Smart Energy & Power Quality Solutions

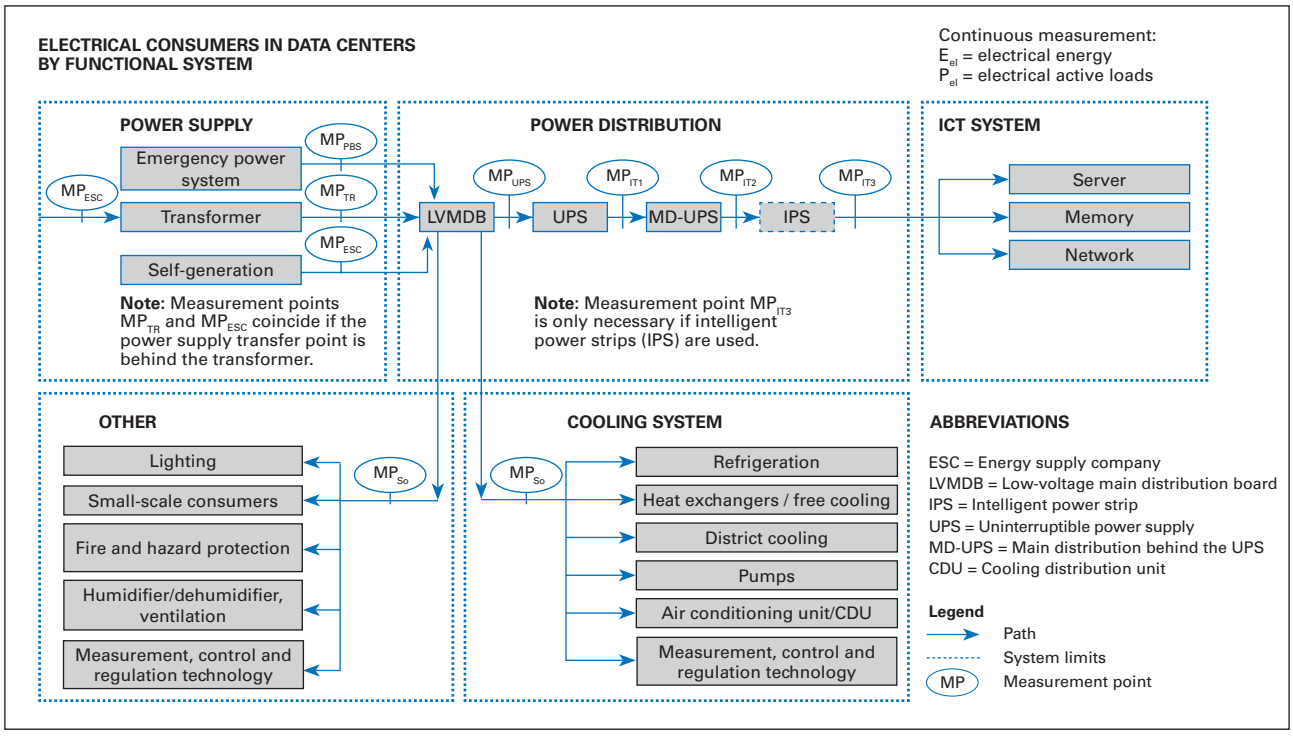
GridVis® FUNCTION OVERVIEW FOR DATA CENTERS

Janitza®

ENERGY MONITORING FOR DATA CENTERS

Energy monitoring software for data centers can perform a wide range of tasks and is not just restricted to energy efficiency and energy metering. High availability is of the utmost importance in data centers, as each failure costs a lot of money. High availability stands and falls with a reliable power supply and a grid compatibility level which must be maintained. Utilization levels and extreme values of many parameters must be monitored continuously in order to maintain consistent high availability.

GridVis® power grid monitoring software provides tools for all basic key tasks and supports operations with customized functions that are active during business operations. System solutions from Janitza are certified in accordance with DIN EN ISO 50001 and satisfy 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.



Electrical energy measurement concept (current quantities)
Source: Blue Angel Environmental Label for Data Centers, DE-UZ 228, January 2023 edition.

FUNCTION OVERVIEW

Below you will find an overview of the most important functions of the GridVis® data center. These will be explained in more detail on the following pages. As well as the functions listed here, GridVis® offers many other useful features and applications. If you are looking for information on a specific function, a comprehensive 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 (EIT, ERZ, 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 analysis

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

ENERGY EFFICIENCY

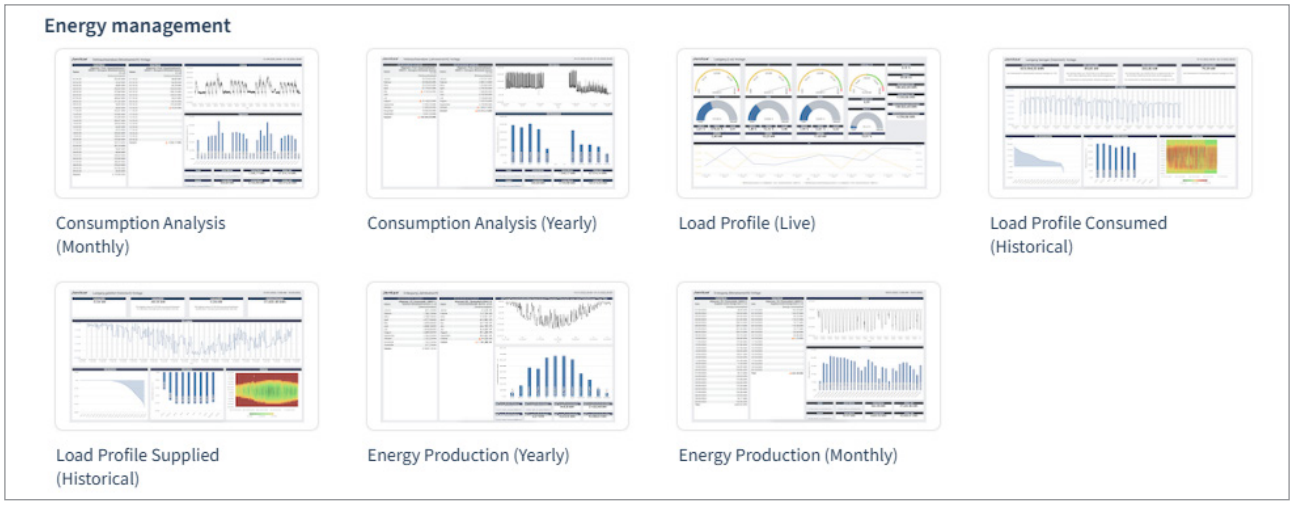
Important key performance indicators such as PUE or CER can be readily evaluated via all power supply or heat supply paths. The representations of summation power such as ERZ or EIT are not a problem for GridVis® and can be readily visualized with prepared objects. This also makes it easy to demonstrate the goals of energy efficiency guidelines/data center sustainability compliance reporting.

Energy efficiency dashboards

With ISO 50001/50006-certified GridVis® power grid monitoring software (Standard and Expert editions), you can evaluate your PUE as well as other key performance indicators, such as EnPIs.

- Create individual performance indicators
- Calculate and visualize directly in the software
- Show changes in key performance indicators using the trend and evaluation system
- Monitoring of energy efficiency

PUE 1 as an example



Complete dashboards

Energy efficiency analysis objects

So that you always have the measured values to hand, GridVis® offers a range of visualization objects for user-friendly analysis. The objects can be stored on individual dashboards or in reports.

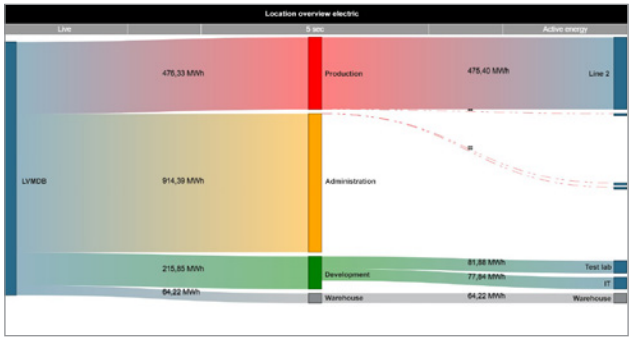
Dashboard and report editor at a glance:

- Large range of objects for visualizing KPIs and measured values
- Display of historical values and live data
- Freely selectable time periods
- Presentation mode for continued display of the most important data

Bar Chart	Regression Scatter Chart	Multiple linear regression	Line Chart	Column Chart	Pie Chart	Speedometer
Level Meter	Stacked Column Chart	Duration Curve	Waterfall Chart	Heat Map	ABC Analysis (Pareto Chart)	Stacked Line Chart

Excerpt from the editors' object selection

Objects for placement in the editor

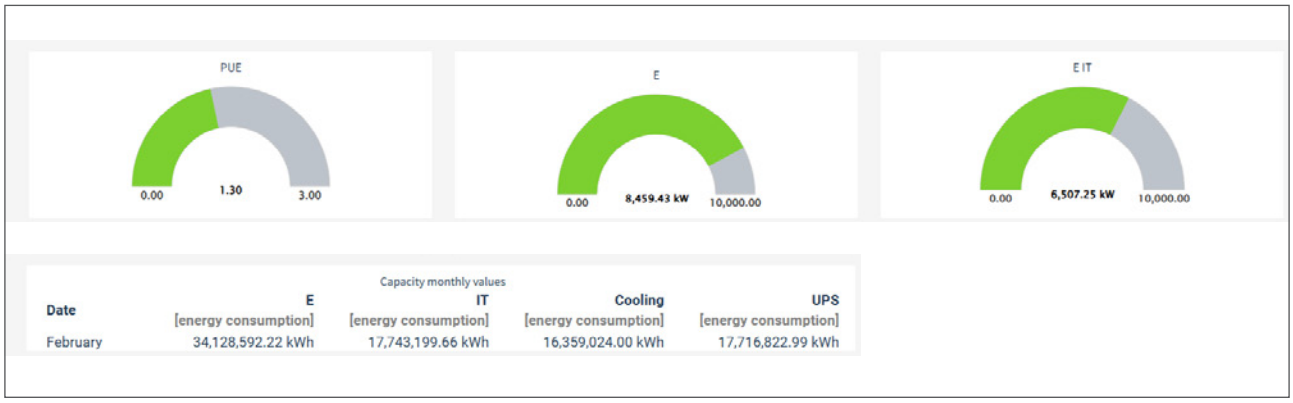


Sankey diagram

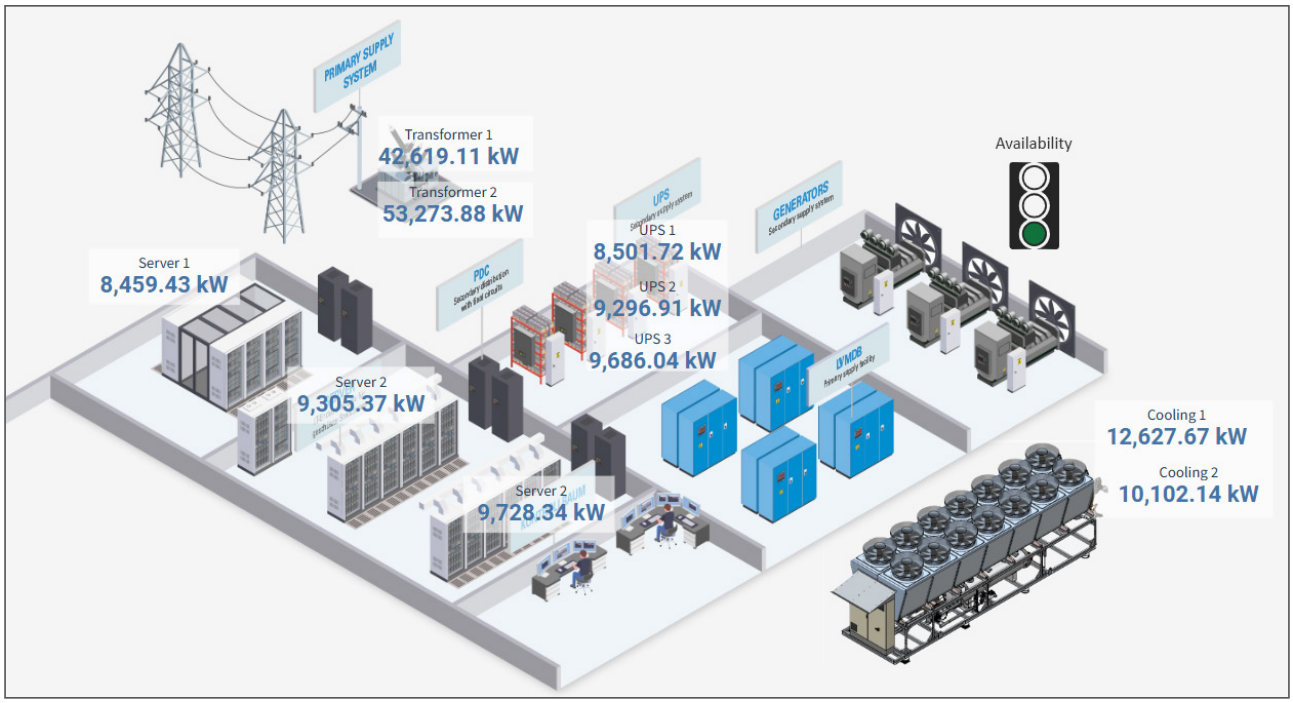
Heatmap

Individual topology pages

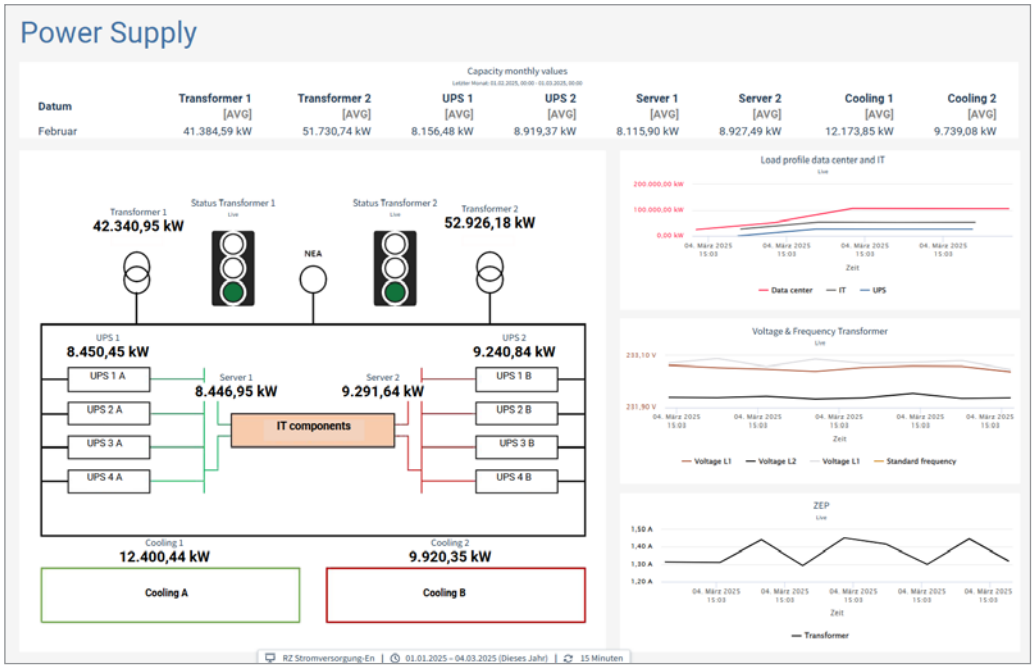
Summary pages with live measured values and alarm indicators are extremely helpful so that operations can draw conclusions, e.g. in critical situations, as quickly as possible. In this case, the data center can be granularly visualized in any manner from the primary supplies to the final circuits.



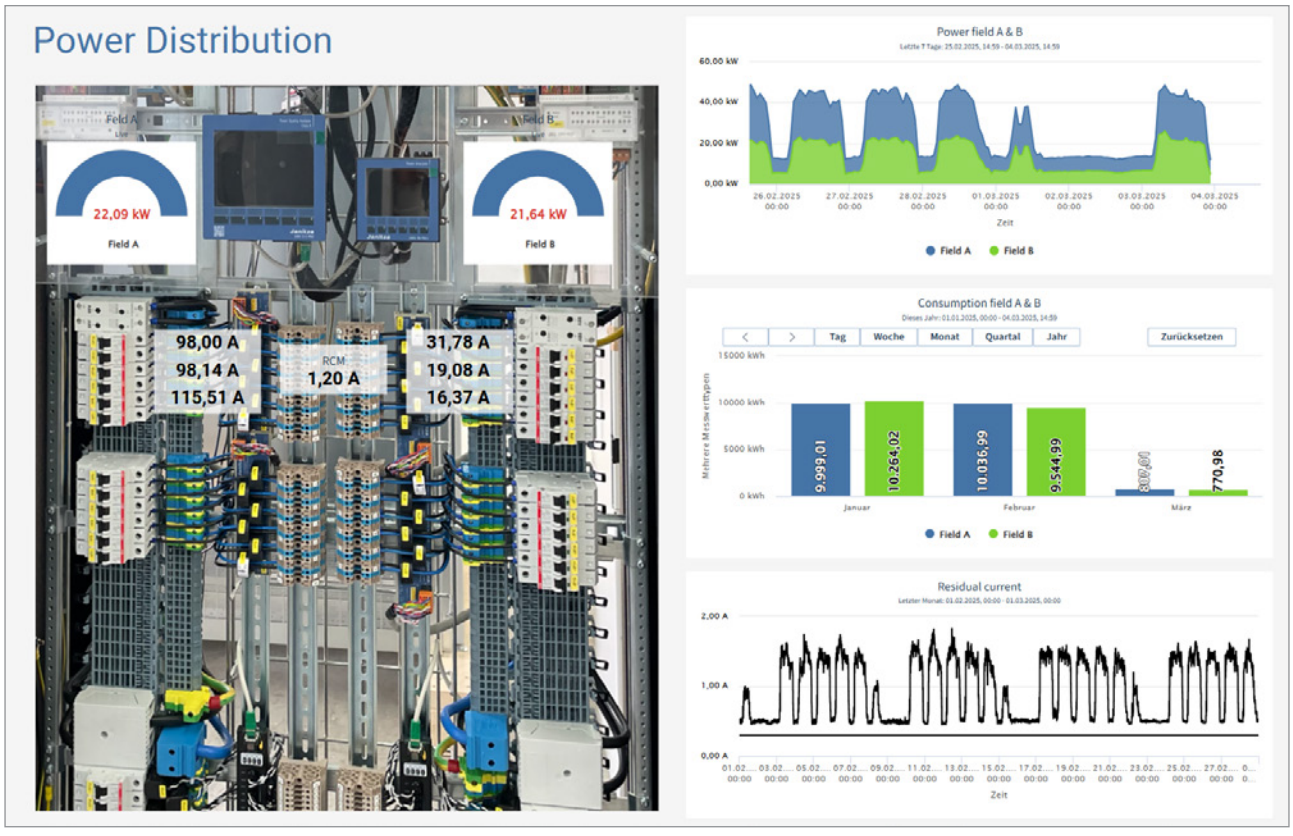
Quick overview of the most important values



Total data center topology



Power supply granularity 1–2



Supply granularity 3

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

GridVis® can also be used to assign several measurement points to a customer and calculate totals by means of virtual measurement devices. Extensive energy reports and data exports as well as a customized energy bill can also be generated.

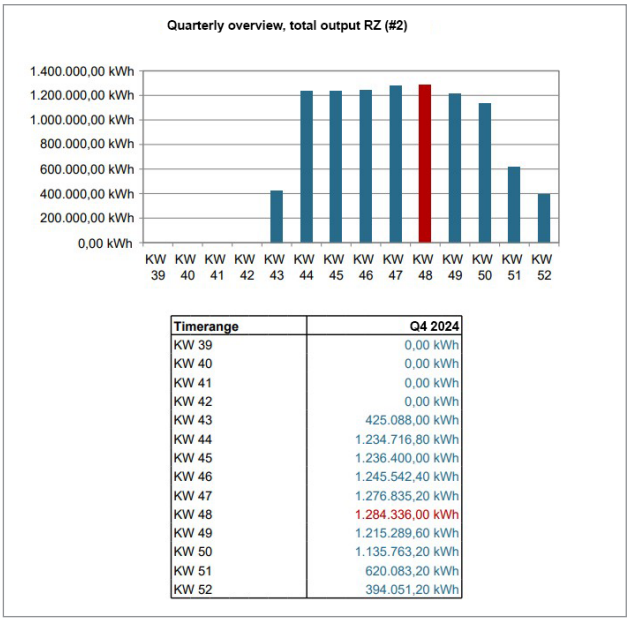
Professional energy bill creation at a glance:

- 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 file 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



Timerange	Q4 2024
KW 39	0,00 kWh
KW 40	0,00 kWh
KW 41	0,00 kWh
KW 42	0,00 kWh
KW 43	425.088,00 kWh
KW 44	1.234.716,80 kWh
KW 45	1.236.400,00 kWh
KW 46	1.245.542,40 kWh
KW 47	1.276.835,20 kWh
KW 48	1.284.336,00 kWh
KW 49	1.215.289,60 kWh
KW 50	1.135.763,20 kWh
KW 51	620.083,20 kWh
KW 52	394.051,20 kWh

Schedule of costs in the energy bill

MONITORING OF ELECTRICAL HIGH AVAILABILITY

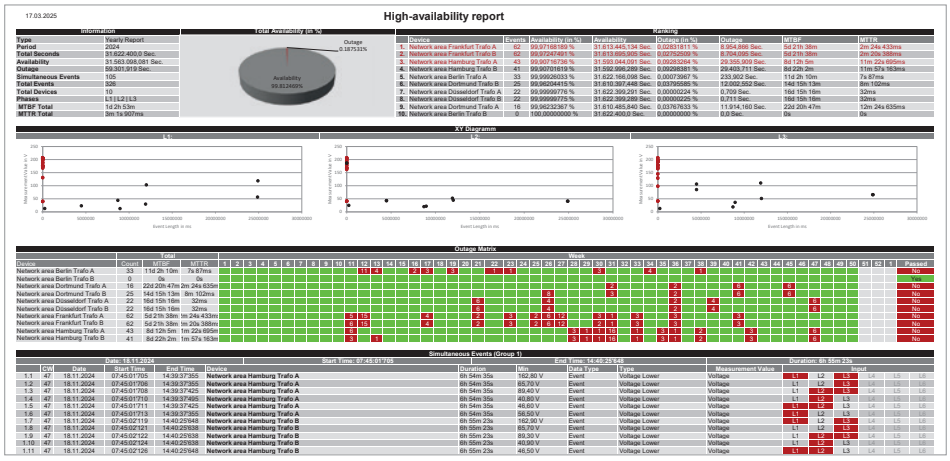
Timely recognition of voltage events means weaknesses can be detected and unscheduled shutdowns can be avoided. Power quality must be monitored according to normative specifications such as EN 50160, EN 61000-2-4, IEEE 519 and ITIC (CBEMA). The combination of Janitza network analyzers and GridVis® provides prepared power quality reports and special tools for evaluating electrical high availability.

Electrical availability

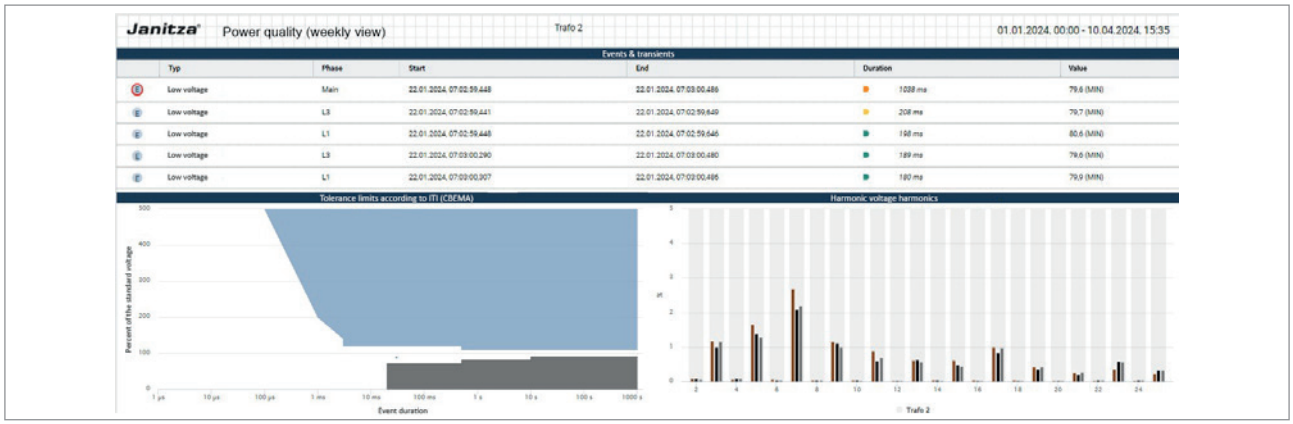
With GridVis® it is possible to monitor and evaluate electrical high availability. The high availability report makes it possible to summarize many measurement points in one report. It is ideal for complex power supplies with several redundancy paths.

The high availability report at a glance:

- Evaluation of all critical nodes in one report
- Clearly shows at which point of the power supply system a failure has occurred
- Voltage availability with absolute downtimes and percentage values
- Calculation of the mean time between failures (MTBF)
- Evaluation of causes and impacts through a simultaneous display arrangement of the events
- Statements about selectivity or the start time
- Display statistics on the affected phase conductors
- Determine the phase in which the short circuit or ground fault occurred
- Monitoring of warranted availability times



GridVis® High-availability report



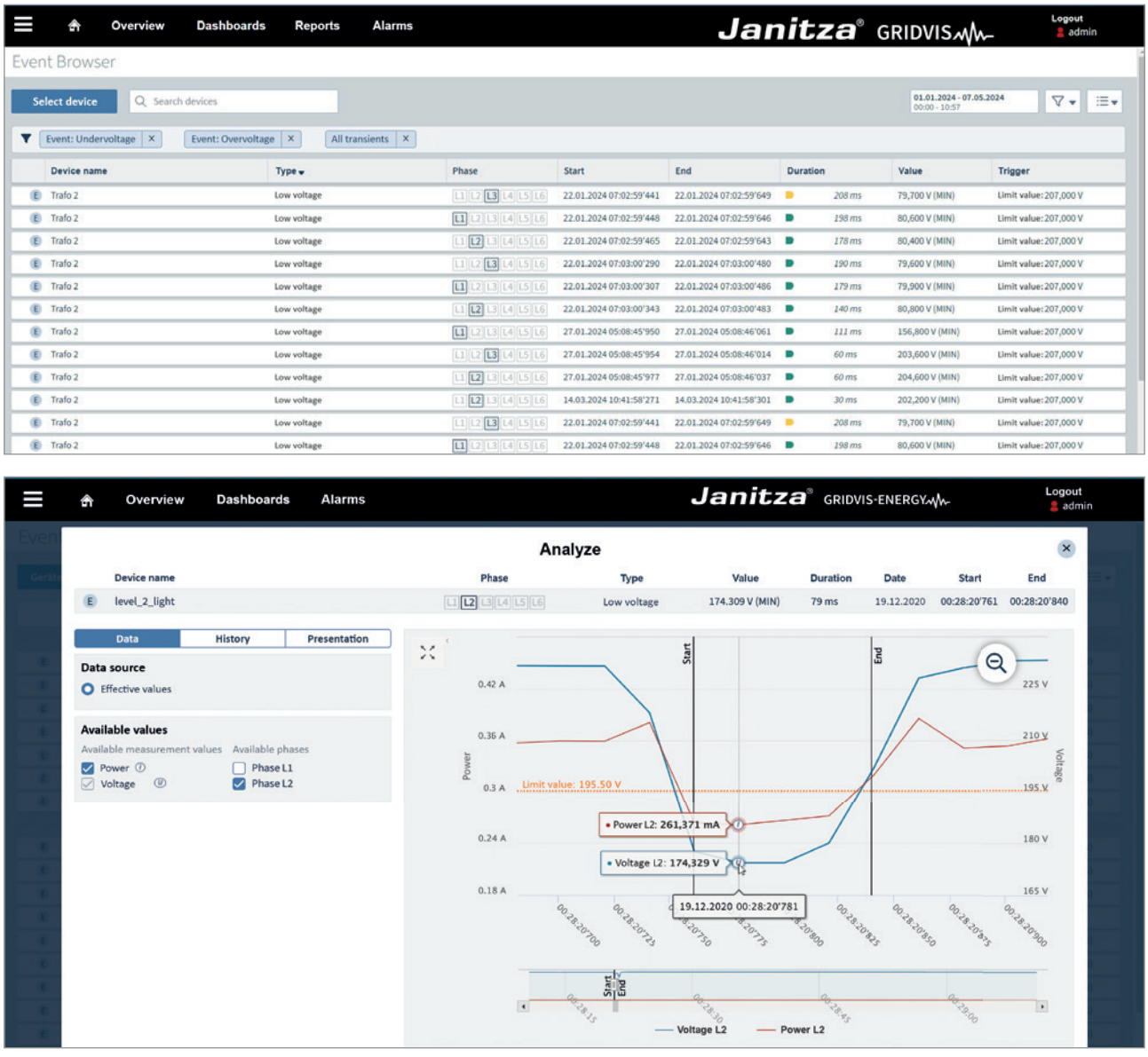
CBEMA curve

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, for example, an ideal foundation for monitoring what are known as catcher systems. 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)



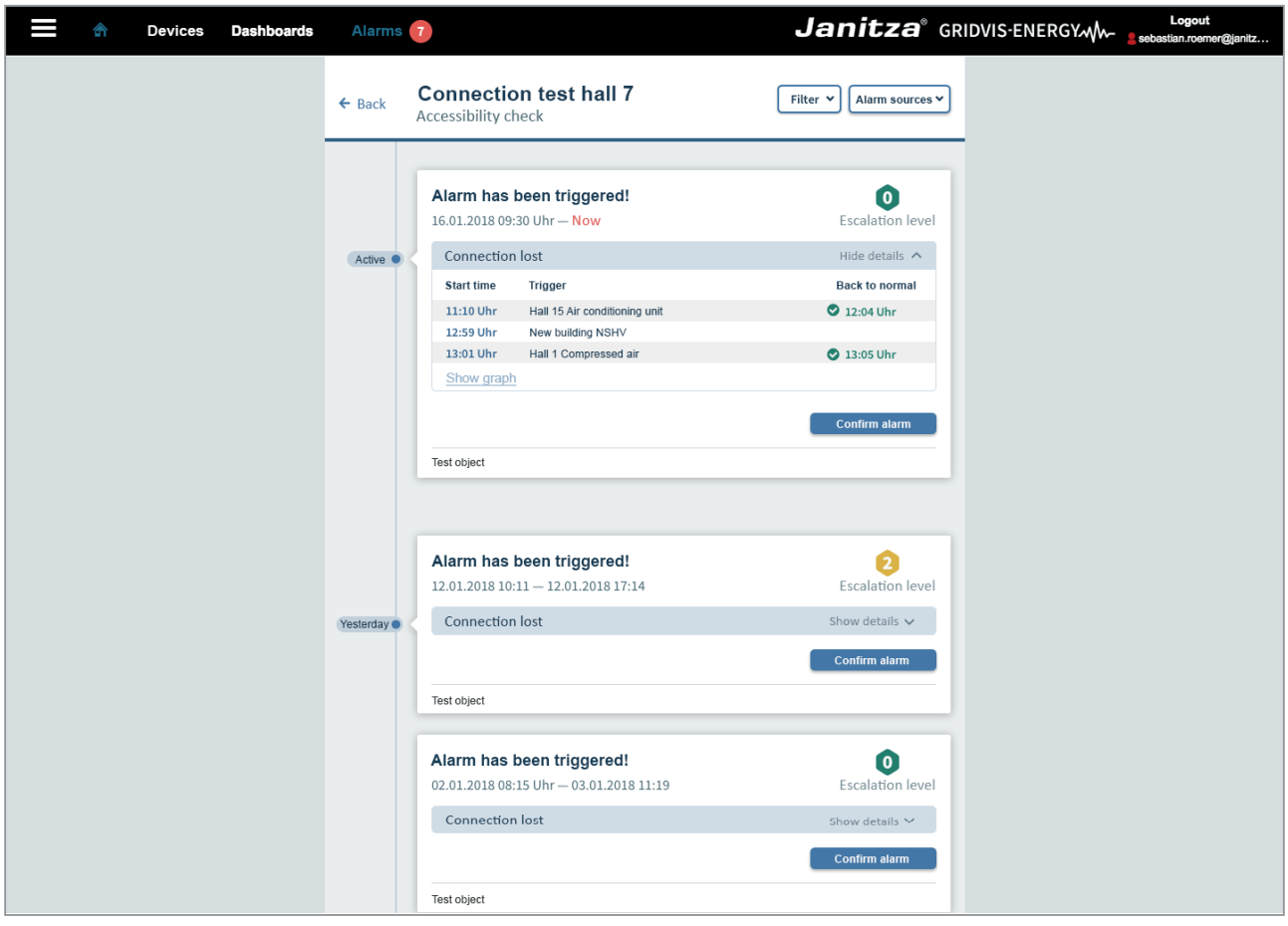
GridVis® event browser

Alarm management

Convenient alarm management is essential for critical systems. It makes it possible to detect limit value violations at an early stage and to effectively avoid unplanned shutdowns through targeted organizational measures. GridVis® enables active monitoring of Janitza measurement devices as well as any third-party devices and variables.

Alarm management at a glance:

- Set and configure alarms
- Manage and edit existing alarms
- View and confirm current alarms
- Retrace past alarms and recognize connections in a history
- Typically monitored parameters: Power quality indicators, nominal currents and voltages, RCM (residual current monitoring), temperature values, efficiency indicators

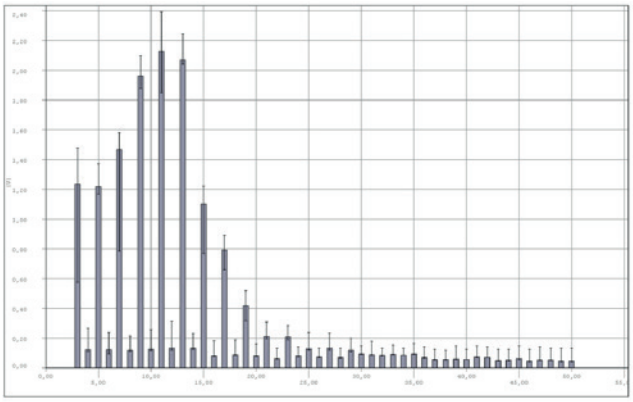


Functions of the alarm system on the web

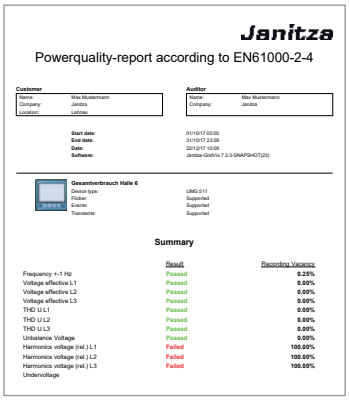
Power quality reports

The power quality in the ancillary supply equipment not provided by the electric 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 evaluate all grid compatibility levels in compliance with all relevant standards and also describe the quality of the voltage provided. These include, for example, the voltage distortion, individual harmonics, frequency and voltage.



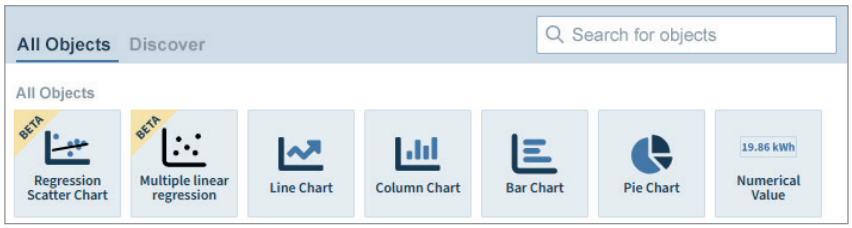
OS spectrum with limit values



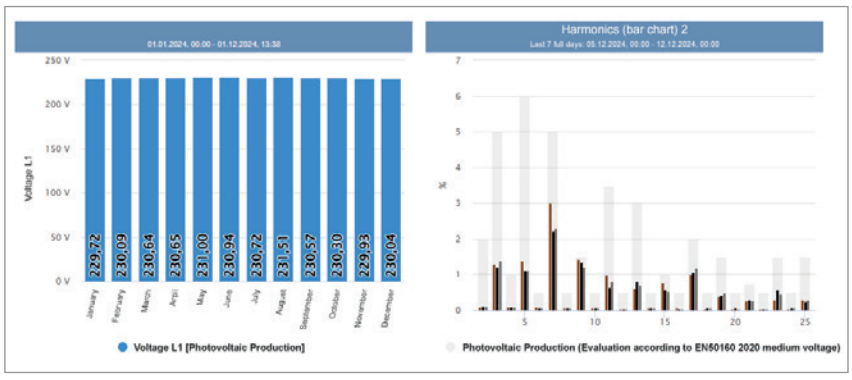
Power quality report according to EN 61000-2-4

PQ objects

Any events and transients that occurred can be conveniently summarized on your dashboards with the Power Quality objects. For example, the ITIC (CBEMA) object can be used to compare events that occurred with the tolerance limits set out in the standard.



Object selection in Dashboard Editor



Statistics and OS spectrum

Redundancies and nominal currents

The utilization report from GridVis® means nominal currents over the entire power supply system with primary and final secondary distributors can be displayed and evaluated. 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 in percent 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

17.03.2025

Utilization of circuits

Information	
Timerange	01.01.2024 - 31.12.2024
Devices	10
Groups	-
Measurements	Average (AVG)
Violations	0

Workload Ranking

	Measuring point	Workload	Current (max.)	Threshold	Current reserve
1.	Network area Frankfurt Trafo A	52%	521,13 A	1000,00 A	478,87 A
2.	Network area Berlin Trafo A	52%	518,32 A	1000,00 A	481,68 A
3.	Network area Frankfurt Trafo B	51%	510,33 A	1000,00 A	489,67 A
4.	Network area Berlin Trafo B	50%	500,02 A	1000,00 A	499,98 A
5.	Network area Dortmund Trafo A	33%	326,71 A	1000,00 A	673,29 A

Devices

		Device Description	Workload	Current (max.)	Threshold	Current reserve	L1	L2	L3	N	cos phi	Active Power	Apparent Power	Reactive Power	Active Energy	Fuse	Guaranteed Power	Power Reserve
	A	Network area Berlin Trafo A	52%	518,32 A	1000,00 A	481,68 A	502,07 A	508,08 A	518,32 A	58,30 A	1,00	350,73 kW	352,81 kVA	-1,93 kVAr	2908135 kWh	2000 A	700 kW	349,27 kW
	B	Network area Berlin Trafo B	50%	500,02 A	1000,00 A	499,98 A	487,35 A	492,02 A	500,02 A	61,80 A	-	339,07 kW	341,47 kVA	-	2811431 kWh	2000 A	700 kW	360,93 kW
	A	Network area Dortmund Trafo A	33%	326,71 A	1000,00 A	673,29 A	326,71 A	324,19 A	324,43 A	28,03 A	1,00	222,47 kW	224,18 kVA	4,05 kVAr	1844654 kWh	2000 A	700 kW	477,53 kW
	B	Network areaDortmund Trafo B	32%	321,08 A	1000,00 A	678,92 A	314,99 A	321,08 A	316,66 A	31,94 A	1,00	217,24 kW	219,01 kVA	-2,35 kVAr	1801353 kWh	2000 A	700 kW	482,76 kW
		Network area Düsseldorf Trafo A	6%	59,41 A	1000,00 A	940,59 A	54,78 A	57,66 A	59,41 A	17,76 A	0,76	30,82 kW	40,22 kVA	-21,86 kVAr	255534 kWh	2000 A	700 kW	669,18 kW
		Network area Düsseldorf Trafo B	6%	55,78 A	1000,00 A	944,22 A	51,50 A	54,81 A	55,78 A	16,75 A	0,75	28,40 kW	37,93 kVA	-21,50 kVAr	235510 kWh	2000 A	700 kW	671,60 kW
		Network area Frankfurt Trafo A	52%	521,13 A	1000,00 A	478,87 A	506,33 A	515,37 A	521,13 A	46,80 A	1,00	358,75 kW	360,29 kVA	13,95 kVAr	2974773 kWh	2000 A	700 kW	341,25 kW
		Network area Frankfurt Trafo B	51%	510,33 A	1000,00 A	489,67 A	500,35 A	509,44 A	510,33 A	43,90 A	1,00	353,96 kW	355,25 kVA	10,90 kVAr	2935070 kWh	2000 A	700 kW	346,04 kW
		Network area Hamburg Trafo A	12%	115,94 A	1000,00 A	884,06 A	113,78 A	114,51 A	115,94 A	9,51 A	0,96	77,94 kW	80,84 kVA	17,15 kVAr	646306 kWh	2000 A	700 kW	622,06 kW
		Network area Hamburg Trafo B	11%	107,81 A	1000,00 A	892,19 A	106,56 A	106,49 A	107,81 A	8,88 A	0,97	73,07 kW	75,36 kVA	15,69 kVAr	605871 kWh	2000 A	700 kW	626,93 kW
		Sum A										**573,19 kW**	**577,00 kVA**	**2,13 kVAr**				
		Sum B										**556,31 kW**	**560,48 kVA**	**-2,35 kVAr**				
		Total sum										**2052,44 kW**	**949,90 kVA**	**14,33 kVAr**	**17018638 kWh**			

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.

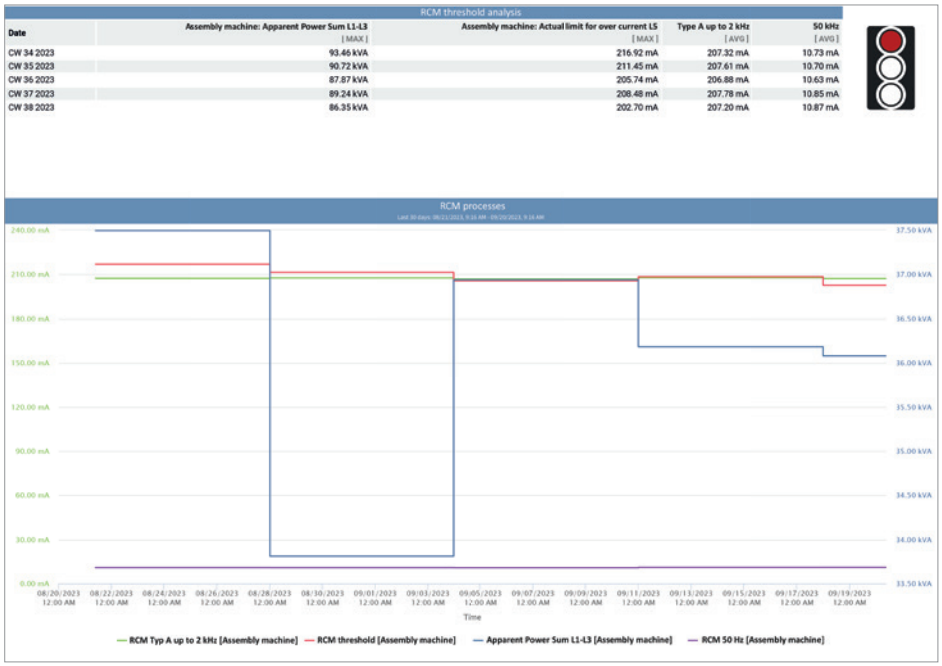
The functionality of TN-S systems can be monitored and logged using a comprehensive residual current monitoring system. Fires due to insulation faults and failures can be detected and prevented before they occur. Insulation measurements as part of the retest can be omitted and the resulting downtime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

RCM report

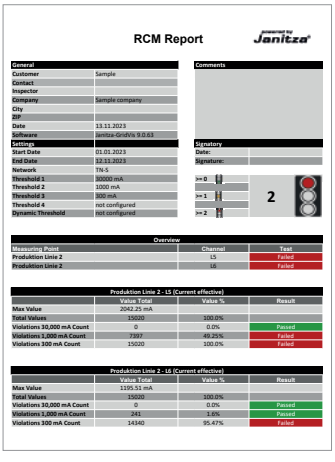
The RCM report provides a quick overview regarding the state of your power supply and differential currents. The clear color-coding enables quick statements to be made. In addition, the report is useful when satisfying the need to provide verification. Alongside the standard report, it is also possible 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:

- Meaningful statistics on exceedances of limit values for residual currents and operational interruptions
- 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



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



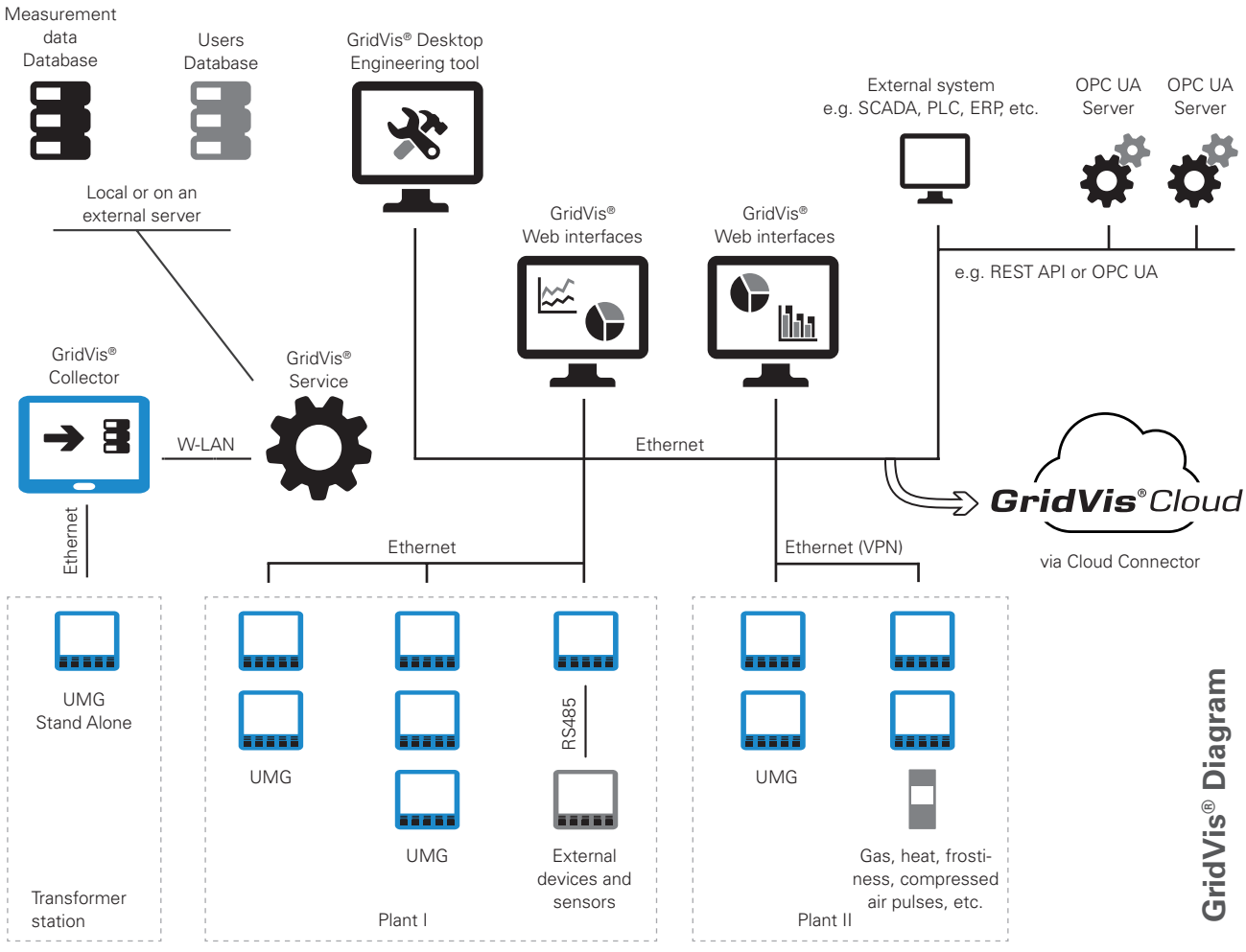
Standard RCM report

SERVICES

In addition to the power grid monitoring software, Janitza offers a wide range of complementary benefits to optimize your use of GridVis®.

Overview of the range of services

- Planning advice (new and on-going)
- 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



Extensive connectivity of GridVis®

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Item no.: 8501160 ▪ Document no.: 2.500.326.0 ▪ Dated 03/2025

Your point of contact
in the data center sector

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