

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 (% 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 %

¹Range = 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 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 M Ω		
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		

¹The 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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