

# QUICK REFERENCE GUIDE

## MAVOWATT | 30 Power | Visa



## MAVOWATT | 40 Power | Guide



## MAVOWATT | 70 Power | Xplorer



This document is a quick reference guide for the MAVOWATT 30, MAVOWATT 40, MAVOWATT 70 product family. It is recommended that the user still be familiar with the complete User's Guides for the respective products, as it contains more detailed information about all of the functions, as well as the specifications and accessories.

## **WARNING**

Death, serious injury, or fire hazard could result from improper connection of this instrument. Read and understand this manual before connecting this instrument. Follow all installation and operating instructions while using this instrument.

Connection of this instrument must be performed in compliance with the National Electrical Code (ANSI/ NFPA 70-2005) of USA and any additional safety requirements applicable to your installation.

Installation, operation, and maintenance of this instrument must be performed by qualified personnel only. The National Electrical Code defines a qualified person as "one who has the skills and knowledge related to the construction and operation of the electrical equipment and installations, and who has received safety training on the hazards involved."

Qualified personnel who work on or near exposed energized electrical conductors must follow applicable safety related work practices and procedures including appropriate personal protective equipment in compliance with the Standard for Electrical Safety Requirements for Employee Workplaces (ANSI/NFPA 70E-2004) of USA and any additional workplace safety requirements applicable to your installation.

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## **ADVERTENCIA**

Una conexión incorrecta de este instrumento puede producir la muerte, lesiones graves y riesgo de incendio. Lea y entienda este manual antes de conectar. Observe todas las instrucciones de instalación y operación durante el uso de este instrumento.

La conexión de este instrumento a un sistema eléctrico se debe realizar en conformidad con el Código Eléctrico Nacional (ANSI/NFPA 70-2005) de los E.E.U.U., además de cualquier otra norma de seguridad correspondiente a su establecimiento.

La instalación, operación y mantenimiento de este instrumento debe ser realizada por personal calificado solamente.

El Código Eléctrico Nacional define a una persona calificada como "una que esté familiarizada con la construcción y operación del equipo y con los riesgos involucrados."

El personal cualificado que trabaja encendido o acerca a los conductores eléctricos energizados expuestos debe seguir prácticas y procedimientos relacionados seguridad aplicable del trabajo incluyendo el equipo protector personal apropiado en conformidad con el estándar para los requisitos de seguridad eléctricos para los lugares de trabajo del empleado (ANSI/NFPA 70E-2004) de los E.E.U.U. y cualquier requisito de seguridad adicional del lugar de trabajo aplicable a su instalación.

## **AVERTISSEMENT**

Si l'instrument est mal connecté, la mort, des blessures graves, ou un danger d'incendie peuvent s'en suivre. Lisez attentivement ce manuel avant de connecter l'instrument. Lorsque vous utilisez l'instrument, suivez toutes les instructions d'installation et de service.

Cet instrument doit être connecté conformément au National Electrical Code (ANSI/NFPA 70-2005) des Etats-Unis et à toutes les exigences de sécurité applicables à votre installation.

Cet instrument doit être installé, utilisé et entretenu uniquement par un personnel qualifié. Selon le National

Electrical Code, une personne est qualifiée si "elle connaît bien la construction et l'utilisation de l'équipement, ainsi que les dangers que cela implique".

Le personnel qualifié qui travaillent dessus ou s'approchent des conducteurs électriques activés exposés doit suivre des pratiques en matière et des procédures reliées par sûreté applicable de travail comprenant le matériel de protection personnel approprié conformément à la norme pour des conditions de sûreté électriques pour les lieux de travail des employés (ANSI/NFPA 70E-2004) des Etats-Unis et toutes les conditions de sûreté additionnelles de lieu de travail applicables à votre installation.

## **WARNUNG**

Der falsche Anschluß dieses Gerätes kann Tod, schwere Verletzungen oder Feuer verursachen. Bevor Sie dieses Instrument anschließen, müssen Sie die Anleitung lesen und verstanden haben. Bei der Verwendung dieses Instruments müssen alle Installation- und Betriebsanweisungen beachtet werden. Der Anschluß dieses Instruments muß in Übereinstimmung mit den nationalen Bestimmungen für Elektrizität (ANSI/NFPA 70-2005) der Vereinigten Staaten, sowie allen weiteren, in Ihrem Fall anwendbaren Sicherheitsbestimmungen, vorgenommen werden. Installation, Betrieb und Wartung dieses Instruments dürfen nur von Fachpersonal durchgeführt werden. In dem nationalen Bestimmungen für Elektrizität wird ein Fachmann als eine Person bezeichnet, welche "mit der Bauweise und dem Betrieb des Gerätes sowie den dazugehörigen Gefahren vertraut ist."

Qualifiziertes Personal, das an bearbeiten oder herausgestellte angezogene elektrische Leiter sich nähern, muß anwendbare Sicherheit bezogener Arbeit Praxis und Verfahren einschließlich passende persönliche schützende Ausrüstung gemäß dem Standard für elektrische Sicherheitsauflagen für Angestellt-Arbeitsplätze (ANSI/NFPA 70E-2004) der Vereinigten Staaten und alle zusätzlichen Arbeitsplatzsicherheitsauflagen folgen, die auf Ihre Installation anwendbar sind.

## Safety Summary

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**Definitions**      WARNING statements inform the user that certain conditions or practices could result in loss of life or physical harm.

CAUTION statements identify conditions or practices that could harm the instrument, its data, other equipment or property.

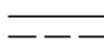
NOTE statements call attention to specific information

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**Symbols**      The following International Electrotechnical Commission (IEC) symbols are marked on the top and rear panel in the immediate vicinity of the referenced terminal or device:



Caution, refer to accompanying documents (this reference guide and complete Users Guide)



Direct current (DC) operation of the terminal or device



Power Switch

## Safety Precautions

The following safety precautions must be followed whenever any type of voltage or current connection is being made to the MAVOWATT 30/40/70:

- Wear proper Personal Protective Equipment, including safety glasses and insulated gloves when making connections to power circuits.
- Hands, shoes and floor must be dry when making any connection to a power line.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
- Set the MAVOWATT 30/40/70 power switch to Off.
- Before connecting to electric circuits to be monitored, open their related circuit breakers or disconnects. **DO NOT install any connection of the MAVOWATT 30/40/70 to live power lines.**
- Connections must be made to the MAVOWATT 30/40/70 first, then connect to the circuit to be monitored.

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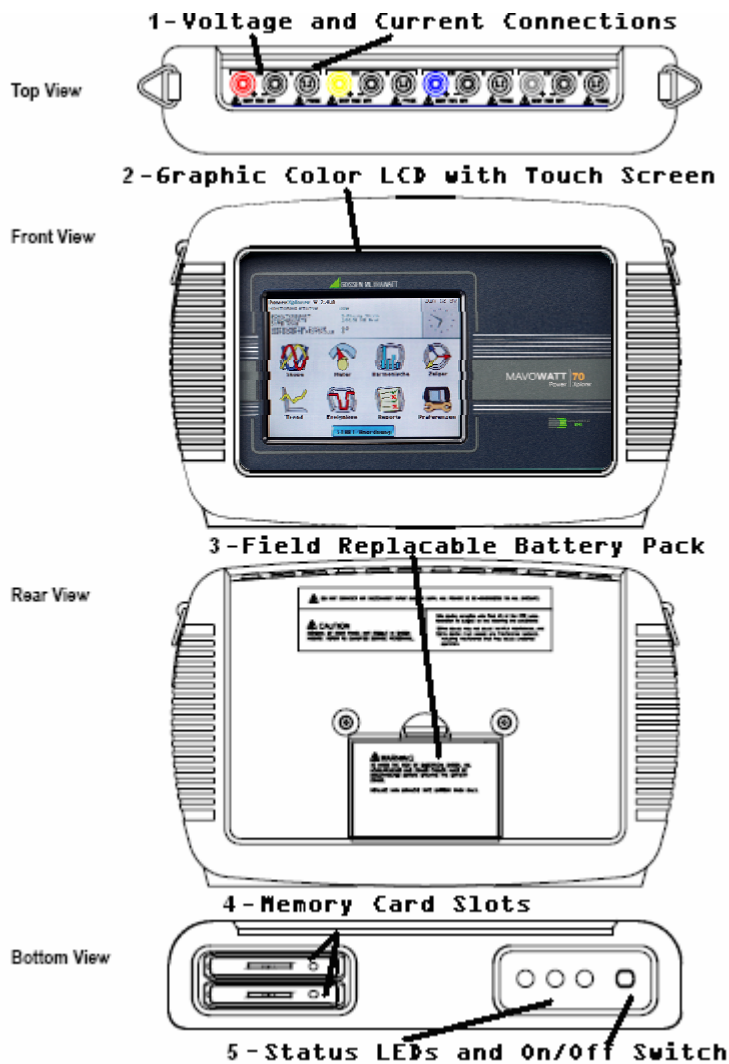
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## INTRODUCTION

The Gossen-Metrawatt MAVOWATT 30, 40 and 70 are three portable, hand-held, eight-channel power quality meter/monitors, very similar in operation though the MAVOWATT 70 and MAVOWATT 40 have some additional parameters not in the MAVOWATT 30, and the MAVOWATT 70 has a high speed sampling board for capturing the details of very fast transients. The common features are covered in this document, and the MAVOWATT 70 name will be used to represent all three instruments. These cutting-edge power quality instruments are designed with a color liquid crystal display (LCD) 1/4 VGA, using touch screen technology. They can monitor, record and display data on four voltage channels and four current channels simultaneously.

MAVOWATT 30/40/70 is designed to meet both the IEEE 1159 and IEC 61000-4-30 Class A standards for accuracy and measurement requirements. It can do PQ-optimized acquisition of power quality related disturbances and events. It is designed with a statistical package called Quality of Supply (QOS), with monitoring and setup protocols set to determine voltage measurement compliance required for EN50160 monitoring. European standard EN50160 requires that measurement parameters must be within a specified percentage for 95% of the time.

The MAVOWATT 30/40/70 firmware can monitor power quality phenomena for troubleshooting and/or compliance purposes. It can record inrush conditions, carry out long-term statistical studies to establish performance baselines, and perform field-based equipment testing and evaluation for commissioning and maintenance. The firmware integrates an intuitive instrument setup procedure to ensure the capture of all relevant data for additional post process analysis, report writing, and data archiving using other compatible Dranetz-BMI software applications such as NodeLink® and DranView®.



1. Voltage and Current Connections – there are four differential voltage and four differential current channels, which can be wired to measure a variety of circuit configurations. Use only Dranetz-BMI voltage leads and current probes for proper operation. Do not exceed marked ratings.
2. Graphic Color LCD with Touch Screen – the color LCD has an integral touch screen that is used to select functions for setups, real time meters, and viewing stored data. Either a clean finger or a PDA-type stylus can be used and the screen should be calibrated with whichever you are going to use by selecting Preferences; Display Preferences, then Calibrate Touch screen when first turned on. Clean only with soft cloth.
3. Field Replaceable Battery Pack – the internal UPS feature requires that the internal batteries be properly charged and maintained. If the battery pack is in need of replacement, de-energize the connections and power to the unit before opening the battery door and replacing the pack only with the Dranetz-BMI battery pack PN# BP-PX5 (Z818G). A spare battery pack may be useful to have.
4. Memory Card slots for data and firmware updates – the Dranetz-BMI supplied Compact Flash memory cards are used for data storage, as well as to upload new firmware versions when available. Use only Dranetz-BMI supplied memory cards, as the speed

requirements of the instrument can not be satisfied by many off-the-shelf memory cards. Do not remove the memory card while monitoring. Only one slot is active at a time.

5. There are three status LEDs and the ON/OFF switch (push for on, push for off) are located on the bottom of the instrument. AC power connection for charging the battery and powering the unit with AC Adapter 117029-G1 is located on the right side of the instrument. From left to right, the LEDs are:
  - Battery Charge Indicator. LED will light steadily while battery is fast charging and blink when fully charged.
  - Status Indicator. LED will light steadily when abnormal condition is detected. The unit is operating normally when light is off.
  - Power Indicator. LED will blink in a heartbeat fashion (once per second) when the unit is operating normally.

## MAKING CONNECTIONS

### WARNING

Death, serious injury, or fire hazard could result from improper connection of this instrument. Read and understand the warnings in the beginning of this manual before connecting this instrument.

### ADVERTENCIA

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### WARNUNG

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## Connecting Voltage Measurement Cables

### Measurement cable set

Description: Voltage measurement cables are provided as standard accessories and are stored in a cable pouch as part of the measurement cable set, P/N 116042-G3. Each cable set consists of a cable and alligator clip.

Voltage Rating: Direct connection of all voltage measurement cables are rated at 600 Vrms max. For measuring voltages greater than 600 Vrms, potential transformers (PTs) must be used.

### Optional fused voltage adapter

There are two optional fuse accessory kits available for use with the measurement cables for MAVOWATT 30/40/70. One kit (P/N FVA-1) contains one fused voltage adapter and one measurement connecting Red cable 50 cm in length. The other kit (P/N FVA-4) contains four voltage adapters and four measurement connecting cables 50 cm in length (one Red, one Yellow, one Blue, and one Grey).

- **WARNING:** To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
- **WARNING:** To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Fuses must be located as close to the load as possible to maximize protection.
- **WARNING:** For continued protection against risk of fire or shock hazard replace only with same type and rating of recommended fuse. Use only fast blow type fuse which is rated 600V. Recommended fuse type is Littelfuse, part number KLKD0.30 rated 600V AC/DC, 0.3A fast blow.
- **WARNING:** Do not replace fuse again if failure is repeated. Repeated failure indicates a defective condition that will not clear with replacement of the fuse. Refer condition to a qualified technician.

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MAVOWATT 30/4070 can monitor the following power configurations:

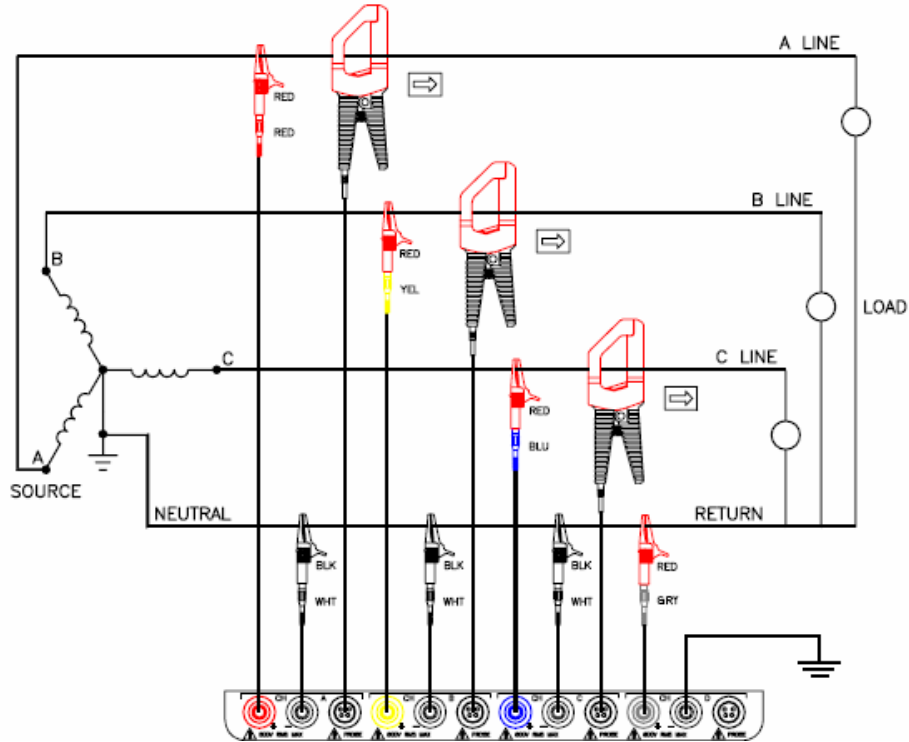
- Single phase
- Split phase
- 3 Phase Delta
- 3 Phase Wye
- 3 Phase 2-Wattmeter Delta
- Generic
- 2 ½ Element without Vb
- 2 ½ Element without Vc

3 Phase Wye and 3 Phase Delta are described in this Quick Reference version of the User's Guide. For other configurations, please consult the complete Users' Guide, UG-MAVOWATT 30/40/70.

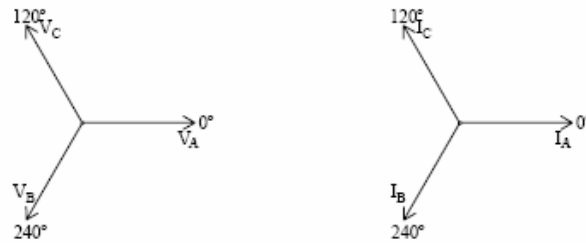
### 3 Phase, Four Wire Wye

Channels A, B, and C are connected to voltage and current probes. The neutral is connected to common and is the reference for the three channels. The figure also shows voltage connection using channel D as a differential input for measuring neutral to ground voltage. Neutral to ground measurements are important but optional.

Connection diagram



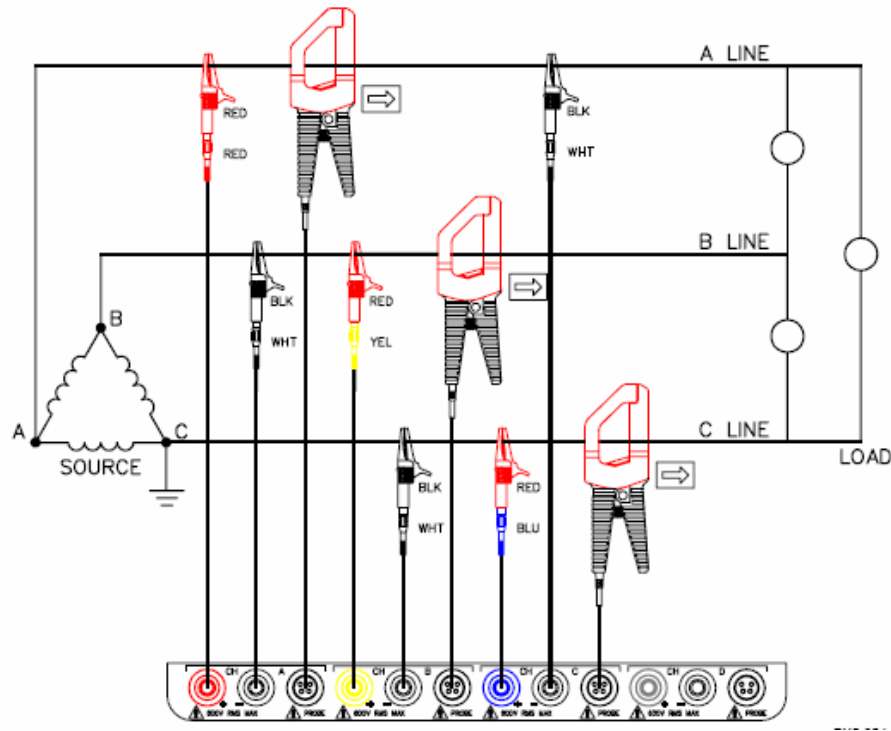
Phasor diagrams



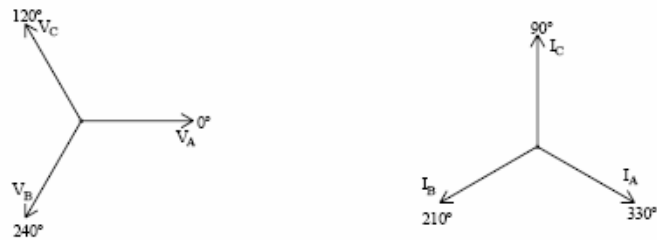
### 3 Phase (Floating or Grounded) Delta

In this power connection, the MAVOWATT 30/40/70 uses voltage channels A, B, and C as differential inputs with channel A using source voltage A-B, channel B using B-C, and channel C using C-A as the reference. Current probes are connected to channels A, B, and C. Neutral to ground measurements are important but optional.

Connection diagram



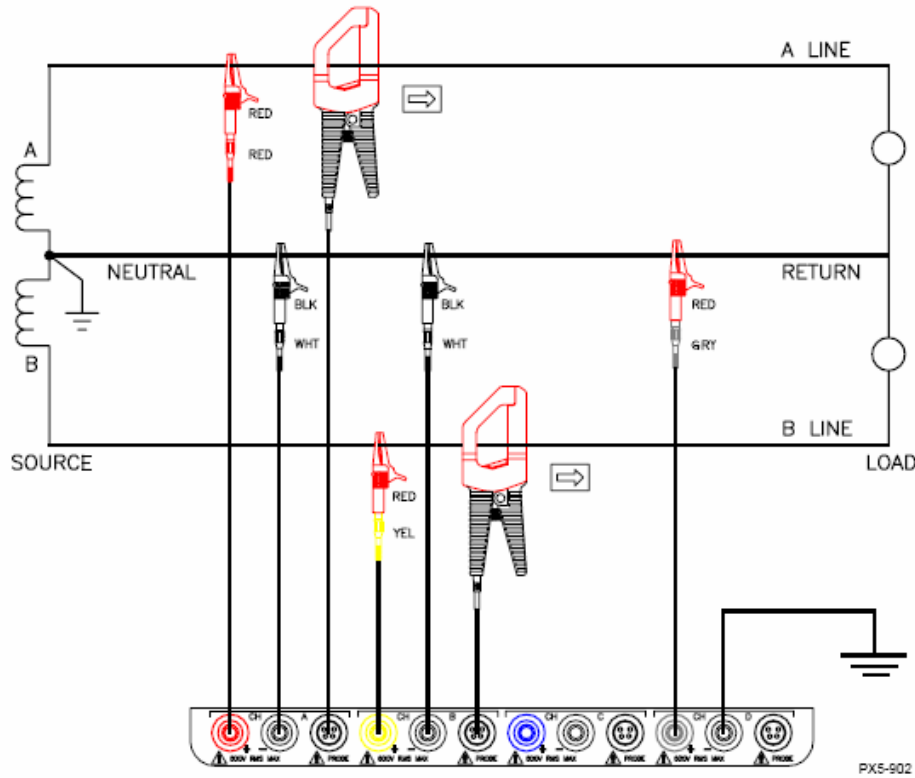
Floating Delta phasor diagrams



## Split Phase and Open Delta

For either of these two power connections, the MAVOWATT 30/40/70 uses only two voltage channels A and B as differential inputs with channel A using source voltage A-N or A-C and, channel B using B-N or B-C. Current probes are connected to channels C and D. Neutral to ground measurements are important for split phase but optional.

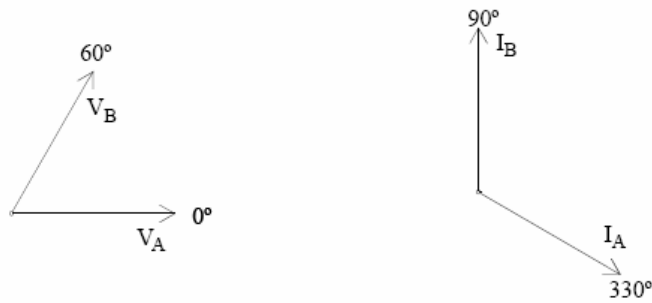
### Connection diagram



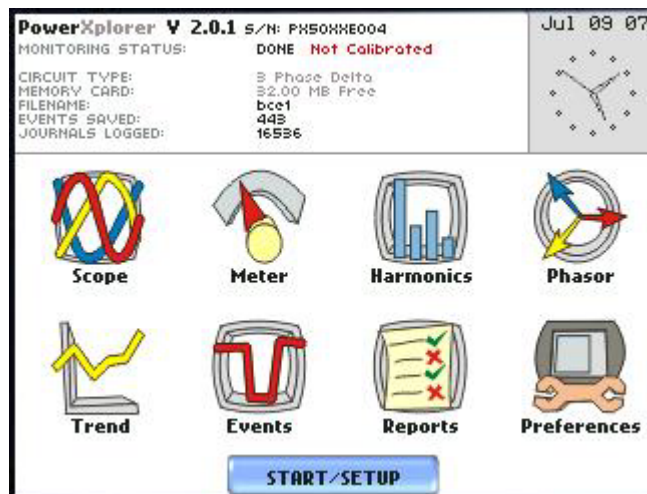
### Phasor diagrams



Split Phase (above)  
Open Delta (below)



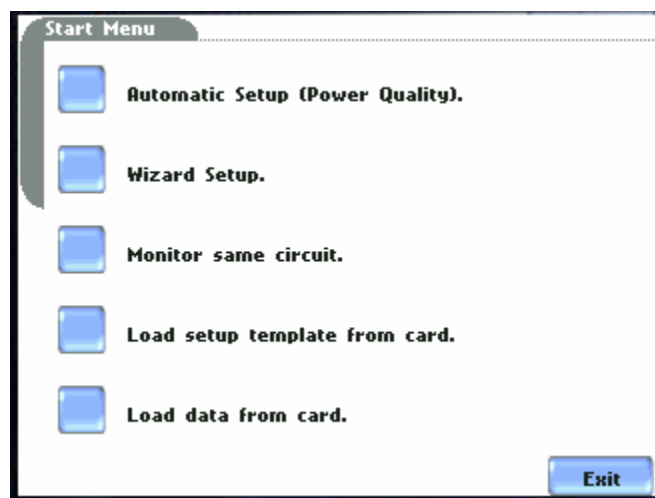
# USER INTERFACE



The instrument powers up with the Home Page screen, shown above. The top portion of the screen is for status information, including: monitoring status (on, off, or armed); what type of circuit is being monitored; the memory card status (not inserted or percentage full); the data file name; the number of waveform cycles saved (indication of event activity); number of journal records saved (periodic timed storage of parameters); and, the real time clock display.

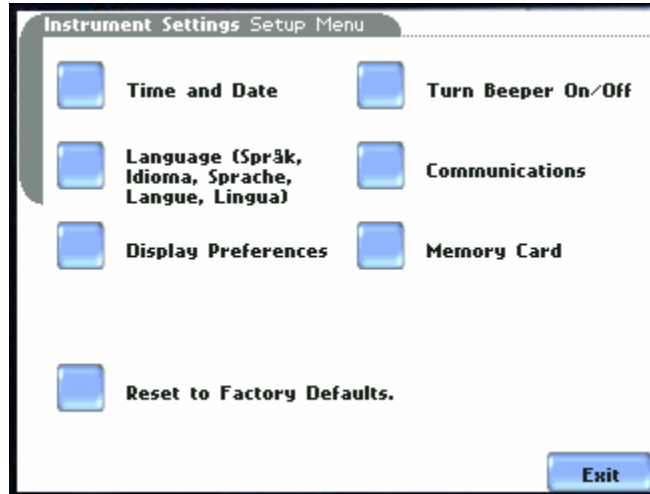
The first row of icons are referred to as Real-Time-Meters, showing the instantaneous values of the parameters. The second row of icons are for display of stored data, either through trend plots, event waveforms and rms plots, and reports of either EN50160 data or an annunciator panel of user selectable parameters and their state (normal, out of limits). Also in this second row is the icon for setting up instrument parameters, such as time/date, memory, language, LCD, and touch screen.

In the bottom of the screen is a button for Start menu, which allows for starting to monitor from either the existing setup, recalling a stored setup from the memory card, or going through the setup process again, either in automatic setup mode, or the step-by-step wizard.



## OTHER INSTRUMENT SETUP

Functions, such as the time/date, which language, communication port setups, and LCD settings can be changed from the Instrument Settings menu, as well as formatting a memory card. This screen is activated from the PREFERENCES icon on the Home page.

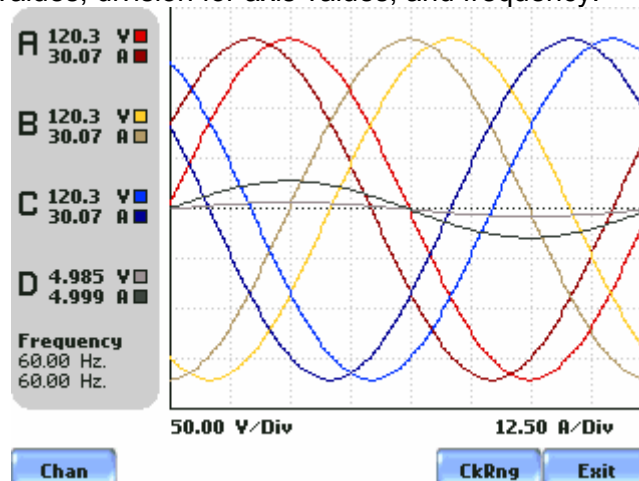


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## REAL TIME METER MODES

### Scope mode

Scope mode functions as an oscilloscope, displaying real-time waveforms of voltage and current for up to eight channels simultaneously, with one second update rate. The colors of waveform display are user programmable. Scope mode also provides a textual display of rms values, division for axis values, and frequency.



## Meter mode

Meter mode functions as a true rms voltmeter and a true rms clamp-on ammeter. Voltage and current measurements, along with other calculated and advanced power parameters, are displayed on the Meter mode screens in both textual and graphical format.

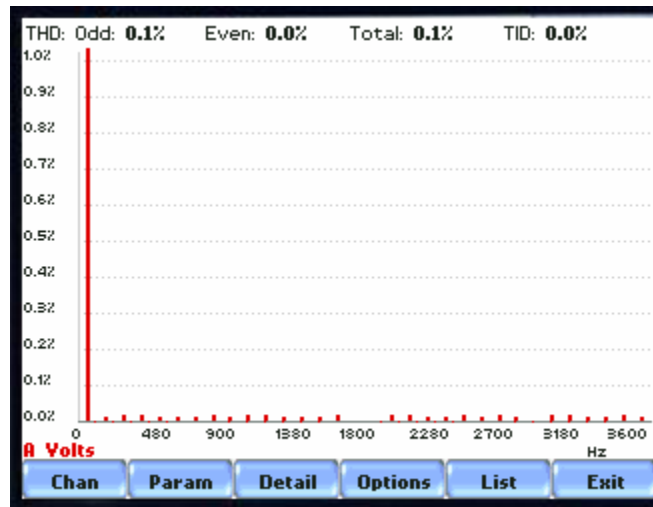
| Standard Distortion UserFreq Unbalance Advanced |     |       |       |
|---|-----|-------|-------|
| Basic   |     | Volts | Arms  |
| Comp Basic                                      | A   | 120.3 | 30.07 |
| Power   | B   | 120.3 | 30.07 |
| Demand  | C   | 120.3 | 30.07 |
| Energy  | D   | 4.985 | 4.999 |
| Harmonics                                       | A-B | 209.3 | *     |
| Flicker   | B-C | 209.3 | *     |
|   | C-A | 206.3 | *     |

\* Derived values

Exit

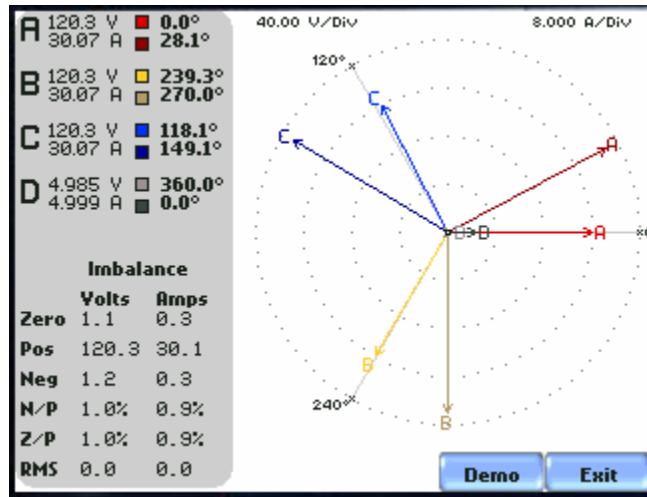
## Harmonics

Harmonics display the amplitude and phase of each harmonic to the 63rd harmonic in both graphical and textual format. User can select which parameter to show the harmonics for (V,I,W), which channel (A,B,C,D), zoom in a the 5Hz components, set options such as showing harmonics and/or interharmonics and displaying in Hz or harmonic number, scaling to the fundamental or absolute value, and a list of the harmonic magnitudes and phase angles in tabular fashion.



## Phasor diagram

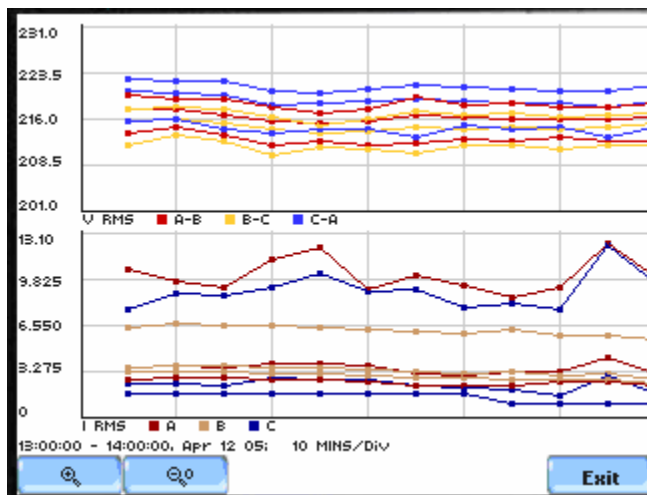
The phasor screen displays a graph that indicates phase relations between voltage and current based upon the angles at the fundamental frequency, as determined by Fourier analysis. Phasor diagram displays voltage and current phasors for all channels. Functioning as a phase angle meter, the unit can display system imbalance conditions and provides such information in textual form also. The phase angle display can also verify if monitoring connections have been made correctly. Animated phasor demo rotations demonstrating resistive, inductive and capacitive loads can be displayed.



## STORED DATA FUNCTIONS and DISPLAYS

### Trend

Users can generate plots for all journalled data combined with min/max recordings of that parameter. Most journal parameters have multiple channels to plot.

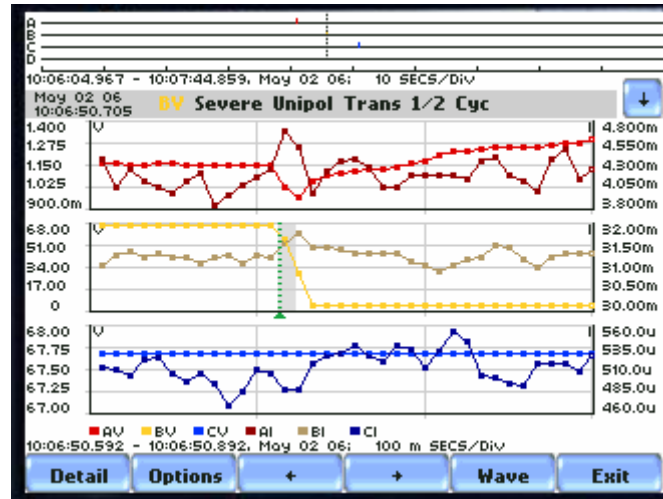




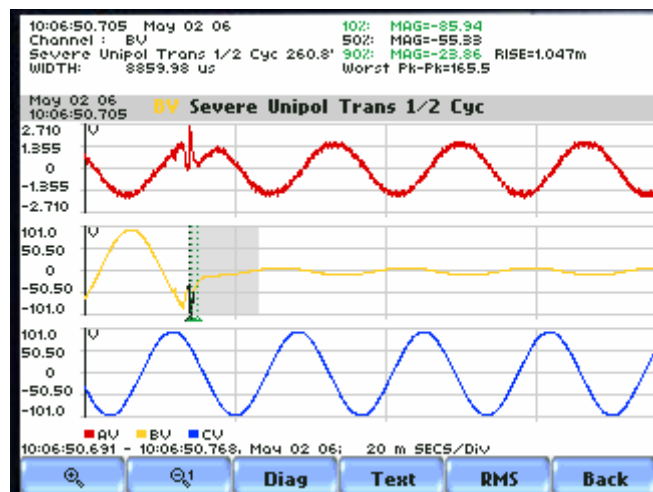
## Events

An event occurs when a programmed threshold limit is crossed. An event consists of the pre-trigger cycle(s), trigger cycle(s), and post-trigger cycles(s)

The event data for all of the captured channels can be displayed in time plots of the rms values or waveforms, event details such as trigger conditions, characterization of the event according to PQ standards, and min/max values, or the time-stamped event list.



Trend of rms voltage and current



Waveforms from transient event capture

| 10:06:50.705 May 02 06 Channel BV |                      |           |       |
|-----------------------------------|----------------------|-----------|-------|
| Trigger                           | Threshold            | Min       | Max   |
| RMS High, Low, Very Low           | 74.87 61.25<br>6.806 | 29.70     | 67.67 |
| Absolute Instantaneous Peak       | 144.6                | 94.63     | 96.27 |
| RMS Distortion Waveshape          | 13.61                | 384.5m    | 54.05 |
| Cycle-to-cycle Waveshape          | 13.6, 15.0%          | Triggered |       |
| Integrated High Frequency Trigger | 113.4                | Triggered |       |

10:06:50.705 BV Severe Neg Unipol Trans at 260.8°, 1/2 Cy  
 Worst Peak-Peak = 165.542 Duration = 8.860m SECS  
 10% mag = -85.9413, offset 13352.44 u SECS  
 50% mag = -55.3284, offset 13672.54 u SECS  
 90% mag = -23.8631,  
 Rise time = 1046.62 u SECS

Chan      +      +      Back

Detailed information of transient event capture

10:06:50.705 May 02 06 10% MAG=-85.94  
 Channel : BV 50% MAG=-55.33  
 Severe Unipol Trans 1/2 Cyc 260.8° 90% MAG=-23.86 RISE=1.047m  
 WIDTH: 8859.98 us Worst Pk-Pk=165.5

|                           |                                  |   |
|---------------------------|----------------------------------|---|
| May 02 06<br>10:06:45.813 | AV Mild Unipol Trans 1/16 Cyc    | ↑ |
| May 02 06<br>10:06:45.814 | AV Mild Bipol Trans 1/16 Cyc     |   |
| May 02 06<br>10:06:45.825 | AV Instantaneous Sag.            |   |
| May 02 06<br>10:06:50.705 | BV Mild Bipol Trans 1/16 Cyc     |   |
| May 02 06<br>10:06:50.704 | BV Mild Bipol Trans 1/16 Cyc     |   |
| May 02 06<br>10:06:50.705 | BV Mild imp                      |   |
| May 02 06<br>10:06:50.705 | BV Mild Bipol Trans 1/16 Cyc     |   |
| May 02 06<br>10:06:50.705 | BV Severe Unipol Trans 1/2 Cyc   |   |
| May 02 06<br>10:06:55.876 | CV Moderate Unipol Trans 1/4 Cyc | ↓ |

OK      Cancel

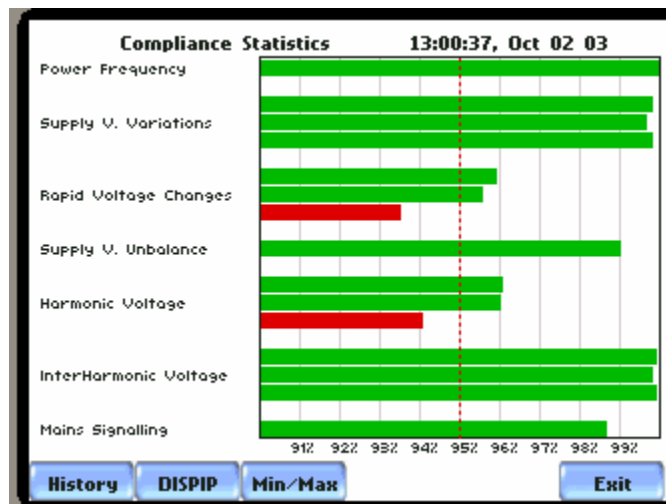
List of events with characteristics

## REPORTS

There are two types of reports – EN50160 for Quality of Supply reporting, and the Annunciator panel, which the user can select to display the present state of 4-16 parameters

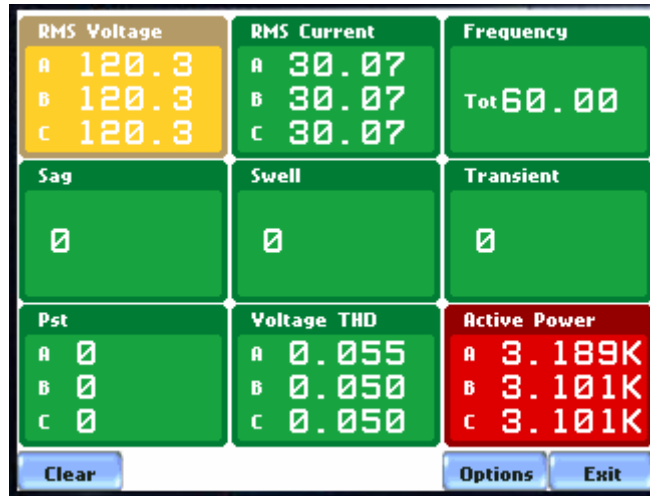
### EN50160

If a parameter is below the 95% limit for EN50160, then the bar graph will turn red. Some of the parameters have more detailed information about them, which can be displayed by pressing on the parameter name. History of prior measurement weeks can be displayed, along with the magnitude and duration distribution table (DISDIP), and the min/max values during monitoring interval.



## ANNUNCIATOR

If the parameter is outside of the normal, it will either turn yellow limits (low or high) or flashing red (very high or very low) until the user clears the annunciator to reset them all to green. Pressing the parameter button itself will show time plots and other detailed information about the parameter.



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## SETUPS

Setup is a configuration of parameter thresholds that control the data recorded by MAVOWATT 30/40/70.

Users may perform instrument setup in three ways: via Automatic Setup which utilizes auto-configured settings and allows users to proceed directly with data monitoring; via Wizard Setup which follows a step-by-step sequence where users go through a series of circuit setup screens; or via Advanced Options setup which allows users to modify trigger parameters and intervals or tweak threshold settings.

## MEASUREMENT CONNECTIONS

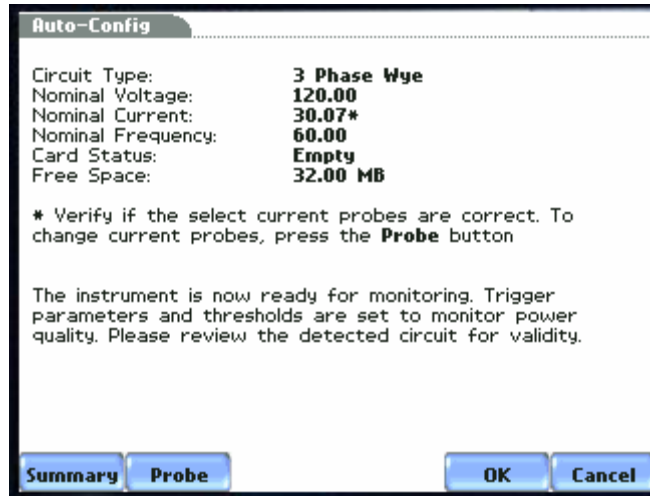
MAVOWATT 70 can monitor the following power configurations:

- Single phase
- Split phase
- 3 Phase Delta
- 3 Phase Wye
- 3 Phase 2-Wattmeter Delta
- Generic
- 2 ½ Element without Vb
- 2 ½ Element without Vc

While monitoring any of the above configurations, the MAVOWATT 30/40/70 can also be connected to monitor neutral to ground voltage and neutral or ground current.

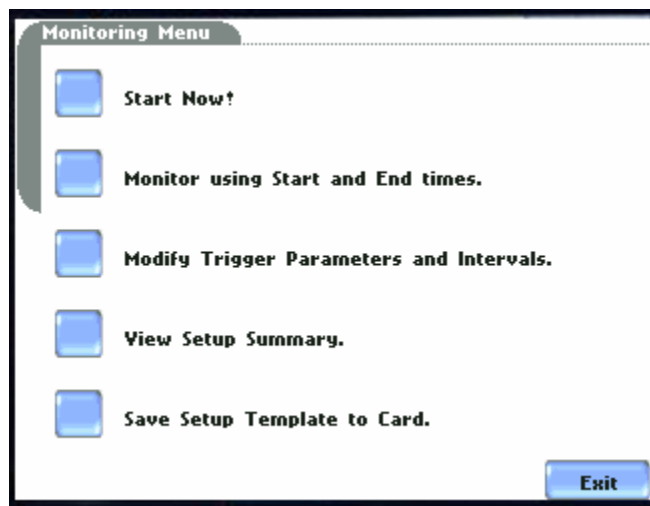
## AUTOMATIC SETUP

Automatic Setup is a one-stop process using pre-defined values to set the unit automatically. Users have the option to view the summary list of parameter settings, change probe types if current will be monitored, and/or proceed directly with data monitoring.



## MONITORING MENU

Once the setup (either stored, automatic or wizard) has been completed, the user can start monitoring instantly or monitor for a fixed period of time.



## WIZARD SETUP

Wizard Setup guides the user through the circuit setup step-by-step, via a series of screens prompting for information about the circuit to be monitored. The unit automatically turns on the correct channels, sets the parameter thresholds and waveform capture settings depending on the detected circuit type, nominal voltage and current values, and monitoring mode specified by the user. The screens are shown in the sequence that they appear when in the Wizard Setup.

### INPUT CONFIGURATION

Current probe types (if used), scale factors (when using additional PTs and/or CTs), circuit configuration (single phase, wye, delta, etc), and the nominal voltage, current and frequency tracking range are set up first before selecting the monitoring mode.

**Current Probe Selection**

|   |                     |        |
|---|---------------------|--------|
| A | Other, Scale: 1.000 | Change |
| B | Other, Scale: 1.000 | Change |
| C | Other, Scale: 1.000 | Change |
| D | Other, Scale: 1.000 | Change |

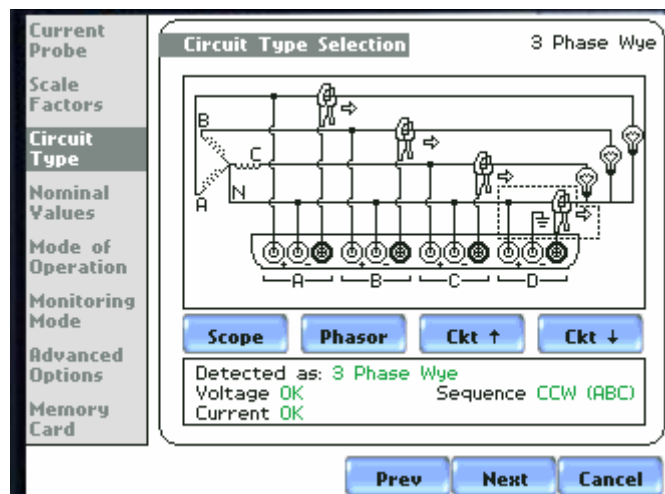
Enable Currents     Set Identical

Next    Cancel

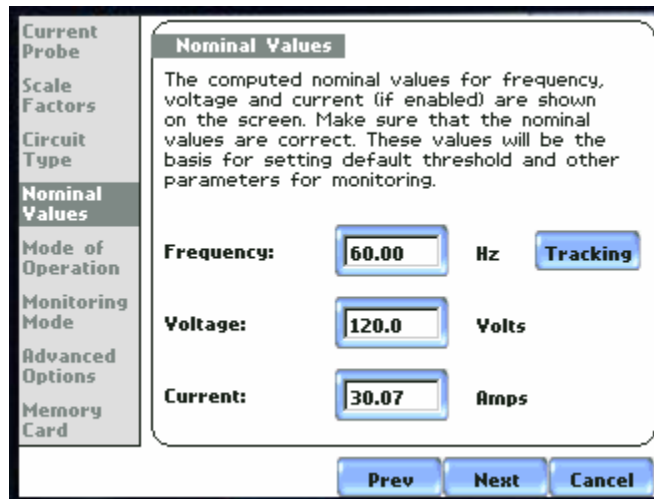
**Scale Factor Setup**

|   | Volts | Amps  |
|---|-------|-------|
| A | 1.000 | 1.000 |
| B | 1.000 | 1.000 |
| C | 1.000 | 1.000 |
| D | 1.000 | 1.000 |

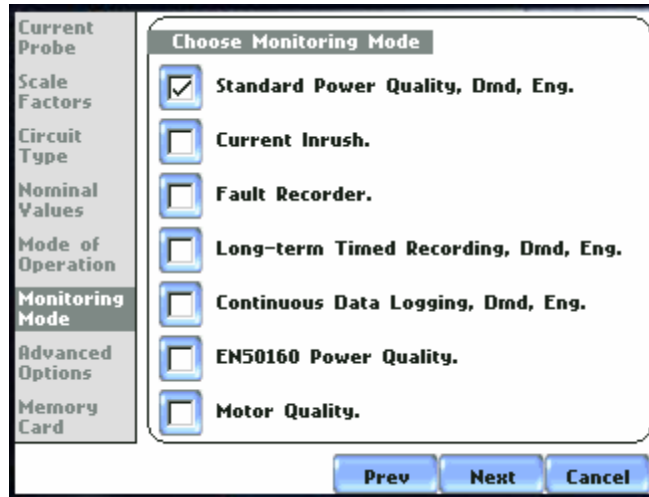
Prev    Next    Cancel



Includes automatic detection and comparison of wiring versus selected configuration



## MONITORING MODES



### Monitoring modes

MAVOWATT 70 allows users to monitor events in the following setup categories: Standard Power Quality, Current Inrush, Fault Recorder, Long-term Timed Recording, Continuous Data Logging, and EN50160 Power Quality mode. Selecting any setup category automatically sets trigger and capture conditions. Advanced users are free to mix and match settings (see Chapter 6 Advanced Setup Options).

**Standard Power Quality, Demand, Energy:** MAVOWATT 70 algorithms automatically evaluate existing rms and waveform conditions to optimize setups to reliably capture data. This feature ensures that the first-time user gets the expected results, while providing the experienced user with the ability to tweak settings for specific applications. Either way, the necessary data used to identify critical events and optimize mitigation solutions is recorded into the data card as it occurs.

**Current Inrush:** Determining system characteristics during current inrush conditions such as impedance changes during motor energization or the I<sup>2</sup>t curve of a breaker trip is key to preventative maintenance and enhanced power system performance. Inrush type events such as motor start-up typically requires extended duration cycle-by-cycle recording. With MAVOWATT 70, users can capture and store detailed data to evaluate system performance against specifications and previous benchmark data. Under the current inrush mode, triggers are current-based. By operating in the inrush mode, the instrument will capture and store highly detailed data to a Compact Flash data card in real time, then rearm and be ready to capture data during the next test run.



**Fault Recorder:** A fault in a wire circuit is usually due to unintentional grounding, a break in the line, a crossing or shorting of the wires, etc. A digital fault recorder logs extended duration cycle-by-cycle recording. Under the fault recorder mode, triggers are voltage-based. MAVOWATT 70 can help locate failures detected in various components of assorted equipment by recording an extended period of cycle-by-cycle data to capture the entire duration of the fault and the associated system response.

**Long-term Timed Recording, Demand, Energy:** Performing a statistically valid power quality energy survey requires the capture of a set of basic data over an extended period of time. MAVOWATT 70 is designed to facilitate long-term monitoring by collecting min/max/avg data at each predetermined interval in order to perform post-process harmonic and other events analysis. MAVOWATT 70 is also designed to be left unattended in the field, recording statistically representative data for long-term analysis. Using the Dranetz-BMI lockable portable case option or other available enclosures, power quality studies can be carried out in harsh weather environments.

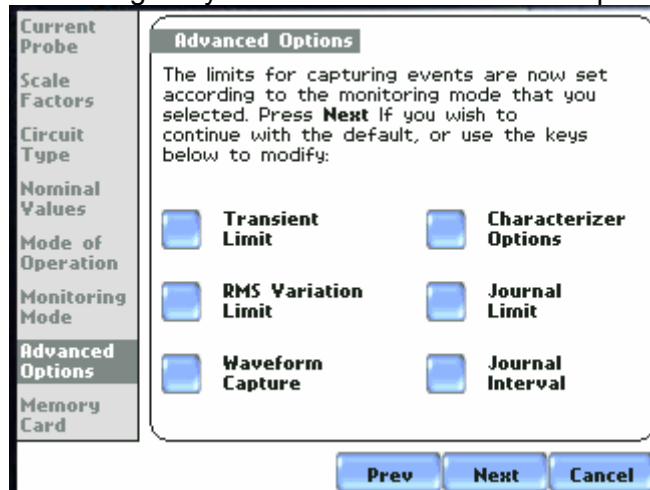
**Continuous Data Logging, Demand, Energy:** This logs the rms and power values once per second for totally gapless logging. Cyclic triggers are disabled. No waveforms are recorded under this monitoring mode.

**EN50160 Power Quality:** EN50160 monitors and reports Quality of Supply (QOS) compliance as specified by the EN standard. The seven parameters required by EN50160 to determine QOS compliance are: Power Frequency, Supply Voltage Variations, Rapid Voltage Changes, Supply Voltage Unbalance, Harmonic Voltage, Interharmonic Voltage, and Mains Signalling.

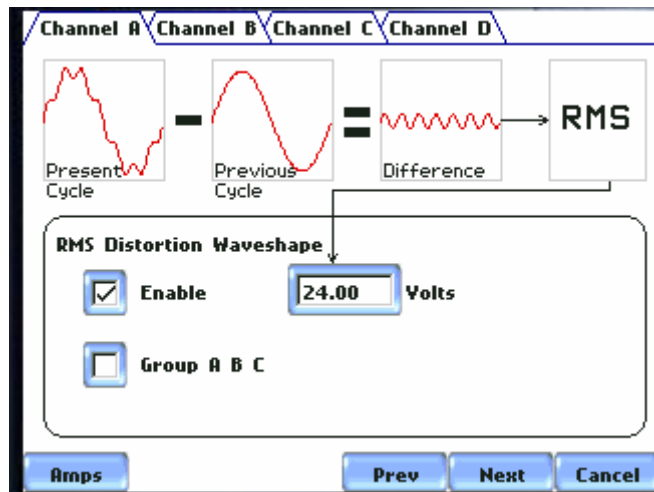
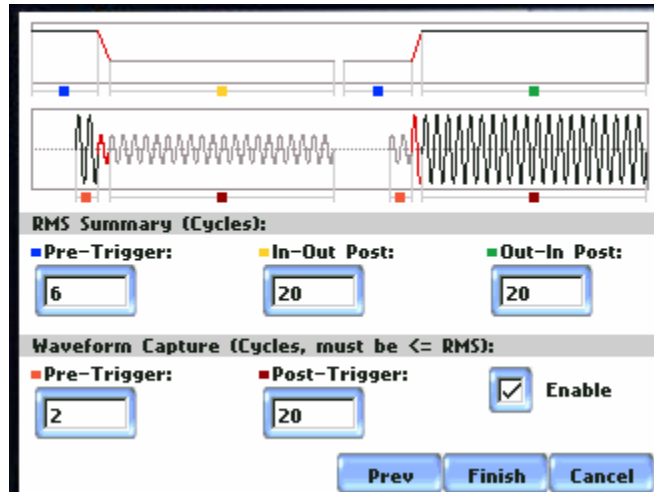
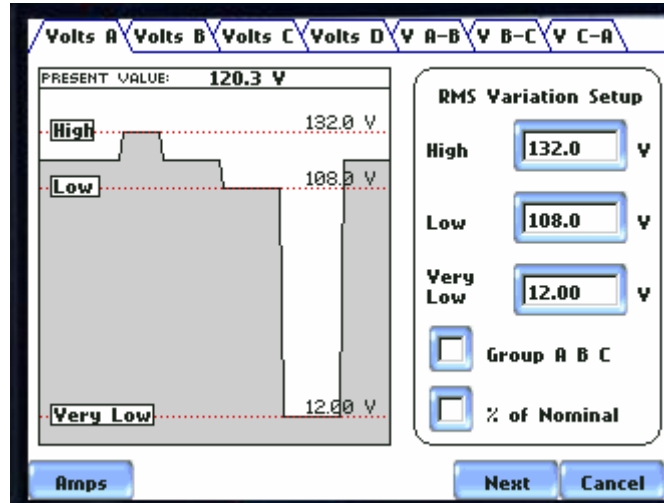
**Motor Quality:** Automatically sets up the parameters that affect the operation of motors. Motor parameters include True Power Factor, Horsepower, and Derating Factor, among others.

## EVENT CAPTURE and JOURNAL SETTINGS

The transient limits for instantaneous peak, high frequency transient (MAVOWATT 70 only), waveshape deviation and waveshape rms deviation; rms variation limits for cycle-to-cycle triggers (high, low, very low), waveform capture cross-trigger matrix, characterization options, journal limits (very high, high, low, very low), and journal interval rate can be changed by the user and saved as a template for future use.



The wizard uses interactive graphical images to show the user what the present values are and the effect of the proposed changes, as illustrated below.



The cross trigger matrix determines which channels are saved when a given channel determines that an event has occurred.


| Trigger Channel | Saved Waveforms                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |
|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                 | Va                                  | Vb                                  | Vc                                  | Vd                                  | Ia                                  | Ib                                  | Ic                                  | Id                                  |
| Volts A         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Volts B         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Volts C         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Volts D         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Amps A          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Amps B          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Amps C          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Amps D          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Volts A-B       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Volts B-C       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Volts C-A       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |

Group A B C

OK Cancel

## SITE NAME and MEMORY CARD SETUP

The last step in the setup is to select the name for the data file, as well as perform any housekeeping functions on the memory card, such as format a new card or delete old data by reformatting. When multiple monitoring sessions are performed using the same file name, the instrument automatically increments and appends a number to the end of the file name.

|  |  |  |
|--|--|--|
| Current Probe<br>Scale Factors<br>Circuit Type<br>Nominal Values<br>Mode of Operation<br>Monitoring Mode<br>Advanced Options<br><b>Memory Card</b> | <b>Site Name/Memory Card</b>   |  |
|  | <b>Site Name:</b>  |  |
|  | Power Xplorer Site   | Change   |
|  | <b>Memory Card</b>   |  |
|  | Free Space: 32.00MB  | <input type="checkbox"/> Free Space: 100.0%<br><input type="checkbox"/> Used Space: 0.0% |
|  | Status: Empty  |      |
|  | Press <b>Finish</b> to continue or:  |  |
|  | <input type="checkbox"/> <b>Format</b> card (Data will be <b>erased</b> ). |  |
|  | <input type="checkbox"/> Memory Card Contents.                             |  |
|  | Prev Finish Cancel   |  |

## Example of Power Quality setup using the Wizard

### Current Probe

Select the current probes you are going to use from the list. If you are using LEMFlex make sure the probe and list match exactly. Full scale current should not exceed probe rating and nominal current should not be less than 10% of full scale.

### Scale Factors

Set Scale factors if working with the secondary of PTs or CTs. If your Probe is in the list and selected, Amps Scale Factor should be 1 if not connected to a secondary of another CT.

### Circuit Type

Select the circuit type. If you see a mismatch while connected you may not be connected properly or your current probes are reading <10% of full scale or could be V or I imbalance. You can choose to override and monitor anyway although not recommended if connection is wrong.

### Nominal Values

If connected the unit will show values it is reading. If you are not connected, then you can set your values by pressing the blue bordered box.

### Mode of Operation

Select *Continue*

### Monitoring Mode

Select *Standard Power Quality*

### Advanced Options

Six Sub-categories

- 1) Transient – Leave defaults as long as Nominal Values were correct.
- 2) RMS Variation – Leave defaults as long as Nominal Values were correct.
- 3) Waveform Capture – Easiest thing to do is set all boxes with a check mark.
- 4) Characterizer Options – Verify IEEE 1159.
- 5) Journal Limit – Select *Disable*, then disable All  
Note that this will disable alarming functions on the annunciator panel status report. Activate only those that you specifically need.
- 6) Journal Interval – Leave defaults.

### Memory Card

Name your survey. The Site Name will be your data file name. Format your memory card as long as other data files are saved on your PC.

*Finish* then *Start Now*.

## Example of Energy/Demand setup using the Wizard

Same as above, except:

### Monitoring Mode

Select *Long Term Timed*

### Advanced Options

Select *Journal Limits*, then *Disable ALL*. Note that this will disable alarming functions on the annunciator panel status report. Activate only those that you specifically need.

## Statements and Notices

### Statement of warranty

All products of Dranetz-BMI are warranted to the original purchaser against defective material and workmanship for a period of one year from the date of delivery. Dranetz-BMI will repair or replace, at its option, all defective equipment that is returned, freight prepaid, during the warranty period. There will be no charge for repair provided there is no evidence that the equipment has been mishandled or abused. This warranty shall not apply to any defects resulting from improper or inadequate maintenance, buyer-supplied hardware/software interfacing, unauthorized modification or misuse of the equipment, operation outside of environmental specifications, or improper site preparation or maintenance.

### Statement of reliability

The information in this manual has been reviewed and is believed to be entirely reliable, however, no responsibility is assumed for any inaccuracies. All material is for informational purposes only and is subject to change without prior notice.

### Notice regarding FCC compliance

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

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