

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	$\pm (0.7 \% + 2)$					
	60.00 V	0.01 V		1000 V	1 V			
	600.0 V	0.1 V	Using low pass filter					$\pm (0.7 \% + 2)$

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
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 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.

80 Series V

Digital Multimeter

Safety Information



Limited Lifetime Warranty.
See the Users Manual for the full warranty.


A **Warning** identifies conditions and procedures that are dangerous to the user.

Warning

To prevent possible electrical shock, fire, or personal injury:

- Use this Meter only as specified in the manual or the protection provided by the Meter might be impaired.
- Do not use the Meter if it is damaged. Before you use the Meter, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Make sure the battery door is closed and latched before operating the Meter.
- Replace the battery as soon as the battery indicator (+) appears.
- Remove test leads from the Meter before opening the battery door.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the Meter.


















- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.
- Never operate the Meter with the cover removed or the case open.
- Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.
- Use only the replacement fuses specified by the manual.
- Use the proper terminals, function, and range for measurements.
- Avoid working alone.
- When measuring current, turn off circuit power before connecting the Meter in the circuit. Remember to place the Meter in series with the circuit.
- When making electrical connections, connect the common test lead before connecting the live test lead; when disconnecting, disconnect the live test lead before disconnecting the common test lead.
- Do not use the Meter if it operates abnormally. Protection may be impaired. When in doubt, have the Meter serviced.
- Do not operate the Meter around explosive gas, vapor, or dust.
- Use only a single 9 V battery, properly installed in the Meter case, to power the Meter.
- When servicing the Meter, use only specified replacement parts.
- When using probes, keep fingers behind the finger guards on the probes.
- Do not use the Low Pass Filter option to verify the presence of hazardous voltages. Voltages greater than what is indicated may be present. First, make a voltage measurement without the filter to detect the possible presence of hazardous voltage. Then select the filter function.
- Never attempt an in-circuit current measurement where the open-circuit potential to earth is greater than 1000 V. You may damage the Meter or be injured if the fuse blows during such a measurement.

- Do not use AutoHOLD mode to determine that circuits are without power. The AutoHOLD mode will not capture unstable or noisy readings.
- Repairs or servicing not covered in this manual should be performed only by qualified personnel as described in the 80 Series V Service Information.
- Remove the test leads and any input signals before replacing the battery or fuses. Install ONLY specified replacement fuses.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator () appears. If the display shows **batt** the Meter will not function until the battery is replaced.
- Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.
- Do not use the TL175 or TP175 test probes in CAT III or CAT IV environments without the probe tip fully extended and correct category rating visible in the window.
- When the TL175 is used with instruments or other accessories, the lowest category rating of the combination applies. One exception is when the probe is used with the AC172 or AC175.

For the Model 88 V only:

- Make sure that the engine is off before connecting or removing the pickup. The ignition system can create a potential shock hazard.
- To prevent possible electric shock or damage to the Meter, turn off engine before making measurements.
- When isolating a circuit to cause a current drain, do not attempt this test on a lead-acid battery that has recently been recharged.

Symbols

Symbol	Description
	WARNING. RISK OF DANGER.
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	Conforms to European Union directives
	Certified by CSA Group to North American safety standards.
	Conforms to relevant South Korean EMC Standards.
	Battery. Low battery when displayed.
	Conforms to relevant Australian Safety and EMC standards.
	Fuse
CAT II	Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.
CAT III	Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.
CAT IV	Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.
	Double insulated
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste.
	AC (Alternating Current)
	DC (Direct Current)
	Continuity test or continuity beeper tone.
	Earth
	Capacitance
	Diode

Safety Specifications

Maximum voltage between any Terminal and Earth Ground	1000 V
Frequency Overload Protection	$\leq 10^6$ V-Hz
Fuse Protection for mA or μA inputs	0.44 A, 1000 V, IR 10 kA
Fuse Protection for A input	11 A, 1000 V, IR 17 kA
Battery Type	9V, IEC 6LR61
Temperature	
Operating	-20 °C to 55 °C
Storage.....	-40 °C to 60 °C
Operating Relative Humidity	0 % to 90 % (0 °C to 35 °C), 0 % to 75 % (35 °C to 40 °C), 0 % to 45 % (40 °C to 50 °C)
Altitude	
Operating	$\leq 2,000$ m
Storage.....	$\leq 12,000$ m
Safety	IEC 61010-1: Pollution Degree 2 IEC 61010-2-033: Measurement CAT III 1000 V / CATIV 600 V

Electromagnetic Compatibility

International: IEC 61326-1: Portable Electromagnetic

Environment: IEC 61326-2-1 CISPR 11: Group 1, Class A

Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.

Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.

Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.

The equipment may not meet the immunity requirements of this standard when test leads and/or test probes are connected.

Korea (KCC): Class A Equipment (Industrial Broadcasting & Communication Equipment)

Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

USA (FCC): 47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

In an RF field of 3 V/m total accuracy = specified accuracy + 20 counts.

Except: 600 UA dc range total accuracy = specified accuracy + 60 counts. Temperature not specified.