

ENCORE SERIES® 61000 System

USER INTERFACE OPERATION GUIDE



DRANETZ
1000 New Durham Road
Edison, New Jersey 08817-4019

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 70-2011) 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-2009) 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 70-2011) 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-2009) 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 70-2011) 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-2009) 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 70-2011) 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-2009) der Vereinigten Staaten und alle zusätzlichen Arbeitsplatzsicherheitsauflagen folgen, die auf Ihre Installation anwendbar sind.

Safety Summary

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 61000, its data, other equipment, or property.

NOTE statements call attention to specific information.

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 manual).



Alternating current (ac) operation of the terminal or device.



Direct current (DC) operation of the terminal or device.



Protective conductor terminal.

Definiciones

Las ADVERTENCIAS informan al usuario de ciertas condiciones o prácticas que podrían producir lesiones mortales o daño físico.

Las PRECAUCIONES identifican condiciones o prácticas que podrían dañar la 61000, sus datos, otros equipos o propiedad.

Las NOTAS llaman la atención hacia la información específica.

Símbolos

Los siguientes símbolos de la Comisión Internacional Electrotécnica (IEC) aparecen marcados en el panel superior y el posterior inmediatos al terminal o dispositivo en referencia:



Precaución, consulte los documentos adjuntos (este manual).



Operación de corriente alterna (ca) del terminal o dispositivo.



Operación de corriente continua (CC) del terminal o dispositivo.



Terminal de protección del conductor.

Safety Summary, Continued

Définitions

Les messages d'AVERTISSEMENT préviennent l'utilisateur que certaines conditions ou pratiques pourraient entraîner la mort ou des lésions corporelles.

Les messages de MISE EN GARDE signalent des conditions ou pratiques susceptibles d'endommager "61000", ses données, d'autres équipements ou biens matériels.

Les messages NOTA attirent l'attention sur certains renseignements spécifiques.

Symboles

Les symboles suivants de la Commission électrotechnique internationale (CEI) figurent sur le panneau arrière supérieur situé à proximité du terminal ou de l'unité cité:



Mise en garde, consultez les documents d'accompagnement (ce manuel).



Fonctionnement du terminal ou du dispositif sur le courant alternatif (c.a.).



Fonctionnement du terminal ou de l'unité en courant continu (CC).



Borne conductrice de protection.

Definitionen

WARNUNGEN informieren den Benutzer darüber, daß bestimmte Bedingungen oder Vorgehensweisen körperliche oder tödliche Verletzungen zur Folge haben können.

VORSICHTSHINWEISE kennzeichnen Bedingungen oder Vorgehensweisen, die zu einer Beschädigung von 61000, seiner Daten oder anderer Geräte bzw. von Eigentum führen können.

Symbole

HINWEISE machen auf bestimmte Informationen aufmerksam. Die folgenden Symbole der Internationalen Elektrotechnischen Kommission (International Electrotechnical Commission; IEC) befinden sich auf der Abdeck- und Seitenplatte unmittelbar am betreffenden Terminal oder Gerät.



Vorsichtshinweis, siehe Begleitdokumente (dieses Handbuch).



Wechselstrombetrieb des Terminals bzw. Geräts.



Gleichstrombetrieb im Terminal oder Gerät.



Terminal-Schutzleiter.

Safety Summary, Continued

Safety precautions

The following safety precautions must be followed whenever any type of voltage or current connection is being made to the instrument.

- 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 instrument 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 instrument to live power lines.
- When used, pods should be connected first to the instrument, then connect to the circuit to be monitored.
- If the equipment is used in a manner not specified in this user's guide, the protection provided by the equipment may be impaired.

These safety precautions are repeated where appropriate throughout this manual.

Statements and Notices

Statement of warranty

All products of Dranetz are warranted to the original purchaser against defective material and workmanship for a period of one year from the date of delivery. Dranetz 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.

Notice regarding proprietary rights

This publication contains information proprietary to Dranetz. By accepting and using this manual, you agree that the information contained herein will be used solely for the purpose of operating equipment of Dranetz.

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Statements and Notices, Continued

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Encore Series® 61000 System Rack Mount Enclosure with User Interface (61RMTD)



Encore Series® 61000 System Switchgear Enclosure with User Interface (61SGD)

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61000 User Interface

Overview; Power On Sequence; Functional Icons; Start/Setup Menu

Overview

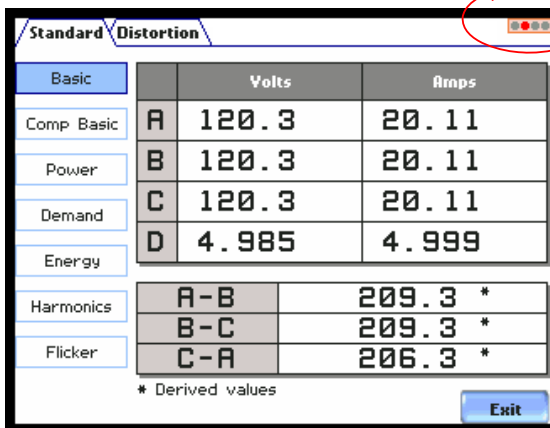
61000 user interface

The Encore Series® 61000 System (hereinafter referred to as the 61000) has an optional color liquid crystal display (LCD) with a touch screen that serves as local user interface. The 61000 local user interface is available in two different mounting formats:

- 61RMTD - 19" rack mount with the 61000 mounted behind the LCD/touch screen
- 61SGD - switchgear mounting enclosure with the LCD/touch screen integrated into the package

Both of the user interfaces operate in the same manner and can have multiple modules that can be configured as multiple virtual analyzers, or, multiple instruments in one mainframe. Depending on the input modules installed, there can be one to four virtual analyzer tabs across the top of the home page of the screen. The user selects which virtual analyzer to view. All subsequent screens will then reflect the data for that virtual analyzer only. To change to another virtual analyzer, simply go back to the home page and select a different tab. **On subsequent screens, an indicator in the upper right corner will show which virtual analyzer's data is currently being displayed.**

sample screen below indicates that the meter panel is displaying data from the second virtual analyzer



	Volts	Amps
A	120.3	20.11
B	120.3	20.11
C	120.3	20.11
D	4.985	4.999
A-B	209.3	*
B-C	209.3	*
C-A	206.3	*

* Derived values

Continued on next page

61000 user interface (continued)

This virtual analyzer configuration is programmed at the 61000 web interface, and is not covered in this document. The connections of the measuring inputs and other operations of the mainframe are also not covered in this document; refer instead to the *Encore Series 61000 Installation Guide* available from Dranetz. Likewise, refer to the *Encore Series Software User's Guide* for information on how to view the data and setups remotely from a web-browser.

Real-time data display

The 61000 provides the user with the ability to see real-time data displays as well as set preferences, such as time/date format, backlighting, and language selection. The real-time data displays include:

- Scope Mode - oscillograph-type display of the input channels of the virtual analyzer.
 - Meter Mode - tabular displays of the various parameters being monitored and calculated by the virtual analyzer.
 - Harmonics - harmonic voltage, current, and power in either spectrum bar graphs or list of harmonic magnitudes and phase angles.
 - Phasor diagram - voltage and current vectors plotted on a polar graph, showing magnitude and phase angles, along with unbalance values.
 - 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 is crossed. An event consists of the pre-trigger cycle(s), trigger cycle(s), and post-trigger cycle(s).
 - Reports - show a quick status summary of Standard PQ parameters using the annunciator panel.
-

This guide

This guide contains instructions on how to operate the 61000 LCD touch screen interface.

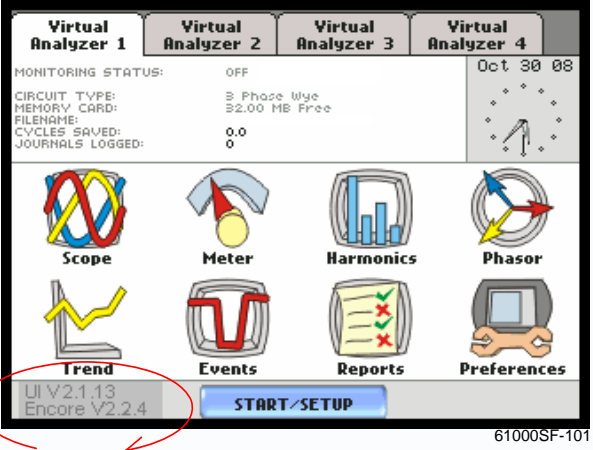
For 61000 hardware description and optional accessories, refer to the *Encore Series 61000 Installation Guide*.

For operational description using remote communications via Encore® Series Software refer to the *Encore Series Software User's Guide*.

Power On Sequence

Power on sequence

Follow these steps to turn on the 61000. The unit defaults to Virtual Analyzer 1 Home screen upon power up.

Step	Action
1	Connect the ac adapter/battery charger plug into the input connector on the rear panel of the instrument.
2	Plug the power adapter into the appropriate source.
3	<p>Press the instrument On/Off power button to turn the unit on.</p> <p><u>Result:</u> The Home screen for Virtual Analyzer 1 will be displayed.</p>  <p>NOTE 1: UI Vx.x.xx refers to the firmware for the touchscreen LCD panel Encore Vx.x.x refers to the firmware for the mainframe</p> <p>NOTE 2: When the unit is first powered up, the message “Synchronizing with host” will display for up to 30 seconds.</p>

Virtual analyzer platform

61000 uses the concept of virtual analyzers to interface with the modular design of the mainframe. As described in the *Encore Series 61000 Installation Guide*, the unit can have a maximum of 4 input modules, with separate and independent connection for each input module installed. The user can configure up to four virtual analyzers in a single instrument.

Continued on next page

Virtual analyzer platform (continued)

Users can configure the 61000 to have up to four virtual analyzers, depending on the input module connections installed. The instrument is factory-set to pair voltage and current modules in adjacent slots together as a virtual analyzer. If the two sets of voltage and current modules are present, there will be two virtual analyzers. If one voltage and three current modules are present, each current module will be paired up with the voltage module to make three virtual analyzers. Also, four voltage modules are four separate virtual analyzers as would be digital input modules.

Virtual analyzers operate independently of each other. Each has its own set of functional icons, which when pressed allows users to view data from. For example, after the user selects Virtual Analyzer 2 configured to monitor voltage and current data, the user can then press the Meter icon to view voltage and current meter values. Similar concept applies to Scope, Harmonics, Trend, and Events.

Functional Icons

Home screen features

Home screen is frequently referenced as the starting point for all major functionalities of 61000. The date and time appear on the top right corner of the Home screen.

The tab name displays the virtual analyzer actively selected on screen. All pertinent information that appear in the status message i.e. monitoring status, circuit configuration, site/file name, number of event cycles saved, and number of timed intervals saved, refer to monitoring activities under the active virtual analyzer setup.

MONITORING STATUS: OFF indicates that the analyzer is not actively monitoring data. The monitoring status message will change to ON, DONE or ARMED, depending upon the state of data monitoring. Typically, the status should be ON.

Home screen contains the icons used to access the various 61000 functions. See next section for the description of each icon found in Home screen.

Functional icons Each virtual analyzer has the following functional icons:

Scope - Scope mode shows real-time voltage and current waveforms of the signals on the measuring inputs. See Chapter 2 View Real Time Data - Section A Scope Mode.

Meter - Meter mode displays voltage and current measurements, along with other calculated parameters. See Chapter 2 View Real Time Data - Section B Meter Mode.

Harmonics - Harmonic screen displays a spectral graph and textual matrix featuring the amplitude and phase of each voltage and current harmonic to the 63rd harmonic. See Chapter 2 View Real Time Data - Section C Harmonics.

Phasor - Phasor diagrams indicate phase relations between voltage and current based upon the angles of the fundamental. See Chapter 2 View Real Time Data - Section D Voltage and Current Phasor.

Trend - Trend allows users to view 24-hour plots of journalled data along with min/max measurements over the interval, beginning with the last 24 hours. See Chapter 3 View Trend Data.

Events - Events result in a contiguous collection of cycles that is recorded into memory based on user-selected thresholds. Events are classified according to IEEE 1159, IEC 61000-4-30 Class A, and EN50160 standards. See Chapter 4 View Event Data.

Continued on next page

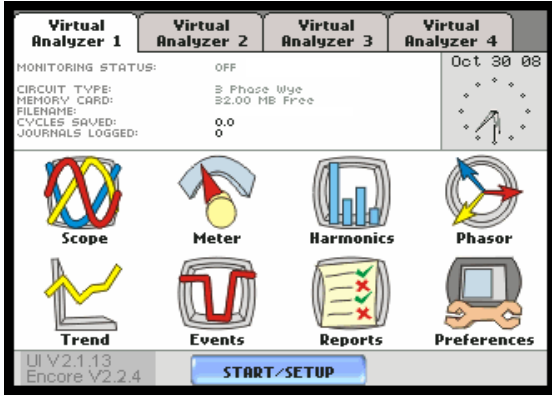

Functional icons (continued) Reports - Reports allow users to view a quick status summary of Standard PQ parameters using the annunciator panel. The color coded panel indicates whether or not the parameter is within limits and/or events have occurred since the last time the panel was cleared. See Chapter 5 Reports.

Preferences - Users can set display preferences like time and date format, time zone, daylight savings, threshold alarm feedback, language selection, LCD display, and reset to factory settings. See Chapter 6 Display Settings.

Start/Setup / Stop- Users can Start Monitoring, View Present Setups, and/or Stop Monitoring if needed. See next section.

Start/Setup Menu

Using the Start/Setup Menu Follow these steps to operate the Start/Setup Menu.

Action...	Result...
<p>STEP 1: Press the 61000 On/Off power button to turn the unit on. The Home screen will be displayed.</p>	 <p>61000SF-101</p>
<p>STEP 2: Press Start/Setup. The 61000 will begin monitoring and the Stop Monitoring Menu will be displayed.</p>	 <p>61000SF-102</p>

Start/Stop menu options

The Start/Stop Menu allows users to perform the following:

- **Start/Setup** - begin monitoring of an electrical system immediately.
- **Stop Now!** - stop monitoring of an electrical system if necessary. This should normally be done as the instrument is usually controlled through the Encore Series Software. If the Encore Series Software is polling the 61000, monitoring will be turned back on at the next poll.
- **View Present Setups** - display the current parameter settings during monitoring

To return to the Home screen without stopping monitoring, press **Exit**.

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View Real Time Data

Overview; Scope Mode; Meter Mode; Harmonics; Voltage and Current Phasor

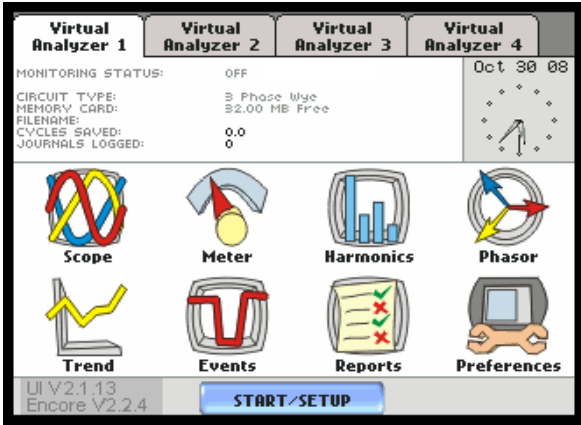
Overview

Introduction

The 61000 allows users to view power quality phenomena as it happens, when it happens. The instrument is able to capture and process data in real time, and allows users to view it in Scope mode, Meter mode, Harmonics, and Phasor display. The user can select which of the analyzer to view data from.

Access to real time data

Icons for Scope mode, Meter mode, Harmonics and Phasor display are available in the Home screen for each virtual analyzer.

Action...	Result...
<p>STEP 1: Upon power up or after exiting from other screens, the Home screen for Virtual Analyzer 1 will be displayed.</p>	 <p>61000SF-101</p>

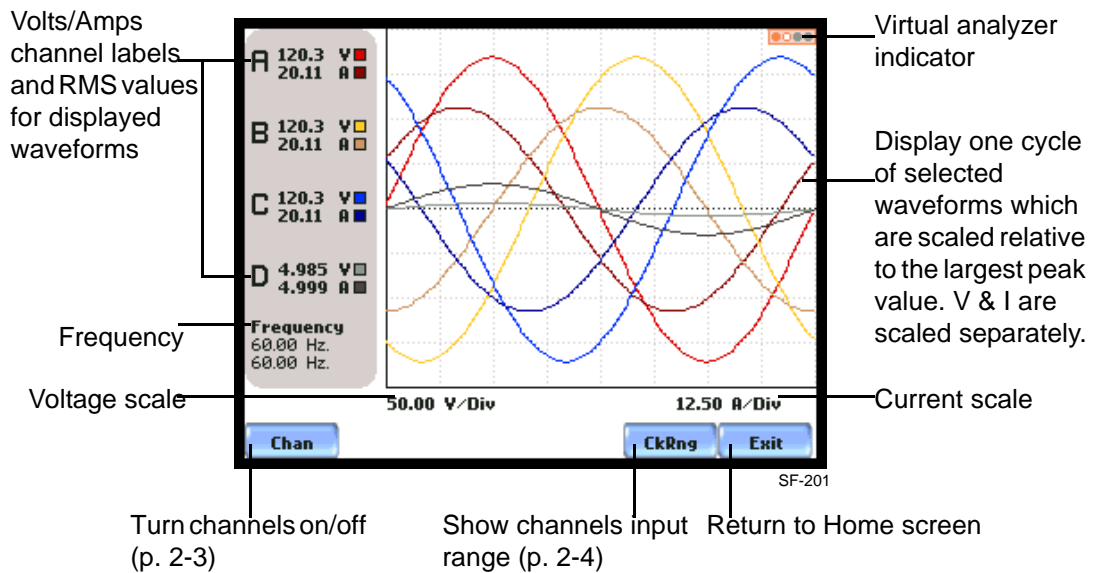
Section A

Scope Mode

Overview

Introduction Scope mode allows you to view real-time voltage and current waveforms for up to eight channels simultaneously.

Scope mode screen The Scope mode screen can be displayed by pressing the Scope key on the Home screen. The sample screen below shows the Scope mode for Virtual Analyzer 2.

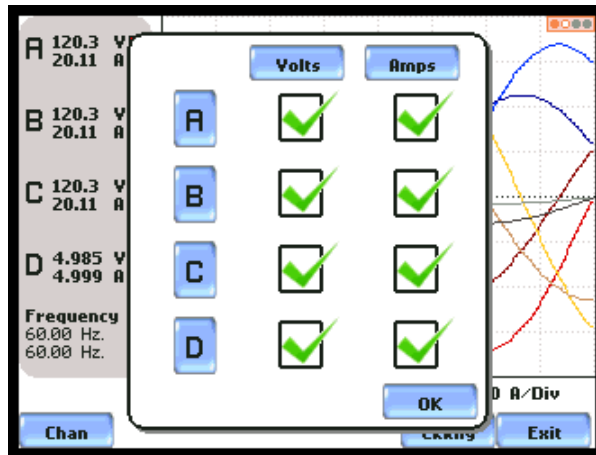


In this section The following topics are covered in this section.

Topic	See Page
Turning Channels On/Off	2-3
Checking Input Range	2-4

Turning Channels On/Off

Select channels to display From the Scope mode screen, press Chan to turn Volts/Amps channel selection on/off.



SF-202

Any of the following will turn channels on/off:

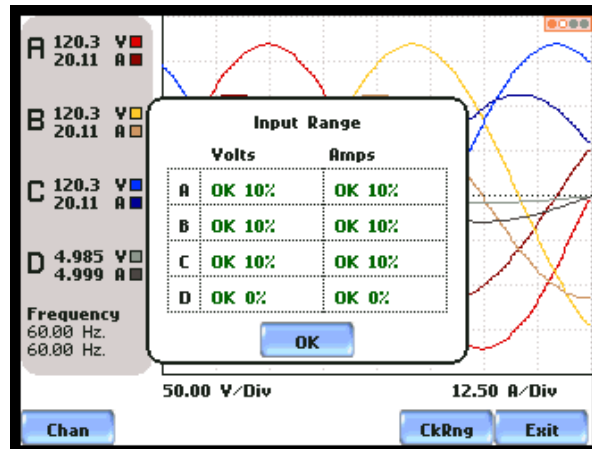
- Press the desired Volts/Amps channel to turn it on/off.
- Press Volts or Amps button to turn on/off all channels of that parameter.
- Press A, B, C, D to turn on/off both the Volts and Amps for that channel.

Press OK to accept channel selection.

Checking Input Range

Input range

The Input Range screen is displayed by pressing the CkRng key on the Scope mode screen. Input Range shows the detected range for all channels. The number after the status shows the percentage of the input of the instrument's full range.



SF-203

The input range can only be viewed, not changed. Press OK when done viewing the input range.

Input range description

The following table describes the messages that may register on the Input Range screen. The instrument is able to detect the input range for voltage and current channels A, B, C, and D.

Input Range	Description
OK	Within Range
OVER	Over Range
UNDER	Under Range
N/A	Channel Disabled
CLIP	Clipping

If input range is OVER, UNDER, or CLIP, then the rms readings will not be accurate. Using CTs below 10% of Full Scale may also cause inaccuracies in amplitude, phase and harmonic distortion readings.

Section B

Meter Mode

Overview

Introduction Meter mode allows you to view real-time meter data. The metered parameters available are logically separated into the following tabs: Standard List and Distortion. Meter screens are displayed in tabular form.

NOTE: Meter mode operation does not interfere with the 61000's monitoring or recording functions. Turning monitoring off does not affect meter readings.

Metered parameters display 61000 is designed to provide setup as well as data display. Metered parameters are available for display. Users can trend journal entries by limits (Very High, High, Low, Very Low) or by time (users can set the time interval of how often rms and waveform snapshots will be recorded even when no disturbances occur).

In this section The following topics are covered in this section.

Topic	See Page
Standard Meter Tab	2-6
Distortion Meter Tab	2-8

Standard Meter Tab

Standard meter list

Meter mode can be displayed by pressing the Meter icon on the Home screen. At start-up, meter mode defaults in the Standard tab featuring the basic power quality parameters available. The standard metering properties include Voltage, Computed Basic, Power, Demand, Energy, Harmonics and Flicker as shown below.

		Volts	Amps
Basic	A	120.3	20.11
	B	120.3	20.11
	C	120.3	20.11
	D	4.985	4.999
Harmonics	A-B	209.3 *	
	B-C	209.3 *	
	C-A	206.3 *	

* Derived values

61000SF-301

Standard Tab	Parameter Name	Label
Basic (for A, B, C, D)	Volts NOTE: Some voltage channel meter values are derived based on the circuit type selection. The values will change depending on the wiring configuration setup.	Volts
	Ampere	Amps
Computed Basic	Vector Displacement Power Factor	Vector Displacement PF
	Arithmetic Displacement Power Factor	Arithmetic Displacement PF
	Residual Current	Residual Current
	Net Current	Net Current
Power (for A, B, C, D, Total)	Watts	W
	Volts Ampere	VA
	Volts Ampere Reactive	VAR
	True Power Factor	TPF
	Displacement Power Factor	DPF

Continued on next page

Standard meter list (continued)

Standard Tab	Parameter Name	Label
Demand	Active Power Demand	Active Power Demand
	Apparent Power Demand	Apparent Power Demand
	Reactive Power Demand	Reactive Power Demand
	RMS Current Demand Phase A	RMS Current Demand Ph A
	RMS Current Demand Phase B	RMS Current Demand Ph B
	RMS Current Demand Phase C	RMS Current Demand Ph C
	RMS Current Demand Average	RMS Current Demand Avg
Energy (for A, B, C, D, Total)	Watt Hours	Watt Hrs
	Volts Ampere Hours	VA Hrs
	Volts Ampere Reactive Hours	VAR Hrs
Harmonics (for A, B, C, D)	Voltage Total Harmonic Distortion	V THD
	Current Total Harmonic Distortion	I THD
	RMS Harmonic Current	RMS I Harm
	Harmonic Power Unsigned	Harm Pwr Unsigned
Flicker (for A, B, C)	Short Term Flicker	Pst
	Long Term Flicker (Sliding)	Plt (Slide)
	Long Term Flicker	Plt

Distortion Meter Tab

Distortion meter list 61000 is able to meter distortions or uncharacteristic changes in the waveform of original signals. Distortion calculations measure the deviation of complex waveshapes from pure sine waves. Harmonics are measured in accordance with IEC 61000-4-7 Class I.

	VTHD(%) fund	ITHD(%) fund	VTHD RSS	ITHD RSS
A	0.055	0.052	<0.01	<0.01
B	0.050	0.051	<0.01	<0.01
C	0.050	0.052	<0.01	<0.01
D	0.118	0.088	<0.01	<0.01

61000SF-311

Distortion Tab	Parameter Name	Label
THD (for A, B, C, D)	Voltage Total Harmonic Distortion Fundamental	V THD fund
	Current Total Harmonic Distortion Fundamental	I THD fund
	Voltage Total Harmonic Distortion Root Sum of Square	V THD RSS
	Current Total Harmonic Distortion Root Sum of Square	I THD RSS
TID (for A, B, C, D)	Voltage Total Interharmonic Distortion Fundamental	V TID fund
	Current Total Interharmonic Distortion Fundamental	I TID fund
	Voltage Total Interharmonic Distortion Root Sum of Square	V TID RSS
	Current Total Interharmonic Distortion Root Sum of Square	I TID RSS

Continued on next page

Distortion meter list (continued)

Distortion Tab	Parameter Name	Label
TIF (for A, B, C, D)	Voltage Telephone Influence Factor Fundamental	V TIF fund
	Current Telephone Influence Factor Fundamental	I TIF fund
	Voltage Telephone Influence Factor RMS	V TIF RMS
	Current Telephone Influence Factor RMS	I TIF RMS
	Telephone Influence Factor Product	TIF Prod
Crest Factor (for A, B, C, D)	Voltage Crest Factor	Volts Crest Factor
	Current Crest Factor	Amps Crest Factor
Power (for A, B, C, D)	Signed Phase Harmonic Power	Signed
	Unsigned Phase Harmonic Power	Unsigned
Transformer (for A, B, C, D)	Transformer Derating Factor	Derating Factor
	K Factor	K Factor

Section C

Harmonics

Overview

Harmonics display

61000 allows users to view voltage and current harmonics/interharmonics in graphical or in list form. Harmonics are waveform distortion, a steady-state deviation from an ideal power frequency sinusoid and is characterized by the spectral content of the waveform. Interharmonics are frequency components between the harmonic frequencies. The IEC 61000-4-7 Standard dictates that harmonic analysis is done using a synchronous window of 10 cycles for 50 Hz, or 12 cycles for 60 Hz. This results in bins which are nominally 5 Hz wide. The actual width of the bins is equal to the actual frequency divided by 10 if the nominal frequency is 50 Hz, and 12 if 60 Hz. For example, if actually operating at 49.9 Hz, the bin is 4.99 Hz, but is labelled “5 Hz” as specified by the standard.

Use the respective touch screen buttons to display the next Channel (Channels A, B, C, D) and the next Parameter (V, I, W) of harmonic data. The number of harmonics/interharmonics displayed is up to the 63rd. Summary values of odd, even and total distortion are displayed. A summary of harmonic distortion as well as interharmonic distortion values per phase/parameter are also available on display.

Harmonic Graph: Harmonics are measured in accordance with IEC 61000-4-7 Class 1. Users can choose the unit of measure by which harmonic data is calculated and graphed, based on a Percentage of the fundamental value or in Engineering units (volts and amps). The graphs can be zoomed and rescaled.

Harmonic List: The list gives a textual display of the following for each of the measured values: frequency and harmonic number; magnitude in Engineering units and percent of fundamental; phase in degrees (for harmonics only).

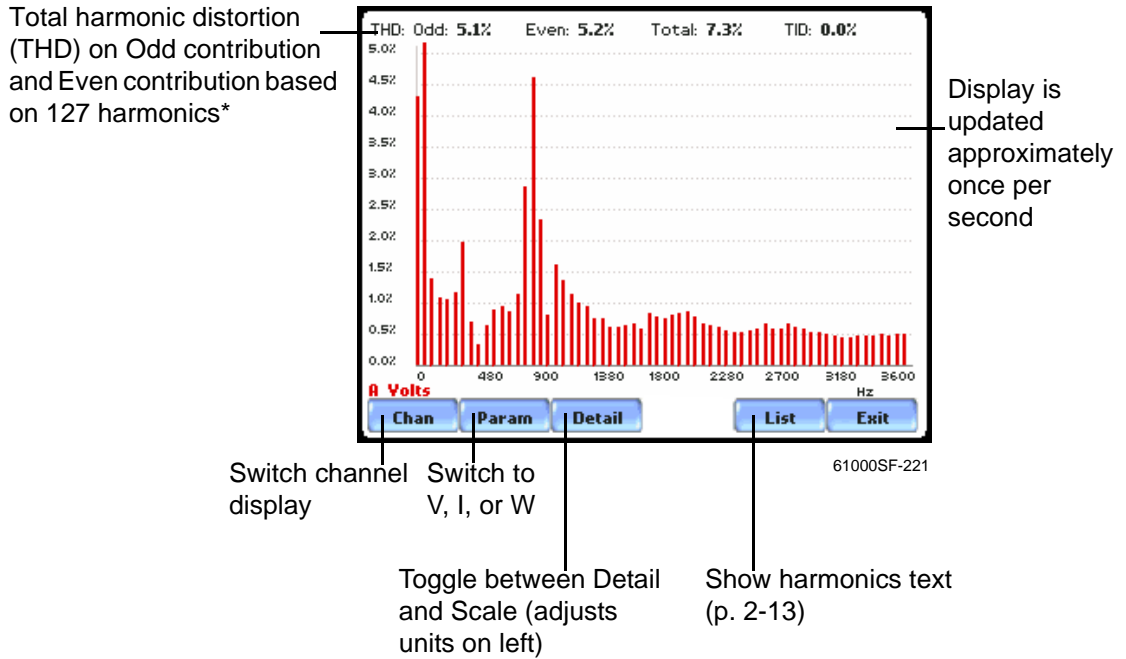
In this section

The following topics are covered in this section.

Topic	See Page
Harmonic Graph	2-11
Harmonic Detail	2-12
Harmonic List	2-13

Harmonic Graph

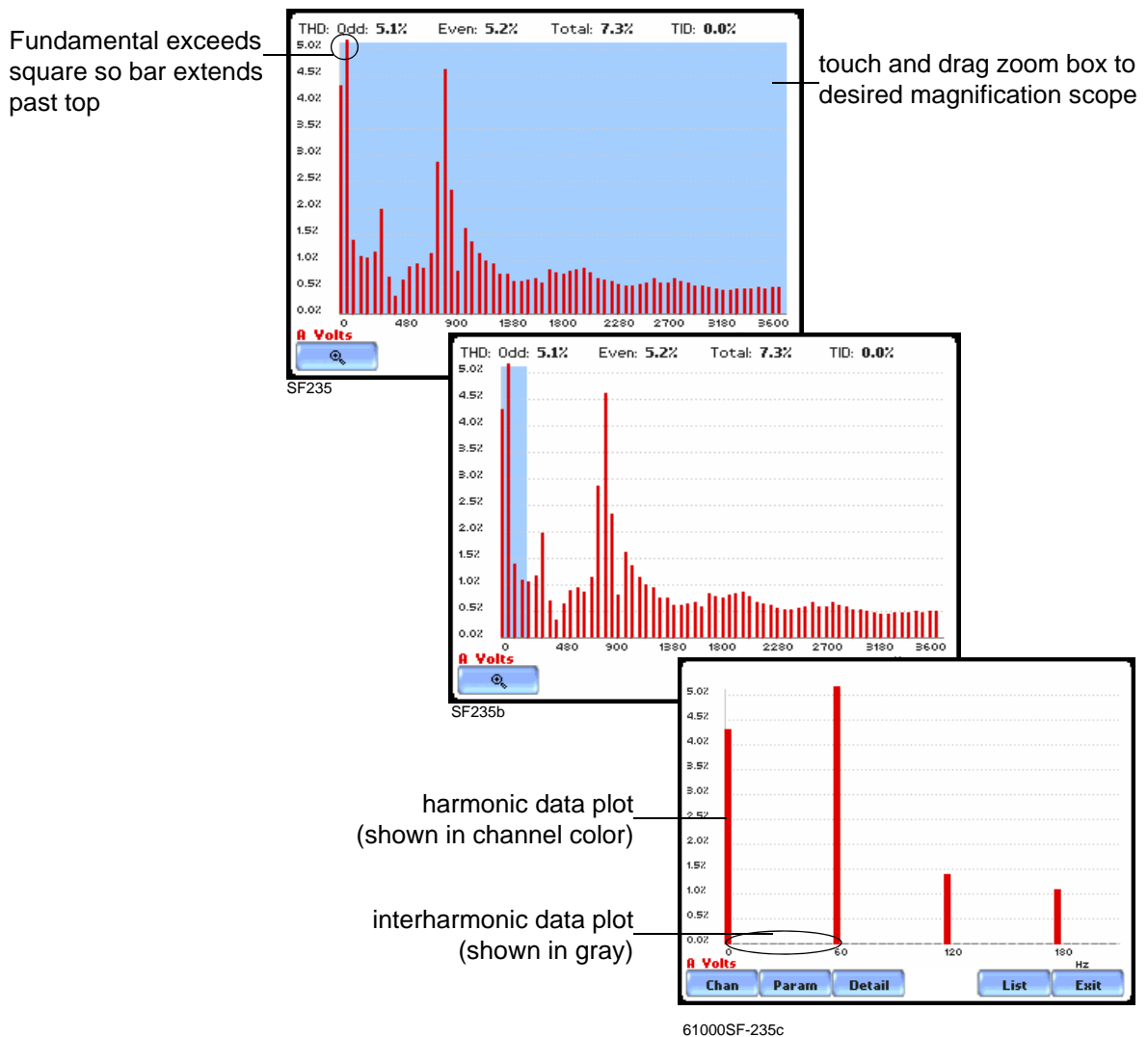
Harmonic graph display The harmonic graph can be displayed by pressing Harmonics on the Home screen. The screen defaults to a graphical spectrum display, although users have the option to choose between the graph and list form. The screen will show a spectral graph featuring the amplitude of the harmonics relative to the fundamental frequency.



**The odd contribution is the square root of the sum of the squares of the relative amplitudes of harmonics 3, 5, and 7 through N-1, where N is a function of sampling frequency. The even contribution is similar for harmonics 2, 4, and 6 through N. Total value is the square root of the sum of the squares of all harmonics.*

Harmonic Detail

Harmonic graph details 61000 allows users to determine the numbers or the range of harmonic frequencies to trend. A blue box showing the default zoomed area appears once the Detail button is pressed. Touch any side of the zoom box to activate the drag function. Touch and drag the sides of the zoom box to expand or narrow in on a select number of harmonic/interharmonic graphs. The zoom box moves horizontally only. The vertical scale will autoscale when zoomed.



The magnify buttons serve as zoom function keys, each of which feature a plus sign or a minus sign within. Press **Zoom+** to display the zoomed area and view harmonic graphs in greater detail. Users may repeatedly zoom in on a plot for up to seven (7) levels. Press **Zoom-(n)** to unzoom graph display one increment at a time, where n is the counter of how many times the harmonic graphs have been magnified.

Harmonic List

Harmonic text display

To view the harmonics magnitude text display, press List from the Harmonic graph screen on page 2-11. The touch screen buttons displayed on list include (from left): Chan (Channel), Param (Parameter), Units (toggle between Units and Percent), Phase (toggle between Phase and Magnitude), Graph, and Exit.

Use the respective touch screen buttons to display the next Channel (Channels A, B, C, D) and the next Parameter (V, I, W) of harmonic data.

Users can also determine how to plot harmonic/interharmonic data and specify the Units/Percent of measure by which harmonic data is calculated.

Harmonic phase degree values from 1 to 63 are displayed for voltage and current; while phase degree values from 1 to 50 are displayed for harmonic watts. Harmonic phase angle values can be normalized to the phase of the fundamental of the displayed channel. The Phase button also allows users to toggle between Normalized (showing normalized phase angle values) and UnNormalized phase values.

Use the Graph button to default back to a graphical spectrum display.

Section D

Voltage and Current Phasor

Overview

Phasor display The phasor screen displays a graph that indicates the phase relations between the voltage and current based upon the angles of the fundamentals, as determined by Fourier analysis.

Phasor screen shows eight phasors autoscaled with zero degrees to the right (normally channel A voltage) for clockwise rotation and with synchronized channels. Users are allowed to display up to four channels at any one time for either volts or amps, or a single channel for both volts and amps, depending on the phases being monitored.

A touch screen Demo button presents an animated phasor demo rotation for resistive, capacitive and inductive loads.

In this section The following topics are covered in this section.

Topic	See Page
Phasor Screen	2-15
Phasor Rotation	2-16
Phasor Parameter/Channel Selection	2-18

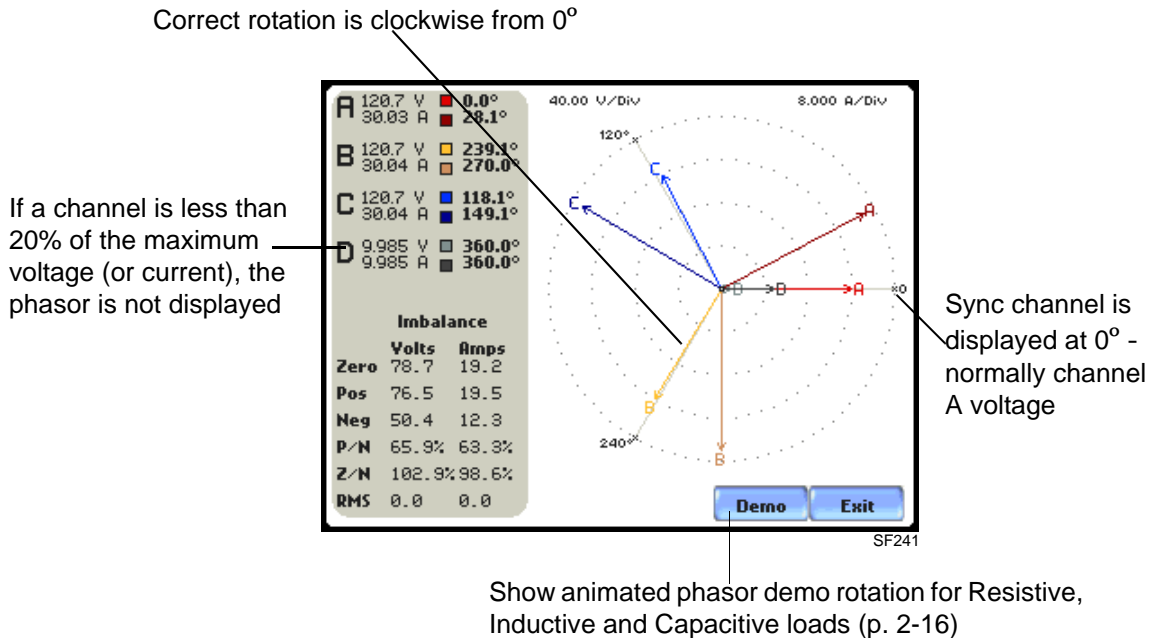
Phasor Screen

Phasor screen display

The Phasor screen is displayed by pressing Phasor on the Home screen.

The Phasor screen shows eight phasors autoscaled with zero degree to the right for clockwise rotation and with synchronized channels. The left sidebar shows rms values for Volts/Amps for channels A, B, C and D; zero, positive and negative values for Volts/Amps; zero, positive and negative sequence component values for Volts/Amps.

Depending on the phases being monitored, up to four channels may be displayed at any one time for either Volts or Amps, or a single channel for both Volts and Amps. An arrow head and channel label are displayed on the vector.



Phasor Rotation

Animated phasor rotation

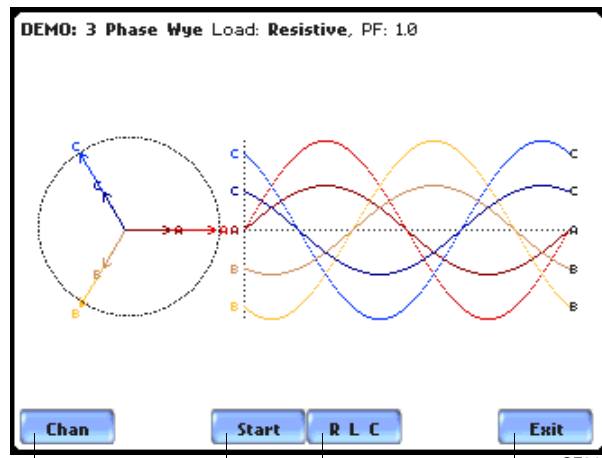
Graphic illustration in the form of rotating phasors relative to the sine wave graph of a four wire wye circuit is available by pressing the Demo button on the Phasor screen (see page 2-15). The Demo key will be replaced by Start/Stop once phasor rotation has been viewed. Press Start to replay animated phasor rotation. Users can choose to Stop the phasor demo rotation at any time.

Phasor vectors are displayed using a clockwise rotation from the zero degrees reference. Animated phasor demo for Resistive, Inductive and Capacitive loads is available for viewing.

Sample 2-Phase, three wire delta rotation

The following diagrams describe the positive phase rotation of voltage and current phasors (for Resistive, Inductive and Capacitive loads) for a three phase, three wire delta connection. An arrow head on the line indicates direction pointing toward the load.

Three phase vectors are displayed as three lines, 120 degrees apart in a Resistive load



Display parameter/channel selection (p. 2-18)

Start/Stop demo plot waveforms as rotate phasors; press any time

Switch phasor demo rotation between Resistive, Inductive and Capacitive load effects; press any time (p. 2-17)

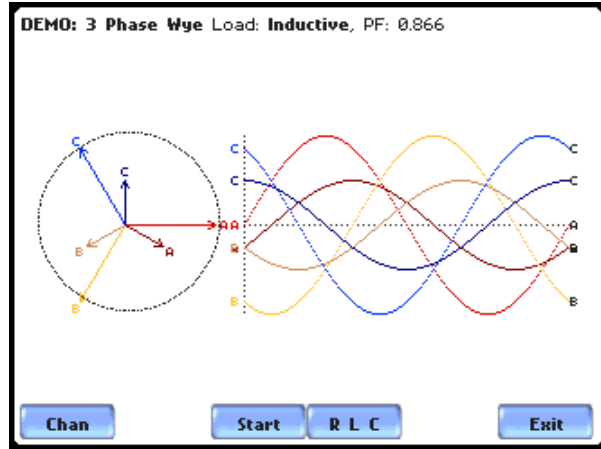
Return to Phasor screen

Continued on next page

**Distortion meter
Sample 2-Phase,
three wire delta
rotation
(continued)**

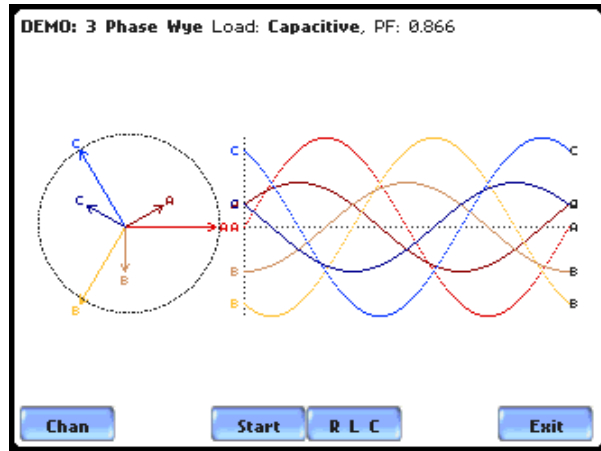
The following diagrams describe the positive phase rotation of voltage and current phasors (for Resistive, Inductive and Capacitive loads) for a three phase, three wire delta connection. An arrow head on the line indicates direction pointing toward the load.

Three phase vectors are displayed as three lines, 120 degrees apart in an Inductive load



SF243

Three phase vectors are displayed as three lines, 120 degrees apart in a Capacitive load



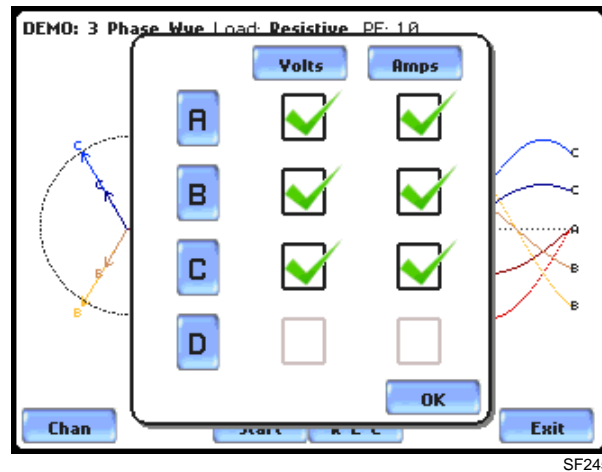
SF244

Phasor diagrams

Refer to the *Encore Series 61000 Installation Guide* for the diagrams that describe the voltage and current phasors for the standard type of power connections.

Phasor Parameter/Channel Selection

Parameter/Channel display The Parameter/Channel selection screen is displayed by pressing Chan on the phasor Demo screen. Depending on the phases being monitored, up to four channels may be displayed at any one time for either Volts or Amps, or a single channel for both Volts and Amps.



Press to enable/disable the parameter/channel for display in the animated phasor rotation. Any of the following will turn channels on/off:

- Press the desired Volts/Amps channel to turn it on/off.
- Press Volts or Amps button to turn on/off all channels of that parameter.
- Press A, B, C, D to turn on/off both the Volts and Amps for that channel.

Press OK to accept channel selection. The phasor Demo rotations will display the parameters/channels enabled.

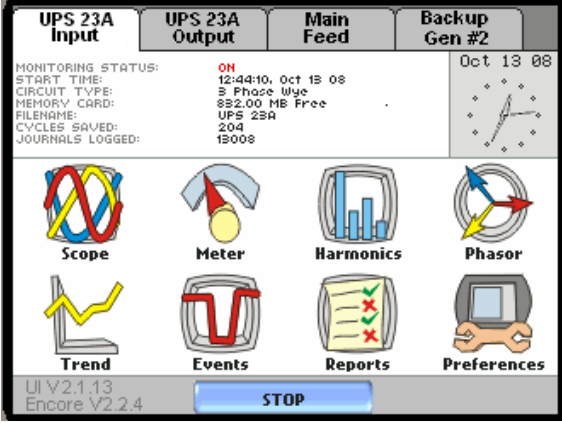
View Trend Data

Overview; Trend Display; Trend Setup

Overview

- Trend data** 61000 offers a graphical, information-packed, and easy to navigate display of trend data. A trend is a graph of the value of one parameter and channel over time. Trends aim to show a macro view interface of timespan, trigger conditions, and channels of waveforms and rms that were recorded over 24-hour periods. Users can zoom in on trends for a more detailed view.
-
- Trend icon** The Trend icon is accessible at the Home page and is used to view trend data in each virtual analyzer setup. Trend displays time plots or trend visualizations of journalled data beginning with the last 24-hours. The parameters to plot consist of journal entries enumerated in section below.
- The Trend screen can display up to four plots, with a maximum of two parameters per plot. One parameter can have multiple channels to plot. Users have the option to enable/disable plot display, where display area will resize according to the number of plots enabled for display. The Trend screen also features a Zoom box, where users can expand or narrow the zoomed area via touch and drag. Users can select the trend coordinates to view in detail.
-
- Trend categories** 61000 is able to display statistical trends or plots for the following parameter categories:
- Standard: Parameters include basic volts and amps, frequency, displacement power factor, residual and net current, energy, harmonic distortion, demand, and flicker. These power parameters are measured more accurately using a one (1) second interval, summarized by min, max and avg at the end of the interval.
- Distortion: Parameters include voltage and current THD (Fund and RSS), voltage and current TID, voltage and current TIF rms, crest factor, signed and unsigned harmonic power, transformer factor, and K-factor.
-

View data using Trend Follow these steps to display trend data.

Action...	Result...
<p>STEP 1: Trend is accessible from the Home screen.</p> <p>A monitoring status message appears on the top section of the screen.</p> <ul style="list-style-type: none"> • Press Trend to view 24-hour plots of journalled data along with min/max measurements over the interval, starting with the last 24-hours. 	 <p>The screenshot shows a monitoring interface for a UPS system. At the top, there are four tabs: 'UPS 23A Input', 'UPS 23A Output', 'Main Feed', and 'Backup Gen #2'. Below the tabs, the monitoring status is displayed as 'ON' in red, with a timestamp of '12:44:10, Oct 13 08'. Other details include 'CIRCUIT TYPE: 3 Phase Wye', 'MEMORY CARD: 882.00 MB Free', 'FILENAME: UPS 23A', 'CYCLES SAVED: 204', and 'JOURNALS LOGGED: 15008'. A clock icon shows the date 'Oct 13 08'. Below the status information are eight icons representing different monitoring functions: Scope (waveform), Meter (gauge), Harmonics (bar chart), Phasor (three-phase diagram), Trend (line graph), Events (calendar), Reports (document with checkmarks), and Preferences (wrench and screwdriver). At the bottom left, it says 'UI V2.1.13' and 'Encore V2.2.4'. A blue 'STOP' button is located at the bottom center. The reference number '61000SF-301' is in the bottom right corner.</p>

In this chapter The following topics are covered in this chapter.

Topic	See Page
Trend Display	3-3
Trend Setup	3-5

Trend Display

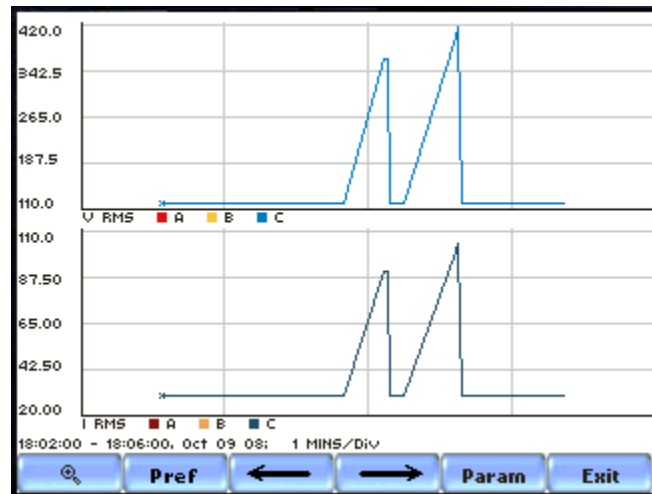
What is displayed on a trend?

A trend consists of the timed and threshold waveforms for the parameter on display. It allows users to view plots of journalled data along with min/max measurements over the interval, beginning with the last 24-hour.

Users have the option to enable/disable a trend or plot display, wherein display area will resize according to the number of plots enabled for display. In addition, users have the option to enable/disable channels to trend in a select parameter. Each parameter can have one or multiple channels to plot.

The trend screen also features a Zoom box, wherein users can expand or narrow the size of a zoomed area via touch and drag. The zoom feature allows users to view trend coordinates of min, max and avg values in greater detail.

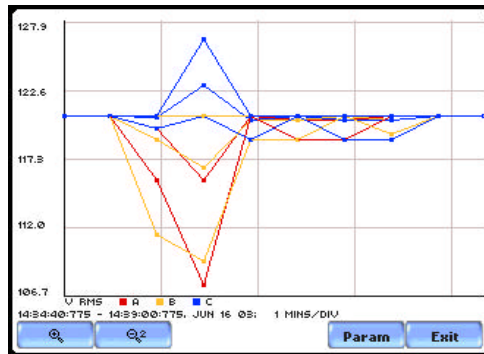
From the Home screen, press Trend. A sample trend plot is shown below along with the functional trend buttons available for use. Trend display and setup are explained in detail in the next pages.



Sample trend screens

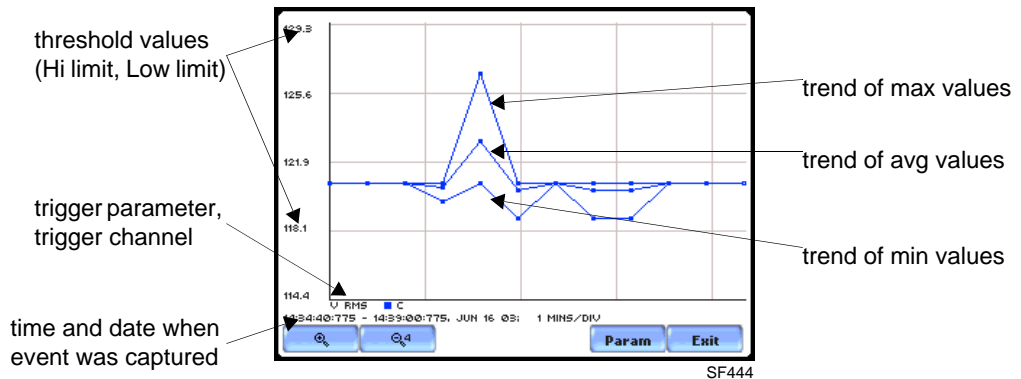
Sample screens below feature the same Voltage rms parameter.

Example 1 - One Parameter, Multiple Channels plot: Voltage rms parameter with enabled channels A (in red), B (in yellow), and C (in blue). The plot below has been zoomed in three times.



SF443

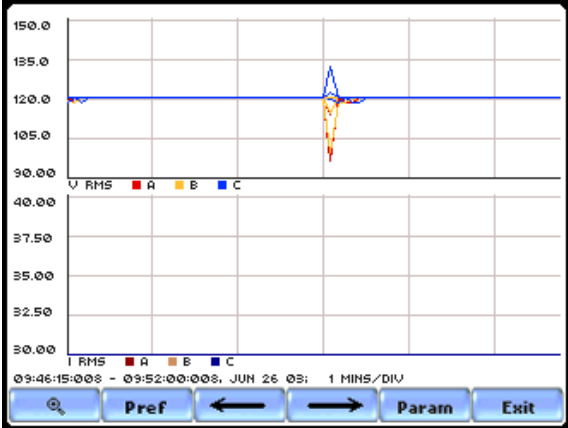
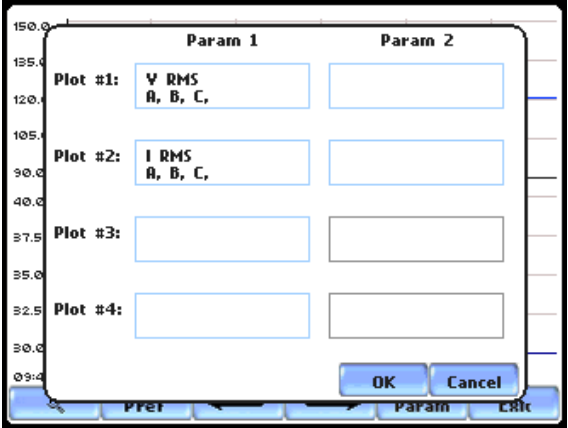
Example 2 - One Parameter, One Channel plot: Voltage rms parameter with enabled channel C (in blue). The plot below has been zoomed in five times.



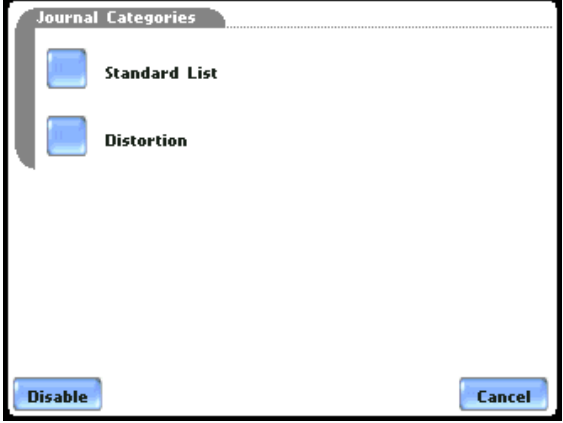
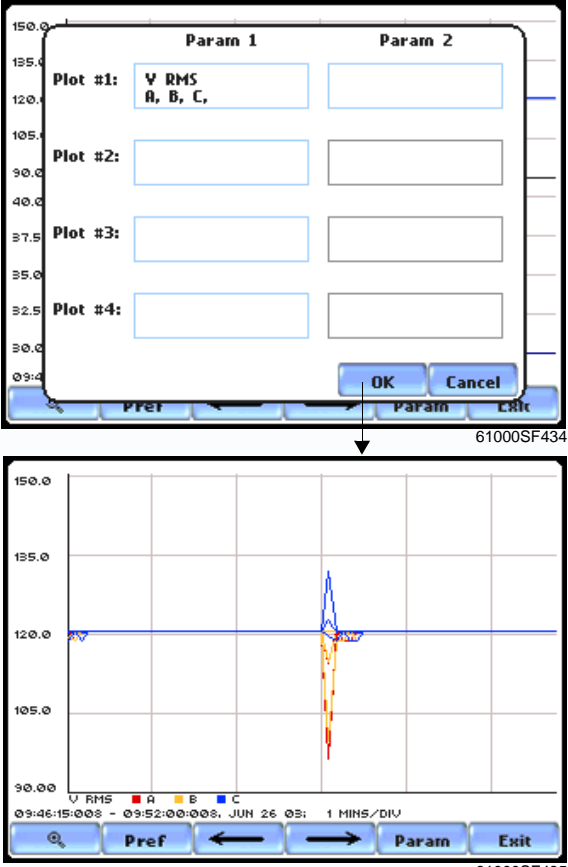
SF444

Trend Setup

Trend settings Follow these steps to view data trends. The same procedure applies even when you select different journal categories to plot.

Action...	Result...
<p>STEP 1: From the Home screen, press Trend.</p> <ul style="list-style-type: none"> The default number of plots displayed in the trend screen is two. Press Param to show the current parameters & channels displayed on screen. Proceed to Step 2. Use the Magnify button to zoom in/out and to view plot coordinates in detail. Pref allows the arrow keys to be selected from a pre-configured list (last 24 hours, last 6 hours, last 2 hours, last hour). Use the left/right arrow to view the previous/next 24-hour plots of journalled data. Press Exit to quit and return to Home screen. 	
<p>STEP 2: Individual plot numbers appear on the left hand section of the screen. Users have the option to change and/or add parameters/channels to display.</p> <ul style="list-style-type: none"> Press the parameter field that you want to change. <u>For Example:</u> Press to change Plot #2 - Parameter 1. Proceed to Step 3 on page 3-6. Press OK to accept changes and view plot display. Press Cancel to ignore parameter/channel changes and return to the screen containing the original plot. 	

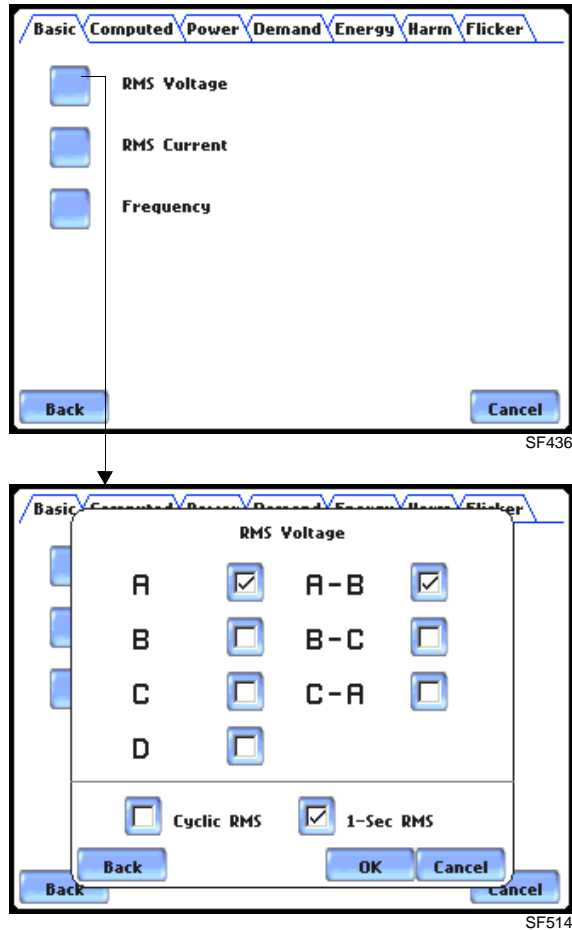
**Trend settings
(continued)**

Action...	Result...
<p>STEP 3: The Journal Categories allow users to select parameters/channels to trend for display.</p> <ul style="list-style-type: none"> • Press the Disable button to clear the parameter display in Plot #2 (from Example in Step 2). Proceed to Step 4. • Users have the option to choose a journal category from which to select parameters/channels to plot. <p>For Standard List - RMS parameters, see RMS Settings on page 3-7.</p> <ul style="list-style-type: none"> • Press Cancel to ignore changes and return to the previous screen. 	 <p style="text-align: right;">61000SF-433</p>
<p>STEP 4: Parameter/channels on Plot #2 were disabled.</p> <ul style="list-style-type: none"> • Press OK to accept changes and view new plot display. The plot area will resize according to the plot numbers enabled for display. (Whereas the original plot in Step 1 shows Plot #1 and Plot #2 on display, the screen auto-adjusts when parameters in Plot #2 were disabled.) • Press Cancel to ignore parameter/channel changes and return to the screen containing the original plot. 	 <p style="text-align: right;">61000SF434</p> <p style="text-align: right;">61000SF435</p>

RMS settings

61000 provides setup options to measure rms data per cycle or per second.

The RMS Voltage and RMS Current parameters are available under Journal Categories - Standard List.



Cyclic RMS: RMS values are computed over 1 power frequency cycle (16.67 msec @ 60 Hz) in 1/2 cycle steps (every 8.33 msec). The min/max/avg of these cyclic values are updated every cycle and then stored every journal interval, you can only display 24-hours worth of them at a time.

1-Sec RMS: Similar to cyclic rms, except that each rms value is computed over 1 second's worth of data points (which is 1/60th of a second @ 60 Hz), rather than over 1 cycle.

NOTE: Data for Cyclic or 1-Sec sampling rates apply only to rms parameters.

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View Event Data

Overview; Event List; Event Data Display; Event Activity Graph; Event Detail; Event Options

Overview

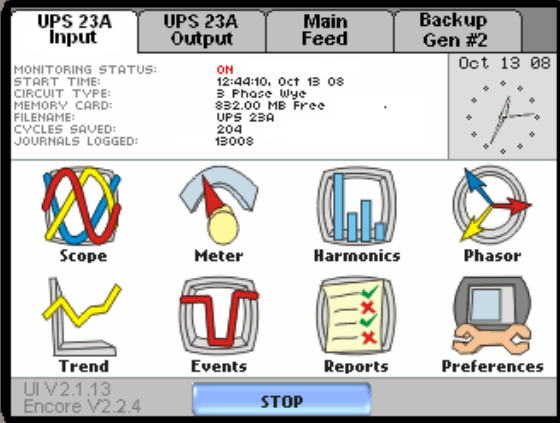
Events data The 61000 firmware architecture is designed to engage in various stages of acquisition, characterization, communication, and visualization of event data and journalled data. An event occurs when a programmed threshold limit is crossed. An event consists of pre-trigger cycle(s), trigger cycle (fault), and post-trigger cycle(s). A contiguous collection of cycles caused by events is recorded into memory. An event may also contain information about other channels depending on how the user sets up the application. Events are classified according to IEEE 1159, IEC 61000-4-30 Class A, and EN50160 standards.

Events icon The Events icon is accessible at the Home page and is used to view event list and event data in each virtual analyzer setup. Events will display event activity graphs, waveform display, event Detail magnification, and Options to change and/or add parameters/channels to plot. When applicable, buttons to view previous/next event and waveform/rms cycle display are also available.

What is displayed? The event screen displays actual voltage or current waveforms that occurred when a certain threshold parameter was crossed. Event list, activity graphs, waveform display, rms display, and time plots are visually interfaced showing event patterns and behaviors over threshold limits and time. The event screen also enables users to customize data plots, allowing users to change and/or add parameters/channels for each of the four plot areas. Zoom box features, wherein users can expand or narrow the size of a zoomed area via touch and drag, are also available for more thorough data analysis and interpretation.

View Events data

Follow these steps to display event data.

Action...	Result...
<p>STEP 1: Events button is accessible from the Home screen.</p> <ul style="list-style-type: none"> • Press Events to view event list, graphs and waveform/rms display. 	 <p>The screenshot shows the main monitoring screen for a UPS 23A system. At the top, there are four status indicators: UPS 23A Input, UPS 23A Output, Main Feed, and Backup Gen #2. Below these, monitoring status is shown as 'ON' with a red indicator. The start time is 12:44:10 on Oct 13 08. The circuit type is 3 Phase Wye. Memory card information shows 882.00 MB free. The filename is UPS 23A, and 204 cycles have been saved. 15008 journals have been logged. The date and time are Oct 13 08. The interface features several icons: Scope (waveform), Meter (gauge), Harmonics (bar chart), Phasor (vector diagram), Trend (line graph), Events (highlighted with a red border), Reports (document with checkmarks), and Preferences (wrench and screwdriver). At the bottom, there is a 'STOP' button and version information: UI V2.1.13 and Encore V2.2.4. The ID number 61000SF-301 is visible in the bottom right corner.</p>

In this chapter

The following topics are covered in this chapter.

Topic	See Page
Event List	4-3
Event Data Display	4-4
Event Activity Graph	4-5
Event Detail	4-6
Event Options	4-9

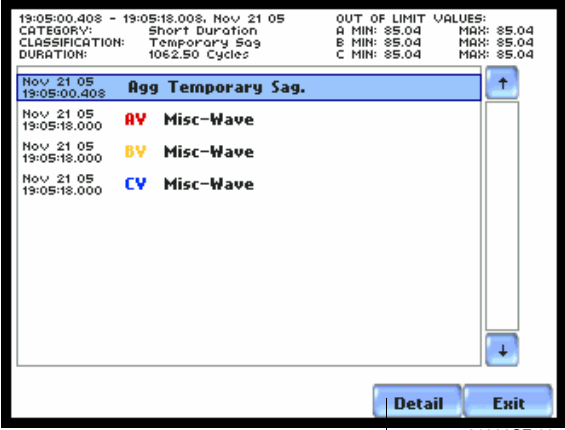
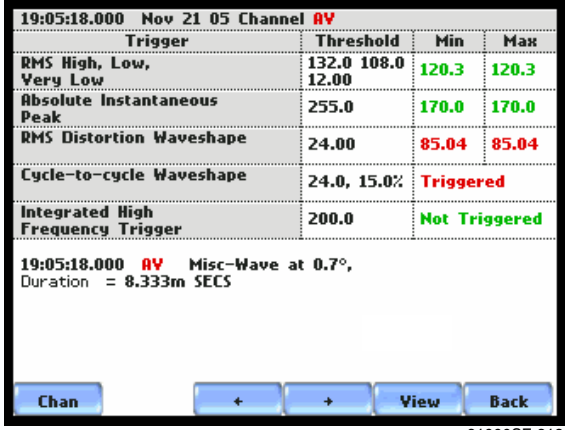
Event List

Event list description

Event list presents a summary of all captured events in the order that they occurred. Each event contains a general heading indicating the time and date when the disturbance occurred, the disturbance category, disturbance classification, and number of cycles of duration.

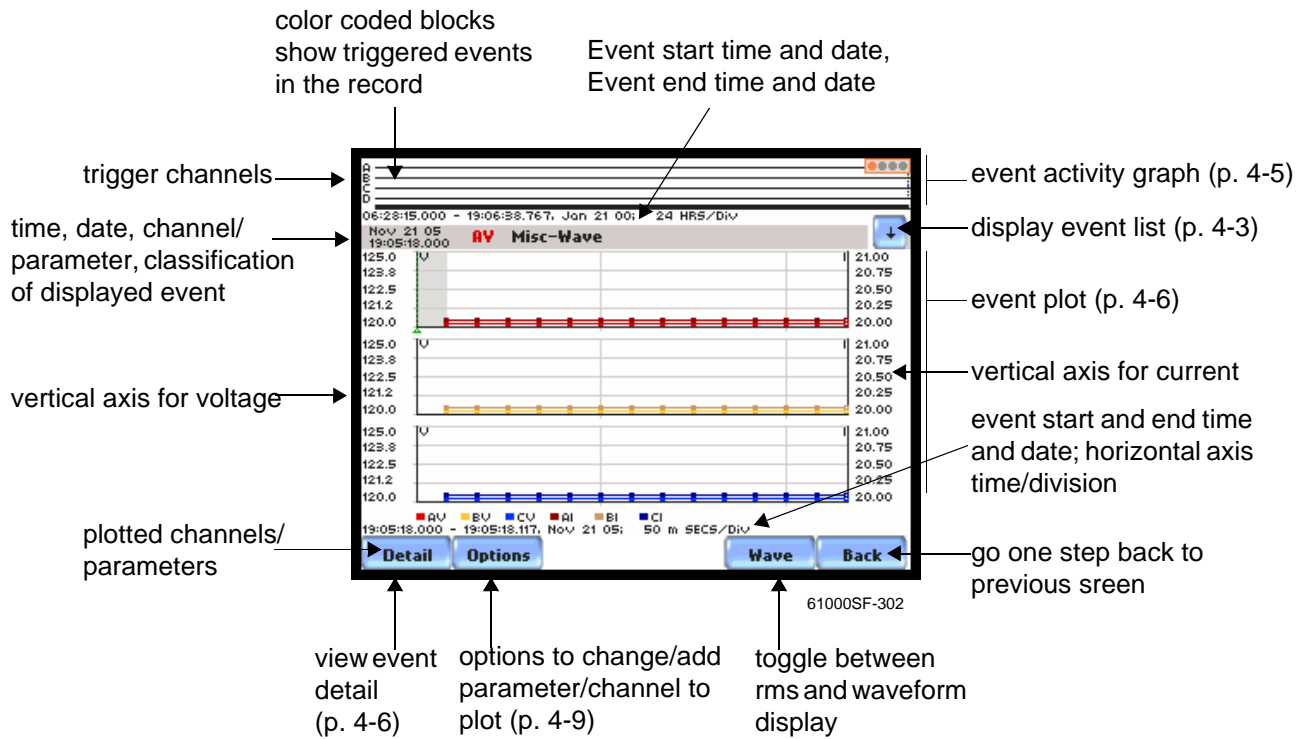
View event list

Follow these steps to access the event list.

Action...	Result...																								
<p>STEP 1: From the Home screen, press Events.</p> <p>The top section of the Event List screen features a summary description of the selected event (in highlight).</p> <p>Each entry is identified by the time and date when the event was captured, the color coded channel/parameter of captured event, and the event classification.</p> <ul style="list-style-type: none"> Use the Up/Down arrow keys to scroll the page up or down by one line or press and drag the scroll bar to move the page up or down. Select (highlight) the desired event entry then press Detail to view event list details. <ul style="list-style-type: none"> Use Chan to switch channel display. If a previous/next event is available for display, the left/right arrow keys will appear; otherwise, the arrow keys will not appear. Use View to display events in rms/waveform plot. See Event Data Display on page 4-4 and Event Details on page 4-6. Use Back to go one step back to previous screen. 	 <p>19:05:00.408 - 19:05:18.008, Nov 21 05 OUT OF LIMIT VALUES: CATEGORY: Short Duration A MIN: 85.04 MAX: 85.04 CLASSIFICATION: Temporary Sag B MIN: 85.04 MAX: 85.04 DURATION: 1062.50 Cycles C MIN: 85.04 MAX: 85.04</p> <p>Nov 21 05 19:05:00.408 Agg Temporary Sag. ↑</p> <p>Nov 21 05 19:05:18.000 AV Misc-Wave</p> <p>Nov 21 05 19:05:18.000 BV Misc-Wave</p> <p>Nov 21 05 19:05:18.000 CV Misc-Wave</p> <p>↓</p> <p>Detail Exit</p> <p>61000SF-305</p>  <table border="1"> <thead> <tr> <th>Trigger</th> <th>Threshold</th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>RMS High, Low, Very Low</td> <td>132.0 108.0 12.00</td> <td>120.3</td> <td>120.3</td> </tr> <tr> <td>Absolute Instantaneous Peak</td> <td>255.0</td> <td>170.0</td> <td>170.0</td> </tr> <tr> <td>RMS Distortion Waveshape</td> <td>24.00</td> <td>85.04</td> <td>85.04</td> </tr> <tr> <td>Cycle-to-cycle Waveshape</td> <td>24.0, 15.0%</td> <td colspan="2">Triggered</td> </tr> <tr> <td>Integrated High Frequency Trigger</td> <td>200.0</td> <td colspan="2">Not Triggered</td> </tr> </tbody> </table> <p>19:05:18.000 AV Misc-Wave at 0.7°, Duration = 8.333m SECS</p> <p>Chan + + View Back</p> <p>61000SF-313</p> <p>The event list summary is color coded. Red indicates the threshold value(s) and parameter(s) that are out of limits. Green indicates the measurement parameters that are within limits.</p> <p>NOTE 1: The left/right arrow keys will not appear if there is no previous/next event available for display.</p> <p>NOTE 2: View will show events in graphic rms/waveform display (see pages 4-4 and 4-6).</p>	Trigger	Threshold	Min	Max	RMS High, Low, Very Low	132.0 108.0 12.00	120.3	120.3	Absolute Instantaneous Peak	255.0	170.0	170.0	RMS Distortion Waveshape	24.00	85.04	85.04	Cycle-to-cycle Waveshape	24.0, 15.0%	Triggered		Integrated High Frequency Trigger	200.0	Not Triggered	
Trigger	Threshold	Min	Max																						
RMS High, Low, Very Low	132.0 108.0 12.00	120.3	120.3																						
Absolute Instantaneous Peak	255.0	170.0	170.0																						
RMS Distortion Waveshape	24.00	85.04	85.04																						
Cycle-to-cycle Waveshape	24.0, 15.0%	Triggered																							
Integrated High Frequency Trigger	200.0	Not Triggered																							

Event Data Display

View event data screen View event data will display an event activity graph, rms/waveform plot, and buttons like Detail magnification, Options to change and/or add parameters/channels to trend, and RMS/Waveform toggle. From the Event List screen, press View. The following screen will be displayed:



Event Activity Graph

Event graph description

The event graph is located on the top section of the View event data screen (see page 4-4). Four timelines represent all events recorded from the time monitoring started. Events for voltage channels are displayed above the grid and current channels are displayed below the grid.

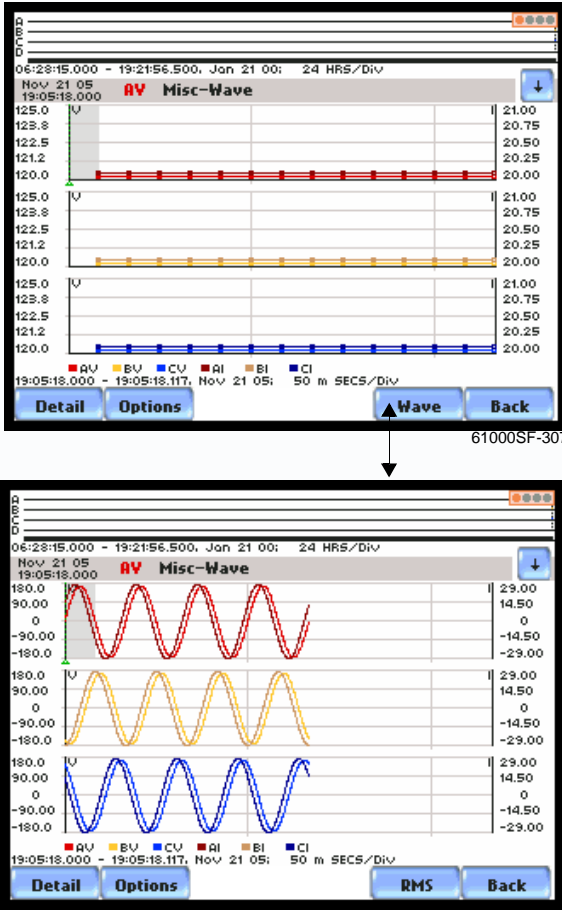
Event Detail

Event details 61000 allows users to view events in graphic waveform/rms display. The Detail screen features zoom buttons to magnify event cycles, and a zoom box that users can resize via touch and drag. The Detail screen also allows viewing of events alternately in rms or waveform.

Horizontal axis Auto-scaled to display all waveforms in file until range is narrowed by zoom in.

Vertical axis Auto-scaled to the minimum and maximum value within time range.

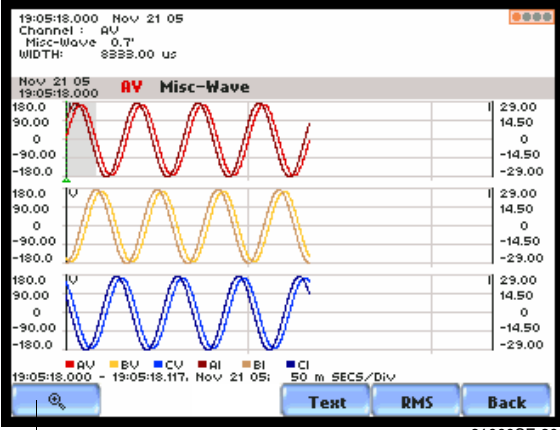
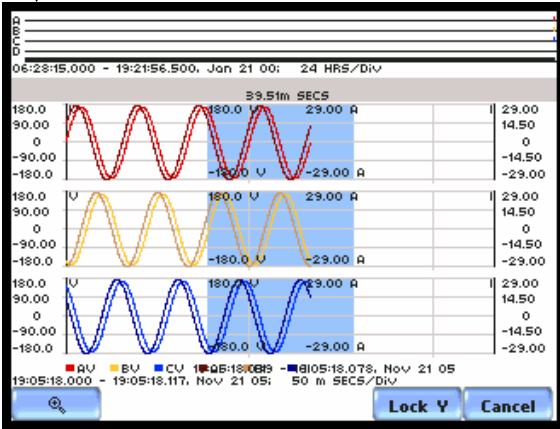
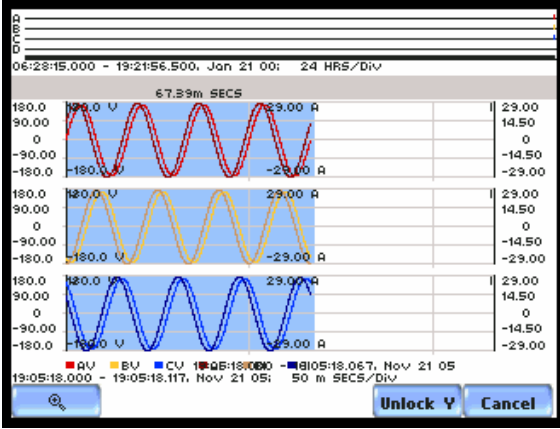
View event details An event detail screen is generated for each event. The detail screen shows events in rms by default. Follow these steps to view event details.

Action...	Result...
<p>STEP 1: From the Event List screen, press View.</p> <p>Use the event list button (down arrow) to scroll through event entries.</p> <ul style="list-style-type: none"> Press Wave/RMS to toggle between waveform and rms display. <p>NOTE 1: The gray area marks the duration of the event displayed. The dotted black lines indicate the start of event.</p> <ul style="list-style-type: none"> Press Detail to use the zoom features and view waveform/rms in detail. Proceed to Step 2 on page 4-7. 	 <p>The top screenshot shows the 'Wave' view of the event detail screen. It displays three waveforms (red, yellow, and blue) over a time range from 19:05:18.000 to 19:05:18.117. A gray shaded area indicates the event duration. The bottom screenshot shows the 'RMS' view of the same event, displaying three RMS waveforms (red, yellow, and blue) over the same time range. Both screenshots include 'Detail', 'Options', and 'Back' buttons.</p>

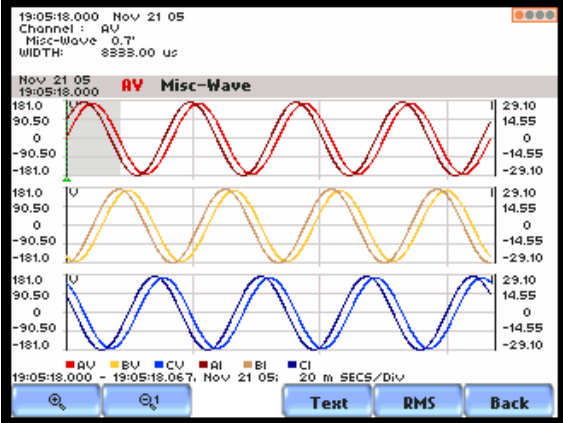
Continued on next page

View event details (continued)

The magnification button allows users to select the number of waveform/rms cycles that they can zoom in.

Action...	Result...
<p>STEP 2: A blue box showing the default zoomed area appears once the magnify button is pressed.</p> <p>Touch any side of the zoom box to activate the drag function. Touch and drag the sides of the zoom box to expand or narrow in on the waveform/rms cycle. The cycle duration (in seconds) of event covered in the zoom box is also displayed.</p> <p>NOTE: The horizontal drag is locked between all graphs. This means the horizontal drag will apply consistently to all data plots. The vertical drag is independent by axis. Users have the option to lock/unlock the vertical drag.</p> <ul style="list-style-type: none"> • Press Lock Y if you want the vertical axis to apply consistently to all data plots. • Press Unlock Y if you want to adjust the vertical axis differently for each data plot. • Once the zoom area is determined, press the Magnify button once. Proceed to Step 3 on page 4-8. 	 <p>61000SF-309</p>  <p>SF-310</p> <p>Resize/move zoomed area by touching and dragging the sides of the zoom box.</p>  <p>SF-311</p>

View event details (continued)

Action...	Result...
<p>STEP 3: The magnify buttons serve as zoom function keys, each of which feature a plus sign or a minus sign within.</p> <ul style="list-style-type: none"> • Press Zoom+ to display the zoomed area and view the event cycles in greater detail. Users may repeatedly zoom in on a plot for up to seven (7) levels. To further zoom in on an event cycle, simply repeat the procedure on Step 1. • Press Zoom-(n) to unzoom cycles display one increment at a time, where n is the counter of how many times the event cycles have been magnified. • Use the RMS/Wave button to toggle between rms and waveform display. <p>NOTE: Pressing Wave will only display waveform data for channels that are enabled to record waveforms. For channels that do not have associated waveform data, the screen will maintain the format, but will leave the plot blank.</p> <ul style="list-style-type: none"> • Text allows you to return to the Event List screen. • Press Back to go one step back to the previous screen. 	 <p>The screenshot shows a waveform display interface with three stacked plots. The top plot is red, the middle is yellow, and the bottom is blue. Each plot has a vertical axis ranging from -181.0 to 181.0 and a horizontal axis ranging from 19:05:18.000 to 19:05:18.067. The interface includes a legend at the bottom with color-coded boxes for channels: AV (red), BU (yellow), CU (blue), AI (orange), BI (green), and CI (purple). Below the legend are buttons for 'Text', 'RMS', and 'Back'. The title bar of the window reads 'Nov 21 05 AV Misc-Wave'.</p>

Event Options

Voltage and Current channels to plot

A time plot is a graph of the value of one parameter and channel over time. 61000 is able to display time plots for individual Voltage and Current channels (Va, Vb, Vc, Vd, Ia, Ib, Ic, Id) or phase-to-phase Voltage channels (Vab, Vbc, Vca), depending on the available channels for Voltage and the selected circuit type.

RMS trigger parameters

RMS variation is the most common type of disturbance and is identified as a specific type of event by IEEE and IEC. Event characterization implemented in 61000 adheres to the IEEE 1159 and IEC 61000-4-30 Class A standards. RMS values are updated at half-cycle rates. The min/max/avg of these cyclic values are updated every cycle and then stored every journal interval, allowing users to display 24-hours worth of them at a time. The high and low limits can be enabled and programmed individually for each phase and phase-to-phase value.

The following parameters are required to define how an rms variation is triggered:

Very Low limit

Low limit

High Limit

Cycles in range to end event

As per IEEE and IEC standards for multi-phase systems, the beginning of the voltage rms event occurs when any phase voltage goes outside the limits, and ends when all of the phases are within limits for an end-event number of cycles specified. This is only true for voltage, not current.

In addition, rms variations can have three stages of averaging or chart rates, which is particularly useful for long duration events to save memory in exchange for reduced resolution. This mode begins if the rms value remains out of limits for longer than the post-start number of cycles that were programmed.

What is displayed on a time plot?

A time plot consists of the timed and threshold waveforms for the parameter on display. The instrument provides users Options to change and/or add parameters/channels to plot.

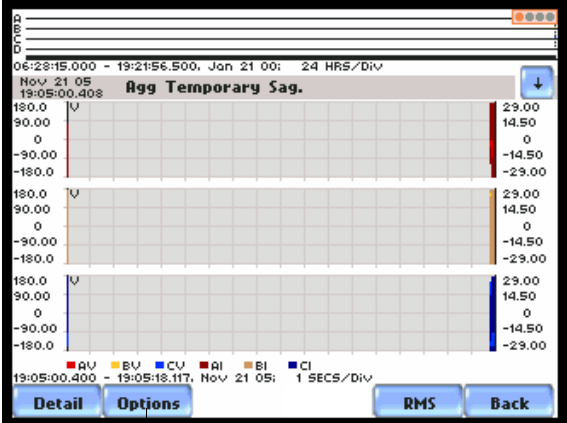
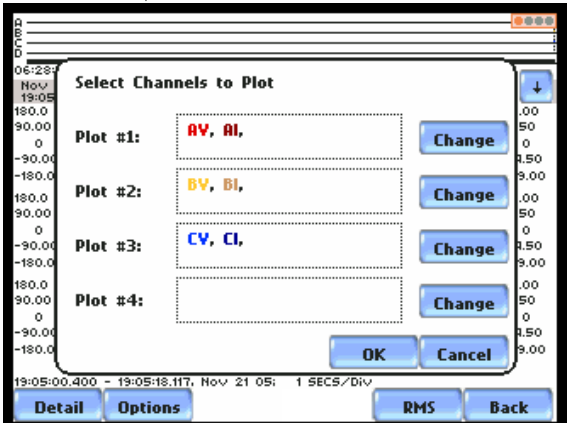
Channels

Voltage: A, B, C, D, A-B, B-C, C-A

Current: A, B, C, D

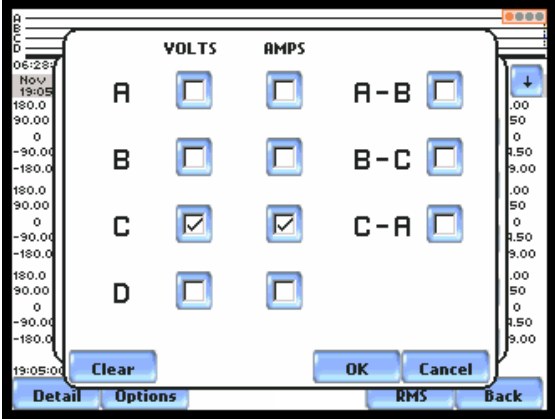
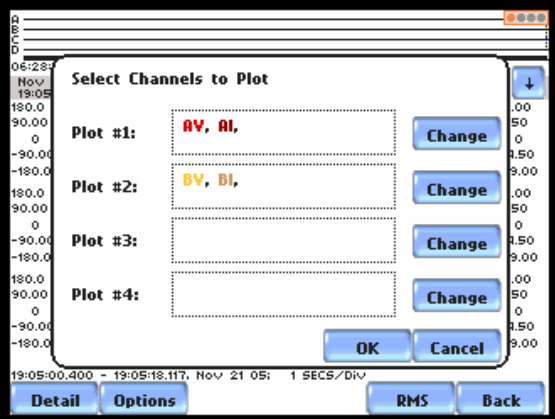
View event options

Follow these steps to access event Options.

Action...	Result...
<p>STEP 1: From the View event screen, press Options.</p> <p>Plot #s appear on the left side of the screen. Users have the option to enable/disable channels for any of the Plot #. The plot display area will resize according to the number of parameters/channels enabled/disabled for display.</p> <ul style="list-style-type: none"> • Press the Change button adjacent to the Plot # where you want to change and/or add parameters/channels to plot. <p><u>For Example:</u> Press Change adjacent to Plot #3. Proceed to Step 2 on page 4-11.</p> <ul style="list-style-type: none"> • Press OK to accept changes and view new plot display. • Press Cancel to ignore changes and return to the event screen. 	 <p style="text-align: right;">61000SF-314</p>  <p style="text-align: right;">61000SF-315</p>

Continued on next page

View event options (continued)

Action...	Result...
<p>STEP 2: Check the channels that you want to enable, uncheck those you want to disable.</p> <p><u>For Example:</u> Uncheck to disable Channel C Volts and Amps.</p> <ul style="list-style-type: none"> • Press OK to accept parameter/channel changes. Proceed to Step 3. • Press Clear if you want to reset channel selection. • Press Cancel to ignore parameter/channel changes and return to the event screen containing the original plot. 	 <p style="text-align: right; font-size: small;">61000SF-316</p>
<p>Step 3: The parameter/channel changes are reflected in Plot #3.</p> <ul style="list-style-type: none"> • Press OK to accept changes and view event with the new configuration. • Press Cancel to ignore parameter/channel changes and return to event screen with the original configuration. <p>NOTE: The event screen retains the present configuration every time it is accessed. The channel/parameter configuration will reset to default anytime a new monitoring session starts.</p>	 <p style="text-align: right; font-size: small;">61000SF-317</p>

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Reports

Overview; Report Parameters; Panel Operation

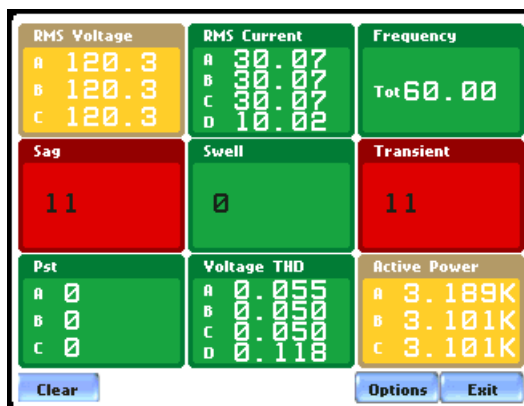
Overview

Standard PQ status report

Reports display Standard PQ meter data (or event count) in a 2x2, 3x3, or 4x4 matrix. The annunciator panel is color coded to indicate whether a parameter is within limits. The elements of the matrix are linked to the journal plot screen. Real time data, event count, or user-specified calculated data is available in the matrix display of the annunciator panel. Journal data and events can be directly viewed from the annunciator panel.

For example:

From the Home screen, press Reports. The annunciator panel will display the Standard PQ preset parameters shown below.



61000SF-600

NOTE: Where applicable, the values reported within a parameter in the annunciator panel refer to measurements on channels A, B, C, and D respectively. The measurement values for each channel are updated approximately once per second while monitoring is on.

Evaluation Period: The 61000 monitors QOS compliance on a continuous basis. The user may choose to press Clear to reset the annunciator panel data and restart the time/date from which the panel will display status for journalled data and events.

Continued on next page

**Standard PQ
status report
(continued)**

Compliance: The annunciator panel is color coded such that green indicates the parameter is within limits and/or no events have occurred since the last time the panel was cleared. Red indicates the parameter is out of limits and/or events of that type have occurred since the panel was last cleared. Each parameter on the panel is hyperlinked to a trend display that shows the values of each of the parameters over the interval, and the time they exceeded limits. The plot shows actual voltage or current waveforms that occurred when a certain threshold parameter was crossed. Users also have the option to enable/disable channels to plot.

In this section

The following topics are covered in this section.

Topic	See Page
Report Parameters	5-3
Panel Operation	5-4

Report Parameters

Preset parameters

The following are the Standard PQ preset parameters displayed in the annunciator panel:

Standard PQ uses the standard power quality parameters based on IEEE 1159 PQ standard. This includes basic power parameters such as volts, amps, watts, event counters, THD, and flicker.

Setup	Parameters		
Standard PQ	RMS Voltage Sag Pst	RMS Current Swell Voltage THD	Frequency Transient Active Power

Panel Operation

Annunciator panel color scheme

The annunciator panel displays metered data for the selected parameter. The metered data is updated once per second. This is the same data that appears in the meter screen, and used in calculating journals. If the selected parameter is not journalled, the rms event or transient event count can be selected to appear in the panel instead of journalled data.

Disabled parameters appear in gray. A panel is considered disabled if none of the limits were set.

Enabled parameters, on the other hand, are color-coded. A panel is active while the 61000 is monitoring. An active panel can have two or three states (Normal, Moderate, or Severe). When monitoring, parameters that are within limits are shown in green (indicates Normal state). Those that are moderately out of limits, exceeding Low or High threshold limits, are shown in yellow (indicates Moderate state). Parameters that are extremely out of limits, exceeding Very Low or Low threshold limits, are shown in blinking red (indicates Severe state).

Annunciator panel links

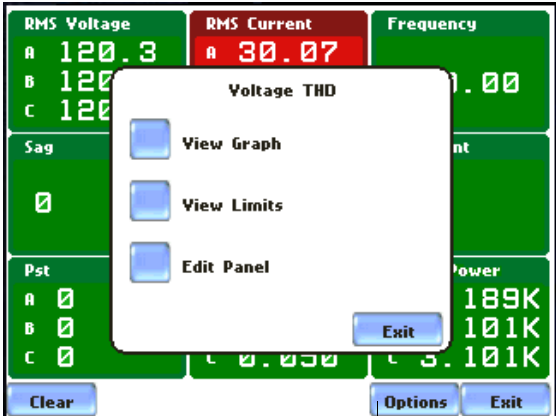
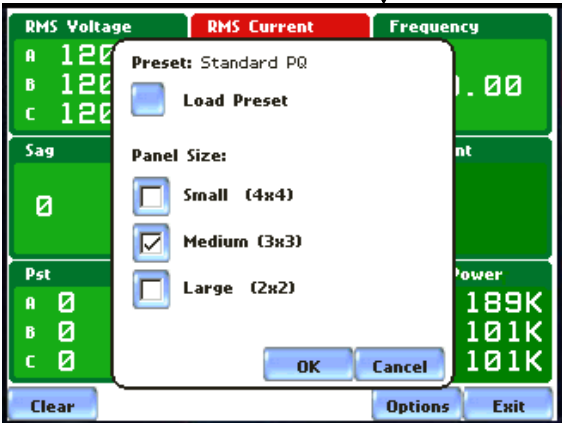
Users may choose to plot a parameter since the panel is linked to the plot screen. Simply select the parameter if you want to view it in detail. Use View Graph to display the parameter plot and use View Limits to view the parameter threshold values.

The properties of a panel can also be customized. Use Edit Panel to enable/disable channels to plot.

The next pages show how to view a parameter in detail using the annunciator panel. The same procedure applies even when you select different journal categories to plot.

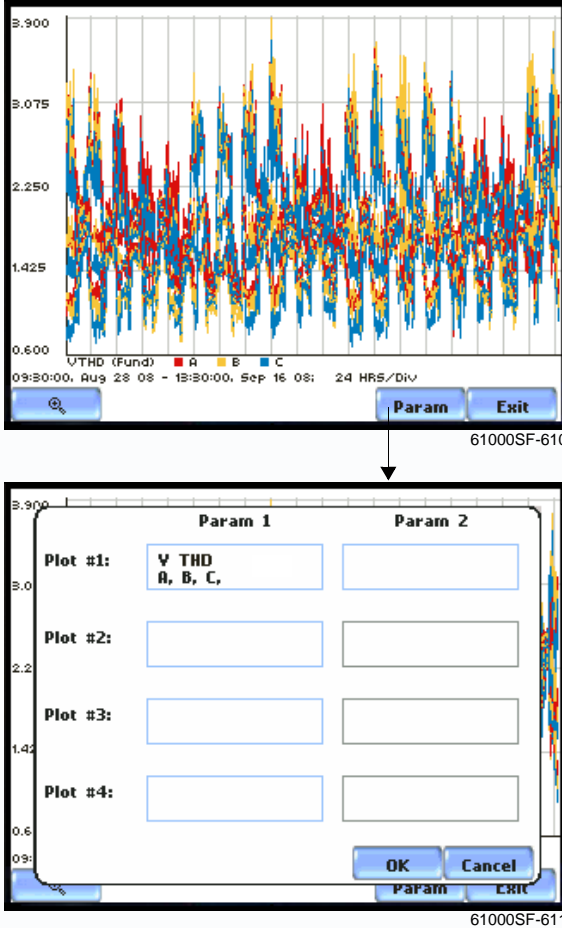
Parameter data plot

The following procedure describes how to view parameter details in the annunciator panel.

Action...	Result...
<p>STEP 1: From the Home screen press Reports to display the Standard PQ summary report via the annunciator panel.</p> <p>Press to select the parameter that you want to view in detail.</p> <p><u>FOR EXAMPLE:</u> Click on Voltage THD to view the parameter in detail.</p> <ul style="list-style-type: none"> • Press View Graph to display the data plot for Voltage THD. Proceed to page 5-6. • Press View Limits to display the threshold values crossed. Proceed to page 5-7. • Press Edit Panel to display the tab function where you can disable/enable parameters/channels to plot. Proceed to page 5-7. • Press Clear if you want to reset existing data on the panel and restart monitoring at a new time/date. • Press Options if you want to load the preset Standard PQ parameters and/or change the panel size display into a 2x2, 3x3, or 4x4 matrix. • Press Exit to quit and return to Home screen. 	<p>NOTE: An activity indicator periodically appears in the middle of the screen signifying that data monitoring is on and the 61000 is actively characterizing events and searching database.</p>  

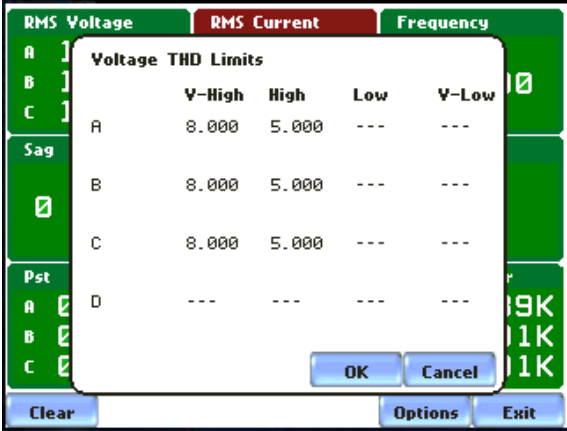
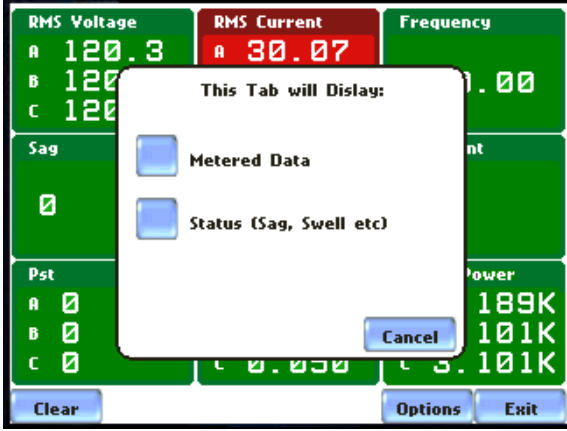
Continued on next page

Parameter data plot (continued)

Action...	Result...
<p><u>FOR EXAMPLE:</u> Once View Graph is selected, coordinates for Voltage THD event are displayed on screen.</p> <ul style="list-style-type: none"> • Press the Magnify button to use the zoom features and to view plot coordinates in detail. • Press Param to show the trigger parameter and channel/s displayed on screen. • Press Exit to return to the annunciator panel. 	 <p>The top screenshot shows a data plot with a y-axis ranging from 0.600 to 5.900 and a legend for 'V THD (Fund)' with channels A (red), B (yellow), and C (blue). The bottom screenshot shows a configuration window with two columns, 'Param 1' and 'Param 2', and four rows labeled 'Plot #1' through 'Plot #4'. The 'Plot #1' row has 'V THD' and 'A, B, C' entered in the 'Param 1' column. The window includes 'OK' and 'Cancel' buttons and a 'Param' button at the bottom.</p>

Continued on next page

Parameter data plot (continued)

Action...	Result...
<p>Once View Limits is selected, threshold values crossed that cause the V THD event are displayed on screen.</p>	 <p style="text-align: right; font-size: small;">61000SF-612</p>
<p>Once Edit panel is selected, the window where you can select Metered Data journal categories to plot is displayed.</p> <p>You can also view the trend plot for sag, swell, and transient by pressing the Status button.</p>	 <p style="text-align: right; font-size: small;">61000SF-613</p>

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Display Settings

Overview; Display Settings Menu; Time and Date Settings; Select Language; Set Display Preferences; Touch Screen Calibration; Turn Threshold Beeper On/Off; Reset to Factory Configuration; Start-up Screen

Overview

Introduction This chapter describes the miscellaneous tasks that users can perform to keep the 61000 running efficiently. These are tasks that users might perform only occasionally.

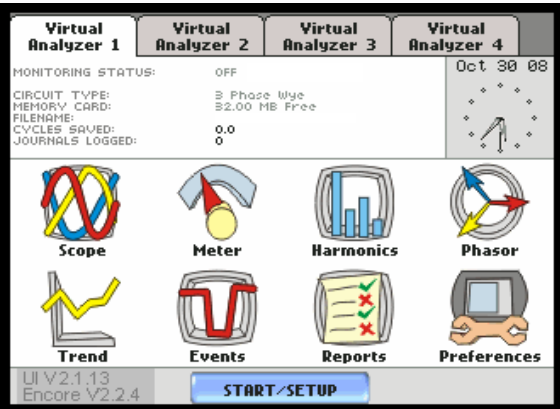
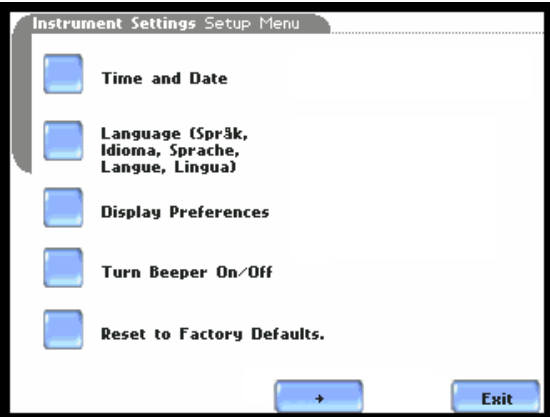
In this chapter The following topics are covered in this chapter.

Topic	See Page
Display Settings Menu	6-2
Time and Date Settings	6-3
Select Language	6-4
Set Display Preferences	6-5
Touch Screen Calibration	6-6
Turn Threshold Beeper On/Off	6-8
Reset to Factory Configuration	6-9
Start-Up Screen	6-11

Display Settings Menu

Preferences menu screen


All functions in this chapter are found under the Instrument Settings Setup Menu. Follow these steps to access the settings setup screen.

Action...	Result...
<p>STEP 1: Press the 61000 On/Off power button to turn the unit on. The Home screen will be displayed.</p>	 <p>The screenshot shows the Home screen with the following details: <ul style="list-style-type: none"> Virtual Analyzer 1, 2, 3, 4 MONITORING STATUS: OFF CIRCUIT TYPE: 3 Phase Wye MEMORY CARD: 32.00 MB Free FILENAME: CYCLES SAVED: 0.0 JOURNALS LOGGED: 0 Date: Oct 30 08 Icons for Scope, Meter, Harmonics, Phasor, Trend, Events, Reports, and Preferences. UI V2.1.13, Encore V2.2.4 START/SETUP button </p>
<p>STEP 2: Press Preferences. The Instrument Settings Setup Menu will be displayed.</p>	 <p>The screenshot shows the Instrument Settings Setup Menu with the following options: <ul style="list-style-type: none"> Time and Date Language (Språk, Idioma, Sprache, Langue, Lingua) Display Preferences Turn Beeper On/Off Reset to Factory Defaults. Navigation buttons: + and Exit </p>

Time and Date Settings

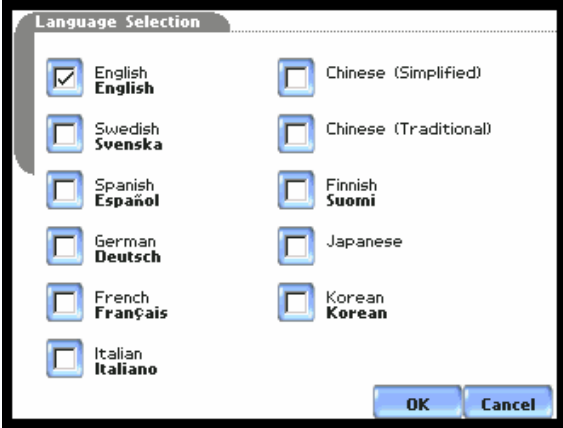
Time and Date display

The local time and date is set by the 61000, however users have the option to select the format of how time and date appear on screen.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press Time and Date.</p> <ul style="list-style-type: none"> • Press Time Style to select the format in which you want time displayed on screen. The following are the three different time formats to choose from: <ul style="list-style-type: none"> • analog • digital using 1 to 12 hr format (AM/PM) • digital using 1 to 24 hr format • Press Date Style to select the format in which you want date displayed on screen. The following are the three different date formats to choose from: <ul style="list-style-type: none"> • mm/dd/yy format • dd/mm/yy format • yy/mm/dd format • Use Time Zone to set the 61000 following your current local time. It is important to set this properly so that the display shows local time, not the coordinated universal time or UTC which is how data is stored.. • Daylight Savings is off by default. Set the daylight savings time (DST) on if you need it to take effect accordingly. • Press Exit to return to the Instrument Settings Setup Menu. 	 <p>NOTE: The local time and date is controlled by the 61000 and cannot be set by the user interface.</p>

Select Language

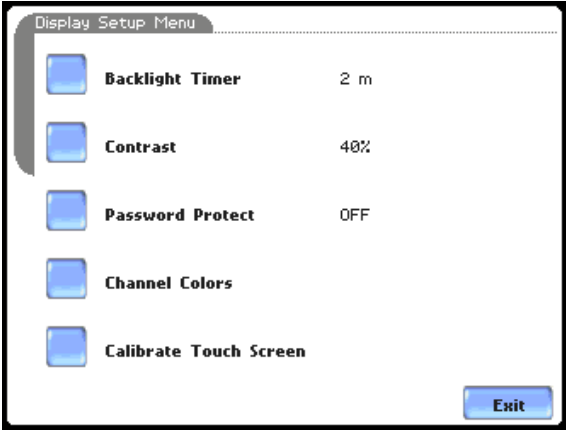
Select Language The 61000 menu screens appear in the English language by default. Users have the option to set screen display to any of the following languages: English, Swedish, Spanish, German, French, Italian, Finnish.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press Language.</p> <ul style="list-style-type: none">• Check to select the desired language in which you want display screens to appear.• Press OK to accept new language selection. The screen will return to Instrument Settings menu. All screens will automatically change to the selected language.• Press Cancel to retain present language.	 <p data-bbox="1369 982 1417 1003">SF-602</p> <p>NOTE: The following languages are currently not available:</p> <ul style="list-style-type: none">• Chinese (Simplified)• Chinese (Traditional)• Japanese• Korean

Set Display Preferences

LCD settings

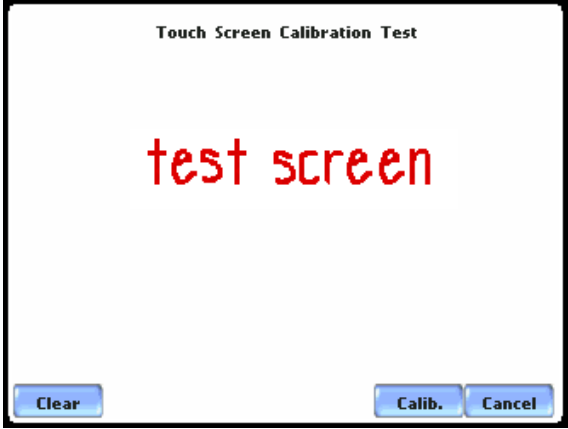
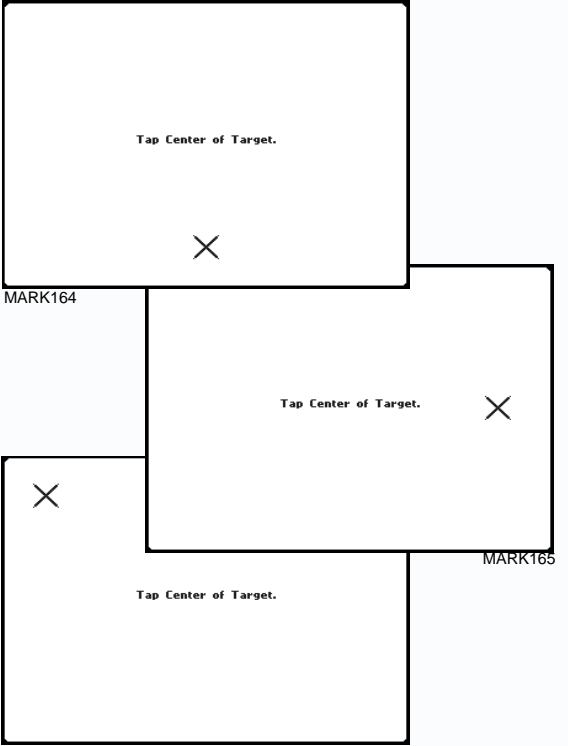
User programmable settings for the LCD screen include the backlight timer, contrast, password protect, parameter/channel colors, and touch screen calibration.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press Display Preferences.</p> <ul style="list-style-type: none"> Automatic backlight shutoff timer is provided for the LCD display. Press Backlight Timer to automatically turn off backlight after 1, 2, 5, 10 or 15 minutes of no user activity. Set the Backlight Timer to Always On if you do not want the backlight to shut off. <p>NOTE: The auto-shutoff feature extends the life of the battery and should be duly considered.</p> <ul style="list-style-type: none"> Press Contrast to brighten/dim screen display to preferred percentage. Press Password Protect to enable/disable password log in code. When password protect is enabled and the user reactivates the 61000 from auto-shutoff (see Backlight Timer setting), the keypad screen used to enter password will appear. The user will have to enter the correct password to continue using the instrument. The message Invalid Password! will appear when an incorrect password is entered. Press Channel Colors to change the color of the parameter/channel display. Select desired color from a 28 color selection grid. Press Calibrate Touch Screen to calibrate the unit's touch screen functionalities. Proceed to page 6-6. Press Exit to return to the Instrument Settings Setup Menu. 	 <p>The screenshot shows a 'Display Setup Menu' with the following options and values:</p> <ul style="list-style-type: none"> Backlight Timer: 2 m Contrast: 40% Password Protect: OFF Channel Colors Calibrate Touch Screen <p>An 'Exit' button is located at the bottom right of the menu.</p> <p style="text-align: right;">SF156</p>

Touch Screen Calibration


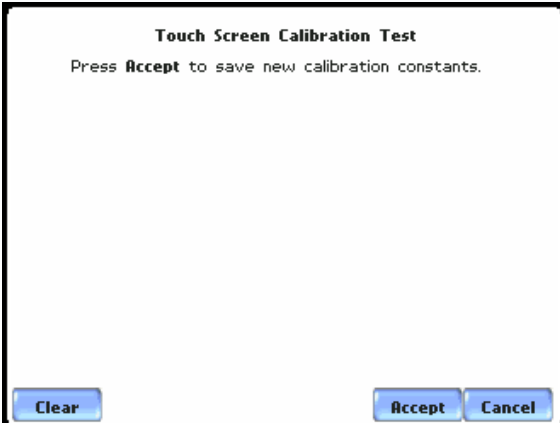
Calibration procedure

61000 is able to perform calibration to ensure the proper operation of the unit's touch screen functionalities. The calibration procedure will correct the problem of out of tolerance touch screen malfunction. Note that errors corrected by this calibration procedure are specific only to touch screen operation.

Action...	Result...
<p>STEP 1: From the Display Setup Menu (see page 6-5) screen, press Calibrate Touch Screen. Test if touch screen recognition operates properly by applying pressure on the LCD screen.</p> <ul style="list-style-type: none"> • Press Clear to reset LCD screen and delete display markings. • Press Calib to begin touch screen calibration procedure. Proceed to Step 2. • Press Cancel to end calibration test and return to the Display Setup Menu. 	
<p>STEP 2: Follow the instruction Tap Center of Target to begin calibration. Target object X is initially located in the lower middle section of the screen.</p> <ul style="list-style-type: none"> • A series of screens will flash showing movement of the target object: from the lower middle section to mid-right and finally to upper left section of the screen. • To end touch screen calibration, tap the center of the target object X now located in the upper left section of the screen. Proceed to Step 3 on page 6-7. 	

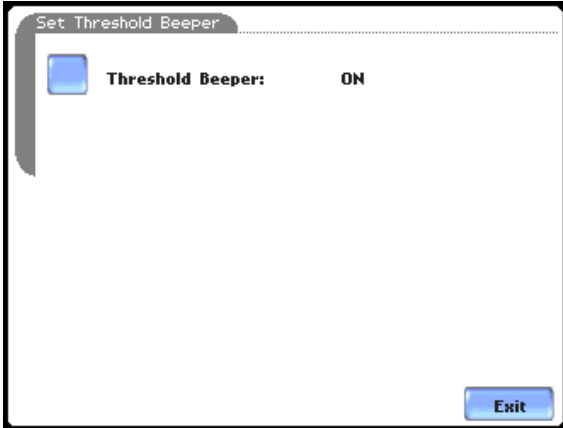
Continued on next page

Calibration procedure (continued)

Action...	Result...
<p>STEP 3: Once touch screen calibration is done, a message will appear to indicate Touch screen was successfully calibrated.</p> <ul style="list-style-type: none"> • Press OK to continue on with calibration test verification. Proceed to Step 3. 	 <p style="text-align: right;">MARK167</p>
<p>STEP 3: Test if touch screen recognition operates properly by applying pressure on the LCD screen.</p> <ul style="list-style-type: none"> • Press Clear to reset LCD screen and delete display markings. • Press Accept to complete the touch screen calibration procedure. Accepting will save and store new touch screen calibration data in memory. Once the new data is stored, the old touch screen calibration data is lost. The screen will return to the Display Setup Menu. • Press Cancel to discontinue the touch screen calibration procedure. Pressing Cancel will retain the previous touch screen calibration constants, no new calibration data will be stored in memory. The screen will return to the Display Setup Menu. 	 <p style="text-align: right;">MARK168</p>

Turn Threshold Beeper On/Off

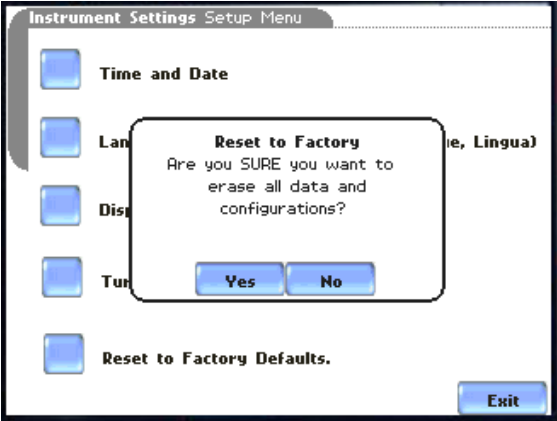
Audible alarm When set to ON, the unit will beep when threshold limits are crossed and other event triggers occur. The beep that provides audible feedback to pressing touch screen key is not affected by this setting.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press Turn Beeper On/Off.</p> <ul style="list-style-type: none">• The unit can provide audible alarm signals when triggered. Press Threshold Beeper to turn the alarm On or Off.• Press Exit to return to the Instrument Settings Setup Menu.	 <p>The screenshot shows a screen titled "Set Threshold Beeper". On the left side, there is a blue square icon. To its right, the text "Threshold Beeper:" is followed by "ON". In the bottom right corner, there is a blue button labeled "Exit".</p> <p>SF157</p>

Reset to Factory Configuration

Definition Factory configuration is the default settings of all programmable features of the 61000 as it left the factory.

Procedure Follow these steps to reset the instrument to its factory settings.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press Reset to Factory Defaults.</p> <p>A confirmation message verifies if you want to reset the 61000 to factory configuration and lose all new data and settings.</p> <ul style="list-style-type: none"> • Press Yes to erase existing settings and reset the instrument to factory-configured setups. <p>NOTE: The Touch Screen Calibration Test screen will come up after the 61000 is reset to factory defaults. Follow the calibration screen prompts or refer to the procedure on page 6-6 to ensure proper touch screen operation.</p> <p>When done, proceed to Step 2.</p> <ul style="list-style-type: none"> • Press No to cancel. <p>STEP 2: Once you reset to factory settings, turn the unit Off and then switch it back On. This will complete the reset process.</p>	 <p style="text-align: right; font-size: small;">61000SF-158</p>

Factory default settings

Dranetz has set the default values for the display parameters of the 61000.

Clock Type: *Analog*

Date Style: *mm/dd/yy*

Time Zone: *UCT*

Daylight Savings: *Off*

Language: *English*

Display

Backlight Timer: *1 minute*

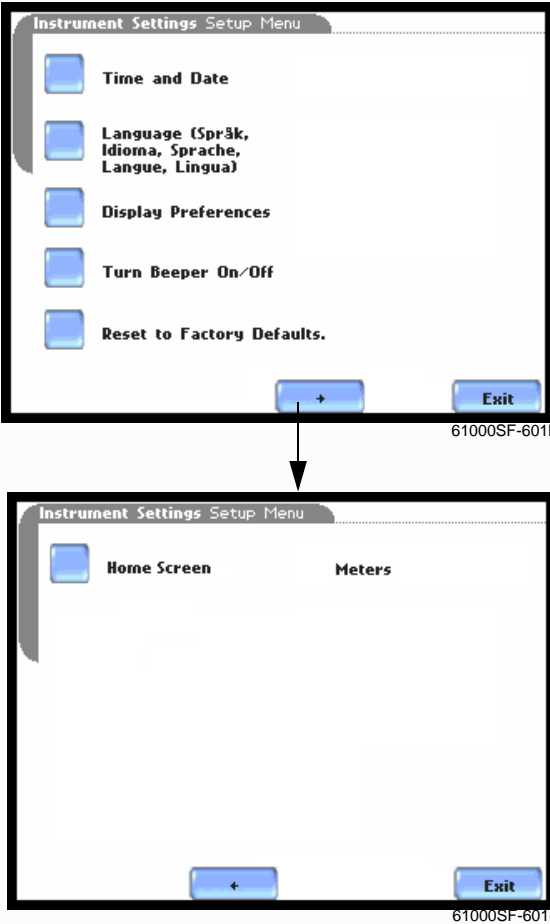
Contrast: *70%*

Password Protect: *OFF*

Start-Up Screen

Definition Start-up screen refers to the screen that the unit will display as home screen upon power up. The 61000 is configured to display the Default home screen, however, users can change this and select either the Meters or Reports screen to be the start-up screen.

Procedure Follow these steps to set the Start-up screen.

Action...	Result...
<p>STEP 1: From the Instrument Settings Setup Menu screen, press the Right-arrow key to select the start-up screen setup.</p> <ul style="list-style-type: none"> • Press the Home Screen button repeatedly to toggle between the following start-up screen selections: <ul style="list-style-type: none"> • Default • Meters • Reports <p>NOTE: The unit will start to the newly selected home screen once it is turned off and activated on power up. When set to Default, the unit will start to the normal home screen.</p> <ul style="list-style-type: none"> • Press the Left-arrow key to return to the Instrument Settings Setup Menu. • Press Exit to return to the currently default home screen. 	 <p>The top screenshot shows the 'Instrument Settings Setup Menu' with the following options: Time and Date, Language (Språk, Idioma, Sprache, Langue, Lingua), Display Preferences, Turn Beeper On/Off, and Reset to Factory Defaults. There are '+' and 'Exit' buttons at the bottom. The bottom screenshot shows the 'Instrument Settings Setup Menu' with 'Home Screen' and 'Meters' options. There are '+' and 'Exit' buttons at the bottom. An arrow points from the '+' button in the top screenshot to the '+' button in the bottom screenshot.</p>

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