

MAVOLOG 10L/N/S Power Analyzer

3-349-028-03

2/4.99

Test Instrument for the Monitoring of Voltage Quality
and Power Analyzer for Long-Term Recording

Features

- **Monitoring of supply power quality**
with recording function for the simultaneous logging of three-phase AC quantities
- **Internal voltage quality analysis**
for short-term, daily and weekly intervals in accordance with EN 50160, as well as other industrial standards
- **256 k internal memory**,
capacity for various measuring and testing tasks can be configured in a user specific fashion
- **RS485 interface**
for connection of up to 32 instruments
- **Alarm output for events messages**
- **METRAwin[®]10 for MAVOLOG PC software** as accessory for parameters configuration, programming and data transfer



Applications

Interference generated by users causes disturbances within the distribution network which may influence the reliability of operations for other consumers within the network. Free markets for electrical power supply thus necessitate special measures which assure adequate quality for all consumers within a power network.

MAVOLOG 10 series three-phase power analyzers have been designed primarily for the acquisition of electrical power supply characteristics and monitoring of the corresponding compatibility level (voltage quality) in accordance with the standards. Characteristics for available AC quantities can be continuously recorded at the same time.

The measured quantities required for energy and power analysis in three-phase systems are also made available with the MAVOLOG 10S model (with current inputs).

Description

Even the **MAVOLOG 10L** basic version without current inputs or LCD is equipped with a programmable alarm output for events messages. The primary range of applications includes the areas of voltage quality and voltage recording in three-phase AC systems.

Measurement values are acquired and stored to internal memory along with the relevant analyses at either short-term, daily or weekly intervals depending upon memory configuration.

Connection to other instruments, as well as to a PC, is established via the RS485 interface.

The **MAVOLOG 10N** is equipped with an LCD for the on-site observation of measurement values and analyses. Up to ten selected measurement quantities and analyses can be consecutively displayed at the LCD by activating a push-button. This version is otherwise identical to the MAVOLOG 10L.

The **MAVOLOG 10S** power analyzer with LCD and current inputs is a universal instrument for the recording of the characteristics of significant power quantities in three-phase systems, and for the testing of voltage quality characteristics.

Measured quantities U_1 , U_2 , U_3 and U_N , as well as I_1 , I_2 and I_3 , are processed directly at a DSP (digital signal processor). The user-specific selection of available measured quantities and analyses is stored to the internal **256 k memory**. Memory configuration can be adapted within a broad range to the desired requirements. Stored data are uploaded to the computer via the RS485 interface. Up to 32 instruments with different configurations can be connected with a bus cable. The bus configuration provides for plain and simple configuration, as well as reliable operation.

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Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 50160	Voltage characteristics in public electrical power supply networks
EN 60529 VDE 0470 Part 1	Test instruments and test procedures Protection provided by enclosures (IP Code)
EN 50081-2	Electromagnetic compatibility (EMC) Generic standard for interference emission
EN 50082-2	Electromagnetic compatibility (EMC) Generic standard for interference immunity
EN 61000-4-15	Flicker meters: functional description and design specification

Technical Data

Voltage Inputs

Number	4 (U_{L1} , U_{L2} , U_{L3} , U_N)
Measuring Ranges	100 V/400 V selectable via PC software
Voltage Measurement	phase-earth 0 ... (57.7) 230 ... (76) 300 V phase-phase 0 ... (100) 400 ... (132) 520 V
Overload	max. 600 V AC
Connection	4-wire / 3-wire with artificial neutral point
Measuring Method	RMS, AC DIN 40110-1 and 2
Averaging Time	1 second
Frequency	45 ... 65 Hz
Impedance	2.4 M Ω
Transformation	voltage transformation programmable from 1.00 to 655.35

Frequency Measurement at Voltage Input U_{L1} Only

Current Inputs (MAVOLOG 10S)

Number	4 (I_{L1} , I_{L2} , I_{L3} , I_N) zero current measurement via internal summation current transformer
Measuring Range	1: 0 ... 1 ... 1.2 A 2: 0 ... 5 ... 6 A selectable via PC software
Overload	1.2-fold
Surge Withstand Capability	50 A, 1 s
Measuring Method	RMS, AC DIN 40110-1 and 2
Averaging Time	1 second
Frequency	45 ... 65 Hz
Impedance	typ. 40 m Ω
Transformation	Current transformation programmable from 1 to 65,535

Measuring Error at Nominal Value

Voltage	Class 0.2
Current	Class 0.2
Power	Class 0.4
Frequency	$\pm(0.5 \text{ Hz} + 1 \text{ digit})$

Reference Conditions

Frequency	50 Hz ± 1 Hz
Temperature	23° C ± 2 K
Relative Humidity	50% $\pm 5\%$
Auxiliary Power	24 V $\pm 10\%$
Measuring Range	230 V, 1 A
Voltage and Current Transformation Ratio	1
cos ϕ	1
Waveshape	sine, total harmonic distortion < 1% $\pm 0.1\%$ of reading

Auxiliary Voltage

Voltage Range	18 ... 36 V DC
Power Consumption	< 3 W
Stored Energy Time	device: typ. 100 ms at 24 V DC clock: approx. 12 hours

Real-Time Clock

Resolution	10 ms
Accuracy	± 25 ppm per month at 20° C
Date	year/month/day: YYYY.MM.DD
Time	hours/minutes/seconds: hh:mm:ss.ss

Mechanical Design

Standard combination housing for mounting to plate or to DIN top-hat rail (EN 50022 / 32 mm)	
Terminals	screw terminals, max. 2.5 square mm
Dimensions	100 mm x 75 mm x 105 mm
Weight	approx. 360 gr.

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Electrical Safety

Overvoltage Category	III per EN 61010
Protection Class	II
Protection	housing: IP 40 terminals: IP 00
Operating Voltage	300 V

Test Voltages (type test (safety impedance))

Inputs to Interface, Auxiliary Voltage, Relay	3.7 kV
Inputs to Housing	3.7 kV

Ambient Conditions

Climatic Category	3z/55/75
Temperature Range	operation: 0° C...+55° C storage / transport: -25° C...+75° C
Deployment	indoor use only, to 2000 m above sea level

Electromagnetic Compatibility (EMC)

Interference Emission	EN 50081-1: 1992
Limit Value Class	B

Interference Immunity	EN 50082-2: 1992
Instrument	8 kV atmospheric ESD 10 V/m fields
Cables	symmetrical 2 kV burst symmetrical 1 kV burst asymmetrical 2 kV burst

Sampling Frequency

6.4 kHz, corresponds to 128 samples per period at 50 Hz
12 bit resolution

Data Interface

Type	RS485
Baud Rate	115/57/19.2/9.6 kBaud
Bus Capacity	32 users without bus coupler
Matching Resistor	1.2 k Ω

Alarm Output

Number	1
Switching Element	Relay
Contact Type	normally closed / normally open, programmable
Switching Capacity	50 V, 0.5 A
Assignments	event or events group, programmable (group interrupt)

Data Storage

Memory Capacity	256 kByte
Operating Modes	FIFO (first in first out) overwrite protected (stop mode)
Functions	Events logger: Storage of events after limit values are exceeded in alphanumeric format with event type, value, date and time Graphic / event logger: Event logger with additional storage of waveshape over a time period of 2 seconds Data logger: Recording of measured quantities and analyses as measurement series. 40 of the available measured quantities can be recorded simultaneously. Selection is made with the help of METRAWin [®] 10 for MAVOLOG software.

Standard Equipment

- 1 MAVOLOG 10L, N or S instrument
- 1 Operating instructions

FFT/FSA Option

Harmonic Analysis

- Up to 40 harmonics for voltage and current
- THD (total harmonic distortion)
Accuracy: Class B in accordance with EN 61000-4-7

Flicker Interference Factor

Measurement	P_{St}/P_{Lt} per voltage input
Measuring Error	in accordance with EN 61000-4-15
Storage to Memory	continuous – averaging time P_{St} : 10 minutes – averaging time P_{Lt} : 120 minutes

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Power Analyzer

Order Information

Description	Type	Article Number
3-phase power analyzer for the acquirement of electrical power supply characteristics. Without LCD, without harmonic analysis and without flicker measurement <ul style="list-style-type: none"> • Voltage inputs • Programmable alarm output for events messages • RS 485 interface • 256 k internal memory, configurable for the storage of measurement series, events and static analyses 	MAVOLOG 10L	M830A
Same as MAVOLOG 10L, except with harmonic analysis and flicker measurement	MAVOLOG 10L+FFT/FSA	M830D
Same as MAVOLOG 10L, except with LCD and push-button for on-site display of up to 10 measured quantities and/or analyses.	MAVOLOG 10N	M830B
Same as MAVOLOG 10N, except with harmonic analysis and flicker measurement	MAVOLOG 10N+FFT/FSA	M830E
Same as MAVOLOG 10L, except with current inputs I1, I2 and I3 for max. 5 A AC and events analysis . Zero current measurement via integrated summation current transformer. LCD and push-button for on-site display of up to 10 measured quantities and/or analyses.	MAVOLOG 10S	M830C
Same as MAVOLOG 10S, except with harmonic analysis for voltage and current, as well as flicker measurement	MAVOLOG 10S+FFT/FSA	M830F
Accessories		
Battery pack (rechargeable) for power supply to MAVOLOG instruments in the event of mains failure	MAVOLOG BP	Z863E
Power back with integrated RS232-RS485 interface converter for power supply to MAVOLOG 10 instruments and MAVOLOG BP	MAVOLOG PS/C	Z863D
Uninterruptible power supply, 120 W/200 VA	USV-Pulsar 2	Z864A
Clip-on current transformer 0.5 ... 1000 A-, 1 mA-/A- with cable and protective circuit Jaw opening: 54 mm max. cable diameter	Z3512	GTZ 3512 000 R0001
Clip-on current transformer 1 ... 2000 A-, 1 mA-/A- with cable and protective circuit Jaw opening: 64 mm max. cable diameter	Z3514	GTZ 3514 000 R0001
Software		
Data transmission and analysis software for MAVOLOG in German and English	METRAwin [®] 10 for MAVOLOG	Z852D

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