

## Fluke 430 Series II Three-Phase Power Quality and Energy Analyzers

### Technical Data

More detailed power quality analysis capability, and a new Fluke-patented energy monetization function

The new 430 Series II Power Quality and Energy Analyzers offer the best in power quality analysis and introduce, for the first time ever, the ability to monetarily quantify energy losses.

The new Fluke 434, 435 and 437 Series II models help locate, predict, prevent, and troubleshoot power quality problems in three-phase and single-phase power distribution systems. Additionally, the Fluke-patented energy loss algorithm, Unified Power Measurement, measures and quantifies energy losses due to harmonics and unbalance issues, allowing the user to pinpoint the origin of energy waste within a system.



- **Energy loss calculator:** Classic active and reactive power measurements, unbalance and harmonic power, are quantified to pinpoint true system energy losses in dollars (other local currencies available).
- **Power inverter efficiency:** Simultaneously measure AC output power and DC input power for power electronics systems using optional DC clamp.
- **PowerWave data capture:** 435 and 437 Series II analyzers capture fast RMS data, show half-cycle and waveforms to characterize electrical system dynamics (generator start-ups, UPS switching etc.).
- **Waveform capture:** 435 and 437 Series II models capture 50/60 cycles (50/60Hz) of each event that is detected in all modes, without set-up.
- **Automatic Transient Mode:** 435 and 437 Series II analyzers capture 200 kHz waveform data on all phases simultaneously up to 6 kV.
- **Fully Class-A compliant:** 435 and 437 Series II analyzers conduct tests according to the stringent international IEC 61000-4-30 Class-A standard.
- **Mains signaling:** 435 and 437 Series II analyzers measure interference from ripple control signals at specific frequencies.
- **400 Hz measurement:** 437 Series II analyzer captures power quality measurements for avionic and military power systems.
- **Troubleshoot:** Analyze the trends using the cursors and zoom tools.
- **Highest safety rating in the industry:** 600 V CAT IV/1000 V CAT III rated for use at the service entrance.
- **Measure all three phases and neutral:** With included four flexible current probes with enhanced thin flex designed to fit into the tightest places.
- **Automatic Trending:** Every measurement is always automatically recorded, without any set-up.
- **System-Monitor:** Ten power quality parameters on one screen according to EN50160 power quality standard.
- **Logger function:** Configure for any test condition with memory for up to 600 parameters at user defined intervals.
- **View graphs and generate reports:** With included analysis software.
- **Battery life:** Up to 8 hours operating time per charge on Li-ion battery pack.

437 Series II  
Three-Phase  
Power Quality  
and Energy  
Analyzer will  
be available  
in early 2012

## Unified Power Measurement

Fluke’s patented Unified Power Measurement system (UPM) provides the most comprehensive view of power available, measuring:

- Parameters of Classical Power (Steinmetz 1897) and IEEE 1459-2000 Power
- Detailed Loss Analysis
- Unbalance Analysis

These UPM calculations are used to quantify the fiscal cost of energy loss caused by power quality issues. The calculations are computed, along with other facility-specific information, by an Energy Loss Calculator that ultimately determines how much money a facility loses due to wasted energy.

## Energy savings

Traditionally energy savings are achieved by monitoring and targeting, or in other words, by finding the major loads in a facility and optimizing their operation. The cost of power quality could only be quantified in terms of downtime caused by lost production and damage to electrical equipment. The Unified Power Measurement (UPM) method now goes beyond this to achieve energy savings by discovering the energy waste caused by power quality issues. Using the Unified Power Measurement, Fluke’s Energy Loss Calculator (see screen shot below) will determine how much money a facility is losing due to waste energy.

## Unbalance

UPM gives a more comprehensive breakdown of the energy consumed in the plant. In addition to measuring reactive power (caused by poor power factor), UPM also measures the energy waste caused by unbalance; the effect of unevenly loading each phase in three-phase systems. Unbalance can often be corrected by reconnecting loads on different phases to ensure the current drawn on each phase is as equal as possible. Unbalance can also be corrected by installing an unbalance reactance device (or filter), that will minimize the effects. Correcting unbalance should be basic good housekeeping in the facility as unbalance problems can cause motor failure or shorten equipment life expectancy. Unbalance also wastes energy. Using UPM can minimize or eliminate that energy waste, thus saving money.

## Harmonics

UPM also provides details of the energy wasted in your facility due to the presence of harmonics. Harmonics may be present in your facility due to the loads you operate or may be caused by loads in adjacent facilities. The presence of harmonics in your facility can lead to:

- overheating transformers and conductors
- nuisance tripping of circuit breakers
- early failures of electrical equipment

Quantifying the cost of wasted energy due to the presence of harmonics simplifies the return-on-investment calculation needed to justify purchasing harmonic filters. By installing a harmonic filter the ill effects of harmonics can be reduced and energy waste eliminated, resulting in lower operational costs and more reliable operation.

### Energy Loss Calculator

Useful kilowatts (power) available \_\_\_\_\_

Reactive (unusable) power \_\_\_\_\_

Kilowatts made unusable by unbalance issues \_\_\_\_\_

Kilowatts made unusable by harmonics \_\_\_\_\_

Neutral current \_\_\_\_\_

Total cost of wasted kilowatt hours \_\_\_\_\_

| ENERGY LOSS CALCULATOR |       |       |      |               |
|------------------------|-------|-------|------|---------------|
| 0:04:25                |       |       |      |               |
|                        | Total | Loss  | Cost |               |
| Effective kW           | 16.3  | W 44  | \$   | 0.00 /hr      |
| Reactive kvar          | - 4.7 | W 4   | \$   | 0.00 /hr      |
| Unbalance kVA          | 15.5  | W 92  | \$   | 0.01 /hr      |
| Distortion kVA         | 29.2  | W 422 | \$   | 0.04 /hr      |
| Neutral A              | 118   | W 539 | \$   | 0.05 /hr      |
| <b>Total</b>           |       |       | \$   | <b>964 /y</b> |

05/17/12 13:59:42 277V 60Hz 3Ø WYE EN50160  
 LENGTH 100 ft DIAMETER 4 AWG METER RATE 0.10 /kWh HOLD RUN

## 430 Series II Power Quality and Energy Analyzer selection table

| Model                          | Fluke 434-II           | Fluke 435-II           | Fluke 437-II           |
|--------------------------------|------------------------|------------------------|------------------------|
| Standard compliance            | IEC 61000-4-30 Class S | IEC 61000-4-30 Class A | IEC 61000-4-30 Class A |
| Volt Amp Hz                    | •                      | •                      | •                      |
| Dips and swells                | •                      | •                      | •                      |
| Harmonics                      | •                      | •                      | •                      |
| Power and energy               | •                      | •                      | •                      |
| Energy loss calculator         | •                      | •                      | •                      |
| Unbalance                      | •                      | •                      | •                      |
| Monitor                        | •                      | •                      | •                      |
| Inrush                         | •                      | •                      | •                      |
| Event waveform capture         |                        | •                      | •                      |
| Flicker                        |                        | •                      | •                      |
| Transients                     |                        | •                      | •                      |
| Mains signaling                |                        | •                      | •                      |
| Power wave                     |                        | •                      | •                      |
| Power inverter efficiency      | •                      | •                      | •                      |
| 400Hz                          |                        |                        | •                      |
| C1740 Soft Case                | •                      | •                      |                        |
| C437-II Hard Case with rollers |                        |                        | •                      |
| SD card (Max 32 GB)            | 8 GB                   | 8 GB                   | 8 GB                   |

All models include the following accessories TL430 test lead set, 4 x i430 thin flexi current probes, BP290 battery, BC430 power adapter with international power adapter set, USB cable A-B mini and PowerLog CD.

## Technical specifications

Specifications are valid for models Fluke 434-II, Fluke 435-II, Fluke 437-II unless otherwise specified. Specifications for Amp and Watt readings are based upon i430-Flexi-TF unless otherwise specified.

### Input characteristics

| Voltage inputs                |  |
|-------------------------------|--|
| Number of inputs              | 4 (3 phase + neutral) dc-coupled   |
| Maximum input voltage         | 1000 Vrms  |
| Nominal voltage range         | Selectable 1 V to 1000 V   |
| Max. peak measurement voltage | 6 kV (transient mode only)   |
| Input impedance               | 4 M $\Omega$ /5 pF   |
| Bandwidth                     | > 10 kHz, up to 100 kHz for transient mode   |
| Scaling                       | 1:1, 10:1, 100:1, 1,000:1 10,000:1 and variable  |
| Current inputs                |  |
| Number of inputs              | 4 (3 phase + neutral) dc- or ac-coupled  |
| Type                          | Clamp or current transformer with mV output or i430flex-TF   |
| Range                         | 0.5 Arms to 600 Arms with included i430flex-TF (with sensitivity 10x)<br>5 Arms to 6000 Arms with included i430flex-TF (with sensitivity 1x)<br>0.1 mV/A to 1 V/A and custom for use with optional ac or dc clamps |
| Input impedance               | 1 M $\Omega$   |
| Bandwidth                     | > 10 kHz   |
| Scaling                       | 1:1, 10:1, 100:1, 1,000:1 10,000:1 and variable  |

## Input characteristics cont.

| Sampling system        |   |
|------------------------|---|
| Resolution             | 16 bit analog to digital converter on 8 channels                      |
| Maximum sampling speed | 200 kS/s on each channel simultaneously                               |
| RMS sampling           | 5000 samples on 10/12 cycles according to IEC61000-4-30               |
| PLL synchronization    | 4096 samples on 10/12 cycles according to IEC61000-4-7                |
| Nominal frequency      | 434-II and 435-II: 50 Hz and 60 Hz<br>437-II: 50 Hz, 60 Hz and 400 Hz |

## Display modes

|                  |  |
|------------------|--|
| Waveform display | Available in all modes via SCOPE key<br>435-II and 437-II: Default display mode for Transients function<br>Update rate 5x per second<br>Displays 4 cycles of waveform data on screen, up to 4 waveforms simultaneously |
| Phasor diagram   | Available in all modes via Scope waveform display<br>Default view for Unbalance mode   |
| Meter readings   | Available in all modes except Monitor and Transients, provides tabulated view of all available readings<br>Fully customizable up to 150 readings for Logger mode   |
| Trend graph      | Available in all modes except Transients<br>Single vertical cursor with min max and avg reading at cursor position   |
| Bar graph        | Available in Monitor and Harmonics mode  |
| Event list       | Available in all modes<br>Provides waveforms on 435II & 437II only.  |

## Measurement modes

|  |  |
|--|--|
| Scope  | 4 voltage waveforms, 4 current waveforms, Vrms, Vfund. Arms, A fund, V @ cursor, A @ cursor, phase angles  |
| Volts/amps/hertz   | Vrms phase to phase, Vrms phase to neutral, Vpeak, V Crest Factor, Arms Apeak, A Crest Factor, Hz  |
| Dips and swells  | Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> , Pinst with programmable threshold levels for event detection   |
| Harmonics dc, 1 to 50, up to 9th harmonic for 400 Hz     | Harmonics Volts, THD, Harmonic Amps, K factor Amps, Harmonic Watts, THd Watts, K factor Watts, Interharmonic Volts, Interharmonic Amps, Vrms, Arms (relative to fundamental or to total rms)   |
| Power and energy   | Vrms, Arms, Wfull, Wfund., V <sub>A</sub> full, V <sub>A</sub> fund., V <sub>A</sub> harmonics, V <sub>A</sub> unbalance, var, PF, DPF, CosQ, Efficiency factor, Wforward, Wreverse  |
| Energy loss calculator                                   | Wfund, V <sub>A</sub> harmonics, V <sub>A</sub> unbalance, var, A, Loss Active, Loss Reactive, Loss Harmonics, Loss Unbalance, Loss Neutral, Loss Cost (based upon user defined cost / kWh)  |
| Inverter efficiency (requires optional dc current clamp) | Wfull, Wfund, Wdc, Efficiency, Vdc, Adc, Vrms, Arms, Hz  |
| Unbalance  | Vneg%, Vzero%, Aneg%, Azero%, Vfund, Afund, V phase angles, A phase angles   |
| Inrush   | Inrush current, Inrush duration, Arms <sup>1/2</sup> , Vrms <sup>1/2</sup>   |
| Monitor  | Vrms, Arms, harmonic Volts, THD Volts, PLT, Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> , Hz, dips, swells, interruptions, rapid voltage changes, unbalance and mains signalling.<br>All parameters are measured simultaneously in accordance with EN50160<br>Flagging is applied according to IEC61000-4-30 to indicate unreliable readings due to dips or swells |
| Flicker (435-II and 437-II only)                         | Pst(1min), Pst, Plt, Pinst, Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> , Hz   |
| Transients (435-II and 437-II only)                      | Transient waveforms 4x Voltage 4x Amps, triggers: Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> , Pinst  |
| Mains Signaling (435-II and 437-II only)                 | Relative signaling voltage and absolute signaling voltage averaged over three seconds for up to two selectable signaling frequencies   |
| Power Wave (435-II and 437-II only)                      | Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> W, Hz and scope waveforms for voltage amps and watts   |
| Logger   | Custom selection of up to 150 PQ parameters measured simultaneously on 4 phases  |

## Product specifications

|   | Model                       | Measurement range  | Resolution    | Accuracy  |
|---|-----------------------------|--|---------------|---|
| <b>Volt</b>                                     |                             |  |               |   |
| Vrms (ac+dc)                                    | 434-II                      | 1 V to 1000 V phase to neutral   | 0.1 V         | ± 0.5 % of nominal voltage****                          |
|   | 435-II and 437-II           | 1 V to 1000 V phase to neutral   | 0.01 V        | ± 0.1 % of nominal voltage****                          |
| Vpk   |                             | 1 Vpk to 1400 Vpk  | 1 V           | 5 % of nominal voltage                                  |
| Voltage Crest Factor (CF)                       |                             | 1.0 > 2.8  | 0.01          | ± 5 %   |
| Vrms½   | 434-II                      | 1 V to 1000 V phase to neutral   | 0.1 V         | ± 1 % of nominal voltage                                |
|   | 434-II and 435-II           |  | 0.1 V         | ± 0.2 % of nominal voltage                              |
| Vfund   | 434-II                      | 1 V to 1000 V phase to neutral   | 0.1 V         | ± 0.5 % of nominal voltage                              |
|   | 435-II and 437-II           |  | 0.1 V         | ± 0.1 % of nominal voltage                              |
| <b>Amps (accuracy excluding clamp accuracy)</b> |                             |  |               |   |
| Amps (ac +dc)                                   | i430-Flex 1x                | 5 A to 6000 A  | 1 A           | ± 0.5 % ± 5 counts                                      |
|   | i430-Flex 10x               | 0.5 A to 600 A   | 0.1 A         | ± 0.5 % ± 5 counts                                      |
|   | 1mV/A 1x                    | 5 A to 2000 A  | 1A            | ± 0.5 % ± 5 counts                                      |
|   | 1mV/A 10x                   | 0.5 A A to 200 A (ac only)   | 0.1 A         | ± 0.5 % ± 5 counts                                      |
| Apk   | i430-Flex                   | 8400 Apk   | 1 Arms        | ± 5 %   |
|   | 1mV/A                       | 5500 Apk   | 1 Arms        | ± 5 %   |
| A Crest Factor (CF)                             |                             | 1 to 10  | 0.01          | ± 5 %   |
| Amps½   | i430-Flex 1x                | 5 A to 6000 A  | 1 A           | ± 1 % ± 10 counts                                       |
|   | i430-Flex 10x               | 0.5 A to 600 A   | 0.1 A         | ± 1 % ± 10 counts                                       |
|   | 1mV/A 1x                    | 5 A to 2000 A  | 1A            | ± 1 % ± 10 counts                                       |
|   | 1mV/A 10x                   | 0.5 A A to 200 A (ac only)   | 0.1 A         | ± 1 % ± 10 counts                                       |
| Afund   | i430-Flex 1x                | 5 A to 6000 A  | 1 A           | ± 0.5 % ± 5 counts                                      |
|   | i430-Flex 10x               | 0.5 A to 600 A   | 0.1 A         | ± 0.5 % ± 5 counts                                      |
|   | 1mV/A 1x                    | 5 A to 2000 A  | 1A            | ± 0.5 % ± 5 counts                                      |
|   | 1mV/A 10x                   | 0.5 A A to 200 A (ac only)   | 0.1 A         | ± 0.5 % ± 5 counts                                      |
| <b>Hz</b>                                       |                             |  |               |   |
| Hz  | Fluke 434 @ 50 Hz nominal   | 42.50 Hz to 57.50 Hz   | 0.01 Hz       | ± 0.01 Hz   |
|   | Fluke 434 @ 60 Hz nominal   | 51.00 Hz to 69.00 Hz   | 0.01 Hz       | ± 0.01 Hz   |
|   | Fluke 435/7 @ 50 Hz nominal | 42.500 Hz to 57.500 Hz   | 0.001 Hz      | ± 0.01 Hz   |
|   | Fluke 435/7 @ 60 Hz nominal | 51.000 Hz to 69.000 Hz   | 0.001 Hz      | ± 0.01 Hz   |
|   | Fluke 437 @ 400 Hz nominal  | 340.0 Hz to 460.0 Hz   | 0.1 Hz        | ± 0.1 Hz  |
| <b>Power</b>                                    |                             |  |               |   |
| Watts (VA, var)                                 | i430-Flex                   | max 6000 MW  | 0.1 W to 1 MW | ± 1 % ± 10 counts                                       |
|   | 1 mV/A                      | max 2000 MW  | 0.1 W to 1 MW | ± 1 % ± 10 counts                                       |
| Power factor (Cos j/DPF)                        |                             | 0 to 1   | 0.001         | ± 0.1 % @ nominal load conditions                       |
| <b>Energy</b>                                   |                             |  |               |   |
| kWh (kVAh, kvarh)                               | i430-Flex 10x               | Depends on clamp scaling and V nominal   |               | ± 1 % ± 10 counts                                       |
| Energy loss                                     | i430-Flex 10x               | Depends on clamp scaling and V nominal   |               | ± 1 % ± 10 counts<br>Excluding line resistance accuracy |
| <b>Harmonics</b>                                |                             |  |               |   |
| Harmonic order (n)                              |                             | DC, 1 to 50 Grouping: Harmonic groups according to IEC 61000-4-7                       |               |   |
| Inter-harmonic order (n)                        |                             | OFF, 1 to 50 Grouping: Harmonic and Interharmonic subgroups according to IEC 61000-4-7 |               |   |
| Volts   | %f                          | 0.0 % to 100 %   | 0.1 %         | ± 0.1 % ± n x 0.1 %                                     |
|   | %r                          | 0.0 % to 100 %   | 0.1 %         | ± 0.1 % ± n x 0.4 %                                     |
|   | Absolute                    | 0.0 to 1000 V  | 0.1 V         | ± 5 % *   |
|   | THD                         | 0.0 % to 100 %   | 0.1 %         | ± 2.5 %   |
| Amps  | %f                          | 0.0 % to 100 %   | 0.1 %         | ± 0.1 % ± n x 0.1 %                                     |
|   | %r                          | 0.0 % to 100 %   | 0.1 %         | ± 0.1 % ± n x 0.4 %                                     |
|   | Absolute                    | 0.0 to 600 A   | 0.1 A         | ± 5 % ± 5 counts  |
|   | THD                         | 0.0 % to 100 %   | 0.1 %         | ± 2.5 %   |
| Watts   | %f or %r                    | 0.0 % to 100 %   | 0.1 %         | ± n x 2 %   |
|   | Absolute                    | Depends on clamp scaling and V nominal   | —             | ± 5 % ± n x 2 % ± 10 counts                             |
|   | THD                         | 0.0 % to 100 %   | 0.1 %         | ± 5 %   |
| Phase Angle                                     |                             | -360° to +0°   | 1°            | ± n x 1°  |

## Product specifications cont.

| Flicker                      |   |   |        |                         |
|------------------------------|---|---|--------|-------------------------|
| Plt, Pst, Pst(1min) Pinst    |   | 0.00 to 20.00   | 0.01   | ± 5%                    |
| Unbalance                    |   |   |        |                         |
| Volts                        | % | 0.0% to 20.0%   | 0.1%   | ± 0.1%                  |
| Amps                         | % | 0.0% to 20.0%   | 0.1%   | ± 1%                    |
| Mains signaling              |   |   |        |                         |
| Threshold levels             |   | Threshold, limits and signaling duration is programable for two signaling frequencies | —      | —                       |
| Signaling frequency          |   | 60 Hz to 3000 Hz  | 0.1 Hz |                         |
| Relative V%                  |   | 0% to 100%  | 0.10%  | ± 0.4%                  |
| Absolute V3s (3 second avg.) |   | 0.0 V to 1000 V   | 0.1 V  | ± 5% of nominal voltage |

## Trend recording

|                |  |
|----------------|--|
| Method         | Automatically records min, max and average values over time for all readings being displayed for the three phases and neutral simultaneously                 |
| Sampling       | 5 readings/s continuous sampling per channel, 100/120** reading/s for 1/2 cycle values and Pinst   |
| Recording time | 1 hr up to 1 year, user selectable (default setting 7 days)  |
| Averaging time | Minimum of 1 second  |
| Memory         | Data is stored on SDcard (8GB included 32GB max)   |
| Events         | 434-II: Tabulated in event list<br>435-II & 437-II: Tabulated in event list, including 50/60** waveform cycles and 7.5s 1/2 cycle rms Voltage and Amps trend |

## Measurement method

|                      |  |
|----------------------|--|
| Vrms, Arms           | 10/12 cycle contiguous non-overlapping intervals using 500/416 <sup>2</sup> samples per cycle in accordance with IEC 61000-4-30  |
| Vpeak, Apeak         | Absolute highest sample value within 10/12 cycle interval with 40 μs sample resolution   |
| V Crest Factor       | Measures ratio between the Vpeak and Vrms  |
| A Crest Factor       | Measures ratio between the Apeak and Arms  |
| Hz                   | Measured every 10 sec in accordance with IEC61000-4-30. Vrms <sup>1/2</sup> , Arms <sup>1/2</sup> Value is measured over 1 cycle, commencing at a fundamental zero crossing, and refreshed each half-cycle. This technique is independent for each channel in accordance with IEC 61000-4-30.  |
| Harmonics            | Calculated from 10/12-cycle gapless harmonic group measurements on Voltage and Amps according to IEC 61000-4-7   |
| Watt                 | Full and fundamental real power display. Calculates average value of instantaneous power over 10/12 cycle period for each phase. Total Active Power PT = P1 + P2 + P3.   |
| VA                   | Full and fundamental apparent power display. Calculates apparent power using Vrms x Arms value over 10/12 cycle period.  |
| var                  | Fundamental reactive power display. Calculates reactive power on fundamental positive sequence components. Capacitive and inductive load is indicated with capacitor and inductor icons.   |
| VA Harmonics         | Total disturbance power due to harmonics. Calculated for each phase and for total system based upon total apparent power and fundamental real power.   |
| VA Unbalance         | Unbalance power for total system. Calculated using symmetrical components method for fundamental apparent power and total apparent power.  |
| Power factor         | Calculated total watt/VA   |
| Cos φ                | Cosine of angle between fundamental voltage and current  |
| DPF                  | Calculated fundamental Watt/VA   |
| Energy/energy cost   | Power values are accumulated over time for kWh values. Energy cost is calculated from user defined /kWh cost variable  |
| Unbalance            | The supply voltage unbalance is evaluated using the method of symmetrical components according to IEC61000-4-30  |
| Flicker              | According to IEC 61000-4-15 flickermeter—functional and design specification. Includes 230 V 50 Hz lamp and 120 V 60 Hz lamp models.   |
| Transient capture    | Captures waveform triggered on signal envelope. Additionally triggers on dips, swells, interruptions and Amps level  |
| Inrush current       | The inrush current begins when the Arms half cycle rises above the inrush threshold, and ends when the Arms half cycle rms is equal to or below the inrush threshold minus a user-selected hysteresis value. The measurement is the square root of the mean of the squared Arms half cycle values measured during the inrush duration. Each half-cycle interval is contiguous and non-overlapping as recommended by IEC 61000-4-30. Markers indicate inrush duration. Cursors allow measurement of peak Arms half cycle. |
| Mains signaling      | Measurements are based on: either the corresponding 10/12-cycle rms value interharmonic bin or the rms of the four nearest 10/12-cycle rms value interharmonic bins per IEC 61000-4-30. Limit setup for Monitor mode follows EN50160 standard limits.  |
| Time synchronization | Optional GPS430-II timesync module provides time uncertainty ≤ 20 ms or ≤ 16.7 ms for time tagging of events and time aggregated measurements. When synchronization is not available, time tolerance is ≤ 1-s/24h  |

## Wiring configurations

|                     |  |
|---------------------|--|
| 1Ø + NEUTRAL        | Single phase with neutral  |
| 1Ø SPLIT PHASE      | Split phase  |
| 1Ø IT NO NEUTRAL    | Single phase system with two phase voltages without neutral  |
| 3Ø WYE              | Three phase four wire system WYE   |
| 3Ø DELTA            | Three phase three wire system Delta  |
| 3Ø IT               | Three phase system without neutral WYE   |
| 3Ø HIGH LEG         | Four wire three phase Delta system with center tapped high leg   |
| 3Ø OPEN LEG         | Open delta three wire system with 2 transformer windings   |
| 2-ELEMENT           | Three phase three wire system without current sensor on phase L2/B (2 watt meter method)                             |
| 2½-ELEMENT          | Three phase four wire system without voltage sensor on phase L2/B  |
| INVERTER EFFICIENCY | dc voltage and current input with ac output power (automatically displayed and selected in Inverter Efficiency mode) |

## General specifications

|                 |   |
|-----------------|---|
| Case            | Design Rugged, shock proof with integrated protective holster<br>Drip and dust proof IP51 according to IEC60529 when used in tilt stand position<br>Shock and vibration Shock 30 g, vibration: 3 g sinusoid, random 0.03 g <sup>2</sup> /Hz according to MIL-PRF-28800F Class 2 |
| Display         | Brightness: 200 cd/m <sup>2</sup> typ. using power adapter, 90 cd/m <sup>2</sup> typical using battery power<br>Size: 127 mm x 88 mm (153 mm/6.0 in diagonal) LCD<br>Resolution: 320 x 240 pixels<br>Contrast and brightness: user-adjustable, temperature compensated          |
| Memory          | 8GB SD card (SDHC compliant, FAT32 formatted) standard, upto 32GB optionally<br>Screen save and multiple data memories for storing data including recordings (dependent on memory size)   |
| Real-time clock | Time and date stamp for Trend mode, Transient display, System Monitor and event capture   |

## Environmental

|                                      |  |
|--------------------------------------|--|
| Operating temperature                | 0 °C ~ +40 °C; +40 °C ~ +50 °C excl. battery   |
| Storage temperature                  | -20 °C ~ +60 °C  |
| Humidity                             | +10 °C ~ +30 °C: 95% RH non-condensing   |
|                                      | +30 °C ~ +40 °C: 75% RH non-condensing   |
|                                      | +40 °C ~ +50 °C: 45% RH non-condensing   |
| Maximum operating altitude           | Up to 2,000 m (6666 ft) for CAT IV 600 V, CAT III 1000 V   |
|                                      | Up to 3,000 m (10,000 ft) for CAT III 600 V, CAT II 1000 V   |
|                                      | Maximum storage altitude 12 km (40,000 ft)   |
| Electro-Magnetic-Compatibility (EMC) | EN 61326 (2005-12) for emission and immunity   |
| Interfaces                           | mini-USB-B, Isolated USB port for PC connectivity<br>SD card slot accessible behind instrument battery |
| Warranty                             | Three years (parts and labor) on main instrument, one year on accessories                              |

## Included accessories

|                                    |  |
|------------------------------------|--|
| Power options                      | BC430 Power Adapter<br>International plug adapter set<br>BP290 (Single capacity Li-ion battery) 28Wh (Up to 8 hours) |
| Leads                              | TL430 Test lead and Alligator clip set   |
| Color coding                       | WC100 color coding clips and regional decals   |
| Flexible current probes            | i430flex-TF, 24 inch (61cm) length, 4 clamps   |
| Memory, Software and PC connection | 8 GB SD card<br>PowerLog on CD (includes operator manuals in PDF format)<br>USB cable A-Bmini                        |
| Carrying case                      | C1740 Soft Case for 434-II and 435-II<br>C437 Hard Case with rollers for 437-II                                      |

\* ± 5 % if ≥ 1 % of nominal voltage ± 0.05 % of nominal voltage if < 1 % of nominal voltage  
 \*\* 50Hz/60Hz nominal frequency according to IEC 61000-4-30  
 \*\*\* 400Hz measurements are not supported for Flicker, Mains Signaling and Monitor Mode.  
 \*\*\*\* for nominal voltage 50 V to 500 V

## Flexible Current Probe i430 Flexi-TF specification

| General specifications                         |   |
|--|---|
| Probe and cable material                       | Alcryn 2070NC, reinforced insulation, UL94 V0, Color: RED |
| Couplings material                             | Lati Latamid 6H-V0 Nylon                                  |
| Probe cable length                             | 610 mm (24 in)  |
| Probe cable diameter                           | 12.4 mm (0.49 in)   |
| Probe cable bend radius                        | 38.1 mm (1.5 in)  |
| Output cable length                            | 2.5 meters RG58   |
| Output connector                               | Safety BNC connector                                      |
| Operating range                                | -20 °C to +90 °C  |
| Storage temperature                            | -40 °C to +105°C  |
| Operating humidity                             | 15% to 85% (non condensing)                               |
| Degree of protection (Probe)                   | IP41  |
| Specifications                                 |   |
| Current range                                  | 6000 A AC RMS   |
| Voltage output (@1000 ARMS, 50 Hz)             | 86.6 mV   |
| Accuracy                                       | ± 1% of reading (@ 25 °C, 50 Hz)                          |
| Linearity (10% to 100% of range)               | ± 0.2% of reading   |
| Noise (10 Hz – 7 kHz)                          | 1.0 mV ACRMS  |
| Output impedance                               | 82 Ω min  |
| Load impedance                                 | 50 MΩ   |
| Internal Resistance per 100 mm probe length    | 10.5Ω ± 5%  |
| Bandwidth (-3dB)                               | 10 Hz to 7 kHz  |
| Phase error (45 Hz – 65 Hz)                    | ± 1°  |
| Position sensitivity                           | ± 2% of reading max.                                      |
| Temperature coefficient                        | ± 0.08% max of reading per °C                             |
| Working voltage (see safety standards section) | 1000 V AC RMS or DC (head)<br>30 V max. (output)          |

## Ordering information

|              |  |
|--------------|--|
| Fluke-434-II | Three-Phase Energy Analyzer                          |
| Fluke-435-II | Three-Phase Power Quality and Energy Analyzer        |
| Fluke-437-II | 400 Hz Three-Phase Power Quality and Energy Analyzer |

## Optional/replacement accessories

|                   |  |
|-------------------|--|
| I430-FLEXI-TF-4PK | 6000 A Fluke 430 Thin Flexi 61 cm (24 in) 4 pack |
| C437-II           | Hard Case 430 Series II with roller              |
| C1740             | Softcase for 174X and 43X-II PQ Analyzer         |
| i5sPQ3            | i5sPQ3, 5 A ac Current Clamps, 3-pack            |
| i400s             | i400s AC Current Clamp                           |
| WC100             | WC100 Color Localization Set                     |
| GPS430-II         | GPS430 Time Synchronization Module               |
| BP291             | Double capacity Li-ion battery (up to 16 hr)     |
| HH290             | Hanging hook for use on cabinet doors            |

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