

**MAVOSYS** | **10**  
POWER QUALITY | SYSTEM

# The Modular Measuring Instrument for Safe Systems

The MAVOSYS 10 opens up entirely new possibilities for monitoring mains quality, power and energy: It's the first mains analyzer with more than 8 channels, it can be configured in a modular fashion and it provides an ideal, cost-saving solution for all requirements.

## Stable Mains Quality – More Important than Ever

Assuring mains quality is becoming more and more important for many companies. IT, production and logistics systems necessitate interference-free supply power, alone due to increasing degrees of complexity. These systems influence mains quality themselves in many ways, but they react extremely sensitively to disturbances as well. For this reason, corporate responsibility now includes keeping one's own electrical systems under control – 24 hours a day: Failures and functional impairments soon snowball into considerable economic losses.

Effective action is required as soon as initial signs of poor mains quality become apparent. Typical indicators include overheated motors, transformers and cables, excessive current in neutral conductors, flickering lights, computer failures and inexplicably increased energy costs.

## Reliable Analysis and a Sense of Security

Disturbances and events can be easily pinpointed, documented and analyzed with the MAVOSYS 10, even in highly branched-out systems, with reference to applicable standards – the perfect foundation for sustainable optimization. Optimization increases operating reliability, keeps product quality stable and assures high levels of cost effectiveness. And of course a stable electrical system provides a true sense of safety.

## The Innovative Solution for Clean Mains Power

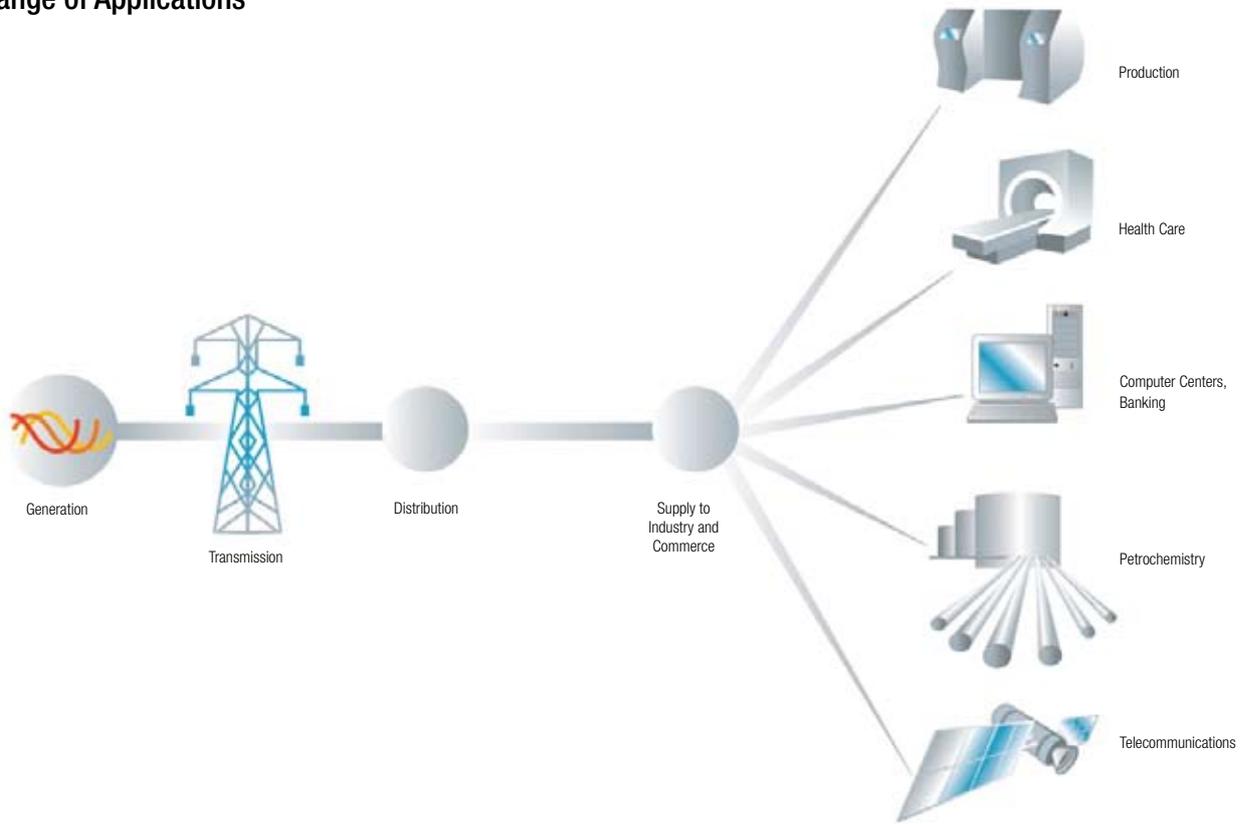
The MAVOSYS 10 stationary monitoring systems provides a trend-setting response to these demands. It encompasses three decades of experience with mains analyzers and numerous innovative solutions for outstanding flexibility: a top quality, professional measuring instrument which is capable of pinpointing the causes of all types of interference. Troubleshooting can thus be initiated and executed in a targeted, efficient fashion.

## Features

- Modular design in various layouts with 4 slots
- ■ ■ Input modules for 4x voltage, 4x current and 8x digital signals
- Combinations with up to four virtual analyzers in a single housing
- Local operation and visualization with an optional ¼ VGA touch-screen
- Ethernet 10/100 BaseT, RS 232 and RS 485 interfaces included as standard equipment
- TCP/IP, HTTP, XML and Modbus TCP/RTU communication protocols
- Optionally available GSM/GPRS and analog modems
- Time synchronization via NTP time server and/or optional GPS receiver
- Internal and external cross-triggering
- Complies with all national and international standards
- Certification in accordance with IEC 61000-4-30, class A
- 1 GB internal flash memory



## Range of Applications



## Compliance with Worldwide Standards

The MAVOSYS 10 is ideally suited for continuous monitoring in accordance with international standards, for example EN 50160, as well as user defined requirements. The input module for voltage is certified in accordance with IEC 61000-4-30, class A, by an independent laboratory. Measurements performed with the MAVOSYS 10 are precise, and reproducible, and they fulfill all strict requirements.

- EN 50160, IEEE 1159
- IEC/EN 61000-4-30 class A, IEEE 1459
- IEC/EN 61000-4-7, IEEE 519
- IEC/EN 61000-4-15, IEEE 1453
- NVE, CREG



# A Unique System

Thanks to its modular concept, the MAVOSYS 10 can be individually adapted, and a single device can even execute tasks which would necessitate several conventional mains analyzers.

## Extremely Flexible Thanks to Modularity

The MAVOSYS 10 can be freely configured with the help of modules, and precisely matched to the respective application. Its architecture is oriented towards each individual task. And thus it's possible to put together a high performance, and nevertheless cost-effective version. This flexibility, along with the multiuser web interface provided by Encore Series® Software and a ¼VGA local touch-screen, make the MAVOSYS 10 an ideal solution for any application.

## Ground-Breaking Innovation

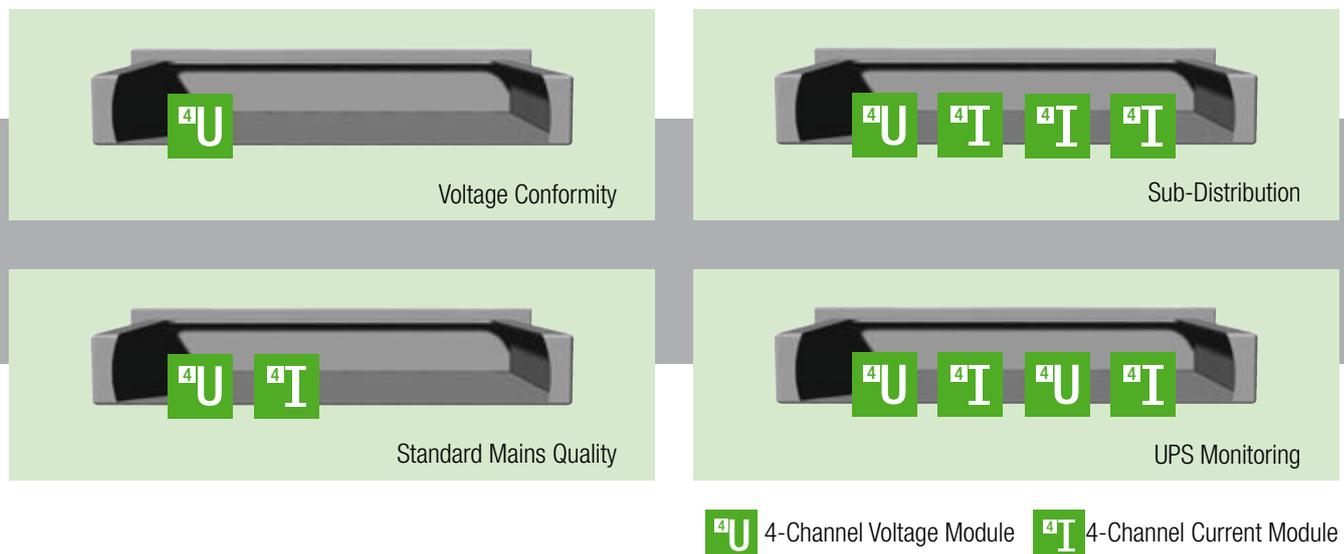
Technically, the MAVOSYS 10 represents a genuine breakthrough: It's the first mains analyzer to go beyond the conventional upper limit of 8 channels for voltage and current inputs. Users can now select from amongst various input modules for voltage (4 channels), current (4 channels) and digital signals (8 channels). Applications which used to require two or more devices can now be

implemented by combining up to 4 modules in a single MAVOSYS 10 – and that saves space and reduces costs. Common combinations include:

- 8 channels for conventional monitoring of mains quality and power: one input module each for voltage and current
- 16 channels for monitoring the functions of systems such as uninterruptible power supplies (input/output): two input modules each for voltage and current
- 16 channels for monitoring supply to substations: one input module for voltage and three for current

## Universal Connector Technology

The individual modules are available with plug connectors for measurement cables and current sensors, or with screw terminals. The current input module for 1 A or 5 A current transformers occupies two slots. Device replacement during operation is made possible by means of a combination current-voltage module with central plug for remote connector modules.





### Variable Layout for Any Application

Available housing layouts are just as diverse as the technical versions of the MAVOSYS 10. The user selects the layout required for his application, adds the appropriate modules and ends up with a perfectly matched solution:

- The MAVOSYS 10 can be operated as a stand-alone device in the standard housing, or mounted to a 19" cabinet with a rack fixture.
- A wall mounting bracket and a weather-proof housing for extremely adverse ambient conditions are also available.
- A panel mount version is also available with 1/4 VGA touch-screen, or without display.



# Intelligent Software for Optimum Efficiency

User-friendly Encore Series software is available for controlling and communicating with the MAVOSYS 10. It allows for visualization and analysis of events, sequences and measured values. Automatic evaluations can be executed with optional Answer Modules® – intelligent algorithms for specific data interpretation.

## Mains Management Simplified

With PC compatible Encore Series software, the MAVOSYS 10 can be utilized ideally in a great variety of electrical systems with a large spectrum of configurations. Special features include a password protected multiuser web interface and a broad range of functions: Even complex monitoring and analysis tasks can be organized and processed in a clear-cut fashion. Encore Series software is thus ideally suited for convenient data acquisition and storage.

- Simple user interface based on a web browser
- Up to 50 or more MAVOSYS 10 instruments are supported
- Mains quality, demand, energy and process analyses

Enterprise software is additionally available for extended analyses and management of several logging systems.

## Intelligent Analysis Extras

Decades of experience and expert knowledge have been engineered into our Answer Modules® – intelligent algorithms for automatic

interpretation and compilation of data. They're integrated into Encore Series software as required, and they expand its range of functions.

### Available Answer Modules®

**Sag Direction:** diagnosis of voltage sags and the direction to their cause

**CapSwitch™:** analysis of transients triggered by switching compensation capacitors

**KVAR Verification:** monitoring of compensation systems for correct functioning

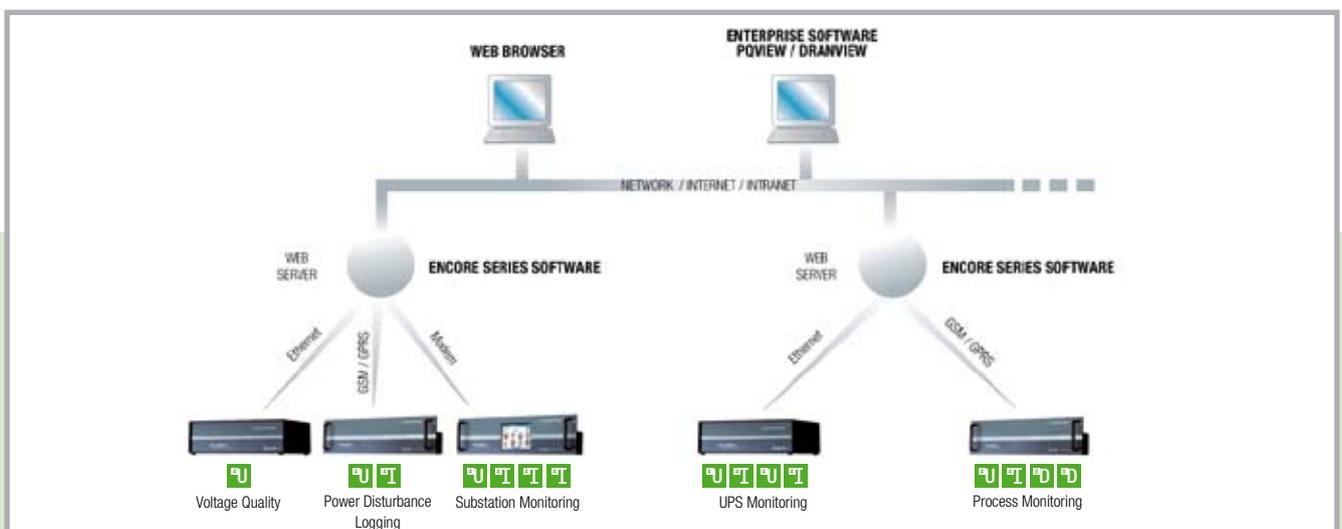
**UPS Verification:** monitoring of uninterruptible power supplies for correct functioning

**Energy User:** specific reports regarding energy consumption and costs

**Radial Line Fault:** ascertainment of cause and distance to faults in the mains

**Reliability Benchmark:** ascertainment and evaluation of mains reliability

**Online Diagram:** customer-specific system diagrams with indication of momentary status, events and mains quantities



## Technical Data

### Voltage

- Channels: (4) differential inputs, AC/DC
- A-D conversion: 512 samples per period, 16 bit A-D, synchronous
- Measuring range: 1 to 600 V<sub>TRMS</sub>, ± 1000 V<sub>peak</sub>
- Frequency range: 16 to 20 Hz, 50 Hz, 60 Hz
- Input impedance: 10 MΩ to ground
- Measuring error: 0 to 600 V: 0.1% rdg. ± 0.05% of the measuring range,  
7 KHz bandwidth for low and medium frequency transients,  
100 to 300 V<sub>AC</sub>: 0.1% rdg. per EN/IEC 61000-4-30

### Current

- Channels: (4) differential inputs, AC/DC
- A-D conversion: 512 samples per period, 16 bit A-D
- Measuring range: upper range current limit = 1.5 V<sub>TRMS</sub>, crest factor 3
- Measuring error: 0.1% rdg. ± 0.05% of the measuring range,  
3 kHz bandwidth for low and medium frequency transients,  
current transformer not included

### Digital Inputs

- Channels: (8), range: 0 to 135 V<sub>AC/DC</sub>
- 40 kHz sampling rate, edge or level triggering
- Adjustable logic (active high or active low)
- Time stamp with 1 ms resolution

### Communication

- Standard: RJ45 TCP/IP Ethernet, RS 232 / RS 485
- Optional: GSM/GPRS modem, analog modem
- Protocols: XML, Modbus TCP/RTU
- Time synchronization: NTP, optional: internal GPS receiver

### Memory

- 1GB internal flash

### Power Supply

- Standard version  
12 V<sub>DC</sub> input, external power pack: 90 to 264 V<sub>AC</sub>, 50/60 Hz  
Optional: external power pack, 125 V<sub>DC</sub>, 220 V<sub>DC</sub>
- Panel mount version with screw terminals  
90 to 250 V<sub>AC</sub>, 50/60 Hz, 105 to 125 V<sub>DC</sub>  
Optional: 90 to 250 V<sub>AC/DC</sub>, 50/60 Hz
- Internal UPS for 15 minutes power supply (specified with display and 4 modules)



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