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FLUKE®

80 Series V Digital Multimeters

New

True RMS



EN 61010-1
CAT III 1000V
CAT IV 600V

Lifetime
Warranty!
Keep your Fluke meter
up and running

Performance and accuracy for maximum industrial productivity

The new Fluke 80 Series V 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 80 Series V operates very similar to the classic 80 Series, but with more problem-solving power, safety, convenience and impact protection.

A built-in thermometer conveniently allows you to take temperature readings without having to carry a separate instrument.

Electrical safety

All inputs are protected to EN61010-1 (2nd edition) CAT III, 1000 V and CAT IV 600V. They can withstand impulses in excess of 8,000 V and reduce risks related to surges and spikes.

The new Fluke 87V has a unique function for accurate voltage and frequency measurements on adjustable speed motor drives and other electrically noisy equipment.

Features

	83V	87V
True-RMS voltage and current for accurate measurements on non linear signals		●
Bandwidth (voltage/current)	5 kHz	20 kHz
Digital display counts (default/selectable)	6000	20000 / 6000
Selectable filter for accurate voltage and frequency measurements on motor drives		●
Large display with analog bargraph and 2 level bright white backlight	●	●
Auto and manual ranging for maximum flexibility	●	●
Built-in thermometer lets you carry one less tool		●
Peak capture to record transients as fast as 250 μs		●
Relative mode to remove test lead resistance from low ohms measurements	●	●
Min-Max-Average recording with Min/Max Alert to capture variations automatically	●	●
Touch Hold* to capture stable readings avoiding noisy signals	●	●
Audible continuity, diode test and duty cycle	●	●
Input Alert	●	●
*"Classic" design with new removable holster with built in test lead and probe storage	●	●
Improved selectable sleep mode for long battery life		●
Easy battery and fuse exchange without opening the complete case	●	●

LISTED



Accessories and Ordering Information

Included Accessories

TL75 test leads, AC72 alligator clips, holster, 80BK temperature probe (87V only), 9 V battery (installed), CD-ROM (user's manual and technical notes) and operator's guide.

Ordering Information

Fluke 83V Multimeter
Fluke 87V True RMS Multimeter
Fluke 87V/E Industrial Electrician Combo Kit

Specifications (Check the Fluke Web for detailed specifications)

Functions	Maximum Range	83V		87V*	
		Max. resolution	Accuracy	Max. resolution	Accuracy
Voltage DC	1000 V	0.1 mV	±(0.1+1%)	10 μV	±(0.05%+1)
Voltage AC	1000 V	0.1 mV	±(0.5%+2)	10 μV	±(0.7%+2)
Current DC	10 A **	0.1 μA	±(0.4%+2)	0.01 μA	±(0.2%+2)
Current AC	10 A **	0.1 μA	±(1.2%+2)	0.01 μA	±(1.0%+2)
Resistance	50 MΩ	0.1 Ω	±(0.4%+1)	0.01 Ω	±(0.2%+1)
Conductance	60 nS	0.01 nS	±(1.0%+10)	0.001 nS	±(1.0%+10)
Capacitance	9999 μF	0.01 nF	±(1.0%+2)	0.01 nF	±(1.0%+2)
Frequency	> 200 kHz	0.01 Hz	±(0.005%+1)	0.01 Hz	±(0.005%+1)
Temperature	-200 to 1090 °C	-	-	0.1 °C	1.0%
80BK temperature probe	- 40 to 260 °C	-	-	-	2.2 °C or 2%

Accuracies are best accuracies for each function.

* 87V accuracy is stated for 6,000 counts and resolution for 20,000 counts

** 20 A up to 30 seconds

Battery Life : Over 400 hours typical (alkaline).

Size (without holster) (HxWxD): 186 mm x 86 mm x 32 mm

Weight : 0.36 kg

Lifetime Warranty

Fluke 87V: The ideal multimeter for measuring adjustable speed drives



The Fluke 87V DMM overcomes measurement problems caused by the adjustable speed motor drives. These drives adjust the speed of alternating current motors using pulse width modulation that generates a very 'noisy' or 'chopped' signal.

Ordinary DMMs may indicate voltage higher than the voltage actually supplied to the motor. Measurements may not agree with drive controls, and frequency measurements may be erratic. Bottom line: the technician can't tell whether a problem lies with the controls, drive or motor.

With the press of a button, the Fluke 87V DMM solves these problems. The 87V blocks unwanted high frequencies generated by inverters and provides accurate and stable measurements of motor drives: AC voltage, frequency (to calculate motor rpm) and AC current (using the current clamp accessory).

Fluke 87V/E Industrial Electrician Combo Kit

This new combo kit is based on the Fluke 87V and includes special accessories to make industrial troubleshooting even more productive. Save over 60% compared with the individual purchase price of all the accessories.

- Fluke 87V True RMS Multimeter
- TL224 SureGrip™ Silicone Test Lead Set
- TP238 SureGrip™ Slim Reach Test Probe Set (insulated tips with 4 mm of exposed metal)
- AC220 SureGrip™ Alligator Clip Set
- Magnetic Hanger
- 80BK Temperature Probe
- C800 Hard Case



Recommended accessories with the new Fluke 80 Series V

80i400 AC Current Clamp (400 A)



TPAK ToolPak, Meter Hanging Kit



C90 Soft Case



C800 Hard Case



L210 Probe light and probe extender



Fluke. *Keeping your world up and running.*

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Fluke 83V and 87V True-rms 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
$\sqrt{\text{V}}$ ^{2,4}	600.0 mV	0.1 mV	$\pm (0.7 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)$	$\pm (2.0 \% + 20)$
	6.000 V	0.001 V	$\pm (0.7 \% + 2)$					
	60.00 V	0.01 V		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
$\sqrt{\text{V}}$ 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{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{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	$\pm (0.7 \% + 1)$	$\pm (0.6 \% + 1)$
	50.00 M Ω	0.01 M Ω	$\pm (1.0 \% + 3)^2$	$\pm (1.0 \% + 3)^2$
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 A~ (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 A $\overline{\overline{}}$	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
μ A~ (45 Hz to 2 kHz)	600.0 μ A	0.1 μ A	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 μ V/ μ A
	6000 μ A	1 μ A	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 μ V/ μ A
μ A $\overline{\overline{}}$	600.0 μ A	0.1 μ A	$\pm (0.4 \% + 4)$	$\pm (0.2 \% + 4)$	100 μ V/ μ A
	6000 μ A	1 μ A	$\pm (0.4 \% + 2)$	$\pm (0.2 \% + 2)$	100 μ V/ μ 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
— —	10.00 nF	0.01 nF	$\pm (1 \% + 2)^1$
	100.0 nF	0.1 nF	$\pm (1 \% + 2)^1$
	1.000 μ F	0.001 μ F	$\pm (1 \% + 2)$
	10.00 μ F	0.01 μ F	$\pm (1 \% + 2)$
	100.0 μ F	0.1 μ F	$\pm (1 \% + 2)$
	9999 μ F	1 μ F	$\pm (1 \% + 2)$
— +	3.000 V	0.001 V	$\pm (2 \% + 1)$

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



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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					
\bar{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					
\bar{V}	1000 V rms	10 MΩ < 100 pF (ac-coupled)	> 60 dB, dc to 60 Hz		Typical Short Circuit Current					
					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	1 µA	1 µA	0.5 µA
\rightarrow	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 70 % (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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