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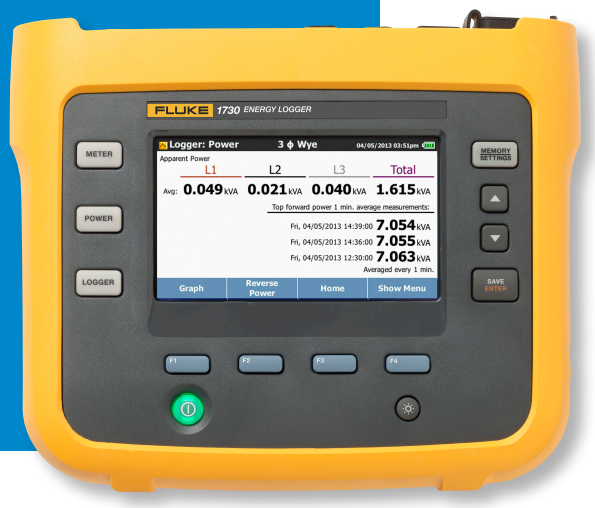
Fluke 1730
Three-Phase Electrical Energy Logger

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

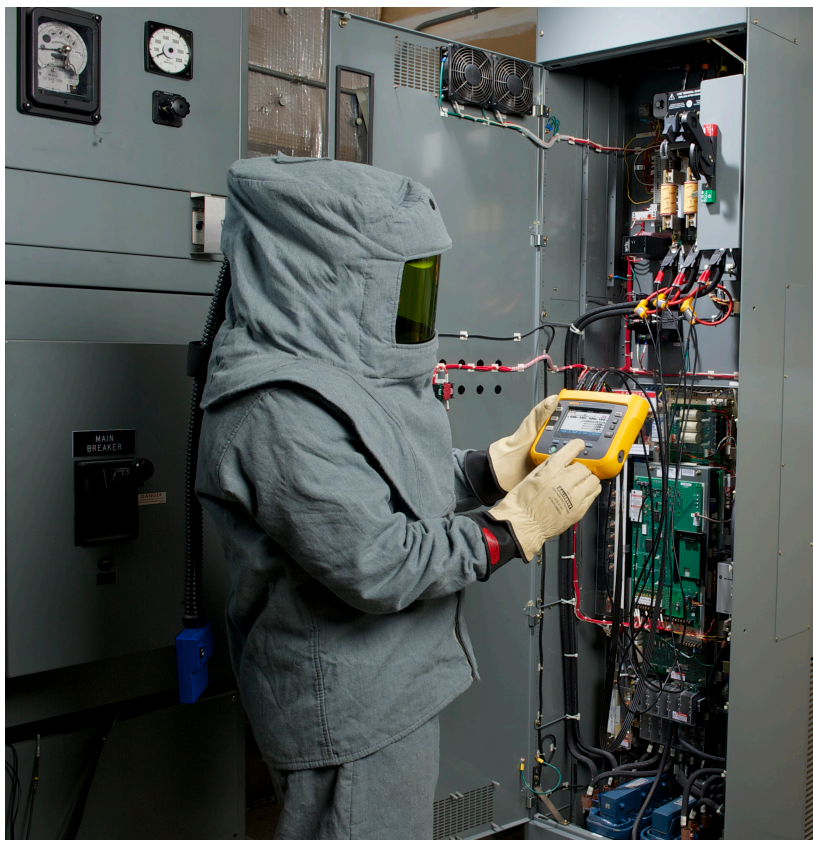
Load studies
Discover how much energy individual pieces of equipment are consuming when they are operating at minimum and maximum capacity. Check capacity of circuits prior to adding additional loads (various standards exist for this process; in the US the NEC 220–87 is the recommended standard). Load 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.



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Specifications

Accuracy				
Parameter		**Range**	**Resolution**	**Intrinsic Accuracy at Reference Conditions (% of Reading + % of Full Scale)**
Voltage		1000 V	0.1 V	± (0.2 % + 0.01 %)
Current: 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 accessory	defined by 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)[1]					
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[1]	U >250 V	0.015 %	0.0225 %	0.0225 %	0.015 %

[1]Range = 1000 V x Irange

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 Irange
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

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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[1]
Logging period	**Averaging period** / **Recommended for 20 sessions** / **Logging Period for 1 session** 1 second / 3 hours / 2.5 days 5 seconds / 15 hours / 12 days 10 seconds / 28 hours / 24 days 30 seconds / 3.5 days / 10 weeks 1 minute / 7 days / 20 weeks 5 minutes / 5 weeks / 2 years 10 minutes / 10 weeks / > 2 years 15 minutes / 3.5 months / > 2 years 30 minutes / 7 months / > 2 years[1]
Interfaces	
USB-A	File transfer via USB flash drive, firmware updates 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_{rms}, 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_{rms}/50 mV_{rms}; CF 2.8
Rogowski coil input	150 mV_{rms}/15 mV_{rms} at 50 Hz, 180 mV_{rms}/18 mV_{rms} 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

[1]The number of possible logging sessions and logging period depends on user requirements.

Auxiliary inputs	
Number of inputs	2
Input range	0 to ± 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)
Environmental specifications	
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 28800E, 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
General specifications	
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

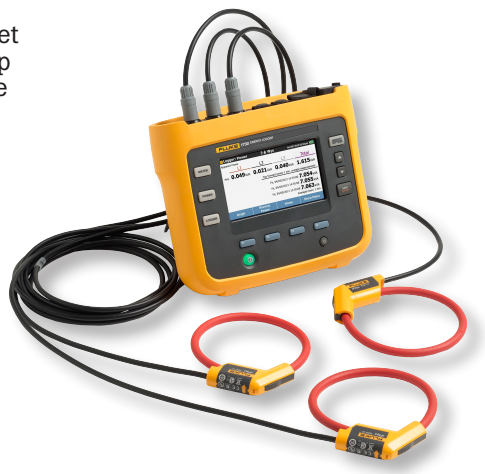
***Reference condition:**
- Environmental: 23 °C ± 5 °C, no external electrical/magnetic field, RH 65 %
- Primary conductor in center position

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



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