Smart Energy & Power Quality Solutions



UMG 512-PRO

Class A power quality analyser

Janitza®


Power Quality Analyser
Class A
L2 U MIN
231.5 V
1.85 A
222.3 V
1.68 A
213.0 V
1.52 A
203.7 V
1.36 A
194.4 V
1.20 A
IL1
UL1
IL4
UL4
IL2
UL2
2017 Jan 21 13:27:40,437
esc
Legende
1
2
3
4
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6
Janitza
UMG 512-PRO


Energy supplier


Industry

The power quality analyser for many areas of application

The Janitza UMG 512-PRO is particularly well suited to the monitoring of power quality in accordance with current standards, e.g. EN 50160, IEEE519 or EN 61000-2-4. All power quality parameters are recorded and analysed, e.g. flicker, short-time interruptions with fault recorder function, transients, harmonics up to the 63rd order, starting currents, etc. Comprehensive communication options, e.g. Ethernet (TCP/IP) with multi-port access, BACnet, Modbus, Profibus, HTTP, FTP, SMTP, SNMP, DNS, etc. enable cost-efficient and rapid integration into existing communication architectures. The devices' own web homepages can be accessed from around the globe via a browser. The integrated Jasic® interpreter enables free access to all integrated variables (measured values etc.) through the loadable Jasic® programs. User-specific Jasic®programs can be created, whereby up to 7 can run in parallel. The GridVis®-Basic software included in the scope of delivery allows comprehensive analyses and reports for current PQ standards at the touch of a button.

Communication
- Profibus (DP/V0)
- Modbus (RTU, TCP, Gateway)
- TCP/IP
- BACnet (optional)
- HTTP
- FTP (file transfer)
- TFTP
- NTP (time synchronisation)
- SMTP (email function)
- DHCP
- SNMP

Interfaces
- Ethernet
- Profibus (DSUB-9)
- RS485 Modbus (terminal strip)

Accuracy of measurement
- Energy: Class 0.2S (... / 5 A)
- Current: 0.1 %
- Voltage: 0.1 %

Networks
- IT, TN, TT networks
- 3 and 4-phase networks

Power quality
- Harmonics up to the 63rd harmonic, odd / even
- Flicker measurement
- Short term interruptions (from 10 ms)
- Transient recorder (> 39 µs)
- Start-up currents (> 10 ms)
- Imbalance
- Half wave RMS recordings (up to 11 min.)
- Events can be displayed as waveforms

Measured data memory
- 256 MByte Flash

Programming language
- Graphical programming
- Jasic®
- PLC functionality

Network visualisation software
- GridVis®-Basic (in the scope of supply)

2 digital inputs
- Pulse input
- Logic input
- State monitoring
- HT / LT switching

2 digital outputs
- Pulse output kWh / kvarh
- Switch output
- Threshold value output
- Logic output

(expandable via external I/O modules)

Thermistor input
- PT100, PT1000, KTY83, KTY84

RCM – Residual Current Monitoring
- 2 residual current inputs





First class power quality measurement

User-friendly, colour graphical display with intuitive user guidance
- High resolution colour graphical display 320 x 240, 256 colours
- User-friendly, self-explanatory operation
- Illustration of measured values in numeric form, as a bar graph, line graph or waveform
- Waveform representation of current and voltage
- Online and historical graphs of events and transients

Modern, open communications architecture via Ethernet
- Simple integration in an Ethernet network
- Integration in PLC systems and building management systems through additional interfaces, 4 ports simultaneously
- Various IP protocols: SNMP, ICMP (Ping), NTP, FTP ...

RCM measurement
- 2 RCM current measurement inputs
- The residual current monitoring in conjunction with GridVis® alarm management provides additional safety
- Leakage current measurement with wire breakage detection

Measurement device homepage with password protection
- Web server on the measuring device (device's own homepage)
- Online data available directly via the homepage

BACnet protocol for building communication
- Optimal interoperability between devices from various manufacturers and a great variety of trades
- Predefined BIBBs (BACnet Interoperability Building Block)
- Supports device type B-SA with the BIBBs DS-RP-B and DS-WP-B, BIBBs DS-COV-B and DM-UTC-B
- BACnet is optionally available with UMG 512-PRO

Modbus Gateway function
- Ethernet-Modbus gateway
- Ideal for master-slave structures, reading out Modbus measurement devices via the UMG 512-PRO at Ethernet level





Programming / PLC functionality
- Further processing of the measurement data in the measuring device (local intelligence)
- Monitoring and alarm functions
- Sustainable functional expansions far beyond pure measurement, Apps from the Janitza library
- Comprehensive programming options with
  – Jasic® source code programming
  – Graphical programming

Large 256 MB measurement data memory
- Memory range up to 2 years (configuration-dependent)
- Individually configurable recordings
- PQ recordings template preconfigured for conventional standards (e.g. EN 50160)

Alarm management
- Information available immediately by email
- Programming via Jasic® or graphical programming
- Comprehensive alarm management functions via GridVis®-Service alarm management

Peak load representation
- Illustration of the 3 highest monthly power peaks on the LCD display (P, Q, S)
- Rolling bar chart representation of the peak power values over 3 years on the LCD display (P, Q, S)

Power quality
- Class A certificate (IEC 61000-4-30)
- Events and transients
- Flicker, imbalance, THD, rotation field....
- GridVis® PQ software
- Extensive PQ reports

Harmonics
- Harmonics up to 63rd harmonic and interharmonics
- Distortion factors THD-U, THD-I

First class power quality measurement

Power quality
- Harmonics analysis up to the 63rd harmonic, odd / even (U, I, P, Q)
- Interharmonics (U, I)
- Distortion factor THD-U / THD-I / TDD
- Measurement of positive, negative and zero sequence component
- Imbalance
- Direction of rotation field
- Voltage crest factor
- Flicker measurement in accordance per DIN EN 61000-4-15
- Logging and storage of transients (> 39 µs)
- Short term interruptions (from 10 ms), illustration with effective values and waveforms
- The half wave effective values of voltage, current, power, reactive power and frequency for star and delta are available simultaneously

High quality measurement
- Constant true RMS
- Measurement process in accordance with IEC 61000-4-30
- Certified accuracy of measurement per class A
- Continuous sampling of the voltage and current measurement inputs at 25,600 Hz
- 512 measurement points per period
- Recording of over 2,000 measured values per measurement cycle
- Accuracy of measurement of the active energy: Class 0.2S
- Ultrasonic measurement even enables the logging of rapid transients from 39 µs
- Logging of currents and voltages (15 – 440 Hz)

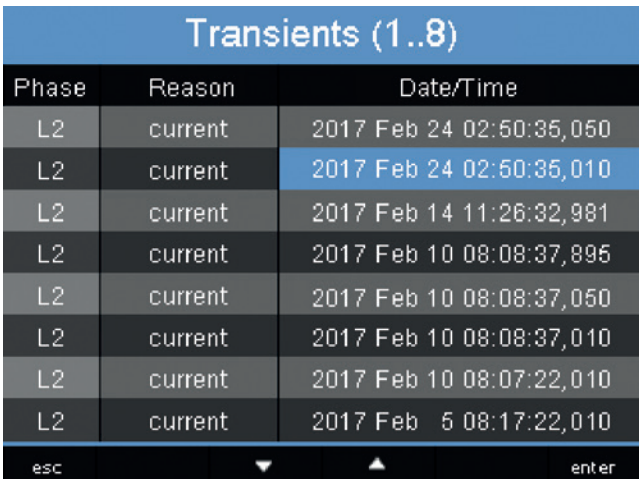


Fig.: Transients list

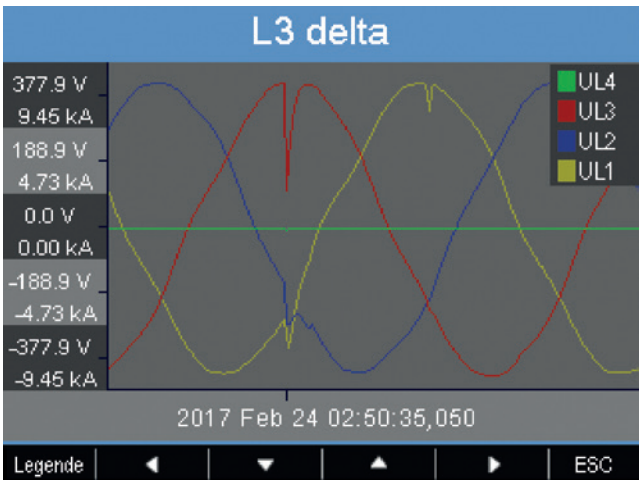


Fig.: Graphical representation of a transient

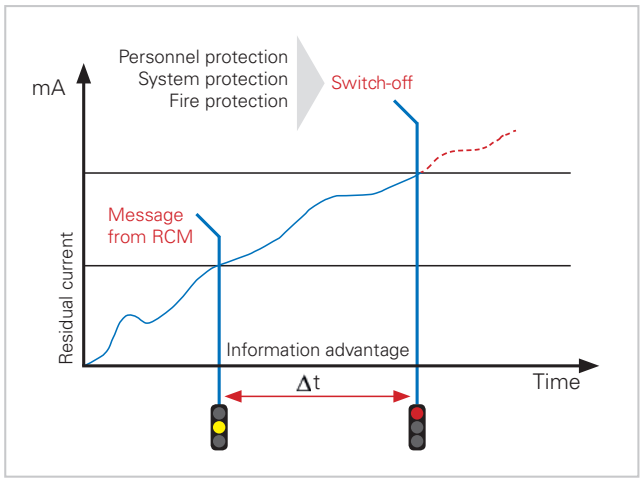


Fig.: Report prior to switching off – an aim of residual current monitoring



Fig.: Illustration of online and historical data via the device homepage

GridVis® – network visualisation software

With GridVis®, Janitza offers powerful, user-friendly software for the development of energy and power quality monitoring systems. The basic version GridVis®-Basic, which is part of the scope of delivery of the measurement devices, serves both for the programing and configuration of the UMG 512-PRO and also for the reading out, saving, display, processing and analysis of the measurement data. GridVis® is a comprehensive and scalable software solution for energy suppliers, industrial applications, facility management, building market and infrastructure projects. GridVis® provides technicians and managers with the required data to identify potential energy savings, reduce energy costs, avoid production shut-downs and optimise the utilisation of production resources.

- Intuitive operation
- Configuration of the measurement system and the UMG measurement devices
- Certified ISO 50001 EnMS software
- Automatic or manual readout of measurement data
- Graphical illustration of online and historical measurement data
- Comprehensive alarm management
- User management
- Generic Modbus devices, virtual meters
- Graphic user interface (topological view) for visualising real-time data and messages

- Display of minimum, average and maximum values in a graph
- Statistical evaluation of the measured data
- Comprehensive export functions (e.g. Excel)
- Reports for energy usage and power quality (EN 50160, IEEE 519, EN 61000-2-4) manual or time-controlled with individual schedule
- Saving of data in a central database incl. database management (e.g. MySQL / MS SQL / Derby / Janitza DB)
- Open system architecture and scalability

Diverse attributes are dependent on the version



Reporting

The power quality in the real grid nowadays is far removed from a pure sinusoidal waveform in most cases. Various different "grid feedback effects" in the form of voltage interruptions, transients, harmonics, flicker or start-up currents change the sinusoidal character of the currents and thus also the voltage. The GridVis® software offers all tools necessary for the PQ analysis and likewise for the energy management systems. The heart of the network analysis and the energy management is the reporting system of the GridVis® software. This shows at a glance the confirmation of whether the power quality is adequate or not in the time period in question. Reports can compile different information, depending on the requirements and the settings. Thus one can have energy and power related cost centre reports, for example. In doing so the display of arbitrary media (gas, water, etc.) is possible. Load profile analyses provide a quick overview of the peak consumption.

Power quality

- Pre-defined PQ reports provide immediate statements about the power quality and compliance with the applicable standards: EN 50160, EN 61000-2-4, NeQual, IEEE 519, ITIC (CBEMA) (only manual)
- Reports can be generated, time-driven
- Freely configurable time plans
- Reports' outputs as paper or digital (HTML, XML, Excel, Word or PDF)
- Convenient, time-driven, automatic Excel export for further processing of the data or incorporation into other systems

Energy management

- Integrated report generator enables the evaluation of the delivered energy usage data
- Presentation of the electrical energy values from measurement devices as well as evaluation of other media (e.g. gas, water, etc.) possible
- Load profile analyses provide an overview of peak consumption throughout a stipulated period of time



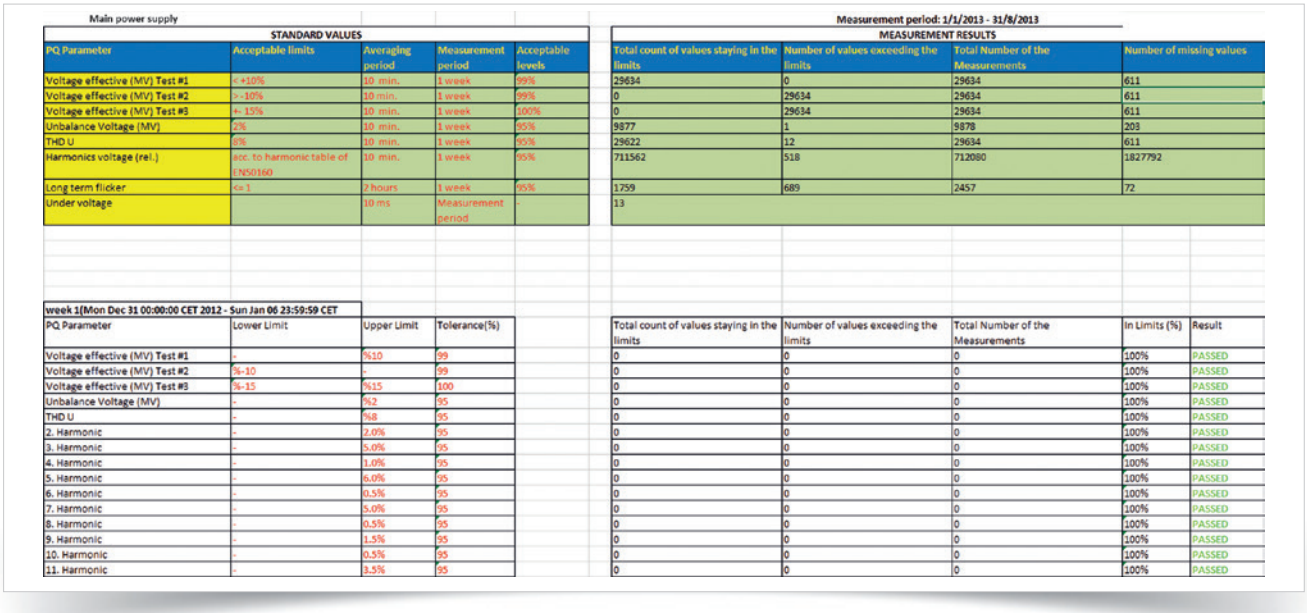
EN 50160 power quality, annual report

Energy suppliers have the challenge of numerous measurement points over a 52 week period. In practice one cannot look through this large number of individual reports. The GridVis® software provides reports for energy supply companies, distribution network operators and regulatory authorities. This annual overview is based on the standard EN 50160 and ensures a quick overview of the supply areas in which EN 50160 was not complied with for defined periods of the year.

Total number of breaches of EN 50160



Fig.: Heatmap, i.e. colour (traffic light principle) illustration of how good or bad the power quality was at a particular measurement point in a calendar week. This principle guarantees a quick overview of the complete supply area.



Main power supply

STANDARD VALUES				
PQ Parameter	Acceptable limits	Averaging period	Measurement period	Acceptable levels
Voltage effective (MV) Test #1	< +10%	10 min.	1 week	99%
Voltage effective (MV) Test #2	> -10%	10 min.	1 week	99%
Voltage effective (MV) Test #3	+- 15%	10 min.	1 week	100%
Unbalance Voltage (MV)	2%	10 min.	1 week	95%
THD U	8%	10 min.	1 week	95%
Harmonics voltage (rel.)	acc. to harmonic table of EN50160	10 min.	1 week	95%
Long term flicker	<= 1	2 hours	1 week	95%
Under voltage		10 ms	Measurement period	-

Measurement period: 1/1/2013 - 31/8/2013

MEASUREMENT RESULTS			
Total count of values staying in the limits	Number of values exceeding the limits	Total Number of the Measurements	Number of missing values
29634	0	29634	611
0	29634	29634	611
0	29634	29634	611
9877	1	9878	203
29622	12	29634	611
711562	518	712080	1827792
1759	689	2457	72
13			

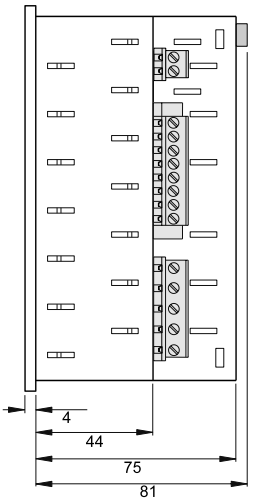
week 1(Mon Dec 31 00:00:00 CET 2012 - Sun Jan 06 23:59:59 CET

PQ Parameter	Lower Limit	Upper Limit	Tolerance(%)	Total count of values staying in the limits	Number of values exceeding the limits	Total Number of the Measurements	In Limits (%)	Result
Voltage effective (MV) Test #1	-	%10	99	0	0	0	100%	PASSED
Voltage effective (MV) Test #2	%-10	-	99	0	0	0	100%	PASSED
Voltage effective (MV) Test #3	%-15	%15	100	0	0	0	100%	PASSED
Unbalance Voltage (MV)	-	%2	95	0	0	0	100%	PASSED
THD U	-	%8	95	0	0	0	100%	PASSED
2. Harmonic	-	2.0%	95	0	0	0	100%	PASSED
3. Harmonic	-	5.0%	95	0	0	0	100%	PASSED
4. Harmonic	-	1.0%	95	0	0	0	100%	PASSED
5. Harmonic	-	6.0%	95	0	0	0	100%	PASSED
6. Harmonic	-	0.5%	95	0	0	0	100%	PASSED
7. Harmonic	-	5.0%	95	0	0	0	100%	PASSED
8. Harmonic	-	0.5%	95	0	0	0	100%	PASSED
9. Harmonic	-	1.5%	95	0	0	0	100%	PASSED
10. Harmonic	-	0.5%	95	0	0	0	100%	PASSED
11. Harmonic	-	3.5%	95	0	0	0	100%	PASSED

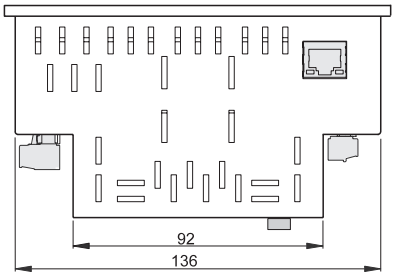
Fig.: Extract from the EN 50160 annual report

Dimension diagrams

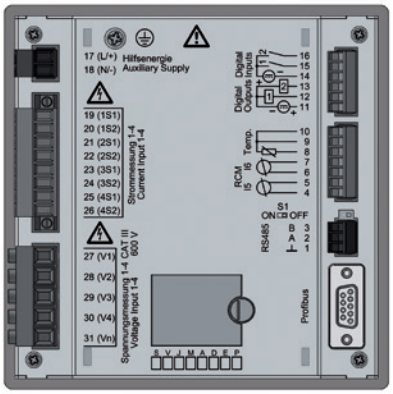
All dimensions in mm



Side view

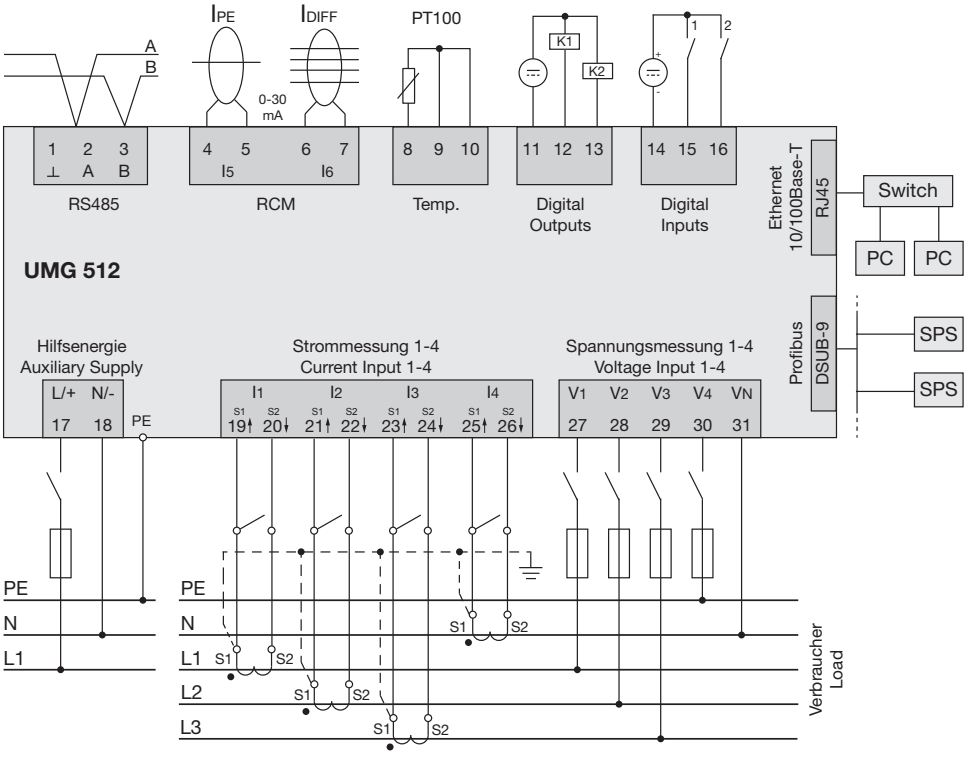


View from below



Rear view

Typical connection variants



Device overview and technical data

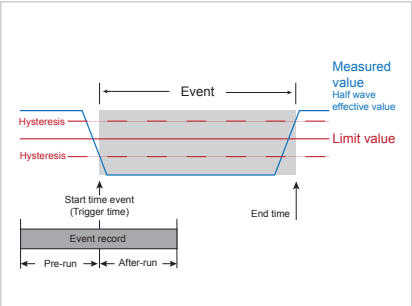


Fig.: The event record consists of a mean value, a minimum or maximum value, a start time and an end time. With longer events, the waveform will be recorded both at the start and at the end of the event.

UMG 512-PRO		
Item number	**52.17.011**	**52.17.003**
Supply voltage AC	95 ... 240 V AC	48 ... 110 V AC
Supply voltage DC	80 ... 300 V DC	24 ... 150 V DC

General	
Use in low, medium and high voltage networks	•
Measurement accuracy for current / voltage	0.1 % / 0.1 %
Accuracy of measurement with active energy (kWh, .../5 A)	Class 0.2S
Number of measurement points per period (uninterrupted measurement)	512
Effective value measurement - momentary and mean values	
Current, voltage, frequency	•
Active, reactive and apparent power / total and per phase	•
Power factor / total and per phase	•
Energy measurement	
Active, reactive and apparent energy [L1, L2, L4, L3, Σ L1–L3, Σ L1–4]	•
Number of tariffs	8
Measurement of the power quality	
Harmonics per order / current and voltage / active and reactive power	1st - 63rd
Distortion factor THD-U / THD-I in %	•
Current and voltage, positive, zero and negative sequence component	•
Flicker	•
Transients	> 39 µs
Short term interruptions, events	10 ms
Oscillogram function (waveform U and I)	•
Ripple control signal	•
Under and overvoltage recording	•
Measured data recording	
Memory (Flash)	256 MB
Mean, minimum, maximum values	•
Measured data channels	10
Alarm messages	•
Display	
LCD colour graphical display 320 x 240, 256 colours, 6 buttons	•
Language selection	•
Password protection	•
Interfaces	
RS485: 9.6 – 921.6 kbps (plug-in strip)	•
Profibus DP: Up to 12 Mbps (DSUB-9-plug)	•
Ethernet 10/100 Base-TX (RJ-45 socket)	•
Protocols	
Modbus RTU, Modbus TCP, Modbus RTU over Ethernet	•
Modbus Gateway for Master-Slave configuration	•
Profibus DP V0	•
HTTP (homepage configurable)	•
SMTP (email), NTP (time synchronisation), TFTP, FTP (file transfer), SNMP, DHCP, TCP/IP, BACnet (optional)	•
Software GridVis®-Basic*1	☑

Comment:
For detailed technical information please refer to the operation manual and the Modbus address list.

• = included - = not included

*1 = Optional additional functions with the packages GridVis®-Professional, GridVis®-Enterprise and GridVis®-Service.

Technical data	
Type of measurement (4 quadrants)	Continuous real effective value measurement up to the 63rd harmonic
Frequency measuring range	15 ... 440 Hz
Sampling frequency	25.6 kHz / phase
Rated current	x / 5 A or x / 1 A
Overload for 1 sec.	120 A (sinusoidal)
Residual current inputs	2
Measurement range, residual current input	0.05 ... 30 mA
Temperature measurement inputs	1

Smart Energy &
Power Quality Solutions

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Item no.: 33.03.673 • Doc. no.: 2.500.046.9 • 04/2018 • Subject to technical alterations.

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