

Energy Analyze Plus

[Online Help](#)

Fluke Corporation
Fluke Energy Analyze Plus Software
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Introduction

Fluke Energy Analyze Plus (FEA+) is the PC software that supports the Fluke family of Energy/Power Loggers and Power Quality Loggers (referred to as the Logger in this document). The software is compatible with Windows® 8.1 and Windows 10.

With Fluke Energy Analyze Plus, you can:

- [Download](#) the results from a logging session for further processing and archiving.
- Analyze energy or load profiles, including zoom-in and zoom-out on details.
- Add comments, pictures, and other supplementary information to data.
- Overlay data from different logging sessions to identify and document changes.
- Create a report from the analysis you have done.
- Export measurement results for further processing with a third party tool.

This manual has instructions for the installation and how to use the software, as well as how to connect to a Logger. This manual also explains how to open, view, export, and create reports.

The most up-to-date information about Energy Analyze Plus is available from www.fluke.com.

How to Contact Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: www.fluke.com

To register your product, view, print, or download the latest manual or manual supplement, go to our website.

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Requirements

- Free Hard Disk space minimum 300 MB, >100 GB (for measurement data) recommended. Additionally, Energy Analyze can use up to 3 % of the disk size for internal logs. Internal log data is not shared with Fluke or any third party unless allowed by the user.
- Installed Memory:
 - 2 GB minimum, >2 GB recommended for 32-bit systems
 - ≥8 GB recommended for 64-bit systems
- Monitor, 1280 x 1024 (@4:3) or 1440 x 900 (@16:10), wide-screen (16:10) or higher resolution recommended
- Ethernet, WiFi, or USB ports

- Windows 8.1 32/64-bit, Windows 10 32/64-bit.

FEA+ performance improves on systems with SSD data storage. For future updates, Fluke recommends systems based on CPUs that support the SSE4/BMI2 instruction set.

Note

Windows 7 Starter edition and Windows 8 RT are not supported. Energy Analyze Plus also works on Windows Vista and Windows 7 systems but is not specifically tested because manufacturer support has been discontinued.

Installation

1. Download the latest version of Fluke Energy Analyze from <https://www.fluke.com/en-us/support>
2. Run **FEA_Vx.xx_Install.exe** and follow the on-screen instructions.
3. Accept the Fluke Energy Analyze Plus License Agreement to install this software. The agreement text will be presented in the language you select. If you do not accept the agreement, Energy Analyze Plus does not install.

The installer has these options for a target directory where the user data will be stored.

- The default option is to save data into a location that can only be accessed by one specific user. This directory is located in the standard Windows directory "C:\Users\<user name>". You must have permissions to write in that directory. Choose this option if you consider it more important to let different users organize their data privately.
- The installer also has an option for **Shared by all users**. If you copy the data files to this folder, access is allowed to multiple users.

After you choose to allocate a directory in either shared or private space, Energy Analyze Plus will use that directory as a default target when you download data from the Logger.

4. The installer will also let you modify the location from which you can start Fluke Energy Analyze Plus after installation. By default, **Fluke > Fluke Energy Analyze Plus** is added to the Windows Start button. These entries are created if they do not exist or overwritten. No user data is changed or deleted by overwriting an existing installation.

The installer adds:

- Microsoft Visual C++ 2015-2019 Redistributable 14.28.29914 (required for Fluke Energy Analyze Plus and its components)
- USB drivers (automatically install when a Logger is plugged in for the first time)

Note

Make sure the Logger is not connected to the PC during installation. This is required for the Energy Analyze installer to apply changes to USB drivers. Reboot the system after installation.

Connections

To connect the computer to the Logger:

1. Power on the computer and the Logger.
2. Wait for each to complete its startup routine.
3. Install the Energy Analyze Plus Software.
4. Connect the Logger to the PC with a USB or Ethernet cable, or set up a WiFi connection. See the users manual for the Logger.
5. Connect the USB cable to the USB ports of the computer and the Logger as shown in Figure 1.

Note

The USB driver automatically installs the first time the Logger connects with the PC.

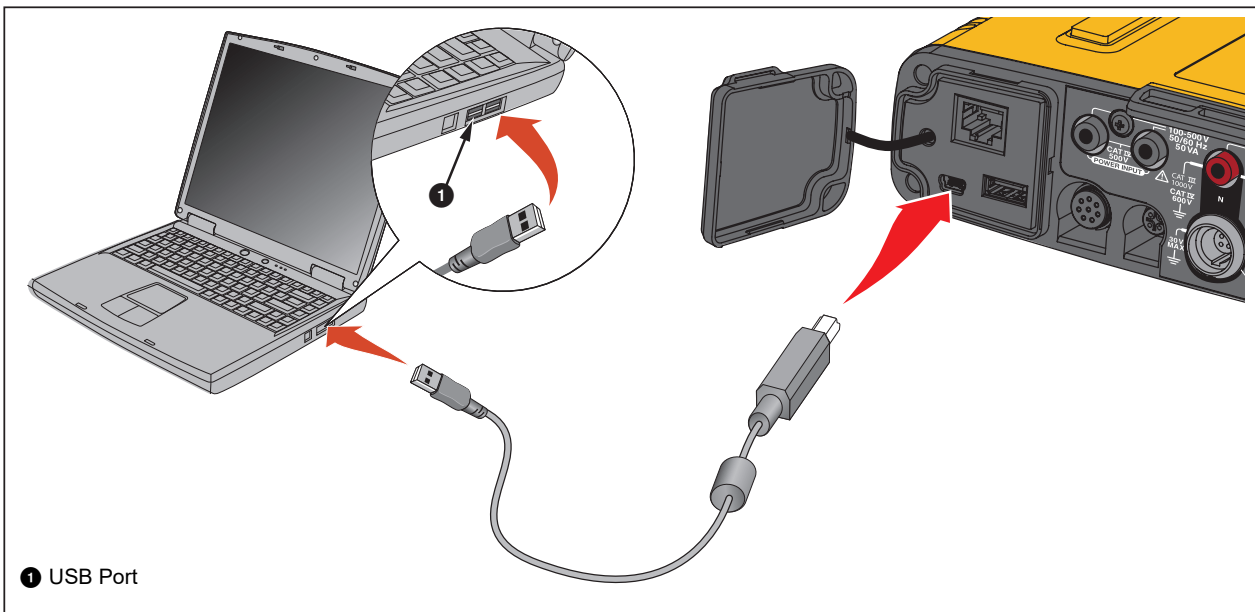
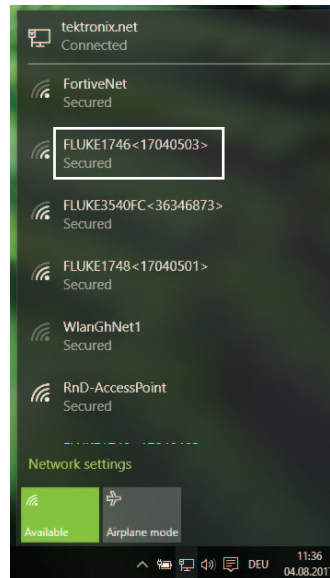


Figure 1. System Connections

6. On the PC, go to the list of available WiFi Access Points and select the entry that identifies the Logger connection. See the user manual for the Logger to find more information on WiFi configuration.



Note

To communicate with the Logger through a wireless connection, see the users manual for the Logger.

Get Started with Energy Analyze Plus

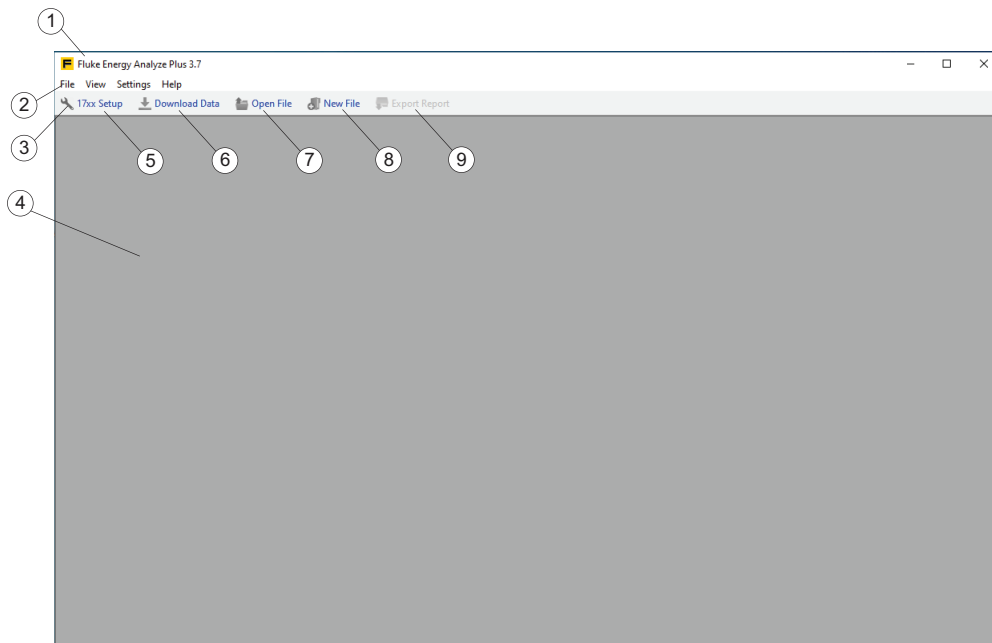
If you are new to Energy Analyze Plus, use these tips:

- When you start the software for the first time, a sample data file is available. Go to **File** > **Recent** to open this file. This file contains data that was downloaded from a Logger. You can use it as you become familiar with Energy Analyze Plus.
- Select a language for the user interface. On the Energy Analyze Plus Menu bar, go to **Settings** > **Language**.

After installation, start Fluke Energy Analyze Plus from the Windows Start button, or click on an associated file. Associated files have the file extension “.fca” (Fluke Compound Analysis).

Versions of Energy Analyze Plus that are previous to 3.7 create “.fca” files when you download data from the Fluke 173x and 174x series of products. With version 3.7 and later, Energy Analyze Plus creates “.fca2” files that support the large data sets and data generated by the most current Fluke Power Quality products.

At user request, Energy Analyze Plus will load and show the data contained in the selected file. See [Create a New Analysis File](#) for more information.



When started from the Windows Start button, Energy Analyze Plus does not automatically load data – the main window title ① shows the software name and version, the menus ②, and the toolbar ③. The main panel ④ is empty.

From the toolbar you have these options:

- Configure 1742/46/48 type of Loggers ⑤.
Connect a Logger to the PC before you use this function. See [Instrument Setup](#).
- Download data from the Logger ⑥.
Connect a Logger to the PC before you use this function. See [Download Data](#).
- Open a file that you have worked with previously ⑦.
- Create a new file and choose data from previous downloads ⑧.
Create new files with downloaded data and compare older results with newer results. See [How to Work with Files](#).
- Save reports ⑨.
Save a report document with the output format adjusted under **Settings** > **Report Output Format**. For this option to be available, you need to define the data and report items. See [Report](#).

When a data file is selected with the “Open file” icon or the “File” menu, Fluke Energy Analyze Plus shows the [Project Manager](#) tab as an overview of the data in that file.

Data Format and Management

Logged data never changes in Fluke Energy Analyze Plus – regardless of what you add, combine, or modify.

The Fluke Compound Analysis (.fca) file keeps raw logging data separate from any other entries – logged data (session results) or pictures are stored inside the file and do not change. Any edits, such as changes to descriptions, are kept in another location within the file.

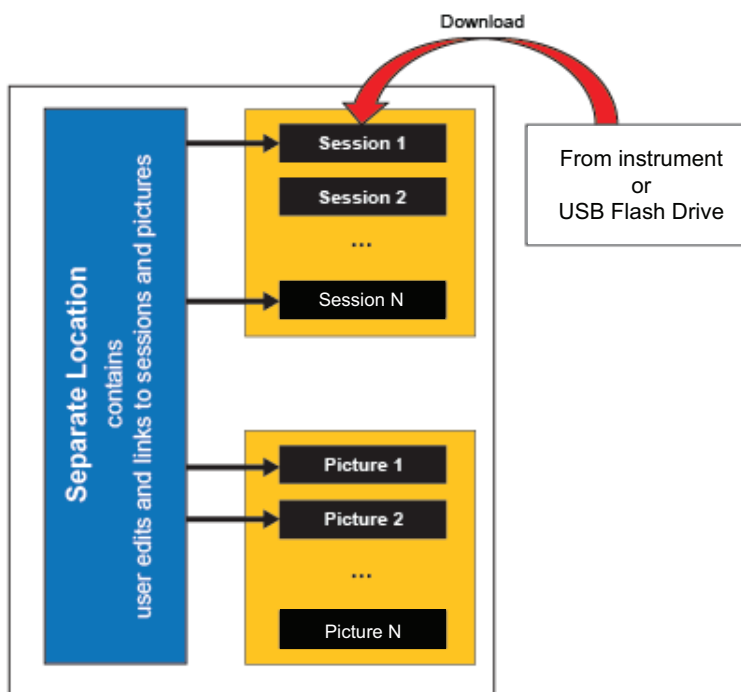
The software creates a single .fca file for each session when the logging data is loaded from the Logger or a USB flash drive.

Fluke Energy Analyze Plus lets you combine data from up to four different logging sessions into one analysis file. See [Download Data](#) and [Add Data to a File](#) for more information about how to work with .fca files.

.fca Files (Version 3.6.4 and earlier)

Note

Fluke recommends that you keep files that are created from downloaded data in a dedicated directory.



.fca2 Files (Version 3.7 and later)

In addition to the structure described above, the session data is pre-processed during download. Pre-processing data allows Energy Analyze to work with data sets >4GB.

The Home Screen

From the Home screen, you can navigate through the software to set up and do necessary tasks. When no data is loaded, the home screen is empty and allows you to load data. If a 174x Logger is connected to the PC, you can configure the Logger. Depending on the type of data loaded, the home screen shows results organized on separate tabs.

Project Manager. The project manager tab show meta information of the loaded sessions and is visible once data has been loaded.

Energy Study. Logging sessions of this type contain all parameters required for the analysis of power and energy consumption (see the Logger's Users Manual). You must attach the voltage leads and current sensors to get the full list of logged parameters.

Data shown under the Energy Study tab is organized into predefined views that let you quickly access relevant information. The Energy Study tab will only be shown if data loaded stems from an Energy Study.

Load Study. Logging sessions of this type contain a subset of parameters that can be recorded if only current sensors are attached. This saves the user time and effort to attach voltage leads, yet inform on load conditions of the system under observation – (see the Logger's Users Manual).

Data shown under the Load Study tab is organized in a similar manner as in the Energy Study tab. The Load Study tab will only be shown if data loaded stems from a Load Study.

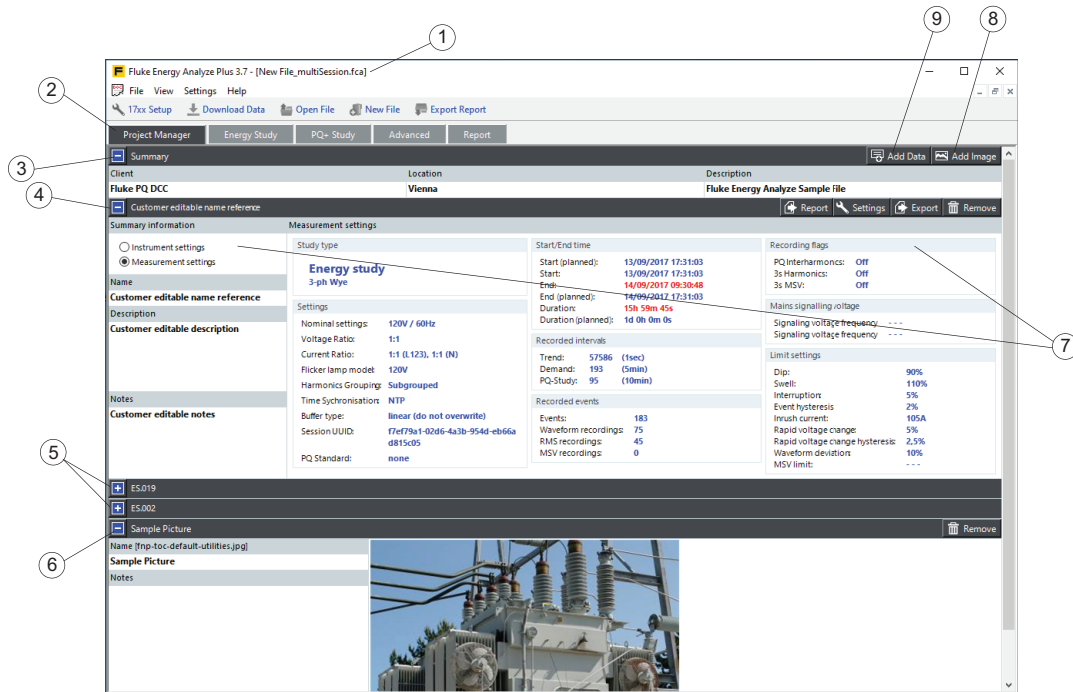
PQ+ Study. Logging sessions of this type contain additional data for the assessment of voltage and power quality in the system under observation. These data sets are logged at fixed intervals (see the Logger's Users Manual). The PQ+ Study tab will show data as logged and additionally the results of its statistical evaluation. Availability depends on the data loaded.

Advanced. The Advanced tab lets you compose plots that are not already covered by any of the predefined views. For example, to plot fundamental active energy in one chart with total harmonic content, use this tab to create the new view. The Advanced tab has table views (overview - contains all data of a session and time-range contains the data selected graphically on the graph view with the time range cursors). The functionality of the tables under the Advanced tab is modified so selected data can be exported. The Advanced tab is always shown.

Reports. The Report tab will let you compose custom-defined as well as predefined items, and save a report document from these. This tab is always shown.

Project Manager

The Project Manager is a summary of information about the data contained in a file.



The name of the current open file is added to the title bar (1) and data shows below the Project Manager tab (2). The data is organized into these categories:

- A generic summary (3) of text input fields (client, location, and description) for audience and purpose of the study. To edit these fields, click on the field and enter text. The client and location fields accept a single line of text, each limited to 250 characters. The description field accepts multiple lines of text (press Shift-Enter to start a new line) and is limited to 1000 characters.
- A list of up to four logging sessions (4) (5). A data set contains all the information collected from one logging session. Use the widget (9) to add data to this currently loaded file. For more information on how to load Logger sessions to a file, refer to [Download Data](#) and [Add Data to a File](#). Along with user editable text, the session summary also informs users about the Logger setup when logging that data (7).
- A list of screen shots (or pictures in general) that were manually added to the currently opened file (6). Screenshots can be amended with descriptive text in the "Name" and "Notes" fields. Use the widget (8) to add images to this open file. For more information on how to load screenshots (or pictures in general) to a file, refer to [Download Data](#) and [Add Data to a File](#).

Energy Study

For this study type, the Logger stores parameters that are accessible from a number of categories in the software. These are:

- RMS Power: find active, reactive, and apparent power results with harmonic content in this category.
- Demand: find active, reactive, and apparent energy results in this category.
- Calendar View: compare data grouped into hours, days, or weeks.
- Fundamental Power: power parameters that, in contrast to those shown on the RMS Power category, do not include harmonic content.

The Fundamental Power and VAHz/THD categories follow a similar structure described by the example of the RMS Power category below. The only difference is the available parameter set.

- V, A, Hz, THD: volts, amps, frequency, and THD readings.
- Unbalance: find sequence component data for both voltage and current systems. Unbalance ratio plots are also shown.

Within the RMS Power category the focus is on these parameters:

- Active Power
- Reactive Power
- Apparent Power
- Power Factor

RMS Power Overview Table

Fluke Energy Analyze Plus 3.7 - [New File_multiSession.fca]

File View Settings Help

17xx Setup Download Data Open File New File Export Report

Project Manager Energy Study PQ+ Study Advanced Report

RMS Power Demand Calendar View Fundamental Power V, A, Hz, THD Unbalance

RMS Power overview table Full Screen Copy Add Bookmark

Customer editable name reference

Logging Information

Active Power [kW]

	A	B	C	Total
Max	6.905 kW 14/09/2017 04:02:10	6.897 kW 14/09/2017 04:01:24	6.746 kW 14/09/2017 04:02:10	20.544 kW 14/09/2017 04:02:10
linear Avg	6.019 kW	5.990 kW	5.993 kW	18.002 kW
Min	0.240 kW 14/09/2017 03:5935	0.237 kW 14/09/2017 03:5955	0.921 kW 14/09/2017 04:0036	1.400 kW 14/09/2017 04:0036

Apparent Power [kVA]

	A	B	C	Total
Max	13.779 kVA 14/09/2017 04:0100	13.763 kVA 14/09/2017 04:02:10	13.488 kVA 14/09/2017 04:0147	45.987 kVA 14/09/2017 04:02:10
linear Avg	12.005 kVA	11.970 kVA	11.953 kVA	41.507 kVA
Min	0.479 kVA 14/09/2017 04:0036	0.475 kVA 14/09/2017 03:5955	4.312 kVA 14/09/2017 04:0036	8.059 kVA 14/09/2017 04:0036

Non-Active Power [kvar]

	A	B	C	Total
Max	12.016 kvar 13/09/2017 20:4359	11.945 kvar 13/09/2017 20:4755	11.684 kvar 14/09/2017 04:0147	41.143 kvar 14/09/2017 04:02:10
linear Avg	10.387 kvar	10.364 kvar	10.342 kvar	37.400 kvar
Min	0.415 kvar 14/09/2017 04:0036	0.412 kvar 14/09/2017 20:4755	4.212 kvar 14/09/2017 04:0036	7.936 kvar 14/09/2017 04:0036

Power Factor [1]

	A	B	C	Total
Max	0.51 14/09/2017 03:2056	0.51 13/09/2017 20:5434	0.55 13/09/2017 20:4934	0.45 14/09/2017 04:02:10
linear Avg	0.50	0.50	0.50	0.43
Min	0.028 13/09/2017 20:4718	0.051 13/09/2017 20:4755	0.21 14/09/2017 04:0036	0.17 14/09/2017 04:0036

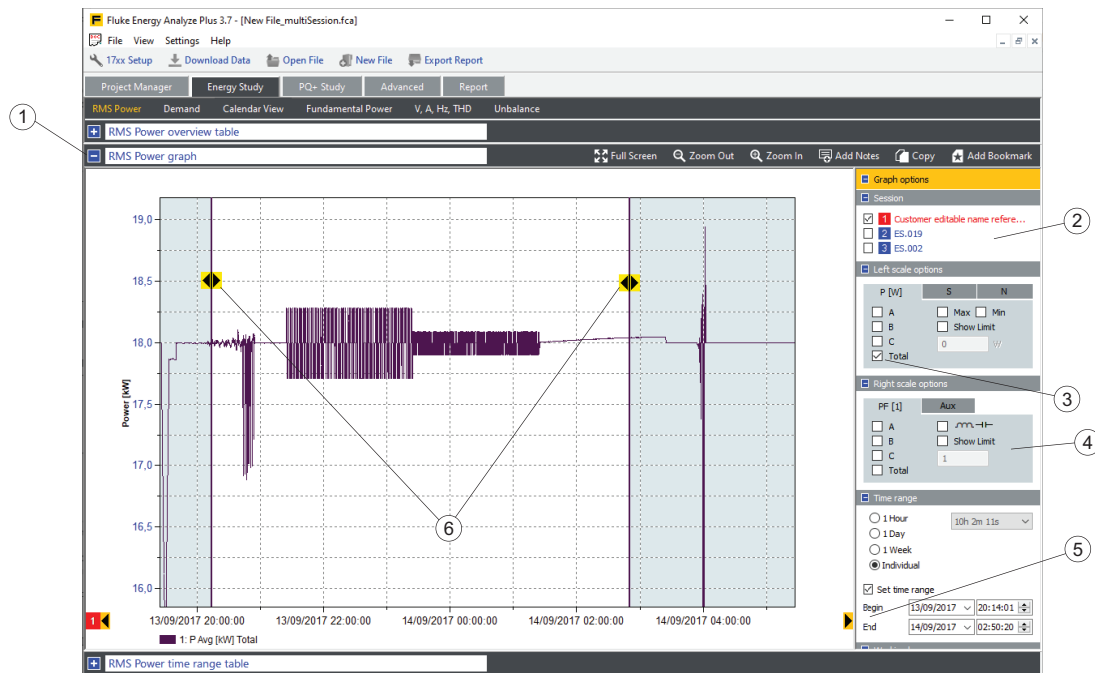
ES.019

ES.002

RMS Power graph

The RMS Power screen is divided into sections. The first section ① contains the overview table that shows all minimum, maximum (with time and date), and averages of the parameters as numerical values for the entire duration of that logging session ③. Separate parameter entries collapse or expand with a click on the blue option box ④ to organize the information you see on screen. The widgets on the table header line ② provide quick access to create a bookmark for later reuse within a report or copy the table to the clipboard and paste into other Windows® applications.

RMS Power Graph



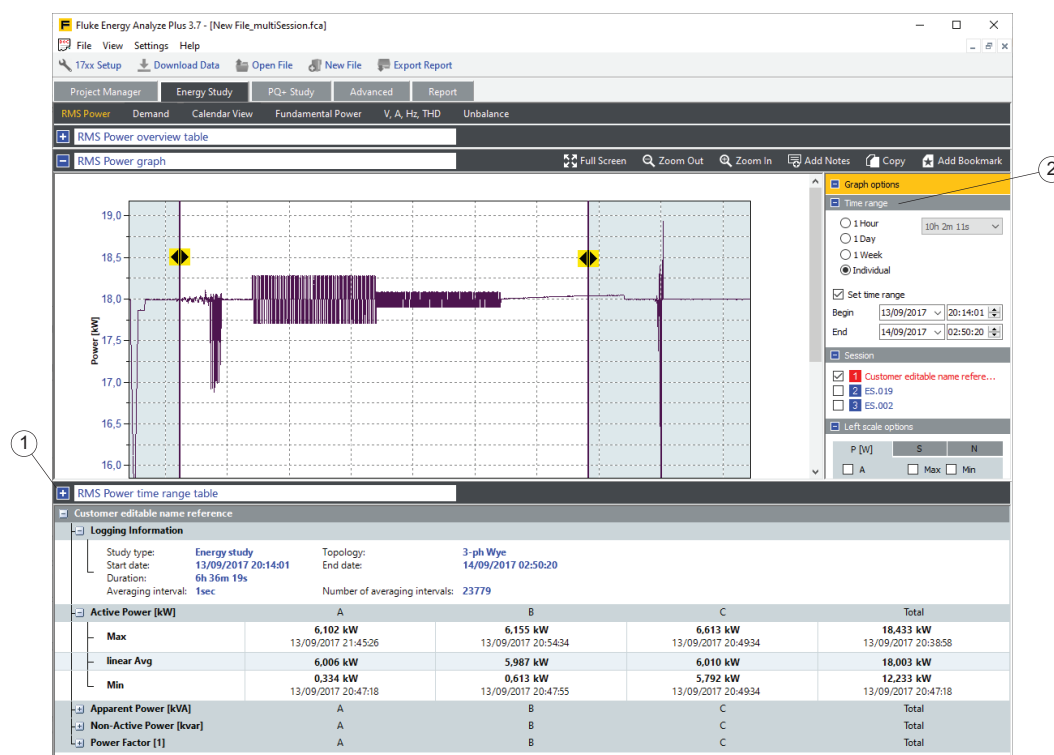
Click the blue option box next to the title line ① to open the RMS Power graph. This view lets you plot selected parameters ③ in more detail. If additional logging sessions are loaded, these list as sources ②. The plot contains the selected parameters ③ if the check box next to the source identification is checked. Additional parameters ④ can be added to the plot to allow comparison or documentation of influences.

The time range feature lets you select a specific time period for analysis and look at the data in more detail. The time range is adjustable with the "Begin" and "End" controls ⑤ that move the position of the vertical time range cursors ⑥. Or, click and drag to move the cursor position. Alternately, click on a curve point to snap the closest time-range selector to that point.

The zoom-in and zoom-out functions or moving the x-axis does not change the defined time range. The icon for the time range cursor changes to an arrow if zooming or moving an axis positions it outside of the plotted area. To move a time range selector back into the visible area, single-click on this arrow. This will change the selected time span. Numerical data that corresponds to the selected time range shows in the time range table.

Manually or automatically scale the plot axes. Right-click the mouse button on the axis to open the context menu. Use the arrow icons (black on yellow background) to the left or right of the x-axis to step through the entire data series. The currently shown x-axis span is the step scale. In this case, the time range shifts to the same relative position on the screen.

RMS Power Time Range Table

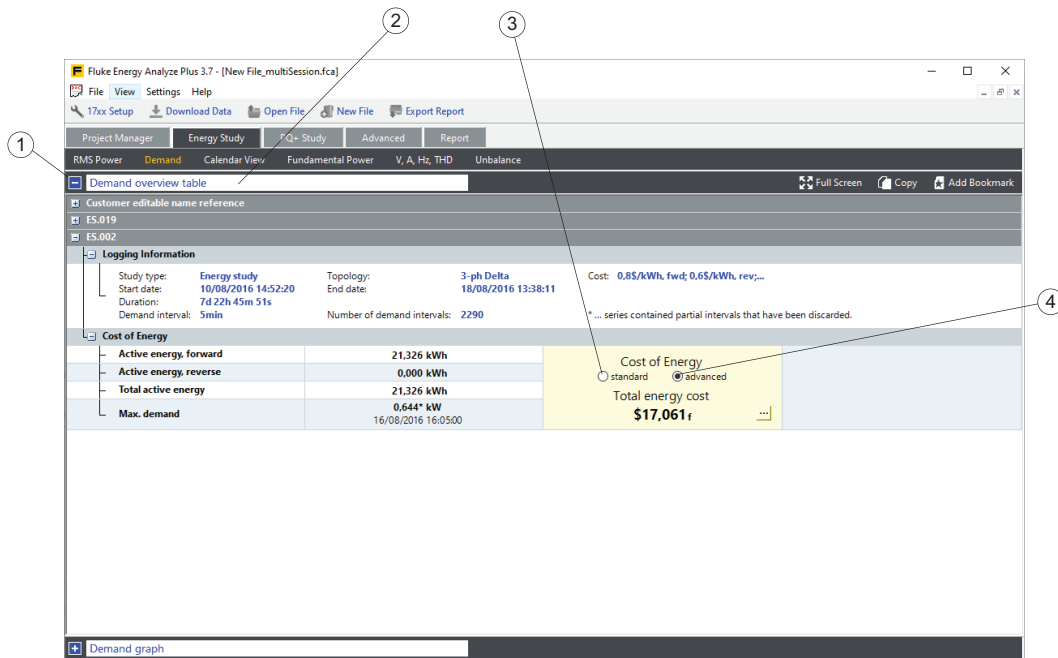


The third section – the time range table – uses the same layout as the overview table, and is only available if the **Time Range** check box (see item ⑤ in the [Energy Study - RMS Power Graph](#) section) is checked. It shows results that are within the time range defined in the graph view.

The time range table can be pulled to any position on the screen so that the graph is visible at the same time. To minimize or maximize the time range table view, use the blue rectangle ①, or double click on the gray area in its title line.

In **Graph Options** you can position the relevant sections to your preference on the right side of the screen. This example shows the **Time Range** settings ② are at the top of the Graph Options.

Demand Overview Table

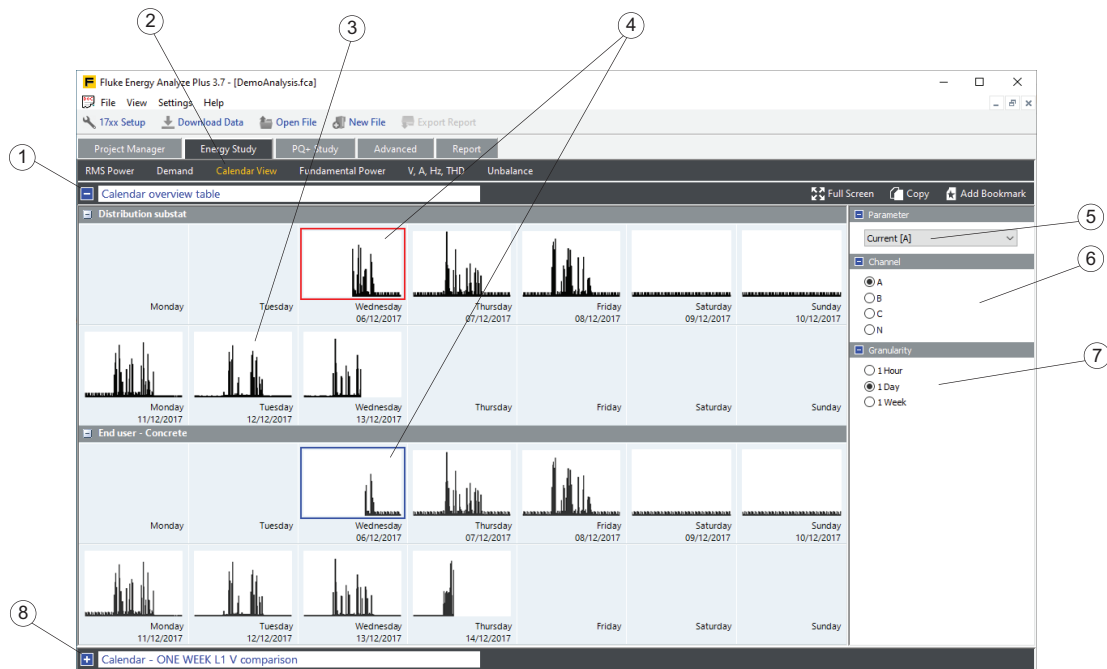


The "Demand" category lets you focus on energy consumption and related cost with parameters for:

- Active Energy
 - Forward (taken from the distribution grid, consumed).
 - Reverse (fed into the distribution grid, delivered).
 - Total (forward – reverse).
- Reactive Energy
- Apparent Energy
- Power Factor

Demand ① is organized into sections. Click on the blue box next to the title ② to activate these views. The Overview table shows active energy logging results and peak demand power in one table. For cost of energy calculations you may choose to apply the cost parameters that were used on the Logger when logging ③. To override these parameters with what you put into Energy Analyze Plus, double-click **advanced** ④. Cost associated with forward or reverse active energy are reported separately and indicated by "f" and "r" subscripts to the cost positions in the result field.

Calendar Overview Table



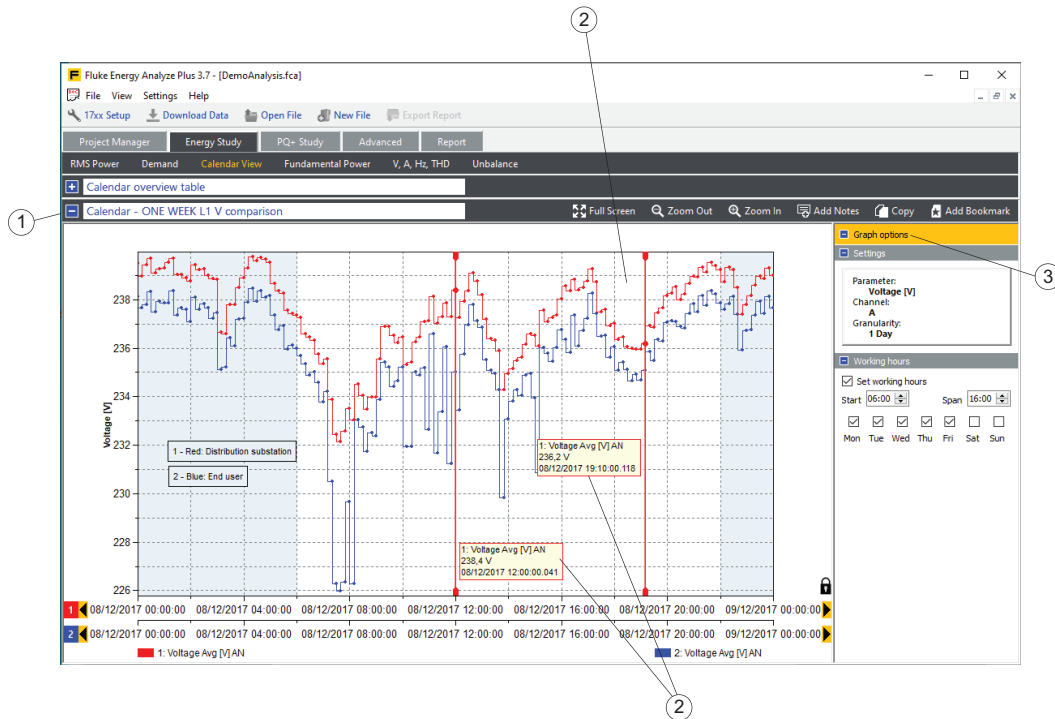
Calendar View (2) helps to quickly identify change patterns in parameters and lets you compare these changes by parameter in detail.

The overview table (3) shows pictograms that contain miniature plots of the selected parameter (5) over time (7). In the example above, the amps measurements of the A (L1) channel (6) are plotted, one hour (7) for each pictogram.

The Calendar View lets you compare the data from different logging sessions, such as, before and after an update to a power factor correction capacitor. In this case, both sessions would be loaded into an analysis file, and the total (6) reactive power (5) might be compared at a granularity setting of one day (7) in order to look at the effects the update had for a typical work week. See [Adding Data to a File](#).

In order to compare two items with each other, click on the first thumbnail to select the base and chose a second one for comparison (4). The detail time plot of the selected thumbnails shows under the graph section (8).

Calendar Detail Graph



A detail plot (2) of the data selected in the overview table shows in the graph section (1). Information about the plot traces is found in the “Graph Options” (3). As in other graph views, use the vertical cursors to get numerical readings of data “behind” curve points (4).

Load Study

For this study type the Logger stores parameters that do not require voltage measurements. You can define an assumed voltage and have Energy Analyze calculate a limited set of power estimations. Accessible categories for load studies are:

- **RMS Power:** shows estimated apparent power readings based on an assumed voltage (user entry).
- **AHz/THD:** amps, frequency and THD readings.
- **Calendar View:** compare data grouped by hours, days, or weeks.

The load study lets you check electrical load conditions in an installation without connection to voltage leads. You can manage the full list of parameters associated with an Load Study. Load Study measurement results can be represented in a single “Summary” category.

As in the Energy Study, you can use the Calendar View to identify specific load patterns or to compare data taken at different times.

For the “RMS Power” category, a value for the nominal voltage of the installation under test can be entered and the software makes calculations of the estimated apparent power. The results show in a tabular (Overview Table, Time Range Table) or graph format.

PQ+ Study

The Energy/Power Logger can be set up to configure, verify, and download measurement sessions with power quality data. See the Users Manual for more information. Power quality data is logged using a dedicated aggregation interval with a fixed length of 10 minutes (to meet standard IEC61000-4-30), except for “events” that are captured and stored as they occur.

For PQ+ Studies, the Logger stores information about the quality of voltage and power in the system. Energy Analyze shows these in separate categories:

- PQHealth
- Events
- Harmonics

PQHealth

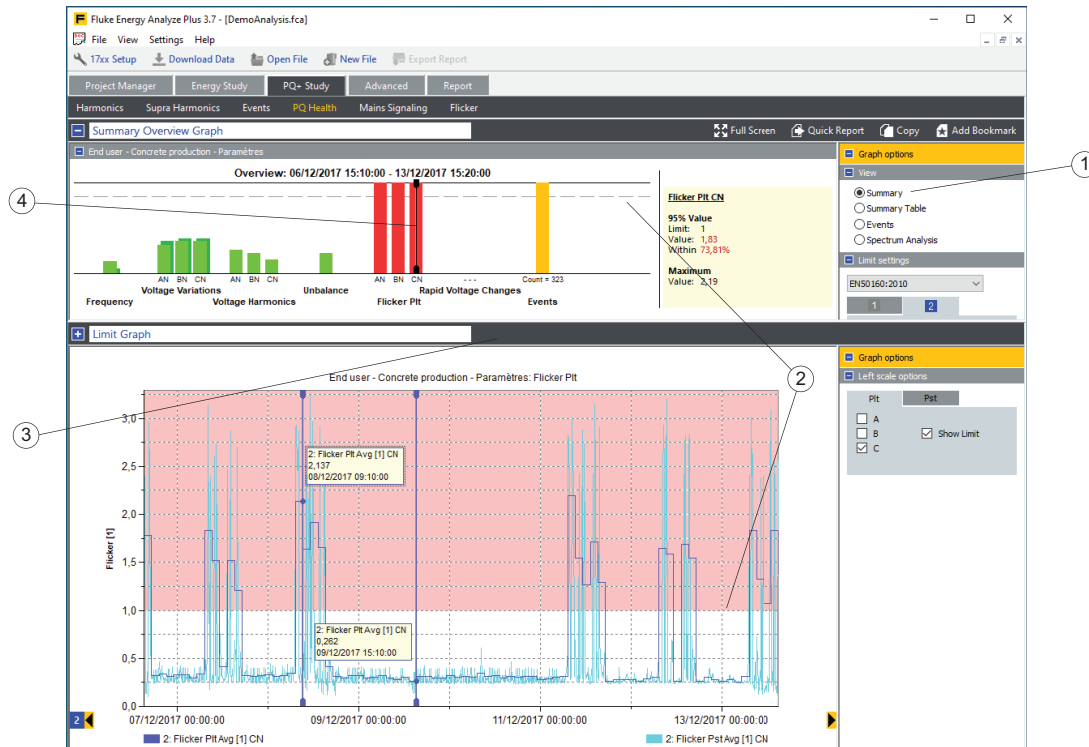
The **PQHealth** category lets you view results of:

- Standardized statistical analysis (for example, EN 50160 and IEEE 519)
- Voltage Unbalance [%], Symmetrical Components P, N, and Z [V]
- Current Unbalance [%], Symmetrical Components P, N, and Z [A]

Analysis capability must be licensed on the Logger used for logging data. See the User Manual for the Logger.

Summary View

The Summary ^① view shows which parameters violate limits according to the selected standard reference, marked by a horizontal limit line ^②. You can directly navigate to detail views ^③ by selecting a bar ^④ of specific interest.



The example above shows an evaluation that complies with EN50160. For each mandatory parameter, a bar represents the proximity to the relevant limit. The Voltage Harmonic bars represent groups of parameters. The length of the bar is determined by the worst condition for the entire group. Position the cursor on a bar in the "Summary Overview Graph" to get more detail. See "Limit Graph".

In the example, the cursor has been placed on "Unbalance", and the limit graph shows Voltage Unbalance along with a limit shown as red marked area.

Summary Table View

Select Summary Table view ① to view the data that is shown as graphs on the “Summary” view but in tabular format.

The screenshot shows the Fluke Energy Analyze Plus 3.7 software interface. The main window displays a table of limit settings according to EN50160:2010. The table is organized into sections for Frequency, Voltage Variations, Voltage Harmonics, Unbalance, Flicker Pst, Rapid Voltage Changes, and Events. Each section contains a table with columns for Limit Type, Percentile, Limit, Result, and Total. The 'Summary Table' view is selected in the 'Graph options' panel on the right side of the window, indicated by a circled '1'.

Section	Limit Type	Percentile	Limit	Result	Total
Frequency	% of 50Hz	99.5 Value	1% / -1%	PASS	0,16% / -0,15%
	% of 50Hz	100% Maximum	4% / -6%	PASS	0,24% / -0,22%
Voltage Variations	% of 230V	95% Value	10% / -10%	PASS	3,72% / 0,28%
	% of 230V	100% Maximum	10% / -15%	PASS	4,22% / -1,74%
Voltage Harmonics	% of Fund	95% Value	6%	PASS	0,15%
	% of Fund	95% Value	0,5%	PASS	0,13%
Unbalance	%	95% Value	2%	PASS	0,53%
	%	Maximum	-	-	0,73%
Flicker Pst	1	95% Value	1	FAIL	2,39
	1	Maximum	-	-	2,86
Rapid Voltage Changes	Count	-	-	-	-
	Count	-	-	-	-
Events	Count	-	-	-	-
	Count	-	-	-	323

Events View

The Events view shows dips, swells, and interruptions in a table that is sorted by duration and severity (UNIPED DISDIP table).

- Dips: half-cycle RMS voltage readings of the system under test that go below the dip threshold defined as percentage of the nominal voltage of that system.
- Interruptions: half-cycle RMS voltage readings of the system under test that go below the interruption threshold defined as percentage of the nominal voltage of that system.
- Swells: half-cycle RMS voltage readings of the system under test that exceed the swell threshold defined as percentage of the nominal voltage of that system.

The view shows combined events. That is, events in poly-phase systems that overlap in time of occurrence will be counted as one event, even if the effect is visible on different phases. For more information, see the users manual for the Logger.

The screenshot displays the 'Event Overview Table' in the Fluke Energy Analyze Plus 3.7 software. The table is organized into three main sections: Interruptions (4), Swells (5), and Dips (6). Each section has a blue icon (3) for expanding or collapsing the table. The table columns include 'Duration' and various time intervals (e.g., 180s, 10ms, 500ms, 5s, 60s). The table rows show voltage thresholds and event counts. For example, in the 'Int' section, a row shows '5% > u (8V > u)' with a count of 1. In the 'Swells' section, a row shows 'u ≥ 120% (u ≥ 144V)' with a count of 1. In the 'Dips' section, a row shows 'u ≥ 90% (u ≥ 108V)' with a count of 1. The 'Graph Options' panel on the right shows session selection (1) and evaluation period settings (2). The 'Evaluation period' dialog shows 'From: 18/09/2017 16:50:00' and 'To: 19/09/2017 09:10:00'.

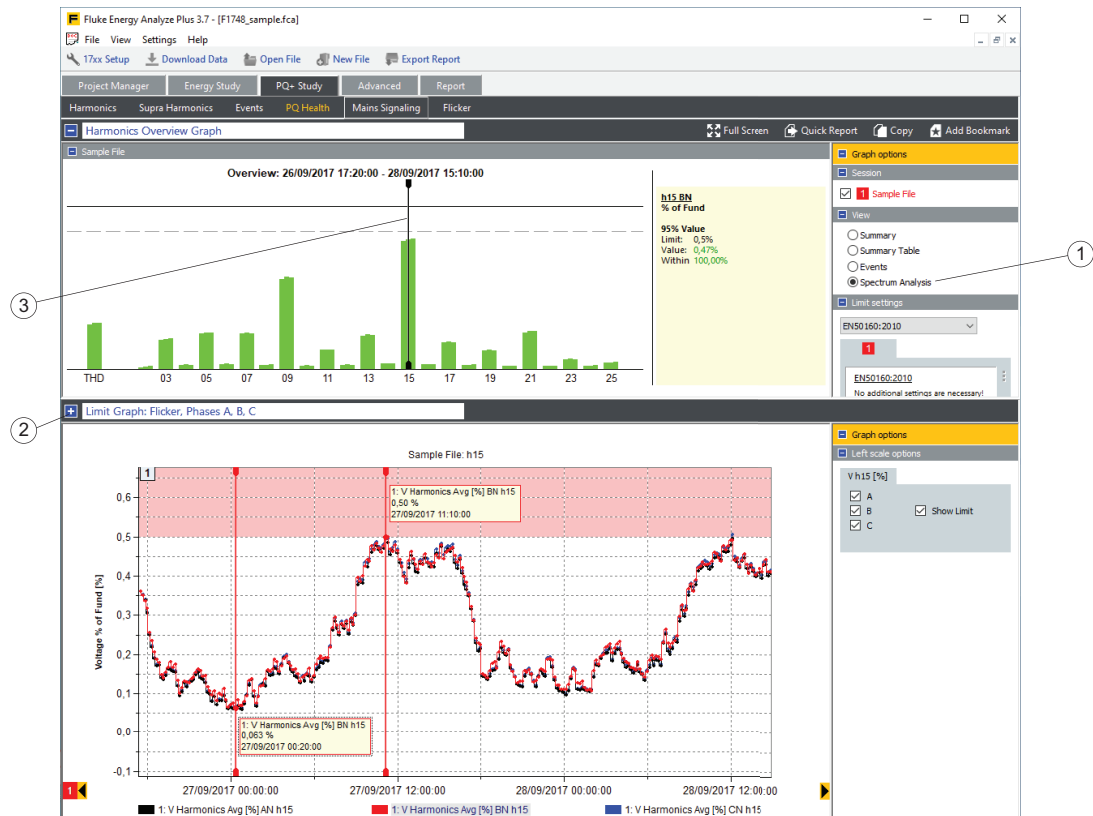
If more than one session is loaded, these list as sources ① in Graph Options. Each has a check box that enables or disables a corresponding table section. Table sections expand or collapse with the blue icons ③ on the table headers.

To compare results, you can limit the time span for a specific session. The evaluation period dialog ② lets you define the start and end times used for the events counted in the overview table.

The overview table is divided into three sections to show Interruptions ④, Swells ⑤, and Dips ⑥. Voltage thresholds are shown in percentage and absolute volts for each row of the table. Energy Analyze Plus uses the nominal voltage that is adjusted on the Logger for the specific session to show these values.

Spectrum Analysis View

The Harmonics view shows harmonic and interharmonic voltage and current levels relative to their corresponding limits.



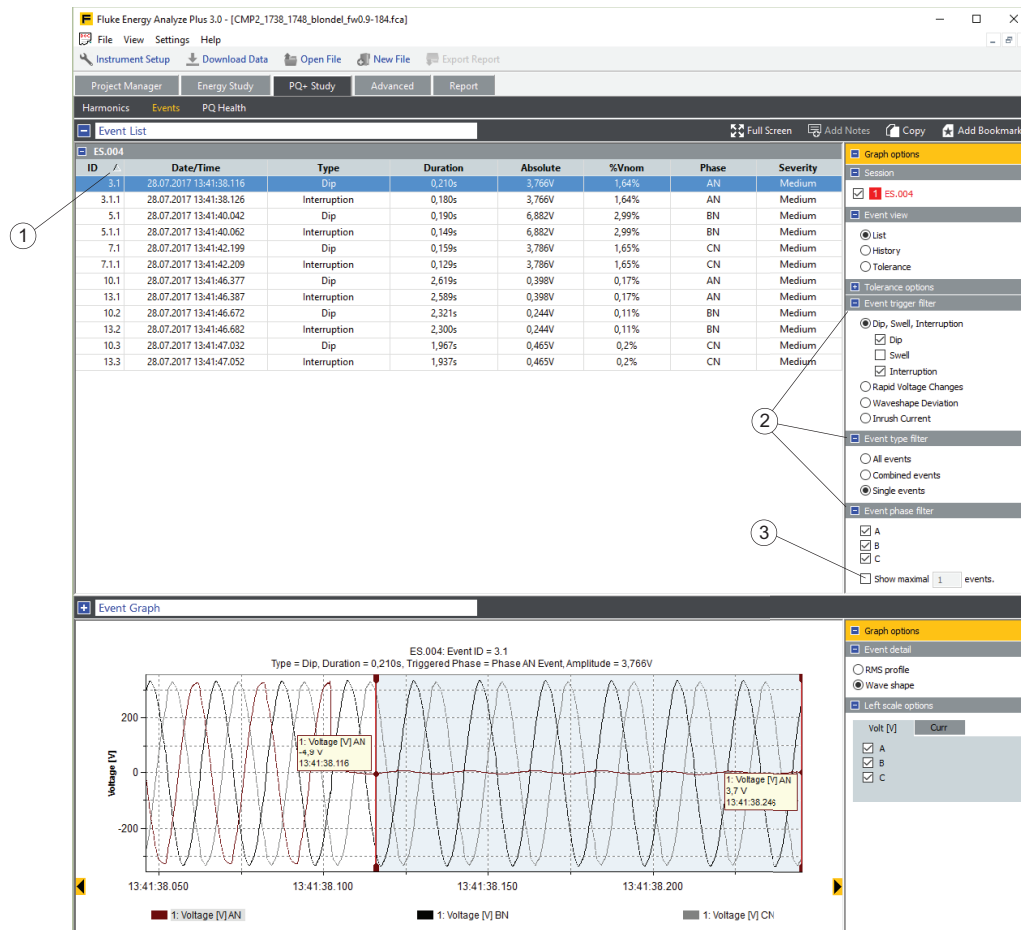
Select a standard ① and Energy Analyze applies the limits to the measured data according to the standard. You can directly navigate to detail views ② by selecting a bar ③ of specific interest.

Events

The Events category lets you view details of events that were captured during logging.

Events List view

This view shows all events in comprehensive lists with options to filter and sort. Select an event from the list and view important detail on the same screen.



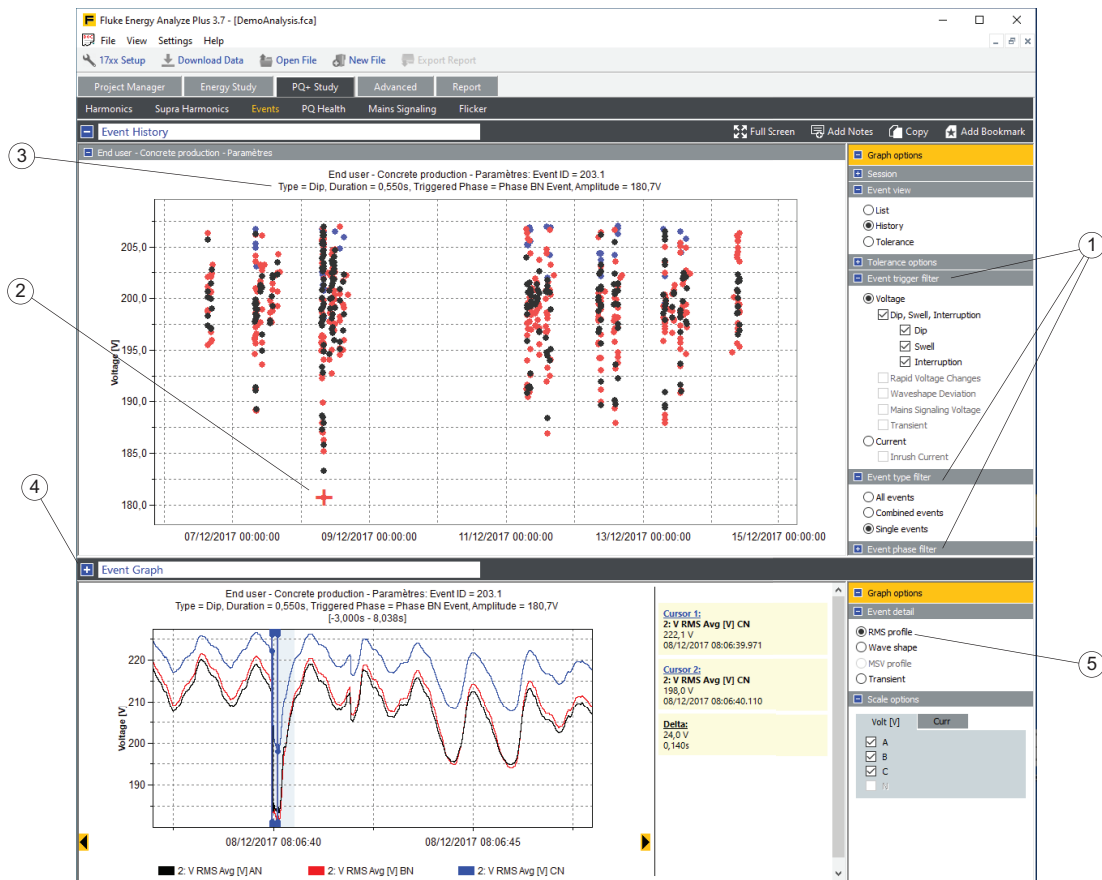
Click on a table header cell to sort the entire table. A small triangle ① to the right of the table header cell marks the sorting parameter and the ascending or descending sequence of the list. Use the Event filter elements ② to optimize long lists of event records. Also, an option to limit the number of list entries ③ is available in this view. You cannot add notes to this view.

The columns contain:

- ID: Event reference number. The Logger stores events with a reference number shown in the first column. In case of poly-phase events, one reference number is allocated to the poly-phase record, and further references for each single-phase record that a poly-phase record contains. For example, if a dip occurred on phases A, B, and C of a three phase WYE system, four event reference IDs are shown – a major number for the poly-phase event, and major.minor numbers for the single phases.
- Date/Time: Start date and time of an event.
- Type: Dip, Swell, Interruption, Rapid Voltage Change, Wave Shape Deviation, Inrush Current. For more information, see the users manual for the Logger.
- Duration: Duration of an event condition. For more information, see the users manual for the Logger.
- Absolute: Minimum half-cycle RMS voltage during the event condition or the maximum half-cycle RMS current during an inrush current condition. This column is shown neither for Rapid Voltage Changes, nor for Wave Shape Deviation events.
- % VNom: this column populates only for dip, swell, or interruption events. It shows the half cycle RMS voltage extreme captured during the event, relative to the nominal voltage in percent (%).
- Delta VMAX, Delta Vss: these columns are shown for Rapid Voltage Changes, only. Values shown are defined by IEC61000-4-30, that is ΔVSS is the change in steady-state voltage levels before and after the event, and $\Delta VMAX$ is maximum difference of the voltage level to the steady-state voltage level before the event.
- Max Deviation: this column is shown for Wave Shape Deviation events only. Values represent the maximum difference of voltage sample values between two consecutive voltage cycles at fundamental frequency.
- Phase: Phase on which an event condition was registered.
- Severity: this column only populates for dip, swell, and interruption events. Values are low, medium, and critical. These ratings are assigned by the Logger at the time of logging and based on the potential damage to electrical equipment from an event at given duration and maximum voltage.

Events History View

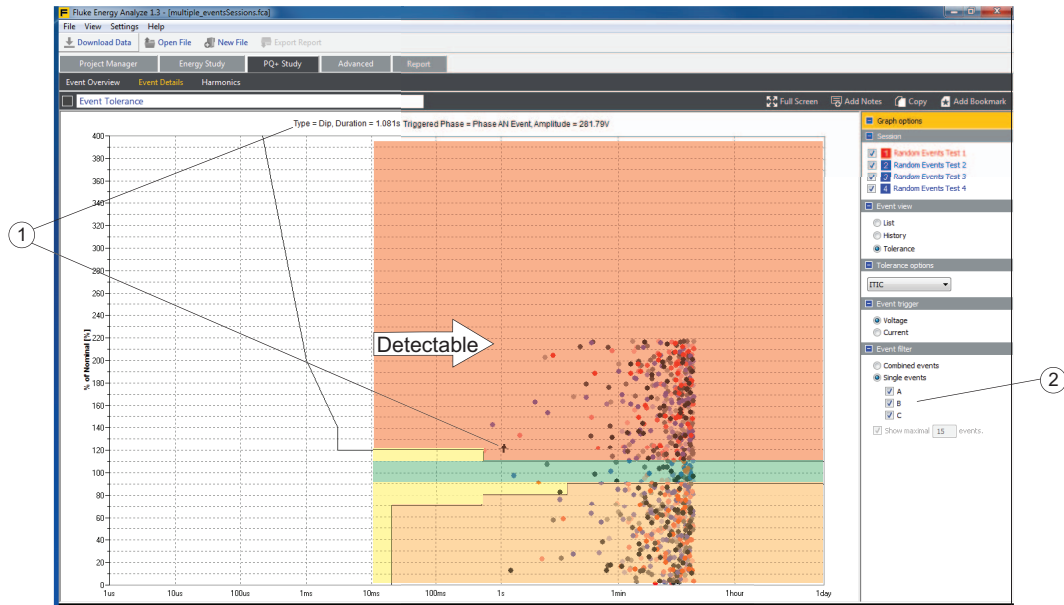
This view shows dip, swell, interruption or inrush current events in a time line to help identify potential occurrence pattern over time.



Use event filters ① to limit the items shown. Click on an event marker ② and have additional information show in the title ③, and view the event detail graph ④ to get related time series plots ⑤.

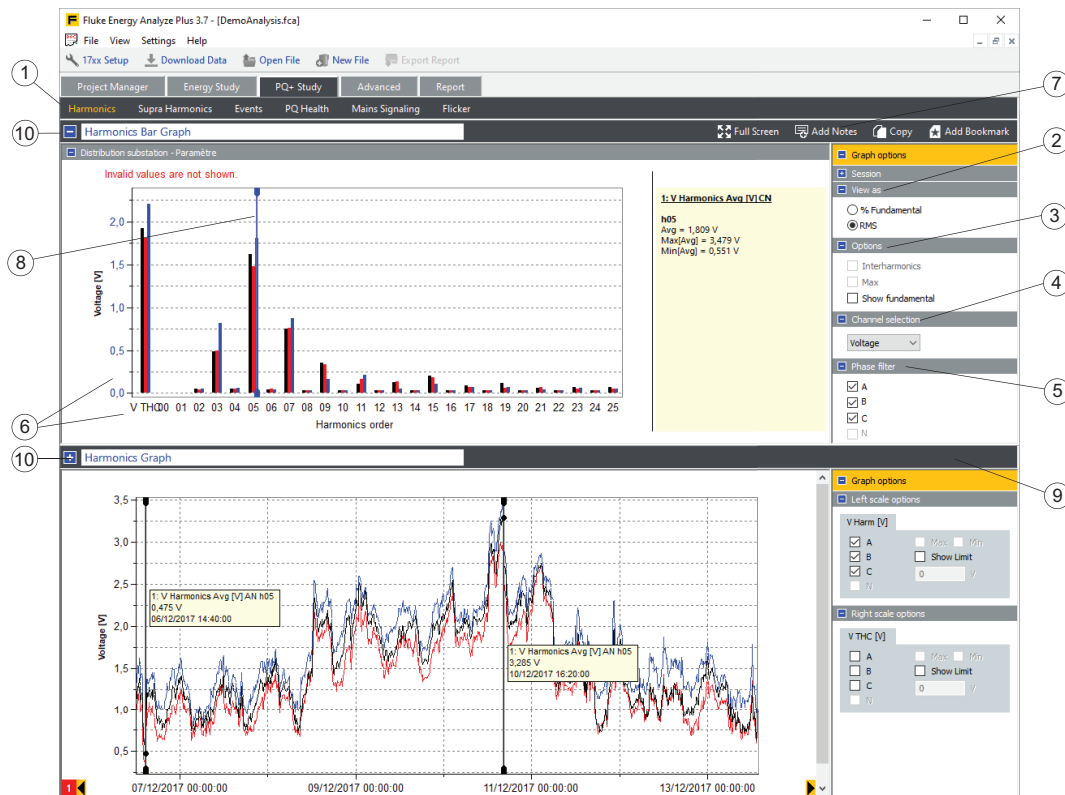
Events Tolerance view

The Event Tolerance View shows dip, swell, and interruption events in a plot 'Duration' vs. 'Percent of nominal voltage' of the system under test, along with severity limits according to ANSI, CBEMA, or ITIC standard. Events of all selected sessions are mixed into one plot. Placing the cursor onto an event marker ① shows additional information in the title line. Use the Event filter ② to optimize the selection of events by phases.



Harmonics

Use the Harmonics view ① for in-depth analysis of harmonic and interharmonic content in voltage and current signals.



To modify the content of the bar chart view, select the sessions to include and use these options:

- View as ② affects the scaling applied to the bar chart as well as its content:
 - % fundamental: Energy Analyze Plus scales the bars in % of the fundamental amplitude. Select this view to make the THD readings for the selected channels visible. This works for voltage and current readings.*
 - RMS: Energy Analyze scales the bars in [Vrms] or [Arms]. THD readings are not shown while scaling is set to RMS.*
- Options ③
 - Max: shows the maximum levels per session in either RMS or %fund scaling, stacked on top of session averages.*
 - Show fundamental: enables or disables the fundamental bar (harmonic order 01) in the chart.*
- Channel selection ④ lets you choose to either show voltage or current readings.
- Phase filter ⑤ lets you limit the content of the bar chart to selected phases.

To zoom into more detail, draw a zoom rectangle with the mouse or open a context menu with a right-button mouse click on the axis you want to modify ⑥.

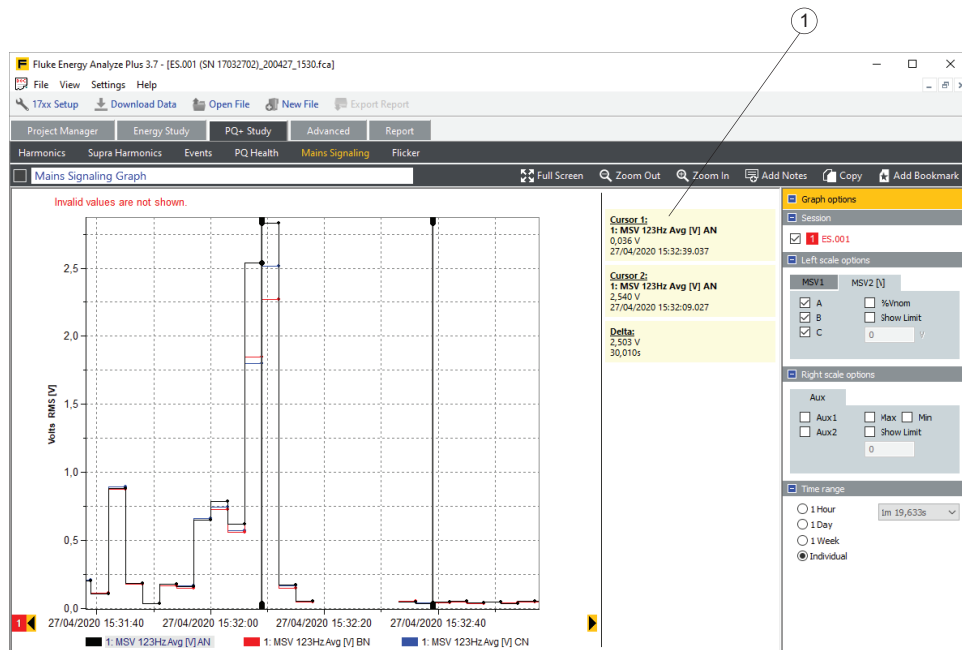
Use the Add Notes ⑦ widget to place text in the chart. Notes can float on the graphs white space, or you can attach to a bar. If the latter case, the note text is pre-filled with data of item to which it was attached to. Floating notes remain visible regardless of zoom state and print in reports that use the bookmarked view. Attached notes remain visible as long as the data item it is attached to is visible. Depending on visibility, attached notes print (or not) in reports that use the bookmarked view.

Use the cursor ⑧ to get text readouts of bar values. The cursor can be moved with the mouse or with the cursor keys on the keyboard. The Harmonic Graph view automatically updates to the cursor position. To use this feature, pull up the splitter line ⑨ so the bar graph and time plot show together. You can view the session average in the bar chart and the time series plot of the selected harmonic in the graph view as shown in the screen shot below.

Use the Add Bookmark widget to bookmark the Harmonics Bar graph and the Harmonics graph views. Edit the title lines ⑩ to help finding these bookmarks under the report tab when you create a document from the analysis.

Mains Signaling Graph

The Mains Signaling category provides a view on time series data that has been logged according to the instrument settings. This example shows data from an instrument that logged the voltage amplitude at 123 Hz ①. This graph remains empty for sessions that do not contain MSV data.



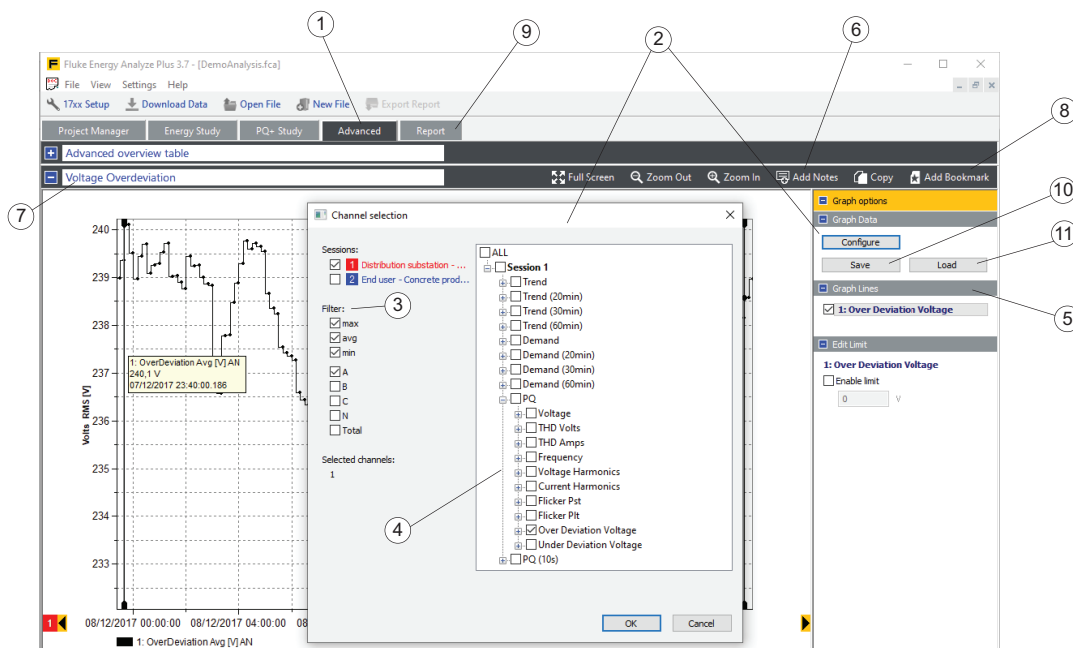
Flicker Graph

The Flicker category shows short-term and long-term Flicker severity results as logged by the instrument. For the example below cursors were hidden. See [Plot Usage](#) for more information.



Advanced

The Advanced tab ① lets you define custom graphs and export selected data series in tabular format to other applications.



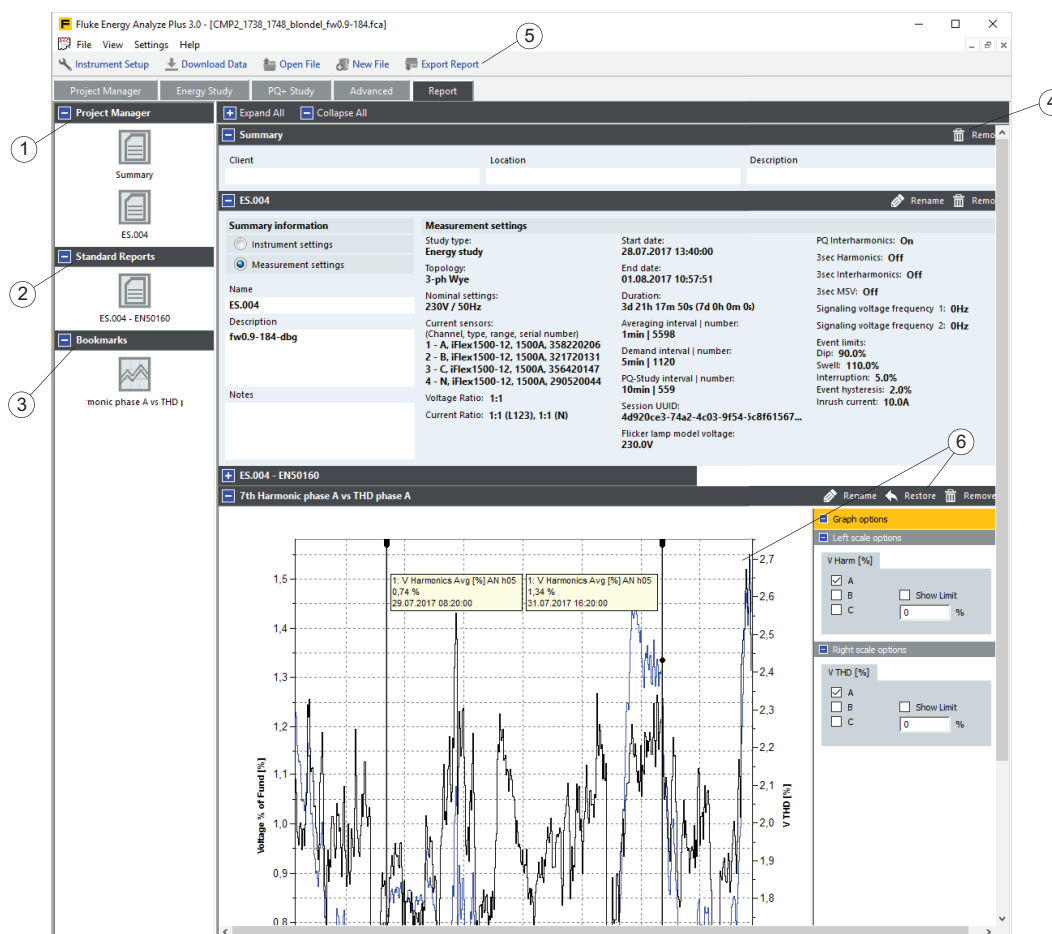
Unless content has been defined before, the tab shows an empty graph. Click **Configure** ② to open the Channel selection panel. The panel offers a set of filters ③ that lets you optimize the list of available channels and a channel selection tree ④ that lets you choose the channels to plot. Click **OK** to plot the selected channels of interest. All selected channels list in the Graph lines section ⑤ in the Graph options side bar. It is useful to select more channels than will be plotted in one graph, and enable/disable them later. A maximum number of 36 different channels can be selected.

Once you configure the view, use **Save** ⑩ to store this configuration into a file for later reuse. To reuse a configuration, click **Load** ⑪ to restore and apply a saved configuration to new session data.

Use the Add notes widget ⑥ to make comments about the plots. Once a view is created and notes are added, edit the graph title ⑦ and use the **Add Bookmark** widget ⑧ to save this view. Saved bookmarks are listed under the 'Report' tab ⑨ shown below.

Report

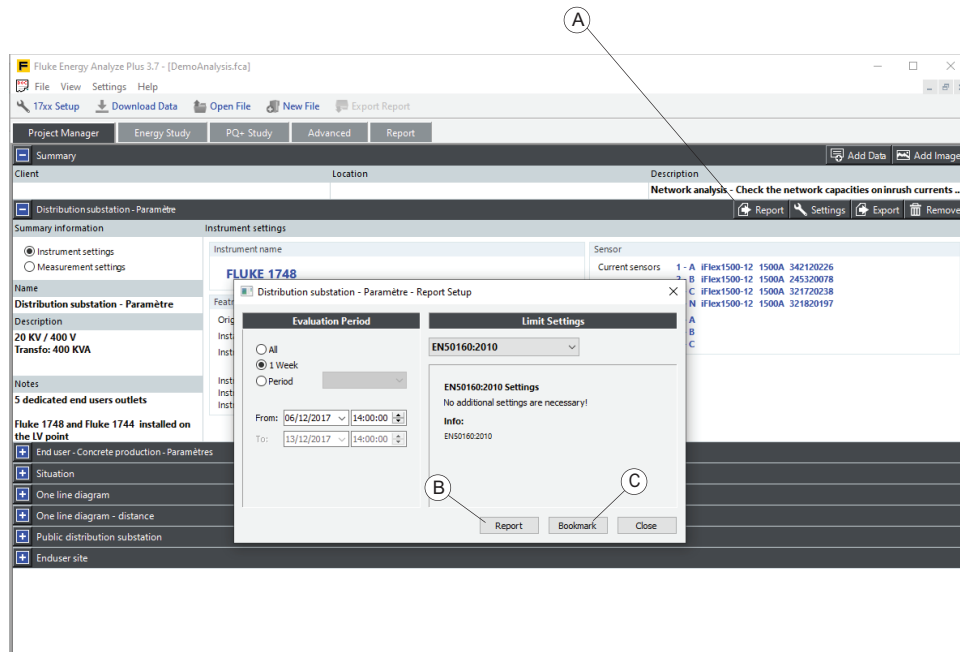
The Report tab lets you configure the report output.



Navigate to the Report tab and find the list of report items at the left side of the screen. Report items are:

- Predefined (1)
 - *Session Summary* – see [Project Manager](#). This item hosts user-editable information on client, location, and description associated with each session.
 - *Session Meta information* – see [Project Manager](#). This item contains a detailed description of the Logger configuration that was applied when creating a session (logging).

- Standard Reports (2). See [Project Manager](#) Tab. This item contains results from statistical evaluation of logged data according to selectable standards.



To create a standard compliance report according to EN50160, use the Report widget on the corresponding session entry on the Project Manager tab. Click **Report** (A) to directly get a report document saved (B), or to get a standard-compliance report item listed under the Report tab (C). Use the latter if you want to add specific details, insights, etc to the statistics results.

- Bookmarks (3). See [Create Bookmarks](#). These items contain custom views, such as plots with notes and tables.

Drag and drop a report item into the right side of the screen to show that item in the final report in the order of appearance on the screen. To change this order, click on the item title and drag it to the new position within the content panel (on right-hand side).

To remove an item from the report, drag it back to the left-hand side of the screen, or use the **Remove** widget (4) located on the item title line.

When you click the **Create Report** icon (5) on the main tool bar, Energy Analyze Plus creates a Portable Document File (PDF) from all items contained in the right-hand side of the screen in the order of their occurrence.

Use the Restore Bookmark (6) function to return to the original view that uses the same settings as where used when you created the bookmark. This function also lets you use the **Advanced** tab to create, refine, and export different views into a report when done.

How to Use Fluke Energy Analyze Plus

The software is used to download data from a Fluke Logger, or to work with saved data that was downloaded before. Use Fluke Energy Analyze Plus to:

- Load and administer logged data with the Logger.
- Combine and compare logged data results.
- Create custom views of data in table or graph format.
- Copy data to other Windows® applications with copy-and-paste.
- Export data to files for use in other supported applications.
- Create reports to show standard compliance, cost saving potentials, effects, and issues.

Connect Logger to PC

Logger setup, data download and administration, and time adjustment activities require a connection that lets Energy Analyze 'talk' with the Logger. The Logger supports several interfaces to connect to the PC:

- USB cable
- Ethernet (174x only)
- WiFi - direct connection (where enabled)
- WiFi - connection to infrastructure (where enabled)

You can also transfer logging data from the Logger to the PC with a USB drive.

USB or Ethernet Cable Connection

You can download data directly from the Logger to a PC that has the Energy Analyze Plus software installed for analysis and reports.

To download:

1. Use a USB cable or Ethernet cable to connect the Fluke Logger to the PC. The driver required to communicate with the device has been prepared for use during the installation process of Fluke Energy Analyze Plus, see [Connections](#).
2. Start the software and select **File > Download Data** from the main toolbar.

WiFi Connection

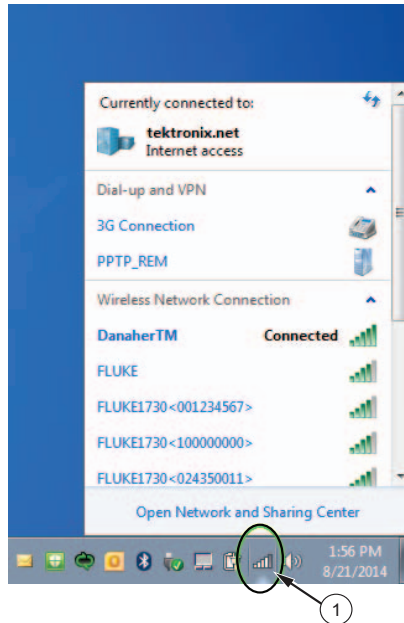
With a commercially available USB WiFi adapter you can download measurement data and screenshots to the Energy Analyze Plus software.

To download:

1. See the users manual for the Logger for information about the adapter.

After the installation on the Logger is successful, the next steps are necessary to connect the PC running Energy Analyze Plus by WiFi to the Logger for the first time.

2. Make sure the PC running Energy Analyze Plus has its WiFi adapter enabled.
3. To view available network connections, click on the network icon ① in the notification area of the Windows task bar (or use the "Network and Sharing Center" available from Windows Control Panel) to add a new connection.



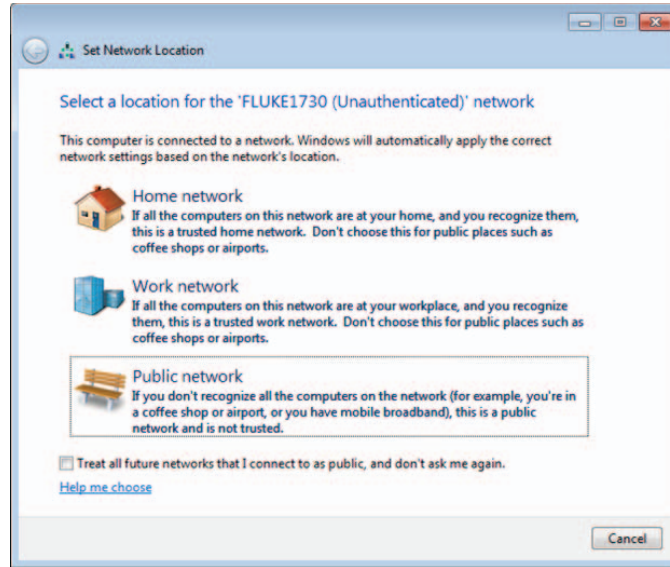
4. Select the Logger to connect to, compare the listed SSIDs with that shown on the WiFi Configuration page (for more information, see the users manual for the Logger), and chose the matching one.

Note

When "Connect automatically" is not selected, the Security key must be entered each time you establish a WiFi connection with the device.

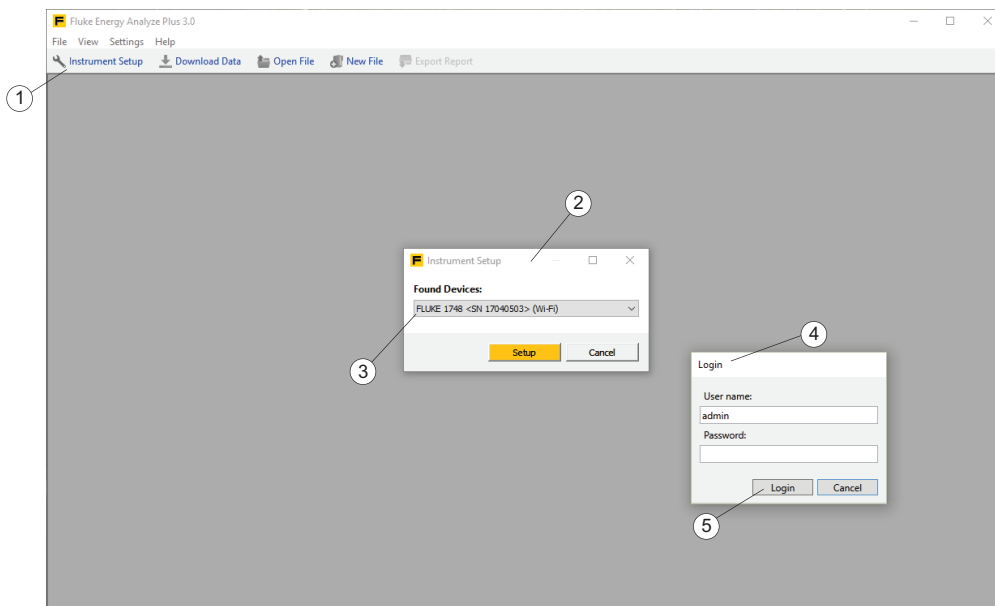
5. Enter the Security key. See the users manual for the Logger.

A new network connection becomes available. Windows may ask you to select a network location, choose **Public network** if not known.



Instrument Setup

Energy Analyze Plus, revision 3.0 and newer, lets you configure the 1742, 1746, and 1748 Loggers. This function is only available for the 174x series.



1. Make sure the Logger is connected to the PC.
2. Click **Instrument Setup** ①. A message panel opens and lists the found Loggers ②.

Note

The Instrument Setup function is implemented as a separate program that communicates with Energy Analyze Plus. In the event Energy Analyze Plus encounters an issue, it shows a file-open dialogue. Select the location of the instrument setup program (C:\Program Files (x86)\Fluke\PQ SetupTool\PQSetup.exe).

This is required only once.

3. If several Loggers are connected, select the one you want to configure from the drop-down list ③ and click **Setup**.

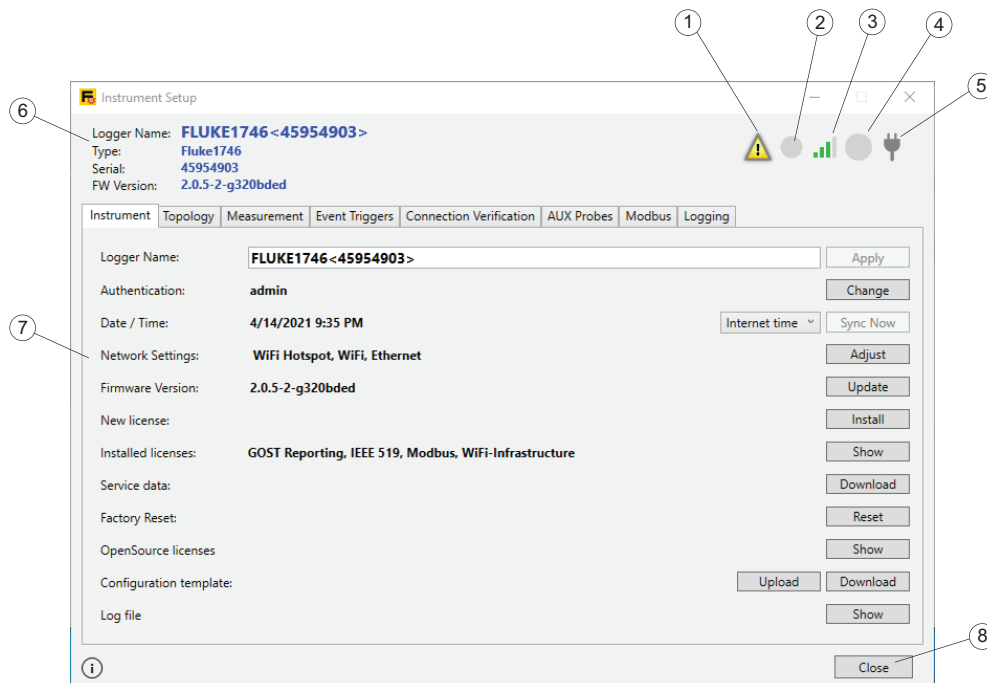
The 174x series use authorized and encrypted communication for configuration. A user name and password ④ is required. These parameters are stored on the Logger. Energy Analyze initializes these parameters to factory defaults. When you connect for the first time you can click **Login** ⑤ without further input.

4. When connected, the Instrument Setup tool allows you to change the user name and password parameters. Fluke recommends that you change these, take note of the new settings, and keep them in a safe place. In case the user credentials are lost, see the users manual for the Logger on how to reset to factory defaults.

Note

You can read the logging data from the Logger using Energy Analyze without entering user credentials. Only tool configuration requires the user name and password.

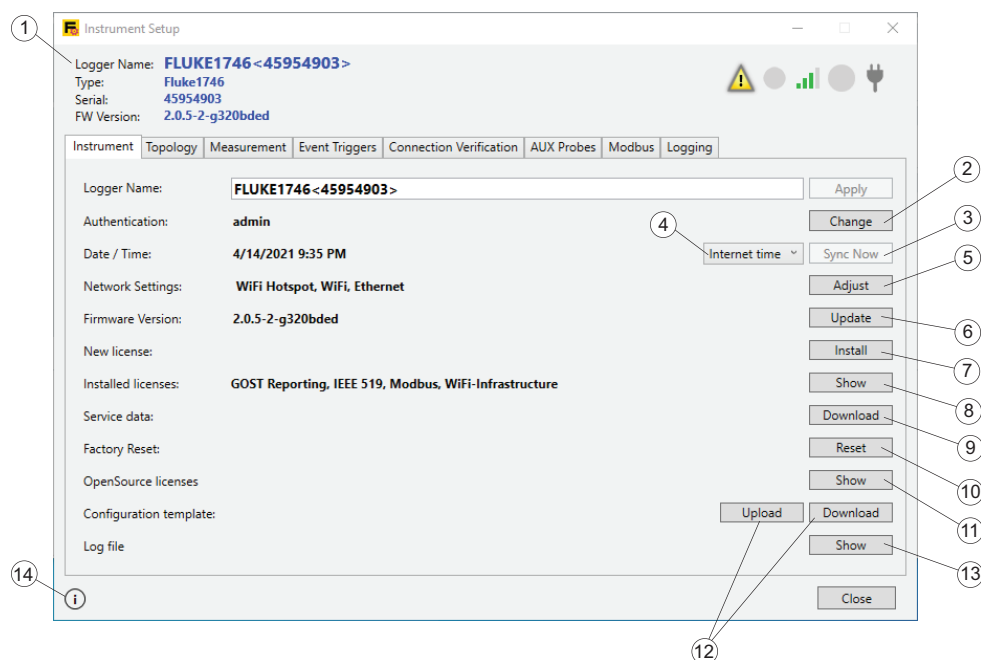
This opens the Instrument Configuration panel that contains all elements required to configure the 1742/46/48 series.



The panel shows the Logger state ⑥, lets you view and change settings on the Logger ⑦, and contains buttons ⑧ that let you apply changes or exit configuration. Status information contains the Logger name, serial number, and the firmware revision. Icons provide further detail:

- Message icon ① indicates there are messages for you to review. You can view and confirm messages. Confirmed messages are removed from the message buffer. Once the message buffer is empty, the message icon indicates no messages until the Logger generates new messages.
- Recording state ② icon shows whether the Logger is logging or not logging. The icon is red when logging and gray when not logging.
- WiFi field strength ③ shows the local field strength as seen by the secondary WiFi port on the Logger. Also see "Network Settings". See the users manual for the Logger for details on available communication ports.
- Memory gauge ④ icon shows available memory on the Logger. The icon is gray when there is no stored data. The amount of memory consumed is shown as a blue segment. A full blue circle indicates that the memory is full. You must download and save data using Energy Analyze software and then delete stored data from the Logger in order to start new sessions.
- Supply icon ⑤ shows a mains symbol if the Logger is connected to a mains supply or the battery state if mains connection is not in use. See the users manual for the Logger for details on the power source options.

Instrument Tab



Logger Name

Go to the "Instrument" tab to change the name of the Logger ①. The name is initialized to the Logger type and serial number, and can be changed to an arbitrary text. This feature helps to make sure you're connected to a specific Logger in case you have several in range. To change the name, click into the text field and enter the location, your name, or any other text.

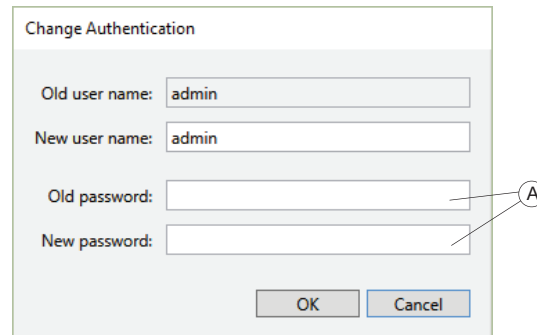
Note

You cannot change the Logger name while a logging session is active.

Authorization Credentials

Communication with the Logger requires authentication. To change the user name and password, click on the **Change** button ② to the right in the line that shows the current user name. This will open a dialog that requires you to provide the current user name and password, and a new set of credentials to apply (A). Your input will

be stored on the Logger and subsequent configuration tasks will require the adjusted credentials. See the users manual for the Logger for how to reset the Logger to factory defaults in case you forgot the authorization credentials.

A screenshot of a 'Change Authentication' dialog box. It contains four text input fields: 'Old user name:' with 'admin' entered, 'New user name:' with 'admin' entered, 'Old password:', and 'New password:'. The 'Old password' and 'New password' fields are highlighted with a circled 'A' and an arrow. At the bottom are 'OK' and 'Cancel' buttons.

Note

You cannot change authorization credentials while a logging session is active.

Logger Time Synchronization Mode

Fluke 174x series feature automatic time synchronization with an accurate source for IEC61000-4-30 class A compliance. The current Logger time is shown in the line "Date / Time", along with a warning if the time read from the Logger deviates from the time adjusted on the PC. Several methods for synchronizing (4) the real-time clock are available:

- PC time: Enables the **Sync Now** (3) button. With PC time selected, click this button to get the current PC time, convert it to the logger time zone, and request the Logger real-time-clock (RTC) to update with that value. The button is only available when "PC time" is selected. With other selections, the Logger automatically keeps the RTC in sync. This selection will turn off automatic time synchronization during logging sessions. Resulting logging data may not comply with Class A requirements.
- Internet time: Disable **Sync Now**. The Logger will contact a time server on the Internet (NTP) and keep its real-time clock synchronized also during long logging sessions. This setting requires the Logger to be configured for Internet access – see "Network Settings", below. Time stamps of resulting logging data will be more accurate also over longer periods, but may not comply with Class A requirements.
- GPS: Disable **Sync Now**. The Logger uses the GPS signals to derive most accurate time synchronization. See the users manual for the Logger for details on how to use a GPS antenna. Time stamps of resulting logging data will be most accurate and meet Class A requirements.

Note

You cannot change time or synchronization mode while a logging session is active.

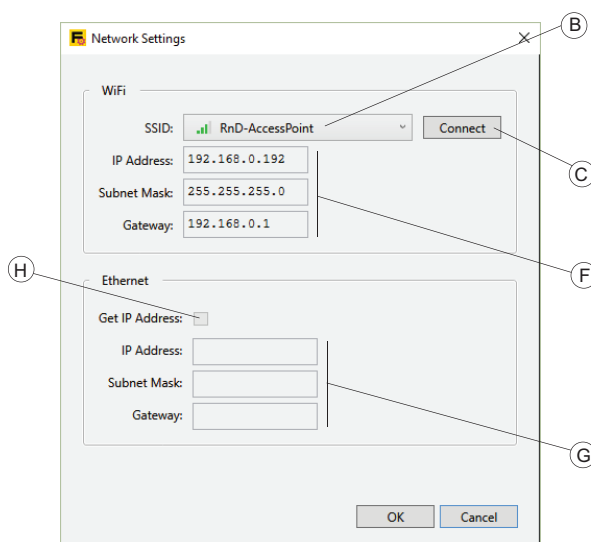
Network Settings

The Logger supports an Internet connection through WiFi or Ethernet to an Internet-enabled access point or network. See the users manual for the Logger for information on the interfaces it supports.

Note

The optional WiFi infrastructure license must be installed in the Logger. This license is free and automatically emailed to the registered email address when the Logger is registered at the Fluke website. Users must input details including the serial number of the Logger. The license is unique to the Logger serial number.

Click the **Adjust** ⑤ button at the right of the “Network Connections” line to configure the Logger interfaces, and find WiFi and Ethernet configuration options on the panel that opens from there.



To configure the Logger to connect to a WiFi access point, select from the options in the SSID box. The setup tool requests a list of discoverable SSIDs from the Logger and offers the result, along with associated field strength, as options. Select the SSID (B). If the access point to connect to works with a hidden SSID, select that entry. Click **Connect** (C).

The image shows two screenshots of a 'Wifi Password' dialog box. The top screenshot has a 'Hidden SSID' field with the placeholder text 'enter Hidden SSID here' (labeled D) and a 'Security' dropdown menu set to 'WPA2-PSK' (labeled E). The bottom screenshot shows the 'Security' dropdown menu set to 'WPA-PSK' (labeled E). Both screenshots have 'Login' and 'Cancel' buttons.

Depending on the configuration of the access point you chose, setup tool will ask for a passphrase – enter the passphrase of the WiFi Access Point. The setup tool will pre-select the security algorithm (E) based on the published capabilities of a discovered network (SSID).

If you chose to connect to an AP using a hidden SSID, also enter the SSID name (D), select the security algorithm (E) and enter the passphrase of the WiFi Access Point.

Click **Login** to command the Logger to connect using the given parameters. The process of connecting may take a few seconds, during which the setup tool will not respond to user inputs. On successful connection, the "IP Address", "Subnet Mask", and "Gateway" fields will show IP addresses.

Alternatively, you can use the Ethernet port to connect the Logger to a network that provides DHCP service. A connection is successful if the "IP Address", "Subnet Mask", and "Gateway" fields (G) will show IP addresses. The Logger will use this connection to gain access to the Internet. To assign a static IP address to the Logger, select the "Get IP Address" check box (H) and enter corresponding IP addresses manually.

Make sure the IT infrastructure supports this mode. Do not use a static IP address on the Logger unless you are sure the entered IP addresses are viable choices within the network you want to use.

It is important to have WiFi or Ethernet, or both, successfully connected to the Internet in case the Logger's Time Synchronization Mode was set to "Internet Time".

Note

You cannot change time or synchronization mode while a logging session is active.

Firmware version

To update the Logger firmware, make sure no logging is active and any logging data on the Logger has been transferred to the PC. The firmware update process will erase all logging data from the Logger.

Click **Update** ⑥ in the Instrument Setup window to start the firmware update process. Update options are:

- USB Drive
- Direct from PC

To update from USB drive:

1. Use a FAT32 formatted USB drive for 173x and 174x family of instruments. Use an exFAT formatted USB drive for 177x family of instruments.
2. Create a folder named **Fluke174x** at root level of the USB drive.
3. Download the latest firmware binary from:
fluke.com/support/software-downloads
4. Place the downloaded file in the folder on the USB drive.
5. Insert the USB drive into the Logger, and click **USB**.

To update direct from the PC:

1. Click **Direct**.
2. Select the downloaded firmware binary file.
3. Follow the on-screen instructions.

The firmware binary file transfers to the instrument.

The Logger will decrypt the firmware binary. This process takes a few minutes. On successful decryption, the actual update process begins. During update, the Logger will close down all interfaces, so the connection to the setup tool will be lost. The power button on the Logger flashes white during the update process and turns green after successful restart. When the power-button turns green, re-connect the Logger through WiFi, USB, or Ethernet.

See the users manual for the Logger for more information on firmware update and signals shown on the Logger front panel.

Note

You cannot update the Logger firmware while a logging session is active. During the firmware update process, the Logger deletes all logged data.

New License

This feature lets you apply an upgrade license to the Logger. Go to the Fluke website or contact a Fluke Representative for offered licenses. With the license purchase, a license file is sent to you by email.

To apply a license to the Logger:

1. Prepare a FAT32 formatted USB drive for 173x and 174x family of instruments. Prepare an exFAT formatted USB drive for 177x family of instruments.
2. Create a directory named **Fluke174x** or **Fluke177x** at root level.
3. Copy the received license file into the folder on the USB drive.
4. Insert the USB drive into the Logger.
5. Start Energy Analyze and connect to the Logger.
6. In Instrument setup mode, click **Install** ⑦ at the right of the "New License" row on the Instrument tab.

Note

A license can only be applied to the Logger it has been purchased for. You cannot apply a new license to the Logger while a logging session is active.

Installed Licenses

This line shows licenses that are already installed on the connected logger. Click **Show** ⑧ in the Instrument Tab to see the full list of licenses if not all licensed features fit one line.

Copy Service Data

Your Logger maintains internal logs to track any abnormalities or errors. Should a state occur that requires you to contact the Fluke Support Organization, use this feature to retrieve these logs and to share them with Fluke Support. Internal logs neither contain personal information, nor can data be used for any other purpose than to provide support more effectively.

Click **Download** ⑨ in the Instrument Tab to download the system log file.

Factory Reset

This feature lets you reset all configuration to factory defaults. This includes all settings that can be changed by instrument configuration.

The "reset to factory defaults" command in the Setup tool will not affect any installed licenses. However, if you use the "reset to factory defaults" command from the Logger front panel, you will need to re-install purchased licenses.

Click **Reset** ⑩ in the Instrument Tab to clear all logging data and to restore the factory defaults on the Logger.

OpenSource Licenses

Click **Show** ⑪ in the Instrument Tab to see a list that includes OS license texts for all components in the Logger firmware.

Configuration template

You can store and reuse known configurations. When the Logger is configured for a specific task, click **Download** ⑫ in the Instrument Tab to download a file with the current Logger settings. Save this file on a PC to apply to other Loggers or to repeat a campaign the requires these settings.

To apply saved settings, click **Upload** ⑫ in the Instrument Tab and select a stored configuration file.

Log file

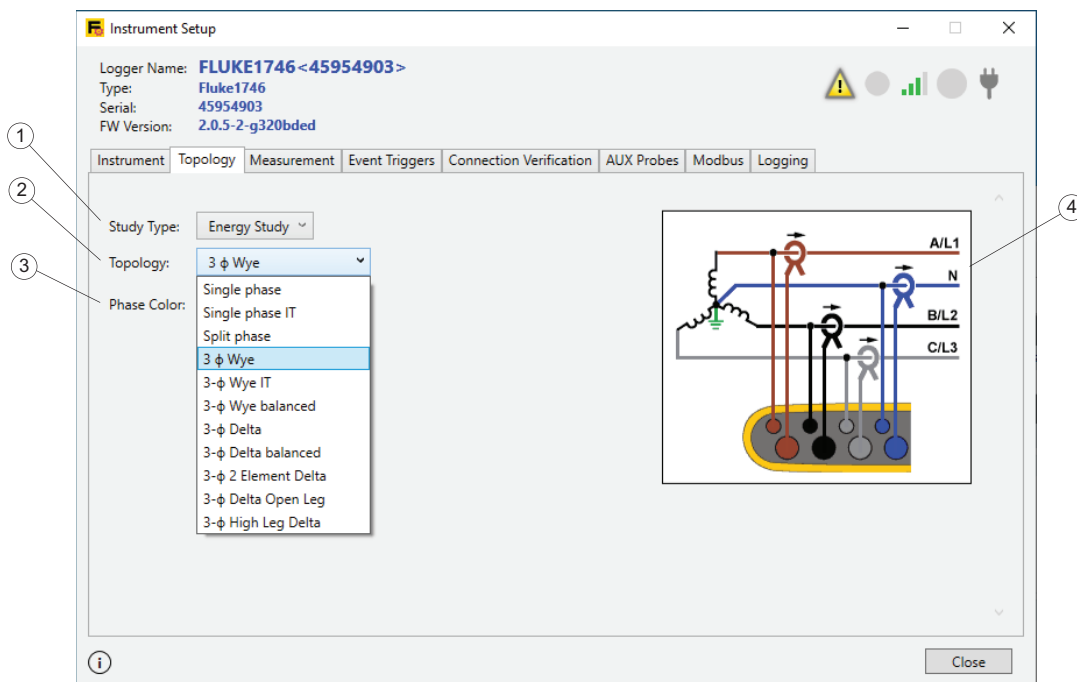
Click **Show** ⑬ in the Instrument Tab to see system logs from the Fluke PQSetup software component. These logs are use useful for troubleshooting and sharing with the Fluke Support Team.

Version information

Click the Info icon ⑭ in the Instrument Tab to see the version of the Fluke PQSetup software component.

Topology Tab

Adjust the Study type ① and the grid topology ② of the system under consid-
eration. You can also select color codes ③ applied to phase indication depending on
you locale.



Note

You cannot change the Study type or grid topology settings while a logging session is active.

Select Study Type

Your Logger supports two study types – Energy Study and Load Study.

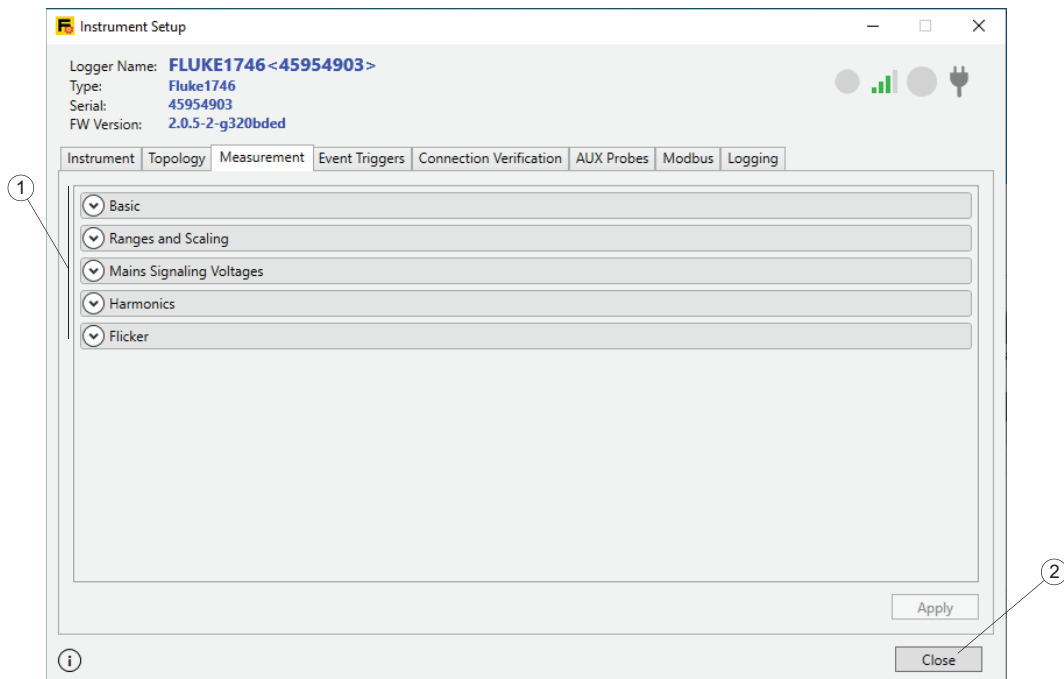
Energy Studies require you to connect voltage leads, and the results contain detailed and accurate power readings. Load Studies do not make use of voltage readings, thus spare you the effort of having to connect voltage leads. Refer to LOAD and ENERGY study descriptions.

Adjust Grid Topology

Select a topology setting from the list provided in the “Topology” row ②. This updates the connection schematics ④ shown to the right. The schematics show required connections based on the selected Study type and grid topology for quick reference during Logger configuration.

Measurement Tab

Go to the Measurement tab to configure the Logger to do specific logging tasks. This section is about the settings to choose the algorithms that the Logger uses to capture harmonics and interharmonics data. It is important to apply the correct settings and review choices before a logging session starts. After logging starts, you cannot change the configuration.

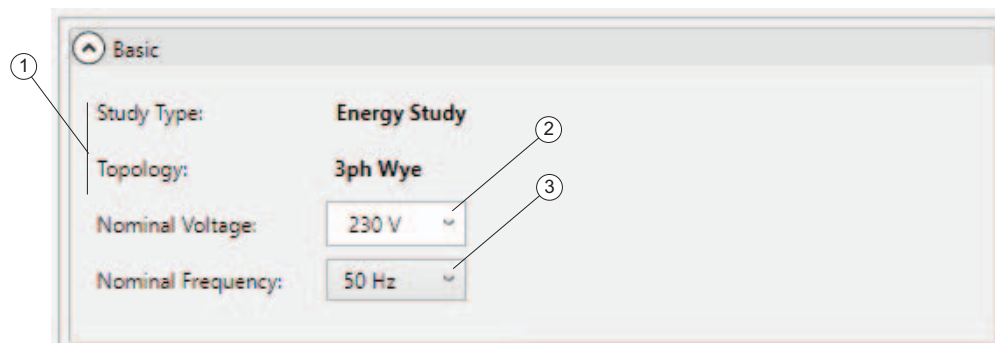


Content of the Measurement tab depends on the capabilities of the Fluke Logger you are about to configure. Features not supported by a Logger are not shown. See the users manual for the Logger for details on supported features.

Expand a section ① to change settings. When done, click **Apply** ②.

Basic Settings

The Basic section shows the currently adjusted Study Type and Grid Topology ①. To modify these settings, navigate to the “Topology” tab and apply changes there.



The Nominal Voltage selector ② lets you select the nominal voltage of the grid from a list of common settings in low-voltage nets. You can enter a custom setting if the list does not contain the correct setting. The definition of event triggers will depend on this setting.

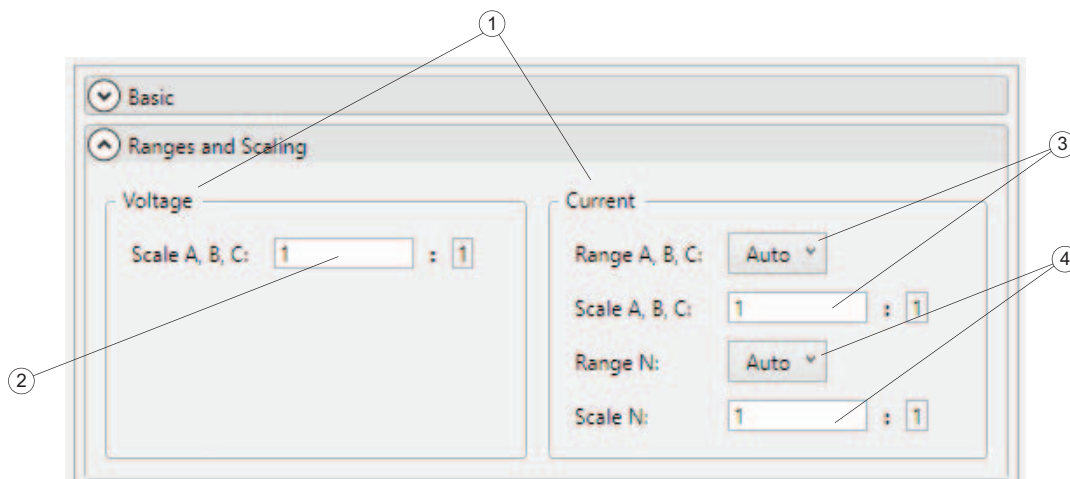
The Nominal Frequency selector ③ lets you pick the nominal frequency of the grid from a list of settings the Logger supports ②. The RMS calculation results depend on the selection of the Nominal Frequency.

Note

You cannot modify Basic Settings while a logging session is active.

Ranges and Scaling

The Ranges and Scaling lets you configure the Logger for use with voltage and current transducers in medium and high voltage electrical supply grids. Configuration is split into items that apply to voltage channels and those for current channels ①.



To adjust the scaling of voltages for use with voltage transducers, make sure to have configured the Nominal Voltage in the Basic Settings section to the reading of the primary side of the voltage transducer. Then enter the transducer-ratio in the Voltage Scaling text box (2). This setting affects the definition of Event triggers.

To adjust the scaling of voltage channels for use with transducers, make sure to have "Energy Study" selected as a study type.

The Logger takes current readings that use two measurement ranges and supports auto-ranging for the highest accuracy across the specified measurement range. Two range selectors are associated with current ranges and scaling (3, 4), one for phase quantities and one for the neutral current channel. This lets you cater for situations in which you expect significantly different current amplitudes on phase conductors versus those on the neutral conductor. To avoid automatic ranging, select a fixed current range to use during a logging session for cases that require gapless sampling.

Click on a current range selector (3, 4) to select a fixed range. Because the actual scale of current channels depend on the attached current sensors, the setup tool will show actual ranges in absolute readings only if the current sensors are connected to the Logger during configuration. Otherwise, "low" or "high" are given as options.

Enter the current transducer ratios for phase and neutral channels in the associated text boxes (3, 4). This setting affects the definition of "Inrush Current" events.

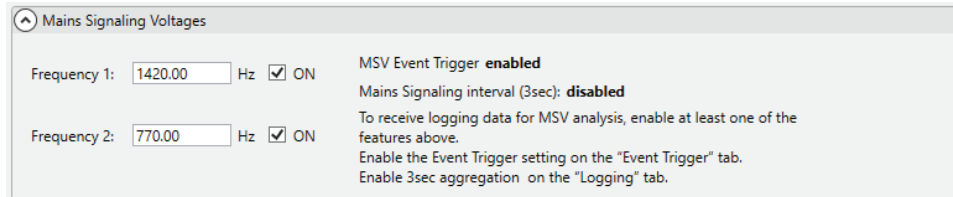
Make sure to have configured a suitable Grid Topology in order to get readings from the neutral current channel.

Mains Signaling Voltages

The Logger supports the assessment of mains signaling voltages as defined by IEC61000-4-30.

This section explains how to configure two frequency values for the voltage signal level readings to record. Make sure to have configured an "Energy Study" session.

The configuration starts at this section and is completed with event triggers selection. See [Mains Signaling Voltages](#) and [Session Configuration](#) for more information.



The screenshot shows the 'Mains Signaling Voltages' configuration window. It has two input fields for frequency: 'Frequency 1' set to 1420.00 Hz and 'Frequency 2' set to 770.00 Hz, both with 'ON' checkboxes. To the right, it shows 'MSV Event Trigger' as 'enabled' and 'Mains Signaling interval (3sec)' as 'disabled'. Below this, there is explanatory text: 'To receive logging data for MSV analysis, enable at least one of the features above. Enable the Event Trigger setting on the "Event Trigger" tab. Enable 3sec aggregation on the "Logging" tab.'

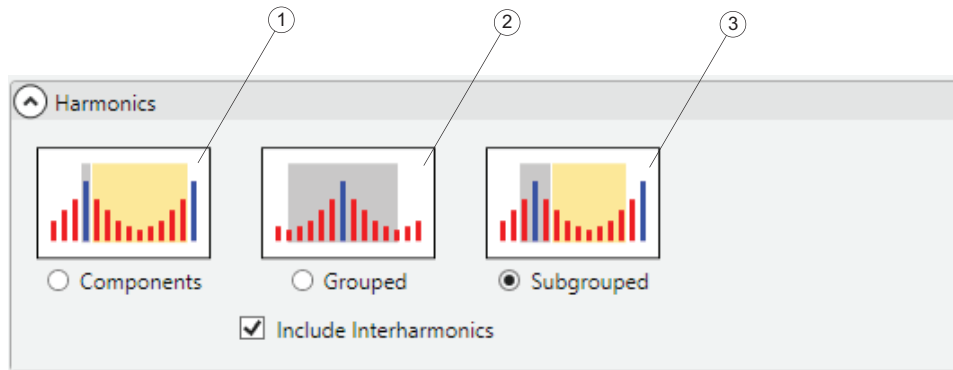
This setting affects configuration of Mains Signaling Voltage (MSV) Event triggers, in that only the configured frequency can trigger MSV events. Note that the trigger level is defined relative to the configured Nominal Voltage.

Select Harmonics Measurement Mode

Your Logger supports the assessment of harmonic (blue bars) and interharmonic (red bars) signal levels as defined per IEC61000-4-7. This section lets you select a calculation model from the options contained in the above mentioned specification.

To support this feature, the Logger performs FFT analysis while a logging session is active.

To log Harmonic Components only, select the **Component** ① model. Only bins that represent a harmonic frequency will be stored (blue bar and gray background). Interharmonic content (red bars, yellow background) will include all bins of the spectrum that lie between two harmonic bins.



The screenshot shows the 'Harmonics' configuration window. It features three radio button options: 'Components' (labeled ①), 'Grouped' (labeled ②), and 'Subgrouped' (labeled ③ and selected). Below these is a checked checkbox for 'Include Interharmonics'. Each model is accompanied by a small bar chart icon: ① shows blue bars on a gray background, ② shows blue bars on a gray background with red bars in between, and ③ shows blue bars on a gray background with red bars in between and yellow background elsewhere.

To log Grouped Components, select the **Grouped** ② model. Average signal levels of frequency bins that lie between harmonic frequencies will be distributed between two harmonic bins. That is, half of frequency bins including interharmonics (red bars,

gray background), in the spectrum to right and to the left of a discrete harmonic frequency (blue bar) are considered with that harmonic frequency's signal level (gray background).

Note

With the Grouped model applied, interharmonic signal levels are considered with harmonic bins and cannot be logged separately.

To log Harmonic Subgroups, select the **Subgrouped** model. Average signal levels of the two neighboring interharmonic frequency (one blue bar and two red bars) bins will be taken into account in a harmonic reading (gray background). Remaining interharmonic bins are grouped into one interharmonic reading (yellow background).

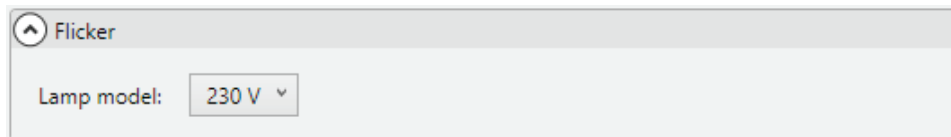
To log Interharmonic readings, you need to select either the **Components** or the **Subgrouped** model and select the **Include Interharmonics** check box.

The model selection made influences harmonic data that gets logged for analysis under the PQHealth tab. Depending on the study type selection made, the Logger collects data for voltage and current harmonics and interharmonics. While the model selection also affects data collected in very short intervals (three seconds aggregation as per IEEE 519), this interval will contain voltage readings, only.

By default, the **Harmonic Subgroups** model is selected to enable power quality standard compliance reporting (EN 50160, GOST 33073, IEEE 519, etc).

Flicker - Lamp Model selection

The Logger supports the assessment of Flicker severity according to IEC61000-4-15. This section lets you determine the lamp-model applied within the Flicker measurement algorithm executed while a logging session is active.

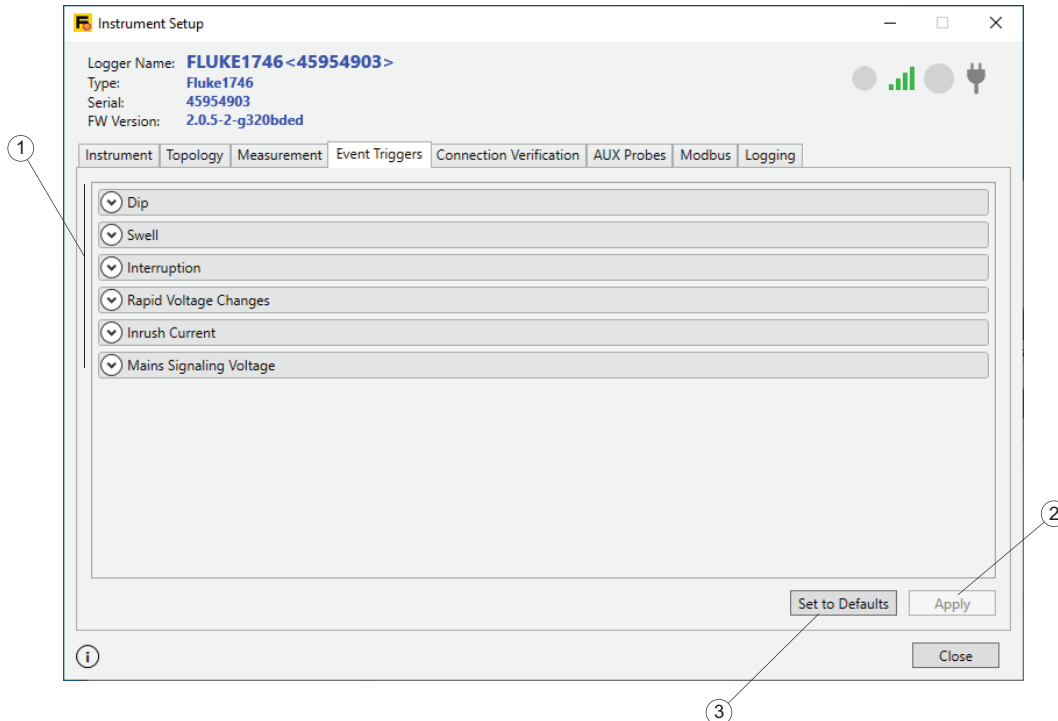


Unless you use Range and Scaling modifiers, make sure the lamp model selection matches the Nominal Voltage setting made under the "Basic Settings" section. If the measurement is on a medium or high voltage system that uses voltage transducers, make sure to select a model that matches the Nominal Voltage definition of the associated low voltage grid.

Events Triggers Tab

Go to the Events tab to configure event triggers and associated thresholds. This tab allows you to configure all event triggers that are supported by the Logger. Event types not supported by the Logger model are not shown. See the users manual for the Logger for information on the supported event types and trigger conditions.

All event triggers comply with IEC61000-4-30. If you intend to create a standard compliance report from the logged data, make sure the trigger types and associated limits comply with that standard.



Click **Set to Defaults** (1) to apply limits to triggers that are required for EN 50160 compliance reporting.

Click **Apply** (2) to send changes to the event configuration to the Logger.

All sections under the Events tab are designed to show trigger conditions in clear-text where possible. Click the arrow to the left of each section to collapse or expand.

Note

You cannot change the event configuration while a logging session is active.

Sliding Reference: For Dip and Swell events you can choose **Sliding Reference** to derive trigger conditions. If sliding reference mode is selected, the defined trigger threshold is applied to an adaptive reference derived from voltage level readings averaged over a period of one minute. This configuration is commonly used in mid- and high voltage grids.

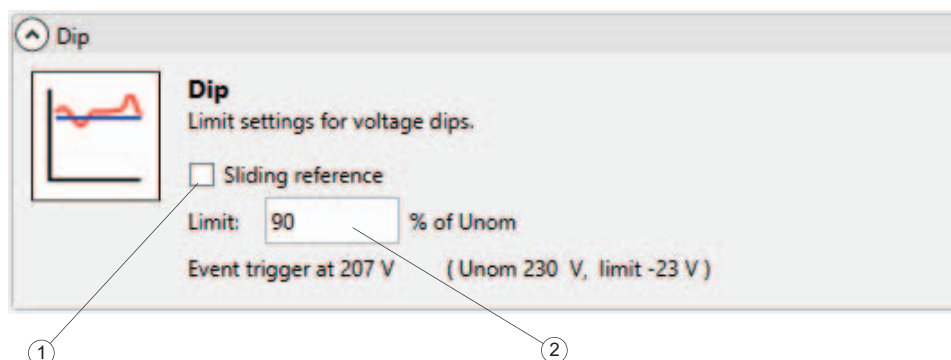
Where sliding reference is not enabled, the trigger limit is applied to the actual half-cycle RMS value of the corresponding voltage channel.

In a trigger condition, the Logger captures sample data as well as fast RMS readings that are shown as wave shapes and RMS profiles in Energy Analyze.

Voltage Dips

This section lets you configure Voltage Dip triggers as defined by IEC61000-4-30.

Select the **Sliding Reference** check box ① to use an adaptive limit based on past measured voltage levels averaged over a period of one minute, instead of a fixed voltage level.



Disable **Sliding reference** mode to apply a fixed voltage level for triggering Dip events.

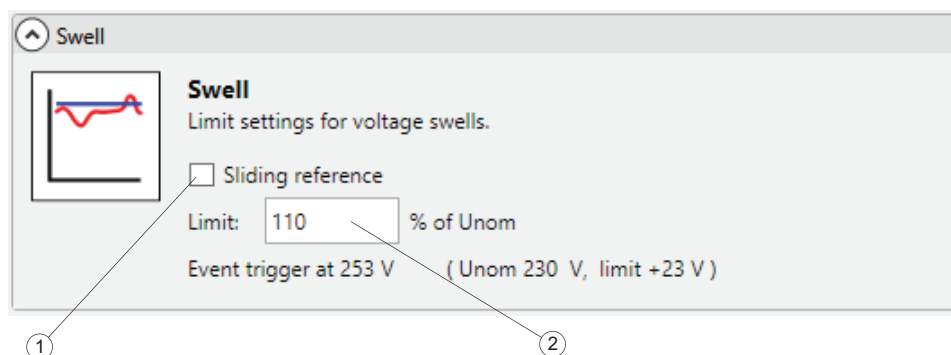
Enter a Limit value ② relative to the adjusted Nominal Voltage to define the trigger threshold. The actual trigger level is shown as a clear text reading based on the configured Nominal Voltage and includes scaling parameters.

A voltage Dip event is triggered if the level of the half-cycle RMS voltage goes below the defined threshold. See the users manual for the Logger for more detail on Dip events.

Voltage Swells

This section lets you configure Voltage Swell triggers as defined by IEC61000-4-30.

Select the **Sliding Reference** check box ① to use an adaptive limit based on past measured voltage levels averaged over a period of one minute, instead of a fixed voltage level.



Disable **Sliding reference** mode to apply a fixed voltage level for triggering Dip events.

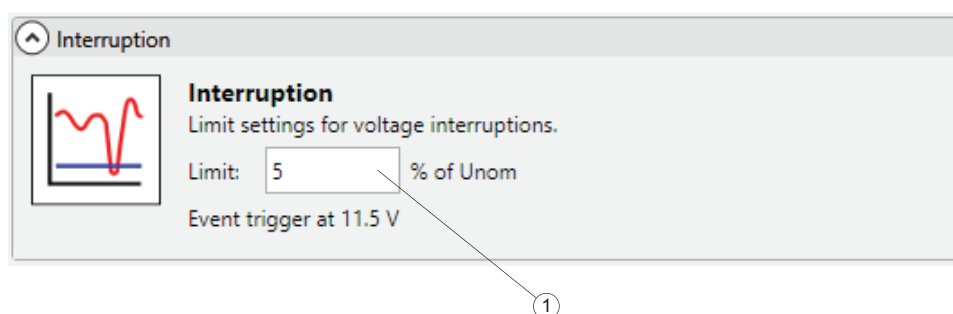
Enter a **Limit** value ② relative to the adjusted Nominal Voltage to define the trigger threshold. The actual trigger level is shown as a clear text reading based on the configured Nominal Voltage and includes scaling parameters.

A voltage Swell event is triggered if the level of the half-cycle RMS voltage goes above the defined threshold. See the users manual for the Logger for more detail on Swell events.

Voltage Interruptions

This section is about how to configure the Voltage Interruption triggers as defined by IEC61000-4-30.

Enter a **Limit** value ① relative to the adjusted Nominal Voltage to define the trigger threshold. The actual trigger level is shown as a clear text reading based on the configured Nominal Voltage and includes scaling parameters.

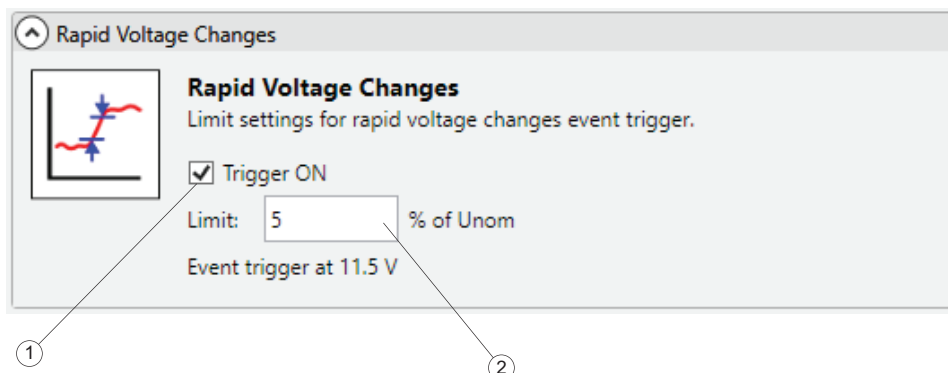


A voltage Interruption event is triggered if the level of all half-cycle RMS voltage channels goes below the defined threshold. See the users manual for the Logger for more detail on Interruption events.

Rapid Voltage Changes

This section is about how to configure the Rapid Voltage Change triggers as defined by IEC61000-4-30.

Rapid Voltage Changes are quick transitions of the RMS voltage between two steady states. Enter a **Limit** value ② relative to the adjusted Nominal Voltage to define the trigger threshold.



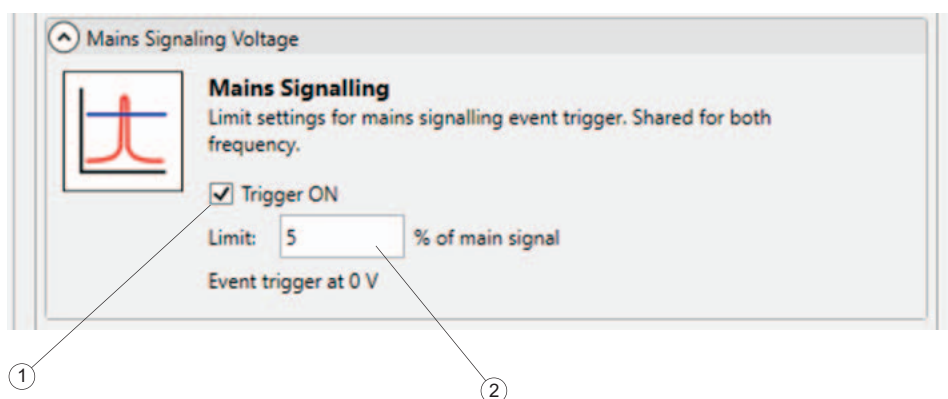
To enable the RVC trigger, select the **Trigger ON** check box ①. A Rapid Voltage Change event is triggered, if the difference between two steady states exceeds the trigger threshold. The Logger captures the event along with detailed data. Disable the trigger to save Logger memory if not needed.

Mains Signaling Voltages

This section is about how to configure Mains Signaling Voltage triggers as defined by IEC61000-4-30.

Mains Signaling Voltages are bursts of signals, often applied at a non-harmonic frequency, that remotely control industrial equipment, revenue meters, and other devices.

To configure Mains Signaling Voltage event triggers on the Logger, make sure to have configured the frequencies of interest on the "Measurement" tab. Select the **Trigger ON** check box ① to additionally enable the detection of events. If a trigger condition is met, the Logger also captures detail data.

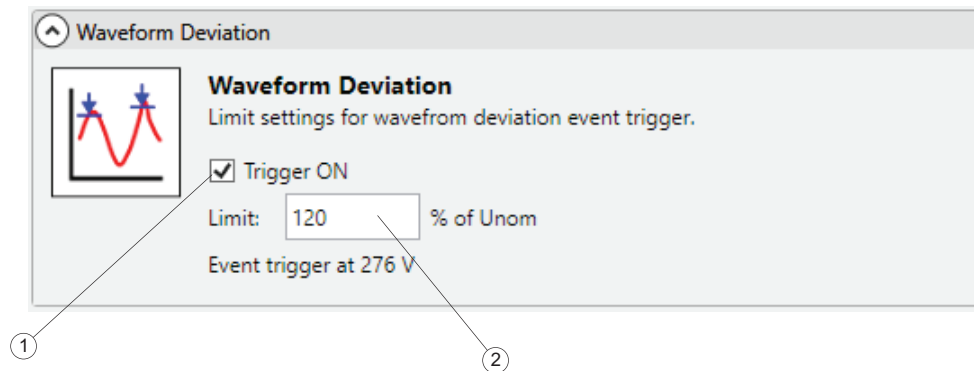


Enter a Limit value ② relative to the adjusted Nominal Voltage to define the trigger threshold. Disable the trigger to save Logger memory if not needed.

Waveform Deviation

The Waveform Deviation trigger monitors the differences in the waveforms of consecutive voltage cycles. This makes it a general-purpose trigger to capture all kind of disturbances caused by sudden changes in the wave shape.

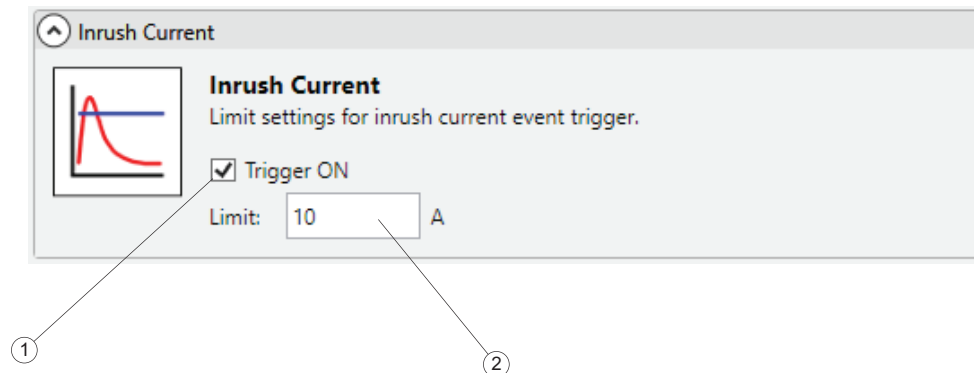
To enable the Waveform Deviation trigger, select the **Trigger ON** check box ①. A waveform deviation event is triggered, if the difference between two voltage cycles exceeds the defined **Limit** ②. The Logger captures the event along with detailed data. Disable the trigger to save Logger memory if not needed.



Inrush Current

Inrush currents are surge currents that occur when a large or low-impedance load comes on line.

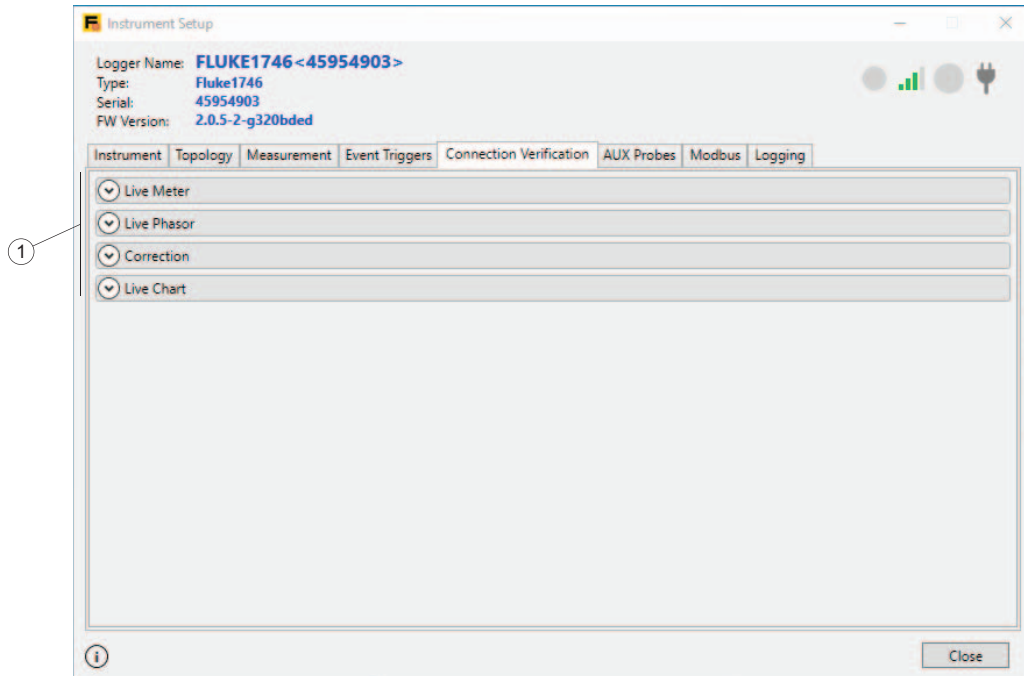
To enable the Inrush Current trigger, select the **Trigger ON** check box ①. An Inrush Current event is triggered, if the actual half-cycle RMS readings of a current channel exceeds the defined **Limit** ②. The Logger captures the event along with detailed data. Disable the trigger to save Logger memory if not needed.



Connection Verification Tab

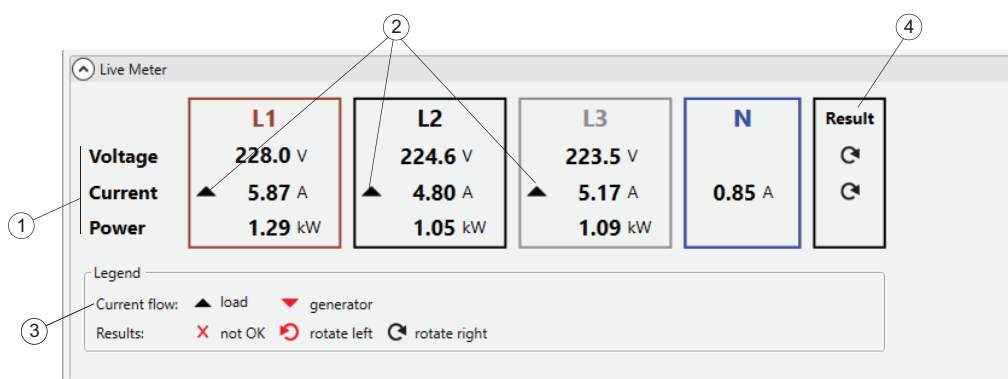
Go to the "Connection Verification" tab to check the connections of voltage leads and current sensors are made correctly in terms of phase sequence and polarity. Correct phase sequence requires to have identified phases as A (L1), B (L2), C (L3) for voltage connections and to have these matched with the relevant current channels. It is important for current sensors to have them attached in direction of the load flow, additionally to getting the phase sequence correctly.

Items ① on this tab are different views to help review phase sequence and current sensor polarity. This tab also has a tool to digitally correct identified issues without physically changing the connections.



Live Meter

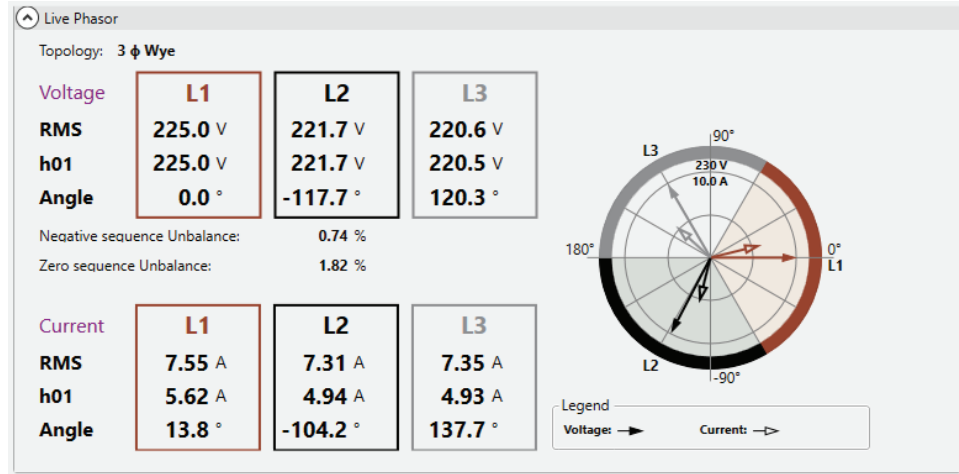
The live RMS readings ① for voltage, current, and resulting active power are shown at the top of the tab. For current readings, the black or red arrows ② indicate the load direction. To see the loads in terms of Current Flow ③, a black arrow indicates the sensor of the corresponding channel has been mounted to correctly result in active power being 'consumed', for example, a load condition. A red arrow indicates the current on this channel is connected in the wrong direction and the actual results indicates power being generated, not consumed. The Results ④ box shows how the phase sequences of voltage channels match with that of amps channels. Only if both, voltage and current systems, show the same rotational direction, can the connections be corrected.



Note

It is important to define the Current Flow ③ to match the system. For systems that change load direction (energy recovery), make sure the system takes only one state, load OR generator, while correcting the connections.

Live Phasor



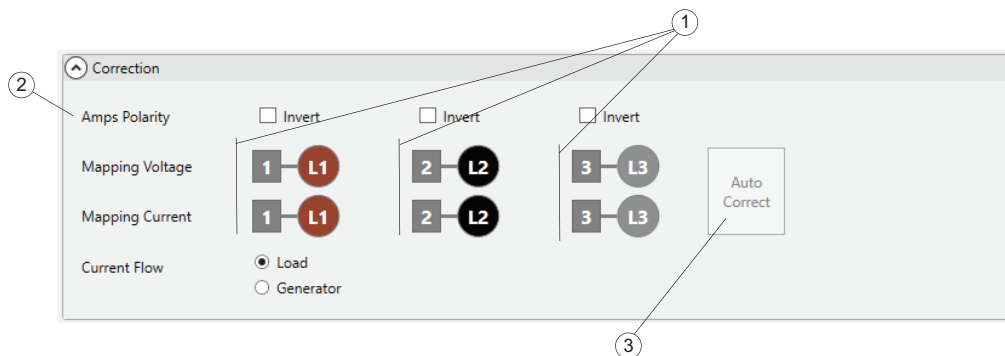
Correction

Features in this section let you digitally correct the connections made to the Logger in a safe environment without touching the voltage leads or current sensors.

First, make sure that both the voltage and the current systems of a poly-phase topology rotate in the same direction. In a three-phase system, the rotation direction changes if you swap channels.

To swap two voltage channels:

1. Click on the number box ① next to the channel label to select the first channel.
2. Click on the numbered box of the channel to change positions.
3. Confirm the rotation indication, active Power readings, and sequence component ratios in Live Meter or Live Phasor views.
4. If necessary, apply the procedure to current channels, too.



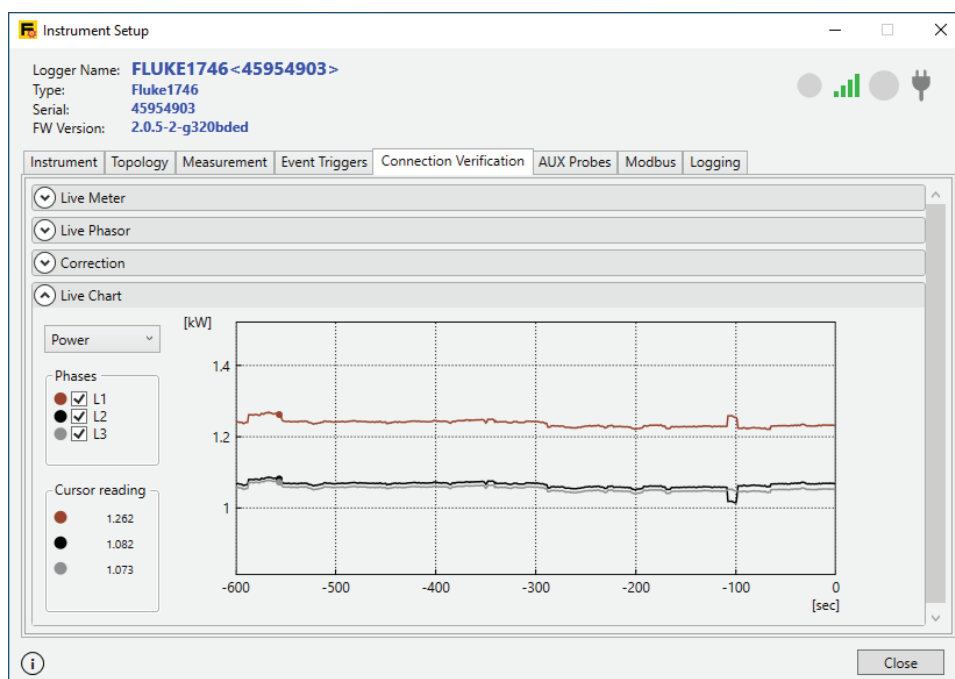
5. With phase sequences corrected, look at the load direction of the current channels and active power readings.

6. Select the check boxes for the **Amps Polarity** row ② for channels that show a wrong load direction (red arrow in case of load view).

This is the digital equivalent to physically open a current sensor, turn it by 180°, and reattach it to the wire so that the arrow on the current sensor now points in the opposite direction.

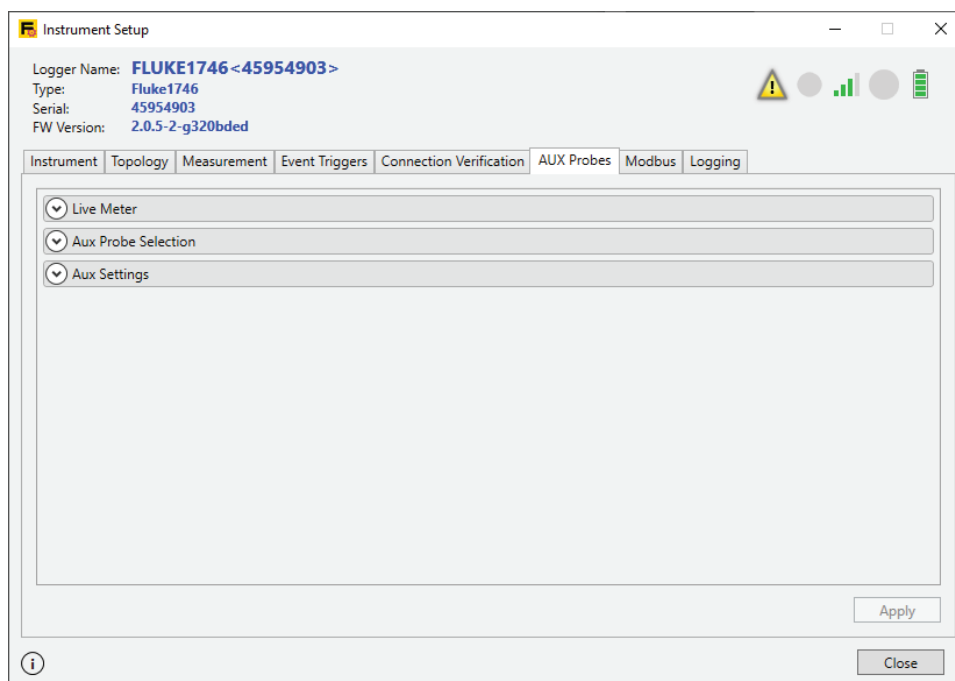
Your Logger has the capability to automatically suggest required connection correction for load-systems or generator-systems. Alternatively, click on the **Auto Correct** ③ to automatically show the new state as well as updated phase mapping and current sensor polarity. Where the Logger is not able to identify an unambiguous correction, the **Auto Correct** is disabled and you need to use the UI elements to correct the phase sequence and Amps polarity as described above.

Live Chart



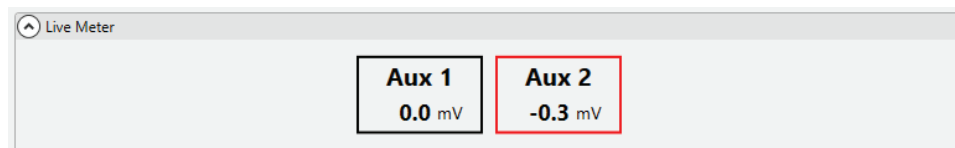
AUX Probes

Items on the AUX Probes tab show current data for Aux channels and let you configure linear transfer functions for the attached sensors. You can also choose between using the Auxiliary inputs of the Logger or to connect Fluke 3000 FC-based modules.



Live Meter

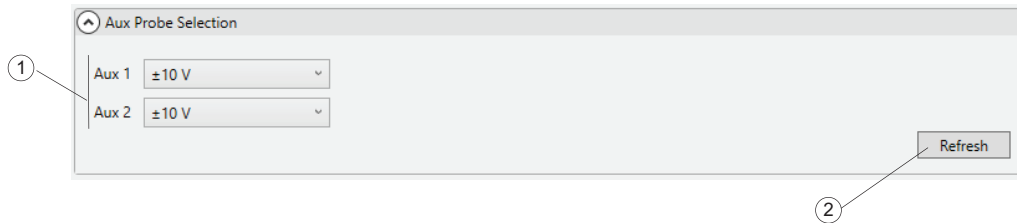
This section shows live readings from the Aux channel configurations. See [AUX Settings](#) for more information about how to change the Aux configuration.



AUX Probe Selection

The 1732/4/6/8 and 1742/6/8 Loggers support two Aux channels connected to the AUX input. These are shown as "±10V" or "wired" in the Aux Probe Selection.

Additionally, choose from a range of 3000-series modules to remotely monitor equipment. These modules require a BLE (Bluetooth®) connection with the Logger. See the users manual of the Logger for more information about how to connect.

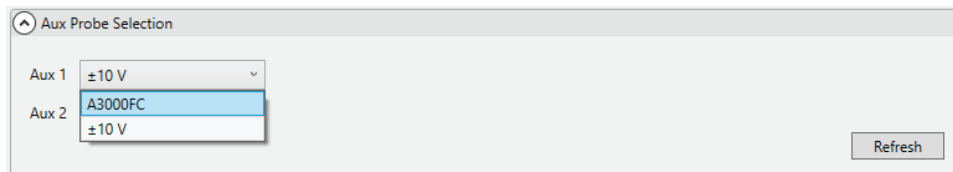


After you connect a 3000-series module to the Logger, Fluke 174x instruments need to be configured to use data from the modules instead of the wired Aux inputs:

1. Click **Refresh** ② to re-scan any paired F3000-modules or repeat the refresh when new modules are paired.

Available modules show as a new entry in the dropdown menu ①.

2. Select the module. A3000FC shows in the example below as the Aux channel that you want to use from the F3000-module.



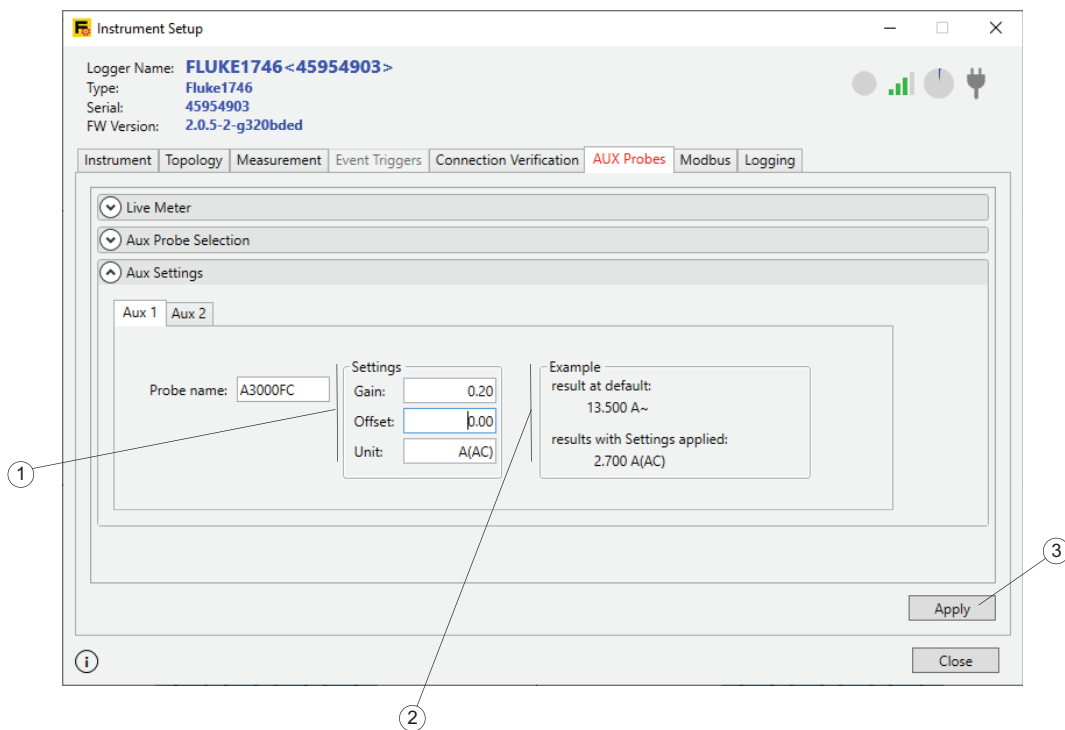
3. Continue in the Aux Settings dialog to change scaling and unit to log and later report to Energy Analyze. As an example, if you plan to use a DC voltage module to log data from a sensor in the system under observation that provides an 0..10V output signal.

AUX Settings

To adjust the scale of values captured through the Aux channels, use the items in the Settings group ①. Gain and Offset parameters enable linear recalculation of values received (wired or BLE) versus values stored in the logged data. Enter text to the Unit parameter to change the unit that shows in FEA+.

Refer to the Example group to make sure that the changed settings yield the correct results. Results are updated using measured values from the actual sensor (BLE or wired). Once settings are correctly adjusted, click **Apply** ③ to save these as part of the configuration data to the Logger.

The text in the AUX Probes tab ④ turns from red to black when all changes are applied.

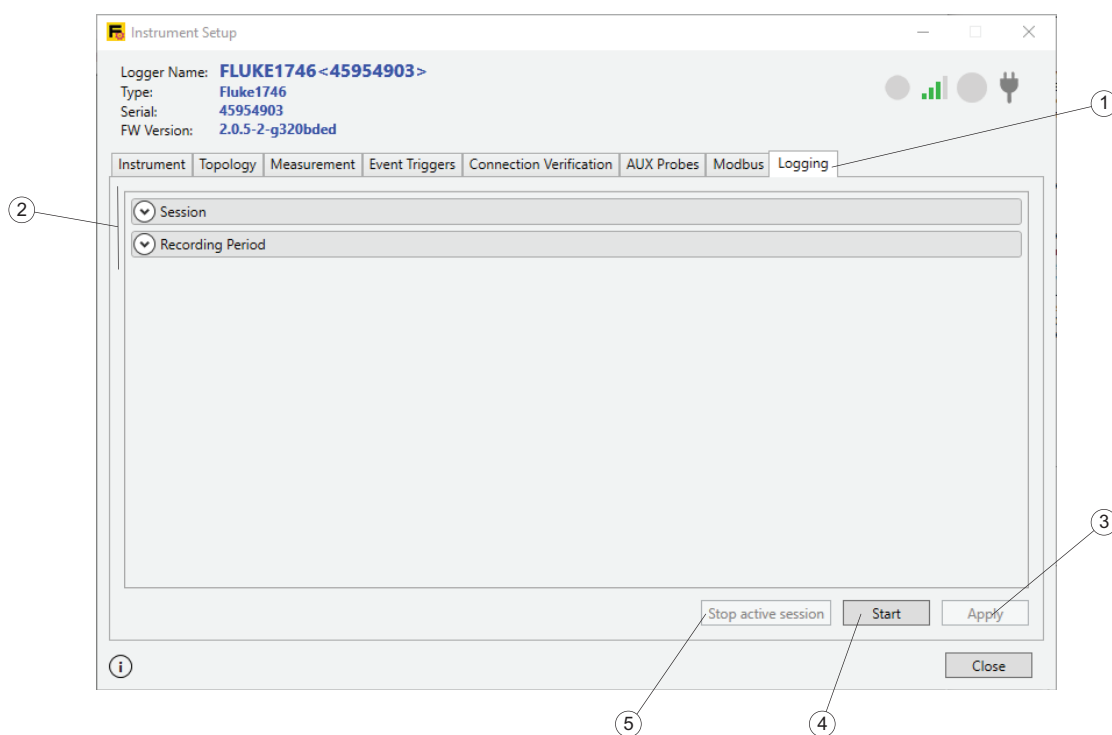


Logging Tab

The Logging Tab ① lets you configure properties of a logging session, such as its name, duration and content. Properties are organized into sections that can be collapsed or expanded ②. It is recommended to change an item and click **Apply** ③ to let the change propagate to other options where needed.

After you change and apply parameters, click **Start** ④ at the bottom of the panel to start the logging session.

To stop an active logging session, click **Stop active session** ⑤.



Note

You cannot change logging session attributes while a logging session is active.

Session Configuration

Under the Session category, adjust what **Memory model** ① the Logger uses for a session. If you select a circular model, the Logger will start to replace oldest session data with the latest once the defined size is full. In this mode, logging can always stay active and you can download data once there was an issue.

The screenshot shows the 'Session' configuration window. It contains the following fields and controls:

- Memory Model:** A dropdown menu currently showing 'Offline, Linear'. Callout ① points to this dropdown.
- Name:** A text input field. Callout ② points to this field.
- Description:** A larger text input field. Callout ③ points to this field.
- Trend Interval:** A dropdown menu. Callout ④ points to this dropdown.
- Demand Interval:** A dropdown menu. Callout ⑤ points to this dropdown.
- Harmonics Interval (3sec):** A checkbox that is checked. Callout ⑥ points to this checkbox.

If you select a linear model, the Logger logs until the defined end date is reached and then stops.

You can also choose whether or not to synchronize logged data to your Fluke Connect[®] account. If you chose an online model, data is sent to the Fluke Connect[®] data center. In an offline model, the Logger stores logging data to internal memory.

The **Name** field ② will be initialized to a session name that auto-generates. Logger-generated name are formatted to <ES.xxx> or <LS.xxx>, where

- ES is the abbreviation for "Energy Study"
- LS is the abbreviation for "Load Study"
- xxx is an incremental file number maintained by the Logger. The counter resets when the Logger is set to factory defaults.

You can override the default by entering a custom name into the **Name** field ②, this will help you find logging session files on the PC hard disk. A valid custom name can take up to 31 characters and must not contain tilde (~), number (#), percent (%), ampersand (&), asterisk (*), braces { }, [], backslash (\), colon (:), angle brackets (< >), question mark (?), plus (+), pipe (|), quotation marks (" ").

The **Description** field ③ lets you enter more details about the measurement, such as customer, location, and load-rating plate data. Text is limited to 127 characters. After you download a logging session with Energy Analyze, the description can be also entered or modified.

The **Trend Interval** ④ contains averaged readings of measurements. See the users manual for the Logger for details on logged data. Select the duration of one aggregation interval after which a new set of trend data is stored. The available intervals are:

- 1 s
- 5 s
- 10 s
- 30 s
- 1 min
- 5 min
- 10 min
- 15 min
- 30 min

A shorter interval provides more details at the cost of higher memory consumption, but can be useful when you want to identify the duty cycle of frequently switching loads or calculate the electrical energy needed for production steps.

Electrical Energy providers use the **Demand Interval** ⑤ to measure customer demand, and cost of energy. Select an interval to get energy costs and the maximum demand value (average power measured over a demand interval). The available intervals are:

- off
- 5 min
- 10 min
- 15 min
- 20 min
- 30 min

Demand Interval length of 15 minutes is widespread. If you don't know the billing interval of the Energy provider, choose 5 minutes and let Energy Analyze recalculate the aggregation to a value that meets the needs.

Note

The Demand Interval data is not logged in Load Studies.

You can enable or disable logging of Harmonics Interval ⑥ that contains voltage and current results aggregated into three-second intervals. These values are required for standard compliance reporting according to IEEE 519, which is available as a license option for the Logger. See the users manual for the Logger for details, or contact your Fluke Representative on available options. Disabling this interval lets you create logging sessions for a longer period because the Logger stores less data.

Recording Period

Go to the Recording Period category to set the start and duration for the logging session.

The screenshot shows the 'Recording Period' configuration window. It contains the following elements with numbered callouts:

- ①: ☐ Immediate start
- ②: Start date: 4/15/2021 (calendar icon)
- ③: Start time: 8:40 AM (time picker icon)
- ④: Duration: 1 day (dropdown menu)
- ⑤: End date: 4/16/2021 (calendar icon)
- ⑥: End time: 8:40 AM (time picker icon)

To set the start time, select **Immediate start** ① or set a **Start date** ② and **time** ③ that is in the future. If **Immediate start** is checked, the Logger starts to log trend data (see [Session Configuration](#)) immediately and data that is used to create plots in under the PQHealth tab will start at a boundary that matches a 10 minutes boundary relative to the real-time-clock. For instance, let the local time be 18:08, Trend Interval 10 minutes, Demand Interval 15 minutes. Then actual data logging will start at these time stamps:

- Trend Interval
 - first trend interval start: 18:08
 - first trend interval stored: 18:18
- Demand Interval
 - first demand interval start: 18:15
15 minute boundaries are hh:15, hh:30, hh:45, hh:00. The next available boundary at 18:08 starts 18:15
 - first demand interval stored: 18:30
- Data under PQHealth tab
 - first PQHealth dataset start: 18:20
10 minute boundaries are hh:10, hh:20, hh:30, hh:40, hh:50, hh:00. The next available boundary starts at 18:20, because the Logger reserves a buffer time of five minutes before logging data for the PQHealth tab.
 - first PQHealth dataset stored: 18:30

The logging session can always be stopped with the remote client or by pressing the Logger's Start/Stop button for longer than 3 seconds.

To configure a scheduled recording, uncheck **Immediate start** and select the start date from the calendar ② and enter the time ③ with the time-picker control. The setup tool may issue an error indication if the duration based on memory model, and the trend-, demand- and harmonics interval settings cannot be satisfied. Error indications are shown by red circular icons next to the parameter.

Instead of defining the end date (5) and time (6) of a logging session, you may also select its duration (4). You can set the duration of the measurement from a list. The "Maximum" entry from the list configures the maximum possible duration based on the available memory. For a duration not shown in the list, select **Custom** to enter the duration in number of hours or days.

This method allows you to configure the Logger to measure a full week profile starting on Monday 0:00 and ending on Sunday 24:00. The setup tool shows an error indication if the duration does not fit available memory capacity.

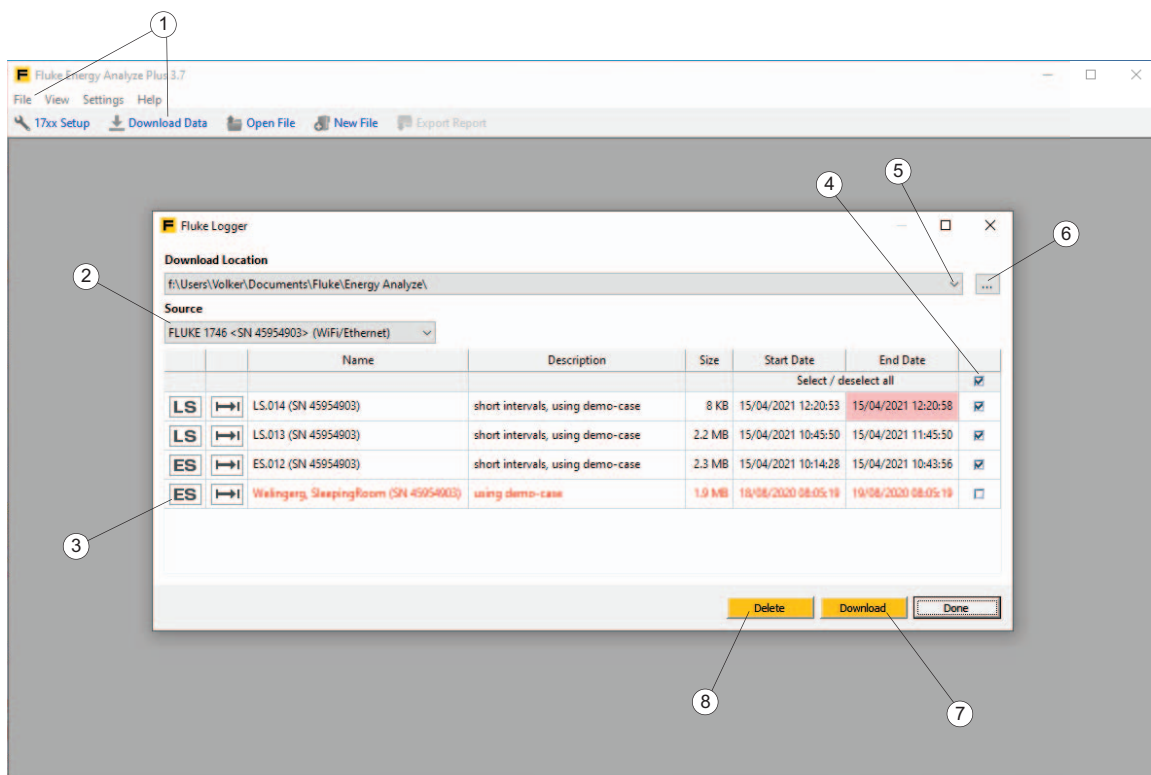
Note

With a scheduled recording configured, push the Logger's Start button to enable the configured schedule.

Even when a start date and time has been configured, you must push the Start button on the Logger in order to arm the schedule.

Download Data

You can transfer logged data from the Logger to the PC through a direct USB connection to the PC, by WiFi or Ethernet connection, or a USB flash drive. See the users manual for the Logger for more information about the available interfaces. The software automatically detects available data sources.



To download data:

1. Make sure the Logger is connected with the PC. See *Connect an Instrument to the PC* for more information.

Or, insert a USB drive that has been used to transfer data from the Logger.

2. Start the software and select **File > Download Data**, or click the Download Data icon ① on the main toolbar. The Logger is automatically listed as a "Source" and includes a connection description. It is important to connect the data source, for example, the Logger or USB drive, to the PC before you use the Energy Analyze data download function. If not, the Source ② selector cannot provide the access paths.

A default download location is allocated during the software installation. The download dialog offers an option to store data to a previously used location ⑤ or to define a new location ⑥.

3. Once source and destination are set, select the data to be transferred ④ and click **Download** ⑦. Files that already exist at the selected location are shown in red text ③.

If the download starts and data already exists at the download location with the same file names, the software prompts you to overwrite, rename, or skip the logging session.

After data is downloaded to the PC, you can remove this data from the Logger.

To do so:

1. Select the files to remove ④.
2. Click **Delete** ⑧.
3. Click **Done** to close the dialog.

How to Work with Files

Fluke Compound Analysis files (.fca) store the logged data separate from edits and keeps both in one file. See [Data Format and Management](#) for more information.

Create a New Analysis File

Click **File** > **New File** from the main toolbar. The software prompts you for a new file name and location. Once this information is provided, the software shows an empty file in the Project Manager view and accepts text input to the client, location, and description fields. See [Project Manager](#) for more information.

Note

It is recommended to keep user files created this way in a different directory than downloaded files.

Add Data to a File

Click  located at the right side of the file summary title line. A file-open dialog pops up to let you choose the source file that contains the data to add. Once a source file for downloaded data is selected from the directory, the data is copied to the open file.

Note

If the source contains more than one data set, only the first set is copied.

A successful data addition includes a session summary field. See [Project Manager](#).

Add Images to a File

Click  (right side of the file summary title line) to open the popup dialog box and choose the image to import. This feature supports the addition of screenshots from the Logger, a mobile device, or a digital camera to an analysis file.

Create Bookmarks

Bookmarks have two purposes:

- To store a view for use within a report.
- To store a view you intend to continue to work on or reuse at a later time. The software can be closed and when the analysis file is loaded again, locate the bookmark in the report tab and return to the saved state.

 is available from all data representation sections (overview tables, graphs, time range tables) on the Energy Study or Load Study tabs. Use the editable section title line to enter a custom name, then click  to store a snapshot of the current view.

To remove a bookmark from the current project:

1. Select the bookmark in the report item list.
2. Press the delete key or use the context menu (right-button mouse click on the bookmark item in the left pane of the window).

To edit a stored bookmark:

1. Double-click on that list element, or use Edit on the title line of the item in the report content panel.

This will take you to the exact same view that was active when that bookmark was created.

2. Make changes:
 - Enter a new name in the title line of the view you are editing.
 - Add a new bookmark once done.
 - Remove old bookmarks. Energy Analyze does not overwrite any bookmarks.

Copy to Clipboard

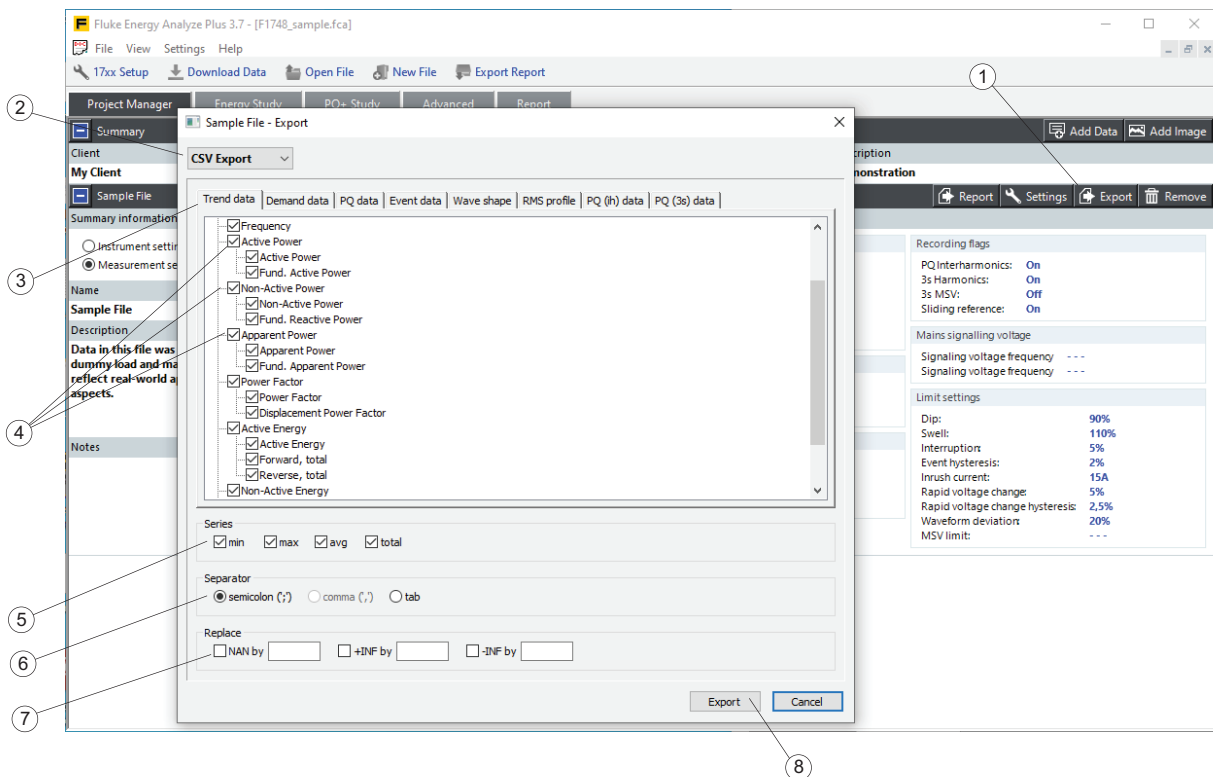
The **Copy to Clipboard**  widget is available from all title lines of all sections on Energy Studies and Load Studies. Use this widget to copy the content shown below the corresponding title line into the Windows clipboard. From the Windows clipboard, you can paste it into other applications such as word-processing software or email.

Export Data to .txt File

Export Data  ① allows you to export data from the current logging session. You will see this widget in the title line of each session summary on the Project Manager. Click to open the dialog and choose the target format for data export.

Export to CSV

Select the CSV Export option ②.



Energy Studies contain several sets of data series that are listed as in tabbed categories ③.

Note

Demand data is recorded with the sync to demand interval setting on the Logger. Trend data is recorded using the trend interval setting on the Logger. PQ data is recorded at a fixed aggregation interval of 10min that are aligned to the real-time clock. For more information, see the users manual for the Logger.

1. Select each of the parameters or parameter groups ④ to export.

The selection on series items ⑤ affects all selected parameters and groups.

2. If interested only in averages, make sure to uncheck "min", "max", and "total".
The "total" selection applies to results that total phase quantities in poly-phase systems, such as power readings.

The file export function creates a text file with delimited fields separated by the character F that you define.

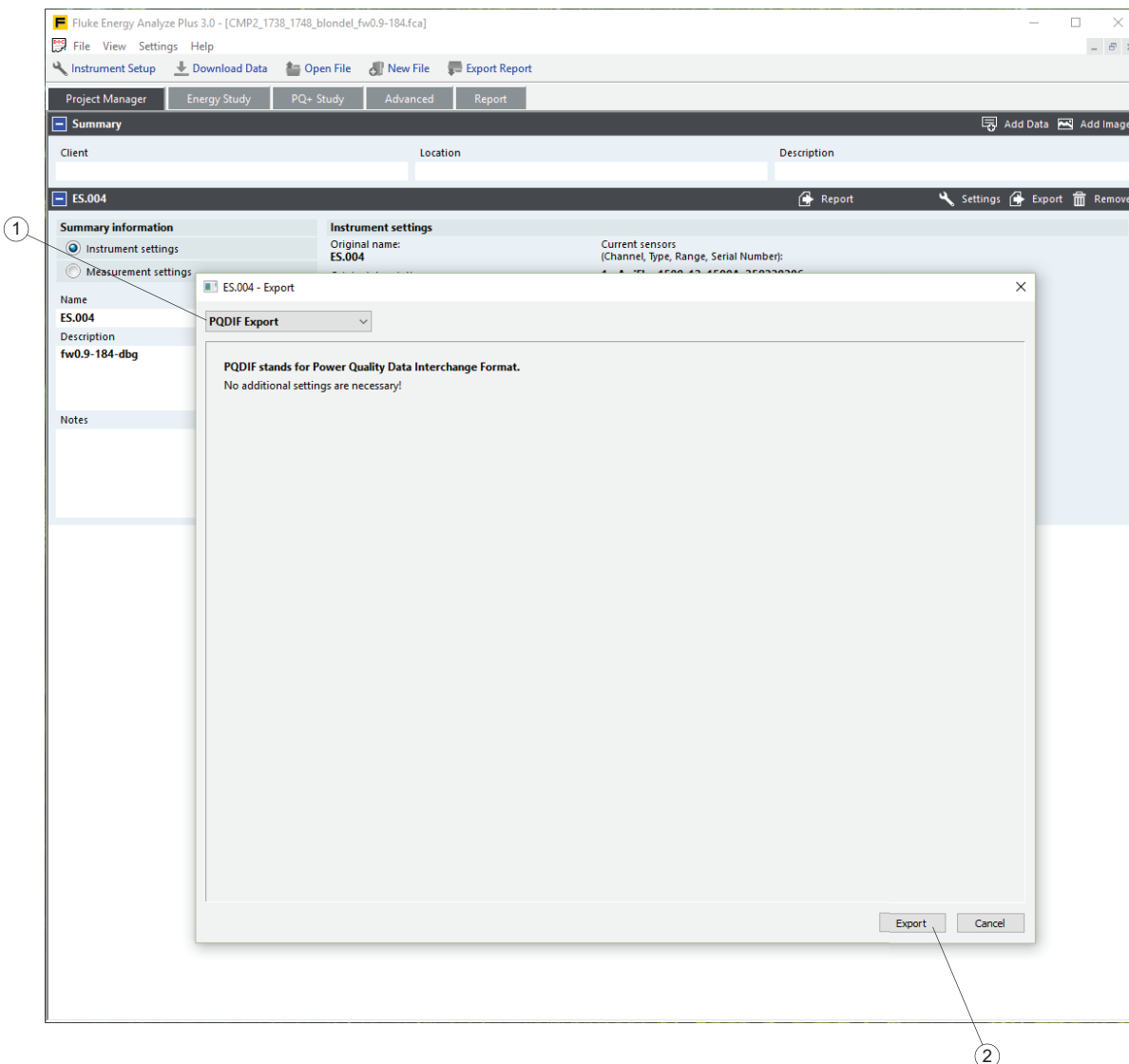
3. After all adjustments are complete, click **Export** ⑥ to create the data file.

The Logger internally uses floating point number representation, including IEEE-754-compliant exceptions qNaN (quiet "Not-a-Number"), +INF (positive infinity) and -INF (negative infinity). You can define characters that will **Replace** ⑦ these floating-point exceptions in the text file that result from the export.

4. After all adjustments are complete, click **Export** ⑧ to create the data file.

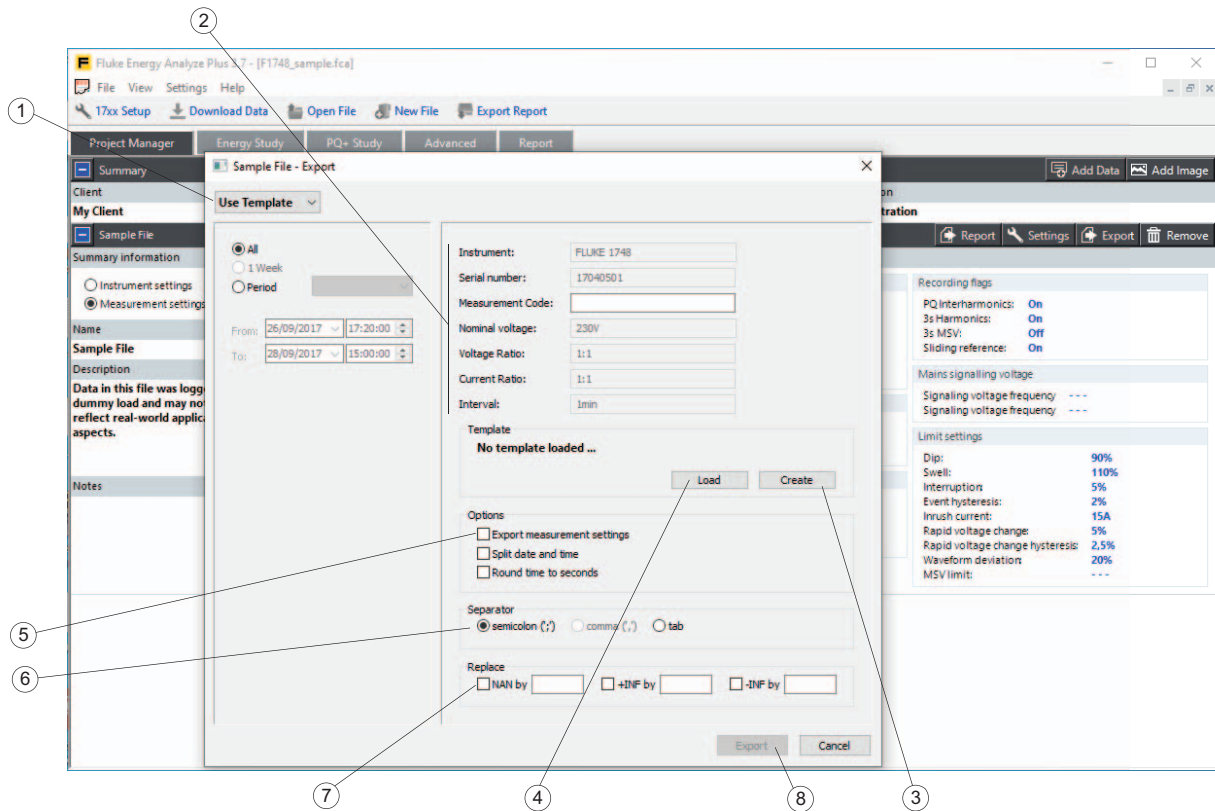
Export to PQDIF

Select the PQDIF Export option ①. Energy Analyze exports all available data into a standard PQDIF file that uses standard PQDIF IDs. Click **Export** ② to save data to a PQD file.



Custom-Template Based

Choose the option **Use Template** ① for frequent exports of the same data from different sessions.



The exported .csv file contains a header that consists of the items to the top-right of the panel ②:

1. Click **Create** ③ to make a new template. Pick data required items from the channel selection tree and save the template.

2. To apply a saved template, click **Load** ④.

The loaded template path and name show on the panel.

3. Review additional **Options** to adjust content for the data export. For example, check **Split date and time** to set one column for the date and another for the time.

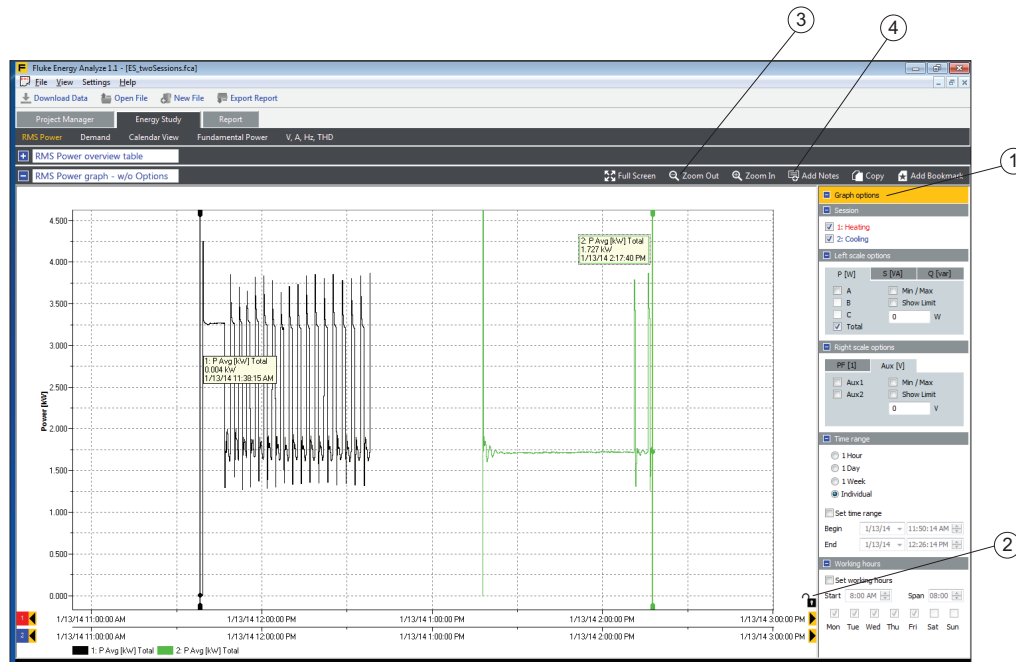
The file export function creates a text file with delimited fields separated by the character that you define.

The Logger internally uses floating point number representation, including IEEE-754-compliant exceptions qNaN (quiet "Not-a-Number"), +INF (positive infinity) and -INF (negative infinity).

4. Define characters that will **Replace** ⑦ these floating-point exception in the text file resulting from the export.
5. After all adjustments are complete, click **Export** ⑧ to create the data file.

Plot Usage

To select the data of interest, use **Graph Options** ①. The view can be modified to highlight the information that is most important for the report. In this example, two sessions have been recorded with one Logger.



To compare data from both sessions in more detail:

1. Click the lock symbol ② to unlock the x-axes.
2. Right-button click on either x-axis to open the **Auto Scale X/Y to fit** context menu and use it to overlay both traces so that they start the plot at the same point.

The context menu will also let you numerically enter a time span with the Manual Scale function.

3. Drag the lower x-axis to a new position to fine-adjust the overlap of both data series in the plot. Energy Analyze Plus will automatically snap curves so that alignment to the grid of the first x-axis (master axis) is achieved.
4. Use the zoom functions to adjust the granularity of the grid.
5. Click the lock symbol ② again to save the adjusted relative position.
6. Use the 'Alt' key (left of the space bar) to move any x-axis by grid position.

To view more or less detail of a plot, use the Zoom In  and Zoom Out  widgets (3). You can zoom in or zoom out both the x and y axis by approximately 20 %. To select which axis a zoom operation is applied to, press either the 'x' or 'y' key when you click on the corresponding widget. Alternatively, draw a rectangular area across the area you want to zoom in on. Keep the left 'Alt' key pressed while you draw the selection to reduce the entire plot area to the defined rectangular area.

Use **Add Notes** (4) to add comments to the plot. If clicked, the cursor shape changes to indicate you can now pick a place for the note. This can be somewhere on the plot area if you want to make a generic comment that applies to the entire series. If you put the mouse pointer over a plot trace, the arrow will change to a hand symbol to indicate that a note is associated with this specific point of the trace. Click to place the note, and type the text into the entry field. For a note associated with a curve point, the text entry field is prefilled with the values that represent the curve point. When done, the text entry field closes and a numbered box appears at the selected position. In reports, text is shown in a table below the plot and uses a reference number.

To edit existing notes, double-click on the numbered box, or right-click, to open a context menu that lets you edit, delete, move, or release a note.

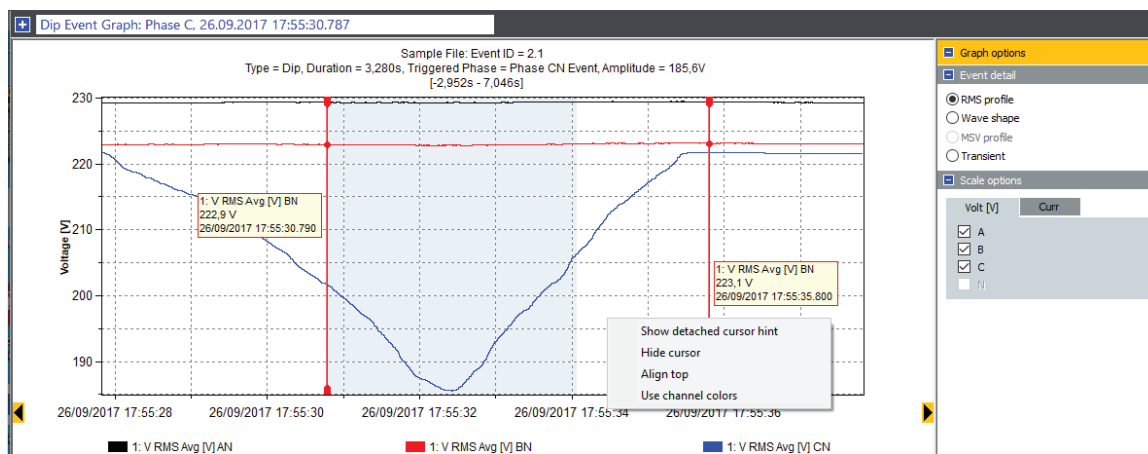
Select **Move** and use a single-click at a new position. This also lets you associate notes with a different curve point.

Select **Delete** to permanently remove a note from the current project.

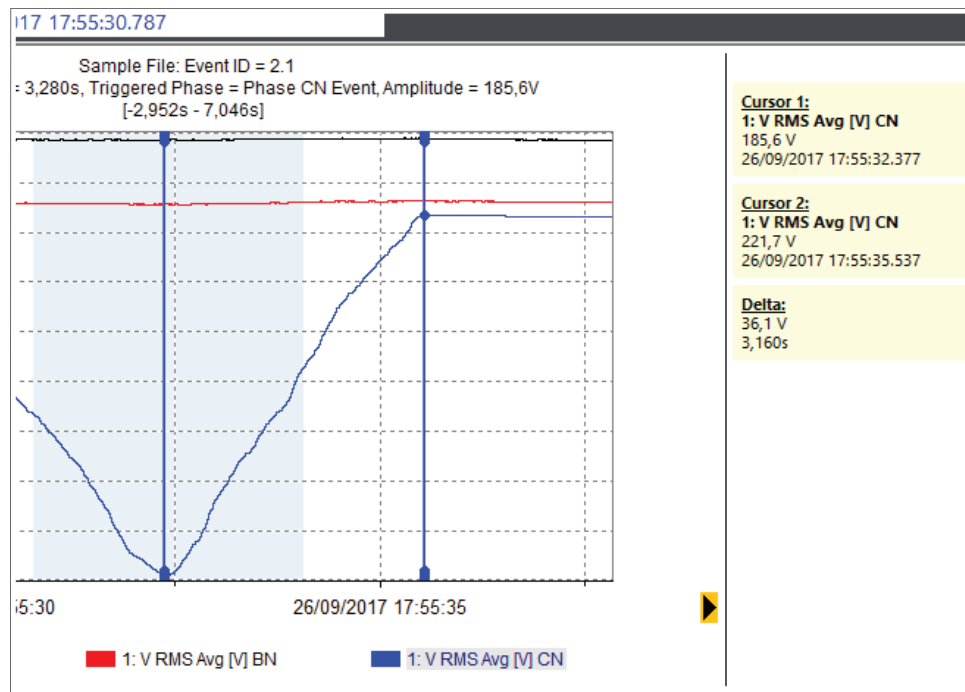
Select **Release** to disassociate a note from a curve point. This does not remove the reference values that are prefilled in the text field.

Select **Show Text** to show the note text instead of the number reference.

To read detail from charts, open the context menu (right click on the chart area) to modify **cursor properties**.



Show detached cursor hint moves the cursor text fields out of the graph area to the top or to the right of the chart. In detached mode, a delta function shows the difference in data between cursor 1 and cursor 2.



Hide cursor disables the vertical cursors as well as any detached cursor hints.

Align top moves the detached cursor hint fields from the right to the top of the chart area.

Use channel colors applies the color of the selected channel to the text in the detached hint field.

To change the channel that a cursor is associated with:

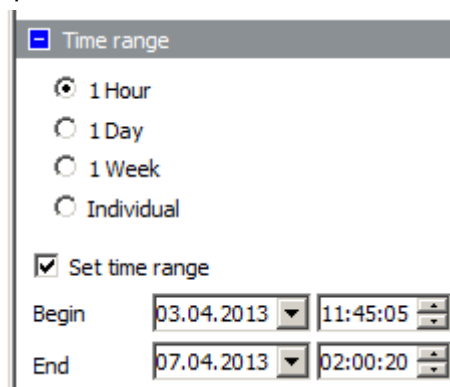
1. Select one of the cursors.
2. Click on the color icon in the corresponding legend entry at the bottom of the chart.

Time Range Usage

The Time Range feature lets you see the details of a specific graph and get numerical values that are associated with that selection. An example of this feature would be to find the energy consumption of a machine during a specific time period and document the process efficiency in terms of energy usage.

It is available from these graph sections:

- Energy Studies:
 - RMS Power graph
 - Demand graph
 - Fundamental Power graph
 - VAHz graph
- Load Studies:
 - RMS Power graph
 - A, Hz, THD graph



The screenshot shows a control panel titled "Time range" with a blue header bar. Below the title, there are four radio buttons: "1 Hour" (selected), "1 Day", "1 Week", and "Individual". Below these is a checked checkbox labeled "Set time range". Under the checkbox, there are two rows of date and time pickers. The first row is labeled "Begin" and shows "03.04.2013" and "11:45:05". The second row is labeled "End" and shows "07.04.2013" and "02:00:20". Each picker has a dropdown arrow and a small up/down arrow icon.

A time range is set with the controls located under the Graph Options at the right-hand side of a graph screen. Use the radio buttons to quickly adjust the time-axis to contain the selected time span.

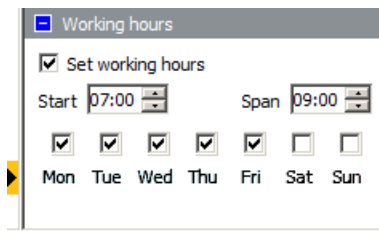
In order to get numerical values printed in a list, select the **Set time range** checkbox. This shows two vertical cursors that define start and end time. The time span used to fill the time range table (available from the section below the graph) is shown with a white background. To view tabular values related to that selection, click on the blue option box next to the section title to expand the time range table.

You can drag the vertical time range cursors to change the selection, or use the Begin/End date and time pickers.

Working Hours Usage

The Working Hours feature is used to graphically delineate working- from non-working time. An example of this feature would be to quickly see high-load conditions that occur during out-of-office hours.

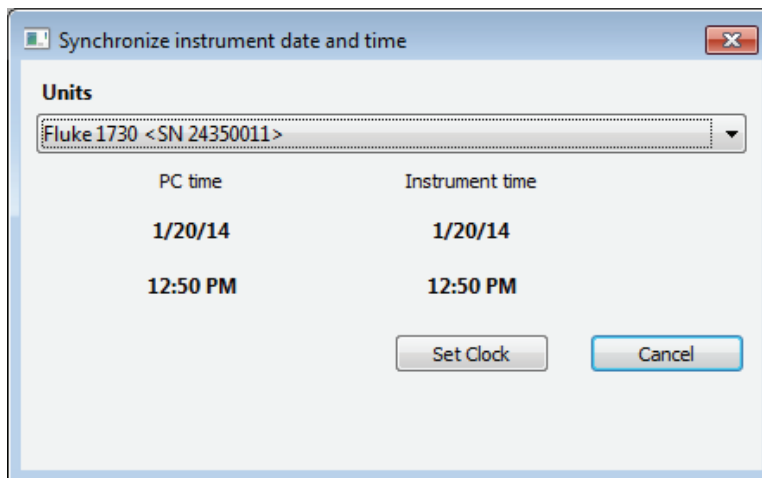
Working hours are set with the controls located under the Graph Options at the right-hand side of a graph screen.



Non-working hours are shown in a light-blue color on the plot area. The setting accepts the start time and the duration of the active period. To show working hours from 7 am to 4 pm (9 hours) on Monday through Friday, enter 07:00 as start time, 9:00 as the span, and select the check boxes for Mon, Tue, Wed, Thu, and Fri.

Set Instrument Time

Connect the Logger to the PC and open the Energy Analyze Plus program. From the main menu, go to **Settings** > **Synchronize time** to open the dialog box shown below. Make sure the Logger is listed in the **Units** field and click **Set Clock** to adjust the date and time on the Logger.



Note

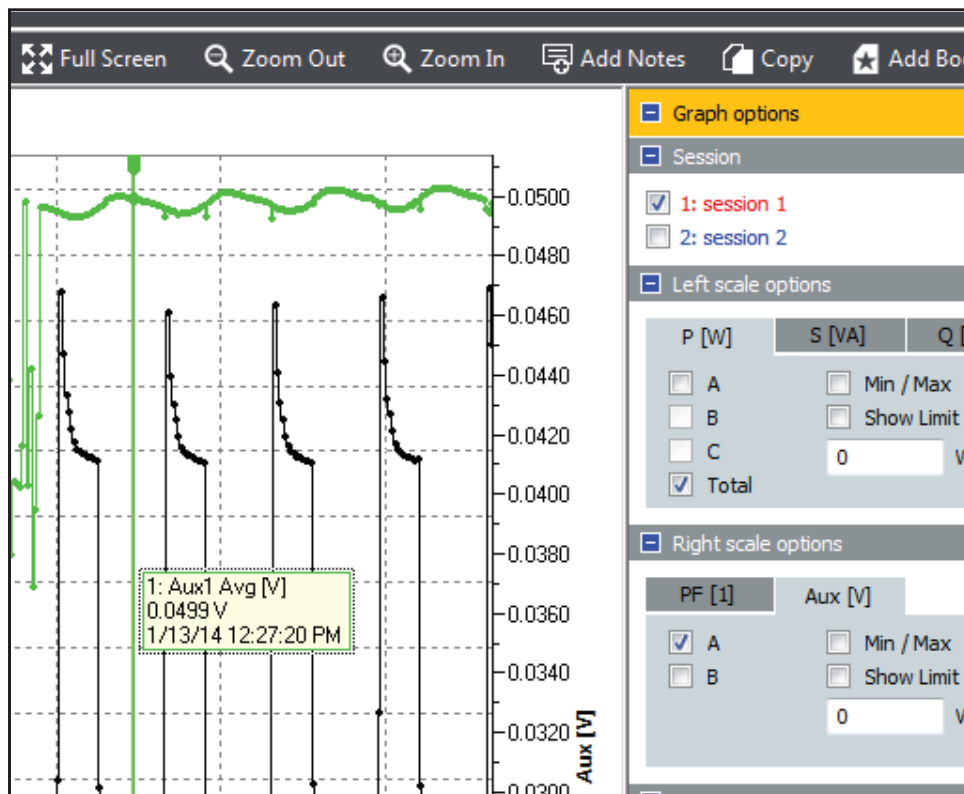
173x: No time zone changes are made to the 173x with this setting. A time zone change is done manually. For more information, see the users manual for the Logger.

174x: Use the "Instrument Setup" function available from the shortcut ribbon below the main menu to change the time zone.

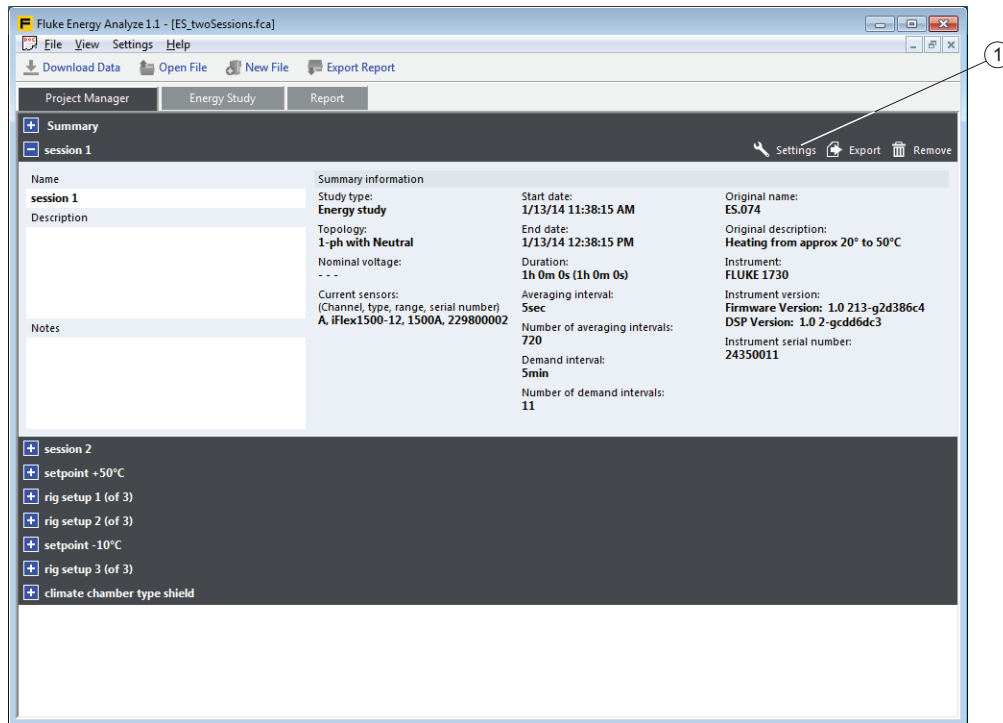
Change Auxiliary Channel Scaling

Log two channels of generic data in addition to the electrical parameters with the addition of the optional AUX adapter. These channels are referred to as AUX 1 and AUX 2. The Logger is configurable for use with various sensors (for more information, see the users manual for the Logger). Fluke Energy Analyze Plus allows you to adjust the scaling of auxiliary channels after a session is complete.

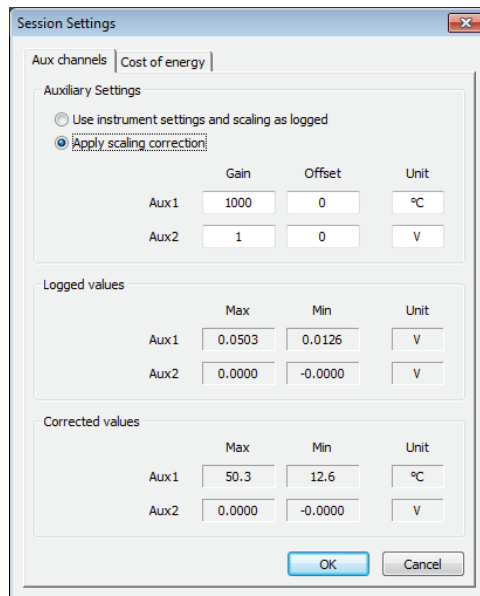
In this example, the session has been recorded with a temperature sensor that has a 1 mV/°C readout and is connected to AUX 1. Energy Analyze Plus plots AUX 1 in volts instead of °C because this information was not entered at the time of logging.



To correct, go to the 'Project Manager' tab, and click on **Settings** ① of the corresponding session.



This opens a dialog that lets you override the adjustment made on the Logger before the logging session was started. Select **Apply scaling correction** and enter gain and offset values (in this example, **1000** to rescale from [1mV/°C] to [°C]) and the proper unit. The sections below the input fields show the before and after values.



Click **OK** when the "Corrected values" are as expected. Energy Analyze Plus now shows the corrected scaling of values.

Change Cost of Energy Parameters

Energy Analyze Plus, by default, uses a simple energy tariff scheme to calculate the cost of energy: you can set a price/unit of energy for forward energy and another price for reverse energy. If this does not meet the requirements, an advanced scheme can be defined that allows different rates depending on the time of day.

To set:

1. Go to the **Project Manager** > **Settings** to open the **Session Settings** dialog.
2. Click on the **Cost of Energy** tab to edit cost profiles for this session.
3. Define the base cost. The price/unit of energy defined here is applied for all time periods that have no different ratio defined.
4. Define the exceptions from the base cost.
5. Click on **Add new ratio** ① to add a set of cost parameters and determine the time slot for which these should be applied. You can add several ratios, or define several time slots for one ratio.
6. Use the blue **+** buttons to add a ratio or to add a time slot to an existing ratio. Use the red **x** buttons to remove ratios or time slots.

When you edit the time slots, Energy Analyze Plus checks for overlaps to previously defined time slots that exist and indicates this condition with the time settings shown in red background. If overlapping slots remain defined, Energy Analyze Plus will use the last defined ratio for cost calculations. In this example, forward energy between 09:00 and 10:00 will be priced at \$1/kWh.

The screenshot shows the 'Session Settings' dialog box with the 'Cost of energy' tab selected. The 'Basic energy costs' section includes a 'Currency' field set to '\$', and 'Cost/kWh, fwd' and 'Cost/kWh, rev' fields set to '0.100' and '0.800' respectively. Below this is the 'Ratio 1 energy costs' section, which has 'Cost/kWh, fwd' set to '2.000', 'Cost/kWh, rev' set to '1.000', 'Start' time set to '08:00', and 'End' time set to '10:00'. The 'Ratio 2 energy costs' section has 'Cost/kWh, fwd' set to '1.000', 'Cost/kWh, rev' set to '0.500', 'Start' time set to '09:00', and 'End' time set to '11:00'. The 'Start' and 'End' time fields for Ratio 2 are highlighted in red, indicating an overlap with the 'End' time of Ratio 1. A circled '1' points to the 'Add new ratio' button in the 'Basic energy costs' section. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

7. Click **OK** when all adjustments are done.

Click the **advanced** ① check box in the Demand overview and time-range tables to apply the new price scheme. Select **standard** ② to use the settings from the Logger.

The screenshot shows the 'Demand overview table' in the software. The 'Cost of Energy' section is highlighted in yellow. Two callouts are present: callout 1 points to the 'advanced' radio button, and callout 2 points to the 'standard' radio button. The 'standard' button is currently selected.

Logging Information	
Study type:	Energy study
Start date:	26/09/2017 17:14:09
Duration:	1d 21h 52m 43s
Demand interval:	5min
Topology:	3-ph Wye
End date:	28/09/2017 15:06:52
Cost:	0.15/kWh, fwd; 0\$/kWh, rev
* ... series contained partial intervals that have been discarded.	

Cost of Energy	
Active energy, forward	178,485 kWh
Active energy, reverse	0.000 kWh
Total active energy	178,485 kWh
Max. demand	4.217 kW
	26/09/2017 17:35:00

Cost of Energy
☒ standard ☐ advanced
 Total energy cost
\$17,849

