

# PQ

## Out of the Box and Ready To Go Power Quality Analyzer Series

**MAVOWATT | 30** The powerful instrument for standard applications - covering basic functionality with easy to use customer interface.

**MAVOWATT | 40** The sophisticated tool for experienced power quality applications - pinpointing the source and cause of power quality problems by intelligent AnswerModules®

**MAVOWATT | 70** The perfect device for high end applications – covering high speed transients up to 1µs with event characterisation as well as advanced distortion and unbalance parameters.



## Common Functionality

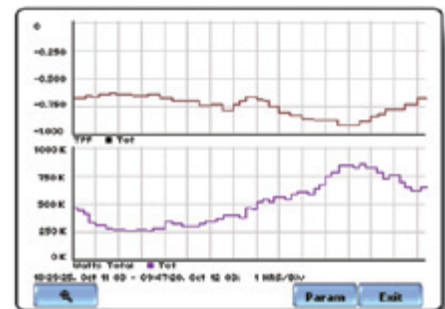
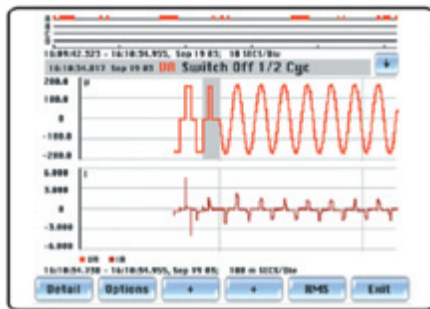
Equipped with 8 independent channels, the 3-phase MAVOWATT series are advanced power monitoring instruments which incorporate a color touch screen into their lightweight design. Automated setups provide instant detection of circuits and configurations, ensuring that the instrument is ready to successfully collect data. User can select the length and mode of data collection, including troubleshooting, data logging, power quality surveys, energy and load balancing. The MAVOWATT collect data at 256 samples/cycle/channel, offer remote communications using RS-232, Ethernet or USB options and comply to present power quality and power-measurement standards.



EN50160 – European Voltage Characteristics • IEC61000-4-7 International Harmonics

IEC 61000-4-15 International Flicker • IEC 61000-4-30 Class A – International PQ

IEEE 1159 – US PQ • IEEE 519 – US Harmonics • IEEE1453 – US Flicker



## Equipment Performance Testing

Determining the availability and compatibility of facility power prior to the installation of new equipment is simplified using the MAVOWATT series. The instrument incorporates advanced features such as RMS triggers, low/medium frequency transients, and cross triggering between channels to demonstrate that power mitigation devices such as UPSs are operating properly. Real time readings observed during maintenance and startup processes enable users to see results and tweak that equipment during the testing process.

## Troubleshooting

The MAVOWATT series unique annunciator “report card” provides instant power quality answers in the field. A wide range of power monitoring data is collected, analyzed and tabulated in color-coded categories to quickly identify areas of concern, which are identified in red. Drill down for more detailed information by simply touching the intuitive graphical screen to troubleshoot problems, locate the source and pinpoint the root cause of power quality disturbances.

## Energy Surveys

The cost of energy is oftentimes a facility's largest operating expense. Reducing energy consumption during peak times, shifting loads, purchasing energy efficient equipment, or changing energy suppliers can shave 10-40% annually off that cost. The MAVOWATT series is an invaluable tool for performing energy surveys, including monitoring energy consumption, usage patterns, peak demands and the activation of large loads to reduce electricity costs. Plus, the PowerVisa makes it easy to track and allocate energy costs by process or department.

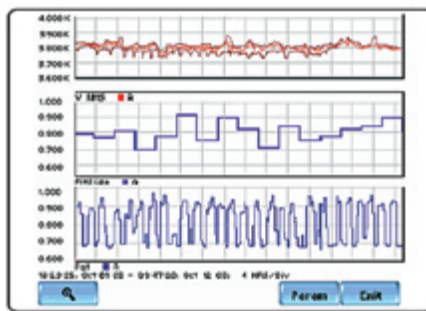
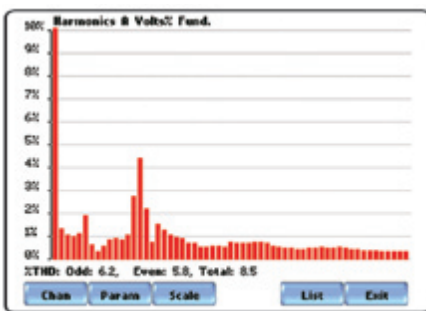
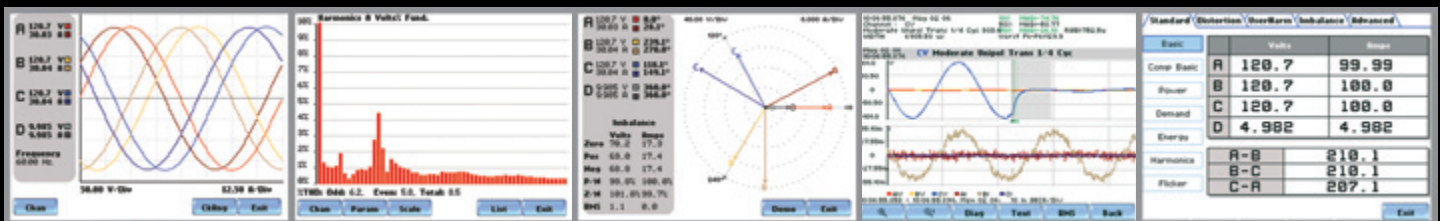


## MAVOWATT | 30

The powerful instrument for standard applications - covering basic functionality with easy to use customer interface.

Data can be viewed in real time using scope mode, meter mode, event mode, harmonics spectrum or phasor diagrams. With the touch of your finger or a stylus, you can view data and zoom-in on captured disturbances for more detail and automated event characterisation.

Capture data on a memory card for analysis, trending, visualization and reporting using industry-leading DRAN-VIEW® software.



### Harmonics

As the sensitivity of power electronics increases, equipment ranging from HVAC systems, personal computers and copiers to computerized process equipment and manufacturing systems are susceptible to harmonic pollution. In fact, harmonics can cause small, almost imperceptible variations in performance that aggregate to affect significant long-term damage. Current harmonics generated by a source can pollute the entire power system without being affected itself. The MAVOWATT series captures detailed harmonics, interharmonics and subharmonics to effectively troubleshoot the complex problems caused by these events.

### Flicker

The activation of arc furnace, large induction machines and other large loads that produce continuous voltage fluctuations which cause a power quality event called flicker. Typically, flicker occurs on systems that are weak relative to the amount of power required by the load, combined with considerable variations in current occurring over a short period of time. The MAVOWATT series captures flicker data per IEC 61000-4-15, which can be further evaluated using Dran-View visualization, analysis and reporting software.

### Compliance Monitoring

The MAVOWATT series has been designed to meet the most advanced power quality standards, including IEEE 1159, IEC 61000-4-30 Class A and EN50160. A statistical output is produced to quickly verify compliance with international quality-of-supply standards and benchmark power quality. In an instant, the MAVOWATT series provides a snapshot of over 13 key parameters, including unbalance, voltage variations and harmonics.



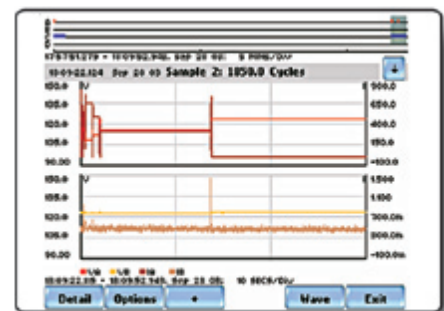
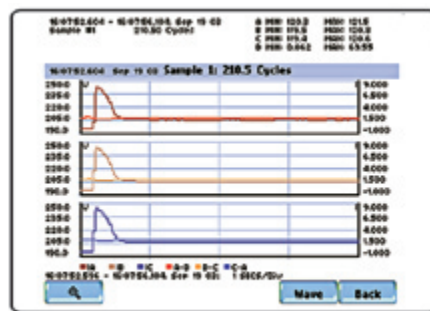


## MAVOWATT | 40

The sophisticated tool for experienced power quality applications – pinpointing the source and cause of power quality problems by intelligent AnswerModules®.



To further speed analysis, Gossen Metrawatt has added AnswerModules®, intelligent algorithms that help pinpoint the source and cause of power quality problems, to the MAVOWATT 40. These diagnostic and reporting tools are based on decades of analytical experience and bench-marking/troubleshooting work, as they convert raw data into precise answers for rapid decision-making.



### Inrush

The startup of motors, transformer energization, breaker trips, and the activation of backup generators and other applications with inrush conditions require extended cycle-by-cycle recording to ensure proper operation and to determine their impact on other devices. The MAVOWATT 40 goes beyond other power monitoring instruments by providing current-based RMS triggers and peak threshold crossings to optimize the performance and longevity of that essential equipment.

### Fault Recording

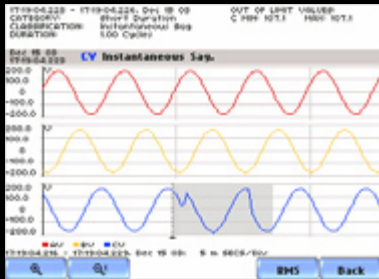
The MAVOWATT 40 simple fault recording mode provides instantaneous detection of electrical malfunctions and identification of faults within a facility's power infrastructure. The MAVOWATT 40 will characterize the magnitude and duration of a fault and help direct the user toward its source. Information including voltage and current frequency stability, power flow and harmonics underlie the MAVOWATT 40 diagnostic capabilities.



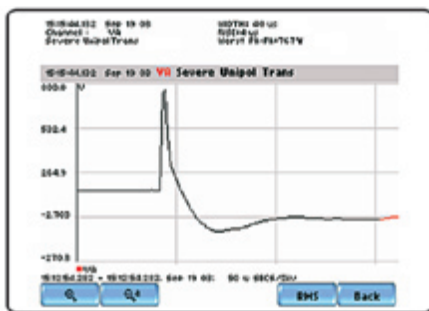
## MAVOWATT | 70

The perfect device for high end applications – covering high speed transients up to 1µs with event characterisation as well as advanced distortion and unbalance parameters.

## 400 Hz

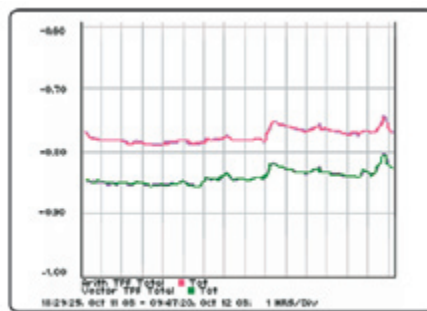


400 Hz Applications – Mil Standard 1399 Testing Evaluation and testing the performance of military components and computerized systems under true operation conditions – 400 Hz or other – is key to ensuring a successful mission. The MAVOWATT 70-400 incorporates this feature with a Mil standard 1399 testing. This interface standard for shipboard systems is the approved testing protocol for naval sea standards and all relevant departments within the US DOD. The electrical power system serves a variety of user equipment including aircraft, airport jetways, elevators, communication systems, weapon systems and computers. The testing protocol is used to verify compatibility with a prescribed list of characteristics and tolerances including transients, sags and spikes, unbalance, frequency tolerances and harmonics. Recommended testing apparatus – a voltmeter, frequency meter, oscilloscope, harmonics meter, and current transformers – can all be replaced with one instrument the MAVOWATT 70-400.



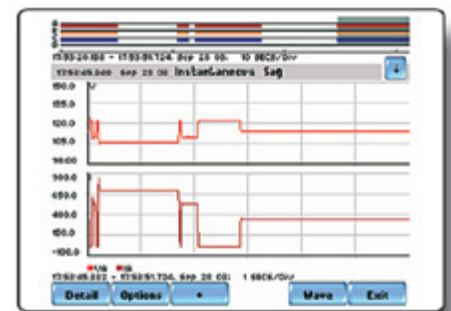
### Fast Transient Capture

The MAVOWATT 70 uses digitized high-speed sampling to capture and analyze microsecond-wide transients. Transients, generated by fast-switching electronics, medical diagnostic equipment, capacitor switching, lightning, transformer energization, and load shifting, are immediately characterized as impulsive or oscillatory and detailed for further analysis. Capable of capturing the complete power quality spectrum, the MAVOWATT 70 provides scope-like display of the entire transient.



### Load Distortion and Imbalance

Rectified-input power supplies plus other non-linear loads have increased from 25% of the total U.S. load to over 65% today. These loads draw current only during part of the waveform, resulting in current distortion, and depending on harmonic impedances, which causes voltage distortion as well. This distortion can have a significant derating effect on equipment such as motors and transformers, causing overheating that shorten equipment life. The MAVOWATT 70 measures the full range of arithmetic, vector and sequencing parameters contained in IEEE 1459, to evaluate distortion and restore balanced loads.



### Power Quality Surveys and Diagnostics

A power quality survey is key to pinpointing and diagnosing problems or negative trends and to effectively implement a reliability-centered maintenance program. By evaluating power quality over a week or longer, baseline conditions and susceptibility to events can be determined so that corrective measures can be implemented. The MAVOWATT 70 has a built-in event characterizer that directly supports trouble-shooting and the gathering of survey data—for improving power quality and equipment reliability, as well as for matching the requirements and susceptibilities of that equipment to the incoming supply.

# The Industry Leading Power Management Software Tool

## Dran-View® 6

Dran-View® 6 is a Windows-based software package that enables power professionals to simply and quickly visualize and analyze power monitoring data. It is a snap to navigate, delivers automated functionality, and incorporates powerful analytical capabilities and customizable options to meet the needs of each individual user. Dran-View is successfully used by thousands of customers around the world and has become the industry leading power management software tool.

- Dran-View features an intuitive, easy-to-use interface that enhances even the first time user's experience.
- The software has been optimized for speed and accommodate large data sets. It takes full advantage of modern operating systems and hardware, enabling users to fully utilize all available computer power.
- All measured and calculated parameters are sorted into different categories, making it easy to find and select the data you want to display. Dran-View even presents explanatory text in several languages to support graphic views.
- Scrollable (rubber band) chart axes make it easy to pan and zoom diagrams to pinpoint problems for quick resolution.
- Flexibility has been integrated throughout the package—users can customize both appearance and behavior.
- Dran-View contains unique analysis support such as the harmonic demo tool, separate harmonics scaling for voltage, current and power, and a rescue kit to correct timestamps, flip probes, adjust incorrect connection types or change scaling factors without recollecting data.
- Any data source can be exported to PQDIF format (IEEE 1159.3) and Dran-View Enterprise can even import COMTRADE files from protection relays.
- Two versions are available—one for the everyday user (Pro), the second for advanced power professionals (Enterprise).

Reporting



### Automated Reporting

Using simple wizards, format data into professional easy-to-understand reports. Dran-View automatically detects the measurement mode, such as Inrush or Fault Recording, and selects the relevant graphics and reports for distribution.

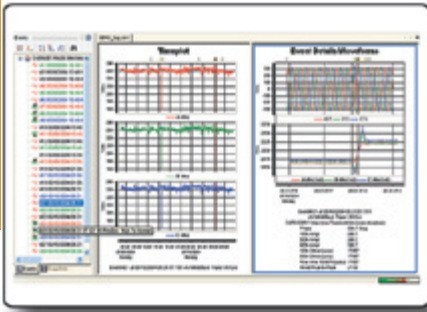
### Design Custom Reports

Choose from over 20 different reporting options and modify diagrams, data listings and standards to fit your individual reporting requirements. Options include fixed or user-selected timeplots, ITIC, worst case summaries, and more. You can even define your own standards. A single click lets you bookmark any report for future reference.

### Edit Reports

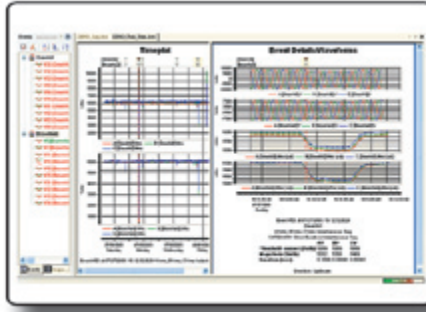
Dran-View has a built-in text editor where you can easily insert pictures and text notations, delete events, rearrange diagrams and adjust layout. Camera function in Enterprise lets you add photos, charts and waveforms into reports.





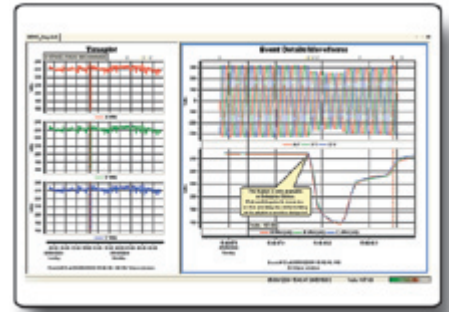
## Three Pane Window

View events, timeplots and waveforms simultaneously and interactively to quickly diagnose power quality problems. Move your mouse over events to drill down for more detail or access to different channels.



## Compare Multiple Sites

Dran-View Enterprise allows you to simultaneously view data from many different sites or instruments, to compare data from various locations or times in the same chart.



## Tailored Presentation Options

Chart, object, area, site and other exclusive tools to help you select the most appropriate diagrams for the project. Tools such as zoom, pan, area marker, harmonic scaling, and event removal are among the more than 50 available options.

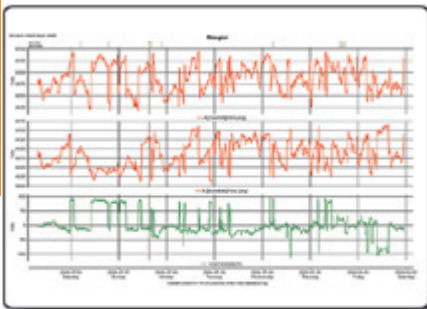
### DRAN-VIEW® 6 PROFESSIONAL

- Simple user interface
- High speed file conversion
- Support for large data files
- Efficient file compression
- Rollable (rubberbanding) axes in diagrams, zoom, pan, etc.
- Unlimited undo/redo
- Built-in text editor
- Monitoring mode specific automatic and custom report writer
- Format templates for consistent formatting
- Timeplots/waveshape/magnitude-duration & DFT charts
- Rescue kit (repair data)
- Separate harmonic scaling for voltage, current and power
- Automatic updates via the Internet
- Compatible with Dran-View 5

### DRAN-VIEW® 6 ENTERPRISE

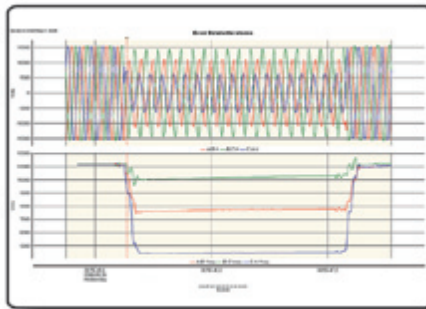
#### All that Pro has, plus:

- Multi-site presentation/report writing – supports presentation of many simultaneous data sets
- Multi-site mathematical formulas
- Additional advanced report writer modules
- Drag-and-drop user interface
- Customizable toolbars, menus and keyboard shortcuts
- Data removal
- Data aware text balloons in your charts
- Timeplot and harmonics calculations from waveshapes
- Images and photographs can be inserted
- Imports COMTRADE files (including data from protection relays)
- Imports PQ data from text/spreadsheet
- Snapshots to create print queues or restore program status
- Enhanced DFT features for selecting and analyzing harmonics



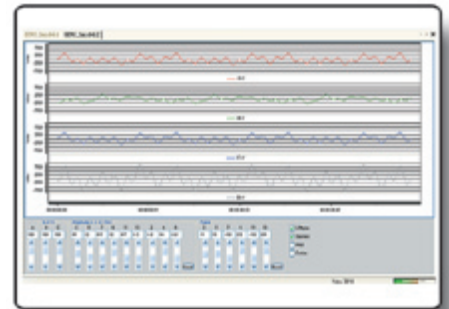
## Events Categorized, Sorted and Grouped

Dran-View's new workspace bar not only categorizes all power quality events, but can display data through event-data filtering, subset display, sort-order, branching, or via custom search. You can even create formulas to perform calculations between sites.



## Evaluate Data from Various Formats

Any data source can be exported to IEEE 1159.3 PQDIF format. COMTRADE files and tabulated text files with waveforms or trends can be imported into Dran-View Enterprise.



## Harmonics Tools

In addition to the unique Harmonic Demo Tool, Dran-View now includes a harmonics/timeplot calculator used to calculate parameters such as sliding RMS, harmonics, power and symmetrical components. This tool is ideal for use during generator start-up and Inrush projects.

**MAVOWATT** 30  
Power Visa

**MAVOWATT** 40  
Power Guide

**MAVOWATT** 70  
Power Xplorer

**Measured Parameters**

4 differential inputs, 1-600 Vrms, AC/DC $\pm 0.1\%$ rdg, $\pm 0.05\%$ fs, 256 samples/cycle, 16 bit ADC		
4 inputs with CTs 0.1-6000 Arms CT-dependent, AC/DC, 0.1%rdg + CTs, 256 samples/cycle, 16 bit ADC		
-	-	1 MHz High Speed Sampling, 14 bit ADC, 1%FS
Frequency Range 45-65 Hz and 15-20 Hz	Frequency Range 45-65 Hz and 15-20 Hz	Frequency Range 45-65 Hz and 15-20 Hz 45-65 Hz and 380-420 Hz (only MAVOWATT 70-400)"
Phase Lock Loop - Standard PQ mode	Phase Lock Loop - Standard PQ mode	Phase Lock Loop - Standard PQ mode, Generator Tracking

**Monitoring/Compliance**

EN50160 Quality of Supply / IEC 61000-4-30 Class A / IEEE 1159		
Long Term Monitoring / Continuous Data Logging w / min / max / avg		
-	Current Inrush / Energization	Current Inrush / Energization
-	Voltage Fault recording	Voltage Fault recording
-	-	Mil Standard 1399 Testing (only MAVOWATT 70-400)

**Power Quality Triggers**

Cycle-by-cycle analysis		
256 samples/cycle; 1/2 cycle RMS steps		
L-L, L-N, N-G RMS Variations: Sags/swells/interruptions		
RMS Recordings V & I, Waveshape Recordings		
30 pre-fault, 100 post-fault cycles	30 pre-fault, 10,000 post-fault cycles	30 pre-fault, 10,000 post-fault cycles
Low and Medium Frequent Transients - V & I		
-	-	High Frequency Transients - V&I, 3% FS trigger
Harmonics Summary Parameters		
Cross Trigger V & I Channels		
RMS Event Characterization IEEE or IEC		
-	Power Quality AnswerModules	Power Quality AnswerModules
-	-	Transient Event Characterization

**Distortion/Power/Energy**

W, VA, VAR, TPF, DPF, Demand, Energy, etc.		
-	-	IEEE 1459 Parameters for distorted and unbalanced systems
Harmonics THD / Harmonic Spectrum (V,I,W), Interharmonics TID / Interharmonic Spectrum (V,I) to 63rd per IEC 61000-4-7		
Flicker Pst, Plt, Sliding Plt per IEC 61000-4-15		
Crest Factor, K Factor, Transformer Derating Factor, Telephone Interference Factor		
Unbalance (max. rms deviation) & sequencing components		
-	-	5 User Spec Harmonics or Signaling Frequency
-	-	Vector / Arithmetic / Coincident Parameters

**Available Languages**

English, French, Italian, German, Spanish, Swedish, Finnish, Chinese (simplifyed), Chinese (traditional), Japanese, Korean

**General Specifications**

Size: 12" x 2.5" x 8" (30cm x 6.4cm x 20.3 cm), Weight: 4.2 pounds (1.9 kg)
Operating Temperature: 0 -50 (32 to 122 ), Storage Temperature: -20 to 55 (4 to 131 F), Humidity: 10 to 90% non-condensing
System Time Clock-Crystal controlled-1 second resolution
Charger / Battery Eliminator: 90-264 VAC 47-63 Hz
Display: LCD color touch screen
Memory options (must have one): 32M-256M removable compact flashcard

It is recommended to select one of the complete MAVOWATT packages. They include the instrument with battery and battery charger, a compact flash memory card, all voltage and 3 current probes, the software DranView 6 Professional and a soft carrying case.

For own configurations there is a wide range of accessories available. Please contact your distributor.



**Safety through Competence**

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