

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



Fluke 437-II



Fluke 435-II



Fluke 434-II



On all inputs

True RMS



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

The 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.
- 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 100/120 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 5  $\mu$ s transient data on all phases simultaneously up to 6 kV.
- Fully Class-A compliant: 435 and 437 Series II analyzer conduct tests according to the stringent international IEC 61000-4-30 Class-A standard with 435 and 437 Series II analyzers.
- 400 Hz measurement: 437 Series II analyzer captures power quality measurements for avionic and military power systems.
- Troubleshoot real-time: 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.
- 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 150 parameters on each phase/neutral at user defined intervals.

### 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 in local currency the cost of energy loss caused by power quality issues.

### Energy savings

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 will determine how much money as facility is losing due to waste energy.

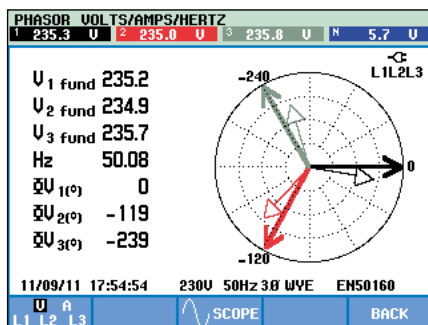
### Unbalance

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.

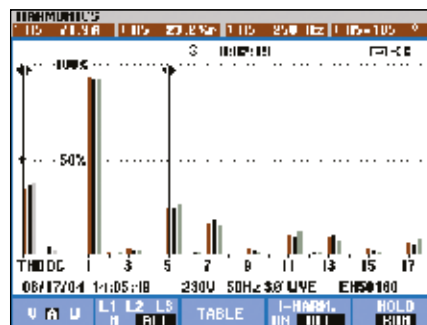
### Harmonics

UPM also provides details of the energy wasted in your facility due to the presence of harmonics. The presence of harmonics in your facility can lead to:

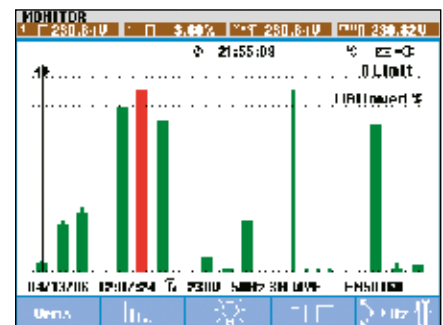
- Overheating transformers and conductors
- Nuisance tripping of circuit breakers
- Early failures of electrical equipment



Phasor diagram.



Track harmonics up to the 50th, and measure and record THD in accordance with IEC61000-4-7 requirements.



The System-Monitor overview gives instant insight into whether the voltage, harmonics, flicker, frequency and the number of dips and swells fall outside the set limits. A detailed list is given of all events falling outside the set limits.

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FLUKE®

## Energy Loss Calculator

Line losses due to:  
Active power  
Reactive power  
Unbalance  
Distortion (Harmonics)  
Neutral current

ENERGY LOSS CALCULATOR			
	Total	Loss	Cost
Active	25.6 kW	197 U	0.83 Eur/Ah
Reactive	9.6 kvar	28 U	0.88 Eur/Ah
Unbalance	20.5 kVA	126 U	0.82 Eur/Ah
Distortion	25.1 kVA	348 U	0.86 Eur/Ah
Neutral	95.7 A	439 U	0.87 Eur/Ah
<b>Total</b>		<b>1693 Eur/h</b>	

Logger				
	L1	L2	L3	M
Vrms	230.83	223.86	222.38	9.76
A rms	286	275	282	2.2
Hz	50.004			
kW	64.7	58.9	62.1	185.6

Logging provides instantaneous analysis of user selectable parameters.

## Input characteristics



Fluke 437 II with all standard accessories.

<b>Voltage inputs</b>	
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 MO/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
<b>Current inputs</b>	
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) 5 Arms to 6000 Arms with included i430flex-TF (with sensitivity 1x) 0.1 mV/A to 1 V/A and custom for use with optional AC or DC clamps
Input impedance	1 MO
Bandwidth	> 10 kHz
Scaling	1:1, 10:1, 100:1, 1,000:1 10,000:1 and variable
<b>Measurement modes</b>	
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%, Arms%, 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., VAfull, VAFund., VAharmonics, VAunbalance, var, PF, DPF, CosQ, Efficiency factor, Wforward, Wreverse
Energy loss calculator	Wfund, VAharmonics, VAunbalance, 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%, Vzzero%, Aneq%, Azero%, Vfund, Afund, V phase angles, A phase angles
Inrush	Inrush current, Inrush duration, Arms%, Vrms%
Monitor	Vrms, Arms, harmonic Volts, THD Volts, PLT, Vrms%, Arms%, Hz, dips, swells, interruptions, rapid voltage changes, unbalance and mains signalling. All parameters are measured simultaneously in accordance with EN50160. 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 ½, Arms ½, Hz
Transients (435-II and 437-II only)	Transient waveforms 4x Voltage 4x Arms, triggers: Vrms ½, Arms ½, 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
UPower Wave (435-II and 437-II only)	Vrms%, Arms% W, Hz and scope waveforms for voltage amps and watts
Logger	Custom selection of up to 150 PQ parameters measured simultaneously on 4 phases

## Included Accessories

TL430 test lead and alligator clip set,  
i430flex-TF-II, 60 cm, 4 clamps,  
BC430 power adapter,  
BP290 single capacity Li-ion battery,  
International plug adapter set,  
WC100 color coding clips and regional decals,  
8 GB SD card,  
PowerLog on CD,  
USB cable A-Bmini,  
C1740 softcase (434-II, 435-II),  
C437 hard case (437-II)

## Ordering information

Fluke 434-II Three-Phase Energy Analyzer  
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**Battery life:** 7 hours operating time per charge on Li-ion battery pack  
**Safety:** EN61010-1 (2nd edition) pollution degree 2; 1000 V CAT III / 600 V CAT IV  
**Case:** Rugged, shock proof with integrated protective holster, IP51 (drip and dust proof)  
**Shock:** 30 g; **Vibration:** 3g according to MIL-PRF-28800F Class 2  
**Operating temperature:** 0°C to +50°C  
**Size (HxWxD):** 265 mm x 190 mm x 70 mm; **Weight:** 2.1 kg  
**Three Years Warranty**

## Recommended Accessories



See page 116 for power quality current clamps