



**FLUKE**<sup>®</sup>

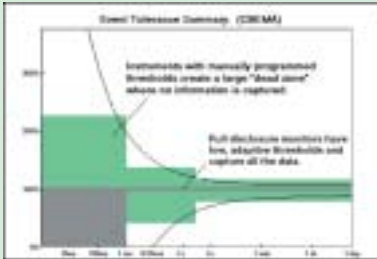
— **Power Quality**

**Simply disclose everything**

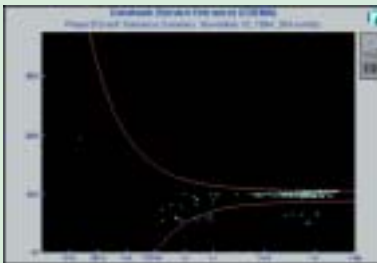
**Power Recorder Series**

# Simply disclose everything

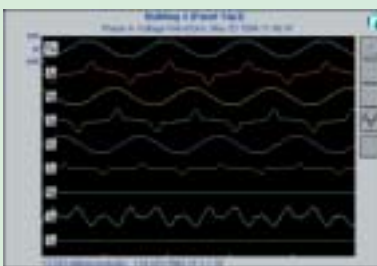
**Every event, every parameter, on every cycle, all the time - within seconds**



Capture thousands of events without setting any threshold using the unique Full Disclosure technology.



Plot events on any power tolerance curve. You can create your own or use CBEMA, ITIC and ANSI curves.



Real-time waveform display shows up to 9 channels (4 voltage, 5 current) including ground and neutral current.



Real-time voltage and current meters feature phasor diagrams to help with correct hookup.

No longer will your power distribution system hold any secrets. The power recorder series is a unique range of instruments that increase your ability to maintain and troubleshoot your plant's power quality. They monitor every aspect of power without blind spots or gaps, on all conductors in your 3-phase distribution system. 9 channels allow you to exactly monitor what's happening on the neutral and ground conductors as well. Unlike other power monitors, every parameter on every conductor is measured all the time.

And they are easy to use. Within seconds you will have your first measurements. There's no need to set trigger thresholds or reconfigure the instrument. Just hook it up and start monitoring.

- 4 voltage channels to measure the three phases plus neutral-to-ground voltage.
- Unique 5 current channels allow you to monitor neutral and ground current in addition to the individual phases.
- The power recorder looks at every cycle for power quality events such as sags, swells, interruptions and transients on all channels simultaneously. You will see everything from sub-cycle transients to long-term outages in clear detail. The power recorder automatically selects the best resolution for each event.
- Don't know what to look for? Don't worry, you don't need to set trigger thresholds. Adaptive thresholds optimize event capture. You won't be disappointed about missed events or a memory full of noise through wrong thresholds settings. Your measurements will be right first time. You will see not only changes that are outside of the limits, but you will also see changes that are *not quite* out of tolerance.
- Records true RMS voltage, true RMS current, frequency, harmonics, power consumption parameters (W, kWh, VA, VAR, PF), imbalance and flicker.
- Analyzes voltage characteristics according to the EN50160 standard.
- Transient capture down to 500 ns duration and 6400 Vpk.
- High-speed waveform capture allows you to display transients as fast as 500 ns.
- Store up to 96,000 events.
- Real-time oscilloscope shows all 9 channels simultaneously.
- Aluminum enclosure is designed to handle a lifetime of use.
- Ethernet interface makes downloads fast and easy and TCP/IP enables communication via Internet.
- Wide selection of models. Whether portable or for fixed installations, just pick the model that fits your application best. Growing needs? You can always expand capabilities by adding options later.





# Software completes the system

There are two software packages available for the Power Recorder:

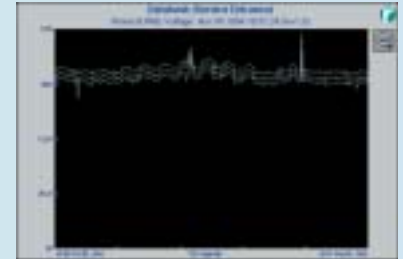
- The Power Analysis System software and
- The Scenario software.

Both packages handle seamless communication with the Power Recorder, graphical display of power-system parameters, and data-management tools.

## Power Analysis System software

For the Power Analysis System software there are two optional packages available:

- Report writer software. This software analyzes all the data collected. It sorts events and summary data and merges graphs with Microsoft Word for easy documentation and report creation.
- Polling and alarm software. This automates collection of data from multiple monitors to:
  - alert key personnel to serious events by executing alarm procedures.
  - easily centralize data collection via a LAN/WAN network.

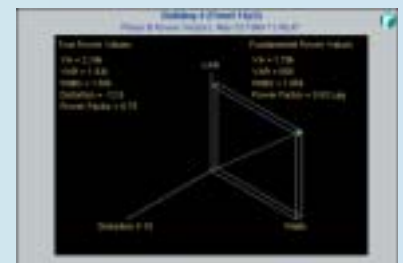


Trend windows give you an overview of power parameters – fast. Measurements are processed for every cycle. Min, max and average values are plotted so you can quickly see worst case.

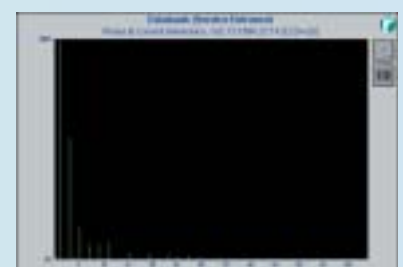
## The Scenario software

This powerful software package performs predictive analysis, manages data and gives advanced warning to avoid shutdowns.

- Allows plotting of multiple-measurement sessions on one timescale
- Includes facilities for comparing trends from multiple databases
- Calculates a Power Quality Index – a single figure of merit that characterizes the overall performance of a power system. The Power Quality Index allows you to determine system-performance trends over time and determine whether a system is improving or degrading.



Real-time meter and vector diagrams display watts, VA, VAR, PF and dPF (Cosφ).



Display harmonics up to the 63<sup>rd</sup> as a spectrum or table.



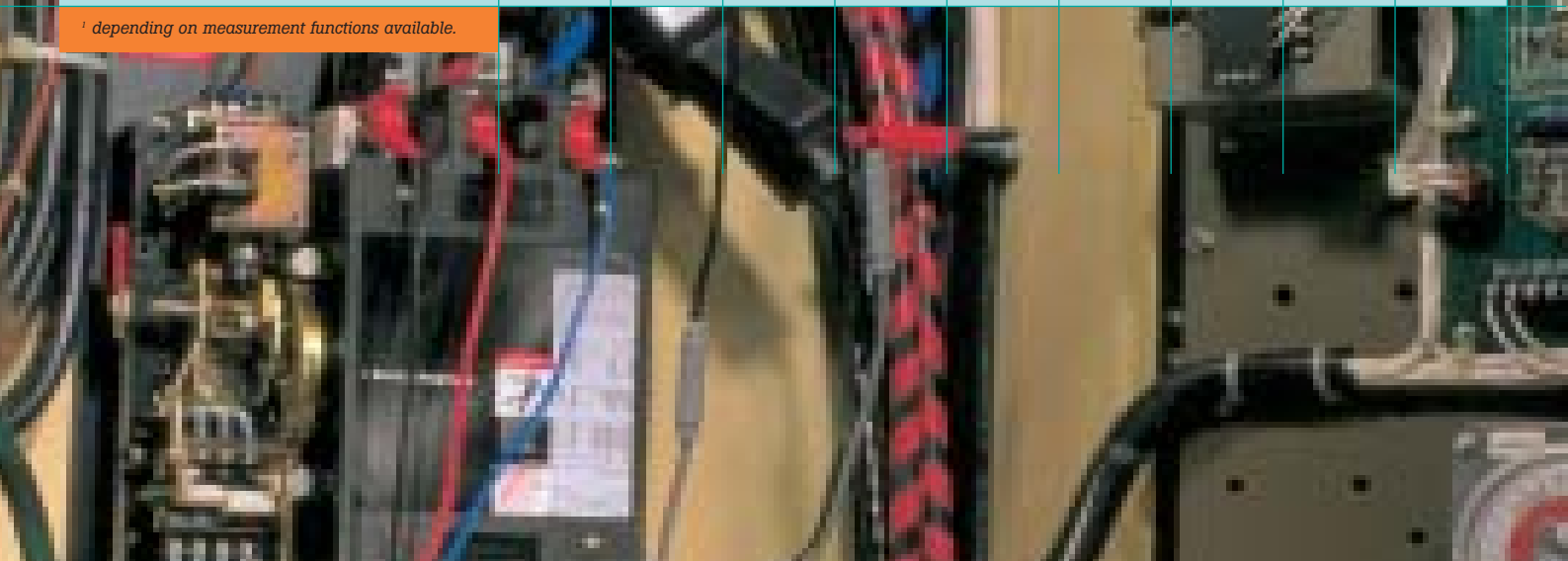
With high-speed waveform capture you can view transients as short as 500 ns.



# Model selection table

	Power recorder	High-speed power recorder	Harmonics recorder	High-speed harmonics analyzer	Power quality recorder	High-speed power quality recorder	High-speed power quality analyzer	Multipoint power quality recorder	High-speed multipoint power quality analyzer
Application	Portable	Portable	Portable	Portable	Portable	Portable	Portable	Portable	Fixed
4 voltage channels	•	•	•	•	•	•	•	•	•
5 current channels including neutral and ground	•	•	•	•	•	•	•	•	•
Automatic thresholds; adaptive to signal	•	•	•	•	•	•	•	•	•
True rms - voltage and current	•	•	•	•	•	•	•	•	•
Sags and swells - voltage and current	•	•	•	•	•	•	•	•	•
Transient capture	130 µs	500 ns	130 µs	500 ns	130 µs	500 ns	500 ns	130 µs	500 ns
Waveform display- max sampling rate	6.4 kS/s	6.4 kS/s	6.4 kS/s	2 MS/s	6.4 kS/s	6.4 kS/s	2 MS/s	6.4 kS/s	2 MS/s
Event memory – max number of voltage and current events stored	6000	6000	96000	96000	96000	96000	96000	96000	96000
Maximum peak voltage	1000 V	6400 V	1000 V	6400 V	1000 V	6400 V	6400 V	1000 V	6400 V
Frequency trends	•	•	•	•	•	•	•	•	•
Phasor diagrams	•	•	•	•	•	•	•	•	•
Real time 9 channel oscilloscope display	•	•	•	•	•	•	•	•	•
Power tolerance curves – customer definable, ANSI, CBEMA	•	•	•	•	•	•	•	•	•
Harmonic spectrum, phase, magnitude to 63 <sup>rd</sup> harmonic			•	•	•	•	•	•	•
Tracking of individual harmonics			•	•	•	•	•	•	•
THD trend – voltage and current			•	•	•	•	•	•	•
Imbalance – voltage and current			•	•	•	•	•	•	•
Flicker			•	•	•	•	•	•	•
Watts and demand trends					•	•	•	•	•
kWh, individual phases and total					•	•	•	•	•
VA and VAR trends					•	•	•	•	•
Power factor trends, true and displacement (Cosφ)					•	•	•	•	•
Graphical display of power factors – per phase					•	•	•	•	•
External/Internal current transforms	•/-	•/-	•/-	•/-	•/-	•/-	•/-	•/•	•/•
EN50160 analysis <sup>1</sup>	•	•	•	•	•	•	•	•	•
Ethernet and TCP/IP communications	•	•	•	•	•	•	•	•	•

<sup>1</sup> depending on measurement functions available.





# Fixed-installation multipoint power recorders

## Specifications

Number of channels: 9 (4 voltage, 5 current)

Function	Range	Sampling rate	Resolution	Accuracy ±(% of reading + floor)
Voltage (phases)	100 mV - 600 Vrms 1000 V peak	6.4 kS/s <sup>1</sup> or 2MS/s <sup>2</sup>	14 bits, 90 mV	± (1.5% + 0.5 V) over entire range
Voltage (neutral)	10 mV- 70 Vrms 100 V peak	6.4 kS/s <sup>1</sup> or 2MS/s <sup>2</sup>	14 bits, 90 mV	± (1.5% + 0.5 V) over entire range
Current (external CTs)	Depends upon CT	6.4 kS/s <sup>1</sup>	14 bits	± (0.5% + 0.1% of probe range + probe uncertainty)
Current (internal CTs)	20 A maximum	6.4 kS/s <sup>1</sup>	14 bits	± (1% + 0.04 A)
Transient capture	200 - 1000 V peak	6.4 kS/s <sup>1</sup>	10 bits, 12 V	± (5% + 36 V) over entire range
High speed transient capture	200 - 6400 V peak	2 MS/s	10 bits, 12 V	± (5% + 36V ) over entire range

<sup>1</sup> 50 Hz line frequency

<sup>2</sup> For high speed models

Nominal fundamental frequency: 50/60 Hz ± 0.1 Hz

Voltage and current sampling: 128 samples per cycle

### Electrical

Operating voltages: 85-264 VAC, 47 - 440 Hz; 10 - 15 V DC.  
Power consumption: 40 W

Backup power: NiCd battery recharges automatically while line power is applied. Power the instrument for 5 minutes after power is removed and allows controlled shutdown of monitor. Monitoring resumes after power is restored.

### Mechanical

Size: 31.5 cm x 29.4 cm x 15.2 cm

Weight: 4 kg

Operating temperature: 0 ° - 50 °C

90% RH non-condensing

### Standards:

Measurements: IEC 61000-4-30 class b using cycle based techniques

Power Quality: EN50160

Flicker: EN 60868

### Communication:

10-base T Ethernet, RJ 45 connector or via Internet

### Included accessories

All units include user manual

### Warranty:

1 year

## Optional accessories

1230	Metal cabinet
3005R	5A Clamp-on CT
3014R	40 A Clamp-on CT
3100R	1000 A Clamp-on CT
3110/RPM	100 A Flexi-CT (60 cm)
3112/RPM	100 A Flexi-CT (120 cm)
3120R	200 A Clamp-on CT (2 cm)
3210/RPM	1000 A Flexi-CT (60 cm)
3212/RPM	1000 A Flexi-CT (120 cm)
3300R	3000 A Clamp-on CT
3310/RPM	5000 A Flexi-CT (60 cm)
3312/RPM	5000 A Flexi-CT (120 cm)
5000/RPM	Power analysis software
5100/RPM	Power analysis software with Report Writer
5400/RPM	Scenario analysis software
5500/RPM	Power analysis software with Master Polling
5600/RPM	Power analysis software with Report Writer, Master Polling

## Ordering information

1951/3	Multipoint power quality recorder (internal CTs)
1952/3	Multipoint power quality recorder (external CTs)
1958/3	High-speed multipoint power quality analyzer (internal CTs)
1959/3	High-speed multipoint power quality analyzer (external CTs)

Only models with external CTs will accept optional current transformers



# Portable power recorders

## Specifications

Number of channels: 9 (4 voltage, 5 current)

Function	Range	Sampling rate	Resolution	Accuracy ±(% of reading + floor)
Voltage (phases)	100 mV - 600 Vrms 1000 V peak	6.4 kS/s <sup>1</sup> or 2Ms/s <sup>2</sup>	14 bits, 90 mV	± (1.5% + 0.5 V) over entire range
Voltage (neutral)	10 mV- 70 Vrms 100 V peak	6.4 kS/s <sup>1</sup> or 2Ms/s <sup>2</sup>	14 bits, 90 mV	± (1.5% + 0.5 V) over entire range
Current	Depends upon CT	6.4 kS/s <sup>1</sup>	14 bits	± (0. % + 0.1% of probe range + probe uncertainty)
Transient capture	200 - 1000 V peak	6.4 kS/s <sup>1</sup>	10 bits, 12 V	± (5% + 36 V) over entire range
High-speed transient capture	200 - 6400 V peak	2 MS/s	10 bits, 12 V	± (5% + 36 V) over entire range

1) 50 Hz line frequency  
2) For high speed models

Nominal fundamental frequency: 50/60 Hz ± 0.1 Hz  
Voltage and current sampling: 128 samples per cycle

### Electrical

Safety conformance: IEC61010-1 CAT III 600 V  
Operating voltages: 85-264 VAC, 47 - 440 Hz;  
10 - 15 V DC with 4255 optional cable  
Power consumption: 40 W  
Backup power: NiCd battery recharges  
automatically while line power is applied.  
Power the instrument for 5 minutes after power  
is removed and allows controlled shutdown of  
monitor. Monitoring resumes after power is  
restored.

### Mechanical

Enclosure: rugged, aluminum casing  
Size: 21.25 cm x 30 cm x 7.5 cm  
Weight: 6 kg  
Operating temperature: 0 ° - 50 °C  
90% RH non-condensing

### Standards:

Measurements: IEC 61000-4-30 class b  
using cycle based techniques  
Power Quality: EN50160  
Flicker: EN 60868

### Communication:

10-base T Ethernet, RJ 45 connector or via  
Internet

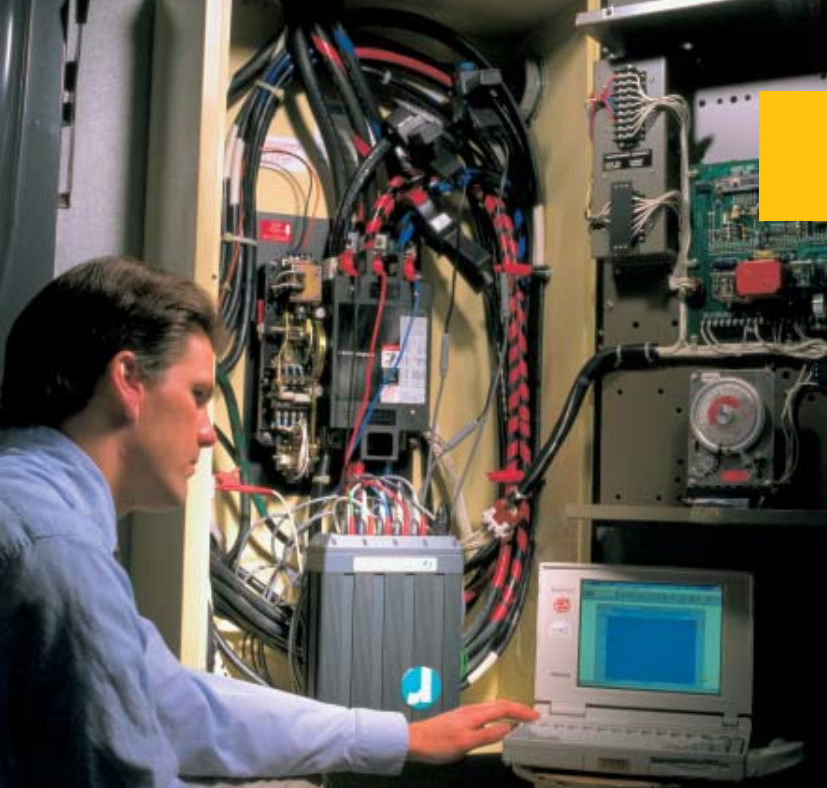
### Included accessories

All units include user manual, line cord, 5  
voltage leads and 5 alligator clips, Ethernet  
cable, socket-socket adapter, and 60 cm  
cross-over cable.

### Warranty:

1 year





## Ordering information

1650/01xB	Power recorder
1650/03xF	Harmonics recorder
1650/03xH	Power quality recorder
1650/11xB	High speed power recorder
1650/13xH	High speed power quality recorder
1650/13xL	High speed harmonics analyzer
1650/13xM	High speed power quality analyzer

x= 1 is Europe  
x= 4 is UK

## Optional accessories

4001	Carrying case, W/Rpm logo
4003	Shipping caddy with wheels
4005	Shipping container, reusable
4006	1.8 m steel lockable security cable
4008	Monitor brackets for wall mounting
4255	DC power cable
3005R	5A Clamp-on CT
3014R	40 A Clamp-on CT
3100R	1000 A Clamp-on CT
3110/RPM	100 A Flexi-CT (60 cm)
3112/RPM	100 A Flexi-CT (120 cm)
3120R	200 A Clamp-on CT (2 cm)
3210/RPM	1000 A Flexi-CT Ct (60 cm)
3212/RPM	1000 A Flexi-CT (120 cm)
3300R	3000 A Clamp-on CT (9 x 11 cm)
3310/RPM	5000 A Flexi-CT (60 cm)
3312/RPM	5000 A Flexi-CT (120 cm)
3602/RPM	Battery type voltage probe, set of 5 clips
3605/RPM	Syringe stud type voltage probes, 5 probes
3606/RPM	Threaded stud type voltage probe, 5 probes
3607/RPM	Bus-bar voltage (F-Type) probe, set of 5
3608/RPM	Plunger type voltage probe, 5 syringe-action
5000/RPM	Power analysis software
5100/RPM	Power analysis software with Report Writer
5400/RPM	Scenario analysis software
5500/RPM	Power analysis software with Master Polling
5600/RPM	Power analysis software with Report Writer, Master Polling



4001 Carrying case



4003 Shipping caddy

# Fluke power quality current transformers

Fluke power quality current transformers (CTs) are specially designed to work seamlessly with the Power Recorders. All Clamp-on and Flexi-CTs are matched to take full advantage of your instrument's ability to set scale factors for accurate readings.



3300 Clamp-on current transformer

### Clamp-on current transformers

Model No.	CT Type	Current range	Accuracy	Frequency response	Jaw opening
3005R	Clamp-on	0.01-5A	1% RDG +/- 0.5% FS	5 kHz	2 cm
3014R	Clamp-on	0.1 - 40 A	1% RDG +/- 0.1% FS	5 kHz	2 cm
3120R	Clamp-on	0.5 - 200 A	1% RDG +/- 0.3% FS	5 kHz	2 cm
3100R	Clamp-on	1 - 1000 A	1% RDG +/- 0.05% FS	5 kHz	5 cm
3300R	Clamp-on	10 - 3000 A	2% RDG +/- 0.5% FS	5 kHz	2 cm



3120R Clamp-on current transformer

### Flexi-CT™ Flexible current transformers

Model No.	CT Type	Current range	Accuracy	Frequency response	Jaw opening
3110/RPM	Flexi-CT	2 - 100 A	1% RDG +/- 0.5% FS	7 kHz	60 cm
3112/RPM	Flexi-CT	2 - 100 A	1% RDG +/- 0.5% FS	7 kHz	120 cm
3210/RPM	Flexi-CT	20 - 1000 A	1% RDG +/- 0.15% FS	7 kHz	60 cm
3210/RPM	Flexi-CT	20 - 1000 A	1% RDG +/- 0.15% FS	7 kHz	120 cm
3310/RPM	Flexi-CT	100 - 5000 A	1% RDG +/- 0.15% FS	7 kHz	60 cm
3312/RPM	Flexi-CT	100 - 5000 A	1% RDG +/- 0.15% FS	7 kHz	120 cm



3210/RPM Flexi-CT

### Interface and extension cables

3570/RPM	CT cable	Connects clamp-on style CT to Power Recorder	2.5 m
3533/RPM	Pod adapter	Connects flexible CT to hostile enclosure current pod	

**Fluke.** Keeping your world up and running.

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