FLUKE®

1760

Power Quality Recorder

Getting Started Manual

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1760 Power Quality Recorder

Introduction

This Getting Started Manual for the Fluke 1760 Power Quality Recorder, referred to throughout simply as “the Recorder”, will allow you to set up and begin various power quality measurements. The guide is an abbreviated version of the User Manual and other materials included on the CD-ROM shipped with the Recorder.

Safety Information

Please read this section carefully for important safety information when using the Recorder. In this manual a **Warning** identifies conditions and actions that pose hazard(s) to the user. A **Caution** identifies conditions and actions that may damage the Recorder.

General Safety Instructions

The design and manufacture of this device conform to the latest state of technology and the safety standards laid down in IEC 61010-1 2nd edition. If used improperly, there is a risk of injury to persons and damage of the property.

Protection Class

The device is assigned to Protection Class I according to IEC 61140 and is equipped with a protective earth ground connector.

Symbols

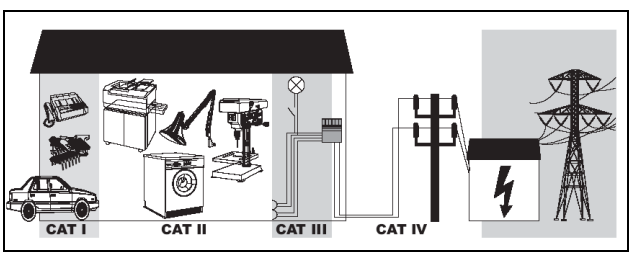
Table 1 describes Warning and Caution symbols used in this manual and/or the Recorder.

Table 1. Symbols

Symbol	Description
	Important information. See manual
	Hazardous voltage
CE	Conforms to requirements of European Union

Identifications

Figure 1 identifies different measurement categories (CAT).



emv01.wmf

Figure 1. CAT Identifications

Qualified Personnel

Adequate qualifications are the following:

- Training and authorization to switch on/off, earth ground, and mark power distribution circuits and devices in accordance with the safety standards of electrical engineering
- Training or instruction in accordance with the standards of the safety engineering in the maintenance and use of appropriate safety equipment
- Training in first aid

Safe Operation

For safe operation of the instrument:

- Ensure that all persons using the device have read and fully understood the operating manual and safety instructions
- The device may only be used under certain ambient conditions. Ensure that actual conditions conform to the admissible conditions outlined in the "Technical Data" chapter of the Users Manual

- During operation, ensure the free circulation of air around the instrument to prevent heat accumulation inside the housing
- Refer to and comply with instructions in Users Manual chapter "Transport and Storage" before packing and transporting the Recorder

Note

Do not use the device for any other purpose than the measuring of voltages and currents that are within the specified ranges and categories, including voltage to earth ground. Refer to the Users Manual for detailed specifications.

Improper use shall void all warranties.

Electrical Connections

- Ensure that the protective earth ground connectors for both the power lead and the housing earth ground are connected according to the instructions for the low-resistance unit earth cable
- Ensure that the power and connecting cables, as well as all accessories used in conjunction with the device, are clean and in proper working order
- Install the Recorder so that its power cable is accessible at all times and can easily be disconnected. If this is not possible, a two-pole circuit breaker with a nominal current (mentioned in the documentation following), must be installed in the power supply lines
- For hazardous voltage connection work, do not work alone. Work in teams of at least two persons
- Do not use the device if the housing or an operating element is damaged

Permitted Accessories

- Use only the accessories supplied with the Recorder or optional equipment specific to your model
- Ensure that any third-party accessories used with the Recorder conform to IEC 61010-031/-2-032 standard and are suitable for the respective measuring voltage range

Risks during Recorder Operation

- Ensure that the connected devices work properly

- Measurement sensors must not be connected to the unused circuits
- Ensure that connectors with locking mechanism are firmly locked

Device Shut Down

- Immediately disconnect the unit from the power supply if you detect any damage to the housing, controls, power cable, connecting leads or connected devices
- If in doubt regarding the safe operation of the Recorder, immediately shut down the unit and the respective accessories, secure them against inadvertent power-on and contact an authorized service agent

Safety Warnings on Device Housing

The mains connection must conform to the following ranges/values:

emv02.wmf

Figure 2. Instrument Label

emv03.bmp

Figure 3. Battery Label

⚠ ⚠ Warning

Connect the supply cable of the device only to sections CAT I, II or III of the supply system (For details refer to *Identifications* section) and the voltage to earth should not exceed 300 V.

Input Voltage – Measuring Inputs

The measurement category (refer to the “Identifications” section) and the maximum voltage to earth ground from the sensors must conform to the power supply system. Refer to “Inscription” and “Technical Specifications” section.

Protection

IP50

Preparing to Use the Recorder

Before you use the Recorder, carefully inspect the packaging and contents to ensure that there is no damage.

Note

Depending on the configuration you ordered, Flexi-Set probes and voltage sensors may not be part of the standard equipment. An internal transient capture option (factory installed only) is another configuration that is determined at time of order.

Verify the shipment is complete using the following list:

- Fluke 1760 Power Quality Analyzer
- Carrying Bag
- Flexi-Set probes and voltage sensors
- 1 standard power cord, with set of country-specific power plugs
- Getting Started Manual
- CD-ROM with application software, manuals, data sheets, and sample data
- 1 crossover Ethernet cable for direct-PC connection (grey cable with red RJ45 plugs)
- 1 Ethernet cable for network connection (grey cable)
- 1 null-modem RS232 connection cable (red cable)

Using the Recorder

The Recorder measures variables in power quality; you analyze the recorded data using PQ Analyze software, included on the CD-ROM. This manual will guide you through installing the software, connecting a Recorder to a network, and beginning data analysis.

System Requirements

Table 2 displays minimum PC or laptop system requirements for installing the PQ Analyze software.

Table 2. System Requirements

System	Requirement
PC/Laptop	Windows ® Operating System
Processor	Pentium > 500 MHz
RAM	> 256MB
Hard disk	Minimum free space: 512MB
Operating system	Microsoft Windows® 2000/XP/NT 4.0
Network	Ethernet IEEE 802.3x 10Base
Other drives	CD-ROM

Note

Install the software on a laptop or stationary PC. You can analyze the measurement data using a remote PC; however, for the Recorder's configuration and the LIVE mode use, a direct connect connection is required.!

Software Installation

To install the PQ Analyze software for use with the Recorder:

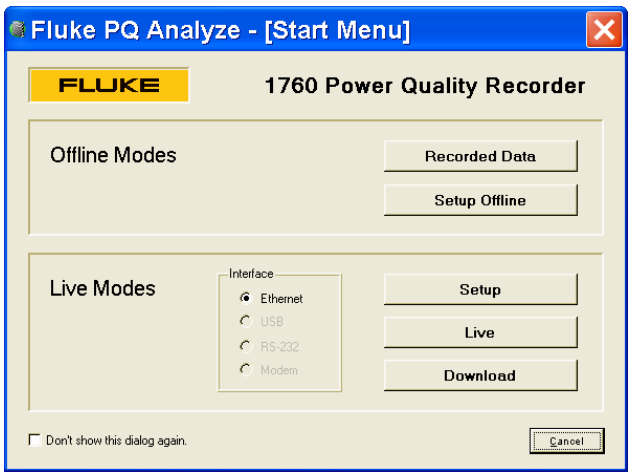
Insert the supplied installation CD in the CD-ROM drive of your PC or laptop. If your CD-ROM drive is configured for Auto run, software installation will start automatically.

If the CD-ROM drive is not configured for Auto run, start the installation program by double-clicking **launch.exe** in the MS Explorer® window.

1. Install PQ Analyze Software.
2. Follow the instructions on the screen to install the software.
3. Restart the PC or laptop before using the software with the Recorder.

Start Menu Options

Start Menu settings are shown in Figure 4.



emv16a.bmp

Figure 4. Start Menu

Offline Mode Options

Recorded Data	Analyze recorded measurement data
Setup Offline	Configure a Recorder offline

Live Mode Options

Setup	Configure the network interface and connect to a Recorder
Live	Live mode for measurements and verification of settings
Download	Download recorded data from the Recorder to the PC or laptop

Network Connection

Installing one or more Recorders in the network allows you to call up the measurement data from your local workstation or from an external destination via the network.

Note

Placing a Recorder on a local area network (LAN) assumes dynamic IP address assignment. If your LAN requires static IP addresses, please contact your system administrator for rights, and see the User Manual for more details.

To connect the instrument to the network:

1. Connect the Recorder to a network hub or port (using the grey Ethernet cable), and switch on.

Ensure the PC or laptop has a connection to the network.

2. On the PC or laptop launch PQ Analyze and open menu **Transfer>Fluke 1760>Search Devices**.
3. Select the appropriate network from the list box.
4. Click on **Search**.
5. Select a Fluke 1760 Power Quality Recorder that is shown in the list and click on **Connect**.
6. When the LED next to the Ethernet connector on the Recorder is flashing green, you have successfully connected the Recorder to the network.

Note

On some networks, security features hide devices such as the Recorder from searching and detecting automatically. This is normal. In such networks, contact your IT administrator and use the hard-coding of IP address procedure in the Reference Manual.

Note

Use the Live mode to download the measuring data of the instrument on demand.

Alternatively, you may connect the Recorder directly to the PC or laptop with the supplied crossover Ethernet cable (grey cable with red connectors) Live Mode. Direct connection using the crossover cable is required for initial Recorder configuration.

Connect to Circuits for Measurement

⚠ ⚠ Warning

By connecting the Recorder to live circuits, the terminals and certain parts inside the device are live. Utilization of leads and accessories that do not meet relevant safety standards could lead to serious injury or death from electric shock.

- **To ensure safe operation, first connect the device to protective earth ground, and then to the power supply.**

- **Open the circuit before establishing a connection to the Recorder. Prior to connecting the circuits, ensure that the maximum measuring voltage and the maximum voltage to earth ground do not exceed the printed voltage level on the voltage sensor and the category of distribution system corresponds with the inscription of the sensor or meets the country specific standard.**

⚠ ⚠ Warning

- **Wear electrician protective gloves, switch off conductors, and ensure that the potential is zero**
- **Use the Flexi Set only at 600 V rms or dc to ground and frequencies below 1 kHz**
- **Use the clamps only on insulated conductors**

Connect the voltage and Flexi Set current sensors according to Figure 5.

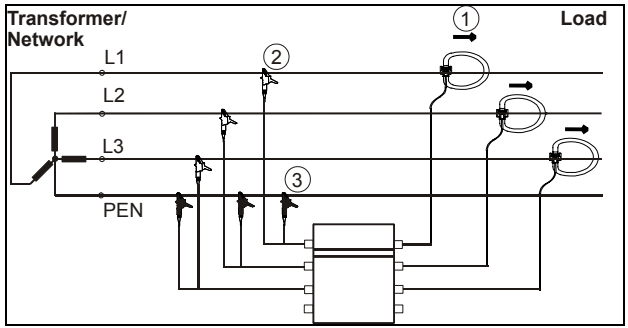


Figure 5. Circuit Diagram

Table 3 shows symbols used in the circuit diagram.

Table 3. Symbols of the Circuit Diagram

No.	Symbol	Description
①	→	Connect the Flexi Set in the right direction The arrow on the Flexi Set must show from the network to the load
②		Red connector
③		Black connector

Note

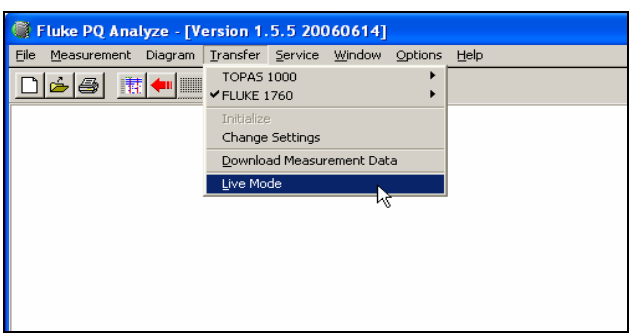
Find more circuit diagram examples in the User Manual or CD that shipped with the Recorder.

⚠ ⚠ Warning

During operation, ensure the free circulation of air around the Recorder to prevent heat accumulation inside its housing.

Check the Data - Live Mode

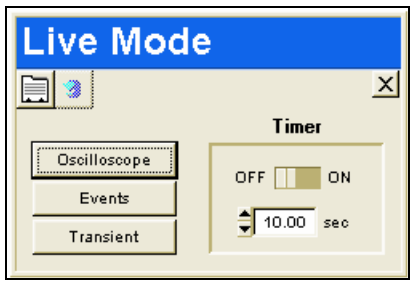
To check the data in Live mode:



emv23.bmp

Figure 6. Live Mode

1. Start the Live mode in the software with the menu **Transfer>Live Mode.**



emv24.bmp

Figure 7. Live Mode Settings

Note

Use the Live mode for the initial functional check of the Recorder. Live mode allows you to test the measuring configuration and assess the received signals.

In Live mode, you can call up partial results at any time without interfering with the current measurement. A measurement session must be initialized in order to make the Live mode work.

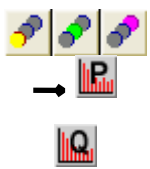
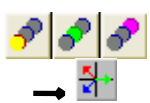
2. Make the settings ① and ③ as described in Figure 7 and Table 4.

Table 4. Live Mode Symbols

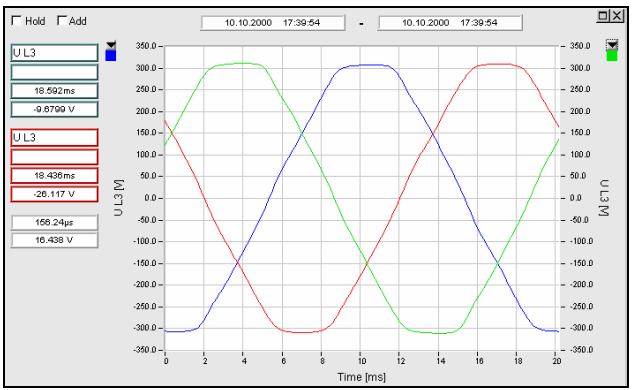
No.	Symbol	Description
①		Activate or deactivate the sensors and set the number of measuring points
③		± View the running events

3. Choose a measurement setting as described in Table 5.

Table 5. Measuring Analysis

No.	Symbol	Description	
②		Setting	Meaning
			Wave shapes
			Voltage, current and power spectrum
			Spectrum for power values
			Vector diagrams for voltage, current
			Vector diagrams for apparent power
			Measurement tables

4. The Live mode is running properly if you get an analysis diagram. See Figure 8.



emv37.bmp

Figure 8. Analysis Diagram

Preparing for Long-Term Measurements

To prepare the Recorder for long-term measurement:

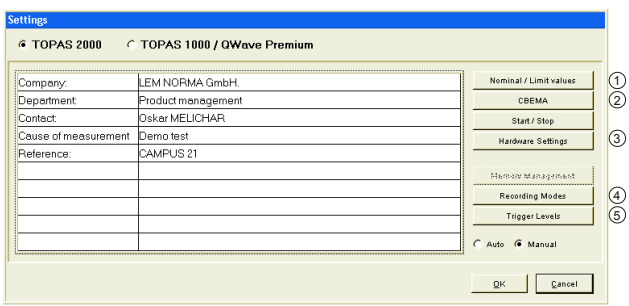
1. Connect the voltage and current sensors to the Recorder and to the electricity supply network as described in the "Connect to Circuits for Measurement" section.
2. Establish a connection between the laptop and the Recorder as described in the "Connect the Recorder to the Network" section.

Configuring the Recording Settings

To configure the recording settings:

1. Launch the **PQ Analyze** application on the PC or laptop.
2. Select the menu **File>New**.

Configure recording using the **Settings** window as shown in Figure 9.



emv17.wmf

Figure 9. Recording Settings

Table 6 shows Settings symbols and their descriptions.

Table 6. Measuring Recording Settings Symbols and Descriptions

No.	Symbol	Description
①	Nominal / Limit values	Adjust the nominal and limit values
②	CBEMA	Adjust the permissible tolerances for the evaluation of events according to CBEMA or ANSI
③	Hardware Settings	Adjust the measurement system, the sensor type and their ranges and scaling factors for each channel
④	Recording Modes	Adjust the recording times, pre-triggers, and hold-off times to the next recording for the virtual measuring instruments
⑤	Trigger Levels	Configure the trigger

Note

Trigger settings help you to minimize the memory space taken up by data recording.

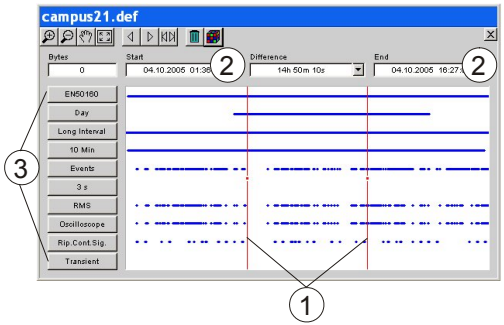
3. Confirm your setting with **OK**.
4. Click **Initialize** to start long-term measurement.
5. Enter a file name and save the settings.
6. Wait 2 minutes; the Recording status LED blinks rapidly to indicate initialization of file settings.
7. After the window “The measuring was initialized” appears and the Recording status LED begins to blink slowly, measurement recording starts.

Analyzing the Recorded Data

Event Analysis

To analyze the recorded data:

1. Start a measuring process as described in “Preparing for Long-Term Measurements” section.
2. When the measuring process is finished, start the software on your PC, and select **File>Open,** then select the ***.def** file.



emv38.wmf

Figure 10. Selecting a Period for Analysis

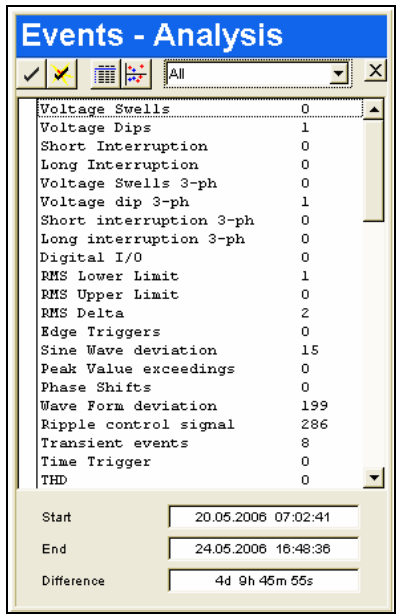
3. Select the period you would like to analyze by clicking on and dragging the red vertical lines ①.

Table 7. Analysis Possibilities

No.	Symbol	Description
③	EN50160	All parameters required by European power quality standards are measured and monitored against pre-defined limit values
	Day	Measurements recorded at intervals of 1 day
	Free Interval	Files whose measurements were recorded during user-defined intervals
	10 Min	Measurements recorded at intervals of 10 minutes
	Events	Permanent recorded values outside range defined by the limit values; recorded for all trigger events

	3 s	Measurements of the harmonics/THD/TID of voltages and currents are recorded at intervals of 3 seconds. Data is generated if a set trigger event occurred
	RMS	RMS shows user-defined averaging times
	Oscilloscope	Shows sample values if a trigger was set
	Ripple contr. sig	Shows recorded ripple control signals if a trigger was set
	Transients	Shows recording of measurements with sampling frequency of between 100 kHz and 10 MHz (if Transients box in Transient Trigger window selected)

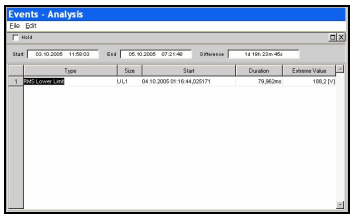
4. Click on **Events** button.
5. Click .



emv49.bmp

Figure 11. Event Overview

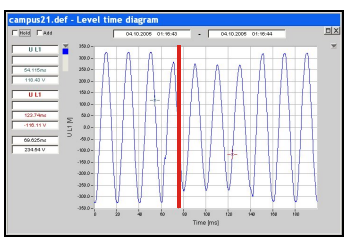
6. The right side column displays the number of events. Double-click on an event for details



emv50.wmf

Figure 12. Event Details

7. The right side column displays the number of events. Double-click on an event for details.



emv51.wmf

Figure 13. Event Diagram

8. The red line highlights the selected event.

Creating a Measurement Report

You can create an exportable report for reference or to present to a customer or audience.

To write a measurement report:

1. Start a measurement as described in the *"Preparing Long-Term Measurements"* section.
2. When the measurement process is finished, open the software on your PC.
3. Prepare the export settings in the menu **Options>Export Options**.
4. Click .
5. Use the icon to set up special parameters for the data report.
6. Export the Excel file into a Word document by clicking the icon.