FLUKE®

1587 FC/1587/1577

Insulation Multimeter

Users Manual

April 2005 Rev.3, 9/15

General Specifications

Maximum Voltage Applied to any Terminal and Common	1000 V
Fuse Protection for mA input	0.44 A, 1000 V, IR 10 kA
Batteries	Four AA batteries (NEDA 15A or IEC LR6)
Battery Life	Meter use 1000 hours; Insulation test use: Meter can perform at least 1000 insulation tests with fresh alkaline batteries at room temperature. These are standard tests of 1000 V into 1 MΩ with a duty cycle of 5 seconds on and 25 seconds off.
Size	5.0 cm H x 10.0 cm W x 20.3 cm L (1.97 in H x 3.94 in W x 8.00 in L)
Weight	550 g (1.2 lb)
Altitude	
Operating	2000 m
Storage	12,000 m
Over-Range Capability	110 % of range except for capacitance which is 100 %
Frequency Overload Protection	$\leq 10^7$ V Hz
Storage Temperature	-40 °C to 60 °C (-40 °F to 140 °F)
Operating Temperature	-20 °C to 55 °C (-4 °F to 131 °F)
Temperature Coefficient	0.05 x (specified accuracy) per °C for temperatures <18 °C or >28 °C (<64 °F or >82 °F)
Relative Humidity	Noncondensing
	0 % to 95 % @ 10 °C to 30 °C (50 °F to 86 °F)
	0 % to 75 % @ 30 °C to 40 °C (86 °F to 104 °F)
	0 % to 40 % @ 40 °C to 55 °C (104 °F to 131 °F)
Enclosure Protection	IEC 60529: IP40 (non-operating)
Safety	
IEC 61010-1	Pollution Degree 2
IEC 61010-2-033	CAT IV 600 V / CAT III 1000 V

Wireless Radio with Adapter

Frequency Range	2402 MHz to 2480 MHz
Output Power	<10 mW
Radio Frequency Certification	FCC: T68-FBLE, IC: 6627A-FBLE

Electromagnetic Compatibility

International	IEC 61326-1:Portable Electromagnetic Environment; IEC 61326-2-2 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.

Electrical Specifications

AC Voltage Measurement

Accuracy (all 1587 models)

Range	Resolution	50 Hz to 60 Hz ±(% of Rdg + Counts)	60 Hz to 5000 Hz ±(% of Rdg + Counts)
600.0 mV	0.1 mV	±(1 % + 3)	±(2 % + 3)
6.000 V	0.001 V	±(1 % + 3)	±(2 % + 3)
60.00 V	0.01 V	±(1 % + 3)	±(2 % + 3)
600.0 V	0.1 V	±(1 % + 3)	±(2 % + 3) [1]
1000 V	1 V	±(2 % + 3)	±(2 % + 3) [1]
[1] 1 kHz bandwidth.			

Low-Pass Filter Voltage (all 1587 models)

Range	Resolution	50 Hz to 60 Hz ±(% of Rdg + Counts)	60 Hz to 400 Hz ±(% of Rdg + Counts)
600.0 mV	0.1 mV	±(1 % + 3)	+(2 % + 3) -(6 % - 3)
6.000 V	0.001 V	±(1 % + 3)	+(2 % + 3) -(6 % - 3)
60.00 V	0.01 V	±(1 % + 3)	+(2 % + 3) -(6 % - 3)
600.0 V	0.1 V	±(1 % + 3)	+(2 % + 3) -(6 % - 3)
1000 V	1 V	±(2 % + 3)	+(2 % + 3) -(6 % - 3)

1577 Accuracy

Range	Resolution	50 Hz to 60 Hz ±(% of Rdg + Counts)
600.0 mV	0.1 mV	±(2 % + 3)
6.000 V	0.001 V	±(2 % + 3)
60.00 V	0.01 V	±(2 % + 3)
600.0 V	0.1 V	±(2 % + 3)
1000 V	1 V	±(2 % + 3)

AC Conversion ..... Inputs are ac-coupled and calibrated to the rms value of sine wave input. Conversions are true-rms responding and specified from 5 % to 100 % of range. Input signal crest factor can be up to 3 at up to 500 V, decreasing linearly to crest factor ≤1.5 at 1000 V. For non-sinusoidal waveforms add ±(2 % reading + 2 % FS) typical, for a crest factor up to 3.

Input Impedance ..... 10 MΩ (nominal), <100 pF, ac-coupled

Common Mode Rejection Ratio
(1 kΩ unbalanced) ..... >60 dB at dc, 50 or 60 Hz

DC Voltage Measurement

Range	Resolution	Accuracy 1587 and 1587T [1] ±(% of Rdg + Counts)	Accuracy 1577 [1] ±(% of Rdg + Counts)
6.000 V dc	0.001 V	±(0.09 % + 2)	±(0.2 % + 2)
60.00 V dc	0.01 V	±(0.09 % + 2)	±(0.2 % + 2)
600.0 V dc	0.1 V	±(0.09 % + 2)	±(0.2 % + 2)
1000 V dc	1 V	±(0.09 % + 2)	±(0.2 % + 2)

[1] Accuracies apply to ± 100% of range.

Input Impedance ..... 10 MΩ (nominal), <100 pF

Normal Mode Rejection Ratio ..... >60 dB @ 50 Hz or 60 Hz

Common Mode Rejection Ratio ..... >120 dB @ dc, 50 Hz or 60 Hz (1 kΩ unbalance)

DC Millivolts Measurement

Range	Resolution	Accuracy all 1587 models ±(% of Rdg + Counts)	Accuracy 1577 ±(% of Rdg + Counts)
600.0 mV dc	0.1 mV	±(0.1 % + 1)	±(0.2 % + 1)

DC and AC Current Measurement

Range		Resolution	Accuracy all 1587 models ±(% of Rdg+Counts)	Accuracy 1577 ±(% of Rdg+Counts)	Burden Voltage (Typical)
AC 45 Hz to 1000 Hz	400 mA	0.1 mA	±(1.5 % + 2) [1]	±(2 % + 2)[1]	2 mV/mA
	60 mA	0.01 mA	±(1.5 % + 2) [1]	±(2 % + 2)[1]	
DC	400 mA	0.1 mA	±(0.2 % + 2)	±(1.0 % + 2)	2 mV/mA
	60 mA	0.01 mA	±(0.2 % + 2)	±(1.0 % + 2)	

[1] 1 kHz bandwidth.

Overload ..... 600 mA for 2 minutes maximum

Fuse Protection for mA Input ..... 0.44 mA, 1000 V, IR 10 kA

AC Conversion ..... Inputs are ac-coupled and calibrated to the rms value of sine wave input. Conversions are true-rms responding and specified from 5 % to 100 % of range. Input signal crest factor can be up to 3 up to 300 mA, decreasing linearly to crest factor ≤1.5 at 600 mA. For non-sinusoidal waveforms add +(2 % reading + 2 % FS) typical, for a crest factor up to 3.

Ohms Measurement

Range	Resolution	Accuracy all 1587 models [1] +(% of Rdg+Counts)	Accuracy 1577 [1] +(% of Rdg+Counts)
600.0 Ω	0.1 Ω	±(0.9 % + 2)	±(1.2 % + 2)
6.000 kΩ	0.001 kΩ		
60.00 kΩ	0.01 kΩ		
600.0 kΩ	0.1 KΩ		
6.000 MΩ	0.001 MΩ		
50.0 MΩ [2]	0.01 MΩ	±(1.5 % + 3)	±(2.0 % + 3)

[1] Accuracies apply from 0 % to 100 % of range.
[2] Up to 80 % relative humidity.

Overload Protection ..... 1000 V rms or dc
Open Circuit Test Voltage..... <8.0 V dc
Short Circuit Current ..... <1.1 mA

Diode Test (all 1587 models)

Diode Test Indication ..... Display voltage drop: 0.6 V at 1.0 mA nominal test current:
Accuracy ..... ±(2 % + 3)

Continuity Test

Continuity Indication ..... Continuous audible tone for test resistance below 25 Ω and off above 100 Ω. Maximum Reading; 1000 Ω
Open Circuit Voltage..... <8.0 V
Short Circuit Current ..... 1.0 mA typical
Overload Protection ..... 1000 V rms
Response Time..... >1 m sec

Frequency Measurement (all 1587 models)

Range	Resolution	Accuracy ±(% of Rdg+Counts)
99.99 Hz	0.01 Hz	±(0.1 % + 1)
999.9 Hz	0.1 Hz	±(0.1 % + 1)
9.999 kHz	0.001 kHz	±(0.1 % + 1)
99.99kHz	0.01 kHz	±(0.1 % + 1)

Frequency Counter Sensitivity (all 1587 models)

Input Range	V ac Sensitivity (RMS Sine Wave)[1]		DC Trigger Levels[1] to 20 kHz[2]
	5 Hz to 20 kHz	20 kHz to 100 kHz	
600.0 mV ac	100.0 mV	150.0 mV	na
6.0 V	1.0 V	1.5 V	-400.0 mV and 2.5 V
60.0 V	10.0 V	36.0 V	1.2 V and 4.0 V
600.0 V	100.0 V	-	12.0 V and 40.0 V
1000.0 V	300.0 V	-	12.0 V and 40.0 V

[1] Maximum input for specified accuracy = 10x range (1000 V max). Noise at low frequencies and amplitudes may affect accuracy.
[2] Usable to 100 kHz with full scale input.

Capacitance (all 1587 models)

Range	Resolution	Accuracy ±(% of Rdg+Counts)
1000 nF	1 nF	±(1.2 % + 2)
10.00 µF	0.01 µF	
100.0 µF	0.1 µF	±(1.2 % ±90 counts)
9999 µF	1 µF	

Temperature Measurement (all 1587 models)

Range	Resolution	Accuracy [1] ±(% of Rdg+Counts)
-40 °C to 537 °C	0.1 °C	±(1 % + 10 counts)
-40 °F to 998 °F	0.1 °F	±(1 % + 18 counts)

[1] Accuracies apply following 90 minutes settling time after a change in the ambient temperature of the instrument.

Insulation Specifications

Measurement Range

- Model 1587, 1587 FC ..... 0.01 MΩ to 2 GΩ
- Model 1577 ..... 0.1 MΩ to 600 MΩ
- Model 1587T ..... 0.01 MΩ to 100 MΩ

Test Voltages

- Model 1587, 1587 FC ..... 50, 100, 250, 500, 1000 V
- Model 1577 ..... 500, 1000 V
- Model 1587T ..... 50, 100 V

Test Voltage Accuracy ..... +20 %, -0 %

Short-Circuit Test Current ..... 1 mA nominal

Auto Discharge ..... Discharge time <0.5 second for C = 1 μF or less

Live Circuit Detection ..... Inhibit test if terminal voltage > 30 V prior to initialization of test

Maximum Capacitive Load ..... Operable with up to 1 μF load

Model 1587/1587 FC

Output Voltage	Display Range	Resolution	Test Current	Resistance Accuracy ±(% of Rdg + Counts)
50 V (0 % to +20 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ	±(3 % + 5 counts)
	6.0 to 50.0 MΩ	0.1 MΩ		
100 V (0 % to +20 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 100 kΩ	±(3 % + 5 counts)
	6.0 to 60.0 MΩ	0.1 MΩ		
	60 to 100 MΩ	1 MΩ		
250 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 250 kΩ	±(1.5 % + 5 counts)
	60 to 250 MΩ	1 MΩ		
500 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 500 kΩ	±(1.5 % + 5 counts)
	60 to 500 MΩ	1 MΩ		
1000 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 1 MΩ	±(1.5 % + 5 counts)
	60 to 600 MΩ	1 MΩ		
	0.6 to 2.0 GΩ	100 MΩ		±(10 % + 3 counts)

Model 1577

Output Voltage	Display Range	Resolution	Test Current	Resistance Accuracy ±(% of Rdg + Counts)
500 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 500 kΩ	±(2.0 % + 5 counts)
	60 to 500 MΩ	1 MΩ		
1000 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 1 MΩ	±(2.0 % + 5 counts)
	60 to 600 MΩ	1 MΩ		

Model 1587T

Output Voltage	Display Range	Resolution	Test Current	Resistance Accuracy ±(% of Rdg + Counts)
50 V (0 % to +20 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ	±(3 % + 5 counts)
	6.0 to 50.0 MΩ	0.1 MΩ		
100 V (0 % to +20 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 100 kΩ	±(3 % + 5 counts)
	6.0 to 60.0 MΩ	0.1 MΩ		
	60 to 100 MΩ	1 MΩ		

Model 1587C FC

Output Voltage	Display Range	Resolution	Test Current	Resistance Accuracy ±(% of Rdg + Counts)
50 V (-10 % to +10 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ	±(3 % + 5 counts)
	6.0 to 50.0 MΩ	0.1 MΩ		
100 V (-10 % to +10 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 100 kΩ	±(3 % + 5 counts)
250 V (-10 % to +10 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 250 kΩ	±(1.5 % + 5 counts)
	60 to 250 MΩ	1 MΩ		
500 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 500 kΩ	±(1.5 % + 5 counts)
	60 to 500 MΩ	1 MΩ		
1000 V (0 % to +20 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 1 MΩ	±(1.5 % + 5 counts)
	60 to 600 MΩ	1 MΩ		
	0.6 to 2.0 GΩ	100 MΩ		±(10 % + 3 counts)