



80 Series V Industrial True-RMS Multimeter with Temperature

Accuracy and diagnostic functions for maximum industrial productivity



The new Fluke 87V has improved measurement functions, troubleshooting features, resolution and accuracy to solve more problems on motor drives, in plant automation, power distribution, and electro-mechanical equipment. The 87V operates very similar to the classic 87, but with more problem-solving power, safety, convenience and impact protection.

New features for maximum productivity

- Unique function for accurate voltage and frequency measurements on adjustable speed motor drives and other electrically noisy equipment (87V)
- Built-in thermometer conveniently allows you to take temperature readings without having to carry a separate instrument (87V)
- Optional magnetic hanger for easy setup and viewing while freeing your hands for other tasks
- Large digit display with bright, two-level backlight makes the 80 Series V significantly easier to read than older models

Electrical safety

All inputs are protected to Category III, 1000 V and Category IV 600 V. They can withstand impulses in excess of 8,000 V and reduce risks related to surges and spikes.



Specifications

Function	Range and resolution	Basic accuracy	
		83V	87V
DC Volts	600.0 mV, 6.000 V, 60.00 V, 600.0 V, 1000 V	0.1 %	0.05 %
AC Volts	600.0 mV, 6.000 V, 60.00 V, 600.0 V, 1000 V	0.5 %	0.7 % (True-rms)
DC Current	600.0 μA, 6000 μA, 60.00 mA, 600.0 mA, 6.000 A, 10.00 A	0.4 %	0.2 %
AC Current	600.0 μA, 6000 μA, 60.00 mA, 600.0 mA, 6.000 A, 10.00 A	1.2 %	1.0 % (True-rms)
Temperature (excl. probe)	-200 to 1090 °C (-328 to 1994 °F)	—	1.0 %
80BK Temperature Probe	-40 to 260 °C (-40 to 500 °F)	—	2.2 °C or 2 %
Resistance	600.0 Ω, 6.000 kΩ, 60.00 kΩ, 600.0 kΩ, 6.000 MΩ, 50.00 MΩ	0.4 %	0.2 %
Capacitance	10.00 nF, 100.0 nF, 1.000 μF, 10.00 μF, 100.0 μF, 9,999 μF	1.0 %	1.0 %
Frequency	199.99 Hz, 1.9999 kHz, 19.999 kHz, 199.99 kHz	0.005 %	0.005 %



Comparison chart

Feature	83V	87V
True-rms ac voltage and current for accurate measurements on non linear signals		•
Selectable filter for accurate voltage and frequency measurements on motor drives		•
0.05 % dc accuracy		•
4-1/2 digit mode for precise measurements		•
Built-in thermometer lets you carry one less tool		•
Large display digits and two-level bright white backlight for increased visibility	•	•
10,000 μ F capacitance range for components and motor caps	•	•
Peak capture to record transients as fast as 250 μ s		•
Measure up to 1000 V ac and dc	•	•
Measure up to 10 A, 20 A for up to 30 seconds	•	•
Auto and manual ranging for maximum flexibility	•	•
Analog bargraph	•	•
Resistance, continuity and diode test	•	•
Frequency to 200 kHz and % duty cycle	•	•
Min/Max and average recording to capture variations automatically	•	•
Relative mode to remove test lead resistance from low ohms measurements	•	•
Improved sleep mode for long battery life	•	•
Access door for fast battery changes without breaking the calibration seal	•	•
Limited lifetime warranty	•	•
Removable holster with built in test lead and probe storage	•	•
Cat IV 600 V and Cat III 1000 V electrical safety ratings	•	•
Basic test leads and alligator clips	•	•
Bead type thermocouple temperature probe		•

Fluke. *Keeping your world
up and running.*

Fluke 83V and 87V Digital Multimeters

Detailed Specifications

For all detailed specifications:

Accuracy is given as $\pm([\% \text{ of reading}] + [\text{number of least significant digits}])$ 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 $-(2 \% \text{ Rdg} + 2 \% \text{ full scale})$ 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
$\tilde{V}^{2,4}$	600.0 mV	0.1 mV	$\pm (0.7 \% + 4)$		$\pm (1.0 \% + 4)$		$\pm (2.0 \% + 4)$	$\pm (2.0 \% + 20)$
	6.000 V	0.001 V						
	60.00 V	0.01 V	$\pm (0.7 \% + 2)$			$\pm (2.0 \% + 4)^3$	unspecified	
	600.0 V	0.1 V						
	1000 V	1 V					unspecified	unspecified
	Using low pass filter		$\pm (0.7 \% + 2)$	$\pm (1.0 \% + 4)$	$+ 1 \% + 4$ $-6 \% - 4^5$	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
\tilde{V}^1	600.0 mV	0.1 mV	$\pm (0.5 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)$
	6.000 V	0.001 V	$\pm (0.5 \% + 2)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)$
	60.00 V	0.01 V	$\pm (0.5 \% + 2)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)$
	600.0 V	0.1 V	$\pm (0.5 \% + 2)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)^2$
	1000 V	1 V	$\pm (0.5 \% + 2)$	$\pm (1.0 \% + 4)$	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
$\overline{\text{V}}$	6.000 V	0.001 V	$\pm (0.1 \% + 1)$	$\pm (0.05 \% + 1)$
	60.00 V	0.01 V	$\pm (0.1 \% + 1)$	$\pm (0.05 \% + 1)$
	600.0 V	0.1 V	$\pm (0.1 \% + 1)$	$\pm (0.05 \% + 1)$
	1000 V	1 V	$\pm (0.1 \% + 1)$	$\pm (0.05 \% + 1)$
$\overline{\text{mV}}$	600.0 mV	0.1 mV	$\pm (0.3 \% + 1)$	$\pm (0.1 \% + 1)$
Ω	600.0 Ω	0.1 Ω	$\pm (0.4 \% + 2)^1$	$\pm (0.2 \% + 2)^1$
	6.000 k Ω	0.001 k Ω	$\pm (0.4 \% + 1)$	$\pm (0.2 \% + 1)$
	60.00 k Ω	0.01 k Ω	$\pm (0.4 \% + 1)$	$\pm (0.2 \% + 1)$
	600.0 k Ω	0.1 k Ω	$\pm (0.7 \% + 1)$	$\pm (0.6 \% + 1)$
	6.000 M Ω	0.001 M Ω	$\pm (0.7 \% + 1)$	$\pm (0.6 \% + 1)$
nS	50.00 M Ω	0.01 M Ω	$\pm (1.0 \% + 3)^2$	$\pm (1.0 \% + 3)^2$
	60.00 nS	0.01 nS	$\pm (1.0 \% + 10)^1$	$\pm (1.0 \% + 10)^1$

¹ When using the REL Δ function to compensate for offsets

² Add 0.5 % of reading when measuring above 30 M Ω in the 50 M Ω 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 $\text{A} \sim$ (45 Hz to 2 kHz)	60.00 mA	0.01 mA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	1.8 mV/mA
	400.0 mA ⁶	0.1 mA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	1.8 mV/mA
	6.000 A	0.001 A	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	0.03 V/A
	10.00 A ⁴	0.01 A	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	0.03 V/A
mA $\text{A} \overline{\text{---}}$	60.00 mA	0.01 mA	$\pm (0.4 \% + 4)$	$\pm (0.2 \% + 4)$	1.8 mV/mA
	400.0 mA ⁶	0.1 mA	$\pm (0.4 \% + 2)$	$\pm (0.2 \% + 2)$	1.8 mV/mA
	6.000 A	0.001 A	$\pm (0.4 \% + 4)$	$\pm (0.2 \% + 4)$	0.03 V/A
	10.00 A ⁴	0.01 A	$\pm (0.4 \% + 2)$	$\pm (0.2 \% + 2)$	0.03 V/A
$\mu\text{A} \sim$ (45 Hz to 2 kHz)	600.0 μA	0.1 μA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 $\mu\text{V}/\mu\text{A}$
	6000 μA	1 μA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 $\mu\text{V}/\mu\text{A}$
$\mu\text{A} \overline{\text{---}}$	600.0 μA	0.1 μA	$\pm (0.4 \% + 4)$	$\pm (0.2 \% + 4)$	100 $\mu\text{V}/\mu\text{A}$
	6000 μA	1 μA	$\pm (0.4 \% + 2)$	$\pm (0.2 \% + 2)$	100 $\mu\text{V}/\mu\text{A}$

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 Δ 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
$\overline{\text{C}}$	10.00 nF	0.01 nF	$\pm (1 \% + 2)^1$
	100.0 nF	0.1 nF	$\pm (1 \% + 2)^1$
	1.000 μF	0.001 μF	$\pm (1 \% + 2)$
	10.00 μF	0.01 μF	$\pm (1 \% + 2)$
	100.0 μF	0.1 μF	$\pm (1 \% + 2)$
	9999 μF	1 μF	$\pm (1 \% + 2)$
$\overrightarrow{\text{D}}$	3.000 V	0.001 V	$\pm (2 \% + 1)$

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	0.01 Hz	± (0.005 % + 1)
	1999.9	0.1 Hz	± (0.005 % + 1)
	19.999 kHz	0.001 kHz	± (0.005 % + 1)
	199.99 kHz	0.01 kHz	± (0.005 % + 1)
	> 200 kHz	0.1 kHz	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					
$\overline{\overline{V}}$	1000 V rms	10 MΩ < 100 pF	> 120 dB at dc, 50 Hz or 60 Hz		> 60 dB at 50 Hz or 60 Hz					
\overline{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					
\tilde{V}	1000 V rms	10 MΩ < 100 pF (ac-coupled)	> 60 dB, dc to 60 Hz							
			Full Scale Voltage		Typical Short Circuit Current					
		Open Circuit Test Voltage	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	1 µA	1 µA	0.5 µA
→+	1000 V rms	< 3.9 V dc	3.000 V dc		0.6 mA typical					

¹ 10⁶ 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.

Fluke 83V and 87V General Specifications

Maximum voltage between any terminal and earth ground: 1000 V rms

Fuse protection for mA or μ A 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 (HxWxD): 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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