FLUKE®

1760

Power Quality Recorder

Getting Started Manual

PN 2713103
June 2006 Rev 2, 7/10
© 2006-2010 Fluke Corporation. All rights reserved. Specifications are subject to change without notice.
All product names are trademarks of their respective companies.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is two years and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.
Fluke authorized resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Fluke. Warranty support is available only if product is purchased through a Fluke authorized sales outlet or Buyer has paid the applicable international price. Fluke reserves the right to invoice Buyer for importation costs of repair/replacement parts when product purchased in one country is submitted for repair in another country.
Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.
To obtain warranty service, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the problem, with postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including overvoltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer, transportation prepaid, and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).
THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FLUKE SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY.
Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
U.S.A.

Fluke Europe B.V.
P.O. Box 1186
5602 BD Eindhoven
The Netherlands

11/99

To register your product online, visit register.fluke.com.

Table of Contents

Title **Page**

Introduction 1
Safety Information 1
- Safety Instructions 1
- Protection Class 1
- Symbols 2
- CAT Identification 3
- Qualified Personnel 3
- Safe Operation 3
- Electrical Connections 4
- Safety Instructions 4
- Accessories 6
- Risks During Operation 6
- Device Shutdown 6
- Safety Instructions on Device Housing 6
- Input Voltage – Measuring Inputs 7
- Protection 7

Preparing to Use the Recorder 7
Using the Recorder 8
PQ Analyze Quick Installation 9
Running PQ Analyze 10
Working with Demo Data 11
Communicating with the Recorder 14
Displaying Measurement Data 18
Next Steps 20

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. It will familiarize you with important safety instructions for handling your 1760 Power Quality 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.

Safety Instructions

The design and manufacture of the device conform to the latest state of technology and the safety standards laid down in EN/IEC 61010-1:2001 (2nd ed.). If used improperly, there is a risk of injury to persons and damage of property.

Protection Class

This device is assigned to protection class I according to IEC 61140 and is equipped with a protective earth connector.

Symbols

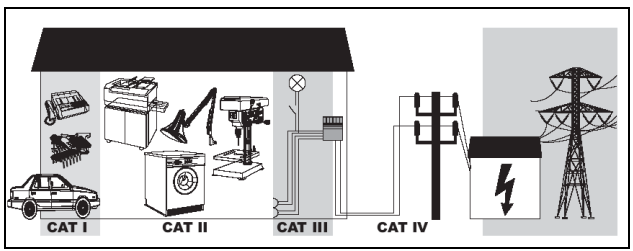
Table 1 shows the symbols used on the instrument and/or in this manual.

Table 1. Symbols

Symbol	Description
	Hazardous voltage. Risk of electric shock.
	Important information. See manual.
	Do not apply around or remove from HAZARDOUS LIVE conductors.
	Earth ground.
	Double insulation.
	AC (Alternating Current)
	DC (Direct Current).
	Conforms to requirements of European Union.
	Canadian Standards Association is the certified body used for testing compliance to safety standards.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	Conforms to relevant Australian Standards.
CAT II	IEC Overvoltage Category/Measurement Category II equipment is designed to be protected against transients from socket outlets and similar points.
CAT III	IEC Overvoltage Category III equipment is designed to protect against transients in installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
CAT IV	IEC Overvoltage Category 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.

CAT Identification

Figure 1 shows an example to identify the locations of different measurement categories (CAT).



emv01.wmf

Figure 1. CAT

Qualified Personnel

Adequate qualifications are the following:

- Trained and authorized to switch on/off, ground (earth) and mark the 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 maintenance and use of appropriate safety equipment
- Training in first aid.

Safe Operation

For safe operation of the Recorder:

- 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 the operation, ensure that the circulation of air around the instrument is possible in order to prevent the accumulation of heat 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 warranty.

Electrical Connections

Ensure that the protective earth connector of the power lead and the housing earth connector are connected according to the instructions to 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 in proper working order and clean.

Install the device in such a way that its power cable is accessible at all times and can easily be disconnected. If this is not applicable a two pole circuit breaker with a nominal current must be installed in the power supply lines.

For connection work, do not work on your own but in teams of at least two persons.

Do not use the device if the housing or an operating element is damaged.

Safety Instructions

⚠⚠ 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 avoid electric shock or personal injury:

- **The Power Recorder must only be used and handled by qualified personnel.**
- **Maintenance work must be done only by qualified service personnel.**
- **First connect the device to protective earth ground and to the power supply by using the mains plug.**
- **Use only specified voltage and current probes. If you use flexible current probes, wear suitable protective gloves or work on de-energized conductors.**
- **Protect the Recorder against wetness and humidity.**

- **Do not hold the Current Clamp anywhere beyond the tactile barrier.**
- **To prevent electrical shock, always connect current probe test leads to the Recorder before connecting to the load.**
- **To avoid electrical shock, do not connect the voltage measuring or power supply input to systems with higher voltages to ground (earth) than is marked on the Recorder.**
- **To avoid damage to the Recorder, never connect the voltage measuring inputs to phase-to-phase voltages higher than defined on the voltage sensors.**
- **Prior to connecting the circuits, ensure that the maximum measuring voltage and the maximum voltage to earth ground do not exceed the listed voltage level on the voltage sensor and the category of distribution system corresponds with the inscription of the sensor or meets the country-specific standards.**
- **Use only the provided original or specified accessories.**
- **Use these accessories only in the specified overvoltage category areas.**
- **Current transformers and/or Flexi-probes should not be applied or removed from HAZARDOUS LIVE conductors without using high-voltage protection gloves.**
- **The power company side of the revenue power meter is considered a CAT IV area. To avoid electrical shock or damage to the equipment, never supply the Recorder from the power in this area.**
- **Use the flexible current probes only at 600 V rms/1000 V rms depending on installation category or dc to ground.**
- **Use the clamps only on insulated conductors, max. 600 V rms or dc to ground.**
- **Additional personal protective measures as required by local government agencies must be taken if the measuring sensors are installed on live conductors.**
- **Avoid connection from multiple channels to the same phase.**

Accessories

Only use the accessories supplied with the device or specifically available as optional equipment for your model.

Ensure that any third-party accessories used in conjunction with the device conform to IEC 61010-031/-2-032 standard and are suitable for respective measuring voltage range.

Risks During Operation

Ensure that the connected devices work properly.

Measurement sensors must not be connected to unfused circuits.

Connectors with locking mechanism have to be locked firmly.

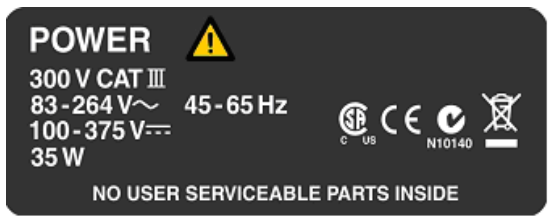
Device Shutdown

If you detect any damage to the housing, controls, power cable, connecting leads or connected devices, immediately disconnect the measuring inputs of the unit and then from the power supply.

If you are in doubt as regards the safe operation of the device, immediately shutdown the unit and the respective accessories, secure them against inadvertent switching on and bring them to an authorized service agent.

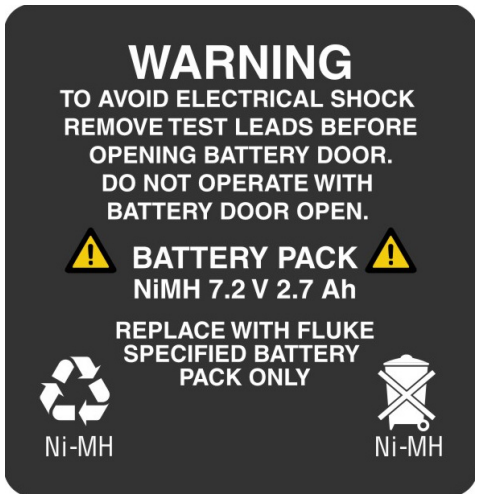
Safety Instructions on Device Housing

The mains connection must conform to the ranges/values as inscribed on the instrument labels.



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 the *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

IP40

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, flexible current 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.

Before commencing work with the device, check the delivery to ensure that it is complete, using the following list and the delivery specifications.

Fluke 1760 Basic models (including Basic TR):

- 1 Power Quality Recorder Instrument
- Carrying bag
- 1 power cord for mains connection
- 1 main connection adapter set
- Getting Started Manual
- CD-ROM with PQ Analyze application software, manuals, data sheets, and demo 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)

Other Fluke 1760 models (including INTL, US models and TR versions):

- Voltage sensors and flexible current sensors
- GPS time sync receiver

Using the Recorder

The Recorder measures variables in power quality; the recorded data is analyzed 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.

PQ Analyze Quick Installation

Insert the PQ Analyze CD into your CD-ROM drive of your Windows PC (for system requirements, see *1760 Reference Manual*). If the launch application does not start automatically, execute "launch.exe" from the CD.

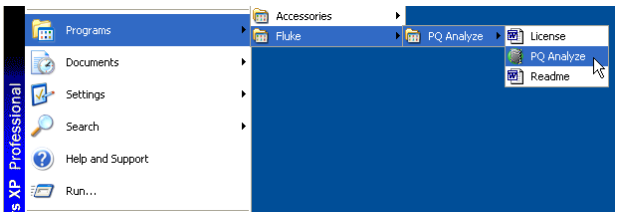
Select "Install PQ Analyze Software" from the CD-ROM menu and follow the instructions for the installation process.



emv04.jpg

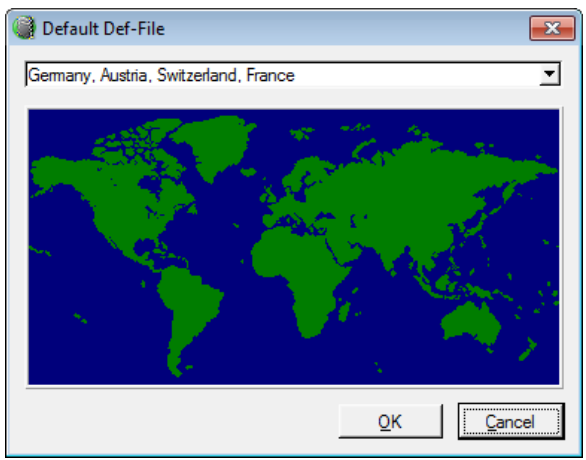
Running PQ Analyze

After the software is installed, start PQ Analyze from the Start menu.



emv05.bmp

The first time you run PQ Analyze you are prompted to select your "Default Def-File". This is a configuration template with region-specific default values. Select the region most appropriate to your location. You can change this at any time later using the "Options>Default Def-File" menu.

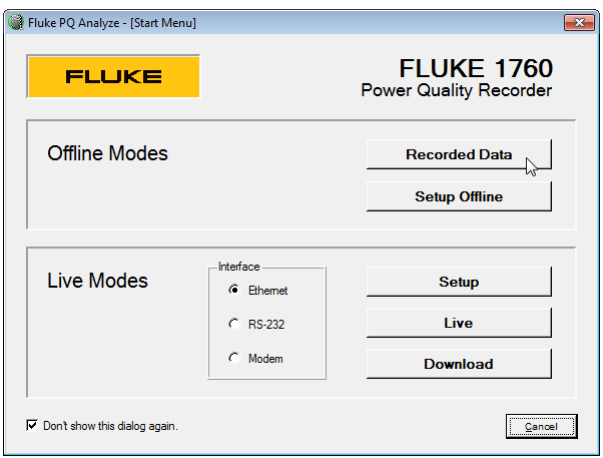


2.bmp

Working with Demo Data

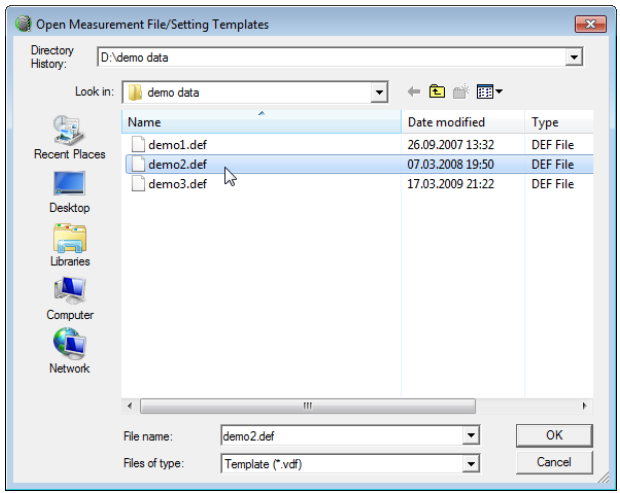
Before connecting the Recorder and downloading real data, familiarize yourself with the basic concepts of the software by testing some of the features with the demo data supplied on the CD-ROM.

In the Start Menu press "Recorded Data" in the "Offline Modes" section (to display the Start Menu select "File>FLUKE 1760 Start Menu").



emv06.bmp

Navigate to the PQ Analyze CD-ROM and select one of the stored measurements in the "demo data" folder.

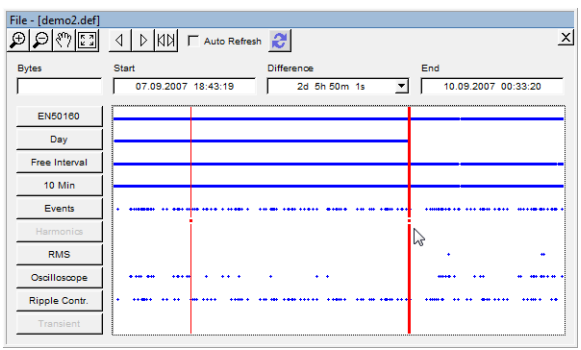


emv07.bmp

The main analysis window is shown next. It is the starting point for all measurement analysis tasks. It shows the "virtual instruments" on the left side and the ranges of available measurement data as blue bars.

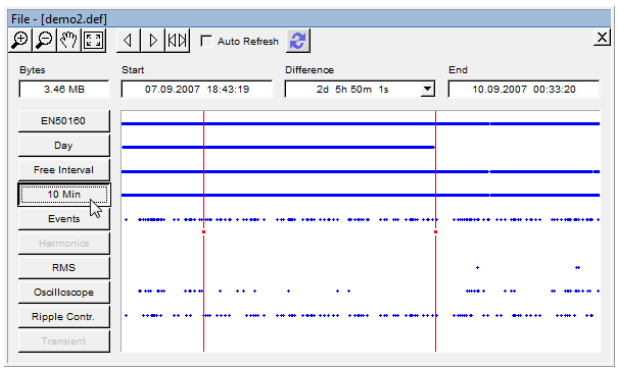
To display any type of data, follow a simple 6 step select process:

1. Select the time range by dragging the cursor marks with the mouse.



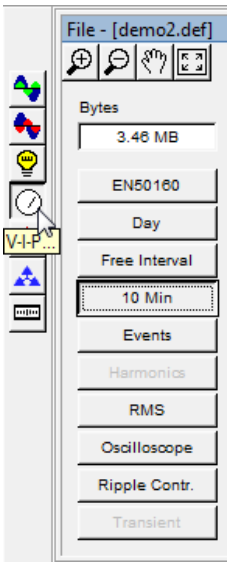
Emv08.bmp

2. Select the "virtual instrument" on the left side.



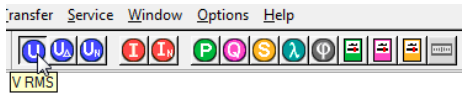
Emv09.bmp

3. Select the parameter group (group of related measurement parameters).



emv10.bmp

4. Select the measurement parameter.



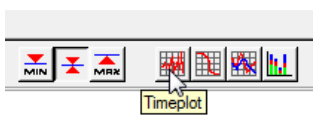
11.bmp

5. Select Minimum, Mean, or Maximum values.



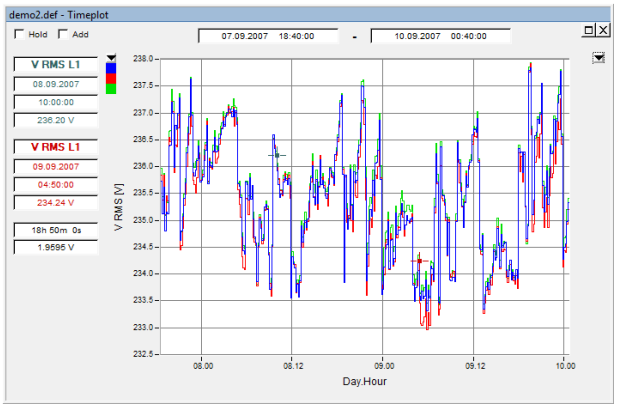
12.bmp

6. Select your analysis function.



13.bmp

The result is displayed in a new window.



emv30.bmp

Try the checkboxes "hold" and "add" to make your analysis persistent and mix and match different parameters in one window.

With a few exceptions, this basic procedure applies to all data analysis tasks. Depending on the virtual instrument, different selections and functions are available.

Communicating with the Recorder

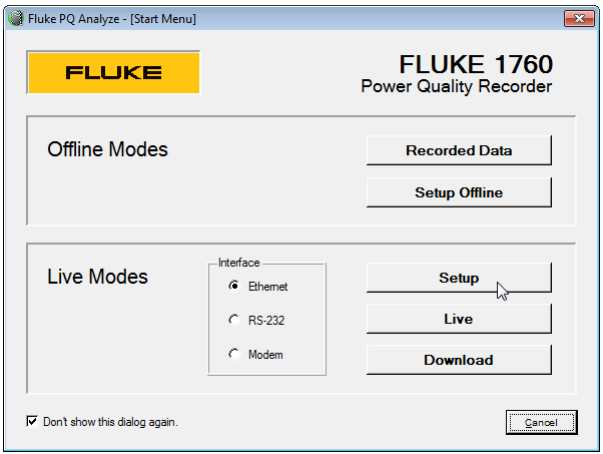
Once familiar with the basic concept of data analysis, try connecting to the Recorder.

Supply the Recorder with mains power, switch it on, connect a voltage sensor to channel 1 and connect the network interface to your PC using the Ethernet cable for direct connection (RJ45 crossover cable with red plugs).



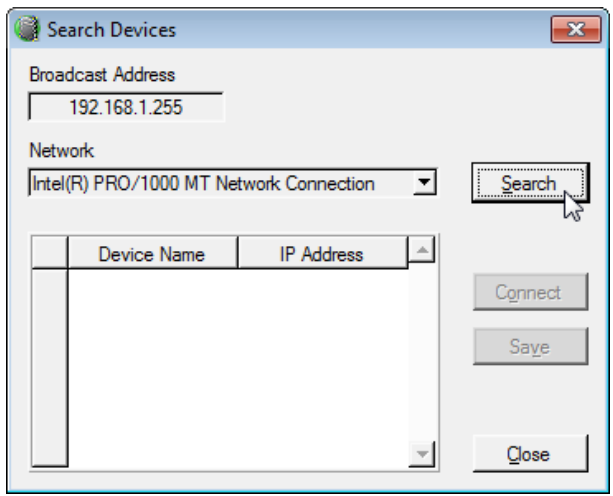
15.bmp

Select menu "File>FLUKE 1760 Start Menu" and press "Setup" in the "Live Modes" section.



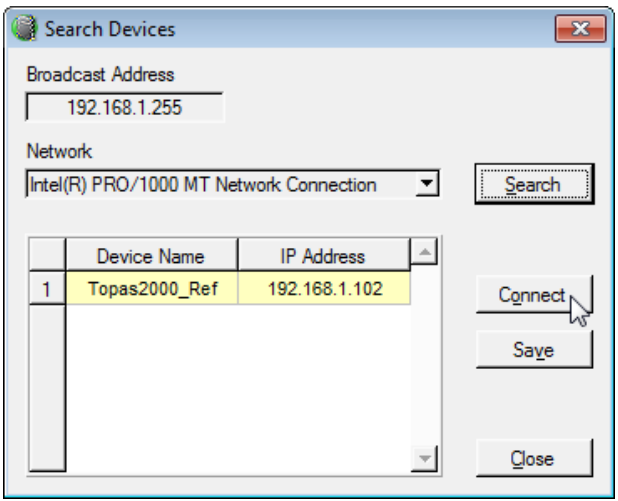
emv31.bmp

If you have more than one network interface installed on your computer, then select the proper one from the “Network” dropdown list. In the "Search Devices" dialog press "Search".



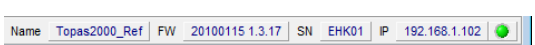
17.bmp

The list will show only one entry (your connected Recorder). Press "Connect".



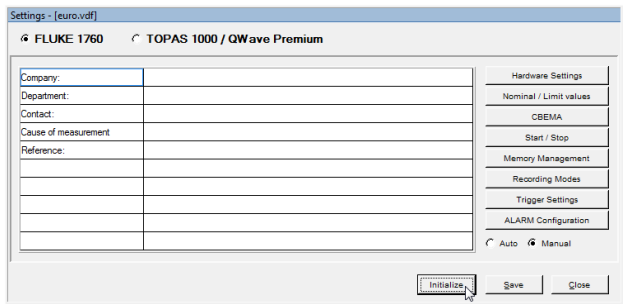
18.bmp

You are now connected to the Recorder. Check the connection status of the Recorder in the bottom right corner of the PQ Analyze window.



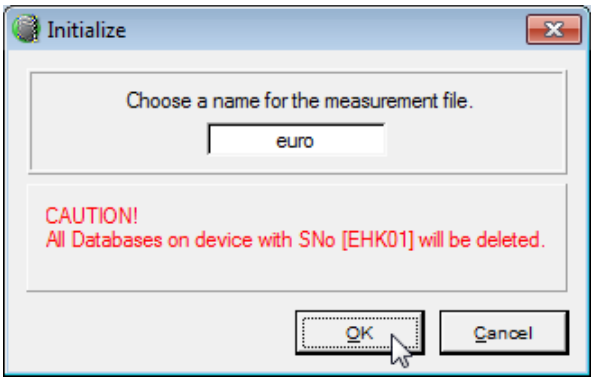
emv32.bmp

The next window is the main settings panel. This is the starting point for all Recorder configurations. Accept the default values for now and press "Initialize".



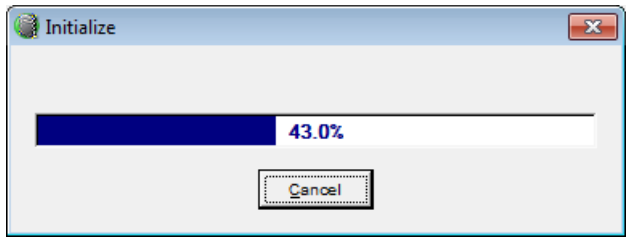
emv33.bmp

Choose a name or accept the default one. Press OK.



20.bmp

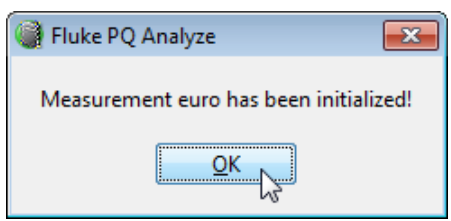
Wait while the measurement is initialized.



21.bmp

Press “OK” and watch the “RECORDING STATUS” LED on the instrument. It should start flashing slowly indicating the active measurement.

Close the “Settings” window.

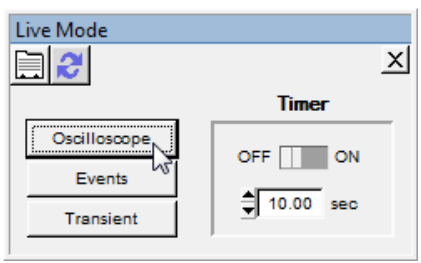


22.bmp

The measurement campaign is now started.

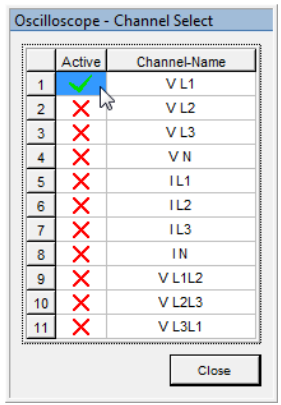
Displaying Measurement Data

Now that the connection has been successfully established, and the measurement campaign has been started, continue with reading some measurement data. The best way for having a quick look at the signals supplied to the Recorder inputs is the "Live Mode". Select the menu “Transfer > Live Mode” and then press “Oscilloscope”.



24.bmp

Select channel 1 and press the “Timeplot” icon.

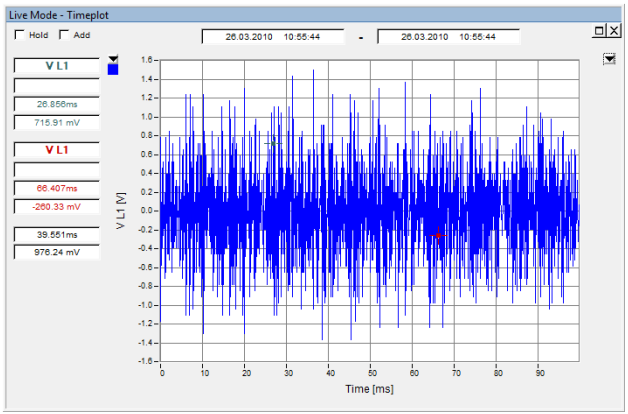


25.bmp



55.bmp

If everything works correctly you will see noise from the open inputs of the voltage sensor.

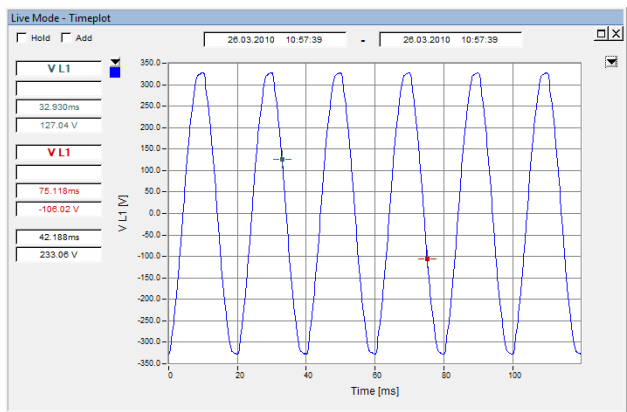


27.bmp

If the test leads are connected to mains voltage you will see something similar to the waveform below.

Note

Please follow safety instructions when connecting measuring circuits (see "Safety Information").

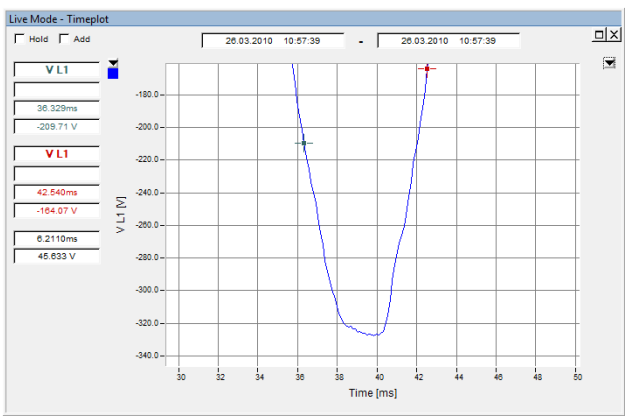


28.bmp

Try the "Zoom" tool to inspect the waveform a little closer.



56.bmp



29.bmp

Next Steps

This explained the basic concepts used with Fluke 1760 / PQ Analyze. You now have verified that your Recorder is working properly and you should also have the necessary knowledge to explore some of the more sophisticated features.

You can also:

- Download measurement data from the Recorder to your PC.
- Check / change the basic instrument settings (time and time zone, device name).
- Connect the instrument to a local area network (LAN).
- Explore the various measurement configuration possibilities.
- Create comprehensive reports.

There is a lot more to discover in PQ Analyze. Please refer to the respective sections in the documentation on the CD-ROM.