FLUKE®

Rev. A-8/00

Fluke 187/189 True-rms Digital Multimeter
Extended Specifications

Nominal Specifications

Function	Ranges/Description
DC Voltage	0 to 1000V
DC Current	0 to 10A (20A for 30 seconds)
AC Voltage, True-rms	2.5 mV to 1000V – 100 kHz bandwidth
AC Current, True-rms	25 µA to 10A (20A for 30 seconds)
Resistance	0 to 500 Mohms
Conductance	0 to 500 Nanosiemens
Capacitance	0.001 nF to 50 mF
Diode Test	3.1V
Temperature	–200°C to 1350°C (–328°F to 2462°F)
Frequency	0.5 Hz to 1000 kHz
Accuracy (Basic DC V)	0.025%
(Basic AC V)	0.4%

Features

Feature	Description
Dual Displays	50,000 count primary display 5,000 count secondary display
Backlight with 2 brightness selections	Bright white backlight for clear readings in poorly lighted areas
Fast Autorange	Meter automatically selects best range – instantly
AC+DC True RMS, ac rms specified to 100 kHz	Choices for AC only, AC and DC dual display, or AC+DC readings
dBm, dBV	User selectable impedance references for dBm
AutoHOLD	Holds readings on display
Continuity/Open Test	Beeper sounds for Ohms readings below threshold or for momentary open circuit indication
Fast Bar Graph	51 Segments for peaking and nulling
Duty Cycle/Pulse Width	Measure time a signal is on or off in % or milliseconds
MIN MAX/Fast MIN MAX with elapsed and Real Time Stamp	Record Maximum, Minimum, and Average values. Real Time for MAX or MIN, elapsed time for AVG. Fast MIN MAX captures peaks to 250 µsec.
Closed Case Calibration	No internal adjustments needed
Battery/Fuse Access Door	Battery or fuse replacement without voiding calibration
Hi-Impact Overmold Case	Integrated Protective Holster provides superior impact protection for your meter

[1] For the 5,000 count mode, divide the number of least significant digits (counts) by 10.
[2] A residual reading of 8 to 180 digits with leads shorted, will not affect stated accuracy above 5% of range.
[3] 20 counts in dual display DC or AC + DC
[4] 10A continuous up to 35°C, less than 10 minutes 35° to 55°. 20A overload for 30 seconds maximum
[5] See AC conversion notes for AC mV and V.

Above specifications are subject to change without notice.

Detailed Specifications

Accuracy is specified for a period of one year after calibration, at 18°C to 28°C (64°F to 82°F) with relative humidity to 90%. Accuracy specifications are given as ±([% of reading] + [number of least significant digits])

Function	Range	Resolution	Accuracy				
			45 Hz-1 kHz	20 Hz-45 Hz	1 kHz-10 kHz	10 kHz-20 kHz	20 kHz-100 kHz
AC mV [1,2]	50,000mV	0.001mV	0.4% + 40	2% + 80	5% + 40	5.5% + 40	15% + 40
	500.00 mV	0.01 mV	0.4% + 40	2% + 80	5% + 40	5.5% + 40	8% + 40
	3000.0 mV	0.1 mV	0.4% + 40	2% + 80	0.4% + 40	1.5% + 40	8% + 40
AC V [1,2]	5.0000V	0.0001V	0.4% + 40	2% + 80	0.4% + 40	1.5% + 40	8% + 40
	50.000V	0.001V	0.4% + 40	2% + 80	0.4% + 40	1.5% + 40	8% + 40
	500.00V	0.01V	0.4% + 40	2% + 80	0.4% + 40	Not specified	Not specified
	1000.0V	0.1V	0.4% + 40	2% + 80	0.4% + 40	Not specified	Not specified
dBV	–56 to –6	0.01 dB	0.1 dB	0.2 dB	0.5 dB	0.5 dB	1.4 dB
	–6 to +34	0.01 dB	0.1 dB	0.2 dB	0.1 dB	0.2 dB	0.8 dB
	+34 to +60	0.01 dB	0.1 dB	0.2 dB	0.1 dB	Not specified	Not specified

Function	Range	Resolution	Accuracy			
			45 Hz-1 kHz	20 Hz-45 Hz	1 kHz-20 kHz	20 kHz-100 kHz
AC µA	500.00 µA	0.01 µA	0.75% + 20	1% + 20	0.75% + 20	6% + 40
	5000.0 µA	0.1 µA	0.75% + 5	1% + 5	0.75% + 10	2% + 40
AC mA	50.000 mA	0.001 mA	0.75% + 20	1% + 20	0.75% + 20	9% + 40
	400.00 mA	0.01 mA	0.75% + 5	1% + 5	1.5% + 10	4% + 40
AC A	5.0000A	0.0001A	1.5% + 20	1.5% + 20	6% + 40	Not specified
	10.000A[4]	0.001A	1.5% + 5	1.5% + 5	5% + 10	Not specified

Function	Range	Resolution	Accuracy	Accuracy Dual Display AC or AC+DC[5]		
			DC	20 Hz-45 Hz	45 Hz-1 kHz	1kHz-20 kHz
DC mV	50.000 mV	0.001mV	0.1% +20	2% + 80	0.5% + 40	6% + 40
	500.00 mV	0.01 mV	0.03% + 2	2% + 80	0.5% + 40	
	3000.0 mV	0.1 mV	0.025% + 5	2% + 80	0.5% + 40	2% + 40
DC V	5.0000V	0.0001V	0.025% + 10[3]	2% + 80	0.5% + 40	
	50.000V	0.001V	0.03% + 3[3]	2% + 80	0.5% + 40	
	500.00V	0.01V	0.1% + 2[3]	2% + 80	0.5% + 40	Not specified
	1000.0V	0.1V	0.1% + 2[3]	2% + 80	0.5% + 40	Not specified
DC µA	500.00 µA	0.01 µA	0.25% + 20	1% + 20	1% + 20	2% + 40
	5.000 µA	0.1 µA	0.25% + 2	1% + 10	0.75% + 10	2% + 40
DC mA	50.000 mA	0.001 mA	0.15% + 10	1% + 20	0.75% + 20	2% + 40
	400.00 mA	0.01 mA	0.15% + 2	1% + 10	1% + 10	3% + 40
DC A	5.0000A	0.0001A	0.5% + 10	2% + 20	2% + 20	6% + 40
	10.000A[4]	0.001A	0.5% + 2	1.5% + 10	1.5% + 10	5% + 40

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Detailed Specifications (continued)

Accuracy is specified for a period of one year after calibration, at 18°C to 28°C (64°F to 82°F) with relative humidity to 90%.
Accuracy specifications are given as ±([% of reading] + [number of least significant digits])

Function	Range	Resolution	Accuracy
Resistance[1]	500.00Ω	0.01Ω	0.05% + 10[6]
	5.0000 kΩ	0.0001 kΩ	0.05% + 2
	50.000 kΩ	0.001 kΩ	0.05% + 2
	500.00 kΩ	0.01 kΩ	0.05% + 2
	5.0000 MΩ	0.0001 MΩ	0.15% + 4[2]
	30.000 MΩ	0.001 MΩ	1% + 4[2]
	100.0 MΩ	0.1 MΩ	3% + 2[11]
	500.0 MΩ	0.1 MΩ	10% + 2[11]
Conductance	50.00 nS	0.01 nS	1% + 10
Capacitance[3]	1.000 nF	0.001 nF	2% + 5
	10.00 nF	0.01 nF	1% + 5
	100.0 nF	0.1 nF	
	1.000 µF	0.001 µF	
	10.00 µF	0.01 µF	
	100.0 µF	0.1 µF	
	1.000 µF	1 µF	
	10.0 mF	0.01 mF	
	50.00 mF	0.01 mF[5]	3% + 10
Diode Test[1]	3.1000V	0.0001V	2% + 20
Frequency	500.00 Hz	0.01 Hz[4]	± (0.005% + 1)
	5.0000 kHz	0.0001 kHz	
	50.000 kHz	0.001 kHz	
	999.99 kHz	0.01 kHz	
Duty Cycle	10.00 to 90.00%	0.1%	±(Voltage Range/ Input Voltage) x 300 counts)[9,10]
Pulse Width[5]	499.99 ms	0.01 ms	±(3% x(Voltage range/ input voltage)+ 1 count)[9,10]
	999.9 ms	0.1 ms	
Temperature	-200 to +1350°C	0.1°C	±(1% of reading + 1°C)[7,12]
	-328 to +2462°F	0.1°F	±(1% of reading + 1.8°F)[7,12]
Min-Max-Avg	Response: 100 ms to 80%		Specifed accuracy ±12 counts for changes >200 ms in duration. (±40 digits in AC for changes >350 ms and inputs >25% of range)
Fast Min-Max	250 µs[8]		Specified accuracy ±100 counts for changes >250 µs in duration[8]

[1] For the 5,000 count mode, divide the number of least significant digits (counts) by 10.
[2] For relative humidity greater than 70%, resistance accuracy is 0.5% over 1 MΩ and 2.5% over 10 MΩ.
[3] For film capacitor or better, using Relative mode (**REL** Δ) to zero residual on 1.1 nF range.
[4] Reading will be 0.00 for signals below 0.5 Hz.
[5] Least significant digit not active above 10 mF.
[6] Using relative mode (**REL** Δ) to zero residual reading.
[7] For ambient temperature changes of ± 5°C, rated accuracy applies after 1 hour.
[8] For repetitive peaks, 2.5 ms for single events.
[9] Frequency greater than 5 Hz, except for VDC, 500 mV dc and 3000 mV dc functions; 0.5 Hz to 1.0 + 0.
[10] Range/input ratios also apply to current functions.
[11] To ensure stated accuracy, switch to conductance mode and verify that the open circuit reading is less than 0.10 nS.
[12] Accuracy specification is relative to the user – adjustable temperature offset, and assumes ambient temperature stable to ± 1°C
Above specifications are subject to change without notice.

Memory and PC Communication Functions (Fluke 189 Only)

The Fluke 189 adds the following capabilities:

Interval LOGGING — At least 288 intervals (specified by user in Setup) may be recorded to internal memory. These values may be viewed using the VIEW MEM function on the meter. Up to 700 unstable event values (similar to AutoHold) are automatically added to LOGGING memory for viewing only through the optional FlukeView® Forms PC software. Additional intervals will be logged if the signal is stable.

Reading SAVE — Up to 100 readings may be saved by the user in a memory separate from LOGGING memory. These readings may be viewed using VIEW MEM.

Frequency Counter Sensitivity

Input Range	Approximate VAC Sensitivity (RMS Sine Wave)[1]				
	15 Hz to 100 kHz[2]	500 Hz[2]	VAC Bandwidth[3]	Approximate VCD Trigger Levels[1]	VDC Bandwidth[3]
50 mV	5 mV	10 mV	1 MHz	-5 mV & 5 mV	1 MHz
500 mV	20 mV	20 mV	1 MHz	5 mV & 65 mV	1 MHz
3000 mV	500 mV	2000 mV	800 kHz	140 mV & 200 mV	90 kHz
5V	0.5V	2.0V	950 kHz	1.4 V & 2.0 V	14 kHz
50V	5V	5.0V	1 MHz	0.5 V & 6.5 V	> 400 kHz
500V	20V	20V	1 MHz	5 V & 65 V	> 400 kHz
1000V	100V	100V	> 400 kHz	5 V & 65 V	> 400 kHz

[1] Maximum imput = 10 x Range (1000 V max). Noise at low frequencies and amplitudes may affect accuracy.
[2] Usable at reduced sensitivity to 0.5 Hz and 1000 kHz.
[3] Typical frequency bandwidth with full scale (or maximum 2 x 10^7 V-Hz product) RMS sine wave.

Burden Voltage (A, mA, µA)

Function	Range	Burden Voltage (typical)
mA- µA	500.00 µA	102 µV / µA
	5,000 µA	102 µV / µA
	50.000 mA	1.8 mV / mA
	400.00 mA	1.8 mV / mA
A	5.0000 A	0.04 V / A
	10.000 A	0.04 V / A

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Input Impedance

Function	Input Impedance (Nominal)					
Volts, mV	10 MΩ, < 100 pF					
	Common Mode Rejection Ratio			Normal Mode Rejection		
DC Volts, mV	>100 dB at dc, 50 Hz or 60 Hz ±0.1%			>90 dB at 50 Hz or 60 Hz ±0.1%		
AC Volts, mV	> 90 dB dc to 60 Hz					
	Open Circuit Test Voltage			Full-Scale Voltage		
				To 5 MΩ	30 to 500 MΩ + nS	
Ohms	< 5V			500 mV	3.1V	
Diode Test	< 5V			3.1000V		
	Typical Short-Circuit Current					
	500Ω	5 kΩ	50 kΩ	500 kΩ	5 MΩ	30 MΩ
Ohms	1 µA	100 µA	10 µA	1 µA	0.1 µA	0.1 µA
Diode Test	1.0 mA typical					

Safety Information

Function	Description
Safety	1000 V, AC/DC, maximum voltage between any terminal and earth ground. Complies with ANSI/ISA-S82.01-94, CSA C22.2 No 1010.1-92 to 1000 V Overvoltage Category III and to 600V Overvoltage Category IV. Certification agencies (approvals/listings pending): UL per standard UL 3111 (pending) CSA per standard CSA/CAN C22.2 No. 1010.1-92 TÜV per standard EN 61010 Part 1-1993 (pending)
Surge Protection	8 kV peak per IEC 1010.1-92
Fuse Protection	440 mA, 1000 V FAST Fuse, 11A, 1000V FAST Fuse
Markings	UL, CSA, TUV, CE (VDE pending)

General Specifications

Function	Description
Display	Digital: 50000/5000 counts primary, 5000 counts secondary, updates 4/second. Analog: 51 segments, updates 40/second.
Operating Temperature	-20°C to +55°C
Storage Temperature	-40°C to +60°C
Temperature Coefficient	0.05 x (specified accuracy)/°C (<18°C or >28°C)
Relative Humidity	0% to 90% (0°C to 55°C) 0% to 70% (35°C to 55°C)
Altitude	Operating: 2000 meters Storage: 10000 meters
Battery Type	4 AA Alkaline, NEDA 15A or LR6
Battery Life	72 Hours typical (with backlight off)
Shock Vibration	Per MIL-T-PRF 28800 for Class II instruments
EMC	Susceptibility and Emissions: Commercial Limits per EN61326-1
Size	10.0 cm X 20.3 cm X 5.0 cm (3.94" X 8.00" X 1.97") (Not Including Accessory Mount)
Weight	545 grams (1.2 lbs.)
Case Sealing	IP-42 per IEC 529, Section 3
Warranty	Lifetime
Calibration Interval	1 year

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