FLUKE®

Power Quality

Fluke 430 Series three-phase and Fluke 43B single-phase Power Quality Analyzers

Technical Data

Analyze your power network quickly

In industry, healthcare, and business – in fact wherever electrical and electronic equipment is depended on – power quality plays a critical role in maintaining productivity and consistency. Non-linear loads, switching, load changes and equipment problems can result in poor power quality. Poor power quality is not only costly in terms of wasted energy and unnecessary downtime, it is also dangerous and increases the risk of equipment failure.

Fluke has an unrivalled range of three-phase and single-phase power quality analyzers to help you maintain power systems. The tools give you the power to analyze every parameter, power-related event or anomaly faster, safer and in more detail than ever before.

The range includes the Fluke 435 and 434 three-phase power quality analyzers and the 43B single-phase power quality analyzer.

Power Quality Analyzer Selection Table

	435	434	43B
Application	Three-phase		Single-phase
Inputs	4 voltage and 4 current (for 3 phases and neutral)		1 voltage and 1 current
Measurements			
Vrms, Arms, Hz, W, VAR, VA, PF, Cos φ (DPF), Crest Factors	●	●	●
Harmonics and THD (V,A,W), k-factor	●	●	●
Inter-harmonics	●	●	-
kWh and kVARh, kVAh, demand interval	●	●	-
Flicker (Plt, Pst, PF5)	●	●	-
Unbalance	●	●	-
Mains signaling	●	Optional*	-
Recorder/Auto trend	●/●	●/●	●/-
Logger	●	Optional*	-
System monitor	●	●	-
Real time scope/Phasor diagrams	●	●/●	●/-
Dips and swells/Half cycle based	●	●/●	●/-
Transient display	●	●	●
Inrush current	●	●	●
IEC61000-4-30, -4-7, -4-15 compliance	Class A	Class B	-
Built-in general purpose Scope and DMM	-	-	●
Memory (screens/data)	50/10**	50/10	20 for screens and data
Memory size	16 MB	8 MB**	
FlukeView Software and interface cable	●	●	Depending on configuration
Power Log Software	●	Optional*	-
EN61010 safety rating	600 V CAT IV/1000 V CAT III		600 V CAT III
Current clamps included	4 X i430 Flex	4 X i400S	i400S

** Optional functionality can be added with upgrade kit. For details see ordering information.*
*** Logger uses user-configurable shared memory.*

Technical Specification Fluke 430 Series Power Quality Analyzers

The specifications of the instrument are verified using the "implementation verification" table 3 as specified in IEC 61000-4-30 a Chapter 6.2
Accuracy is specified in % of reading unless otherwise specified Specifications are valid for models Fluke 435 and Fluke 434 unless orherwise specified

Input characteristics				
Voltage inputs				
Number of inputs		4 (3 phases + neutral) DC coupled		
Maximum input voltage		1000 Vrms		
Nominal Voltage range		50…500 V internally devided in three ranges 500 V, 250 V and 125 V		
Maximum peak voltage		6 kV		
Input impedance		4 MΩ // 5 pF		
Bandwidth		> 10 kHz, up to 100kHz for transient display		
Scaling		1:1, 10:1, 100:1, 1000:1 and variable		
Current inputs				
Number of inputs		4 (3 phases + neutral) DC coupled		
Type		Clamp on current transformer with mV output		
Range		1..400 Arms with included clamps (I400S) 0.1..3000 Arms with optional clamps		
Input impedance		50 kΩ		
Bandwidth		>10 kHz		
Scaling		0.1, 1, 10, 100, 1000 mV/A, variable, i5s and i430-Flex		
Nominal frequency		40..70 Hz		
Sampling system				
Resolution		16 bit analog to digital converter on 8 channels		
Maximum sampling speed		200kS/s on each channel simultaneously		
RMS sampling		5000 samples on 10/122 cycles according IEC 61000-4-30		
PLL synchronization		4096 samples on 10/122 cycles according IEC 61000-4-7		
Display modes				
Waveform display		Available in Scope and Transient mode Captures 8 waveforms simultaneously Display update rate 5x per second Up to 10/12 times horizontal zoom Cursors: Single vertical line showing min, max, avg reading at cursor position		
Phasor		Shows real time phasor diagram Available in Scope and Unbalance mode Display update rate 5x per second		
Meter readings		Available in Volts/Amps/Hertz, Harmonics, Power & Energy, Flicker, Unbalance and Logger[4] mode.		
AutoTrend graph		Available in Volts/Amps/Hertz, Dips & Swells, Harmonics, Power & Energy, Flicker, Unbalance, Inrush, Mains Signaling[4] Logger[4] and Monitor mode Cursors: single vertical line showing with min, max, avg reading at cursor position.		
Bargraph		Available in Harmonics and Monitor mode		
Eventlist		Available in Dips & Swells Mains Signaling[4], Logger[4] and Monitor mode		
Measurement modes				
Scope		Vrms, Arms, Vcursor, Acursor, Vfund, Afund, Hz, V phase angles, A phase angles		
Volts/Amps/Hertz		Vrms, Vpk, V Crest Factor, Arms, Apk, A Crest Factor, Hz		
Dips and Swells		Vrms½, Arms½ Captures up to 1000 events with date, time, duration, magnitude and phase identification with programmable thresholds		
Harmonics DC, 1 ... 50		Harmonic Volts, THD Volt, Harmonic Amps, THD Amps, K Amps, Harmonic Watts, THD Watts, K Watts, Interharmonic Volts[4], Interharmonic Amps[4] (relative to fundamental or to total rms)		
Power and Energy		Watts, VA, VAR, Power factor, Cos φ / DPF, Arms, Vrms, kWh, kVAh, KVARh, peak demand interval using trend, KYZ revenue meter verification via optical input.		
Flicker		Pst(1min), Pst, Plt, PF5, Vrms½, Arms½, Dc, Dmax, TDEX		
Unbalance		Vneg, Vzero, Aneg, Azero, Vfund, Afund, Hz, V phase angles, A phase angles		
Transients		Vrms, Arms, Vcursor, Acursor		
Inrush Currents		Inrush Current, Inrush duration, Arms½, Vrms½		
Mains Signaling[4]		Relative signaling voltage and absolute signaling voltage averaged over three seconds for two selectable frequencies		
Logger[4]		Measures and records up to 100 parameters on all 4 phases simultaneously with selecable averaging time. Captures up to 10000 events with date, time, duration, magnitude and phase identification with programmable thresholds		
System Monitor		Vrms, Arms, Harmonic Volts, THD Volts, Plt, Vrms½, Arms½, Vneg, Hz, dips and swells, unbalance. All parameters are measured simultaneously in accordance with EN50160. Using Flagging to indicate unreliable readings according IEC61000-4-30.		
Accuracy, resolution and range				
Volt/Amps/Hertz		**Measurement range**	**Resolution**	**Accuracy**
Vrms (AC+DC)	Fluke 435 Fluke 434	1…600 Vrms 600…1000 Vrms 1…1000 Vrms	0.01 Vrms 0.01 Vrms 0.1 Vrms	± 0.1% of nominal voltage ± 0.1% ± 0.5% of nominal voltage
Vpk		1…1400 Vpk	1 V	5% of nominal voltage
Voltage Crest Factor (CF)		1.0 ... > 2.8	0.01	± 5%
Arms (AC+DC)	Fluke 435 Fluke 434 Fluke 434 with i400s Fluke 435 with I430Flex	0…20.00 kArms[1] 0…20.00 kArms[1] 0…40 / 400 Arms 30…3000 Arms	0,001…10 Arms[1] 0,001…10 Arms[1] 0.1 and 1 Arms 1 Arms	± 0.5% ± 5 counts[3] ± 1% ± 5 counts[3] ± 1% ± 5 counts[3] ± 0.5% ± 20 counts[3]
Apk	using 1mV/A scaling	0 - 5500 Apk	1A	± 5%
A Crest Factor (CF)		1 … 10	0.01	± 5%
Hz[5]	Fluke 435 @ 50Hz nominal Fluke 435 @ 60Hz nominal Fluke 434 @ 50Hz nominal Fluke 434 @ 60Hz nominal	42.500 ... 57.500 Hz 51.000 ... 69.000 Hz 42.50 ... 57.50 Hz 51.00 ... 69.00 Hz	0.001 Hz 0.001 Hz 0.01 Hz 0.01 Hz	± 0.01Hz ± 0.01Hz ± 0.01Hz ± 0.01Hz
Dips and swells				
Vrms½ (AC+DC)	Fluke 435 Fluke 434	0.0% ….200% of nominal voltage 0.0% ….200% of nominal voltage	0.1Vrms 0.1Vrms	± 0.2% of nominal voltage ± 1% of nominal voltage
Arms½ (AC+DC)	Fluke 435 Fluke 434 Fluke 434 with i400s Fluke 435 with i430Flex	0 … 20,000 Arms[1] 0 … 20,000 Arms[1] 0 … 400 Arms 30 … 3000 Arms	0,001 Arms…10 Arms 0,001 Arms…10 Arms 0.1 Arms and 1 Arms 1 Arms	± 1% ± 10 counts[3] ± 2% ± 10 counts[3] ± 2% ± 10 counts[3] ± 1% ± 20 counts[3]

Threshold levels		Programmable thresholds in percent of nominal voltage Event detection based upon _cycle rms voltages Captures Dips, Swells Interruptions and Rapid Voltage Changes								
Duration		hhh,mm,ss,mmm		Half cycle				One cycle		
Harmonics										
Harmonic order (n)		DC, 1..50 Grouping: Harmonic groups according to IEC 61000–4–7								
Inter–Harmonic order		Off, 1..49 Grouping: Harmonic and Interharmonic subgroups according to IEC 61000–4–7								
Vrms	Relative (%f):	0.0 … 100.0%		0.1%				± 0.1% ± n x 0.1% (± 0.4% for %r)		
	Fluke 435 Absolute:	0.0 … 1000 Vrms		0.1 Vrms				± 0.05% of nominal voltage if < 1% of nominal voltage ± 5% if ≥ 1% of nominal voltage		
	Fluke 434 Absolute:	0.0 … 1000 Vrms		0.1 Vrms				± 5% ± 2 counts		
Arms	Relative (%f):	0.0 … 100.0%		0.1%				± 0.1% ± n x 0.1% (± 0.4% for %r)		
	Absolute:	0.0 … 4000 mV x clamp scaling		1 mVrms x clamp scaling				± 5% ± 5 counts		
Watts	Relative:	0.0 … 100.0%		0.1%				± n x 2%		
(Harmonics only)	Absolute:	depends on clamp and voltage scaling						± 5% ± n x 2% ± 10 counts		
DC	Relative:	0.0 … 100.0%		0.1%				± 0.1% V and A (± 2% Watt)		
	Fluke 435 Absolute V:	0.0 … 1000V		0.1V				± 0.2% of nominal voltage		
	Fluke 434 Absolute V:	0.0 … 1000V		0.1V				± 5% ± 10 counts		
	Absolute A:	0.0 … 4000 mV x clamp scaling		1 mVrms x clamp scaling 0.1V				± 5% ± 10 counts		
	Absolute W:	depends on clamp and voltage scaling		depends on scaling				± 5% ± 10 counts		
$THD_{(n=40)}$	(relative %f or %r)	0.0 … 100.0 %		0.1%				± 2.5% V and A (± 5% Watt)		
Hz		0 … 3500 Hz		1 Hz				± 1Hz		
Phase angle	Fluke 435	–360° ... +0°		1°				± n 1.5[8]		
	Fluke 434	–360° ... +0°		1°				± n 1°[8]		
Power and Energy										
Watt (VA, VAR)	Fluke 435	1.0 … 20.00MW[1]		0.1 … 1 kW[1]				± 1% ± 10 counts[3]		
	Fluke 434	1.0 … 20.00MW[1]		0.1 … 1 kW[1]				± 1.5% ± 10 counts[3]		
kWh[6] (kVA[6], kVAR[6])		00.00 kWhr…200.0 GWhr[1]		00.00 kWhr…200.0 GWhr[1]				0.01 Xhr….100 Whr[1]		
		0.01 Whr….100 Whr[1]		± 1% ± 10 counts[3]				± 1.5% ± 10 counts[3]		
Power Factor		0…1		0.01				± 0.033		
Cos φ / DPF		0…1		0.01				± 0.033		
Flicker										
Pst (1min), Pst, Plt, PF5 instantenous Flicker		0.00 … 20.00		0.01				Within ±5% of tabulated values according IEC61000–4–15		
Dc%, Dmax% and Time d(t) exceeds limits. As described per IEC 61000–3–3		0.0 … ± 100.0% for Dc% and Dmax% and 0.000 ... 9.999s for Time		0.1% for Dc% and Dmax% and 10 ms for Time				± 1% for Dc% and Dmax% and 20 ms for Time		
Unbalance										
Volts	Fluke 435(neg. and zero seq.)	0.0 … 5.0%		0.1%				± 0.15%		
	Fluke 434(neg. and zero seq.)	0.0 … 5.0%		0.1%				± 0.5%		
Current	(neg. and zero seq.)	0.0 … 20%		0.1%				± 1%		
Transient capture										
Volts	cursor reading	± 6000 Vpk		1 V				± 15% of cursor reading		
	rms reading	10 … 1000 Vrms		1 V				± 2.5% of Vnominal		
Minimum detect duration		5 µs								
Sampling rate		200kS/s								
Inrush mode										
Arms (AC+DC)		0.000 … 20.00 kArms[1]		0.001.. 10 Arms[1]				± 1% of meas ± 5 counts		
Inrush Duration		mm:ss:mmm between 7.5s … 30minutes selectable		10ms				± 20 ms (Fnominal = 50 Hz)		
Mains Signaling[4]										
Threshold levels		Thresholds, limits and signaling duration is programable for two independent signalling frequencies.								
Signaling frequency		60 … 3000 Hz		0.1 Hz						
Relative V%		0% … 100% of		0.1%				± 0.4%		
Absolute V3s (3 second average)		0.0 … 1000 V		0.1 V				± 5% of nominal voltage		
Trend recording										
Method		AutoTrend automatically records min, max and average values over time for all readings being displayed for the 3 phases and neutral simultaneously.								
Volts/Amps/Hertz, Harmonics, Power & Energy, Flicker, Unbalance and Mains Signaling[4] mode										
Sampling		5 readings/sec continuous sampling per channel								
Recording time		From 30 min with 1 second display resolution up to 450 days with 6 hour display resolution.								
Zoom		Up to 6x horizontal zoom								
Memory		1800 min, max and avg points for each reading								
	Duration	30 min.	2.5 h	7.5 h	15 h	30 h	150 hr	450 hr	900 hr	75 days
	Resolution	1 s	5 s	15 s	30 s	60 s	5 min.	15 min.	30 min.	1 hr
Dips & Swells mode										
Sampling		100/120[2] readings/sec continuous sampling per channel								
Recording time		From 90 sec with 25msec display resolution up to 450 days with 3 hr display resolution.								
Zoom		Up to 12x horizontal zoom								
Memory		3600 min, max and avg points for each reading								
	Duration	90 s	180 s	6 min.	12 min.	30 min.	1 hr	2.5 hr	7.5 hr	15 hr	30 hr
	Resolution	25 ms	50 ms	100 ms	200 ms	500 ms	1s	2.5 s	7.5 s	15 s	30 s
Inrush Currents and Flicker PF5 mode										
Sampling		100/120[2] readings/sec continuous sampling per channel								
Recording time		From 7.5 sec with 25msec display resolution up to 30 min with 500msec display resolution for Inrush measurements and up to 2hr with 2.5 sec display resolution for PF5 recordings. Recording time								
Zoom		Up to 12x horizontal zoom								
Memory		3600 min, max and avg points for each reading								
	Duration	7.5 s	15 s	30 s	90 s	180 s	6 min.	12 min.	30 min.	1 hr	2hr
	Resolution	25 ms	25 ms	25 ms	25 ms	50 ms	100 ms	200 ms	500 ms	1 s	2s

Technical Specifications Fluke 430 Series three-phase Power Quality Analyzers

Logger mode									
Sampling	Combination of 5 readings/sec and 100/1202 readings/sec continuous sampling per channel depending on the parameter measured								
Recording time	Depends on selected readings and averaging time								
Zoom	Two zoom positions, display all or 1x								
Memory	User configurable shared memory, up to 15 MB on Fluke 435, up to 7 MB on Fluke 434[4]								
Nr of readings on 3 phases + N	1			10			100		
Averaging time	0.5 s	10 min	2 hr	0.5 s	10 min	2 hr	0.5 s	10 min	2 hr
Max[7] duration using 15MB	66 hr	9 year	100 year	6 hr	333 days	10 year	18 min	31 days	1 year
Monitor mode									
Sampling	Combination of 5 readings/sec and 100/120[2] readings/sec continuous sampling per channel depending on the parameter measured.								
Recording time	Up to 1 week with 10 min resoluton								
Memory	1008 min, max and avg points for each reading, 10 minute resolution								
Limits	According EN50160 or customer definable								
Measurement method									
Vrms, Arms	10/12[2] cycle contiguous non overlapping intervals using 500/416[2] samples per cycle in accordance with IEC 61000-4-30								
Vpeak, Apeak	Absolute highest sample value within 10/12[2] cycle interval with 40µs 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$^{1}/_{2}$,Arms$^{1}/_{2}$	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	Selectable Total or Fundamental real power display Calculates average value of instantaneous power over 10/12 cycle period for each phase Total Active Power $P_T = P_1 + P_2 + P_3$								
VA	Selectable Total or Fundamental apparent power display Calculates apparent power using Vrms x Arms value over 10/12 cycle period Total Apparent Power is root mean square of real and apparent power								
VAR	Selectable Total of Fundamental reactive power display Calculates reactive power as root of VA squared minus Watt squared over 10/12 cycle period. Capacitive and inductive load is indicated with capacitor and inductor icons								
Power Factor	Calculated Watt / VA								
Cos φ / DPF	Cos of angle between fundamental voltage and current								
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 230V 50Hz lamp and 120V 60Hz lamp models								
Transient capture	Captures waveform triggered on signal envelope. Additionally triggers on dips, swells, interruptions and Amps level as specified by IEC61000-4-30								
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	Measurement are based on: either the corresponding 10/12-cycle r.m.s. 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 "Meistercurve"								
Time Synchronisation	Optional GPS430 timesync module provides time uncertainty ≤ 20 ms or ≤ 16.7 ms2 for time tagging of events and time aggregated measurements. When synchoronisation becomes unavailable, time tolerance is ≤ 1-s/24 h								
Wiring Combinations									
3Ø WYE	Three phase four wire system WYE								
3Ø DELTA	Three phase three wire system Delta								
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 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)								
2_-ELEMENT	Three phase four wire system without voltage sensor on phase L2 / B								
General									
Case									
Design	Rugged, shock proof with integrated protective holster								
Drip and dust proof	IP51 according to IEC60529 when used in tilt stand position								
Shock and Vibration	Shock 30g, Vibration: 3g Sinusoid, Random 0.03g2/Hz according to MIL-PRF-28800F Class 2								
Display	Bright Full-Color LCD with CCFL backlight, 80cd/m2								
Size	115.2 x 86.4 mm								
Resolution	320 x 240 pixels								
Contrast and brightness	User adjustable, temperature compensated								
Memory									
Screens	50 screen memories								
Data	10 data memories for storing data including recordings								
Logger	User configurable shared memory, up to 15 MB on Fluke 435, up to 7 MB on Fluke 434								
Limit templates	2 preprogrammed, 2 administrator (programmable via FlukeView), 2 user locations								
Real-time clock	Time and date stamp for AutoTrend, Transient display and SystemMonitor								
Mechanical									
Size	256 x 169 x 64 mm								
Weight	2kg								

Power	
Line power	Switchable 115V, 230V adapter with country specific plug
Power Adapter input voltage	15...23 Vdc; use only Power Adapter BC430
Battery power	Rechargeable NiMH BP190 (installed)
Battery operating time	> 7 hours
Battery charging time	4 hours, 8 hours for /006 version (Instrument off)
Power saving	Adjustable time for dimmed backlight with on screen power indicator
Standards	
Measurement methods used	IEC61000-4-30 class A
Measurement performance	Fluke 435 IEC61000-4-30 Class A, Fluke 434 IEC61000-4-30 Class B
Power Quality	EN50160
Flicker	IEC 61000-4-15
Harmonics	IEC 61000-4-7
Cross talk	
Between V inputs	-60 dB @ Fnominal
Voltage to current input	-95 dB @ Fnominal
Safety	
Compliance	IEC/EN61010-1 (2nd edition) pollution degree 2; CAN/CSA C22.2 No 101.1 ANSI/ISA S82.01
Max voltage on banana input	1000 V CAT III / 600 V CAT IV
Max voltage on current BNC input	42 Vpeak
Environmental	
Operating temperature	0°C to +50°C battery only, 0°C to +40°C with adapter, within spec +15°C to +35°C
Storage temperature	-20 °C to +60 °C
Humidity	10 .. 30 °C: 95% RH non condensing 30 .. 40 °C: 75% RH non condensing 40 .. 50 °C: 45% RH non condensing battery only
Maximum operating altitude	3000m. Derate to 1000 V CAT II / 600 V CAT III / 300 V CAT IV above 2000m
Maximum storage altitude	12km
Warranty	3 years on mainframe, 1 year on included accessories
Printers and Interface	
Type	Serial, optically isolated. Compatible with PM9080 (RS-232) or OC4USB (USB)
Baud rate	1200, 2400, 9600 … 57k6
Print out facility (B&W only)	Via optional adapter PM9080 or PAC 91
Print protocol	Epson FX LQ, Deskjet, LaserJet , DPU-414 or PostScript

Accessories Fluke 430 Series

Accessories		
Included	**435**	**434**
	Water-tight hard case with rollers C435	Hard carrying case with clamp holders C430
	4 current clamps, i430-Flexipack	4 current clamps, i400s
	5 Test leads, 4black, 1 green	5 Test leads, 4black, 1 green
	5 Alligator clips, 4black, 1 green	5 Alligator clips, 4black, 1 green
	Battery Charger Eliminator, BC430	Battery Charger Eliminator, BC430
	FlukeView Software, SW43W	FlukeView Software, SW43W
	Power Log Software	
	Optical Cable for USB , OC4USB	Optical Cable for USB, OC4USB
	Color localization set, WC100	Color localization set, WC100
	Getting Started printed	Getting Started printed
	User Manual (CD-ROM)	User Manual (CD-ROM)

Ordering Information

Fluke 435	Power Quality Analyzer (three-phase) with Logger Function
Fluke 434	Power Quality Analyzer (three-phase)
Fluke 434Kit	Logger Upgrade Kit: Adds the Logger Function of the 435 to the 434
OC4USB	Serial Interface Adapter/Cable (USB)
PM9080	Serial Interface Adapter/Cable (RS232)
SW43W	FlukeView Software

[1] depending clamp scaling, volt scaling 1:1

[2] 50Hz/60Hz nominal frequency according to IEC 61000-4-30

[3] Add clamp accuracy

[4] The logger and Mains Signaling function are optional for the Fluke 434 and standard available on the Fluke 435

[5] Measured on reference voltage input A/L1

[6] Maximum time 9999 hours

[7] Estimated duration

[8] Add +/- (n-1) x 2.5° for Amp. when using i430-flex-4pk

Technical Specifications Fluke 43B single-phase Power Quality Analyzer

The Fluke 43B Power Quality Analyzer is optimized for industrial measurements on the 50 Hz fundamental frequency. Since its usable fundamental frequency range extends from 10 Hz to 400 Hz, the 43B is ideal for industrial, aviation, marine and railway applications.

Mode	Usable bandwidth	Harmonics on 400 Hz fundamental	Typical accuracy for 400 Hz fundamental
Volt Amp Hz	10 Hz … 3.5 kHz	9th harmonic	5%
Power	20Hz … 2 kHz	5th harmonic	10%
Harmonics	10 Hz … 3.5 kHz	9th harmonic	10% Channel 1 50% Channel 2

Note: Current harmonics measurements can be done via channel 1 with improved accuracy

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Accuracies are stated as ± (percentage of reading + counts) without probes unless otherwise noted.
Specifications are valid for signals with a fundamental between 40 and 70 Hz.

Input Characteristics	Ranges	Accuracy
Input impedance	1 MΩ, 20 pF	
Voltage rating	600 Vrms, CAT III	
Volt / Amps / Hertz		
True-rms voltage (AC+DC)	5.000 V, 50.00 V, 500.0 V, 1250 V*	± (1 % + 10 counts)
True-rms current (AC+DC)	50.00 A, 500.0 A, 5.000 kA, 50.00 kA, 1250 kA	± (1 % + 10 counts)
Frequency	10.0 Hz to 15.0 kHz	± (0.5 % +2 counts)
CF Crest Factor	1.0 to 10.0	± (5% + 1 count)
Power		
W, VA, VAR Reactive Power 1-phase and 3-phase,3 conductor balanced loads	250 W 2.50 kW, 25.0 kW, 250 kW, 2.50 MW, 25 MW, 250 MW, 625 MW, 1.56 GW	± (2 % + 6 counts) Total Power ± (4 % + 4 counts) Fundamental Power
PF Power Factor	0.00 to 1.00	± 0.04
DPF Displacement Power Factor	0.00 to 0.25 0.25 to 0.90 0.90 to 1.00	not specified ± 0.04 ± 0.03
Hz Frequency Fundamental	40.0 to 70.0 Hz	± (0.5 % + 2 counts)
Harmonics		
Volts, Amps, Watts	Fundamental	V,A ± (3 % + 2 counts), W ± (5 % + 2 counts)
	2 to 31st Harmonic	V,A ± (5 % + 3 counts), W ± (10 % + 10 counts)
	32 to 51st Harmonic	V,A ± (15 % + 5 counts), W ± (30 % + 5 counts)
Frequency of fundamental	40 Hz to 70 Hz	± 0.25 Hz
Phase	Volt & Amps (between Fund. & Harmonic)	2nd (± 3°) … 51st (±15°)
	Watts (between Volt Fund. & Amps Harmonic)	Fund (± 5°) … 51st (±15°)
K-Factor (Amps & Watts)	1.0 to 30.0	±10 %
THD	0.00 to 99.99	± (3% + 8 counts)
Sags & Swells		
Recording times (selectable)	4 min to 16 days	
Vrms Actual, Vrms max, min (AC + DC)	5.000 V, 50.00 V 500.0 V, 1250 V*	Readings ± (2% +10 counts) Cursor readings ± (2% + 12 counts) Cursor Readings Average ± (2% +10 counts)
Arms Actual, Arms max, min (AC + DC)	50.00 A, 500.0 A, 5.000 kA, 50,00 kA	

Recording	Ranges	Accuracy
Recording times (selectable)	4 min to 16 days	
Parameters	Choose one or two parameters from one of the groups below	
V/A/Hz	Line Voltage, Current, Frequency	
Power	Watts, VA, VAR, PF, DPF, Frequency	
Harmonics	THD, Volt(Fund. & Harmonic), Amps(F&H) Watts(F&H) Freq.(H), %(H) of total, Phase(H), KF	
Ohms	Ohms, Diode, Continuity, Capacitance	
Temperature	°C or °F	
Scope	DC Voltage, DC Current, AC Voltage, AC Current, Frequency, Pulse Width + or –,Phase, Duty cycle + or –, Peak max, Peak min, Peak min-max, Crest Factor	
Transients		
Minimum pulse width	40 ns	
Useful bandwidth input 1	DC to 1 MHz (with test leads TL24)	
Number of transients	40	
Voltage threshold settings	20%, 50%, 100%, 200% above or below reference signal	
Reference signal	After START, the Vrms and frequency of the signal are measured. From these data a pure sinewave is calculated as reference for threshold setting.	
Vpeak min, Vpeak max at cursor	10 V, 25 V, 50 V, 125 V, 250 V, 500 V, 1250 V	± 5% of full scale

*Rated 600V CAT III

Inrush Current	Ranges	Accuracy
Current ranges (selectable)	1 A, 5 A, 10 A, 50 A, 100 A, 500 A, 1000 A	
Inrush times (selectable)	l s, 5 s, 10 s, 50 s, 100 s, 5 min	
Cursor readings	A peak max at cursor 1 and cursor 2	± 5% of full scale
Time between cursors**	4 to 235 pixels	± (0.2% + 2 pixels)
Scope, dual channel scope with measurement reading		
Input Impedance		
Input 1	1 MΩ//12 pF; with BB120: 20 pF	± 2 pF; with BB120 ±3 pF
Input 2	1 MΩ//10 pF; with BB120: 18 pF	± 2 pF; with BB120 ±3 pF
Vertical		
Voltage ranges	50 mV/div to 500V/div	± (1% + 2 pixels)
Vertical sensitivity, resolution	5 mV/div to 500V/div, 8 bit (256 levels)	
Bandwidth channel [1] (voltage)	DC to 20 MHz at inputs, or with BB120 and VPS40 (standard with Fluke 43B); 1 MHz with TL24 Leads	
Bandwidth channel [2] (current)	DC to 15 kHz at inputs 10 kHz with supplied current clamps	
Coupling	DC, AC (10 Hz -3 dB)	
Horizontal		
TimeBase modes	Normal, roll, single	
TimeBase ranges	60 s/div to 20 ns/div	± (0.4% + 1 pixel)
Sampling rate	25 MS/s	
Record length (min / max samples)	512 per channel	

Trigger source	Input 1 or Input 2 or Automatic selection	
Trigger Mode	Automatic Connect-and-View™, Free Run, Single Shot.	
Connect-and-View™	Advanced automatic triggering that recognizes signal patterns and automatically adjusts triggering, timebase and amplitude. Automatically displays stable pictures of complex and dynamic signals like motor drive and control signals.	
Pre-trigger	Up to 10 divisions	
Measurement readings, per channel selectable	Volts & Amps (DC, AC, AC + DCrms, Peak max, Peak min, Peak min / max), Frequency, Duty cycle + or - , Phase, Pulse Width + or -, Crest factor	
Ohms, Diode, Continuity, Capacitance		
Ohms	500.0 Ω 5.000 kΩ, 50.00 kΩ, 500.0 kΩ, 5.000 MΩ, 30.00 MΩ	± (0.6% +5 counts)
Diode voltage	0 to 3.000 V	± (2% +5 counts)
Continuity, shorts > 1 ms	Beeper on at < 30Ω ± 5Ω,	
Capacitance	50.00 nF, 500.0 nF, 5.000 µF, 50.00 µF, 500.0 µF	±(2% +10 counts)
Temperature***	-100.0 °C to 400.0 °C, -200.0 °F to 800.0 °F	±(0.5% +5 counts)
Max current, max open circuit volt.	0.5 mA, < 4 V (all functions above)	
Memory		
Number of screens	20	
General specifications		
Optical Isolated RS-232 Interface		
To printer	Supports HP LaserJet, DeskJet, Epson FX/LQ and Postscript printers with optional PAC91 Printer Adapter Cable	
To PC	FlukeView® Power Quality Analyzer software with PM9080 Interface Adapter included with 43B and 43Kit	
FlukeView® Power Quality Software		
Hardware requirements	PC or 100% compatible with Windows 95, 98, Me, 2000, NT4.0.	
Power		
Line voltage adapter/battery charger included		
Installed battery	Rechargeable NiCd pack (4 to 6 Vdc)	
Operating time	4 hours	
Charging time	4 hours (unit OFF) 12 hours (unit ON)	
Refresh Cycle	8 to 14 hours (to keep NiCd battery capacity optimal)	
Environmental		
Operating Temperature	0°C to 50°C (32°F to 122°F)	
Shock & Vibration	MIL 28800E, Type 3, Class III, Style B	
Case	IP51 (dust, drip water proof)	
Mechanical Data		
Size (H x W x D)	232 x 115 x 50 mm	
Weight	1.1 kg	
Safety		
For measurements on 600 Vrms Category III installations, Pollution Degree 2 in accordance with EN61010-1 (1993) (IEC1010-1) ANSI/ISA S82.01-1994 CAN/CSA-C22.2 No. 1010.1-92 UL3111-1		
Surge protection	6 kV on input 1 and 2	
Floating measurements	600 Vrms from any terminal to ground	
Warranty	3 years parts and labor on Fluke 43B, 1 year on accessories	

** 1 pixel = inrush time/250

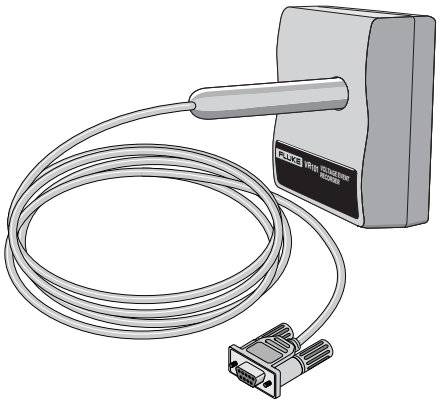
*** Requires optional temperature accessory

Ordering Information

Fluke 43Basic Power Quality Analyzer (Single-phase)
Fluke 43B Power Quality Analyzer (Single-phase)
Fluke 43Kit Power Quality Analyzer (Single-phase)

Standard available in all models	**43Basic**	**43B**	**43Kit**
Fluke 43B Power Quality Analyzer	●	●	●
BP120 NiCd Battery Pack (installed)	●	●	●
PM 8907 Battery Charger/Line Voltage Adapter	●	●	●
TL24 Test Leads	●	●	●
AC20 Industrial Test Clips	●	●	●
TP4 Slim Reach Test Probe Set (4 mm)	●	●	●
BB120 Banana-to-BNC Adapter Plug	●	●	●
Model difference			
i400s AC Current Clamp (200 A)	●		
80i-500s AC Current Clamp (500 A)		●	●
SW43W FlukeView® Software for Windows		●	●
PM 9080 Serial Interface/Adapter Cable		●	●
C120 Hard Case		●	●
TP1 Slim Reach Test Probe Set (flat blade)		●	●
AC85 Large Jaw Alligator Clips		●	●
Power Quality Video		●	●
Users Manual / Application Guide		●	
Manual CD 43B	●		●
Promotional Model Numbers			
VPS40 Voltage Probe		●	
Fluke 61 IR Thermometer		●	
Fluke VR101S Voltage Event Recorder System			●

Technical Specifications Fluke VR101S Voltage Event Recorder System



Ordering Information
(Note: At least one VR101S is required for proper operation)
VR101S Voltage Event Recorder System
VR101 Voltage Event Recorder

Computer Hardware Requirements for EventView software
IBM PC or 100% compatible,
with Windows® 3.1 or Windows 95/98/NT/XP or 2000 installed and operating
At least one free RS-232 serial port
A pointing device (recommended)
2 MB hard drive space
4 MB RAM (8 MB for Windows 95/98 or higher)

Included Accessories VR101S
VR101 Voltage Event Recorder,
Optical interface cable, 9-to-25 pin adapter,
EventView Software on two 31/2 inch floppies, Users Manual

Included Accessories VR101
VR101 Voltage Event Recorder,
Instruction Sheet

Electrical			
(voltage versions, plug style, and manual languages are determined by country)			
Voltage Version	**Operating range**	**Nominal frequencies**	**Power consumption**
120 V	70 V to 140 V	50 Hz or 60 Hz	2 W
230 V	140 V to 270 V	50 Hz or 60 Hz	3 W
Sags, Swells and Outage Measurements			
Voltage Version	**Range**	**Accuracy**	**Resolution**
120 V Hot-to-neutral	0 to 200 V rms	±2 V rms	1 V rms
Neutral-to-ground	3 to 200 V rms	±2 V rms	1 V rms
230 V Hot-to-neutral	0 to 400 V rms	±4 V rms	2 V rms
Neutral-to-ground	3 to 120 V rms	±2 V rms	1 V rms
Transient Measurements			
	Range	**Accuracy**	**Resolution**
Hot-to-neutral	100 to 2500 V peak	±(10% reading +10 V)	10 V
Neutral-to-ground	50 to 2500 V peak	±(10% reading +10 V)	10 V
Phase angle	20° to 180°	±1°	1°
	200° to 360°		
Minimum pulse width: 1 µs			
Frequency Measurements			
	Range	**Accuracy**	**Resolution**
	45 to 65 Hz	±0.1 Hz (3 cycles min)	0.1 Hz
Time Measurements: Events < 1 second			
	Accuracy	**Resolution**	
Hot-to-neutral	±0.5 cycles	0.5 cycles	
Neutral-to-ground	±1 cycle	1 cycle	
Events ≥1 second (time stamp)			
	Accuracy	**Resolution**	
	±(2 sec/day + 8 sec)	8 sec	

General Specifications	
Memory size	4000 events
Power	
Battery type	3.5V lithium (non-replaceable)
Battery life	7 years
Mechanical	
Physical size	85 mm x 68 mm x 35 mm
Weight	120g
Environmental	
Operating temperature	-40 to 70°C
Relative Humidity	0 to 95% (non-condensing)
Safety	
	CSA Certification pending, CSA-NRTL (to UL 3111) certification pending, Complies with requirements of EN61010-1:1993
Warranty	1 year

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