

MAVOLOG | PRO Power Quality Analyzer

3-349-791-03

- 4 current and 4 voltage inputs with Auto-Range 12.5 A and 1000 V_{rms}
- Frequency range 16 Hz to 400 Hz
 Can be used in railway, power grid and on-board networks
- High Resolution: Continuous sampling of voltage and current inputs at 32 kHz per channel
- Up to 20 additional inputs and outputs
 - 2 analog inputs, e.g. for temperature, direct sunlight and wind speed 2 analog outputs for selectable measured quantities 8 digital inputs, e.g. for switching statuses 8 digital outputs, e.g. for rate meter pulses and masked alarms
- Spectral analysis in accordance with EN 61000-4-7
 Up to 63 harmonic
 - Acquisition of 10 custom interharmonics
 - Communication interfaces and protocols Ethernet, USB (Type B), RS232/RS485; TCP / IP, Modbus and DNP3
- Advanced Flicker according to EN 61000-4-15
 For various voltage levels
- Device supports latest Class A standard in accordance with EN 61000-4-30, 3. Edition (we are one of the first worldwide)



Features

- Evaluation of the electricity supply quality in compliance with EN 50160 with automatic report generation
- Measurements of instantaneous values of more than 140 quantities including harmonics, flicker, power line signaling voltage, unbalance...
- Class A (0.1%) accuracy in compliance with EN61000-4-30
- Recording of disturbance, trend and Power Quality (PQ) events in trigger related recorders
- Periodic measurements in 4 standard trend recorders A through D each containing up to 32 arbitrarily evaluated (maximum, minimum, average, maximum demand, minimum demand, actual) quantities with periods ranging from 1 min to 60 min
- 32 adjustable alarms in 4 alarm groups each containing up to 8 alarms. Alarms relate to a particular quantity over/under threshold and serve the purpose of controlling on-device relay outputs as well as informing the server about the occurrence of alarm events
- Recording and on-board evaluation of PQ anomalies and PQ reports based on EN 50160
- Auto range of 4 current and 4 voltage channels (max. 12.5 A and 1000 V_{RMS}) with 31 kHz sampling rate
- Recording up to 128 measurands, 32 adjustable alarms, anomalies and quality reports in the internal memory
- Measurements of 40 minimal and maximal values in different time intervals (from 1 to 256 periods)
- Frequency range from 16 Hz to 400 Hz

- Up to three independent communication ports (RS 232/485 up to 115,200 bit/s, Ethernet and USB 2.0)
- MODBUS and DNP3 communication protocols
- Support for GPS, IRIG-B (modulated and digital) and NTP real time synchronization
- Up to 20 inputs and outputs (analogue inputs/outputs, digital inputs/outputs, alarm/watchdog outputs, pulse input/outputs, tariff inputs)
- Multilingual support
- Harmonic analysis up to the 63th harmonic
- 144 mm square panel mounting
- User-friendly setting and evaluation software, MAVO-View

Additional Functions Waveform and Transient Recorder (Feature H01)

- On-board Web server support for basic measurement overview
- Oscillography capability for recording waveforms and transients with up to 625 samples/cycle sampling frequency
- All trigger related recorder data available on-demand through FTP and automatically on the MiSMART server via autonomous push communication or on demand
- A sophisticated triggering mechanism to register and record events of various nature:
- Transient event generated triggers based on hold-off time (in ms), absolute peak value, fast change (in %Un/µs)

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- PQ event generated triggers based on the following events: voltage dip, voltage swell, voltage interruption, end of voltage interruption, rapid voltage change and inrush current
- External ethernet triggers enabling trigger events with up to 8 different devices within the network
- External digital triggers based on logical/digital inputs
- Up to 16 combined triggers enabling logical operation on previously configured triggers of various nature
- Recording a wide variety of data in the internal device 8GB flash memory based on trigger settings:
- A list of all activated triggers together with time stamp, duration, condition as well as a reference to an (optionally) generated transient, waveform, disturbance and fast trend record
- Waveform recorder for waveform and transient recording with PQDIF/COMTRADE data format selection, selectable recorded channels (4×Voltage, 4×Current, 16×Logical input), 19 sample/cycle to 256 sample/cycle resolution, pretrigger time from 10ms to 1s, post trigger time up to 40 s.
- Disturbance recorder with PQDIF/COMTRADE data format selection, selectable recorded channels (4×P-N Voltage, 3×P-P Voltage, 4×Current, 8×Logical inputs), half/full cycle averaging interval, pretrigger time up to 3000 cycles, post trigger time up to 60000 cycles
- Periodic measurements in advanced fast trend recorders 1 through 4 each containing over 700 arbitrarily evaluated (maximum, minimum, average, actual) quantities with periods ranging from 1s to 60min. The recorder can be set to PQDIF data format selection
- MODBUS, DNP3 and FTP-communication protocols Webserver inclusive (embedded Linux-Board)
- MODBUS-, DNP3- and FTP-communication protocols upgradeable to EN 61850 (optional)

Description

MAVOLOG PRO is an important device for permanent monitoring of power quality from its production, transmission, distribution to final consumers, who are most affected by insufficient quality of voltage. Lack of information about supplied quality of voltage can lead to unexplained production problems and malfunction or even damage to equipment used in production process. Therefore, **MAVOLOG PRO** can be used for utility purposes (evaluation against standards) as well as for industry purposes (monitoring supplied power quality).

MAVOLOG PRO performs measurements in compliance with regulatory requested standard EN 61000-4-30 and evaluates recorded parameters for analysis according to parameters defined in European supply quality standard EN 50160:2011. Moreover **MAVOLOG PRO** stores measurements and quality reports in internal memory for further analysis over recorded measurements from multiple instruments installed on different locations to gain the overall picture of systems' behaviour.

This can be achieved with regard to **MAVOLOG PRO** accurate internal real time clock and wide range of synchronization sources support, which assure accurate, time-stamped measurements from dislocated units.

All required measurements, weekly PQ reports and alarms can also be stored locally in an internal memory. Stored data can then be transferred to a memory card or accessed through communication for post analysis.

MAVOLOG PRO features four recorders A, B, C, D which are independent of each other, alarms and 10 ms recorder for PQ events.

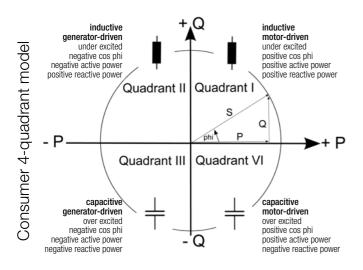
Application and Benefits

The MAVOLOG PRO power quality analyzer can be operated either as a standalone monitoring device or within a network. It is designed for the monitoring of power quality parameters. For this purpose it is normally positioned at the point-of-common-coupling (PCC) of small and medium-sized industrial and commercial energy consumers to monitor the quality of delivered electric energy or at medium or low voltage feeders to monitor, detect and record possible disturbances caused by the operation of consumers

Identifying relevant fixed measuring points is the most important task prior to complete system installation. This system itself will not prevent disturbances in network but it will help diagnose their origin and effects. And this is possible only with system approach by using time synchronized meters and predefined measuring parameters relevant for each individual measuring point.

Therefore the most extensive benefits are achieved when MAVOLOG PRO is used as a part of an energy monitoring system comprising of strategically positioned meters connected to MAVO-Database software solution. MAVO-Database data collector with "push" communication system allows automatic records of all predefined measuring parameters. They are stored in MAVO-Database database, while leaving a copy of same parameters stored locally in memory of each device as a backup copy. Database records in XML format can be searched and viewed in tabular and graphical form using MAVO-Database client or used by third-party application software. Database records can involve numerous parameters of three-phase system, power quality parameters, physical paramaters (temp., pressure, wind speed...) as well as alarms and event logs.

Determination of energy flow direction in accordance with the 4-quadrant model Energy import \leftrightarrow energy export



Compliance with Standards

Measurements and reports of power (voltage) quality (PQ) indexes are only useful when can be compared with measurements and reports from other PQ measuring devices in the supply network and evaluated against agreed limits for assessment of measured PQ indexes to establish an overall view about PQ issues in the network.

For this purpose it is essential to follow guidelines described in series of international and local standards. Beside requirements for safe operation (LVD directive) and immunity against more and more demanding disturbances (EMC directive), PQ measuring depends on two levels of standardization:

Procedures for proper acquirement of PQ indexes, their timed aggregation and required accuracy are described in a standard IEC EN 61000-4-30 and two supplementary standards IEC EN 61000-4-7 (harmonics), IEC EN 61000-4-15 (flicker meter).

Procedures for evaluation of measured PQ indexes according to limit levels described in European standard EN 50160.

MAVOLOG PRO Power Quality Analyzer follows required procedures and meets the precision requirements for class A measuring device as described in standard IEC EN 61000-4-30. It uses acquired measurements to perform automatic evaluation of PQ according to EN 50160 and issues weekly reports. In case if certain PQ indexes fail to meet required quality it also shows details of problematic measurements and time of occurrence of discrepancy.

Standard EN	Description
61010-1: 2010	Safety requirements for electrical equipment for measurement, control and laboratory use
61557-12:2008	Electrical safety in LV distribution systems up to 1kV a.c. and 1.5kV d.c. – Combined performance measuring and monitoring devices for electrical parameters
61000-4-30:2011	Electromagnetic compatibility (EMC) – Power quality measurements methods
61000-4-7:2003 + A1:2009	Electromagnetic compatibility (EMC) — General guide on harmonics and interharmonics measurements
61000-4-15:2011	Electromagnetic compatibility (EMC) – Flicker meter
50160:2011	Voltage characteristics of electricity supplied by public distribution networks
62053-22:2003	Electricity metering equipment - Static meters for active energy (classes 0,2 S and 0,5 S)
62053-23:2003	Electricity metering equipment - Static meters for reactive energy (classes 2 and 3)
61326-1:2006	EMC requirements for electrical equipment for measurement, control and laboratory use
60529:1997/A1:2000	Degrees of protection provided by enclosures (IP code)
60068-2-1/ -2/ -6/ -27/-30	Environmental testing (-1 Cold, -2 Dry heat, -30 Damp heat, -6 Vibration, -27 Shock)
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

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Technical Data

Measurement inputs

Nominal frequency range 50, 60 Hz Measuring frequency range 16 ... 400 Hz

Voltage measurements

Number of channels $4^{1)}$ Min. voltage for sync. $4^{1)}$

 $\begin{array}{lll} \mbox{Nominal value (U_N)} & 500 \ \mbox{V}_{LN} \ , \ 866 \ \mbox{V}_{LL} \\ \mbox{Max. measured value (cont.)} & 600 \ \mbox{V}_{LN} \ ; \ 1000 \ \mbox{V}_{LL} \\ \mbox{Max. allowed value} & 1.2 \times \mbox{U}_N \ \mbox{permanently} \end{array}$

 $2 \times U_N$; 10 s

Consumption $< U^2 / 4.2 \text{ M}\Omega$ per phase Input impedance $4.2 \text{ M}\Omega$ per phase

1) 4th channel is used for measuring U_{PF-N}

Current measurements

Number of channels 4

Nominal value (IN) $$\rm 1~A,~5~A$$ Max. measured value (I1-I3 only) 12.5 A sinusoidal

Max. allowed value (thermal) 15 A cont., \leq 300 A max. 1 s Consumption $< l^2 \times 0.01 \Omega$ per phase

Sampling and resolution

Waveform sampling 32 µs (625 Samples per Cycle)
ADC resolution 24 bit 8-ch simultaneous inputs
Reading refresh rate 100 ms ... 5 s (User defined)

System

Voltage inputs can be connected either directly to low-voltage network or via a voltage transformer to higher voltage network. Current inputs can be connected either directly to low-voltage network or shall be connected to network via a corresponding current transformer (with standard 1 A or 5 A outputs).

For more information about different system connections see "Connection" on page 6.

Basic accuracy under reference conditions

Accuracy is presented as percentage of reading of the measurement except when it is stated as an absolute value.

Measurand	Accuracy	Standard
Voltage L-N, L-L	± 0.1%	acc. to EN 61557-12
Current	± 0.1%	acc. to EN 61557-12
Active power (I _N = 5A)	± 0.2%	acc. to EN 61557-12
Active power (I _N = 1A)	± 0.5%	acc. to EN 61557-12
Active energy	Cl. 0.2S	acc. to EN 62053-22
Reactive energy	Cl.2	acc. to EN 62053-23
Frequency (f)	± 0.01 Hz	acc. to EN 61557-12
Power factor (PF)	± 0.5	acc. to EN 61557-12
THD (U)	± 0.3%	acc. to EN 61557-12
THD (I)	± 0.3%	acc. to EN 61557-12
Real time clock (RTC)	< ± 1s / day	acc. to EN 61000-4-30

INPUT / OUTPUT modules

MAVOLOG PRO Power Quality Analyzer is equipped with two main I/O slots, two auxiliary I/O slots and special time-synchronisation module. The following I/O modules are available:

Module type	Number of modules per slot	
	Main slot	Aux slot
Analogue output (AO)	2	/
Analogue input (AI)	2	/
Digital output (D0)	2	8
Digital input (DI)	2	8
Bistable Digital output (BO)	1	1
Status output (WO)	1 + 1xD0	/

Analogue input (AI)

Three types of analogue inputs are suitable for acquisition of low voltage DC signals from different sensors. According to application requirements it is possible to choose current, voltage or resistance (temperature) analogue input. They all use the same output terminals

MAVO-View software allows setting an appropriate calculation factor, exponent and required unit for representation of primary measured value (temperature, pressure, wind speed...)

DC current input

Nominal input range —20 ... 0 ... 20 mA (±20%)

input resistance 20Ω

accuracy 0.5% of range

temperature drift 0.01% / °C (for range 2) conversion resolution 16 bit (sigma-delta)

Analogue input mode internally referenced Single-ended

DC voltage input

Nominal input range -10 ... 0 ... 10 V (±20%)

 $\begin{array}{ll} \text{input resistance} & 100 \text{ k}\Omega \\ \text{accuracy} & 0.5\% \text{ of range} \end{array}$

temperature drift 0.01 % / °C (for range 2) conversion resolution 16 bit (sigma-delta)

Analogue input mode internally referenced Single-ended

Resistance (temperature) input

Nominal input range (low)* $0 \dots 200 \Omega$ (max. 400Ω)

PT100 (-200 °C ... +850 °C)

Nominal input range (high)* $0 \dots 2 k\Omega$ (max. $4 k\Omega$)

PT1000 (-200 °C ... +850 °C)

connection 2-wire

accuracy 0.5% of range conversion resolution 16 bit (sigma-delta)

Analogue input mode internally referenced single-ended

* Low or high input range and primary input value (resistance or temperature) are setby the MAV0-View setting software

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Analogue output (AO)

Output range 0 ... 20 mA
Accuracy 0.5% of range

Max. burden 150 Ω

Linearization Linear, Quadratic

No. of break points 5

Output value limits ±120% of nominal output

Response time (measurement and

analogue output) depends on set general average

interval (0.1s - 5s)

Residual ripple < 1 % p.p.

Outputs may be either short or open-circuited. They are electrically insulated from each other and from all other circuits.

Output range values can be altered subsequently (zoom scale) using the setting software, but a supplementary error results.

Digital input (DI)

Purpose Tariff input, Pulse input, General

purpose digital input

Max. current 8 mA (48 V), < 0.6 mA (110, 230 V)
SET voltage 60 ... 120% of rated voltage
RESET voltage 0 ... 10% of rated voltage

Tariff input Main slot only

Rated voltage (5 ... 48), 110, 230 ±20% V_{AC/DC}

Frequency range 45 ... 65 Hz

Pulse input Main slot only Rated voltage $5 \dots 48 V_{DC}$ Min. pulse width 0.5 ms Min. pulse period 2 ms

Digital input (5 ... 48), 110, 230 ±20% V_{AC/DC}

Min. signal width 20 ms Min. pause width 40 ms

Digital output (DO, BO)

Type Relay switch

Purpose Alarm output, General purpose

digital output

Rated voltage 230 $V_{AC/DC} \pm 20\%$ max Max. switching current 1000 mA (main slot) 100 mA (aux. slot, DO only)

Contact resistance $\leq 100 \text{ m}\Omega \text{ (100 mA, 24 V)}$

Impulse Max. 4000 imp/hour Min. length 100 ms

Pulse output (PO)

Type Optocoupler open collector switch

(main slot only)
Pulse output

 $\begin{array}{ll} \text{Purpose} & \text{Pulse out} \\ \text{Rated voltage} & \text{40 V}_{\text{AC/DC}} \end{array}$

 $\begin{array}{ll} \text{Max. switching current} & 30 \text{ mA (R}_{\text{ONmax}} = 8 \ \Omega) \\ \text{Pulse length} & \text{programmable (2 ... 999 ms)} \\ \end{array}$

Status (watchdog) output (WO)

Type Relay switch
Normal operation Relay in ON position

Failure detection delay $\approx 1.5 \text{ s}$

Rated voltage 230 V_{AC/DC} ±20% max

Max. switching current 1000 mA

Contact resistance \leq 100 m Ω (100 mA, 24 V)

Time synchronisation input

Digital input GPS or IRIG-B TTL

1pps voltage level TTL level (+5V)

Time code telegram RS232 (GPS)

DC level shif (IRIG-B)

AM analog input IRIG-B AM modulated

Carrier frequency 1 kHz Input impedance 600 Ω

Amplitude 2.5 V_{P-Pmin}, 8 V_{P-Pmax}

Modulation ration 3:1 ... 6:1

Universal Power Supply

Standard (high): CAT III 300V
Nominal voltage AC 80 ... 276 V
Nominal frequency 40 ... 65 Hz
Nominal voltage DC 70 ... 300 V

Consumption (max. all I/O) < 8 VA typical

< 12 VA max. loaded I/O options

Power-on transient current < 20 A; 1 ms

Optional (low): CAT III 300V
Nominal voltage AC 48 ... 77 V
Nominal frequency 40 ... 65 Hz
Nominal voltage DC 19 ... 70 V
Consumption (max. all I/O) < 8 VA typical

< 12 VA max. loaded I/O options

Power-on transient current < 20 A; 1 ms

Electrical Safety

Protection protection class II

functional earth terminal must be connected

to earth potential!

Voltage inputs via high impedance Double insulation for I/O ports and

COM ports

Pollution degree 2

Measuring category CAT IV; 300 V (measuring inputs) CAT III; 600 V Acc. to EN 61010-1

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Mechanical

Dimensions $144 \times 144 \times 100 \text{ mm}$ Mounting Panel mounting $144 \times 144 \text{ mm}$

Required mounting hole 137 × 137 mm Enclosure material PC/ABS

Flammability Acc. to UL 94 V-0

Weight 550 g Enclosure material PC/ABS

Acc. to UL 94 V-0

Ambient conditions

Ambient temperature K55 temperature class

Acc. to EN61557-12 -10 ... 55 °C

Storage temperature -40 to +70 °C

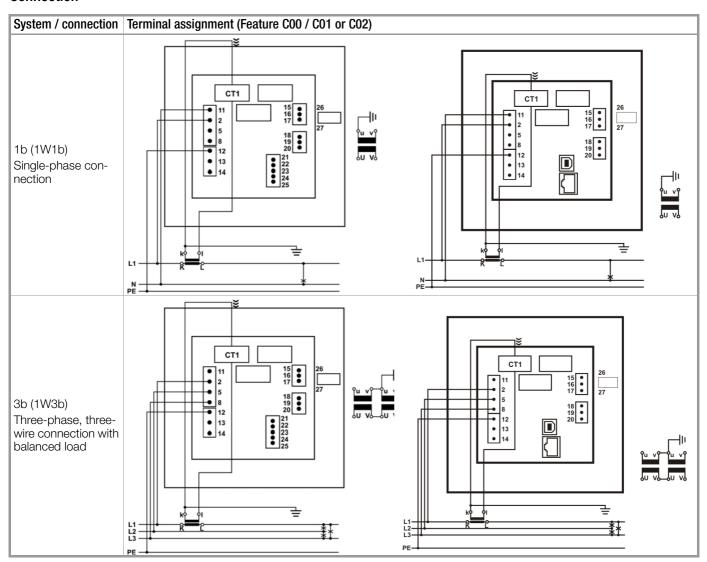
Average annual humidity ≤ 90% r.h. (no condensation)

Pollution degree 2

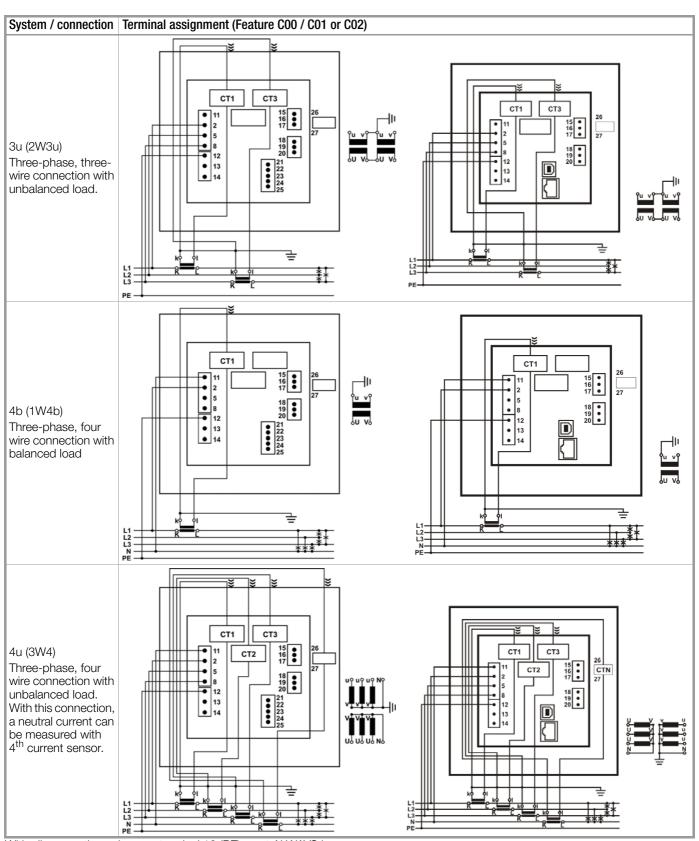
Enclosure protection IP 40 (front plate) IP 20 (rear side)

Installation altitude ≤ 2000 m

Connection



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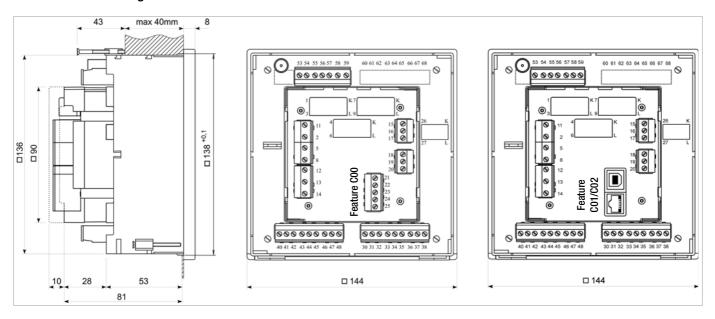
With all connection schemes, terminal 12 (PE) must ALWAYS be connected.

Fourth voltage channel is dedicated for measuring voltage between EARTH (PE, terminal 12) and NEUTRAL (N, terminal 2).

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Dimensional Drawing



Connection table

Function			Connection	Comment
IL1 1/3				
	AC accordant	IL2	4/6	A CAT IV 300 V
	AC current	IL3	7/9	CAT III 600 V
Managerina inneste		ILN	26/27	
Measuring input:		UL1	2	
	AC voltage	UL2	5	A CAT IV 300 V
	AC voitage	UL3	8	CAT III 600 V
		UN 1	11	
		→ +	15	
	Module 1/2	→ – (common)	16	
		→ +	17	
		→ +	18	I/O function depends on type of I/O module
	Module 3/4	→ – (common)	19	Volunction depends on type of Volundadie
Inputs / outputs: Module A Module B		→ +	20	
	Module A	→	30-38	
	→	40-48		
		→ BNC-Eingang	53 58	IRIG-B modulated (1 kHz) time sync. signal
	Modul C	→ 1 pps	53	TTL level 1 pps time sync. Signal or IRIG-B digital
	Modul C	RS485	54, 55	54: A, 55: B
		MODEM/RS232	56 59	56: Rx, 57: GND, 58: Tx, 59: +5 V
		+ / AC (L)	13	CAT III 300 V
Auxiliary power supply:		- / AC (N)	14	GROUND
		GROUND	12	terminal must be always connected !!
RS485 A 21 B 22 BS232 and RS485 are both supported, but only of	DC 40F	A	21	
	RS232 and RS485 are both supported, but only one at the time can be used!			
Communication:		RX	23	
	RS232	GND	24	In case of Ethernet / USB communication, the terminal block 21 to 25 is not available.
		TX	25	
	USB		Тур В	USB 2.0
	ETHERNET		RJ-45	10/100BASE-TX Ethernet

Data For Ordering

When ordering MAVOLOG PRO Power Quality Analyzer, all required specifications shall be stated in compliance with the ordering code. Additional information could be stated.

General ordering code

The following specifications shall be stated:

M9200- A B C D E F G	and transient recorder H 01
	01
04	
$ \begin{vmatrix} 03 & 2\times \text{Relay (alarm) output} \\ 04 & 1\times \text{Bistable Relay (alarm) output} \\ 05 & 2\times \text{Analogue input (mA}_{DC}) \\ 06 & 2\times \text{Analogue input (V}_{DC}) \\ 07 & 2\times \text{Analogue input (R/Temp.)} \\ 08 & 2\times \text{Digital input (230 V}_{AC/DC}) \\ 09 & 2\times \text{Digital input (110 V}_{AC/DC}) \\ 10 & 2\times \text{Digital input (5} \dots 48 \text{V}_{DC}) \\ 11 & 2\times \text{Pulse input (5} \dots 48 \text{V}_{DC}) \\ 12 & 2\times \text{Tariff input (230 V}_{AC/DC}) & I/O1 \text{ only} \\ 13 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 13 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 14 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 15 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 15 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 15 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 16 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 17 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 18 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 \text{ only} \\ 19 & 2\times \text{Tariff input (110 V}_{AC/DC}) & I/O1 o$	
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06	
07	
08	
09	
10	
11	
13 2× Tariff input (110 V _{AC/DC}) I/O1 only	
15 1× Status output + 1× Relay (alarm) output	
00 Without	
00 RS232/485 Pluggable terminals	
01 USB	
02 Ethernet & USB	
00 50, 60 Hz	
01 400 Hz	
01	
00 Universal HIGH (70 300 V _{DC} , 80 276 V _{AC})	
01	

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Example of ordering:

MAVOLOG PRO with a universal-HI supply is connected to a secondary phase voltage up to 500 V L-N and 5 A secondary current on 50Hz network. Ethernet & USB communication, watchdog output (plus one relay output) as I/O1, 2x digital input 230 V as I/O2, 4x analog output as I/OA and 8x relay output as I/OB.

Example ordering code: M9200-A00B00C02D15E08F02G01H00

Standard Models

Standard Models	Article number	Features
MAVOLOG PRO	M9200-V001	A00B00C02D05E00F00G00H00 Basic unit with 4 current and voltage inputs: Universal High 50, 60 Hz Ethernet & USB 2x analog inputs (mA DC)
MAVOLOG PRO	M9200-V002	A00B00C02D05E07F01G02H00 Basic unit with 4 current and voltage inputs: Universal High 50, 60 Hz Ethernet & USB 2x analog inputs (mA DC) 2x analog inputs (R / Temp) 8x relay output 8x digital input
MAVOLOG PRO	M9200-V003	A00B00C00D01E03F00G00H00 Basic unit with 4 current and voltage inputs: Universal High 50, 60 Hz RS232/485 2x Analog output 2x Relay output
MAVOLOG PRO	M9200-V004	A00B00C02D05E00F00G00H01 Basic unit with: Universal High 50, 60 Hz Ethernet & USB 2x analog inputs (mA DC) H01: Waveform and transient recorder
MAVOLOG PRO	M9200-V005	A00B00C02D05E07F01G02H01 Basic unit with: Universal High 50, 60 Hz Ethernet & USB 2x analog inputs (mA DC) 2x analog inputs (R / Temp) 8x relay output 8x digital input H01: Waveform and transient recorder
MAVOLOG PRO	M9200-V006	A00B00C00D01E03F00G00H01 Basic unit with: Universal High 50, 60 Hz RS232/485 2x Analog output 2x Relay output H01: Waveform and transient recorder

Accessories

Description	Туре	Article number
MS-SQL database software MAVO-Da- tabase (for a fee) for PQ Analyser MAVOLOG PRO for visualization, analy- sis and storage of measured values.		
Up to 10 devices can be enabled	MAVO-Database Software	Z849A
Up to 10 devices can be enabled	MAVO-Database Software	Z849B
Up to 10 devices can be enabled	MAVO-Database Software	Z849C

Abbreviations:

PQ Power Quality alias Voltage Quality

RMS Root Mean Square

PA Power angle (between current and voltage)

PF Power factor
VT Voltage transformer
CT Current transformer
THD Total harmonic distortion
Ethernet IEEE 802.3 data layer protocol

MODBUS / DNP3 Industrial protocol for data transmission

MAV0-View Setting and acquisition Software

AC Alternating quantity
RTC Real Time Clock

IRIG Inter-range instrumentation group time

codes

NTP Network Time Protocol

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