

# Fluke 1730

## Three-Phase Electrical Energy Logger

### Technical Data

**Energy logging is now within your reach—discover where you're wasting energy, optimize your facility's energy use and reduce your bill.**

The new Fluke 1730 Three-Phase Electrical Energy logger introduces a new simplicity to discovering sources of electrical energy waste. Discover when and where energy in your facility is being consumed; from the service entrance to individual circuits. Profiling energy usage across your facility helps you identify opportunities for energy savings, and provides you with the data you need to act on them. The new Energy Analyze software package allows you to compare multiple data points over time to build a complete picture of energy usage, which is the first step to reduce the cost of your energy bill.



- **Key measurements:** voltage, current, power, power factor and associated values enable energy saving strategies to be implemented.
- **Bright, color touch screen:** perform convenient in-the-field analysis and data checks with full graphical display.
- **Comprehensive logging:** all measured values are automatically logged and can be reviewed during logging and before downloading for on-the-go analysis. More than 20 separate logging sessions can be stored on the instrument.
- **Optimized user interface:** quick, guided, graphical setup ensures you're capturing the right data every time, and the intelligent verification function indicates correct connections have been made, reducing user uncertainty.
- **Complete 'in-the-field' setup through the front panel:** no need to return to the workshop for download and setup or to take a computer to the electrical panel.
- **Wide range power:** power instrument directly from the measured circuit eliminating the need to find a power outlet while allowing the instrument to be secured safely inside electrical panels.
- **Two USB ports:** one for PC connection and another for fast, simple download to standard USB thumb drives, or other USB devices.
- **Compact size:** designed to fit in tight spaces and panels.
- **Highest safety rating in the industry:** 600 V CAT IV/1000 V CAT III rated for use at the service entrance and downstream.
- **Optimized measurement accessories:** flat voltage cable and thin flexible current probes ensure easy installation even in tight spaces.
- **Battery life:** four-hour operating time (backup time) per charge on lithium-ion battery.
- **Security:** safeguard against theft with a Kensington lock.
- **All new, Energy Analyze application software:** download, analyze and automated reporting for a complete picture of energy saving potential.

## Applications

### Load studies

Discover how much energy individual pieces of equipment are consuming when they are operating at minimum and maximum capacity. Check capacity of circuits prior to adding additional loads (various standards exist for this process; in the US the NEC 220-87 is the recommended standard). Load studies can also identify situations where you may be exceeding the allowable load on the circuit or when an agreed peak demand applies from the utility. For convenience, some load studies simply measure current which makes installation of the measuring equipment quick and easy. It is often recommended that load surveys be performed for 30 days so that all typical load conditions are encountered during the test.

### Energy surveys

Users often ask where measurements should be taken for an energy survey. The answer is multiple points within the facility. Start at the main service feeders; compare the power and energy measured here with the readings from the utility meter to ensure you're receiving the correct charges. Then move downstream to the larger loads; these should be easy to identify by the current rating of the electrical panels downstream of the service entrances. Measuring at many points will allow a full picture of energy usage across the facility to be developed. The next question users typically have is how long an energy survey should last. This of course depends on the facility, but it is recommended that you measure for a period that matches a typical facility activity period. If the facility operates over a five day work week with down time on the weekend, a seven day survey will most likely capture typical conditions. If the facility operates at a constant level for 24 hours a day, 365 days a year, a single day could be reasonably representative as long as you avoid a period where there may be planned maintenance.

To capture a full picture of the facilities energy usage it is not necessarily required to have measurements made simultaneously at every consumption point in the facility. To get a comprehensive picture, spot measurements can be made and then compared on a sliding time timescale. For example, you could compare the service entrance results from a typical Tuesday between 6:00 am and 12:00 pm with those of a larger load in the facility. Typically there will be some correlation between these profiles.

### Power and energy logging

When a piece of equipment is operated it instantaneously consumes a specific amount of power in watts (W) or kilowatts (kW). This power is accumulated over the operating time and expressed as energy consumed in kilowatt hours (kWh). Energy is what your electric utility charges for; there will be a standard charge from the utility per kilowatt hour. Utilities may have other additional charges, such as peak demand, which is the maximum power demand over a defined period of time, often 15 or 30 minutes. There may also be power factor charges, which are based on the effects of the inductive or capacitive loads in the facility. Optimizing peak demand and power factor often results in lower monthly electricity bills. The 1730 Three Phase Electrical Energy logger has the capability to measure and characterize these effects enabling you to analyze the results and save money.

### Simplified load studies

For situations where it's either difficult or impractical to make a voltage connection the simple load study feature allows users to perform a simplified load study by measuring current only. The user can enter the nominal expected voltage to create a simulated power study. For accurate power and energy studies it is required to monitor both voltage and current but this simplified method is useful in certain circumstances.



# Specifications

| Accuracy                 |               |                         |                         |                                                                                |
|--------------------------|---------------|-------------------------|-------------------------|--------------------------------------------------------------------------------|
| Parameter                |               | Range                   | Resolution              | Intrinsic Accuracy at Reference Conditions<br>(% of Reading + % of Full Scale) |
| Voltage                  |               | 1000 V                  | 0.1 V                   | ± (0.2 % + 0.01 %)                                                             |
| Current:<br>Direct input | iFlex1500-12  | 150 A                   | 0.1 A                   | ± (1 % + 0.02 %)                                                               |
|                          |               | 1500 A                  | 1 A                     | ± (1 % + 0.02 %)                                                               |
|                          | iFlex3000-24  | 300 A                   | 1 A                     | ± (1 % + 0.02 %)                                                               |
|                          |               | 3000 A                  | 10 A                    | ± (1 % + 0.02 %)                                                               |
|                          | iFlex6000-36  | 600 A                   | 1 A                     | ± (1.5 % + 0.03 %)                                                             |
|                          |               | 6000 A                  | 10 A                    | ± (1.5 % + 0.03 %)                                                             |
|                          | i40s-EL clamp | 4 A                     | 1 mA                    | ± (0.7 % + 0.02 %)                                                             |
|                          |               | 40 A                    | 10 mA                   | ± (0.7 % + 0.02 %)                                                             |
| Frequency                |               | 42.5 Hz to 69 Hz        | 0.01 Hz                 | ± (0.1 %)                                                                      |
| Aux input                |               | ± 10 V dc               | 0.1 mV                  | ± (0.2 % + 0.02 %)                                                             |
| Voltage Min/Max          |               | 1000 V                  | 0.1 V                   | ± (1 % + 0.1 %)                                                                |
| Current Min/Max          |               | defined by<br>accessory | defined by<br>accessory | ± (5 % + 0.2 %)                                                                |
| Cosφ/DPF                 |               | 0 <= Cosφ <=1           | 0.01                    | ± 0.025                                                                        |
| Power factor             |               | 0 <= PF <=1             | 0.01                    | ± 0.025                                                                        |
| THD on voltage           |               | 1000 %                  | 0.1 %                   | ± (2.5 % ± 0.05 %)                                                             |
| THD on current           |               | 1000 %                  | 0.1 %                   | ± (2.5 % ± 0.05 %)                                                             |

| Intrinsic uncertainty ± (% of reading + % of range) <sup>1</sup> |                    |                                  |                               |                               |                               |
|------------------------------------------------------------------|--------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Parameter                                                        | Influence quantity | iFlex1500-12                     | iFlex3000-24                  | iFlex6000-36                  | i40s-EL                       |
|                                                                  |                    | 150A/1500A                       | 300A/3000A                    | 600/6000A                     | 4A/40A                        |
| Active power P                                                   | PF ≥ 0.99          | 1.2 % + 0.005 %                  | 1.2 % + 0.0075 %              | 1.7 % + 0.0075 %              | 1.2 % + 0.005 %               |
|                                                                  | 0.5 < PF < 0.99    | 1.2 % + 7 x (1-PF) + 0.005 %     | 1.2 % + 7 x (1-PF) + 0.0075 % | 1.7 % + 7 x (1-PF) + 0.0075 % | 1.2 % + 10 x (1-PF) + 0.005 % |
| Apparent power S, S fund.                                        | 0 ≤ PF ≤ 1         | 1.2 % + 0.005 %                  | 1.2 % + 0.0075 %              | 1.7 % + 0.0075 %              | 1.2 % + 0.005 %               |
| Reactive power N, Q fund.                                        | 0 ≤ PF ≤ 1         | 2.5 % of measured apparent power |                               |                               |                               |
| Additional uncertainty in % of range <sup>1</sup>                | U > 250 V          | 0.015 %                          | 0.0225 %                      | 0.0225 %                      | 0.015 %                       |

<sup>1</sup>Range = 1000 V x I range

## Reference conditions:

Environmental: 23 °C ± 5 °C, instrument operating for at least 30 minutes, no external electrical/magnetic field, RH < 65 %

Input conditions: Cosφ/PF=1, Sinusoidal signal f=50 Hz/60 Hz, power supply 120 V/230 V ± 10 %

Current and power specifications: Input voltage 1 ph: 120 V/230 V or 3 ph wye/delta: 230 V/400 V

Input current: I > 10 % of I range

Primary conductor of clamps or Rogowski coil in center position

Temperature coefficient: Add 0.1 x specified accuracy for each degree C above 28 °C or below 18 °C

| Electrical specifications   |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply                |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Voltage range               | 100 V to 500 V using safety plug input when powering from the measurement circuit                                                                                                                                             |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
|                             | 100 V to 240 V using standard power cord (IEC 60320 C7)                                                                                                                                                                       |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Power consumption           | Maximum 50 VA (max. 15 VA when powered using IEC 60320 input)                                                                                                                                                                 |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Efficiency                  | ≥ 68.2 % (in accordance with energy efficiency regulations)                                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Maximum no-load consumption | < 0.3 W only when powered using IEC 60320 input                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Mains power frequency       | 50/60 Hz ± 15 %                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Battery                     | Li-ion 3.7 V, 9.25 Wh, customer-replaceable                                                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| On-battery runtime          | Four hours in standard operating mode, up to 5.5 hours in power saving mode                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Charging time               | < 6 hours                                                                                                                                                                                                                     |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Data acquisition            |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Resolution                  | 16-bit synchronous sampling                                                                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Sampling frequency          | 5120 Hz                                                                                                                                                                                                                       |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Input signal frequency      | 50/60 Hz (42.5 to 69 Hz)                                                                                                                                                                                                      |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Circuit types               | 1-φ, 1-φ IT, Split phase, 3-φ delta, 3-φ wye, 3-φ wye IT, 3-φ wye balanced, 3-φ Aron/Blondel (2-element delta), 3-φ delta open leg, Currents only (load studies)                                                              |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| THD                         | THD for voltage and current is calculated using 25 harmonics                                                                                                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Averaging period            | User selectable: 1 sec, 5 sec, 10 sec, 30 sec, 1 min, 5 min, 10 min, 15 min, 30 min                                                                                                                                           |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Demand interval             | User selectable: 5 min, 10 min, 15 min, 20 min, 30 min                                                                                                                                                                        |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Data storage                | Internal flash memory (not user replaceable)                                                                                                                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Memory size                 | Typical 20 logging sessions of 10 weeks with 10-minute intervals <sup>1</sup>                                                                                                                                                 |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Logging period              | <div><div>Averaging period</div><div>1 second</div><div>5 seconds</div><div>10 seconds</div><div>30 seconds</div><div>1 minute</div><div>5 minutes</div><div>10 minutes</div><div>15 minutes</div><div>30 minutes</div></div> | <div><div>Recommended for 20 sessions</div><div>3 hours</div><div>15 hours</div><div>28 hours</div><div>3.5 days</div><div>7 days</div><div>5 weeks</div><div>10 weeks</div><div>3.5 months</div><div>7 months</div></div> | <div><div>Logging Period for 1 session</div><div>2.5 days</div><div>12 days</div><div>24 days</div><div>10 weeks</div><div>20 weeks</div><div>2 years</div><div>&gt; 2 years</div><div>&gt; 2 years</div><div>&gt; 2 years<sup>1</sup></div></div> |
| Interfaces                  |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| USB-A                       | File transfer via USB flash drive, firmware updates<br>Max. current: 120 mA                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| USB-mini                    | Data download device to PC                                                                                                                                                                                                    |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Extension port              | Accessories                                                                                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Voltage inputs              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Number of inputs            | 4 (3 phases and neutral)                                                                                                                                                                                                      |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Maximum input voltage       | 1000 V <sub>rms</sub> , CF 1.7                                                                                                                                                                                                |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Input impedance             | 10 MΩ                                                                                                                                                                                                                         |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Bandwidth (-3 dB)           | 2.5 kHz                                                                                                                                                                                                                       |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Scaling                     | 1:1, 10:1, 100:1, 1000:1 and variable                                                                                                                                                                                         |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Measurement category        | 1000 V CAT III/600 V CAT IV                                                                                                                                                                                                   |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Current inputs              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Number of inputs            | 3, mode selected automatically for attached sensor                                                                                                                                                                            |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Input voltage               | Clamp input: 500 mV <sub>rms</sub> /50 mV <sub>rms</sub> , CF 2.8                                                                                                                                                             |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Rogowski coil input         | 150 mV <sub>rms</sub> /15 mV <sub>rms</sub> at 50 Hz, 180 mV <sub>rms</sub> /18 mV <sub>rms</sub> at 60 Hz; CF 4; all at nominal probe range                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Range                       | 1 A to 150 A/10 A to 1500 A with thin iFlex flexible current probe, 12 inches                                                                                                                                                 |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
|                             | 3 A to 300 A/30 A to 3000 A with thin Flex flexible current probe, 24 inches                                                                                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
|                             | 6 A to 600 A/60 A to 6000 A with thin iFlex flexible current probe, 36 inches                                                                                                                                                 |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
|                             | 40 mA to 4 A/0.4 A to 40 A with 40 A clamp i40s-EL                                                                                                                                                                            |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Bandwidth (-3 dB)           | 1.5 kHz                                                                                                                                                                                                                       |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Scaling                     | 1:1 and variable                                                                                                                                                                                                              |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |

<sup>1</sup>The number of possible logging sessions and logging period depends on user requirements.

| <b>Auxiliary inputs</b>             |                                                                                                       |
|-------------------------------------|-------------------------------------------------------------------------------------------------------|
| Number of inputs                    | 2                                                                                                     |
| Input range                         | 0 to $\pm 10$ V dc, 1 reading/s                                                                       |
| Scale factor (available 2014)       | Format: kx + d user configurable                                                                      |
| Displayed units (available 2014)    | User configurable (7 characters, for example, °C, psi, or m/s)                                        |
| <b>Environmental specifications</b> |                                                                                                       |
| Operating temperature               | -10 °C to +50 °C (14 °F to 122 °F)                                                                    |
| Storage temperature                 | -20 °C to +60 °C (-4 °F to 140 °F)                                                                    |
| Operating humidity                  | 10 °C to 30 °C (50 °F to 86 °F) max. 95 % RH                                                          |
|                                     | 30 °C to 40 °C (86 °F to 104 °F) max. 75 % RH                                                         |
|                                     | 40 °C to 50 °C (104 °F to 122 °F) max. 45 % RH                                                        |
| Operating altitude                  | 2000 m (up to 4000 m derate to 1000 V CAT II/600 V CAT III/300 V CAT IV)                              |
| Storage altitude                    | 12,000 m                                                                                              |
| Enclosure                           | IP50 in accordance with EN60529                                                                       |
| Vibration                           | MIL 2880OE, Type 3, Class III, Style B                                                                |
| Safety                              | IEC 61010-1: Overvoltage CAT IV, Measurement 1000 V CAT III/600 V CAT IV, Pollution Degree 2          |
| EMI, RFI, EMC                       | EN 61326-1: Industrial                                                                                |
| Electromagnetic compatibility       | Applies to use in Korea only. Class A Equipment (Industrial Broadcasting and Communication Equipment) |
| Radio frequency emissions           | IEC CISPR 11: Group 1, Class A                                                                        |
| Temperature coefficient             | 0.1 x accuracy specification/°C                                                                       |
| <b>General specifications</b>       |                                                                                                       |
| Color LCD display                   | 4.3-inch active matrix TFT, 480 pixels x 272 pixels, resistive touch panel                            |
| Warranty                            | 1730 and power supply: Two-years (battery not included)                                               |
|                                     | Accessories: One-year                                                                                 |
|                                     | Calibration cycle: Two-years                                                                          |
| Dimensions                          | 1730: 19.8 cm x 16.7 cm x 5.5 cm (7.8 in x 6.6 in x 2.2 in)                                           |
|                                     | Power supply: 13.0 cm x 13.0 cm x 4.5 cm (5.1 in x 5.1 in x 1.8 in)                                   |
|                                     | 1730 with power supply attached: 19.8 cm x 16.7 cm x 9 cm (7.8 in x 6.6 in x 3.5 in)                  |
| Weight                              | 1730: 1.1 kg (2.5 lb)                                                                                 |
|                                     | Power supply: 400 g (0.9 lb)                                                                          |
| External protection                 | Holster, Kensington lock slot                                                                         |

**1500-12 iFlex Flexible Current Probe specifications**

|                                                          |                                                                                                       |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Measuring range                                          | 1 to 150 A ac / 10 to 1500 A ac                                                                       |
| Nondestructive current                                   | 100 kA (50/60 Hz)                                                                                     |
| Intrinsic error at reference condition*                  | ± 0.7 % of reading                                                                                    |
| Accuracy 1730 + iFlex                                    | ± (1 % of reading + 0.02 % of range)                                                                  |
| Temperature coefficient over operating temperature range | 0.05 % of reading/°C 0.09 % of reading/°F                                                             |
| Working voltage                                          | 1000 V CAT III, 600 V CAT IV                                                                          |
| Probe cable length                                       | 305 mm (12 in)                                                                                        |
| Probe cable diameter                                     | 7.5 mm (0.3 in)                                                                                       |
| Minimum bending radius                                   | 38 mm (1.5 in)                                                                                        |
| Output cable length                                      | 2 m (6.6 ft)                                                                                          |
| Weight                                                   | 115 g                                                                                                 |
| Transducer cable material                                | TPR                                                                                                   |
| Coupling material                                        | POM + ABS/PC                                                                                          |
| Output cable                                             | TPR/PVC                                                                                               |
| Operating temperature                                    | -20 °C to +70 °C (-4 °F to 158 °F) temperature of conductor under test shall not exceed 80 °C (176°F) |
| Temperature, non-operating                               | -40 °C to +80 °C (-40 °F to 176 °F)                                                                   |
| Relative humidity, operating                             | 15 % to 85 % non-condensing                                                                           |
| IP rating                                                | IEC 60529:IP50                                                                                        |
| Warranty                                                 | One-year                                                                                              |

**\*Reference condition:**

- Environmental: 23 °C ± 5 °C, no external electrical/magnetic field, RH 65 %
- Primary conductor in center position

**Ordering information**

**1730/BASIC** Three-Phase Electrical Energy logger (excludes current probes).

**1730/US** Portable Energy Logger US version

**1730/EU** Portable Energy Logger EU version

**1730/INTL** Portable Energy Logger INTL version

**Accessories**

**i1730-flex1500** iFlex flexible current probe 1500A 12 inch

**i1730-flex3000** iFlex flexible current probe 3000A 24 inch

**i1730-flex6000** iFlex flexible current probe 6000A 36 inch

**i40s-EL** i40s-EL Clamp-on Current Transformer

**i1730-flex1500/3pk** iFlex flexible current probe 1500A 12 inch, 3 pack

**i1730-flex3000/3pk** iFlex flexible current probe 3000A 24 inch, 3 pack

**i1730-flex6000/3pk** iFlex flexible current probe 6000A 36 inch, 3 pack

**i40s-EL/3pk** i40s-EL Clamp-on Current Transformer, 3 pack

**1730-TL0.1M** Test Lead Set; 1000 V CAT III, straight plug; 0.1 m; silicone; red/black

**1730-TL2M** Test Lead Set, 1000 V CAT III; straight plug; 2 m; PVC red/black

**3PHVL-1730** Cable Assembly, Voltage Test Lead 3-Phase+N

**C1730** 1730 Soft Case

**WC100** Color Localization Set

**1730-Hanger** Hanging strap

**1730-Cable** AUX input cable



**Fluke.** *The Most Trusted Tools in the World.*

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