

Fluke 8845A/8846A Digital Multimeters

Extended Specifications

The Fluke 8845A and 8846A 6.5 digit precision multimeters have the precision and versatility to handle your most demanding measurements, on the bench or in a system. These meters are both high performance and feature rich, yet also remarkably easy to use.



Features at a glance

- 6.5 digit resolution
- Basic V dc accuracy of up to 0.0024 % (1 yr.)
- Dual display
- 100 μ A to 10 A current range, with up to 100 pA resolution
- Wide ohms ranges from 10 Ω to 1 G Ω with up to 10 $\mu\Omega$ resolution
- 2 x 4 ohms 4-wire measurement technique
- Both models measure frequency and period
- 8846A also measures capacitance and temperature
- USB memory drive port (8846A)
- Fluke 45 and Agilent 34401A emulation
- Graphical display
- Trendplot™ paperless recorder mode, statistics, histogram
- CAT I 1000 V, CAT II 600 V

These digital multimeters perform the functions you would expect to see in a multifunction DMM, including measuring volts, ohms, and amps, with performance that exceeds expectations. Basic V dc accuracy of up to 0.0024 %, 10 A current range, and a wide ohms range from 10 Ω to 1 G Ω with up to 10 $\mu\Omega$ resolution give you an unbeatable combination of measurement capability.

You can also use the 8845A and 8846A to measure temperature, capacitance, period, and frequency—the functions of a counter, capacitance meter, and thermometer are built in for unparalleled versatility. Extend the meters' utility even more with their graphical display modes, including Trendplot™ paperless recorder mode, statistics and histograms—features you won't find on other multimeters.

Of course, these meters are also durable and dependable, features you expect from any Fluke meter. This unique combination of features and performance makes the 8845A and 8846A an unbeatable value for a wide variety of applications, including manufacturing test, research and development, and service.

General Specifications

Power

Voltage

100 V Setting.....	90 V to 110 V
120 V Setting.....	108 V to 132 V
220 V Setting.....	198 V to 242 V
240 V Setting.....	216 V to 264 V

Frequency..... 47 Hz to 440 Hz. Automatically sensed at power-on.

Power Consumption..... 28 VA peak (12 Watt average)

Dimensions

Height 88 mm (3.46 in.)

Width 217 mm (8.56 in.)

Depth..... 297 mm (11.7 in.)

Weight 3.6 kg (8.0 lb)

Shipping Weight 5.0 kg (11.0 lb)

Display

Vacuum Fluorescent Display, dot matrix

Environment

Temperature

Operating..... 0 °C to 55 °C

Storage..... -40 °C to 70 °C

Warm Up..... 1 hour to full uncertainty specifications

Relative Humidity (non-condensing)

Operating..... 0 °C to 28 °C <90 %

28 °C to 40 °C <80 %

40 °C to 55 °C <50 %

Storage..... -40 °C to 70 °C <95 %

Altitude

Operating..... 2,000 Meters

Storage..... 12,000 Meters

Vibration and Shock..... Complies with Mil-T-28800F Type III, Class 5 (Sine only)

Safety

Designed to comply with IEC 61010-1:2000-1, UL 61010-1A1, CAN/CSA-C22.2 No. 61010.1, CAT I 1000V/CAT II 600V

EMC

Designed to comply with IEC 61326-1:2000-11 (EMC) when used with shielded communications cables. This Meter has shown susceptibility to radiated frequencies greater than 1 V/m from 250 to 450 MHz.

Triggering

Samples per Trigger..... 1 to 50,000

Trigger Delay..... 0 s to 3600 s; in 10 μS increments

External Trigger Delay..... <1 mS

External Trigger Jitter..... <500 μS

Trigger Input..... TTL Levels

Trigger Output..... 5 V maximum (open collector)

Memory

8845A 10,000 measurements, internal only

8846A 10,000 measurements, internal, and up to 2 Gigabyte capacity with USB memory module (available separately, see "Accessories") through front-panel USB port

Math Functions

Zero, dBm, dB, MX+B, Offset, DCV ratio and TrendPlot, Histogram, Statistics (min/max/average/standard deviation), and Limit Test

Electrical

Input Protection	1000 V all ranges
Overrange	20 % on all ranges except 1000 V dc, 1000 V ac (8846A), 750 V ac (8845A), Diode, and 10 A ranges

Remote Interfaces

RS-232C, DTE 9-pin, 1200 to 230400 baud (RS-232C to USB cable available to connect the Meter to a PC USB port. See Accessories)
IEEE 488.2
LAN and "Ethernet 10/100 base T with DHCP (for IP_ADDRESS) option"

Warranty

One year

Electrical Specifications

Accuracy specifications are valid for 6½ digit resolution mode after at least a 1-hour warm-up with Auto Zero enabled.

24-hour specifications are relative to calibration standards and assume a controlled electromagnetic environment per EN 61326-1:2000-11

DC Voltage Specifications

Maximum Input	1000 V on any range
Common Mode Rejection	140 dB at 50 or 60 Hz ±0.1 % (1 kΩ unbalance)
Normal Mode Rejection	60 dB for NPLC of 1 or greater with analog filter off and power line frequency ±0.1 % 100 dB for NPLC of 1 or greater with analog filter on and power line frequency ±0.1 %
Measurement Method	Multi-ramp A/D
A/D Linearity	0.0002 % of measurement +0.0001 % of range
Input Bias Current	<30 pA at 25 °C
Autozero Off Operation	Following instrument warm-up at calibration temperature ±1 °C and less than 10 minutes, add error: 0.0002 % range additional error + 5 μV.
Analog Filter	When using the analog filter, specifications are relative to within one hour of using the ZERO function for that range and NPLC setting.
DC Ratio	Accuracy is +/- (Input accuracy + Reference accuracy), where Input accuracy = DC Voltage accuracy for the HI to LO Input (in ppm of the Input voltage), and Reference accuracy = DC Voltage accuracy for the HI to LO (Sense) Reference (in ppm of the Reference voltage).
Settling Considerations	Measurement settling times are affected by source impedance, cable dielectric characteristics, and input signal changes.

Input Characteristics

Range	Resolution	Resolution			Input Impedance
		4½ Digits	5½ Digits	6½ Digits	
100 mV	100.0000 mV	10 μV	1 μV	100 nV	10 MΩ or >10 GΩ ^[1]
1 V	1.000000 V	100 μV	10 μV	1 μV	10 MΩ or >10 GΩ ^[1]
10 V	10.00000 V	1 mV	100 μV	10 μV	10 MΩ or >10 GΩ ^[1]
100 V	100.0000 V	10 mV	1 mV	100 μV	10 MΩ ±1%
1000 V	1,000.000 V	100 mV	10 mV	1 mV	10 MΩ ±1%

[1] Inputs beyond ±14 V are clamped through 200 kΩ typical. 10 MΩ is default input impedance.

8846A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/ °C Outside 18 to 28 °C
100 mV	0.0025 + 0.003	0.0025 + 0.0035	0.0037 + 0.0035	0.0005 + 0.0005
1 V	0.0018 + 0.0006	0.0018 + 0.0007	0.0025 + 0.0007	0.0005 + 0.0001
10 V	0.0013 + 0.0004	0.0018 + 0.0005	0.0024 + 0.0005	0.0005 + 0.0001
100 V	0.0018 + 0.0006	0.0027 + 0.0006	0.0038 + 0.0006	0.0005 + 0.0001
1000 V	0.0018 + 0.0006	0.0031 + 0.001	0.0041 + 0.001	0.0005 + 0.0001

8845A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23±1 °C)	90 Days (23±5 °C)	1 Year (23±5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 mV	0.003 + 0.003	0.004 + 0.0035	0.005 + 0.0035	0.0005 + 0.0005
1 V	0.002 + 0.0006	0.003 + 0.0007	0.004 + 0.0007	0.0005 + 0.0001
10 V	0.0015 + 0.0004	0.002 + 0.0005	0.0035 + 0.0005	0.0005 + 0.0001
100 V	0.002 + 0.0006	0.0035 + 0.0006	0.0045 + 0.0006	0.0005 + 0.0001
1000 V	0.002 + 0.0006	0.0035 + 0.0010	0.0045 + 0.0010	0.0005 + 0.0001

Additional Errors

Digits	NPLC	Additional NPLC Noise Error
6½	100	0 % of range
6½	10	0 % of range
5½	1	0.001 % of range
5½	.2	0.0025 % of range +12 µV
4½	0.02	0.017 % of range +17 µV

AC Voltage Specifications

AC Voltage specifications are for ac sinewave signals >5 % of range. For inputs from 1 % to 5 % of range and <50 kHz, add an additional error of 0.1 % of range, and for 50 kHz to 100 kHz, add 0.13 % of range.

Maximum Input..... 750 V rms or 1000 V peak (8845A), 1000 V rms or 1414 V peak (8846A) or 8 x 10⁷ volts-Hertz product (whichever is less) for any range.

Measurement Method..... AC-coupled true-rms. Measures the ac component of input with up to 1000 V dc bias on any range.

AC Filter Bandwidth:

- Slow..... 3 Hz – 300 kHz
- Medium..... 20 Hz – 300 kHz
- Fast..... 200 Hz – 300 kHz

Common Mode Rejection..... 70 dB at 50 Hz or 60 Hz ±0.1 % (1 kΩ unbalance)

Crest Factor Error (applies to non-sinusoidal waveforms only)

- Maximum Crest Factor 5:1 at Full Scale
- Additional Crest Factor Errors (<100 Hz)..... Crest factor 1-2, 0.05 % of full scale
Crest factor 2-3, 0.2 % of full scale
Crest factor 3-4, 0.4 % of full scale
Crest factor 4-5, 0.5 % of full scale

Input Characteristics

Range	Resolution	Resolution			Input Impedance
		4½ Digits	5½ Digits	6½ Digits	
100 mV	100.0000 mV	10 µV	1 µV	100 nV	1 MΩ ±2 % shunted by <100 pf
1 V	1.000000 V	100 µV	10 µV	1 µV	
10 V	10.00000 V	1 mV	100 µV	10 µV	
100 V	100.0000 V	10 mV	1 mV	100 µV	
1000 V	1,000.000 V	100 mV	10 mV	1 mV	

8846A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	Frequency	24 Hour (23±1 °C)	90 Days (23±5 °C)	1 Year (23±5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 mV	3 – 5 Hz	1.0 + 0.03	1.0 + 0.04	1.0 + 0.04	0.1 + 0.004
	5 – 10 Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
	10 Hz – 20 kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
	20 – 50 kHz	0.1 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.20 + 0.02
1 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02

Range	Frequency	24 Hour (23±1 °C)	90 Days (23±5 °C)	1 Year (23±5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
10 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
100 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
1000 V	3 – 5 Hz	1.0 + 0.015	1.0 + 0.0225	1.0 + 0.0225	0.1 + 0.00225
	5 – 10 Hz	0.35 + 0.015	0.35 + 0.0225	0.35 + 0.0225	0.035 + 0.00225
	10 Hz – 20 kHz	0.04 + 0.015	0.05 + 0.0225	0.06 + 0.0225	0.005 + 0.00225
	20 – 50 kHz	0.1 + 0.03	0.11 + 0.0375	0.12 + 0.0375	0.011 + 0.00375
	50 – 100 kHz ^[2]	0.55 + 0.06	0.6 + 0.06	0.6 + 0.06	0.06 + 0.006
	100 – 300 kHz ^{[1][2]}	4.0 + 0.375	4.0 + 0.375	4.0 + 0.375	0.2 + 0.015
[1] Typically 30 % reading error at 1 MHz					
[2] 1000 Volt range is limited to 8 X 10 ⁷ volt-Hertz					

8845A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	Frequency (Hz)	24 Hour (23±1 °C)	90 Days (23±5 °C)	1 Year (23±5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 mV	3 – 5 Hz	1.0 + 0.03	1.0 + 0.04	1.0 + 0.04	0.10 + 0.004
	5 – 10 Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
	10 Hz – 20 kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
	20 – 50 kHz	0.1 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
1 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
10 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
100 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^[1]	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.2 + 0.02
750 V	3 – 5 Hz	1.0 + 0.02	1.0 + 0.03	1.0 + 0.03	0.1 + 0.003
	5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
	10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
	20 – 50 kHz	0.1 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
	50 – 100 kHz ^[2]	0.55 + 0.08	0.6 + 0.08	0.6 + 0.08	0.06 + 0.008
	100 – 300 kHz ^{[1][2]}	4.0 + 0.5	4.0 + 0.5	4.0 + 0.5	0.2 + 0.02
[1] Typically 30 % reading error at 1 MHz					
[2] 750 Volt range is limited to 8 X 10 ⁷ volt-Hertz					

Additional Low Frequency Errors

Error is stated as % of reading.

Frequency	AC Filter		
	3HZ (slow)	20HZ (medium)	200HZ (fast)
10 – 20 Hz	0	0.25	–
20 – 40 Hz	0	0.02	–
40 – 100 Hz	0	0.01	0.55
100 – 200 Hz	0	0	0.2
200 Hz – 1 kHz	0	0	0.02
>1 kHz	0	0	0

Resistance

Specifications are for 4-wire resistance function, 2 x 4-wire resistance, or 2-wire resistance with zero. If zero is not used, add 0.2 Ω for 2-wire resistance plus lead resistance, and add 20 mΩ for 2 x 4-wire resistance function.

Measurement Method.....Current source referenced to LO input

Max. Lead Resistance (4-wire ohms)..... 10 % of range per lead for 10 Ω, 100 Ω, 1 kΩ ranges. 1 kΩ per lead on all other ranges

Input Protection.....1000 V on all ranges

Common Mode Rejection..... 140 dB at 50 or 60 Hz ± 0.1 % (1 kΩ unbalance)

Normal Mode Rejection 60 dB for NPLC of 1 or greater with analog filter off and power line frequency ±0.1 %
100 dB for NPLC of 1 or greater with analog filter on and power line frequency ±0.1 %

Analog Filter.....When using the analog filter, specifications are relative to within one hour of using the ZERO function for that range and NPLC setting.

Input Characteristics

Range	Resolution	Resolution			Source Current
		4½ Digits	5½ Digits	6½ Digits	
10 Ω ^[1]	10.00000 Ω	1 mΩ	100 μΩ	10 μΩ	5 mA/13 V
100 Ω	100.0000 Ω	10 mΩ	1 mΩ	100 μΩ	1 mA/6 V
1 kΩ	1.000000 kΩ	100 mΩ	10 mΩ	1 mΩ	1 mA/6 V
10 kΩ	10.00000 kΩ	1 Ω	100 mΩ	10 mΩ	100 μA/6 V
100 kΩ	100.0000 kΩ	10 Ω	1 Ω	100 mΩ	100 μA/13 V
1 MΩ	1.000000 MΩ	100 Ω	10 Ω	1 Ω	10 μA/13 V
10 MΩ	10.00000 MΩ	1 kΩ	100 Ω	10 Ω	1 μA/13 V
100 MΩ	100.0000 MΩ	10 kΩ	1 kΩ	100 Ω	1 μA 10 MΩ/10 V
1.0 GΩ ^[1]	1.000000 GΩ	100 kΩ	10 kΩ	1 kΩ	1 μA 10 MΩ/10 V

[1] 8846A Only

8846A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
10 Ω	0.003 + 0.01	0.008 + 0.03	0.01 + 0.03	0.0006 + 0.0005
100 Ω	0.003 + 0.003	0.008 + 0.004	0.01 + 0.004	0.0006 + 0.0005
1 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
10 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
100 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
1 MΩ	0.002 + 0.001	0.008 + 0.001	0.01 + 0.001	0.001 + 0.0002
10 MΩ	0.015 + 0.001	0.02 + 0.001	0.04 + 0.001	0.003 + 0.0004
100 MΩ	0.3 + 0.01	0.8 + 0.01	0.8 + 0.01	0.15 + 0.0002
1 GΩ	1.0 + 0.01	1.5 + 0.01	2.0 + 0.01	0.6 + 0.0002

8845A Accuracy

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 Ω	0.003 + 0.003	0.008 + 0.004	0.01 + 0.004	0.0006 + 0.0005
1 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
10 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
100 kΩ	0.002 + 0.0005	0.008 + 0.001	0.01 + 0.001	0.0006 + 0.0001
1 MΩ	0.002 + 0.001	0.008 + 0.001	0.01 + 0.001	0.0010 + 0.0002
10 MΩ	0.015 + 0.001	0.02 + 0.001	0.04 + 0.001	0.0030 + 0.0004
100 MΩ	0.3 + 0.01	0.8 + 0.01	0.8 + 0.01	0.1500 + 0.0002

Additional Ohms Errors

Digits	NPLC	Additional NPLC Noise Error
6½	100	0 % of range
6½	10	0 % of range
5½	1	0.001 % of range
5½	0.2	0.003 % of range ±7 mΩ
4½	0.02	0.017 % of range ±15 mΩ

DC Current

Input Protection..... Tool-accessible 11 A/1000 V and 440 mA/1000 V fuses, limits of 400 mA continuous 550 mA for 2 minutes on, 1 minute off.

Common Mode Rejection..... 140 dB at 50 or 60 Hz ±0.1 % (1 kΩ unbalance)

Normal Mode Rejection 60 dB for NPLC of 1 or greater with analog filter off and power line frequency ±0.1 %
100 dB for NPLC of 1 or greater with analog filter on and power line frequency ±0.1 %

Analog Filter..... When using the analog filter, specifications are relative to within one hour of using the ZERO function for that range and NPLC setting.

Input Characteristics

Range	Resolution	Resolution			Shunt Resistance (Ohms)	Burden Voltage
		4½ Digits	5½ Digits	6½ Digits		
100 µA	100.0000 µA	10 nA	1 nA	100 pA	100 Ω	<0.015 V
1 mA	1.000000 mA	100 nA	10 nA	1 nA	100 Ω	<0.15 V
10 mA	10.00000 mA	1 µA	100 nA	10 nA	1 Ω	<0.025 V
100 mA	100.0000 mA	10 µA	1 µA	100 nA	1 Ω	<0.25 V
400 mA ^[3]	400.000 mA	100 µA	10 µA	1 µA	1 Ω	<0.50 V
1 A ^[2]	1.000000 A	100 µA	10 µA	1 µA	0.01 Ω	<0.05 V
3 A ^[1]	3.000000 A	1 mA	100 µA	10 µA	0.01 Ω	<0.15 V
10 A	10.00000 A	1 mA	100 µA	10 µA	0.01 Ω	<0.5 V

[1] Part of 10 A range.

[2] Available on the front panel terminal only.

[3] 400 mA available in software version 2.0 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off.

Accuracy (8846A)

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 µA	0.01 + 0.02	0.04 + 0.025	0.05 + 0.025	0.002 + 0.003
1 mA	0.007 + 0.005	0.030 + 0.005	0.05 + 0.005	0.002 + 0.0005
10 mA	0.007 + 0.02	0.03 + 0.02	0.05 + 0.02	0.002 + 0.002
100 mA	0.01 + 0.004	0.03 + 0.005	0.05 + 0.005	0.002 + 0.0005
400 mA ^[3]	0.03 + 0.004	0.04 + 0.005	0.05 + 0.005	0.005 + 0.0005
1 A ^[2]	0.03 + 0.02	0.04 + 0.02	0.05 + 0.02	0.005 + 0.001
3 A ^{[1][2]}	0.05 + 0.02	0.08 + 0.02	0.1 + 0.02	0.005 + 0.002
10 A ^[2]	0.1 + 0.008	0.12 + 0.008	0.15 + 0.008	0.005 + 0.0008

[1] Part of 10 A range

[2] Available at front panel connectors only

[3] 400 mA available in software version 2.0 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off.

Accuracy (8845A)

Accuracy is given as ± (% measurement + % of range)

Range	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 µA	0.01 + 0.02	0.04 + 0.025	0.05 + 0.025	0.002 + 0.003
1 mA	0.007 + 0.005	0.030 + 0.005	0.05 + 0.005	0.002 + 0.0005
10 mA	0.007 + 0.02	0.03 + 0.02	0.05 + 0.02	0.002 + 0.002
100 mA	0.01 + 0.004	0.03 + 0.005	0.05 + 0.005	0.002 + 0.0005
400 mA ^[3]	0.03 + 0.004	0.04 + 0.005	0.05 + 0.005	0.005 + 0.0005
1 A ^[2]	0.03 + 0.02	0.04 + 0.02	0.05 + 0.02	0.005 + 0.001
3 A ^{[1][2]}	0.05 + 0.02	0.08 + 0.02	0.10 + 0.02	0.005 + 0.002
10 A ^[2]	0.10 + 0.008	0.12 + 0.008	0.15 + 0.008	0.005 + 0.0008

- [1] Part of 10 A range
- [2] Available at front panel connectors only
- [3] 400 mA available in software version 2.0 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off.

Additional Current Errors

Digits	NPLC	Additional NPLC Noise Error for 1 mA, 100 mA, 400 mA, 3A and 10A	Additional NPLC Noise Error for 100 µA, 10 mA, 1A
6½	100	0 % of range	0 % of range
6½	10	0 % of range	0 % of range
5½	1	0.001 % of range	0.01 % of range
5½	0.2	0.011 % of range ± 4 µA	0.11 % of range ± 4 µA
4½	0.02	0.04 % of range ± 4 µA	0.28 % of range ± 4 µA

AC Current

The following ac current specifications are for sinusoidal signals with amplitudes greater than 5 % of range. For inputs from 1 % to 5 % of range, add an additional error of 0.1 % of range.

Input Protection.....Tool accessible 11 A/1000 V and 440 mA/1000 V fuses, limits of 400 mA continuous 550 mA for 2 minutes on, 1 minute off.

Measurement Method.....ac-coupled true-rms, dc-coupled to the fuse and shunt (no blocking capacitor)

AC Filter Bandwidth

- Slow.....3 Hz to 10 kHz
- Medium.....20 Hz to 10 kHz
- Fast.....200 Hz to 10 kHz

Crest Factor Error (applies to non-sinusoidal waveforms only)

- Maximum Crest Factor**.....5:1 at full scale
- Additional Crest Factor Errors (<100 Hz)**.....Crest factor 1-2, 0.05 % of full scale
Crest factor 2-3, 0.2 % of full scale
Crest factor 3-4, 0.4 % of full scale
Crest factor 4-5, 0.5 % of full scale

Input Characteristics

Range	Resolution	Resolution			Shunt Resistance (Ohms)	Burden Voltage
		4½ Digits	5½ Digits	6½ Digits		
100 µA ^[1]	100.0000 µA	10 nA	1 nA	100 pA	100 Ω	<0.015 V
1 mA ^[1]	1.000000 mA	100 nA	10 nA	1 nA	100 Ω	<0.15 V
10 mA	10.00000 mA	1 µA	100 nA	10 nA	1 Ω	<0.025 V
100 mA	100.0000 mA	10 µA	1 µA	100 nA	1 Ω	<0.25 V
400 mA ^[4]	400.000 mA	100 µA	10 µA	1 µA	1 Ω	<0.50 V
1 A ^[3]	1.000000 A	100 µA	10 µA	1 µA	0.01 Ω	<0.05 V
3 A ^{[2][3]}	3.00000 A	1 mA	100 µA	10 µA	0.01 Ω	<0.05 V
10 A ^[3]	10.00000 A	1 mA	100 µA	10 µA	0.01 Ω	<0.5 V

- [1] 8846A Only
- [2] Part of 10 A range
- [3] Available at front panel connectors only
- [4] 400 mA available in software version 1.0.700.18 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off; maximum crest factor 3:1 at 400mA

8846A Accuracy

Accuracy is given as \pm (% measurement + % of range)

Range	Frequency (Hz)	24 Hour (23 \pm 1 °C)	90 Days (23 \pm 5 °C)	1 Year (23 \pm 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 μ A	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.2 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.1 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
1 mA	3 – 5 Hz	1.0 + 0.04	1.0 + 0.04	1.0 + 0.04	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.04	0.3 + 0.04	0.3 + 0.04	0.035 + 0.006
	10 Hz – 5 kHz	0.1 + 0.04	0.1 + 0.04	0.1 + 0.04	0.015 + 0.006
	5 – 10 kHz	0.2 + 0.25	0.2 + 0.25	0.2 + 0.25	0.03 + 0.006
10 mA	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.2 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.1 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
100 mA	3 – 5 Hz	1.0 + 0.04	1.0 + 0.04	1.0 + 0.04	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.04	0.3 + 0.04	0.3 + 0.04	0.035 + 0.006
	10 Hz – 5 kHz	0.1 + 0.04	0.1 + 0.04	0.1 + 0.04	0.015 + 0.006
	5 – 10 kHz	0.2 + 0.25	0.2 + 0.25	0.2 + 0.25	0.03 + 0.006
400 mA ^[3]	3 – 5 Hz	1.0 + 0.1	1.0 + 0.1	1.0 + 0.1	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.1	0.3 + 0.1	0.3 + 0.1	0.035 + 0.006
	10 Hz – 1 kHz	0.1 + 0.1	0.1 + 0.1	0.1 + 0.1	0.015 + 0.006
	1kHz – 10 kHz	0.2 + 0.7	0.2 + 0.7	0.2 + 0.7	0.03 + 0.006
1 A ^[2]	3 – 5 Hz	1.0 + 0.04	1.0 + 0.04	1.0 + 0.04	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.04	0.3 + 0.04	0.3 + 0.04	0.035 + 0.006
	10 Hz – 5 kHz	0.1 + 0.04	0.1 + 0.04	0.1 + 0.04	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
3 A ^{[1][2]}	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.1 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
10 A ^[2]	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.1 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006

[1] Part of 10 A range
 [2] Available only on front panel connectors
 [3] 400 mA available in software version 1.0.700.18 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off; maximum crest factor 3:1 at 400mA; specification for current above 329 mA is typical.

8845A Accuracy

Accuracy is given as \pm (% measurement + % of range)

Range	Frequency (Hz)	24 Hour (23 \pm 1 °C)	90 Days (23 \pm 5 °C)	1 Year (23 \pm 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
10 mA	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.2 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.1 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
100 mA	3 – 5 Hz	1.0 + 0.04	1.0 + 0.04	1.0 + 0.04	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.04	0.3 + 0.04	0.3 + 0.04	0.035 + 0.006
	10 Hz – 5 kHz	0.1 + 0.04	0.1 + 0.04	0.1 + 0.04	0.015 + 0.006
	5 – 10 kHz	0.2 + 0.25	0.2 + 0.25	0.2 + 0.25	0.03 + 0.006
400 mA ^[3]	3 – 5 Hz	1.0 + 0.1	1.0 + 0.1	1.0 + 0.1	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.1	0.3 + 0.1	0.3 + 0.1	0.035 + 0.006
	10 Hz – 1 kHz	0.1 + 0.1	0.1 + 0.1	0.1 + 0.1	0.015 + 0.006
	1kHz – 10 kHz	0.2 + 0.7	0.2 + 0.7	0.2 + 0.7	0.03 + 0.006
1 A ^[2]	3 – 5 Hz	1.0 + 0.04	1.0 + 0.04	1.0 + 0.04	0.1 + 0.006
	5 – 10 Hz	0.3 + 0.04	0.3 + 0.04	0.3 + 0.04	0.035 + 0.006
	10 Hz – 5 kHz	0.1 + 0.04	0.1 + 0.04	0.1 + 0.04	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006

Range	Frequency (Hz)	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
3 A ^{[1][2]}	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.1 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006
10 A ^[2]	3 – 5 Hz	1.1 + 0.06	1.1 + 0.06	1.1 + 0.06	0.2 + 0.006
	5 – 10 Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
	10 Hz – 5 kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
	5 – 10 kHz	0.35 + 0.7	0.35 + 0.7	0.35 + 0.7	0.03 + 0.006

[1] Part of the 10 A range
 [2] Available only at front panel connectors
 [3] 400 m available in software version 1.0.700.18 or greater only. 400 mA continuously; 550 mA for 2 minutes on, 1 minute off; maximum crest factor 3:1 at 400mA; specification for current above 329 mA is typical.

Additional Low Frequency Errors

Error is stated as % of reading.

Frequency	AC Filter		
	3HZ (slow)	20HZ (medium)	200HZ (fast)
10 – 20 Hz	0	0.25	–
20 – 40 Hz	0	0.02	–
40 – 100 Hz	0	0.01	0.55
100 – 200 Hz	0	0	0.2
200 Hz – 1 kHz	0	0	0.02
> 1 kHz	0	0	0

Frequency

Gate Times.....Programmable to 1 s, 100 ms, and 10 ms

Measurement Method.....Flexible counting technique. AC-coupled input using the ac voltage measurement function.

Settling Considerations.....When measuring frequency or period after a dc offset voltage change, errors may occur. For the most accurate measurement, wait up to 1 second for the input blocking capacitor to settle.

Measurement Considerations.....To minimize measurement errors, shield inputs from external noise when measuring low-voltage, low-frequency signals.

8846A Accuracy

Accuracy is given as ± % measurement

Range	Frequency	24 Hour (23 ± 1 °C)	90 Days (23 ± 5 °C)	1 Year (23 ± 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
100 mV to 1000 V ^{[1][2]}	3 – 5 Hz	0.1	0.1	0.1	0.005
	5 – 10 Hz	0.05	0.05	0.05	0.005
	10 – 40 Hz	0.03	0.03	0.03	0.001
	40 Hz – 300 kHz	0.006	0.01	0.01	0.001
	300 kHz – 1 MHz	0.006	0.01	0.01	0.001

[1] Input >100 mV. For 10 – 100 mV, multiply percent measurement error by 10.
 [2] Limited to 8 X 10⁷ volt-Hertz

8845A Accuracy

Accuracy is given as \pm % measurement

Range	Frequency	24 Hour (23 \pm 1 °C)	90 Days (23 \pm 5 °C)	1 Year (23 \pm 5 °C)	Temperature Compensation/°C Outside 18 to 28 °C
100 mV to 750 V ^{[1][2]}	3 – 5 Hz	0.1	0.1	0.1	0.005
	5 – 10 Hz	0.05	0.05	0.05	0.005
	10 – 40 Hz	0.03	0.03	0.03	0.001
	40 Hz – 300 kHz	0.006	0.01	0.01	0.001

[1] Input >100 mV. For 10 – 100 mV, multiply percent measurement error by 10.
 [2] Limited to 8 X 10⁷ volt-Hertz

Gate Time vs. Resolution

Gate Time	Resolution
0.01	5½
0.1	6½
1.0	6½

Additional Low Frequency Errors

Error stated as percent of measurement for inputs >100 mV. For 10 – 100 mV, multiply percent by 10.

Frequency	Resolution		
	6½	5½	4½
3 – 5 Hz	0	0.12	0.12
5 – 10 Hz	0	0.17	0.17
10 – 40 Hz	0	0.2	0.2
40 – 100 Hz	0	0.06	0.21
100 – 300 Hz	0	0.03	0.21
300 Hz – 1 kHz	0	0.01	0.07
> 1 kHz	0	0	0.02

Capacitance (8846A Only)

Accuracy is stated as \pm (% of measurement + % of range)

Range	Resolution	1 Year Accuracy ^[1] (23 \pm 5 °C)	Temperature Coefficient/°C Outside 18 to 28 °C
1 nF	1 pF	2% \pm 2.5 %	0.05 + 0.05
10 nF	10 pF	1% \pm 0.5 %	0.05 + 0.01
100 nF	100 pF	1% \pm 0.5 %	0.01 + 0.01
1 μ F	1 nF	1% \pm 0.5 %	0.01 + 0.01
10 μ F	10 nF	1% \pm 0.5 %	0.01 + 0.01
100 μ F	100 nF	1% \pm 0.5 %	0.01 + 0.01
1 mF	1 μ F	1% \pm 0.5 %	0.01 + 0.01
10 mF	10 μ F	1% \pm 0.5 %	0.01 + 0.01
100 mF	100 μ F	4% \pm 0.2 %	0.05 + 0.05

[1] Stated accuracy is attained when Zero function is used.

Temperature (8846A only)

Test Current..... 1 mA

Accuracy is stated as \pm °C and is based on a Platinum RT100 (DIN IEC 751, 385 type) RTD with less than 10 ohms lead resistance. The accuracy listed in the table below are valid only when using the 4-wire RTD measurement function. Specifications do not include probe accuracy, which must be added.

Range	Resolution	Accuracy		Temperature Coefficient/°C Outside 18 to 28 °C
		90 Days (23 \pm 5 °C)	1 Year (23 \pm 5 °C)	
-200 °C	0.001 °C	0.06	0.09	0.0025
-100 °C	0.001 °C	0.05	0.08	0.002
0 °C	0.001 °C	0.04	0.06	0.002
100 °C	0.001 °C	0.05	0.08	0.002
300 °C	0.001 °C	0.1	0.12	0.002
600 °C	0.001 °C	0.18	0.22	0.002

Additional Errors

Digits	NPLC	Additional NPLC Noise Error
6 1/2	100	0 °C
6 1/2	10	0 °C
5 1/2	1	0.03 °C
5 1/2	0.2	0.12 °C
4 1/2	0.02	0.6 °C

Continuity

Continuity ThresholdSelectable between 1 Ω and 1000 Ω

Test Current..... 1 mA

Response Time.....300 samples/sec with audible tone

Accuracy is given as ± (% measurements + % of range)

Range	24 Hour (23 ±1 °C)	90 Days (23 ±5 °C)	1 Year (23 ±5 °C)	Temperature Coefficient/ °C Outside 18 to 28 °C
1000.0 Ω	0.002 + 0.01	0.008 + 0.02	0.01 + 0.02	0.001 + 0.002

Diode Test

Test Current..... 100 µA or 1 mA

Response Time.....300 samples/sec with audible tone.

Accuracy is given as ± (% measurements + % of range)

Range	24 Hour (23 ±1 °C)	90 Days (23 ±5 °C)	1 Year (23 ±5 °C)	Temperature Coefficient/ °C Outside 18 to 28 °C
5.0000 V	0.002 + 0.002	0.008 + 0.002	0.01 + 0.002	0.001 + 0.002
10.0000 V	0.002 + 0.001	0.008 + 0.002	0.01 + 0.002	0.001 + 0.002

Measurement Rates (IEEE488[4])

Function	Digits	Setting	Integration Time 60 Hz (50 Hz)	Measurements/Second ^[1]	
				8845A	8846A
DC Volts, DC Current, and Resistance	6 1/2	100 NPLC	1.67 (2) s	0.6 (0.5)	0.6 (0.5)
	6 1/2	10 NPLC	167 (200) ms	6 (5)	6 (5)
	5 1/2	1 NPLC	16.7 (20) ms	60 (50)	60 (50)
	5 1/2	0.2 NPLC	3.3 ms	270	270
	4 1/2	0.02 NPLC	500 us	995	995
AC Voltage and AC Current ^[2]	6 1/2	3 Hz		0.47	0.47
	6 1/2	20 Hz		1.64	1.64
	6 1/2	200 Hz ^[3]		4.5	4.5
Frequency and Period	6 1/2	1 s		1	1
	5 1/2	100 ms		9.8	9.8
	4 1/2	10 ms		80	80
Capacitance	6 1/2			NA	2

- [1] Typical measurement rates with auto-zero off, delay = 0, display off, auto range off and math off.
- [2] Maximum measurement rates for 0.01 % of ac step. When dc input varies, additional settling delay is required.
- [3] For remote operation or external trigger using default settling delay
- [4] Speeds available in OutG SW 1.0.700.18 or higher. Note that the measurements rates for RS232 can vary depending on the baud rate chosen. If the baud rate selected is 115,200, the maximum measurement rate is 711 measurement/s. The LAN bus has a maximum measurement rate of 963 measurement/s.

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