

FLUKE<sup>®</sup>

## Fluke 345

### Power Quality Clamp Meter

### Technical Data

The ideal meter for commissioning and troubleshooting modern electrical loads



With a bright color display to analyze the harmonic spectrum, a low-pass filter to remove high frequency noise, and a high EMC immunity design, the Fluke 345 is ideal for measurements on switching loads such as variable frequency drives, electronic lighting and UPS systems. Additionally, the Hall Effect measurement system makes measurement of dc current possible without the need to break the circuit, and the internal memory enables long-term logging for analysis of trends or intermittent problems.

- **AC/DC current:** Clamp-on measurement of ac current up to 1400 A rms and dc current up to 2000 A without breaking the circuit
- **Highest safety rating:** 600 V CAT IV rated for use at the service entrance
- **Accurate in noisy environments:** Even with distorted waveforms present on electronic loads with low-pass filter
- **Data logging:** Identify intermittent faults by logging any power parameters for minutes or months, including harmonics
- **Verify batteries:** Direct measurement of dc ripple (%) for battery and dc systems
- **Troubleshoot harmonics:** Analyze and log harmonics digitally or graphically
- **Inrush current:** Capture and analyze nuisance tripping, from 3 seconds to 300 seconds
- **Easy to use:** Easily confirm instrument setup with large backlit color display of waveforms and trends
- **3-Phase power:** Built in capability for balanced loads
- **View graphs and generate reports:** With included Power Log software

## Applications

**Set up and troubleshoot variable frequency drives and UPS systems** - Verify correct operation by measuring key parameters

**Harmonics measurements** - Uncover harmonic issues that can damage or disrupt critical equipment

**Inrush capture** - Check start-up current where spurious resets or nuisance circuit breaker tripping occurs

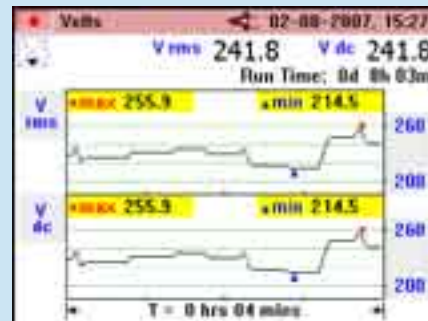
**Load studies** - Verify electrical system capacity before adding loads



## Log measured parameters

All voltage, current, power, and harmonic measurements can be logged for minutes, hours, or months. Measurement averaging periods from 1 second to 15 minutes can be selected depending on the application.

Measured parameters can be logged into three separate recording memory areas. If longer recordings are required, the three areas may be combined into one. Stored measurements can be recalled and displayed on-screen in normal screen format or downloaded using the Power Log software package.



Log parameters over time to track down intermittent faults.



Harmonics measurements—view key harmonic factors such as distortion factor and total harmonic distortion, as well as individual harmonics up to the 30<sup>th</sup> harmonic.

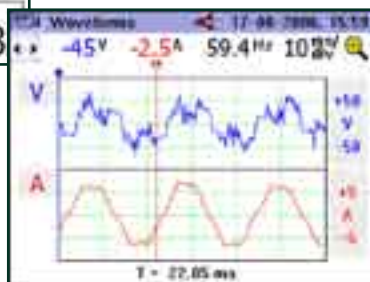
### Flexible and easy to use

The 345 measures a wide range of electrical parameters and can be used for many applications in today's modern electrical environment. Measuring mode is selected by a simple turn of the rotary switch and the large color display presents data in a clear, easy-to-understand way.

By default the display will show the most common measurements, in very large format. If more detailed views are required they are available with the press of a single key (up to six measurements at once).



Equipment performance measurement - power consumed by single- and three-phase balanced loads.



View waveforms for equipment checking and setup.

### Inrush current

Diagnose equipment start-ups with the inrush current mode. A current trigger level is set prior to recording. Once the level has been exceeded, the meter will begin capture. Recordings from 3 seconds to 300 seconds may be captured, and up to 1000 inrush events may be stored in the instruments memory.

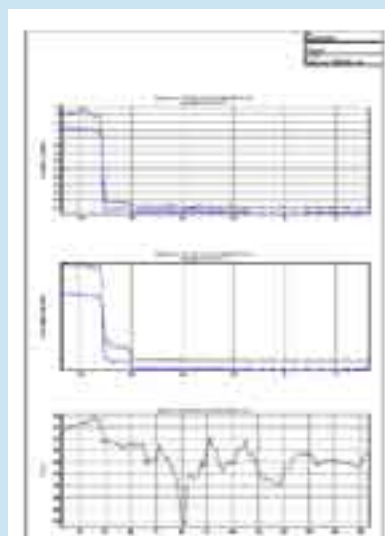
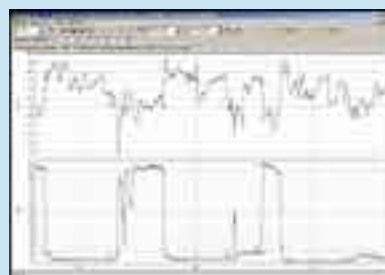
### Screen captures and data logging

Any measurement can be stored in memory for later viewing, or downloaded to a PC. Simply press 'SAVE' to capture the active screen to memory - up to 50 screen shots can be saved for quick and simple documentation. Additionally, over 150,000 individual measurements can be logged for later review on the display or on a PC using Power Log software.

### Analysis and reporting software

Designed to quickly view recorded data, the included Power Log software displays all recorded parameters on interactive trends. Generate professional reports with the 'Report Writer' function, or copy and paste images into report document manually.

- Easy-to-use tabbed window format allows quick data evaluation.
- One-step download and display capability
- Waveform, harmonics, and trend download
- Simple data export to other applications



## General Specifications

### Display

Color transmissive LCD 320 x 240 pixels (70 mm diagonal) with 2 level backlight

### Power supply

Battery type 1.5 V Alkaline AA MN 1500 or IEC LR6 x 6

<b>Battery life typically</b>	> 10 hours (backlight on full)
	> 12 hours (backlight reduced)

#### Battery Eliminator BE345

Input	110 V/230 V, 50/60 Hz
Output	15 V dc, 300 mA

### Ambient conditions (For indoor use only)

<b>Reference conditions</b>	All accuracies stated at 23 °C ± 1 °C (73.4 °F ± 1.8 °F)
<b>Operating temperature</b>	0 °C to 50 °C (32 °F to 122 °F)
<b>Temperature coefficient of current</b>	≤ ± 0.15 % of rdg per °C
<b>Temperature coefficient of voltage</b>	≤ ± 0.15 % of rdg per °C
<b>Maximum relative humidity</b>	80 % for temperatures up to 31 °C (87 °F) decreasing linearly to 50 % relative humidity at 40 °C (104 °F)
<b>Maximum operating altitude</b>	2000 m

### Electrical safety

Safety IEC 61010-1 600 V CAT IV, double or reinforced insulation, pollution degree 2

Protection IP40; EN60529

#### Maximum safe working voltages

Current measurement	600 V ac rms or dc between uninsulated conductor and ground
Voltage measurement	600 V ac rms or dc between either input terminal and ground, or 825 V between energized phase voltages (delta power config.)

### EMC

<b>Emission</b>	IEC/EN 61326-1:1997 class B
<b>Immunity</b>	IEC/EN 61326-1:1997

### Mechanical

<b>Dimensions (length x width x depth)</b>	300 mm x 98 mm x 52 mm (12 in x 3.75 in x 2 in)
<b>Weight including batteries</b>	820 g/1.8 lb
<b>Jaw opening</b>	60 mm
<b>Jaw capacity</b>	58 mm diameter
<b>Cleaning</b>	The unit can be cleaned with an Isopropanol impregnated cloth. Do not use abrasives or other solvents.

## Specifications

### Electrical data

All accuracies stated at 23 °C ± 1 °C (73.4 °F ± 1.8 °F). See Ambient conditions specifications for temperature coefficients.

### Current measurement (dc, dc rms, ac rms)

<b>Measuring range</b>	0 to 2000 A dc or 1400 ac rms
<b>Autorange facility</b>	40 A/400 A/2000 A
<b>Resolution</b>	10 mA in 40 A range
	100 mA in 400 A range
	1 A in 2000 A range
<b>Accuracy</b>	
<b>DC and dc rms</b>	
I > 10 A	± 1.5 % rdg ± 5 digits
I < 10 A	± 0.2 A
<b>AVG</b>	
I > 10 A	± 3 % rdg ± 5 digits
I < 10 A	± 0.5 A
<b>Pk</b>	
I > 10 A	± 5 % rdg ± 5 digits
I < 10 A	± 0.5 A
<b>AHr</b>	
I > 10 A	± 2 % rdg ± 5 digits
I < 10 A	± 0.5 AHr
<b>CF (Crest Factor)</b>	
1.1 ≤ CF < 3	± 3 % rdg ± 5 digits
3 ≤ CF < 5	± 5 % rdg ± 5 digits
Resolution	0.01
<b>RPL (Ripple)</b>	
2 % ≤ RPL < 100 %	± 3 % rdg ± 5 digits
100 % ≤ RPL < 600 %	± 5 % rdg ± 5 digits
Resolution	0.1 %
$I_{dc} > 5 A, I_{ac} > 2 A$	
All measurements dc and 15 Hz to 1 kHz Maximum overload 10,000 A or rms x frequency < 400,000 Amps rms is a true-rms measurement (ac + dc)	

## Voltage measurement (dc, dc rms, ac rms)

<b>Measuring range</b>	0 to 825 V dc or ac rms
<b>Autorange facility</b>	4 V/40 V/400 V/750 V
<b>Resolution</b>	1 mV in 4 V range
	10 mV in 40 V range
	100 mV in 400 V range
	1 V in 750 V range
<b>Accuracy</b>	
<b>DC and dc rms</b>	
V > 1 V	± 1 % rdg ± 5 digits
V < 1 V	± 0.02 V
<b>AVG</b>	
V > 1 V	± 3 % rdg ± 5 digits
V < 1 V	0.03 V
<b>Pk</b>	
V > 1 V	± 5 % rdg ± 5 digits
V < 1 V	± 0.03 V
<b>CF (Crest Factor)</b>	
1.1 ≤ CF < 3	± 3 % rdg ± 5 digits
3 ≤ CF < 5	± 5 % rdg ± 5 digits
Resolution	0.01
<b>RPL (Ripple)</b>	
2 % ≤ RPL < 100 %	± 3 % rdg ± 5 digits
100 % ≤ RPL < 600 %	± 5 % rdg ± 5 digits
Resolution	0.1 %
V <sub>ac</sub> > 0.5 V, V <sub>ac</sub> > 0.2 V	
All measurements dc and 15 Hz to 1 kHz Maximum overload 1,000 V rms Volts rms is a true-rms measurement (ac + dc)	

## Harmonics

<b>THD (Total Harmonic Distortion)</b>	
1 % ≤ THD < 100 %	± 3 % rdg ± 5 digits
100 % ≤ THD < 600 %	± 5 % rdg ± 5 digits
Resolution	0.1 %
<b>DF (Distortion Factor)</b>	
1 % ≤ DF < 100 %	± 3 % rdg ± 5 digits
Resolution	0.1 %
H02 ≤ V <sub>harm</sub> < H13	± 5 % rdg ± 2 digits
H13 ≤ V <sub>harm</sub> ≤ H30	± 10 % rdg ± 2 digits
All measurements up to 30th harmonic (40th harmonic for 15 Hz to 22 Hz) Frequency range F <sub>0</sub> 15 Hz to 22 Hz and 45 Hz to 65 Hz V <sub>acrms</sub> > 1V	

### Watts measurement (single- and three-phase) (dc, dc rms, ac rms)

<b>Measuring range</b>	0 to 1650 kW dc or 1200 kW ac
<b>Autoranging facility</b>	4 kW, 40 kW, 400 kW, 1650 kW ac
<b>Resolution</b>	1 W in 4 kW
	10 W in 40 kW
	100 W in 400 kW
	1 kW in 1200 kW
<b>Accuracy</b>	2.5 % rdg $\pm$ 5 digits
	W1 $\emptyset$ < 2 kW $\pm$ 0.08 kW
	W3 $\emptyset$ < 4 kW $\pm$ 0.25 kW

### VA measurement (single- and three-phase) (dc, dc rms, ac rms)

<b>Measuring range</b>	0 to 1650 kVA dc or 1200 kVA ac	
<b>Autoranging facility</b>	4 kVA, 40 kVA, 400 kVA, 1650 kVA	
<b>Resolution</b>	1 VA in 4 kVA	
	10 VA in 40 kVA	
	100 VA in 400 kVA	
	1 kVA in 1200 kVA	
<b>Accuracy</b>		
	VA > 2 kVA	2.5 % rdg $\pm$ 5 digits
	VA < 2 kVA	$\pm$ 0.08 kVA

### VAR measurement (single- and three-phase)

<b>Measuring range</b>	0 to 1250 kVAR	
<b>Autoranging facility</b>	4 kVAR, 40 kVAR, 400 kVAR, 1200 kVAR	
<b>Resolution</b>	1 VAR in 4 kVAR	
	10 VAR in 40 kVAR	
	100 VAR in 400 kVAR	
	1 kVAR in 1200 kVAR	
<b>Accuracy</b>		
	VAR > 4 kVAR	$\pm$ 2.5 % rdg $\pm$ 5 digits
	VAR < 4 kVAR	$\pm$ 0.25 kVAR
<b>Power factor range</b>	0.3 < PF < 0.99	

### Power factor (single- and three-phase)

#### Power factor

<b>Measuring range</b>	0.3 capacitive and 1.0 to 0.3 inductive (72.5° capacitive and 0° to 72.5° inductive)
<b>Resolution</b>	0.001
<b>Accuracy</b>	$\pm$ 3°
<b>Frequency range</b>	15 Hz to 1 kHz

#### Displacement power factor

<b>Measuring range</b>	0.3 capacitive and 1.0 to 0.3 inductive (72.5° capacitive and 0° to 72.5° inductive)
<b>Resolution</b>	0.001
<b>Accuracy</b>	$\pm$ 3°
<b>Frequency range</b>	15 Hz to 22 Hz and 45 Hz to 65 Hz

## Kilowatt hour (kWhr)

<b>Measuring range</b>	40,000 kWhr
<b>Autorange facility</b>	1 kWhr, 40 kWhr, 400 kWhr, 4,000 kWhr, 40,000 kWhr
<b>Resolution</b>	1 WHr in 4 kWhr
	10 WHr in 40 kWhr
	100 WHr in 400 kWhr
	1 kWhr in 4,000 kWhr
	10 kWhr in 40,000 kWhr
<b>Accuracy</b>	
kWhr > 2 kWhr	$\pm 3\% \pm 5$ digits
kWhr < 2 kWhr	$\pm 0.08$ kWhr
<b>All Watts /VA /VAR /PF measurements</b>	
Frequency range	DC and 15 Hz to 1 kHz
Current range	10 A to 1400 A rms
Voltage range	1 V to 825 V rms
Maximum input	825 V rms/1400 A rms
Maximum overload	1000 V rms/10,000 A

## Frequency measurement (from current or voltage sources)

<b>Measuring range</b>	15 Hz to 1 kHz
<b>Resolution</b>	0.1 Hz
<b>Accuracy</b>	15 to 22 Hz $\pm 0.5\%$ rdg
	40 Hz to 70 Hz $\pm 0.5\%$ rdg
	15 Hz to 1000 Hz $\pm 1\%$ rdg
<b>Current range</b>	10 A to 1400 A rms
<b>Voltage range</b>	1 V to 825 V rms

## Scope function

<b>Current measurement</b>	
Ranges	10 A/20 A/40 A/100 A/200 A/400 A/1000 A/2000 A
Resolution	1 A in 40 A
	10 A in 400 A
	50 A in 2000 A
Accuracy	$\pm 3\%$ rdg $\pm 1$ pixel
Maximum overload	10,000 A
<b>Voltage measurement</b>	
Ranges	4 V/10 V/20 V/40 V/100 V/200 V/400 V/1000 V
Resolution	100 mV in 4 V
	1 V in 40 V
	10 V in 400 V
	31.25 V in 1000 V
Accuracy	$\pm 2\%$ rdg $\pm 1$ pixel
Maximum overload	1000 V rms
Frequency range	DC and 15 Hz to 600 Hz
<b>Time base</b>	2.5 ms, 5 ms, 10 ms, 25 ms, 50 ms/div
<b>Refresh rate</b>	0.5 seconds
<b>Maximum sampling rate</b>	15.625 kHz



## Inrush current function

<b>Ranges</b>	40 A, 400 A, and 2000 A
<b>Resolution</b>	10 mA in 40 A range
	100 mA in 400 A range
	1 A in 2000 A range
<b>Accuracy</b>	
I > 10 A	± 5 % rdg ± 1 pixel
I < 10 A	± 0.5 A
All measurements dc and 15 Hz to 1 kHz	
<b>Maximum overload</b>	Maximum overload 10,000 A or rms x frequency < 400,000
Amps rms is a true-rms measurement (ac + dc)	
<b>Capture time</b>	1 s, 3 s, 10 s, 30 s, 100 s, and 300 s
<b>Maximum sampling rate</b>	15.625 kHz

## Interface

USB Interface to a PC
Power Log software for download, analysis, and reporting
345 Upgrade Utility for installing a new firmware version

## Logging Memory

<b>Logging areas</b>	Three areas that can be used individually or combined into one large area
<b>Averaging periods</b>	1 s, 2 s, 5 s, 10 s, 30 s, 1 min, 5 min, 10 min, 15 min, and custom

**Logging times**

<b>Volts and current mode</b>		
<b>Average time</b>	<b>Logging time (1 area)</b>	<b>Logging time (3 areas)</b>
1 s	1 h 49 m	5 h 12 m
2 s	3 h 38 m	10 h 24 m
5 s	9 h 06 m	1 d 2 h 00 m
10 s	18 h 12 m	2 d 04 h 00 m
30 s	2 d 06 h 36 m	6 d 12 h 01 m
1 min	4 d 13 h 12 m	13 d 00 h 03 m
5 min	22 d 18 h 00 m	65 d 00 h 15 m
10 min	45 d 12 h 00 m	130 d 00 h 30 m
15 min	68 d 06 h 00 m	195 d 00 h 45 m

<b>V &amp; A harmonics mode</b>		
<b>Average time</b>	<b>Logging time (1 area)</b>	<b>Logging time (3 areas)</b>
1 s	0 h 34 m	1 h 38 m
2 s	1 h 08 m	3 h 16 m
5 s	2 h 52 m	08 h 11 m
10 s	5 h 44 m	16 h 23 m
30 s	17 h 13 m	2 d 01 h 11 m
1 min	1 d 10 h 26 m	4 d 02 h 23 m
5 min	7 d 04 h 10 m	20 d 11 h 25 m
10 min	14 d 08 h 20 m	81 d 0 h 50 m
15 min	21 d 12 h 30 m	121 d 13 h 15 m

<b>single- and three-phase power mode</b>		
<b>Average Time</b>	<b>Logging Time (1 area)</b>	<b>Logging Time (3 areas)</b>
1 s	1 h 40 m	4 h 47 m
2 s	3 h 21 m	9 h 34 m
5 s	8 h 22 m	23 h 57 m
10 s	16 h 45 m	1 d 23 h 54 m
30 s	2 d 02 h 17 m	5 d 23 h 42 m
1 min	4 d 04 h 35 m	11 d 23 h 25 m
5 min	20 d 22 h 55 m	59 d 21 h 05 m
10 min	41 d 21 h 50 m	119 d 18 h 10 m
15 min	62 d 20 h 45 m	179 d 15 h 15 m

## Ordering information

<b>Fluke-345</b>	Power Quality Clamp Meter
<b>Includes</b>	Soft carrying case Power Log software Test leads Alligator clips Test probes USB cable International ac adapter / battery eliminator Printed English language user manual Multi-language manual CD

## Recommended Accessories:

**TP220 SureGrip™ Industrial Test Probes** - One pair (red, black) of Industrial test probes. Sharp, 12 mm stainless steel tip provides reliable contact. Use with TL224 test leads.

**AC220 SureGrip™ Alligator Clips** - One pair (red, black) of small, insulated, nickel plated jaws. Blunt tip grabs round screw heads up to 9.5 mm. Use with TL224 test leads.

**TP1 Slim Reach Test Probes** - One pair (red, black) of slender probe bodies for probing closely spaced or recessed terminals. Hard stainless steel probe tips with flat blade design to hold securely in blade type electrical wall sockets.

**L200 Probe Light** - Small, rugged, and light the L200 easily attaches to any Fluke test probe. Bright white LED illuminates contact area and frees hands for work.

**L210 Probe Light and Probe Extenders** - Includes L200 Probe Light and TP280 Test Probe Extenders to keep hands away from live circuits and light work area

**C550 Tool Bag** - Steel reinforced frame with heavy duty hardware and large zippered storage compartment includes 25 pockets. Allows you to carry all your tools to the job site.

**TLK291** - Fused Test Leads provide extra safety with retractable sheath protecting contact points.



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

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