GOSSEN METRAWATT

MAVOLOG®10L/N/S
Power Analyzer

3-349-028-03
3/5.03

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 up to 40 three-phase AC quantities
- **Internal voltage quality analysis**
  in accordance with EN 50160 and/or industrial standards
- **640 k internal memory**,
  capacity for various measuring and testing tasks can be configured in a user specific fashion
- **RS485 interface**
  for the connection of up to 32 instruments to field bus and via coupling modules to Ethernet/Internet, telephone network
- **Alarm output for events messages**
- **PC software METRAwin®10 for MAVOLOG®** as accessory for parameters configuration, evaluation and export of measurement data

Applications

Line Measurements and Power Disturbance Logging in Industrial Applications

- Recording phase currents and power quantities as mean and maximum values allows you to **recognize critical load conditions** and to **quantify remaining reserves** within the electrical system.
- By recording the corresponding power demand values, you can determine your own **characteristic load profile** in order to realize **energy cost reductions by means of diminished load peaks**.
- Energy consumption measurements within several distribution branches provide you with **greater energy consumption clarity**, and assure **correct billing of costs** to the appropriate departments or cost centers.
- The **effectiveness of utilized compensation equipment can be tested**, and associated cost saving potential can be determined with the help of reactive energy measurements.
- A greatly increased number of non-linear consumers gives rise to the growing occurrence of line voltage distortion (harmonics). Increased losses at power transmission equipment and certain types of consumers, as well as **overloading of compensation equipment and neutral conductors** represent additional consequences. This can be **prevented** by measuring harmonic voltages and currents, and neutral conductor current.
- Simultaneous logging of the load current profile in the event of voltage dips allows you to draw **conclusions regarding the cause** of this most common type of **disturbance** in industrial electrical networks. This provides you with a **basis for the clarification of malfunctions** of machines and equipment, or for the implementation of corrective measures.

Power Quality Monitoring within the Service Region of Power Utilities

MAVOLOG®10 offers long-term and synchronous logging of quality-related line voltage characteristics in accordance with EN 50160 from a great number of widely distributed measuring points on high, medium and low voltage level. For remote querying of data records you can either use cable-based or wireless communication lines. The data volume to be transmitted and managed in the central database is minimized by intelligent preprocessing of the measurement data in the instrument.

The software packages on offer enable you to choose from a wide range of options for analyzing, documenting or exporting the data received to other programs.

MAVOLOG®10L/N/S
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Analyzer Variants

MAVOLOG® series instruments have been designed to allow for the selection of ideal configurations for all types of applications, from power generation (utilities) to consumer applications, in combination with multiple instruments or as a stand-alone. Even the inexpensive basic model, the MAVOLOG® 10L+FFT/FSA, provides for comprehensive disturbance recording and voltage quality analysis with integrated harmonic analysis (FFT) and flicker measurement (FSA).

Equipped with an LCD and additional current inputs, the top of the line MAVOLOG®10S+FFT/FSA is a universal measuring instrument which can be used for recording the characteristics of all important measured quantities in 3-phase systems, and simultaneously acquires power disturbances and characteristics for the analysis of voltage quality.

Type		MAVOLOG®10L +FFT/FSA	MAVOLOG®10N +FFT/FSA	MAVOLOG®10S +FFT/FSA	MAVOLOG®10S
FEATURES	Order number	**M830S**	**M830P**	**M830R**	**M830V**
Voltage					
Measurement inputs		3x U_{L-L}/U_{L-N} & U_{N-PE}	3x U_{L-L}/U_{L-N} & U_{N-PE}	3x U_{L-L}/U_{L-N} & U_{N-PE}	3x U_{L-L}/U_{L-N} & U_{N-PE}
Dips, Interruptions		>10 ms	>10 ms	>10 ms	>10 ms
Swells		>10 ms	>10 ms	>10 ms	>10 ms
Asymmetry		●	●	●	●
Frequency		●	●	●	●
Harmonics		1 - 40 & THD	1 - 40 & THD	1 - 40 & THD	❍
Flicker (Pst, Plt)		●	●	●	❍
EN 50160 analysis		●	●	●	❍
Current					
Measuring channels		❍	❍	3 x I_L & I_N	3 x I_L & I_N
Characteristics in case of voltage dips		❍	❍	Resolution: 10 ms	Resolution: 10 ms
Harmonics		❍	❍	1 - 40 & THD	❍
Power / Energy					
Active power P1, P2, P3, PΣ		❍	❍	●	●
Apparent power SΣ		❍	❍	●	●
Reactive power QΣ		❍	❍	●	●
Power factor PFΣ		❍	❍	●	●
Active energy WPΣ		❍	❍	●	●
Reactive energy WQΣ		❍	❍	●	●
Alphanumeric LCD					
Measured values, analyses		❍	10, selectable	10, selectable	10, selectable
Device configuration parameters		❍	●	●	●

● available
❍ not available

MAVOLOG®10L/N/S
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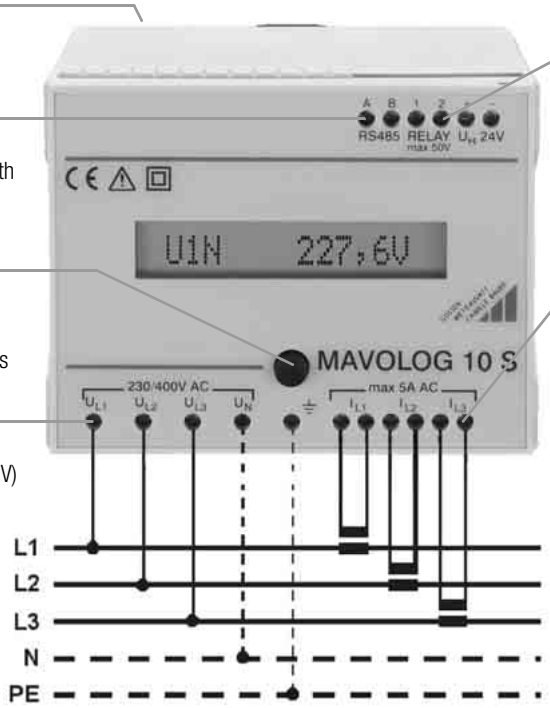
Compact Design
for wall or top-hat rail mounting

RS485 Interface
for connection to a standardized 2-wire bus with up to 32 users (9.6 to 115 kbits per second)

LCD with Display Selector Key
for on-site monitoring of

- Measured / analyzed values for 10 quantities
- Device settings

4 Voltage Measurement Inputs
with selectable measuring range (100 V / 400 V) and programmable transformer ratio for the measurement of U_{L-L} or U_{L-N} and U_{N-PE}



Relay Output
with temporary or continuous signal for indicating events

3 Current Inputs (MAVOLOG 10 S)
with selectable measuring range (1 A/5 A) and programmable transformer ratio for the measurement of I_L and indirect acquisition of I_N via an internal summation current transformer

Flexible Memory Organization

The available measurement data memory can be partitioned and/or used for the execution of various recording tasks. Ring mode or stop mode operation can be selected individually for both partitions.

Example

50% for interval measurement data of 40 measured quantities stored at 10 min intervals over more than 27 days

50% for event data, covering more than 25,000 events

Events Memory

Records line voltage anomalies chronologically. The following, simultaneously active trigger criteria can be configured to this end:

- Upper / lower 10 minute voltage limit value
- Upper / lower 10 ms voltage limit value
- Nominal frequency with tolerance
- 10 minute asymmetry limit value
- Plt flicker limit value*
- 10 minute voltage harmonics limit value*
- 10 minute THD_U limit value*
- N-PE voltage limit value

The following information is available for each event:

- Date and time
- Type of event / event-causing phase
- Measured value (e.g. magnitude and duration of a voltage dip)

*) fixed limit values per EN 50160

Interval Memory

Continuously records measurement data using an adjustable memory interval (1 or 10s, 1, 5, 10 or 15 min., 1 or 24 h). Depending upon the instrument type, up to more than 300 measured quantities or analyses are available.

Of these, up to 40 data retrieval points can be defined for simultaneous recording. Individually for each data point, logging of the instantaneous value (1 s mean value), the minimum value, the maximum value or the mean value during the interval period can be selected.

Signal Memory

Records time characteristics of voltage dips, failures or swells based upon 10 ms TRMS values within a 2 second window with a 25% pre-trigger. Recording of either the affected voltage signal only, or all voltage signals can be selected, and recording of current signals can also be selected with the MAVOLOG®10S.

Statistics Memory

Statistically acquires all relevant data for the exclusive performance of conformity evaluation with regard to EN 50160 based upon counter readings. These include, for example, the number of voltage dips (classified) and interruptions, as well as the total duration of overvoltages and undervoltages, or other limit value violations.

This memory is always active and requires no parameters configuration. Its contents are continuously updated after resetting.

Daily Max. Value Memory

Records extreme values for line voltage each day at midnight, as well as for each harmonic which was maintained for 95% of the day.

With the MAVOLOG®10S, measured maximum values for active and reactive power and phase current since the last reset, as well as energy consumption, are also saved to memory.

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Applicable Regulations and Standards

IEC 61010-1/DIN EN 61010 -1 / VDE 0411 Part1	Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
DIN EN 60529 VDE 0470 Part 1	Test instruments and test procedures Protection provided by enclosures (IP Code)
DIN 40110-1/-2	AC quantities, 2-wire/multiple-wire electric circuits
DIN EN 61326 VDE 0843 Part 20	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61000-4-7 VDE 0847-4-7	Testing and measuring techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto
EN 61000-4-15 VDE 0847-4-15	Testing and measuring techniques – Flicker meters: functional description and design specification
EN 50160	Voltage characteristics in public electric power supply networks
NRS 048-2:1996	Electricity Supply – Quality of Supply – Classification of voltage clips (South Africa)

Technical Data

Voltage Measurement Inputs

Type	4 high impedance AC voltage inputs with common reference point for direct connection to 3~ low voltage systems or system-side voltage transformers		
Measuring channels	Y: U_{1-N}, U_{2-N}, U_{3-N}, U_{N-PE} Δ: U_{1-2}, U_{2-3}, U_{3-1}, U_{N-PE}		
Measuring ranges	nominal Y/Δ	0...57,7/100 V~	0...230/400 V~
	maximum Y/Δ	0...75/130 V~	0...300/520 V~
Transformation ratio	Uratio range	0.01...65535	0.01...65535
Measuring resolution	@ Uratio = 1	0.01 V	0.1 V
Overload withstand	600 V continuous		
Input impedance	2.4 MΩ		
Line frequency	50/60 Hz		
Waveshape	Sinusoidal or distorted up to the 40th harmonic		

Current Measurement Inputs

Type	3 electrically isolated AC current inputs for direct current measurement or connection to a current transformer		
Measuring channels	I_{L1}, I_{L2}, I_{L3} and I_N indirectly via internal summation current transformer		
Measuring ranges	nominal	0 ... 1 A~	0 ... 5 A~
	maximum	0 ... 1,2 A~	0 ... 6 A~
Transformation ratio	Iratio range	1...65535	1...65535
Measuring resolution	@ Iratio = 1	0.001 A	0.01 A
Overload withstand	12 A continuous; 50 A for 1s		
Input impedance	typical 40 mΩ		
Nominal frequency	50/60 Hz		
Waveshape	Sinusoidal or distorted up to the 40th harmonic		

Measuring functions

Logging	Simultaneous sampling of voltage and current measuring inputs with A-D conversion of instantaneous values
Sampling rate	6.4 kHz
Sampling resolution	12 Bit

Voltage / Current

Measuring method	True root mean square measurement (TRMS AC)
Measuring uncertainty	±(0.2% rdg. + 3 digits)

Frequency

Measuring range	45 ... 65 Hz
Measuring resolution	0.01 Hz
Measuring uncertainty	±0.05 Hz

Power

Measuring resolution	0.1 W (@Uratio=1, Iratio=1)
Measuring uncertainty	±(0.4% rdg. + 6 digits)

Harmonics

Measuring method	FFT (Fast Fourier Transformation), EN 61000-4-7
Measuring range	1st to 40th harmonic and THD
Measuring uncertainty	Class B per EN 61000-4-7

Flicker

Measuring method	Flicker meter per EN 61000-4-15
Measuring range	Pst (10 min), Plt (120 min)
Measuring uncertainty	per EN 61000-4-15 - 4% voltage fluctuation

Display

Display element	Alphanumeric LCD, 1line (60 x 10 mm)
Display functions	10 selectable measured quantities, setting and device parameters, memory status active/inactive

Controls

1 key for scrolling through display

Real-Time Clock

Time format	Date	DD.MM.YYYY
	Time	hh:mm:ss,00
Resolution	10 ms	
Drift	maximum 1 minute/month (= 25 ppm)	
Adjustment/ synchronization	PC system time is transferred via the data interface synchronized within approximately 0.1 s.	

Alarm Output

Number	1 isolated switching output for signaling events by continuous or pulse signal with adjustable duration
Switching element	Relay contact; programmable as NO or NC
Switching capacity	50 V; 0.5 A
Allocation	Group alarm for all events; can be masked for flicker and harmonic

Memory

Memory type	non-volatile flash memory

Setup Memory

Function	Storage of device settings
Data retention time	unlimited

Measurement Data Memory

Function	Simultaneous storage of measurement series and events (qualitative and quantitative) in separate storage areas: **Interval memory:** time-controlled recording of up to 40 measured quantities and analyses as measuring series with memory interval: 1 / 10 seconds 1 / 5 / 10 / 15 minutes 1 / 24 hours **Event memory:** storage of event data (date and time, event type, event-causing phase, value) triggered by measured values with adjustable limit values for voltage quality characteristics per EN 50160 **Signal memory:** event-triggered storage of 10 ms TRMS value characteristics for voltage and current within a 2 second time window with a 0.5 second pre-trigger
Capacity	640 kB; can be partitioned
Operating mode	FIFO memory (ring mode) Overwrite-protected memory (stop mode)
Data retention time	unlimited

Data Interface

Type	bidirectional RS485 2-wire bus (conversion to RS232 with MAVOLOG®PS/C or C232/485 module)
Functions	- Configuration and querying of device parameters - Querying of currently measured data (online) - Querying of stored measurement data (offline) - Firmware update
Bus capacity	max. 32 users (without booster)
Transmission speed	9.6/19.2/57.6/115.2 kBaud (kBits per sec.)
Terminal resistance	1.2 kΩ

Auxiliary Power

Voltage range	18 … 36 V DC
Power consumption	max. 3 W
Hold-up time	Device function: 100 ms at 24 V DC typ. Real-time clock: > 12 hours

Reference Conditions

Frequency	50 Hz ±1 Hz
Temperature	23 °C ±2 K
Rel. humidity	50% ±5%
Auxiliary power	24 V DC ±10%
Measuring range	230 V, 1 A
Transformation ratio	for voltage Uratio = 1, for current Iratio = 1
cosφ	1
Waveshape	Sinusoidal, harmonic distortion ≤ 1%

Electrical Safety

Overvoltage category	CAT III per EN 61010-1 for 300 V to earth
Safety class	II
Operating voltage	300 V

Test voltages (Type test (protective impedance))

Inputs to interface, auxiliary voltage, relay	3.7 kV AC
Inputs to housing	3.7 kV AC

Electromagnetic Compatibility (EMC)

Interference emission	EN 61326:2002 class A
Interference immunity	EN 61326:2002 EN 61000-4-2: 1995/A1: 1998 Feature A 8 kV atmosph. discharge 4 kV contact discharge EN 61000-4-3: 1995/A1: 1998 Feature A EN 61000-4-4: 1995 Feature A EN 61000-4-5: 1995 Feature A EN 61000-4-6: 1996 Feature A

Ambient Conditions

Temperature range	Operation/function: 0 °C...+55 °C Storage/transport: –25 °C...+75 °C
Relative humidity	max. 90 %, no condensation allowed
Elevation	up to 2000 m above sea level
Deployment	indoors

Mechanical Design

Housing	„CombiNorm“ housing for panel mounting or DIN top-hat rail (EN 50022/32mm)
Protection	Housing: IP 40 Terminals: IP 00
Terminals	Screw terminals max. 2.5 mm²
Dimensions	100 mm x 75 mm x 105 mm
Weight	MAVOLOG®10L/N: approx. 280 g MAVOLOG®10S: approx. 380 g

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Accessory Components

Various accessory components for auxiliary power and communications functions are available for cost optimized utilization and ideal functionality of MAVOLOG® power analyzers in consideration of prevailing conditions at the installation site.
This modular design concept allows for best-suiting adaptation or expansion of the system in order to fulfill changing requirements.

MAVOLOG®PS/C (Z863D)
MAVOLOG®PS/C universal (Z863G)

The MAVOLOG®PS/C module (PS = power supply / C = converter) includes a power pack with a 24 V DC output for supplying power to as many as five MAVOLOG®10 instruments and one MAVOLOG®BP, as well as a bidirectional RS 232 – RS 485 interface converter for communication between a PC using MAVOLOG® control software, and each individual instrument.
Up to 32 MAVOLOG®10 instruments can be connected to the RS 485 bus (max. length: 1 km, max. transmission speed: 115 kbps, half-duplex). The RS 485 and RS 232 interfaces are electrically isolated from each other, as well as from the power supply of the MAVOLOG®PS/C, in order to assure maximum operating reliability and interference immunity, in particular for interconnected PCs. The standard version is laid out for an input voltage of 230 V AC. The MAVOLOG®PS/C Universal variant has an AC/DC wide range input.

Power supply	**Z863D**	**Z863G**
Line voltage	230 V AC ±10%	50 ... 230 V AC ±10% 60 ... 320 V DC ±10%
Frequency	50 ... 60 Hz	0 ... 60 Hz
Power consumption	max. 46 VA	max. 30 VA
Consumption of nominal power	12 VA	20 VA
Fuse protection	internal PTC	internal PTC + fuse

DC Output	**Z863D**	**Z863G**
Open-circuit voltage	28 V	
Nominal voltage	24 V	20 V
Voltage @ Imax	18 V	
Nominal current	0,25 A	0,8 A
Max. load current	0,75 A	1,0 A
Residual ripple	< 1 Veff	< 0,4 Veff
Short-circuit protection	via electronic current limitation, indication of undervoltage	

Electrical safety

Safety class	II
Overvoltage category	CAT II

Mechanical Design	**Z863D**	**Z863G**
Dimensions (HxWxD)	75 x 55 x 111 [mm]	75 x 100 x 111 [mm]
Weight	ca. 800 g	350 g
Terminals	RS232: 9-pole sub-D jack RS485: 2 screw terminals A-B, screen Terminal resistance: internal 1.2 kΩ	

MAVOLOG®BP (Z863E)

The MAVOLOG®BP (BP = battery pack) is an uninterruptible DC emergency power supply which, in combination with the MAVOLOG®PS/C, automatically supplies power to connected MAVOLOG®10 instruments in the event of mains power failure.
Depending upon the number and type of instruments, they can be operated with a fully charged storage battery for up to 10 hours.
Integrated electronics regulate and monitor the charging process, assuring reliable availability of supply power and long storage battery service life.

Connection Data

Charging voltage	20 V DC ... 30 V DC
Discharge voltage	18 V DC ... 21 V DC
Charging current	„CHARGE“ 120 mA „STANDBY“ 20 mA
Overall power consumption	„CHARGE“ 150 mA „STANDBY“ 50 mA

Rechargeable Battery Characteristics

Charging time „CHARGE“	approx. 3 h
Max. discharge current	approx. 2 A, depending on condition of rechargeable battery
Type	15 x round cell 1.2 V, NiCd sintered accu
Nominal capacity	700 mAh
Service life	approx. 1,000 charging and discharge cycles approx. 3 ... 5 years buffer operation

Short-circuit protection by automatic deactivation
Deep-discharge protection by automatic deactivation
Overcharge protection by temperature monitoring

Mechanical Design

Dimensions	75 mm x 55 mm x 109 mm (HxWxD)
Weight	approx. 480 g

MAVOLOG®DFÜ (Z864C)

The MAVOLOG®DFÜ dial-up modem connects the installed MAVOLOG® power monitoring system to a master computer via public telephone lines for remote parameters configuration, control and data queries.
An SMS message can be transmitted to a cell phone or a fax machine etc., in the event of a power disturbance.

Transmission speed	33,600 kbps
Power supply	10 ... 80 V DC, via MAVOLOG®PS/C
Dimensions	75 mm x 55 mm x 110 mm (HxWxD)
Weight	approx. 250 g

Further ISDN, GSM, Ethernet modem types available on request.

C232/485 (Z863F)

This battery powered RS 232 – RS 485 interface converter is also bidirectional and automatically switches transmission direction, but it does not include electrical isolation.

It can be used in cases where the MAVOLOG®PS/C is not used to supply power to the MAVOLOG®10, and if the MAVOLOG®10 is only read out occasionally with the help of a notebook, e.g. after the occurrence of a power disturbance.

Max. baud rate	115 kBaud
Operating mode	half duplex

Power Supply

Battery	9 V block, 6LF22 or 6LR61
Power consumption	30 mA, max. 100 mA, standby < 1 µA

Mechanical Design

Dimensions	102 mm x 61.5 mm x 26 mm (HxWxD)
Weight	approx. 200 g including battery
Terminals	RS485: 2-wire connection; 0.4 m long RS232: approx. 1 m, 9-pole sub-D-jack
Displays	one LED each for power, TxD, RxD

Joint Technical Data for MAVOLOG®PS/C, MAVOLOG®BP and MAVOLOG®DFÜ

Ambient Conditions

Operating temperatures	–10 °C … +50 °C
Storage temperatures	–20 °C … +60 °C
Deployment	indoors
Elevation	max. 2000 m above sea level

Electrical Safety

Contamination degree	2

Electromagnetic Compatibility (EMC)

DIN EN 61326
VDE 0843 Part 20

Mechanical Design

Protection	terminals: IP20 housing: IP40
Housing	Plastic housing for snap-on mounting on standard profile rail DIN EN 50022/35 x 15 or wall mounting
Terminals	Screw terminals, max. cable diameter 2,5 mm^2

MAVOLOG® Mobil-Set (M830W)

Consisting of the following components, which are wired and installed to a sturdy case (46 x 16 x 35 cm):

- MAVOLOG®10S+FFT/FSA – power quality analyzer
- MAVOLOG®PS/C – mains power pack & interface converter
- MAVOLOG®BP – battery pack

Included accessories:

- Connector cables for
  – mains supply power,
  – voltage measurement inputs including alligator clips
  – RS232 interface
- Parameters configuring and analysis software METRAwin®10 for MAVOLOG®

The case has ample additional space for stowing optionally available clip-on current transformers, e.g. 3 each Z3512 (1000/1 A).

Suitable Clip-on Current Transformers

Type	Nominal Measuring Range	Transformation Factor A/A	Inherent Deviation	max. Cable Diameter
M1 100A	0.1 ... 100 A~	100:1	2% rdg.	15 mm
SM5 500A	0.5 ... 500 A~	500:5	1% rdg.	54 mm
Z3512	0.5 ... 1000 A~	1000:1	0.7% rdg.	52 mm
Z3514	1 ... 2000 A~	2000:1	0.7% rdg.	64 x 150 mm

Frequency Range	40 Hz … 5 kHz
Terminals	2 safety banana plugs 4 mm
Cable length	Z3512/Z3514: approx. 1.5 m M1 100A/SM5 500A: approx. 2 m

M1 100A | SM5 500A | Z3512 | Z3514

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METRAwin®10 - Parameters Configuring and Analysis Software

METRAwin®10 for MAVOLOG® software is used for configuring parameters and visualizing data from the MAVOLOG®10.

It includes the following functions:

- Configuration of device parameters (connection and memory parameters)
- Memory mode initialization
- Print-out of complete or daily statistics
- Visualization of interval data
- Events data formatted as a list and visualization of 10 ms TRMS values of respective event curves
- Representation of harmonics
- Online visualization of selected measured quantities

PC.doc-ACCESS Database and Report Generating Software

PC.doc-ACCESS for MAVOLOG®10 is a database program based on Microsoft Office products including WinWord, Excel and Access for the management, presentation and documentation of data recorded with the MAVOLOG®10.

The database software allows for the management of data from any number of MAVOLOG®10 instruments, and for interactive or automated, time-controlled querying with the help of a scheduler.

The software provides for comprehensive, detailed long-term analysis of voltage quality within a supply network including multiple measuring stations.

Please refer to our MAVOLOG®10 brochure for further information on the analysis software.

Order Information

Description	Type	Article number
3-phase voltage quality analyzer and test instrument for power quality per EN 50160 in CombiNorm housing including harmonic and flicker analysis, without software, incl. operating instructions	**MAVOLOG®10L+FFT/FSA**	M830S
same as MAVOLOG®10L+FFT/FSA, additional LCD for display of measurement data	**MAVOLOG®10N+FFT/FSA**	M830P
same as MAVOLOG®10N+FFT/FSA, additional current measuring inputs and power/energy analysis	**MAVOLOG®10S+FFT/FSA**	M830R
same as MAVOLOG®10S+FFT/FSA, however, without harmonic and flicker analysis	**MAVOLOG®10S**	M830V
Portable power analyser consisting of MAVOLOG®10S+FFT/FSA, MAVOLOG®PS/C, MAVOLOG®BP installed to a metal case, including mains cable, RS232 interface cable, voltage measurement cables with test probes and alligator clips, software METRAwin®10 for MAVOLOG®.	**MAVOLOG®10 Mobil-Set**	M830W
Additional Components		
Mains power pack 230 V~/24 V- for power supply to the MAVOLOG® and MAVOLOG®BP instruments, plus incorporated interface converter RS485/RS232	MAVOLOG®PS/C	Z863D
same as MAVOLOG®PS/C, however, with wide-range mains power pack 60 … 320 V DC and 50 … 230 V AC	MAVOLOG®PS/C universal	Z863G
Battery pack for emergency power supply to MAVOLOG® instruments in the event of a mains failure	MAVOLOG®BP	Z863E
Analog telephone modem in CombiNorm housing for remote data transfer	MAVOLOG®DFÜ	Z864C
Accessories		
Clip-on current transformer 0,1 ... 100 A~, 10 mA/A~ with cable and protective circuit	M1 100A	upon request
Clip-on current transformer 0,5 ... 500 A~, 10 mA/A~ with cable and protective circuit	SM5 500A	upon request
Clip-on current transformer 0,5 … 1000 A ∼, 1 mA / A ∼ with cable and protective circuit	Z3512	GTZ3512000R0001
Clip-on current transformer 1 … 2000 A ∼, 1 mA / A ∼ with cable and protective circuit	Z3514	GTZ3514000R0001
Software		
Parameters configuring and analysis software for MAVOLOG® in German and English	METRAwin®10 for MAVOLOG®	Z852D
Data base software based on MICROSOFT® OFFICE WORD™, EXCEL™ and ACCESS™ for management and documentation of MAVOLOG®10 data (German/English)	PC.doc-ACCESS for MAVOLOG®	Z8520–
Number of controllable devices up to 3		A00
up to 10		A01
up to 50		A02
up to 100		A03
more than 100		A04
Configuration Standard		D00
OEM		D01
One-day training course available on request on the customer's premises in Germany including travel costs (Dept. Training and Seminars; phone 0911/8602-406)		

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