



Fluke 170 Series True-rms Digital Multimeter Extended Specifications

Model Differences (all other specifications are the same for each model)

Feature	Model		
	175	177	179
Backlight		•	•
Temperature Measurement			•
Basic dc voltage accuracy	0.15%	0.09%	0.09%


Nominal Specifications

Function	Absolute Range or Description	
AC Voltage, True-rms	0.1 mV to 1000V (1 kHz)	
DC Voltage	0.1 mV to 1000V	
Continuity	Beeper guaranteed on < 25 Ω, guaranteed off > 250 Ω; detects opens or shorts of 250 μs or longer.	
Resistance	0.1Ω to 50.00 MΩ	
Diode Test	2.400V	
Capacitance	1 nF to 9999 uF	
AC Current, True-rms	0.01 mA to 10.00A (20.00 A over-range for 30 seconds)	
DC Current	0.01 mA to 10.00A (20.00 A over-range for 30 seconds)	
Frequency	2 Hz to 50 kHz	
Temperature (179 Only)	-40 °C to +400 °C; -40 °F to +752 °F	
Basic dc voltage accuracy	0.15% (175)	0.09% (177 & 179)
Basic ac voltage accuracy	1.0%	

Features

Feature	Description
Digital Display	6000 counts, updates 4 x second
Analog Bargraph Display	33 segments, updates 40 x second
Backlight (177 & 179 only)	Automatically turns off after 2 minutes to save battery life The timeout feature can be disabled with a power-up option
HOLD & Auto HOLD	HOLD: freezes the display at the push of a button Auto HOLD: Display holds present reading until it detects new stable input, then the meter beeps and displays new reading
MIN MAX AVG	Minimum, maximum, and average reading memory
Manual or auto ranging	In auto range, the meter selects the range with the best resolution for the present measurement value
Fast continuity/open detection	The beeper sounds with a stretched pulse for opens or shorts as brief as 250 μs
Test lead alert	The message "LEAd" appears briefly on the display when the rotary switch is moved to or from any A (Amps) position
Power-up options	(1) Turn on all LCD segments, (2) Disable beeper, (3) Disable sleep mode, (4) Enable smoothing, (5) Disable backlight timeout (Models 177 & 179 only)
Closed-case calibration	No internal adjustments needed
Probe holders	The instrument comes with built-in probe holders for probe storage and for convenience when making measurements
Battery access door	Battery replacement without voiding calibration
High-impact overmold case	Integrated overmolded protection provides superior impact protection for your meter

General Specifications

Accuracy is specified for 1 year after calibration, at operating temperatures of 18 °C to 28 °C, with relative humidity of 0 % to 75 %. Accuracy specifications take the form of: $\pm ([\% \text{ of Reading }] + [\text{ Counts }])$	
Maximum voltage between any terminal and earth ground	1000V DC or AC RMS
Surge Protection	8 kV peak per IEC 61010
Fuse for mA inputs	440 mA, 1000 V FAST Fuse
Fuse for A input	11A, 1000V FAST Fuse
Display	Digital: 6,000 counts, updates 4/sec Bar Graph: 33 segments, updates 40/sec Frequency: 9,999 counts Capacitance: 9,999 counts
Altitude	Operating: 2000 m; Storage: 12000 m
Temperature	Operating: -10 °C to +50 °C Storage: -30 °C to +60 °C
Temperature coefficient	0.1 X (specified accuracy / °C) (< 18 °C or > 28 °C)
Electromagnetic Compatibility (EN 61326-1:1997)	In an RF field of 3 V/M, accuracy = specified accuracy except in temperature: specified accuracy ± 5 °C, ± 9 °F
Relative Humidity	0 % to 90 % @ 0 °C to 35 °C; 0 % to 70 % @ 36 °C to 50 °C
Relative Humidity in 50 MΩ Range	0 % to 80 % @ 0°C to 35°C; 0 % to 70 % @ 36 °C to 50 °C
Battery Life	Alkaline: ~200 hrs typical
Size, with Holster (H x W x L)	4.3 cm x 9 cm x 18.5 cm
Weight	420g
Safety Compliances	ANSI/ISA S82.02.01, CSA C22.2-1010.1, IEC 61010 to 1000 V Overvoltage Category III, 600 V Overvoltage Category IV
Certifications	CSA, TÜV (EN61010), Australian  (N10140)

Detailed Specifications

Function	Range ¹	Resolution	Accuracy ± ([% of Reading] + [Counts])		
			Model 175	Model 177	Model 179
AC Volts ²	600.0 mV	0.1 mV	1.0 % + 3 (45 Hz to 500 Hz)	1.0 % + 3 (45 Hz to 500 Hz)	1.0 % + 3 (45 Hz to 500 Hz)
	6.000V 60.00V 600.0V 1000V	0.001V 0.01V 0.1V 1V	2.0 % + 3 (500 Hz to 1 kHz)	2.0 % + 3 (500 Hz to 1 kHz)	2.0 % + 3 (500 Hz to 1 kHz)
DC mV	600.0 mV	0.1 mV	0.15 % + 2	0.09 % + 2	0.09 % + 2
DC Volts	6.000V 60.00V 600.0V	0.001V 0.01V 0.01V	0.15 % + 2	0.09 % + 2	0.09 % + 2
	1000V	1V	0.15 % + 2	0.1 % + 2	0.1 % + 2
Continuity	600Ω	1Ω	Meter beeps at < 25 Ω, beeper turns off at > 250 Ω; detects opens or shorts of 250 ms or longer.		
Ohms	600.0Ω	0.1Ω	0.9 % + 2	0.9 % + 2	0.9 % + 2
	6.000 kΩ	0.001 kΩ	0.9 % + 1	0.9 % + 1	0.9 % + 1
	60.00 kΩ	0.01 kΩ	0.9 % + 1	0.9 % + 1	0.9 % + 1
	600.0 kΩ	0.1 kΩ	0.9 % + 1	0.9 % + 1	0.9 % + 1
	6.000 MΩ	0.001 MΩ	0.9 % + 1	0.9 % + 1	0.9 % + 1
	50.00 MΩ	0.01 MΩ	1.5 % + 3	1.5 % + 3	1.5 % + 3
Diode test	2.400V	0.001V	1 % + 2		
Capacitance	1000 nF	1 nF	1.2 % + 2	1.2 % + 2	1.2 % + 2
	10.00 μF	0.01 μF	1.2 % + 2	1.2 % + 2	1.2 % + 2
	100.0 μF	0.1 μF	1.2 % + 2	1.2 % + 2	1.2 % + 2
	9999 μF ³	1 μF	10 % typical	10 % typical	10 % typical
AC Amps (True-rms) (45 Hz to 1 kHz)	60.00 mA 400.0 mA (600 mA for 18 hrs) 6.000A 10.00A (20A for 30s)	0.01 mA 0.1 mA 0.001A 0.01A	1.5 % + 3	1.5 % + 3	1.5 % + 3
	DC Amps	60.00 mA 400.0 mA (600 mA for 18 hrs) 6.000A 10.00A (20A for 30s)	0.01 mA 0.1 mA 0.001A 0.01A	1.0 % + 3	1.0 % + 3
Hz (AC- or DC- coupled, V or A ^{4,5} input)	99.99 Hz 999.9 Hz 9.999 kHz 99.99 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz	0.1 % + 1	0.1 % + 1	0.1 % + 1
Temperature	-40 °C to +400 °C -40 °F to +752 °F	0.1 °C 0.1 °F	NA	NA	1 % + 1.0 °C 1 % + 1.8 °F
MIN MAX AVG	For DC functions, accuracy is the specified of the measurement function ± 12 counts for changes longer than 275 ms in duration. For AC functions, accuracy is the specified of the measurement function ± 40 counts for changes longer than 1.2 s in duration.				

1. All AC voltage and AC current ranges are specified from 5 % of range to 100 % of range.
 2. Crest factor of ≤ 3 at full scale up to 500 V, decreasing linearly to crest factor ≤ 1.5 at 1000 V.
 3. In the 9999 μF range for measurements to 1000 μF, the measurement accuracy is 1.2 % for all models.
 4. In mA and A ranges, frequency measurement is specified to 30 kHz.
 5. Frequency < 10 kHz are not specified in 600 mV AC, 60 mA AC, and 6 A AC ranges.

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Function	Overload Protection ¹	Input Impedance (Nominal)	Common Mode Rejection Ratio (1 kΩ Unbalanced)		Normal Mode Rejection
Volts AC	1000 V RMS or DC	> 10 MΩ < 100 pF	> 60 dB @ DC, 50 or 60 Hz		
Volts DC	1000 V RMS or DC	> 10 MΩ < 100 pF	> 120 dB @ DC, 50 or 60 Hz		> 60 dB @ 50 Hz or 60 Hz
		Open Circuit Test Voltage	Full Scale Voltage To: 6.0 MΩ 50 MΩ		Short Circuit Current
Ohms	1000V RMS or DC	< 1.5 V DC	< 600 mV DC	< 1.5 V DC	< 500 μA
Diode test	1000V RMS or DC	2.4 to 3.0 V DC	2.4 V DC		< 1.2 mA typical

1. 10⁷ V-Hz maximum.

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 Printed in U.S.A. 3/2001

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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
dBV	1000.0V	0.1V	0.4% + 40	2% + 80	0.4% + 40	Not specified	Not specified
	-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	
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	
DC V	5.0000V	0.0001V	0.025% + 10 ³	2% + 80	0.5% + 40	2% + 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	
DC µA	1000.0V	0.1V	0.1% + 2 ³	2% + 80	0.5% + 40	Not specified
	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

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 ⁵
	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	3% + 10	
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%		Specified 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 input = 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 10⁷ 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

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, TÜV, 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

Above specifications are subject to change without notice.

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	$\pm (0.7 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (1.0 \% + 4)$	$\pm (2.0 \% + 4)$	$\pm (2.0 \% + 20)$
	6.000 V	0.001 V	$\pm (0.7 \% + 2)$				$\pm (2.0 \% + 4)^3$	unspecified
	60.00 V	0.01 V					unspecified	unspecified
	600.0 V	0.1 V	unspecified	unspecified				
	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{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	$\pm (0.7 \% + 1)$	$\pm (0.6 \% + 1)$
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}	
\overline{mA} $A \sim$ (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
\overline{mA} $A \overline{=}$	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
$\mu A \sim$ (45 Hz to 2 kHz)	600.0 μA	0.1 μA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 $\mu V/\mu A$
	6000 μA	1 μA	$\pm (1.2 \% + 2)^5$	$\pm (1.0 \% + 2)$	100 $\mu V/\mu A$
$\mu A \overline{=}$	600.0 μA	0.1 μA	$\pm (0.4 \% + 4)$	$\pm (0.2 \% + 4)$	100 $\mu V/\mu A$
	6000 μA	1 μA	$\pm (0.4 \% + 2)$	$\pm (0.2 \% + 2)$	100 $\mu V/\mu A$

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{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	$\pm (1 \% + 2)$
\overline{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					
$\overline{\text{V}}$	1000 V rms	10 MΩ < 100 pF	> 120 dB at dc, 50 Hz or 60 Hz		> 60 dB at 50 Hz or 60 Hz					
$\overline{\text{mV}}$	1000 V rms	10 MΩ < 100 pF	> 120 dB at dc, 50 Hz or 60 Hz		> 60 dB at 50 Hz or 60 Hz					
$\tilde{\text{V}}$	1000 V rms	10 MΩ < 100 pF (ac-coupled)	> 60 dB, dc to 60 Hz		Full Scale Voltage			Typical Short Circuit Current		
					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.

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Printed in U.S.A. 4/2005 2161164 D-US-N Rev B

Accuracy Specifications

Function	Range	Resolution	Accuracy ± ([% of Reading] + [Counts])		Model ^[1]
DC millivolts	600.0 mV	0.1 mV	0.5 % + 2		114, 115, 116, 117
DC Volts	6.000 V	0.001 V	0.5 % + 2		114, 115, 116, 117
	60.00 V	0.01 V			
	600.0 V	0.1 V			
			DC, 45 to 500 Hz	500 Hz to 1 kHz	
Auto-V LoZ ^[2] True-rms	600.0 V	0.1 V	2.0 % + 3	4.0 % + 3	114, 116, 117
			45 to 500 Hz	500 Hz to 1 kHz	
AC millivolts ^[2] True-rms	600.0 mV	0.1 mV	1.0 % + 3	2.0 % + 3	114, 115, 116, 117
AC Volts ^[2] True-rms	6.000 V	0.001 V	1.0 % + 3	2.0 % + 3	114, 115, 116, 117
	60.00 V	0.01 V			
	600.0 V	0.1 V			
Continuity	600 Ω	1 Ω	Beeper on <20 Ω, off >250 Ω; detects opens or shorts of 500 μs or longer.		114, 115, 116, 117
Ohms	600.0 Ω	0.1 Ω	0.9 % + 2		114, 115, 116, 117
	6.000 kΩ	0.001 kΩ	0.9 % + 1		
	60.00 kΩ	0.01 kΩ	0.9 % + 1		
	600.0 kΩ	0.1 kΩ	0.9 % + 1		
	6.000 MΩ	0.001 MΩ	0.9 % + 1		
	40.00 MΩ	0.01 MΩ	1.5 % + 2		
Diode test	2.000 V	0.001 V	0.9 % + 2		115, 116, 117
Capacitance	1000 nF	1 nF	1.9 % + 2		115, 116, 117
	10.00 μF	0.01 μF	1.9 % + 2		
	100.0 μF	0.1 μF	1.9 % + 2		
	9999 μF	1 μF	100 μF - 1000 μF: 1.9 % + 2 >1000 μF: 5 % + 20		
Lo-Z Capacitance (Power-up option)	1 nF to 500 μF		20% + 2 (10% +2 typical)		115, 116, 117
AC Amps True-rms ^[2] (45 Hz to 500 Hz)	6.000 A 10.00 A ^[4] 20 A overload for 30 seconds maximum, 10 minutes rest minimum.	0.001 A 0.01 A	1.5 % + 3		115, 117
DC Amps	6.000 A 10.00 A ^[4] 20 A overload for 30 seconds maximum, 10 minutes rest minimum.	0.001 A 0.01 A	1.0 % + 3		115, 117
Temperature (Type K thermocouple)	-40 °C to 400 °C	0.1 °C	1.0 % + 10 ^[5]		116
	-40 °F to 752 °F	0.2°F	1.0 % + 18 ^[5]		
AC μAmps True-rms ^[2] (45 Hz to 1 kHz)	600.0 μA	0.1 μA	1.5 % + 3 (2.5 % + 3 > 500 Hz)		116
DC μAmps	600.0 μA	0.1 μA	1.0 % + 2		116

Accuracy Specifications (cont)

Function	Range	Resolution	Accuracy ± ([% of Reading] + [Counts])	Model ^[1]
Hz (V or A input) ^[3]	99.99 Hz 999.9 Hz 9.999 kHz 50.00 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz	0.1 % + 2	115, 116, 117
Notes:				
[1] Models listed in this column also refer to the “C” version of the model. For example, those rows containing model 115 are applicable to the 115C as well.				
[2] All ac ranges except Auto-V LoZ are specified from 1 % to 100% of range. Auto-V LoZ is specified from 0.0 V. Because inputs below 1 % of range are not specified, it is normal for this and other true-rms meters to display non-zero readings when the test leads are disconnected from a circuit or are shorted together. For volts, crest factor of ≤3 at 4000 counts, decreasing linearly to 1.5 at full scale. For amps, crest factor of ≤3. AC volts is ac-coupled. Auto-V LoZ, AC mV, AC μamps, and AC amps are dc-coupled.				
[3] AC Volts Hz is ac-coupled and specified from 5 Hz to 50 kHz. AC Amps Hz is dc-coupled and specified from 45 Hz to 5 kHz.				
[4] >10 A unspecified.				
[5] Temperature uncertainty (accuracy) does not include the error of the thermocouple probe.				

Input Characteristics

Function	Input Impedance (Nominal)	Common Mode Rejection Ratio (1 kΩ Unbalanced)		Normal Mode Rejection
Volts AC	>5 MΩ <100 pF	>60 dB at dc, 50 or 60 Hz		
Volts DC	>10 MΩ <100 pF	>100 dB at dc, 50 or 60 Hz		>60 dB at 50 or 60 Hz
Auto-V LoZ	~3 kΩ <500 pF	>60 dB at dc, 50 or 60 Hz		
	Open Circuit Test Voltage	Full Scale Voltage		Short Circuit Current
Ohms	<2.7 V dc	To 6.0 MΩ	40 MΩ	<350 μA
		<0.7 V dc	<0.9 V dc	
Diode Test	<2.7 V dc	2.000 V dc		<1.2 mA

Basic Maintenance

Testing the Fuse (115 & 117 only)

To test the fuse:

1. Set the rotary switch to Ω .
2. Plug a test lead into the $\frac{V}{\Omega}$ jack and touch the probe to the 10A jack, as shown in Figure 1.

If the display shows a resistance value in the range of that shown in Figure 1, the fuse is good.

If the display reads Ω , replace the fuse and test again.

If the display shows any other value, have the Meter serviced. See “Service Information” earlier in this document.

Characteristics for DM305x

DC Characteristics

Accuracy Specifications (% of reading + % of range)^[1]

Function	Range ^[2]	Test Current or Burden Voltage	Input Impedance	1 Year 23°C±5°C	Temperature Coefficient 0 °C to 18 °C 28 °C to 55 °C
DC Voltage	400.000mV		10MΩ or >10GΩ	0.025 + 0.008	0.0015+0.0005
	4.00000V		10MΩ or >10GΩ	0.025 + 0.006	0.0010+0.0005
	40.0000V		10MΩ	0.025 + 0.006	0.0020+0.0005
	400.000V		10MΩ	0.030 + 0.006	0.0020+0.0005
	1000.00V ^[4]		10MΩ	0.030 + 0.005	0.0015+0.0005
DC Current	2.00000mA	<0.03V		0.050 + 0.070	0.0040+0.0070
	20.0000mA	<0.3V		0.050 + 0.008	0.0040+0.0007
	200.000mA	<0.3V		0.050 + 0.009	0.0040+0.0008
	1.00000A	<0.3V		0.100 + 0.070	0.0100+0.0062
	10.0000A ^[5]	<0.6V		0.200 + 0.007	0.0100+0.0007
Resistance ^[3]	400.000Ω	1mA		0.050 + 0.010	0.0030+0.0005
	4.00000kΩ	100uA		0.015 + 0.006	0.0030+0.0005
	40.0000kΩ	10uA		0.015 + 0.006	0.0030+0.0005
	400.000kΩ	2uA		0.030 + 0.007	0.0030+0.0005
	4.00000MΩ	200nA		0.060 + 0.010	0.0030+0.0005
	100.000MΩ	200nA 10MΩ		2.00 + 0.005	0.1500+0.0005
Diode Test	2.4000V ^[6]	1mA		0.05 + 0.010	0.0050+0.0005
Continuity	2000Ω	1mA		0.05 + 0.010	0.0050+0.0005

- [1] Specifications are for 60 minute warm-up, selecting 5 3/4 reading resolution and calibration temperature 18 °C – 28 °C.
- [2] 20% over range on all ranges, except DCV 1000V, ACV 750V, DCI and ACI 10A range.
- [3] Specifications are for 4-wire resistance function, or 2-wire resistance using Math Null. Without Math Null, add 0.2 Ω additional errors in 2-wire resistance function.
- [4] For each additional volt over ± 500 VDC add 0.02 mV of error.
- [5] For current terminal, > 7A DC or ACRMS for 30 seconds ON and 30 seconds OFF.
- [6] Accuracy specifications are for the voltage measured at the input terminals only. 1 mA test current is typical.
Variation in the current source will create some variation in the voltage drop across a diode junction.

Settling Considerations

Reading settling times are affected by source impedance, cable dielectric characteristics, and input signal changes. Typically, settling time <1.5s when source impedance less than 1k Ω .

AC Characteristics

Accuracy Specifications (% of reading + % of range)^[1]

Function	Range ^[2]	Frequency Range	1 Year 23°C±5°C	Temperature Coefficient 0 °C to 18 °C 28 °C to 55 °C
True RMS AC Voltage ^[3]	200.000mV	10Hz-45Hz	1.0 + 0.1	0.02+0.02
		45Hz-20kHz	0.2 + 0.1	0.02+0.02
		20kHz-50kHz	2.0 + 0.2	0.02+0.02
		50kHz-100kHz	4.0 + 0.2	0.02+0.02
	2V to 750.00V	10Hz-45Hz	1.0 + 0.1	0.02+0.02
		45Hz-20kHz	0.2 + 0.1	0.02+0.02
		20kHz-50kHz	1.0 + 0.1	0.02+0.02
		50kHz-100kHz	2.0 + 0.2	0.02+0.02
True RMS AC Current ^[4,6]	20.0000mA	10Hz-45Hz	1.5+0.1	0.02+0.02
		45Hz-2kHz	0.5+0.1	0.02+0.02
		2kHz-10kHz	2.0+0.2	0.02+0.02
	200.000mA	10Hz-45Hz	1.5+0.1	0.02+0.02
		45Hz-2kHz	0.5+0.1	0.02+0.02
		2kHz-10kHz	2.0+0.2	0.02+0.02
	1.00000A	10Hz-45Hz	1.5+0.5	0.02+0.05
		45Hz-2kHz	0.5+0.5	0.02+0.05
		2kHz-10kHz	2.0+0.5	0.02+0.05
	10.0000A ^[6]	10Hz-45Hz	1.5+0.1	0.02+0.02
		45Hz-2kHz	0.5+0.1	0.02+0.02
		2kHz-5kHz	2.0+0.2	0.02+0.02

- [1] Specifications are for 60 minute warm-up and select 5 3/4 reading resolution.
- [2] 20% over range on all ranges, except DCV 1000V, ACV 750V, DCI and ACI 10A range.
- [3] Specifications are for sine wave input >5% of range. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range additional error. For 50 kHz to 100 kHz, add 0.13% of range.
750 Vac range limited to 100 kHz or 8×10^7 Volt-Hz.
- [4] Specifications are for sine wave input >5% of range. Add 0.1% of the range for the sine wave input is 1%~5% of the range.
- [5] For current terminal, > 7A DC or ACRMS for 30 seconds ON and 30 seconds OFF.
- [6] Typically 30% of reading error at 100kHz.

Low Frequency Performance

Three filter settings are available:

Slow: 3Hz~100kHz

Mid: 20Hz~100kHz

Fast: 200Hz~100kHz

Frequencies greater than these filter settings are specified with no additional errors.

Settling Considerations

Applying >300VRMS (or >1ARMS) will cause self-heating in signal-conditioning components. These errors are included in the instrument specifications. Internal temperature changes due to self-heating may cause additional error on lower ac voltage ranges. The additional error will be less than 0.02% of reading and will generally dissipate within a few minutes.

Frequency Period Characteristics

Accuracy Specifications (% of reading)^[1]

Function	Range	Frequency Range	1 Year 23°C±5°C	Temperature Coefficient 0 °C to 18 °C 28 °C to 55 °C
Frequency Period	200mV to 750V ^[2]	3Hz-5Hz	0.10	0.005
		5Hz-10Hz	0.07	0.005
		10Hz-40Hz	0.02	0.005
		40Hz-300kHz	0.02	0.005
	20mA to 10A ^[3]	3Hz-5Hz	0.10	0.005
		5Hz-10Hz	0.07	0.005
10Hz-10kHz		0.02	0.005	

[1] Specifications are for 60 minute warm-up.

[2] For AC input voltages 10% to 120% of range except where noted. 750V range limited to 750VRMS. 100mV range specifications are for full scale or greater inputs. For inputs from 10mV to 100mV, multiply total % of reading error by 10.

[3] For the 20mA, 200mA, 10A ranges, the AC input current from 10% to 120% of range except where noted. For 1A range, the AC input current from 50% to 120% of range except where noted.

Measurement Considerations

All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs from external noise pickup is critical for minimizing measurement errors.

Settling Considerations

Errors will occur when attempting to measure the frequency or period of an input following a DC offset voltage change. The input blocking RC time constant must be allowed to fully settle (up to 1 sec) before the most accurate measurements are possible.

Capacitance Characteristics

Accuracy Specifications (% of reading + % of range)^[1]

Function	Range ^[2]	Test Current	1 Year 23°C±5°C	Temperature Coefficient 0 °C to 18 °C 28 °C to 55 °C
Capacitance	4.000nF	1uA	2 + 2.5	0.05+0.05
	40.00nF	10uA	1 + 0.5	0.05+0.01
	400.0nF	10uA	1 + 0.5	0.01+0.01
	4.000uF	1mA	1 + 0.5	0.01+0.01
	40.00uF	1mA	1 + 0.5	0.01+0.01
	200.0uF	1mA	1 + 0.5	0.01+0.01

[1] Specifications are for 60 minute warm-up using Math Null. Additional errors may occur for non-film capacitors.

[2] Specifications are for 1% to 120% of range on the 4nF range and 10% to 120% of range on all other ranges.

Measuring Characteristics

DC Voltage

Input Resistance:	
400mV, 4V ranges	Selectable 10M Ω \pm 2% or >10G Ω
40V, 400V, 1000V ranges	10M Ω \pm 2%

Resistance

Measurement Method:	Selectable 4-wire or 2-wire. Current source referenced to LO input.
Open-circuit Voltage:	Limit in <7V.
Max. Lead Resistance: (4-wire ohms)	10% of range per lead for 400 Ω , 1k Ω per lead on all other ranges.
Input Protection:	1000V on all ranges.

DC Current

Shunt Resistor:	0.025 Ω for 1A, 10A 1.025 Ω for 200mA 11.025 Ω for 2mA, 20mA
Input Protection:	Externally accessible 10A, 250V fuse Internal 12A, 250V fuse

Continuity / Diode Test

Measurement Method:	1mA \pm 0.2% test current, Limit in <8V
Response Time:	25 samples / sec
Continuity Threshold:	Adjustable from 1 Ω to 2000 Ω
Input Protection:	1000V

True RMS AC Voltage

Measurement Method:	AC coupled true-RMS-measure the ac component of input with up to 400Vdc of bias on any range
Input Impedance:	1M Ω \pm 2%, in parallel with 100pF
Input Protection:	750VRMS all ranges

True RMS AC Current

Measurement Method:	Direct coupled to the fuse and shunt. AC coupled true RMS measurement (measures the ac component only)
Max. Input:	The DC + AC current peak value <300% of the range. The RMS current including DC current <10A.

Shunt Resistor: 0.025Ω for 1A, 10A,
1.025Ω for 200mA,
11.025Ω for 20mA

Input Protection: Externally accessible 10A, 250V fuse
Internal 12A, 250V fuse

Frequency and Period

Measurement Method: Reciprocal-counting technique. AC-coupled input using the ac voltage measurement function.

Input Impedance (Voltage Signal): 1MΩ ± 2%, in parallel with <150pF

Shunt Resistor (Current Signal): 0.025Ω for 1A, 10A,
1.025Ω for 200mA,
11.025Ω for 20mA

Input Protection: 750VRMS all ranges;
Externally accessible 10A, 250V fuse
Internal 12A, 250V fuse

Capacitance

Measurement Method: Current input with measurement of resulting ramp.

Connection Type: 2-wire

Triggering and Memory

Samples per Trigger: 1 to 1000

Trigger Delay: 0 to 2000ms

Trigger Input:

- Input Level: TTL compatible (High level when left trigger input open)
- Trigger Condition: Selectable Rising, Falling, Low-level, High-level.
- Input Impedance: >20kΩ, in parallel with 400pF, AC-coupled
- Min Pulsewidth: 0.24ms

VMC Output:

- Level: TTL compatible (Input to ≥ 1kΩ load)
- Output Polarity: Selectable Positive, Negative
- Output Impedance: 200Ω, typical

Nonvolatile Memory: 512K readings

Volatile Memory: 2M readings

Inspection Function on Rear Panel (for DM3054 ONLY)

**CAUTION:**

Voltage between LO terminal and ground limit to 150Vpeak(Max).

Channels: 12 differential voltage channels, 4 differential current channels.

Measurement Functions: 2WR, Capacitance, DCV, DCI, ACV, ACI, Diodes, frequency and Period.

Work characteristic: Thermo EMF <6 μ V. Maximum scanning rate is 2 channels per second.

Input characteristic: Differential input voltage 150Vpeak(Max), isolation voltage between channels 150Vpeak(Max), current input terminal 1Apeak(Max), channel isolation >60dB(@10kHz), all terminal to the chassis ground voltage 150Vpeak(Max).

Current channel protection: Internal 2A self-recover fuse

Voltage channel protection: 250V over voltage protection.

Real-time Clock

Precision: 1min/month (Environment Temperature >0°C)

Clock battery Life: 2 years

Math Functions

Null, Min/Max/Average, dBm, dB, Limit Test (with TTL output)

Other Functions

Reading Hold, Ratio Measurement

High-speed Sampling

50kSa/s (In Datalog function)

Reading Resolution

480,000 Count, >5 3/4 digits

USB I/O Interface

USB Host (support U-disk), USB Device interface.

Other I/O Interface

RS232, GPIB (Optional) support for SCPI command, LAN (Optional)