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# 1750

## Power Recorder

### Getting Started Guide

PN 2386767

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# 1750 Power Recorder

## Introduction

The Fluke 1750 Power Recorder is a comprehensive yet easy to use system for power quality investigations. The 1750 Power Recorder, referred to hereafter as simply “the Recorder”, consists of a power recorder instrument, a wireless handheld Personal Digital Assistant (PDA) for control and setup, and a powerful yet easy to use PC application, Power Analyze. Four 400 A current probes are provided as standard equipment (not included in Basic version). A wide range of flexible and clamp-on current probes are available from Fluke.

Key features of the 1750 Power Recorder are:

- No PC needed for setup

Using the included wireless-enabled Personal Digital Assistant (PDA) as a controller, you do not need a PC to configure the Recorder, troubleshoot connections, preview data, or download the recorded data. Downloaded data goes onto the SD memory card plugged into the 1750, not directly to the PDA. The range of the PDA with the wireless link is about 15 meters (45 feet) from the Recorder.

- Simplified test lead connections to the power network

Simply connect a voltage probe to a conductor on each phase that you want to record. On the current inputs, the Recorder automatically identifies what type of probe is connected. The Recorder then configures its measurement system appropriately for the model of current probe you are using.

- Connection diagrams for the supported power network configurations (delta, Wye, and others) appear on the handheld PDA controller.

Once you make connections, you can view live readings and a phasor diagram on the PDA to confirm the connections. If a phase channel is wired incorrectly, you can swap the phase to another channel by

changing an internal Recorder setting using the PDA, and then reconfirm correct readings.

- Internal Uninterruptible Power Supply (UPS)

An internal NiMH (Nickel-Metal-Hydride) battery pack and charging system maintain data capture continuity through power interruptions of approximately 8 minutes or less.

- Automatic disturbance capture

The Recorder uses an automatic, self-learning threshold routine, which means you do not have to set any event threshold limits before you start recording. You detect and display power quality events (disturbances) using the Power Analyze software on a PC after the event has been captured. You define thresholds for events after data is stored on the PC. This is called the "event detector" in the software. It does not make permanent changes to the data file, so you can experiment with different thresholds after the fact without worrying about losing data.

With these features, there is little else required to set up and start recording the data to conduct a power quality survey. Should you want to extensively analyze collected data, the procedures described later in this manual review the transfer of data from the Recorder to the PDA, and finally to a PC. Data may then be analyzed using Power Analyze on a PC. Extensive online help is provided in the Power Analyze software on the product CD shipped with the Recorder.

## **Contacting Fluke**

To contact Fluke, call one of the following telephone numbers:

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-3434-0181
- Singapore: +65-738-5655
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at [www.fluke.com](http://www.fluke.com).

To register your product, visit <http://register.fluke.com>.

To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

To contact Technical Support: [fpqsupport@fluke.com](mailto:fpqsupport@fluke.com) or 888-257-9897

## **Safety Information**

See the Specifications section of the Operators Manual for a full agency compliance list. Table 1 lists symbols that appear on the Recorder and in this manual.







### **⚠ ⚠ Warning**

**To avoid electrical shock or fire:**

- **Review the entire manual before using the Recorder and its accessories and observe all warnings and cautions.**
- **Avoid working alone.**
- **Do not operate the Recorder around explosive gas or vapor.**
- **Use only insulated current probes, test leads, and adapters as supplied with the Recorder.**
- **Before use, inspect the Recorder, voltage probes, current probes, leads, and accessories for mechanical damage, and replace when damaged. Look for cracks or missing plastic. Pay special attention to the insulation surrounding the connectors.**
- **Remove all probes, test leads, and accessories that are not in use.**
- **Make sure the Recorder is properly connected through the power cord to protective earth ground.**
- **Do not apply input voltages above the rating of the Recorder as shown on the input panel.**

- Do not apply voltages in excess of the marked ratings of the voltage probes and current probes.
- Do not use exposed metal BNC or banana plug connectors.
- Do not insert metal objects into connectors.

Table 1. Symbols

Symbol	Description	Symbol	Description
	Hazardous voltage. Risk of electrical shock. Precedes Warning		Risk of danger. Important information. See manual. Precedes Caution and Warning.
	Conforms to requirements of European Union and European Free Trade Association (EFTA).		Do not dispose of this product as unsorted municipal waste. Contact Fluke or a qualified recycler for disposal.
	Canadian Standards Association. [ Note: Canadian and US. ]		Protective conductor terminal.
<b>CAT III</b>	CAT III equipment is designed to protect against transients in equipment in fixed-equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.	<b>CAT IV</b>	CAT IV equipment is designed to protect against transients from the primary supply level, such as an electricity meter or an overhead or underground utility service.

## **Standard Accessories**

Table 2 describes the standard accessories that ship with the Recorder. Other optional accessories are also available. See the *1750 Operators Manual* for a complete list.

**Table 2. Standard Accessories**

<b>Description</b>	<b>Part Number</b>
Ethernet cable, 3 meters, yellow	2402854
Colored plastic clips for test leads (32 clips, 8 colors, 4 clips each color)	2157607
Model TLS430, test lead set including cable and clips	2157713
512 MB Secure Digital (SD) Memory Card for downloading data	2386744
Model 3140R, 400 A Probes (4 - not included with Basic version)	2277216
AC power cord, 3 meters	2441360
Personal Digital Assistant (PDA) with docking station	2386780
CD ROM Manuals and Software	2386771
1750 Getting Started Guide	2386767
Sheet of Front Panel Decals	2436261
Sets of international ac power plug adapters for the PDA charger	2583479
International adapters for the Recorder power cord	2441372

# Features

The Recorder front panel is illustrated in Figure 1 and described in Table 3.

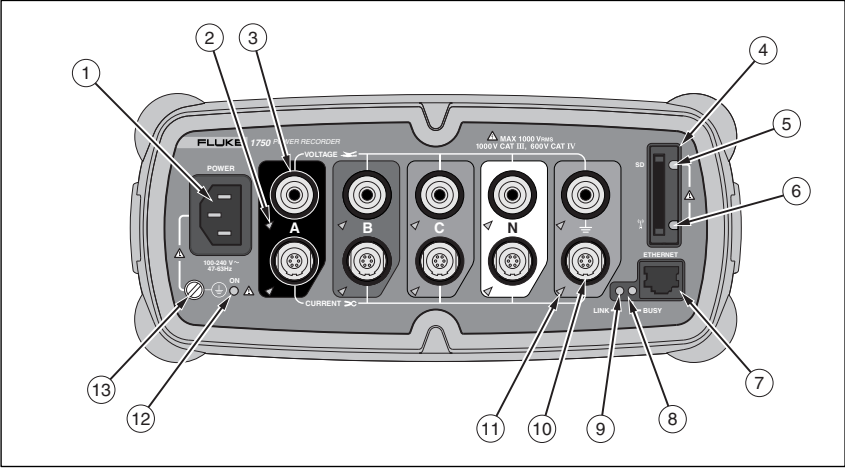


Figure 1. Fluke 1750 Power Recorder

azd09f.eps

**Table 3. Input Terminals and Controls**

Number	Description
①	Standard 120/240 V 50/60 Hz power input for Recorder power
②	Voltage indicator Steady            Voltage is present, not overloaded Blinking        Voltage overload (overload threshold 1100 V)
③	Five voltage measurement inputs
④	Removable Secure Digital (SD) memory card for transfer of large quantities of data. You can remove the card from the Recorder, insert in the PDA and transfer data to the PC via the “synchronize data” feature of the PDA. A USB SD card reader may also be used.
⑤	SD status indicator Steady green    SD card inserted Blinking        Busy - do not remove the card
⑥	Wireless Controller Status Indicator Steady Blue    Wireless controller enabled but not communicating Blinking        Wireless controller communicating or other activity Off              Disabled
⑦	Ethernet port. TCP/IP via Ethernet is used to connect the Recorder to a PC for downloading recorded data, and for configuring the Recorder when not using the PDA. This is the recommended method of data transfer due to its speed and reliability.
⑧	Busy Indicator Blinking        Network is busy
⑨	Link indicator Off              No link Steady         Link Present Blinking        Communicating (with PDA or PC)
⑩	Current Measurement Terminals (5)

**Table 3. Input Terminals and Controls (cont.)**

Number	Description
⑪	<p>Current indicator</p> <p>Steady                      Current probe in normal range</p> <p>Blinking                    &gt;110 % of probe range, use a higher range probe</p> <p>Off                            Current insufficient to measure</p>
⑫	<p>Red/Green LED</p> <p>Steady green                      AC input power normal</p> <p>Green/Orange blinking          Recording</p> <p>Blinking red                        Recorder running on UPS</p>
⑬	<p>Ground Terminal</p> <p>Connecting the supplemental ground terminal and the line cord safety ground to different ground potentials creates a ground loop that can damage the Recorder. To avoid this, use the supplemental ground terminal only when no protective earth ground connection exists through the line power cord. If there is any chance that a safety ground connection does exist through the line power cord connection, make sure to connect the supplemental ground terminal only to the ground system used by the ac receptacle that powers the Recorder. See Figure 2.</p>

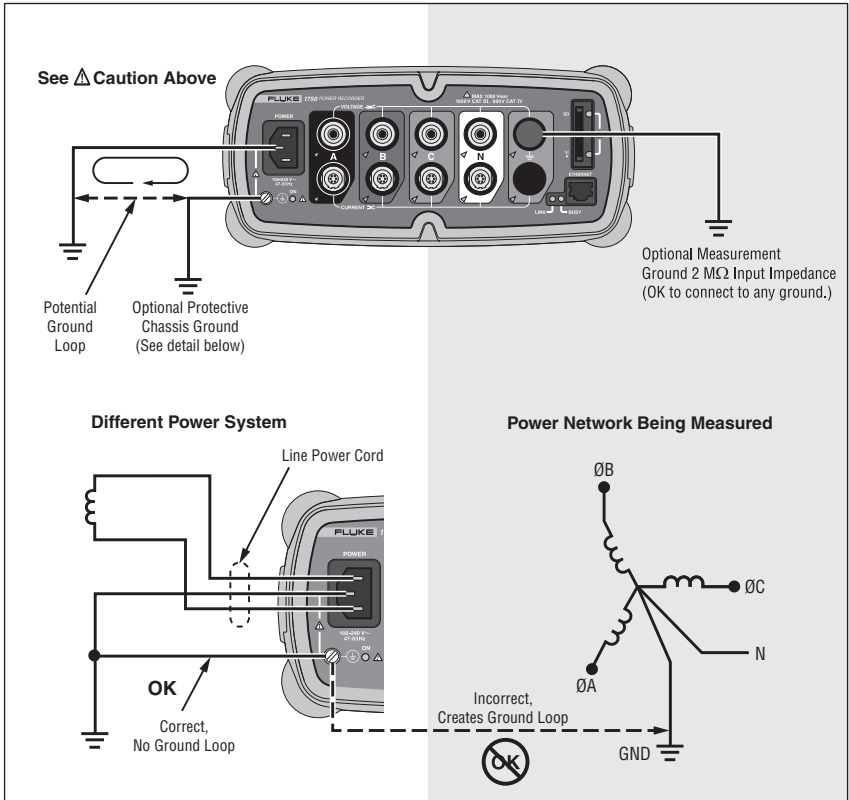



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**⚠ Caution**

**Connecting the supplemental ground terminal and the line cord safety ground to different ground potentials creates a ground loop that can damage the Recorder.**



**Figure 2. Connecting the Supplemental Ground Terminal**

azd11f.eps

## Charging the PDA Battery

Your PDA is shipped with a discharged or partially charged, rechargeable battery. You should fully charge the battery before setting up the device, and recharge it regularly. Refer to your PDA user's guide for detailed information about the battery.

### Caution


**Do not leave important data on the PDA. If the battery discharges completely, you will lose all data not stored in File Store (ROM). Discharging the battery completely is similar to performing a hard reset. Refer to the PDA user's manual for more information.**

## Installing the Software

This section describes how to install Fluke Power View software on the PDA and Fluke Power Analyze software on your PC. Keep your product CD in case you need to reinstall this software in the future. You should periodically check the Fluke website: [www.fluke.com](http://www.fluke.com) to see if any 1750 firmware or application software updates are available for download. Fluke encourages you to register the Recorder. After your Recorder has been registered, you will receive email notifications of firmware and software update availability.

### Installing Power View on the PDA

1. Insert in your PC the CD that ships with your PDA. Follow the on-screen instructions to install the ActiveSync software for Windows XP (or Mobile Device Center for Windows Vista and Windows 7) that allows your PC to communicate with the PDA.
2. Put the PDA in the docking station and establish a partnership between the PDA and your PC. Keep your product CD in case you need to reinstall this software in the future.
3. Insert the CD that ships with your Recorder in the CD-ROM drive on your PC.
4. A window appears that lists options on the CD. If the install software window does not automatically appear, do the following:
  - a. On the Windows taskbar, select **Start**, then **Run**.

- b. Type **d:\sw\PowerViewInstall.exe** (where **d:** is your CD drive letter).
5. Select **Install Software**.
6. Select **Install Fluke Power View**.  
Power View will be installed in the Programs folder on the PDA.
7. To start Power View, select Start, and then Programs on the PDA.
8. Tap the Power View icon () to start using the application.

## **Language Selection**

Power View features a localized user interface for English, German, French, Spanish, Chinese, and Italian. To choose a desired language, select **Menu\1750 Setup\Language** and select a language from the list.



Setup Screen with language.bmp

## PC System Requirement for Power Analyze


- Windows 2000 Professional at minimum, Windows XP or higher recommended. Administrator privileges are required to install applications.
- PC with 300 MHz or higher processor clock speed, Intel Pentium/Celeron family, or AMD Athlon/Duron family, or better.
- Processor Recommended: 1 GHz or higher, Pentium 4, AMD Athlon, or better.
- 256 MB RAM (1 GB recommended).
- 1024 x 768 or higher resolution video.
- Keyboard and mouse.


## Installing Power Analyze

Before installing the software on your PC, make sure you have Internet Explorer version 6, or later appropriate to the language or culture settings of the operating system installed on your computer.

### Caution

**Do not remove the CD until after you have successfully installed the software, rebooted the machine, and opened the application.**

1. Insert the CD into your CD-ROM drive.
2. A window appears that lists options on the CD. If the window does not automatically appear:
  - a. Use Windows Explorer to locate the “sw/FPAInstall.exe” file on the CD.
  - b. Double-click “FPAInstall.exe” to launch the installation program.
3. Select **Install Software**.
4. Select **Install Fluke Power Analyze**.
5. Follow the installation instructions that appear. After software installation is complete, the Power Analyze icon  appears on your desktop.

6. Start Power Analyze on your PC by choosing **Start >All Programs >Fluke >Power Analyze >Launch Power Analyze** or double-click the Power Analyze icon  on your desktop.

After the installation is complete, please take a few minutes to complete your product registration. You can register quickly online (preferred) at <http://register.fluke.com> or you can print the form and fax it to the number provided on the form. Product registration is very important since it allows you to get free software updates and helps us provide you with the fastest and most efficient technical support.

*Note*

*You may need to change your Windows firewall settings to allow the program FPA.exe to use ports 18571 (TCP) and 18572 (UDP). For more on changing firewall settings, refer to <http://support.microsoft.com>.*

## ***Installing the Power Recorder at a Facility***

This section describes the steps you need to take to set up the Recorder at a facility and begin a recording session.

### ***Work Flow***

There are three distinct stages for a recording session.

- **Set-up**  
Set-up, hookup, and verification of connections and measured signals. This is when you will want to clear the Recorder memory (not required, but good practice because data download when finished only contains your new data), make any desired Recorder setting changes, and insert annotations and/or an optional Start mark into the recorded data stream. Annotations are messages or notes you insert into the data stream during a recording session.
- **Interim checkup, mid-recording session (optional)**  
At this time, you may want to re-check all the live input signals, and download the data recorded since the beginning of the recording session. This does not interfere with ongoing recording in any way.

Annotation capability is always available during the recording session.

- End of recording session

You can re-verify if desired, correctness of live data and then download data, power off the Recorder, and pack up for transport.


## **Installing the Recorder**

To install the Recorder at a facility, follow the basic steps below.

1. Position the Recorder within 2 m (6 ft) of the monitoring location.
2. The Recorder can be set on the floor or a table, or attached and secured to a pole or other mounting surface. The Recorder can be oriented vertically or horizontally.
3. Connect the Recorder to a 100 to 240 V ac power source, 50 or 60 Hz.

### **⚠ Caution**

**To avoid damage to the Recorder:**

- **Ground the chassis before you do anything else.**
  - **Connect the power cord to the Recorder using the appropriate supplied adapter.**
  - **Connect the power cord to a properly grounded wall outlet.**
  - **Be sure to plug the power cord into the Recorder panel BEFORE connecting it to an outlet.**
4. Plug the power cord into a properly grounded wall outlet.
  5. All LEDs should flash **ON**, then **OFF**, and then each should turn ON and OFF in sequence. The LEDs will then remain on if you make secure test lead connections and there is sufficient voltage and current.
  6. Turn on the PDA and tap the Power View icon  to launch Power View.

If a Recorder is within range and is not password protected, it should appear in the drop down menu just below the main title bar on the PDA. Select the recorder you want to browse to with the PDA stylus. Upon selection, the Home screen for live data appears.

If more than one Recorder is within range, these will appear in the drop down menu list.

7. If you have previously established password protection for the Recorder using the Power Analyze PC software, you must type the correct password in the Password text box and tap the **Enter** button. (Password protection is established for a specific Recorder using either the Setup Password menu in Power View or the Power Analyze software).

## **Connecting the Recorder to the Wiring**

After you have set up the Recorder you are ready to connect the voltage leads and current probe or flexi-probes to the power network being tested. Refer to the Power Type diagrams provided on the PDA or in the *1750 Operators Manual*.

### **⚠ ⚠ Warning**

**To avoid electric shock, Flexi-probes should not be applied or removed from hazardous live conductors.**

In most cases, you should install the current probes first. Because they are clamped around wires, current probes are usually more secure than voltage probes. Examine the conductors you are about to connect to and determine if you should attach the current probes to the phase wires or busbars before you connect the voltage probes.

1. Select and attach the appropriate current probes to the Recorder.
2. Select and attach the appropriate voltage test leads and probes to the Recorder.

#### *Note*

*If your power connections require potential transformers (PTs) or current transformers (CTs), you can use the ratio settings in Power View to set the Recorder to display readings as they exist on the primary side of the PT and CT (for example, 12000 V).*

3. Connect the Recorder to the wiring by first connecting the measurement ground test lead to the distribution system ground, and then the neutral probe to neutral.
4. Connect the ground clamp to the distribution system ground and the neutral clamp to neutral, with the arrow on the current probe pointing towards the load (away from the source) in each case.
5. Connect the remaining current probes to the power network.
  - The arrow on the clamp should point toward the load.
  - Use the color-coding on the leads to help you connect the probes to the correct phases, neutral and ground.
6. Connect the remaining voltage probes.

*Note*

*Make sure the voltage probes and current probes are paired correctly, Phase A (L1) voltage to Phase A (L1) current and so forth. Calculations are made in pairs and cannot be changed after data is recorded. The leads for the voltage probe and current clamp of the same color should be attached to the same phase wire or busbar.*

7. Check the LED for each phase to make sure a connection is established.
  - When a phase LED is ON or lighted, you know that the connection is active and that voltage and current is within the normal range.
  - When a phase LED is BLINKING, you are connected but the voltage or current is exceeding the normal range or exceeding the range of the probe that you are using.
  - When a current LED is OFF or unlit, there is insufficient current present in the line.

## **Verifying Your Connection**

Before you leave the Recorder to accumulate data at the facility, double-check the connections.

- Make sure the current probes are secured and completely closed around the conductors and that the voltage and current LEDs are steady-on.



- Use the PHASOR screen on the PDA or PC to verify that the voltage and current connections are correct. You can swap the connections using Power View if they are incorrect.

## **Finishing UP**

After making any corrections to the connections, recheck the PHASOR diagrams to confirm your connection. Make sure the nominal voltage, nominal line frequency, and power type (delta, wye, other) are correct before you leave the Recorder. It is a good practice to insert a Start Mark when you are finished with all settings so you can download data and ignore useless readings and events common at the beginning probe connecting activities. You can also use the “**Erase Memory**” function.

## **Managing Recorded Data**

Recorded data resides in the Recorder on an internal non-physically accessible flash memory circuit. It is not transferred to a SD memory card in the Recorder’s SD memory slot until you request a download action using the PDA or an attached PC. Downloading to a PC running Fluke Power Analyze Software (included) using the Ethernet cable is recommended and the fastest way to retrieve data from the Recorder.

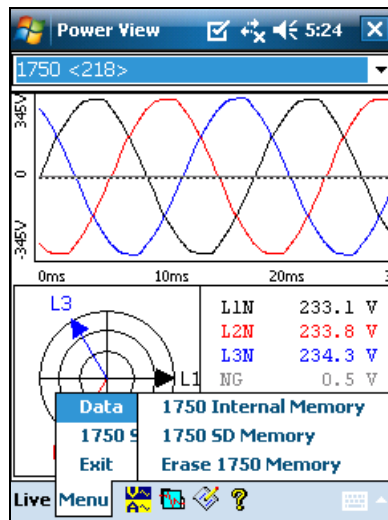
It is never technically necessary to erase internal memory. When the Recorder has new data to record, it does so automatically, overwriting the oldest data. You can erase internal memory for security reasons, or if you want to simplify what you will be seeing in the download data dialog box. The start and end times will represent one recording session when old data is erased.

### *Note*

*Data is not removed from internal Recorder memory until you erase it using Power View software on the PDA or Power Analyze software on your PC.*

## Downloading Data and Erasing Memory

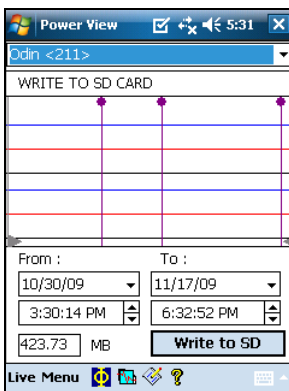
Use the Data menu options to manage the Recorder memory and download recorded data to the SD card plugged into the Recorder's (not the PDA) SD card slot. You are downloading recorded data from the flash memory to an SD card in the Recorder. When you want to use that data, you must move the card data to a PC running Fluke Power Analyze Software. You can later copy the data to your PC for review using the Power Analyze software. Tap **Menu/Data/1750 Internal Memory** to view the Download screen.



1750\_Internal\_Memory.bmp

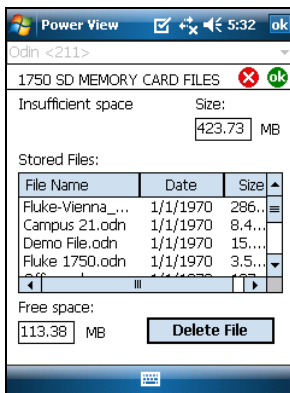
The Download screen shows a three-phase rms V strip chart with date and timescale shown. This represents the data in the Recorder internal memory. The default settings of the start and stop times is everything in memory, to download ALL, tap the **Write to SD** button.

The gray cursor lines right and left with triangular arrowheads at the bottom of the screen show the start and stop times currently selected for download. Green and red flags are START and STOP mark annotations inserted during the recording session. Yellow flags are file name annotations inserted during the recording session, or setup parameter changes that change the data significantly, such as nominal voltage or power type.



1750 IM Write to SD Card.BMP

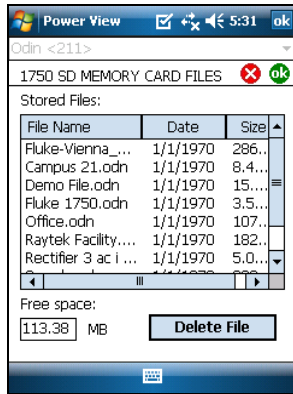
If the SD storage card already contains data files, it may not have room for the new download. Power View alerts you to this condition and asks if you would like to erase the SD card before downloading.



azd107s.bmp

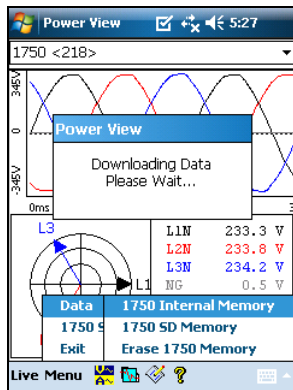
The Memory Card Full message appears for 5 seconds, followed by the screen below. You can also access the download menu by selecting **1750 SD Memory** from the Data menu option.

You can delete files as necessary, and when satisfied that there is room on the card, proceed to write the selected internal Recorder memory data to the SD card.



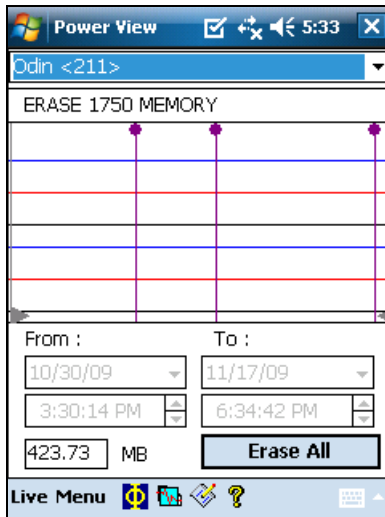
azd108s.bmp

When there is room on the card, a message confirming the download will appear.



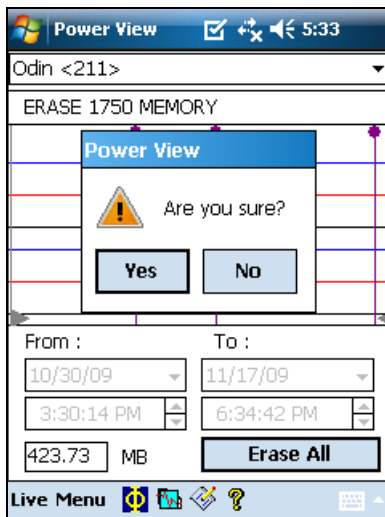
1750 IM Downloading Data.BMP

You can also tap the **Erase 1750 Memory** from the Data menu option which is available under **Menu**, and tap the **Erase All** button to erase all power quality data stored in the Recorder. Even then, if you want you can leave old data in Recorder memory. It will be overwritten automatically when you start your next Recorder session, so it never has an adverse effect on recorded data quality or quantity.



azd109s.bmp

When you choose to **Erase All**, the following popup caution “Are you sure?” appears on the screen.



erase\_all.bmp

*Note*

*You can also download data by connecting your PC directly to the Recorder with an Ethernet cable and run Power Analyze in the 1750 Live mode. All of the functions (controller, PDA, and Power View) are duplicated in 1750 Live mode.*

## **Power Type Diagrams**

Power type diagrams are provided on Power View and Power Analyze and can be referenced when you are setting up nominal power on the Recorder. The diagrams are used as an aid in making the correct test lead connections. The following power type diagrams are for the standard power configurations:

- One-Phase Plus Neutral
- One-Phase IT No Neutral
- One-Phase Split Phase
- Three-Phase Wye
- Three-Phase Delta
- Three-Phase IT
- Three-Phase High Leg
- Three-Phase Open Leg
- 2-Element Delta
- 2 ½-Element Wye

## **Using Fluke Power Analyze**

In addition to analyzing data that has already been recorded, you can also connect to a Recorder through Power Analyze. When you do this, all of the features available through the PDA are also available directly on your PC. For example, you can:

- View live data by connecting to a Recorder connected to power.
- Configure a 1750 Power Recorder to which you are connected.

- Add annotation markers and take manual snapshots that are then stored in the Recorder.

Fluke Power Analyze software lets you work on your PC with power quality data monitored by and received from the Recorder. With Fluke Power Analyze, you can download, review, and analyze data. For example, you can:

- Download data from a Recorder into a data file on your PC, or open a file that was downloaded previously and moved to your computer.
- Analyze the data you have downloaded using a series of views to see different aspects of it, including summary graphs of Volts/Amps/Hz, events, harmonics, THD, flicker, power and energy.

As you review the data on the Power Analyze screens, you can adjust the data shown by turning on and off display of different channels and select other parameters. You can focus on the specifics that help you analyze and understand the power quality data.

- See snapshots of the recorded power quality data at specific points in time as though you had looked at the measurements while they were live.


Because snapshots are captured at regular intervals, you can advance through them and review the measurement as they were at successive points in time.


- Build reports by tagging important data as you review it in Power Analyze, and then use the Power Analyze Report Writer to gather it into a report that includes images and details about the data.

This section of the Getting Started Guide describes how to begin working with Power Analyze software to review and analyze data in recorded data files. Use it to become familiar with the Power Analyze interface and features. Detailed information for is available in the Power Analyze online help.

## ***Getting Answers to Questions as You Work***



As you work with Power Analyze, you can use Online Help to get detailed information about how to use the software to examine recorded data, connect to instruments and view live data, download data, and other tasks. You can access the online help system included in Power Analyze in several different ways.

In the main window, click the **Help** question mark  on the toolbar and then click an item on the screen to get information about that item. You can use this to find information about buttons and other items on the toolbar, commands in menus, and the main screens.

For information about the current view, or for help in a dialog box, click . You can also see this information by pressing the **F1** key.

You can also open the help system by choosing **Help Topics** from the Help menu.

Once Help is open, you can use the **Contents**, **Index**, and **Search** tabs on the left to help you locate information.

If the Help window is too wide, you can hide the navigation pane on the left by clicking  at the top of the Help window. To open the navigation pane again, click .

## Starting Power Analyze

You can start Power Analyze on your PC by choosing **Start >All Programs >Fluke >Power Analyze >Launch Power Analyze**.

As you learn to use Power Analyze, you can use the file named SAMPLE.ODN until you have a data file you want to analyze.

### Note

*You may need to copy the sample database SAMPLE.ODN from where you installed the software (normally, c:\Program Files\Fluke\Power Analyze) to the folder My Documents\PQ. You can then use the File >Open command to open it. This problem can occur if you do not have Windows Admin rights.*

## Working with Recorded Data Files

You work in the Fluke Power Analyze works with one file at a time. When you download data, it is stored in a file with the extension ".odn". When you download using Power Analyze, these files are stored by default in the directory “\MyDocuments\PQ\”. If you move downloaded data from the Recorder to the PC via an SD card, you can copy the .odn file either to this PQ directory or to another folder. For information about moving downloaded data



to your PC, see “Moving Downloaded Data from the Recorder to a PC” later in this manual

To start Fluke Power Analyze and open a file at the same time

1. In the Windows Explorer or on your desktop, locate the .odn file you want to open.
2. Double-click the file to open the file in Fluke Power Analyze.

To open a data file when Fluke Power Analyze is already open

1. From the File menu, choose **Open**.
2. In the Open dialog box, navigate to the file you want to open, select it and click **Open**.

The file opens in a Fluke Power Analyze window and displays the Volts/Amps/Hz view. The name of the file appears in the application title bar. For details about the Power Analyze window, see “Overview of the Power Analyze Screen” later in this manual.

## ***Moving Downloaded Data from the Recorder to a PC***

The procedure below describes how to download recorded data from the SD card to your PC to analyze recorded data using Power Analyze.

To move the downloaded data from an SD card to your PC:

1. Download the data from the Recorder’s internal flash memory to the SD storage card.
2. Remove the SD storage card from the Recorder and insert into the top of the PDA, for easy transport.
3. Place the PDA in a docking station connected to your PC.
4. The SD card should display as a drive in the My Computer folder.
5. On your PC, open the card as a drive.
6. Copy the files from the PDA to the desired location on your computer.

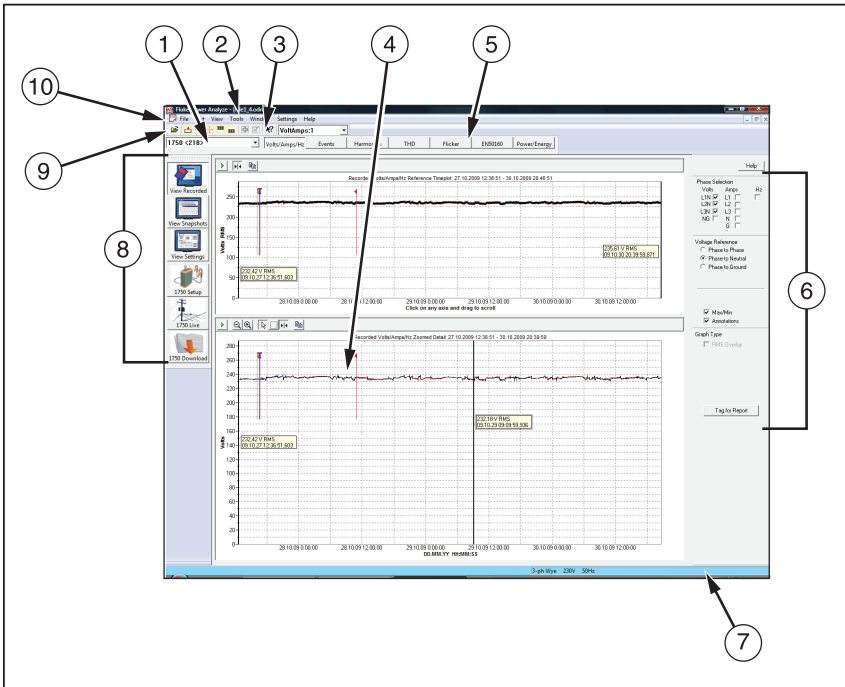
You are now ready to open the recorded data files in Fluke Power Analyze.

## Overview of the Power Analyze Screen

Whether you are working with a recorded data file or are connected live to a Recorder, many of the elements of the Fluke Power Analyze screen are the same.

Power quality data appears in the central screen area. The type of data you see depends on the active mode and view. Additional view controls on the right side and buttons on the tool bar let you customize how the data displays.

Figure 3 shows the Volts/Amps/Hz recorded data view and Table 4 describes the areas and controls of the screen. For a detailed review of the contents of the actual data, see “Recorded Data Screen Overview” later in this manual.



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Figure 3. Power Analyze Screen

**Table 4. Power Analyze Screen Areas and Controls**

Number	Description
①	<b>Connected Recorder.</b> When you are connected to a 1750 Power Recorder, this field shows its name. A drop-down list shows other Recorders to which you can connect.
②	<b>Name of data file.</b> When you view recorded data, the name of the ".odn" file appears in the window title bar.
③	<b>Help buttons.</b> Several types of online help are available for Fluke Power Analyze. Two are shown on this screen. For details about accessing Help, see "Getting Answers to Questions as You Work" earlier in this manual.
④	<b>Main Data Area.</b> The central part of the screen shows the power quality data for the active mode and view. You can make further adjustments to the data displayed by using the view controls and tool bars.
⑤	<b>View toolbar.</b> Provides quick access to the different power quality data views for the active mode (Recorded Data, Snapshots, or Live 1750 Data). The active button on the View toolbar indicates the view you see now.
⑥	<b>View controls.</b> View controls specify what data to display in the view, and how it should appear.
⑦	<b>Status Bar.</b> Shows the power configuration, nominal voltage, and frequency for the data you are viewing. When viewing live data, it also shows the name of the Recorder.
⑧	<b>Power Analyze Mode Side Bar.</b> Mode buttons activate different sets of views and screens in Power Analyze. The active button indicates the mode in view. In the screenshot example, View Recorded is active. For more information, see "Overview of the Power Analyze Modes" later in this manual.
⑨	<b>Main tool bar.</b> Frequently used actions appear as buttons on the toolbar.
⑩	<b>Menu bar.</b> Menus provide access to Power Analyze commands. Frequently used menu items are also available on the main toolbar and view toolbars.

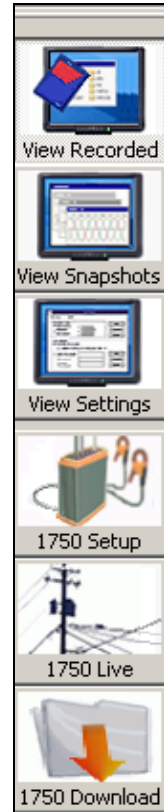
## Overview of the Power Analyze Modes

There are six modes in Fluke Power Analyze, all available from the side bar at the left of the screen. The top three allow you to work with recorded data that has been saved as a data file, while the bottom three let you work with live data when you are connected to a Recorder.

### Recorded Data Modes

These modes are available when a recorded data file (.odn) is open.

- **View Recorded** lets you analyze data that has been downloaded from a Recorder and saved as a data file.
- **View Snapshots** displays snapshots of measured power conditions taken manually or on a periodic basis throughout the monitoring period and stored in the recorded data file.
- **View Settings** displays the Recorder settings that were in effect when the recording was made. This includes power configuration, nominal voltage and frequency, voltage and current ratios, and other connection factors.



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### Live Data Modes

These modes are available when connected to a Power Recorder.

- **1750 Setup** lets you view and set the instrument settings, including the power configuration, nominal voltage and frequency, voltage and current ratios, and other details about the data that is recorded before starting a recording session. You can also create a password in this mode.
- **1750 Live** lets you monitor data directly, when you are connected to a Recorder.

- **1750 Download** lets you retrieve data from the Recorder and save it on your computer.

## **Recorded Data Screen Overview**

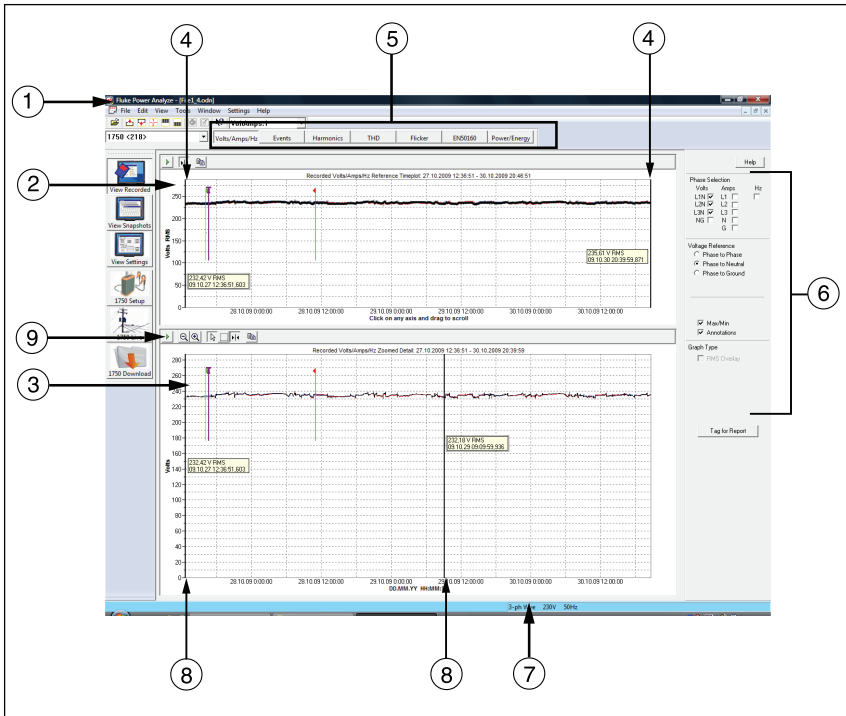
Recorded data views are the primary screens you work with when analyzing power quality data. Five different views of recorded data are available: Volts/Amps/Hz, Events, Harmonics, THD, Flicker, EN50160, and Power/Energy. Figure 4 shows a sample Recorded Data Screen and Table 5 describes the contents of the screen.

In many of the recorded data views you see both a Reference graph and a Detail graph. When zoomed out, the reference graph shows the full range of available data. The detail graph shows a subset of that data. For more information about the screen menu and buttons, refer to the section “Overview of the Power Analyze Screen” earlier in this manual.

When you work with recorded data, many of the elements on the screen are the same regardless of which view is displayed.

*Note*

*Check the Fluke website ([www.fluke.com](http://www.fluke.com)) for updates.*



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Figure 4. Recorded Data Screen

**Table 5. Recorded Data Screen Contents**

<b>Number</b>	<b>Description</b>
①	<b>Name of open data file.</b> Shows the name of data file that is presently open.
②	<b>Reference graph.</b> Provides an overview of the data for the entire recorded period.
③	<b>Detail graph.</b> Shows a detailed view of a portion of the recorded data, determined by the selection cursors on the top graph.
④	<b>Selection cursors.</b> The selection cursor bars mark the data shown in the Detail graph. As you move the cursor bars, the data in the detail graph adjusts.
⑤	<b>View toolbar.</b> Lets you change between recorded data views. The active button indicates the view you see now. In the screenshot above, Volts/Amps/Hz is the active view.
⑥	<b>View controls.</b> Specify data to be displayed in the view, and how it should appear. For example, on the Volts/Amps/Hz graph shown above, view controls let you hide or show phases, select whether maximum values are shown, or show or hide annotations.
⑦	<b>Status Bar.</b> Shows the power configuration, nominal voltage, and frequency for the data you are viewing.
⑧	<b>Measurement guides.</b> This set of guides let you measure data in the Detail graph. The measurement value is shown on the boxed labels between the guides.
⑨	<b>Graph toolbars.</b> Provide access to tools you can use with graphs, such as showing and hiding the guides, or zooming in on data.

## 1750 Live View Screen Overview

When you are connected to a Recorder, five different views of the live power conditions are available. You can see this same information using Fluke Power View on the PDA. Figure 5 shows a sample Live View Screen and Table 6 describes the contents of the screen.

Although the format of the 1750 Live views vary, the overall structure of the live screens is the same. The screenshot below shows the essential elements in the live Scope view. For more information about the Scope view and other 1750 Live views, see the Online Help.

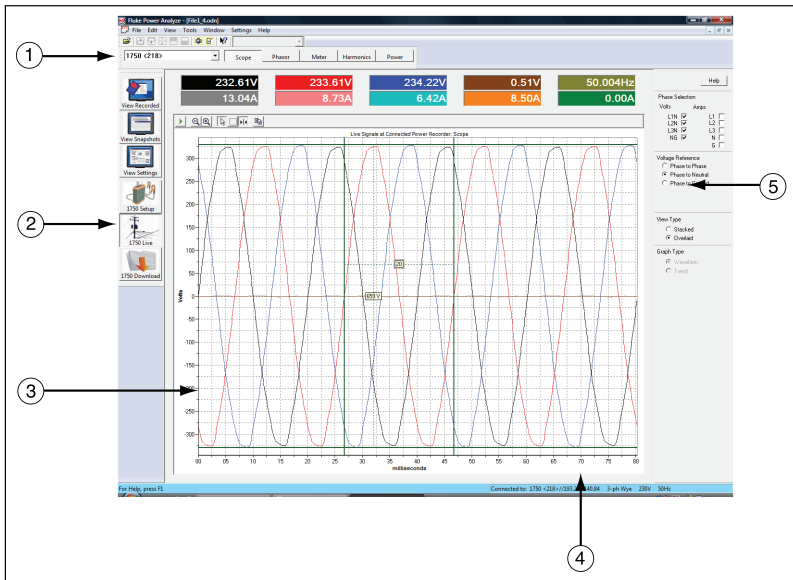


Figure 5. Live View Screen

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**Table 6. Live View Screen Contents**

Number	Description
①	<b>Connected recorder.</b> Shows the name of the Recorder to which you are connected.
②	<b>View toolbar.</b> Lets you change between live views. The active button indicates the view you see now. In the screenshot above, Scope is active.
③	<b>Main data area.</b> Displays the power quality parameters you are viewing: Scope, PHASOR diagram, meter, harmonics, or power.
④	<b>Status bar.</b> Shows the Recorder setup, including selected Recorder name, IP address, power configuration, nominal voltage, and frequency. You can set this information using the 1750 Setup mode, or using Power View on the PDA. For more information setting up a Recorder through Power Analyze, see the Online Help.
⑤	<b>View controls.</b> Specify what data to display in the view, and how it should appear.

## **Snapshot Screen Overview**

Snapshots are screen captures at a single point in time of the measurements made by the Recorder as displayed in 1750 Live mode. When you download data, you download snapshots (taken manually and at regular intervals), along with the long-term summary data and events. All five views that are available for live power are also available in the snapshot views, giving you a detailed view of conditions at specific intervals.

When you first display the Snapshot views, you see the first snapshot taken in the downloaded data. You can use the Slider Bar or the Next/Previous buttons to bring additional snapshots into view.

The interval at which snapshots are captured is specified when the Recorder is set up. In addition, a snapshot can be taken manually using the PDA or using the **Take Snapshot** button.

Figure 6 shows the main elements in snapshot views. More detail on specific snapshot screen elements are described in Table 7.

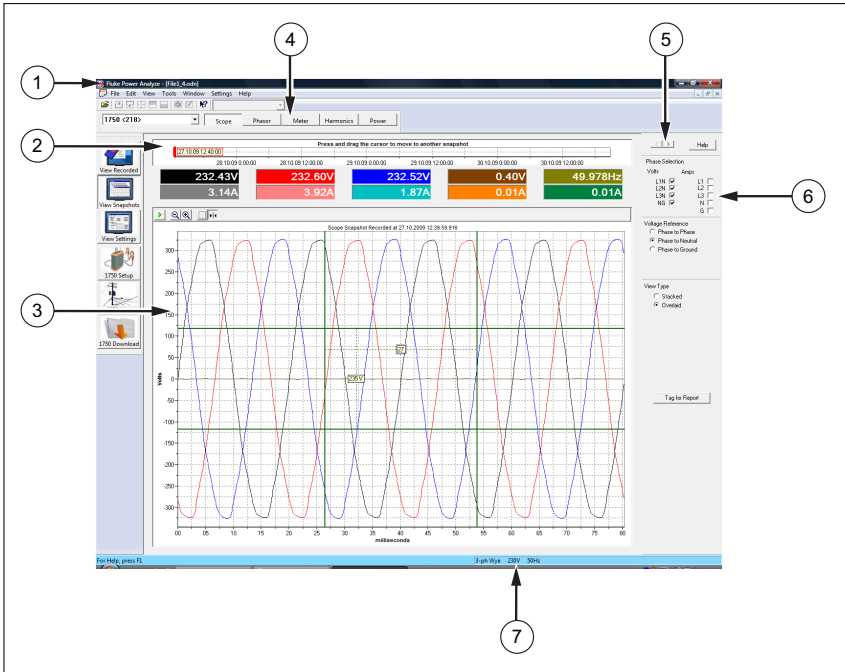


Figure 6. Snapshot Screen

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Table 7. Snapshot Screen Contents

Number	Description
①	<b>Data filename.</b> Shows the name of the data file presently open.
②	<b>Slider bar.</b> Allows you to move to a snapshot at a different point in time within the recorded data by dragging the slider.
③	<b>Main data area.</b> Displays a snapshot of the conditions at the date and time shown in slider bar. In this example, the snapshot is of the Scope for the phases checked in the Phase Selection area of the view controls. For details about the contents of the different snapshot views, see the Online Help.
④	<b>View toolbar.</b> Lets you change to different Snapshot views: Scope, Phasor, Meter, Harmonics, and Power. The active button indicates the view you see now.

**Table 7. Snapshot Screen Contents (cont.)**

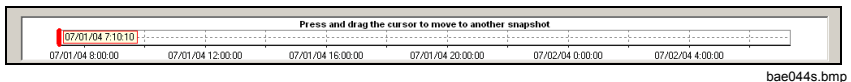
Number	Description
⑤	<b>Next/Previous buttons.</b> Lets you move through snapshots one at a time by clicking these buttons.
⑥	<b>View controls.</b> Specify data to be displayed in the view, and how it should appear.
⑦	<b>Status bar.</b> Shows the power configuration settings at the time the data was recorded.

## Working with Snapshots

Snapshots are captured at regular intervals, based on the **Snapshot Interval** set in **1750 Setup**. You can also capture snapshots manually using the **Take Snapshot** button on the Power Analyze toolbar in 1750 Live Mode, or using the wireless PDA with the Recorder. Snapshot data is saved in the Recorder and downloaded with the rest of recorded data.

When viewing at Snapshot screens in Power Analyze, two tools are available to move through the available snapshots:

- The **Slider bar** appears at the top of each Snapshot view.



Press and drag the slider bar to the point in time for which you want to see power conditions.

The snapshot data closest to this point in time is shown in the Snapshot view.

- The **Next/Previous buttons** ( < > ) appear at the top of the View controls.

Click these buttons to move to the next snapshot in either direction.

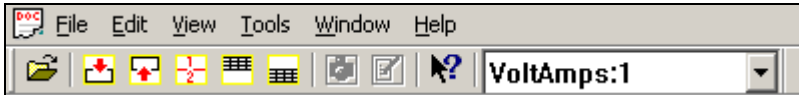
## Main Toolbar

The main toolbar in the Power Analyze window includes standard Windows tools and some specialized buttons for working with Fluke Power Analyze graphs. Figure 7 shows the Main Toolbar and Table 8 describes the contents of the toolbar.

Hide or show the toolbar by choosing **View >Toolbar**.

### Note







*The tools on the main toolbar all have a corresponding topic on a menu.*






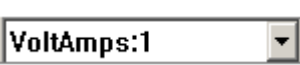
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Figure 7. Main Toolbar

Table 8. Main Toolbar Contents

Button	Description
	<b>Open.</b> Opens a recorded data file.
	<b>Top Full Screen View.</b> Expands the top graph to fill the graph window area.
	<b>Bottom Full Screen View.</b> Expands the lower graph to fill the graph window area.
	<b>Split Screen View.</b> Displays a reference graph on the top and a details graph in the bottom of the graph window area.
	<b>Top Table View.</b> Toggles the display of the data in the top reference graph from graph to table and then back.
	<b>Bottom Table View.</b> Toggles the display of the data in the bottom detail graph from graph to table and then back.

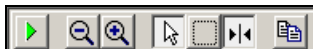
**Table 8. Main Toolbar Contents (cont.)**

Button	Description
	<b>Take Snapshot.</b> Takes a snapshot of the current power measurements. Available only in 1750 Live views.
	<b>Insert Annotation.</b> Inserts an annotation marker. Available only in 1750 Live views
	<b>Help.</b> Lets you get information about buttons on the screen and commands in the menus. Click the Help tool button and then the item you want information about. For information about the contents of the main graph area, click the Help button at the top of the Graph controls on the right side.
	<b>Window List.</b> Lets you switch between multiple windows in the same recorded data file.

## Graph Toolbars

When you view data on graphs, special toolbars are available to help you work with that data. Figure 8 shows a sample Graph Toolbar and Table 5 describes the contents of the toolbar.







The particular tools available vary depending on the contents of the graph. The screenshot below shows some of the tools that appear on graph toolbars, and more detailed information about specific features follows that.



**Figure 8. Graph Toolbar**

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Table 9. Graph Toolbar Contents

Button	Description
	<b>Zoom All the Way Out.</b> Zooms out to display the full graph. Active only after you have zoomed in on a portion of a graph.
	<b>Zoom Out.</b> Zooms out on the graph keeping the same graph center.
	<b>Zoom In.</b> Zooms in on the graph keeping the same graph center.
	<b>Select.</b> Lets you select annotation markers in graphs on the Volts/Amps/Hz view and the Events view. When you select this tool Zoom becomes inactive.
	<b>Guide.</b> Shows or Hides the guides on a graph.
	<b>Copy.</b> Copies the current graph to the Clipboard.

## Zooming In and Out On Graphs


Sometimes the amount of data shown on a graph makes it hard to clearly see the detail you need to analyze power quality data. When this is the case, you can zoom the graph to magnify your view of the data. A combination of zooming and scrolling can often be used to focus on the specific information you need.

Several zooming tools are available: the **Zoom Box** and **Zoom In/Zoom Out** buttons on the graph toolbar, and the **Zoom to Fit** command on the right-click menu (available when you point to either the horizontal or vertical axis).

To zoom in and out incrementally:

- In the graph toolbar, click  and .

To zoom in on a section of a graph with the Zoom box:

1. If it is not already active, click .
2. Draw over the section of the graph you want to see in more detail.

Fluke Power Analyze zooms in on the area you marked and centers it in the window.



The selection cursors on the Reference Graph shift to mark the new selection.

3. If the information you want is not quite centered, you can scroll the graph horizontally or vertically.

*Note*

*You can zoom in multiple times on an area of a graph. If the graph area appears blank, you may have zoomed outside the range of data.*

To zoom out

- If you want to zoom out incrementally, click .
- If you want to zoom back to 100 % size, click .

To use Zoom to Fit:

You can automatically zoom the available data to the size of the graph window by using **Zoom to Fit**.

You can Zoom to Fit based on either the Y-axis or the X-axis:

1. Right-click on the axis you want to resize.
2. Choose Zoom to Fit from the right-click menu.

The available data zooms to the size of the window, based on the axis where you right-clicked. If appropriate, the axis will adjust to match the range of data.

In the Harmonics and THD views, using **Zoom to Fit** on the x-axis of the Harmonics Spectrum graph will display all 50 harmonics in the graph window at once.

## Screen View Tools

When you first view recorded data, the views show two types of data in a split view format. Figure 9 shows a sample Screen View Tools and Table 10 describes the tools.

For most views, the data includes reference data, which gives a broad view of the recorded data, and detail data in the display's top half, which appears in the bottom half of the display.

Options on the left toolbar let you expand either set of data to fill the window.

### Note




*This feature also works when you are displaying as a table either the top or bottom set of data.*



Figure 9. Screen View Tools

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Table 10. Screen View Tools

Button	Description
	Click to see the top full screen view.
	Click to see the bottom full screen view.
	Click to see both graphs again.

## Viewing Data as a Table

In most recorded data views, you can view data in table format as well as in graph format. This is useful for studying results in the form of digital readings, or preparing tabular data for a report.

When you switch to the table display, the tables generated remain on the screen even as you change recorded data views, until you turn off the table display and switch back to graphs.




*Note*

*If you click the Tag for Report button when a table is in view, the portion of the table in view will be included in your next report. (For more information, see “Building a Report” later in this manual.) To print all of the data in the table, first export it to a spreadsheet.*

To toggle between graph and table views:

You can toggle between graph and table views for the top graph, the bottom graph, or both graphs.

- Click one of the Table tools  to display the upper or lower graph as a table.
- Click the Table tool again to return to the graph display shown in Figure 10.

	V RMS								
	L1N			L2N			L3N		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
27.10.2009 12:36:51.602	232.03	232.42	232.74	232.18	232.52	232.82	232.42	232.71	232.98
27.10.2009 12:36:59.882	232.03	232.42	232.74	232.18	232.52	232.82	232.42	232.71	232.98
27.10.2009 12:49:59.873	230.72	232.60	233.04	231.30	232.57	232.90	231.56	232.82	233.20
27.10.2009 12:59:59.930	231.95	232.85	234.19	232.07	232.64	234.22	232.29	232.88	234.48
27.10.2009 13:09:59.826	232.49	233.21	234.41	232.61	233.38	234.86	232.83	233.61	234.78
27.10.2009 13:19:59.968	232.73	233.10	233.33	232.75	233.12	233.41	232.89	233.31	233.62
27.10.2009 13:29:59.958	232.49	233.28	233.67	232.10	233.09	233.59	232.62	233.73	234.23
27.10.2009 13:39:59.936	233.01	233.52	233.80	232.13	232.93	233.68	233.48	233.85	234.17
27.10.2009 13:49:59.879	232.82	233.69	234.08	232.89	233.49	233.85	233.22	234.04	234.39
27.10.2009 13:59:59.893	233.14	233.54	234.44	232.07	232.77	234.44	233.40	233.90	235.04
27.10.2009 14:09:59.807	232.74	233.66	234.99	232.73	233.55	234.93	233.08	234.05	235.42
27.10.2009 14:19:59.846	232.82	233.37	233.88	232.87	233.32	233.74	233.30	233.72	234.06
27.10.2009 14:29:59.938	232.72	233.28	233.67	232.83	233.16	233.52	233.10	233.55	234.02
27.10.2009 14:39:59.871	232.62	232.96	233.37	232.69	233.03	233.47	232.93	233.41	233.67
27.10.2009 14:49:59.893	232.45	233.07	233.66	232.53	232.92	233.50	232.87	233.36	233.94
27.10.2009 14:59:59.871	232.60	233.16	233.58	232.52	233.03	233.45	232.90	233.56	234.03



bae027s.bmp

**Figure 10. Graph Display**

To sort the data in a table:

- When you view Events in a table, you can sort the tables by clicking the header for the column you want to sort by.

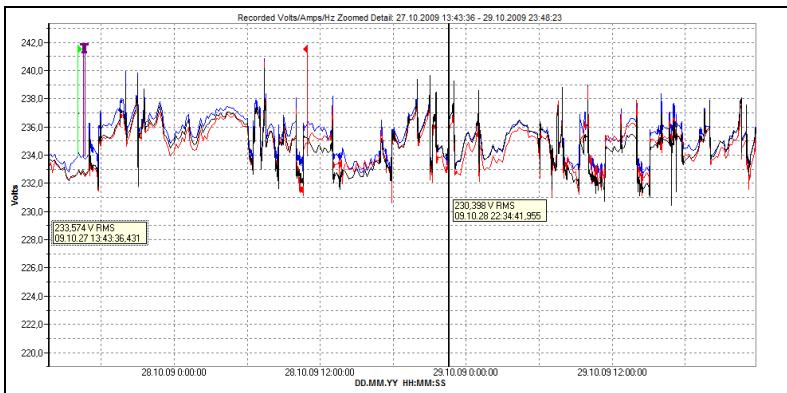
To maximize a table to full size:

- Click the Top Full View button or the Bottom Full View button ( ) , depending on which table you want to view full size.

## Working with Annotations

Annotations are optional markers that can be inserted by the Recorder operator to flag a particular point in the data when recording. They are usually inserted on using Power View with the wireless PDA. Figure 11 shows a sample Annotation View screen.

Annotations can be used to help select what data to download, and to provide additional information when reviewing recorded data in the Volts/Amps/Hz view.



bae063s.bmp

**Figure 11. Annotation View**

There are five types of annotations:

- Start annotation (green)

The Start annotation can be used to signify where important data begins. For example, the operator might want to establish a start annotation after having finished all probe connections and instrument setup, to indicate that any preceding data was preliminary.

### *Note*


*You are not limited to using the Start and Stop annotations in pairs, or to show a range of data. You can use each as many times as desired to mark a particular point during recording.*

- Stop annotation (red)


The Stop annotation can be used to signify where important data ends.

- File annotation (yellow)

File annotations contain the name of a picture or audio file relevant to the data. See “Using Image or Voice Annotations” later in this manual.

- Text annotation 

Text annotations contain a text note.

- Power Configuration Change annotation 

Power Configuration Change annotations are inserted by the system when a change is made to the Power Configuration in the Recorder. These markers only display in the Download dialog box.

To show or hide annotation markers

- In the Volts/Amps/Hz or Events view, check or uncheck the Annotations option on the view controls.

To open an annotation

- In the Volts/Amps/Hz view, Events view, or Download dialog box, click on the annotation.

If the annotation is associated with an audio (.WAV) or image (.jpg) file, the application associated with that file will start and open the file. If the file is not in the default directory *My Documents\PQ*, a dialog box opens so that you can navigate to the file.

*Note*

*If clicking on an annotation marker does not seem to do anything, the Zoom box is probably selected in the graph toolbar, instead of the Select tool. Click the Select tool and then select the annotation.*

To see overlapping annotations

Sometimes annotations are so close to each other that they actually overlap on the Volts/Amps/Hz reference graph. When this is the case, if you click on overlapping annotations, a menu opens and you can select either Open, to open the annotation now on top, or Select Next Overlapping Annotation, to bring the next one to the top.

- To open the annotation now on top, choose Open.
- To bring the next annotation to the top, choose Select Next Overlapping Annotation. To then open that annotation, click on it again and choose Open.

*Note*

*To see overlapping annotations more clearly on the Volts/Amps/Hz reference graph, move the selection cursors so that they just surround the area that contains the overlapping illustrations. The Detail graph adjusts as the cursors move, zooming in to show the area between the selection cursors. You can now see the annotations separately.*

## **Using Image or Voice Annotations**

While you are monitoring data with a Recorder, you may find it helpful to take a picture that relates to the power quality data you are recording, or to record verbal comments as you observe the conditions or review the data being measured. You can then associate the image or recording with the data being recorded by adding annotations that reference them.

The PDA includes a microphone for recording notes which are saved as .WAV files, and an optional camera accessory is available on the PDA which will capture images as .jpg files.


You can associate both images and audio files with the data being gathered in the Recorder by inserting annotations and specifying the name of a .WAV or .jpg file. After you download data from the Recorder, you can then move the image and audio files to the PC along with the recorded data (.odn) file.

*Note*

*You can also associate other types of files with the annotation. For example, if you had a .MPJ file with a movie, or a .DOC file with associated information. You can enter any file name using this annotation method.*

## **Inserting Image or Voice Annotations**

1. Set up the Recorder and begin monitoring.

2. Using your PDA-cam or another camera, take a picture of what you want to capture.
3. In Power Analyze, go to 1750 Live mode and click  to open the Annotate dialog box.

Or on your PDA, in Power View, click the Annotate icon to display the Annotate screen.

4. Select Insert File.
5. Browse to find the picture file (for example, IMG\_2435.jpg ) or audio file (for example, voice\_123.wav) and select it; then click Insert.

The file name you specified is inserted into the data and associated with the present date and time (and therefore, the present power measurements).

## **Managing Image and Voice Files**

If you are using the PDA, move the image or audio file to a location that will make it easier to Transfer it to a PC later, when you download and move the recorded data file to your PC. You can accomplish this in two ways:

- Place the file into the synchronization folder on your PDA, so that it will be automatically transferred into the sync folder on the PC the next time you dock the PDA.

You may find this approach useful if you download data using Power Analyze on your PC. After synching the files from your PDA, be sure to move the annotation files into the folder that contains your .odn files (by default, *My Documents\PQ*).

- Transfer the file onto an SD card for later transfer to your PC.

If you use the PDA to download data to an SD card, copying the audio or image files to the SD card may be the easiest method; then you can copy all associated files to your PC at once. Be sure to copy the files into the same folder that contains the downloaded .odn file.

## **Building a Report**

You can build a report by tagging specific data you see on the screen in the View Recorded and Snapshot modes. You can tag as many different views as

you want before creating the report. Power Analyze remembers what you have tagged until you exit the application, or until you generate a report. If you tag more than you need, it is easy to delete tagged items from the report later.

*Note*

*To make use of the reporting feature in Power Analyze, you must have Microsoft Word 2000 or later installed on your computer.*

To include data in a report

1. Get the screen to look just the way you want.

Power Analyze will capture the contents of the main area just as you see it. Use any of the tools — view controls, zoom features, split/full screen, and so forth — to adjust the display.

2. Click the Tag for Report button at the bottom of the view controls.
3. In the dialog box that displays, enter a heading to identify the data.

This heading will appear in your report. By default, Power Analyze inserts the name of the active view. You can change this heading to be more specific.

4. Click OK.
5. Continue working, tagging additional screens when you want to include them.

To create the report

1. When you are ready to create the report, choose **File>Report Writer**.

A dialog box lists the items you have tagged.

2. Enter a name for the report and click OK.

If you want to create the report in a particular location, before you click OK, click the Browse button, navigate to the appropriate folder, and click Open.

After you click OK, Microsoft Word opens, displaying the screens you tagged. In addition, details about the data are included, such as what channels and phases are displayed, and other criteria selected with the View controls.

*Note*

*To append to an existing report, click Browse and select the report file to which you want to append. The new data you have tagged will be added to the end of the existing report file. (The existing report file must be closed when you select it; it cannot already be open.*

3. You can add additional information to the Word document, to customize your report.



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