmonic
- Two analog inputs in the module: Optionally as 0–20 mA analog inputs or as RCM measurement inputs with cable break detection or additional temperature measurement

UMG 96-PA-MID+

ENERGY MONITORING AND RCM IN ONE DEVICE

MEASURING AT GRANULARITY LEVEL 2

The UMG 96RM-E is suitable for energy and residual current monitoring as well as for harmonics analysis. Continuous monitoring of the residual current in current distributions is possible in addition to the normal measurement of the operating currents. RCM limit values can be set dynami- cally depending on total power, which avoids false alarms. Residual currents and leakage currents are detected and recorded with reference to ground according to IEC 60755 type A and B. An optimal residual current limit value is also ensured in the low-load range.

UMG 96RM-E
Part no.: 5222062

- Analysis of residual current events as well as of the harmonic residual current components
- SNMP alarms
- Email alarms
- Alarm outputs

- Historical data: long-term monitoring of measured variables
- RCM limit values can be optimized for each use case – with a fixed or dynamic limit value

- RCM diagnostics variables
- Optimal residual current limit value – even in the low-load range
- Harmonics current up to the 40th harmonic

UMG 96RM-E

RELIABLE ENERGY MEASUREMENT WITH MID CERTIFICATION

ENERGY BILLING FOR FINAL CIRCUITS

MID energy meters are ideal for billing purposes such as in collocation data centers. They are tested and approved in accordance with MID, IEC and UL (depending on the variant).

The different models are suitable for direct measurement or current transformer measurement and provide an additional pulse output if required. MID energy meters can be readily fitted to and integrated into existing systems.

MID energy meters
Part no.: 1401501, 1401502, 1401503

- ▪ MID-certified measurement: Tamper-proof and legally valid recording of energy data
- ▪ Interface: RS-485 (Modbus RTU)
- ▪ Pulse output included
- ▪ Tested and approved according to MID and IEC
- ▪ Available in different versions

MID ENERGY METERS

RESIDUAL CURRENT FOR MANY FINAL CIRCUITS

MODULAR MEASUREMENT FOR GRANULARITY LEVEL 3

The UMG 20CM residual current monitoring device with connecting residual current transformers is used to detect residual currents and leakage currents with reference to ground in accordance with IEC 60755 type A. It is particularly suitable for power distributors with many final circuits. 20 current measuring channels (inputs) are available for connecting current transformers for measuring differential currents from 10 mA to 15 A. They can be expanded to up to 116 current measuring channels via modules. The new UMG 800 measuring system is ideal for combinations of operating and residual current.

Module 20CM-CT6
Part no. 1401626

UMG 20CM
Part no. 1401625

- 20 current measuring channels: 20 LEDs – one LED for each current channel
- It can be expanded by up to 96 current measuring channels with a module

- 6 channels per module with integrated current transformer
- Status display on the module via LEDs
- Analysis of the harmonic residual current components

- RCM diagnostics variables
- Limit value programming
- Alarm outputs
- RS-485 (Modbus RTU)

UMG 20CM

MONITORING OF RESIDUAL CURRENTS, TYPE A TO B+

CAN BE USED AT ALL MEASURING LEVELS

The two-channel residual current monitoring device meets the requirements of the DIN EN 62020 standard. A recurring insulation test can either be omitted or be restricted. Typical applications are low-voltage main distribution boards (LVMDB) and subdistribution panels (SDP) in grounded systems (e.g. TN-S systems). The RCM 202-AB is a technical alternative across industries if power failure due to a residual current circuit breaker or an insulation resistance measurement cannot be tolerated. Full integration into GridVis® power grid monitoring software is possible.

Direct integration of the device can be via the RS-485 interface. It can be used anywhere as an RCM, such as in DC systems, frequency converters and applications with more stringent fire protection requirements. The RCM 202-AB enables type B/B+ monitoring with typical passive residual current transformers. Type B measurement is also possible with split-core transformers, making it an ideal solution for existing systems.

RCM 202-AB
Part no. 1401627

- Residual current measurement, up to 2 residual current transformers
- Measuring range, AC/DC 10 mA ... 20 A
- Detection, evaluation and monitoring of residual current types A, B and B+ according to DIN EN 62020

- Evaluation of AC and DC
- Harmonics spectrum up to 2 kHz, type B
- Mixed current up to 20 kHz, type A, type B+
- Memory for measured values and extreme values with time stamp
- High resolution LCD display with intuitive operation

- Peripherals:
  – 2 analog outputs
  – 2 alarm outputs
  – compatible with RCM inputs of the UMG 96RM-E & UMG 96-PA with RCM module
- RS-485 interface (protocol: Modbus RTU)
- Patented measuring method

RCM 202-AB

ABOUT JANITZA

Janitza develops comprehensive energy measurement solutions that ensure transparent energy flows and monitor power quality. The global company, headquartered in Germany, provides individual solutions to meet specific customer requirements across a wide range of industries, including data centers, manufacturing, buildings & infrastructure, utilities, and renewable energy.

PRODUCT RANGE

Janitza's portfolio includes innovative measuring devices and the perfectly integrated Power Grid Monitoring Software GridVis®, complemented by high-quality components. Customers worldwide benefit from solutions in energy data management, power quality monitoring, and residual current monitoring, all within a unified system environment – Made in Germany.

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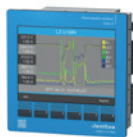Phone: +971 54 404 8001
Email: sales-me@janitza.com

Janitza®

MEASUREMENT TECHNOLOGY FOR DATA CENTERS

Selection guide

Janitza®

Overview of data center products

PRODUCT DESIGNATION	UMG 512-PRO (UL certified)	UMG 509-PRO (UL certified)	UMG 605-PRO (UL certified)	UMG 604-PRO (UL certified)
INDIVIDUAL DEVICES WITH PQ FOR GRANULARITY 1–2				
PART NUMBER	5217011	5226001	5216227	5216201 (EP)
Field of application and main functions				
Granularity level 1 / 2 / 3	• / • / •	– / • / •	• / • / •	– / • / •
Compliant with DIN EN 50600 1 / 2 / 3	•	•	•	•
Critical load monitoring & high availability voltage	•	•	•	•
GridVis® CBEMA compatibility & high availability report	•	•	•	•
Capacity report compatibility	•	•	•	•
EN 50160 / IEC 61000-2-4	• / •	Following / •	• / •	Following / •
General				
Transients	> 39 µs	> 50 µs	> 50 µs	> 50 µs
Short-term interruptions	•	•	•	•
Residual current inputs for RCM	2	2	–	–
N measurement / N calculation	• / •	• / •	• / •	• / •
Cost center according to MID	–	–	–	–
Current measuring channels	4	4	4	4
Harmonics current V / A	1st–63rd	1st–63rd	1st–63rd	1st – 40th
Thermistor input	1	1	1	1
Distortion factor THD-U / THD-I in %	•	•	•	•
Accuracy V; A	0.1 %; 0.1 %	0.1 %; 0.2 %	0.2 %; 0.25 %	0.2 %; 0.25 %
IEC 61000-4-30	Class A	–	Class S	–
Active energy class	0.2S (.../5 A)	0.2S (.../5 A)	0.5S (.../5 A)	0.5S (.../5 A)
Digital inputs	2	2	2	2
Digital / pulse output	2	2	2	2
Analog output	–	–	–	–
Memory for min. / max. values	•	•	•	•
Memory size / recording duration (according to factory setting)	256 MB / approx. 3 months	256 MB / approx. 96 months	128 MB / approx. 2.5 months	128 MB / approx. 48 months
Clock	•	•	•	•
Integrated logic	Jasic® (7 prg.)	Jasic® (7 prg.)	Jasic® (7 prg.)	Jasic® (7 prg.)
Web server / Email	• / •[*9]	• / •[*9]	• / •[*9]	• / •[*9]
Interfaces				
RS-485	•	•	•	•
USB	–	–	–	–
Ethernet	•	•	•	•
Protocols				
Modbus RTU	•	•	•	•
Modbus gateway	•	•	•	•
Profibus DP V0	•	•	•	–
Modbus TCP/IP, Modbus RTU over Ethernet	•	•	•	•
SNMP	•	•	•	•
OPC UA	–	–	–	–
BACnet IP	•[*2]	•[*2]	•[*2]	•[*2]

UMG 801 (UL certified)	UMG 800	800-CT8-A module (UL certified)	800-CT8-LP module	Module 800-CT12-SVD-US	800-CT24 module	800-DI14 module

UMG 801 max. 10 modules (80 additional current measuring channels), UMG 800 max. 13 modules (96 additional current measuring channels)

MODULAR MEASURING SYSTEM GRANULARITY 1–3

5231001	5238001	5231201	5231234	5231301	5231247	5231214
• / • / •	– / • / •	– / • / •	– / • / •	– / – / •	– / – / •	only states e.g. switch
•	•	Yes (central voltage measurement)	Yes (central voltage measurement)	Yes (central voltage measurement)	Yes (central voltage measurement)	only states e.g. switch
•	•	Via basic device	Via basic device	•	Via basic device	only states e.g. switch
•	•	Via basic device	Via basic device	Via basic device	Via basic device	–
•	About current measuring modules	•	•	•	•	–
Following / •	Following / •	Via basic device	Via basic device	Via basic device	Via basic device	–
18 µs (V)	18 µs (V)	•[*6]	•[*6]	•[*6]	•[*6]	–
•	•	•[*6]	•[*6]	•[*6]	•[*6]	–
4	–	–	8 with 333 mV RCM-CT	–	24 with 333 mV RCM-CT	–
• / •	– / –	• / •	• / •	• / •	• / •	– / –
–	–	–	–	–	–	–
8	–	8	8	12	24	–
1st–127th / 1st–63rd	1st–63rd	1st, 3rd, 5th … 25th	1st, 3rd, 5th … 25th	1st, 3rd, 5th … 15th	1st, 3rd, 5th … 15th	–
4	–	–	–	–	–	–
•	only THD-U	THD-I only	THD-I only	THD-I only	THD-I only	–
0.2 %; 0.2 %	0.2 %; –	– ; 0.5 %	– ; 0.2 %	•[*10]; 0.2 %	– ; 0.2 %	–
Class S	–	–	–	–	–	–
0.2S (…/5 A)	–	0.5S (…/5 A)	0.5S (…/333 mV)	0.5S	0.5S (…/333 mV)	–
4	–	–	–	–	–	14
4	–	–	–	–	–	–
1	–	–	–	–	–	–
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
4 GB / approx. 96 months	4 GB / approx. 96 months	–	–	–	–	–
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
Comparator	Comparator	–	–	–	–	–
• / –	• / –	– / –	– / –	– / –	– / –	– / –
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
2	2	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
•[*7]	•[*7]	–	–	–	–	–
–	–	–	–	–	–	–
Modbus TCP/IP	Modbus TCP/IP	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
–	–	–	–	–	–	–
•	•	•[*6]	•[*6]	•[*6]	•[*6]	•[*6]
–	–	–	–	–	–	–

| UMG 96-PQ-L (UL certified) | UMG 96-PA-MID+ (UL certified) | 96-RCM-E module (UL certified) | UMG 96RM-E (UL certified) |

INDIVIDUAL DEVICES WITH PQ & RCM FOR GRANULARITY 2

UMG 96-PQ-L	UMG 96-PA-MID+	96-RCM-E module	UMG 96RM-E
5236001*1 5236021*1 5236005 5236025	5232004*3	5232010 (96-RCM-E)	5222062
– / • / •	– / • / •	–	– / • / •
•	•	–	•
•	–	–	–
•	–	–	–
•			•
Following / •	–	–	–
–	–	–	–
•	–	–	> 200 ms
•*4	•*4	2	2
•*4 / •	•*4 / •	• / –	• / •
–	•	–	–
3 + 1*4	3 + 1*4	1	4
1st – 65th	1st – 40th	–	1st – 40th
•*4	•*4	1	2
•	•	–	•
0.2 %; 0.2 %	0.2 %; 0.2 %	–	0.2 %; 0.2 %
Class S*8	–	–	–
0.2S (…/5 A)	0.2S (…/5 A)	–	0.5S (…/5 A)
3	3	–	3
3	3	–	5
1	1	–	–
•	•	–	•
64 MB / Partition A: approx. 45 months, Partition B: approx. 20 months	8 MB / approx. 3 months (MID+ meter reading cycle: approx. 24 months)	–	256 MB / Partition A: approx. 106 months, Partition B: approx. 26 months
•	•	–	•
Comparator	Comparator	–	Comparator
•*4 / –	•*4 / –	• / –	• / •*9
•	•	–	•
–	–	–	–
•*4	•*4	•	•
•	•	–	•
–	–	•	•
–	–	–	•
•*4	•*4	•	•
–	–	–	•
–	–	–	–
–	–	–	•

- • : Included
- – : Not included
- *1 Other voltages are also available optionally
- *2 Option
- *3 SNMP for internal Profinet communication only
- *4 On the 96-RCM-E module
- *5 MID certified
- *6 On the basic device
- *7 Additional query of Modbus RS485 measurement points (server)
- *8 Applies to part no. 5236021 and 5236025
- *9 Without SSL
- *10 Health check with a non-contact voltage measurement

Comment:
For detailed technical information please refer to the respective operating manuals and the Modbus address lists.

Janitza®

Overview of data center products

PRODUCT DESIGNATION	MID energy meters	UMG 20CM & Module 20CM-CT6		RCM 202-AB
	INDIVIDUAL DEVICE WITH MID GRANULARITY 2–3	**RESIDUAL CURRENT MEASURING SYSTEM GRANULARITY 2–3**		**RCM INDIVIDUAL DEVICE GRANULARITY 1–3**
PART NUMBER	1401501 1401502 1401503	1401625	1401626	5217011
Field of application and main functions				
Granularity level 1 / 2 / 3	– / – / •	– / – / •	– / – / •	RCM only
Compliant with DIN EN 50600 1 / 2 / 3	•	Yes (central voltage measurement)	Yes (central voltage measurement)	RCM only
Critical load monitoring & high availability voltage	–	–	–	RCM only
GridVis® CBEMA compatibility & high availability report	–	–	–	–
Capacity report compatibility	•	•	•	–
EN 50160 / IEC 61000-2-4	–	–	–	–
General				
Transients	–	–	–	–
Short-term interruptions	–	–	–	–
Residual current inputs for RCM	–	20	6	2
N measurement / N calculation	– / –	• / –	• / –	–
Cost center according to MID	•	–	–	–
Current measuring channels	3	20*5	6–96 (max. 16 modules)*5	–
Harmonics current V / A	–	1st–63rd	1st–63rd	RCM type A, B up to 20 kHz
Thermistor input	–	–	–	–
Distortion factor THD-U / THD-I in %	•	•	THD-I only	–
Accuracy V; A	–	1 %; 1 %	– ; 0.5 %	–
IEC 61000-4-30	–	–	–	–
Active energy class	–	1	2	–
Digital inputs	2	–	–	–
Digital / pulse output	–	2	–	–
Analog output	–	–	–	2
Memory for min. / max. values	–	•	•	•
Memory size / recording duration (according to factory setting)	–	768 KB / approx. 1 month	approx. 16 months	756 KB / approx. 3 month
Clock	–	•	Only via UMG 20CM	•
Integrated logic	–	Current limit values per channel	Current limit values per channel	Configurable alarm outputs
Web server / Email	– / –	– / –	– / –	– / –
Interfaces				
RS-485	•	•	Only via UMG 20CM	•
USB	–	–	–	–
Ethernet	–	–	–	–
Protocols				
Modbus RTU	•	•	Only via UMG 20CM	•
Modbus gateway	–	–	–	–
Profibus DP V0	–	–	–	–
Modbus TCP/IP, Modbus RTU over Ethernet	–	–	–	–
SNMP	–	–	–	–
OPC UA	–	–	–	–
BACnet IP	–	–	–	–

ABOUT JANITZA

Janitza develops comprehensive energy measurement solutions that ensure transparent energy flows and monitor power quality. The global company, headquartered in Germany, provides individual solutions to meet specific customer requirements across a wide range of industries, including data centers, manufacturing, buildings & infrastructure, utilities, and renewable energy.

PRODUCT RANGE

Janitza's portfolio includes innovative measuring devices and the perfectly integrated Power Grid Monitoring Software GridVis®, complemented by high-quality components. Customers worldwide benefit from solutions in energy data management, power quality monitoring, and residual current monitoring, all within a unified system environment – Made in Germany.

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