

UMG 512-PRO

Class A power quality analyzer
for panel mounting 144 x 144 mm

**MÜLLER
ZIEGLER** 
Elektrische
Messgeräte

Certificated
ISO 9001
ISO 50001
IEC 61000-4-30
UL



Interfaces

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

Communication

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

Power quality

- Harmonics up to 63.th 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 display in waveforms

Measured data memory

- 256 MB Flash
- 32 MB SDRAM

Accuracy of measurement

- Energy: class 0,2S (.../5 A)
- Current and voltage: 0,1%

Inputs / outputs

- 2 digital inputs
- 2 digital outputs

Networks

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

Thermistor input

- PT100, PT1000, KTY83, KTY84



Application

The class A multifunctional power analyzer UMG 512-PRO is used for continuous monitoring of the voltage quality and for harmonic analysis in energy distribution systems. The documentation of the voltage quality for customers and supervisory authorities is the main task of the device; the current voltage quality standards and standards for measurement methods are observed.



Special features

<ul style="list-style-type: none"> • Continuous monitoring of the power quality 	<ul style="list-style-type: none"> • Documentation of the power quality for customers and regulatory authorities
<ul style="list-style-type: none"> • Harmonics analysis with power quality problems 	<ul style="list-style-type: none"> • Report generator for power quality standards: EN 50160, IEE519, EN61000-2-4, ITIC...
<ul style="list-style-type: none"> • Checking the internal supply network according to EN 61000-4-7, EN 61000-4-15, IEC 61000-4-30 	<ul style="list-style-type: none"> • Report generator for energy consumptions
<ul style="list-style-type: none"> • Fault analysis in case of problems with the energy supply 	<ul style="list-style-type: none"> • Remote monitoring of critical processes



Main features

Power quality

- Harmonics analysis up to the 63rd harmonic, even / odd (U, I, P, Q)
- Interharmonics (U, I)
- Distortion factor THD-U / THD-I / TDD
- Measurement of positive, negative and zero sequence component
- Unbalance
- Direction of rotation field
- Voltage crest factor
- Flicker measurement in accordance with DIN EN 61000-4-15
- Logging and storage of transients ($> 39 \mu\text{s}$)
- Short-term interruptions (ab 10 ms)
- Monitoring start-up processes

High quality measurement

- Constant true RMS measurement
- Measurement process in accordance with IEC 61000-4-30
- Certified accuracy of measurement according to class A
- Continuous sampling of the voltage and current measurement inputs at 25,6 kHz
- 512 measurement points per period
- Recording of over 2,000 measured values per measurement cycle
- Accuracy of active energy measurement: Class 0.2S
- Fast measurement even enables the logging of rapid transients from $39 \mu\text{s}$
- Logging of currents and voltages (15 – 440 Hz)

RCM (Residual Current Monitoring)

- Continuous monitoring of residual currents (Residual Current Monitor, RCM)
- Alarming in case a preset threshold fault current reached
- Near-realtime reactions for triggering countermeasures
- Permanent RCM measurement for systems in permanent operation without the opportunity to switch off
- Ideal for the central earthing point in TN-S systems

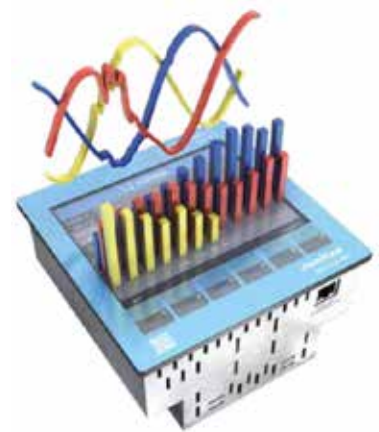


Fig.: High quality measurement results with graphical representation.



Fig.: Connection example of residual current monitoring and PE via current transformers

User-friendly, colour graphical display with intuitive user guidance

- High resolution colour graphical display 320 x 240, 256 colours, 6 buttons
- User-friendly, self-explanatory and intuitive operation
- Backlight for optimum reading, even in darker environments
- Illustration of measured values in numeric form, as a bar graph or line graph
- Clear and informative representation of online graphs and power quality events
- Multilingual: German, English, Russian, Spanish, Chinese, French, Turkish ...

Various characteristics

- 4 voltage and 6 current measurement inputs
- 2 digital inputs, e.g. as data logger for S0 meter
- 2 digital outputs for alarm message or e.g. for connection to a BMS or PLC
- Free name assignment for the digital IOs, e.g. if used as data logger

Comprehensive communication and connection possibilities

- Modbus
- Profibus
- Ethernet (TCP/IP)
- Digital IOs
- BACnet (optional)
- Configurable Firewall

Modern communications architecture via Ethernet

- Simple integration in an Ethernet network
- Reliable and cost-optimised establishment of communication
- Ideal for Master-Slave structures
- High flexibility due to the use of open standards
- Integration in PLC systems and BMS through additional interfaces
- Various IP protocols: SNMP, ICMP (Ping), NTP, FTP ...
- Up to 4 ports simultaneous

Measuring device homepage

- Web server on the measuring device, i.e. device's inbuilt homepage
- Function expansion possible through APPs
- Remote operation of the device display via the homepage
- Comprehensive measurement data incl. PQ (transients, events ...)
- Online data directly available via the homepage, historic data optional via the APP measured value monitor, 51.00.245

BACnet protocol for building communication

- Optimal interoperability between devices from various manufacturers
- Predefined BIBBs (BACnet Interoperability Building Block)
- BACnet is optionally available with UMG 512-PRO
- UMG 512-PRO supports the device type B-SA with the BIBBs DS-RP-B and DS-WP-B
- Furthermore, the BIBBs DS-COV-B and DM-UTC-B are also supported

Modbus Gateway function

- Economical connection of subordinate measuring devices without Ethernet interface
- Integration of devices with Modbus-RTU interface possible (harmonisation of data format and function code necessary)
- Data can be scaled and described
- Minimised number of IP addresses required
- Tried and tested integrated solution without additional hardware

Ereignisse (1..8)		
Phase	Art	Datum/Uhrzeit
L1	U MIN	2017 May 3 12:19:00,626
L1	I MAX	2017 Apr 19 14:30:51,873
L1	I MAX	2017 Apr 19 13:50:04,705
L1	I MAX	2017 Apr 19 13:49:34,695
L1	I MAX	2017 Mar 16 16:20:19,123
L3	U MIN	2017 Feb 24 02:50:38,935
L2	U MIN	2017 Jan 21 13:27:40,437
L1	I MAX	2016 Dec 4 04:22:15,115

Fig.: Event list

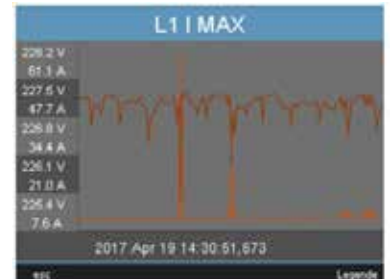


Fig.: Graphical event display (voltage drop)

UMG512					
	Spannung	Strom	Wirkleistung	Blindleistung	PF1
L1-N	229 V	0.16 A	0.03 kW	+0.01 kvar	0.95
L2-N	231 V	0.09 A	0.01 kW	+0.01 kvar	0.93
L3-N	231 V	0.09 A	0.01 kW	+0.01 kvar	0.91
L4-N	1.79 V	0.00 A	-0.00 kW	+0.00 kvar	-0.94
L1-L3	50.0 Hz	0.14 A	0.06 kW	+0.03 kvar	0.91
	Ausgang		Eingang		

Fig.: List of measuring values



Fig.: Homepage - device overview



Fig.: Replacing the battery using ling-nose pliers

Programming / PLC functionality

- Further processing of the measurement data in the measuring device (local intelligence)
- Monitoring and alarm functions simple to program
- Sustainable functional expansions far beyond pure measurement
- Comprehensive programming options with
 - Jasic® source code programming
 - Graphical programming
- Complete APPs from the Janitza library

Large measurement data memory

- 256 MB data memory
- Memory range up to 2 years (configuration-dependent)
- Individually configurable recordings
- Recording averaging times can be freely selected
- PQ recordings template preconfigured for conventional standards (e.g. EN 50160)
- User-defined memory segmenting possible

Powerful alarm management

- Information available immediately by email
- Inform maintenance personnel via the powerful device homepage
- Via digital outputs, Modbus addresses, GridVis®- Power Grid Monitoring Software
- Programming via Jasic® or graphical programming
- Further 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)
- Plain text representation on the LCD display (P)

GridVis® Essentials - Power Grid Monitoring Software

- Multilingual
- Manual read-out of the measuring devices
- Manual report generation (power quality and energy consumption reports)
- Comprehensive PQ analysis with individual graphs
 - Online graphs
 - Historic graphs
 - Graph sets
- Integrated databases (Janitza DB, Derby DB)
- Graphical programming
- Topology views
- High memory range

Certified quality through independent institutes

- ISO 9001
- Energy management certified according to ISO 50001
- Class A certificate (IEC 61000-4-30)
- UL certificate
- EMC-tested product



Fig.: Example harmonics voltage L1



Fig.: Example phase sequence in the vector diagram

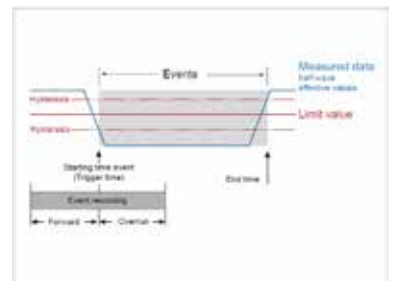


Fig.: The event record consists of a mean value, a minimum or maximum value, a start time and an end time.

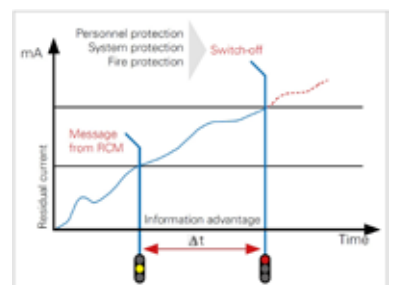


Fig.: Report prior to switching off – an aim of residual current monitoring



Typical connection variant

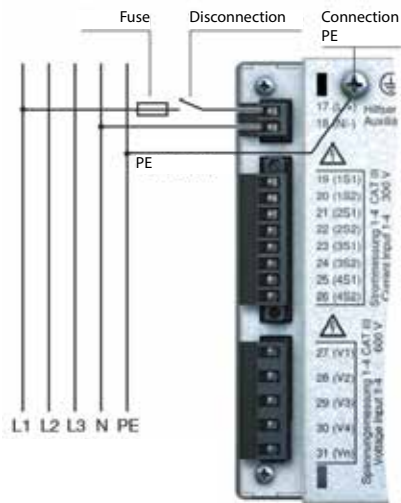
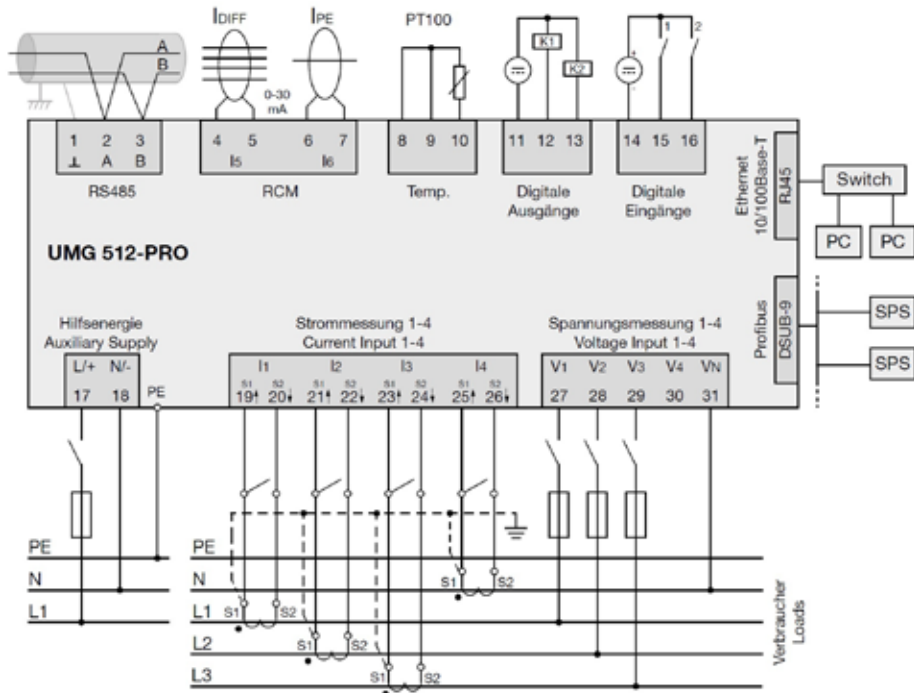


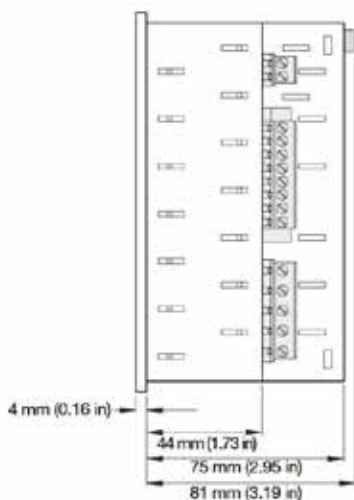
Fig.: Connection of auxiliary voltage



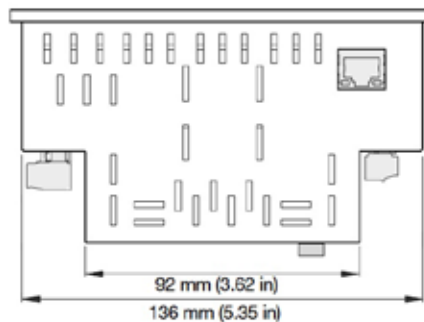
Fig.: Rear view UMG 512-PRO



Dimensions



Side view
Cut-out $138^{+0.8}$ mm x $138^{+0.8}$ mm



View from below



General data

General	Net weight (with attached connectors)	approx. 1080 g (2.38 lb)
	Dimensions (W x H x D)	approx. 144x75x144 mm (5.67x2.95x5.67 in)
	Battery	Type Lithium CR2450, 3V (approval in acc. with UL 1642)
	Clock (in temperature range -40 °C to 85 °C)	+5 ppm (corresp. to approx. 3 min per year)
Transport and storage	Free fall	1 m (39.37 in)
	Temperature	-25° C to +70° C (-13° F to 158° F)
Ambient conditions during operation	Protection class (The device is intended for weather-protected, stationary use.). The device must be connected to the ground wire connection!	I acc. to IEC 60536 (VDE 0106, part 1)
	Working temperature range	-10° C to +55° C (14° F to 131° F)
	Relative humidity	5 to 95% (at 25° C/77° F) without condensation
	Operating altitude	0 to 2000 m above sea level
	Pollution degree	2
	Installation position	upright
	Ventilation	forced ventilation is not required
	Protection against ingress of solid foreign bodies and water	acc. to EN 60529
	- Front / - Rear / - Front with seal	IP40 / IP 20



Technical data

Supply voltage	Option 230 V	
	Nominal range	95 V - 240 V (50/60 Hz) or DC 80 V - 300 V, 300 V CAT III
	Power consumption	max. 14 VA / 7 W
	Option 24 V	
	Nominal range	48 V - 110 V (50/60 Hz) or DC 24 V - 150 V, 300 V CAT III
	Power consumption	max. 13 VA / 9 W
	Operating range	+/- 10% of nominal range
Protection of the supply voltage (fuse)	6 A, Typ C (approved as per UL/IEC)	
Voltage measurement	<i>The voltage measurement inputs are suitable for measurements in the following power supply systems:</i>	
	3-phase 4-wire systems with rated voltages up to	417/720 V (+ 10%) 347/600 V UL listed
	3-phase 3-wire systems with rated voltages up to	600 V (+ 10%)
	<i>From a safety and reliability perspective, the voltage measurement inputs are designed as follows:</i>	
	Overvoltage category	600 V CAT III
	Measurement voltage surge	6 kV
	Protection of voltage measurement	1 - 10 A
	Metering range L-N	0 ¹⁾ - 600 Vrms
	Metering range L-L	0 ¹⁾ - 1000 Vrms
	Resolution	0,01 V
	Crest factor	1,6 (related to 600 Vrms)
	Impedance	4 MΩ / Phase
	Power consumption	approx. 0,1 VA
	Sampling rate	25,6 kHz / Phase
	Transients	39 μs
	U _{din} ²⁾ as per EN61000-4-30	100 - 250 V
	Flicker range (dU/U)	27,5%
Frequency of the fundamental oscillation	45 Hz ... 65 Hz, resolution 0,001 Hz	

¹⁾ The device can only determine measured values, if an L-N voltage of greater than 10 Veff or an L-L voltage of greater than 18 Veff is applied to at least one voltage measurement input.

²⁾ U_{din} = arranged input voltage according to DIN EN 61000-4-30

Current measurement	Rated current	5 A
	Metering range	0,005 to 7 A rms
	Measurement range exceeded (overload)	as of 8,5 A rms
	Crest factor	1,41
	Resolution	0,1 mA
	Overvoltage category	Option 230 V: 300 V CAT III Option 24 V: 300 V CAT II
	Measurement voltage surge	4 KV
	Power consumption	approx. 0,2 VA (Ri = 5 m Ω)
	Overload for 1 sec.	120 A (sinusoidal)
	Sampling rate	25,6 kHz / Phase

Residual current monitoring (RCM)	Rated current	30 mA rms
	Metering range	0 - 40 mA rms
	Triggering current	100 μA
	Resolution	1 μA
	Crest factor	1,414 (related to 40 mA)
	Burden	4 Ohm
	Overload for 1 sec.	5 A
	Sustained overload	1 A
	Overload for 20 ms	50 A
	Residual current monitoring	acc. to IEC/TR 60755 (2008-01), Type A
	Maximum external burden	300 Ohm (for cable break detection)

Phase angle accuracy	of measurement	0,075°
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Digital outputs	2 digital outputs with a joint earth	opto coupler, not short-circuit proof
	Supply voltage	20 to 30 V DC (SELV or PELV supply)
	Switching voltage	max. 30 V AC, 60 V DC
	Switching current	max. 50 mAeff AC/DC
	Response time (Jasic program)	200 ms
	Switching frequency	max. 20 Hz
	Cable length	up to 30 m (32.81 yd) unshielded from 30 m (32.81 yd) shielded

Digital inputs	2 digital inputs with a joint earth	
	Maximum counter frequency	20 Hz
	Response time (Jasic program)	200 ms
	Input signal present	18 V to 28 V DC (typical 4 mA)
	Input signal not present	0 to 5 V DC, current less than 0,5 mA
	Cable length	up to 30 m (32.81 yd) unshielded from 30 m (32.81 yd) shielded

Temperature measurement	3-wire measurement	
	Update time	1 Sekunde
	Connectable sensors	Pt100, Pt1000, KTY83, KTY 84
	Total burden (sensor + cable)	max. 4 kOhm
	Cable length	up to 30 m (32.81 yd) unshielded from 30 m (32.81 yd) shielded

Sensor type	Temperature range	Resistor range	Measur.uncertainty
KTY83	-55° C ... +175° C (-67° F .. to 347° F)	500 Ohm ... 2,6 kOhm	+/- 1,5% rng
KTY84	-40° C ... +300° C (-40° F .. to 572° F)	350 Ohm ... 2,6 kOhm	+/- 1,5% rng
Pt100	-99° C ... +500° C (-146,2° F .. to 932° F)	60 Ohm ... 180 Ohm	+/- 1,5% rng
Pt1000	-99° C ... +500° C (-146,2° F .. to 932° F)	600 Ohm ... 1,8 kOhm	+/- 1,5% rng

RS485 interface	3-wire connection with GND, A, B	
	Protocol	Modbus RTU/slave, Modbus RTU/master, Modbus RTU/gateway
	Transmission rate	9,6 kbps, 19,2 kbps, 38,4 kbps, 57,6 kbps, 115,2 kbps, 921,6 kbps
	Termination resistor	can be activated by micro switch
Profibus interface	Connection	SUB D 9-pin
	Protocol	Profibus DP/V0 acc. to EN 50170
	Transmission rate	9,6 kBaud to 12 MBaud
Ethernet interface	Connection	RJ45
	Function	Modbus, Gateway, Embedded Webserver (HTTP)
	Protocols	CP/IP, EMAIL (SMTP) DHCP client (BootP), Modbus/TCP, Modbus RTU over Ethernet, FTP, ICMP (Ping), NTP, TFTP, BACnet (Option), SNMP
Terminal connection capacity	Supply voltage	Connectable conductors (only one conductor can be connected per terminal!)
	Single core, multi-core, fine-stranded	0,2 - 4 mm ² , AWG 28-12
	Cable end sleeve (not insulated)	0,2 - 2,5 mm ² AWG 26-14
	Cable end sleeve (insulated)	0,2 - 2,5 mm ² AWG 26-14
	Tightening torque	0,4 - 0,5 Nm (3.54 - 4.43 lbf in)
	Stripping length	7 mm (0.2756 in)
Terminal connection capacity	Voltage and current measurement	Connectable conductors (only one conductor can be connected per terminal!)
	Single core, multi-core, fine-stranded	0,2 - 4 mm ² , AWG 28-12
	Cable end sleeve (not insulated)	0,2 - 4 mm ² AWG 26-12
	Cable end sleeve (insulated)	0,2 - 2,5 mm ² AWG 26-14
	Tightening torque	0,4 - 0,5 Nm (3.54 - 4.43 lbf in)
	Stripping length	7 mm (0.2756 in)
Terminal connection capacity	Residual current monitoring	Connectable conductors (only one conductor can be connected per terminal!)
	Single core, multi-core, fine-stranded	0,2 - 1,5 mm ² , AWG 28-16
	Cable end sleeve (not insulated)	0,2 - 1,5 mm ² AWG 26-16
	Cable end sleeve (insulated)	0,2 - 1,5 mm ² AWG 26-16
	Tightening torque	0,2 - 0,25 Nm (1.77 - 2.21 lbf in)
	Stripping length	7 mm (0.2756 in)
	Cable length	up to 30 m (32.81 yd) unshielded from 30 m (32.81 yd) shielded
Terminal connection capacity	Thermistor input	Connectable conductors (only one conductor can be connected per terminal!)
	Single core, multi-core, fine-stranded	0,2 - 1,5 mm ² , AWG 28-16
	Cable end sleeve (not insulated)	0,2 - 1,5 mm ² AWG 26-16
	Cable end sleeve (insulated)	0,2 - 1,5 mm ² AWG 26-16
	Tightening torque	0,2 - 0,25 Nm (1.77 - 2.21 lbf in)
	Stripping length	7 mm (0.2756 in)

