FLUKE®

Fluke 83V and 87V Digital Multimeters

Detailed Specifications

For all detailed specifications:

Accuracy is given as ±([% of reading] + [number of least significant digits]) at 18 °C to 28 °C, with relative humidity up to 90 %, for a period of one year after calibration.

For Model 87 in the 4½-digit mode, multiply the number of least significant digits (counts) by 10. AC conversions are ac-coupled and valid from 3 % to 100 % of range. Model 87 is true-rms responding. AC crest factor can be up to 3 at full scale, 6 at half scale. For non-sinusoidal wave forms add -(2 % Rdg + 2 % full scale) typical, for a crest factor up to 3.

Fluke 87V ac voltage function specifications (true-rms)

Function	Range	Resolution	Accuracy					
			45 - 65 Hz	30 - 200 Hz	200 - 440 Hz	440 Hz - 1 kHz	1 - 5 kHz	5 - 20 kHz[1]
V~ [2,4]	600.0 mV 6.000 V 60.00 V 600.0 V	0.1 mV 0.001 V 0.01 V 0.1 V	± (0.7 % + 4) ± (0.7 % + 2)	± (1.0 % + 4)			± (2.0 % + 4) ± (2.0 % + 4)[3]	± (2.0 % + 20) unspecified
	1000 V	1 V					unspecified	unspecified
	Using low pass filter		± (0.7 % + 2)	± (1.0 % + 4)	+ 1 % + 4 -6 % - 4[5]	unspecified	unspecified	unspecified

[1] Below 10 % of range, add 6 counts.
[2] The Fluke 87V is a true-rms responding meter. When the input leads are shorted together in the ac functions, the meter may display a residual reading between 1 and 30 counts. A 30-count residual reading will cause only a 2-digit change for readings over 3 % of range. Using REL to offset this reading may produce a much larger constant error in later measurements.
[3] Frequency range: 1 kHz to 2.5 kHz.
[4] A residual reading of up to 13 digits with leads shorted, will not affect stated accuracy above 3 % of range.
[5] Specification increases from -1 % at 200 Hz to -6 % at 440 Hz when filter is in use.

Fluke 83V ac voltage function specifications (average responding rms indicating)

Function	Range	Resolution	Accuracy		
			50 Hz - 60 Hz	30 Hz - 1 kHz	1 kHz - 5 kHz
V~ [1]	600.0 mV	0.1 mV	± (0.5 % + 4)	± (1.0 % + 4)	± (2.0 % + 4)
	6.000 V	0.001 V	± (0.5 % + 2)	± (1.0 % + 4)	± (2.0 % + 4)
	60.00 V	0.01 V	± (0.5 % + 2)	± (1.0 % + 4)	± (2.0 % + 4)
	600.0 V	0.1 V	± (0.5 % + 2)	± (1.0 % + 4)	± (2.0 % + 4)[2]
	1000 V	1 V	± (0.5 % + 2)	± (1.0 % + 4)	unspecified

[1] Below a reading of 200 counts, add 10 counts
[2] Frequency range: 1 kHz to 2.5 kHz

Fluke 83V and 87V Detailed Specifications cont.

DC voltage, resistance, and conductance function specifications

Function	Range	Resolution	Accuracy	
			Fluke 83V	Fluke 87V
V ⎓	6.000 V	0.001 V	± (0.1 % + 1)	± (0.05 % + 1)
	60.00 V	0.01 V	± (0.1 % + 1)	± (0.05 % + 1)
	600.0 V	0.1 V	± (0.1 % + 1)	± (0.05 % + 1)
	1000 V	1 V	± (0.1 % + 1)	± (0.05 % + 1)
mV ⎓	600.0 mV	0.1 mV	± (0.3 % + 1)	± (0.1 % + 1)
Ω	600.0 Ω	0.1 Ω	± (0.4 % + 2)[1]	± (0.2 % + 2)[1]
	6.000 kΩ	0.001 kΩ	± (0.4 % + 1)	± (0.2 % + 1)
	60.00 kΩ	0.01 kΩ	± (0.4 % + 1)	± (0.2 % + 1)
	600.0 kΩ	0.1 kΩ	± (0.7 % + 1)	± (0.6 % + 1)
	6.000 MΩ	0.001 MΩ	± (0.7 % + 1)	± (0.6 % + 1)
	50.00 MΩ	0.01 MΩ	± (1.0 % + 3)[2]	± (1.0 % + 3)[2]
nS	60.00 nS	0.01 nS	± (1.0 % + 10)[1]	± (1.0 % + 10)[1]

[1] When using the REL Δ function to compensate for offsets
[2] Add 0.5 % of reading when measuring above 30 MΩ in the 50 MΩ range and 20 counts below 33 nS in the 60 nS range

Temperature specifications (87V only)

Temperature	Resolution	Accuracy[1, 2]
-200 °C to +1090 °C	0.1 °C	1 % + 10
-328 °F to +1994 °F	0.1 °F	1 % + 18

[1] Does not include error of the thermocouple probe.
[2] Accuracy specification assumes ambient temperature stable to ± 1 °C. For ambient temperature changes of ± 5 °C, rated accuracy applies after 1 hour.

Current function specifications

Function	Range	Resolution	Accuracy		Burden Voltage (typical)
			Model 83[1]	Model 87[2, 3]	
mA A~ (45 Hz to 2 kHz)	60.00 mA	0.01 mA	± (1.2 % + 2)[5]	± (1.0 % + 2)	1.8 mV/mA
	400.0 mA[6]	0.1 mA	± (1.2 % + 2)[5]	± (1.0 % + 2)	1.8 mV/mA
	6.000 A	0.001 A	± (1.2 % + 2)[5]	± (1.0 % + 2)	0.03 V/A
	10.00 A[4]	0.01 A	± (1.2 % + 2)[5]	± (1.0 % + 2)	0.03 V/A
mA A⎓	60.00 mA	0.01 mA	± (0.4 % + 4)	± (0.2 % + 4)	1.8 mV/mA
	400.0 mA[6]	0.1 mA	± (0.4 % + 2)	± (0.2 % + 2)	1.8 mV/mA
	6.000 A	0.001 A	± (0.4 % + 4)	± (0.2 % + 4)	0.03 V/A
	10.00 A[4]	0.01 A	± (0.4 % + 2)	± (0.2 % + 2)	0.03 V/A
μA~ (45 Hz to 2 kHz)	600.0 μA	0.1 μA	± (1.2 % + 2)[5]	± (1.0 % + 2)	100 μV/μA
	6000 μA	1 μA	± (1.2 % + 2)[5]	± (1.0 % + 2)	100 μV/μA
μA⎓	600.0 μA	0.1 μA	± (0.4 % + 4)	± (0.2 % + 4)	100 μV/μA
	6000 μA	1 μA	± (0.4 % + 2)	± (0.2 % + 2)	100 μV/μA

[1] AC conversion for Model 83 is ac coupled and calibrated to the rms value of a sine wave input.
[2] AC conversions for Model 87 are ac coupled, true rms responding, and valid from 3 % to 100 % of range.
[3] Model 87 is a true rms responding meter. When the input leads are shorted together in the ac functions, the Meter may display a residual reading between 1 and 30 counts. A 30 count residual reading will cause only a 2 digit change for readings over 3 % of range. Using REL to offset this reading may produce a much larger constant error in later measurements.
[4] ⚠ 10 A continuous up to 35 °C; < 20 minutes on, 5 minutes off at 35 °C to 55 °C. 20 A for 30 seconds maximum; > 10 A unspecified.
[5] Below a reading of 200 counts, add 10 counts.
[6] 400 mA continuous; 600 mA for 18 hours maximum.

Capacitance and diode function specifications

Function	Range	Resolution	Accuracy
⊣⊢	10.00 nF	0.01 nF	± (1 % + 2)[1]
	100.0 nF	0. 1 nF	± (1 % + 2)[1]
	1.000 μF	0.001 μF	± (1 % + 2)
	10.00 μF	0.01 μF	± (1 % + 2)
	100.0 μF	0.1 μF	± (1 % + 2)
	9999 μF	1 μF	± (1 % + 2)
→⊢	3.000 V	0.001 V	± (2 % + 1)

[1] With a film capacitor or better, using Relative mode to zero residual.

Frequency counter specifications

Function	Range	Resolution	Accuracy
Frequency (0.5 Hz to 200 kHz, pulse width > 2 µs)	199.99 1999.9 19.999 kHz 199.99 kHz > 200 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz 0.1 kHz	± (0.005 % + 1) ± (0.005 % + 1) ± (0.005 % + 1) ± (0.005 % + 1) unspecified

Frequency counter sensitivity and trigger levels

Input Range[1]	Minimum Sensitivity (RMS Sine wave)		Approximate Trigger Level (DC Voltage Function)
	5 Hz - 20 kHz	0.5 Hz - 200 kHz	
600 mV dc	70 mV (to 400 Hz)	70 mV (to 400 Hz)	40 mV
600 mV ac	150 mV	150 mV	–
6 V	0.3 V	0.7 V	1.7 V
60 V	3 V	7 V (≤ 140 kHz)	4 V
600 V	30 V	70 V (≤ 14.0 kHz)	40 V
1000 V	100 V	700 V (≤ 1.4 kHz)	100 V
Duty Cycle Range	**Accuracy**		
0.0 to 99.9 %	Within ± (0.2 % per kHz + 0.1 %) for risetimes < 1 µs		

[1] Maximum input for specified accuracy = 10X Range or 1000 V.

Electrical characteristics of the terminals

Function	Overload Protection[1]	Input Impedance (nominal)	Common Mode Rejection Ratio (1 kΩ unbalance)		Normal Mode Rejection					
V⎓	1000 V rms	10 MΩ||< 100 pF	> 120 dB at dc, 50 Hz or 60 Hz		> 60 dB at 50 Hz or 60 Hz					
mV⎓	1000 V rms	10 MΩ||< 100 pF	>120 dB at dc, 50 Hz or 60 Hz		> 60 dB at 50 Hz or 60 Hz					
V~	1000 V rms	10 MΩ||< 100 pF (ac-coupled)	> 60 dB, dc to 60 Hz							
		Open Circuit Test Voltage	Full Scale Voltage		Typical Short Circuit Current					
			To 6.0 MΩ	50 MΩ or 60 nS	600 Ω	6 k	60 k	600 k	6 MΩ	50 MΩ
Ω	1000 V rms	< 7.3 V dc	< 4.1 V dc	< 4.5 V dc	1 mA	100 µA	10 µA	1µA	1 µA	0.5 µA
→+	1000 V rms	< 3.9 V dc	3.000 V dc		0.6 mA typical					

[1] 10^6 V Hz maximum

MIN MAX recording specifications

Model	Nominal Response	Accuracy
83V	100 ms to 80 %	Specified accuracy ± 12 counts for changes > 200 ms in duration (± 40 counts in ac with beeper on)
87V	100 ms to 80 % (dc functions)	Specified accuracy ± 12 counts for changes > 200 ms in duration > 25 % of range
	120 ms to 80 % (ac functions)	Specified accuracy ± 40 counts for changes > 350 ms and inputs
	250 µs (peak) (Model 87 only)[1]	Specified accuracy ± 100 counts for changes > 250 µs in duration (add ± 100 counts for readings over 6000 counts) (add ± 100 counts for readings in Low Pass mode)

[1] For repetitive peaks: 1 ms for single events.

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Fluke 83V and 87V General Specifications

Maximum voltage between any terminal and earth ground: 1000 V rms
Fuse protection for mA or µA inputs: 44/100 A, 1000 V FAST Fuse
Fuse protection for A input: 11 A, 1000 V FAST Fuse
Display:
Digital: 6000 counts updates 4/sec; (Model 87V also has 19,999 counts in high-resolution mode)
Analog: 33 segments, updates 40/sec.
Frequency: 19,999 counts, updates 3/sec at > 10 Hz
Temperature: Operating: -20 °C to +55 °C; Storage: -40 °C to +60 °C
Altitude:
Operating: 2000 m
Storage: 10,000 m
Temperature coefficient: 0.05 x (specified accuracy)/ °C (< 18 °C or > 28 °C)
Electromagnetic compatibility: In an RF field of 3 V/m total accuracy = specified accuracy
Relative humidity: 0 % to 90 % (0 °C to 35 °C); 0 % to 7 0% (35 °C to 55 °C)
Battery type: 9 V zinc, NEDA 1604 or 6F22 or 006P
Battery life: 400 hours typical with alkaline (with backlight off)
Vibration: Per MIL-PRF-28800 for a Class 2 instrument
Shock: 1 Meter drop per IEC 61010-1:2001
Size (HxWxL): 1.25 in x 3.41 in x 7.35 in (3.1 cm x 8.6 cm x 18.6 cm)
Size with holster and flex-stand: 2.06 in x 3.86 in x 7.93 in (5.2 cm x 9.8 cm x 20.1 cm)
Weight: 12.5 oz (355 g)
Weight with holster and flex-stand: 22.0 oz (624 g)
Safety: Complies with ANSI/ISA S82.01-2004, CSA 22.2 No. 1010.1:2004 to 1000 V Overvoltage Category III, IEC 664 to 600 V Overvoltage Category IV. UL listed to UL3111-1. Licensed by TÜV to EN61010-1.

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