FLUKE®

1587 FC/1587/1577

Insulation Multimeters

Calibration Manual

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Introduction

The Fluke Model 1587 FC, Model 1587, and Model 1577 are battery-powered, true-rms insulation multimeters (hereafter, Meter or UUT) with a 6000-count and a 3 ¾ digit display. Although this manual contains calibration information for Models 1587 FC, 1587, and 1577, all illustrations and examples assume use of the Model 1587 FC. Table 1 provides a description of all the symbols used in this manual.

The Meter meets CAT III and CAT IV IEC 61010 standards. The IEC 61010 standard defines four measurement categories (CAT I to IV) based on the magnitude of danger from transient impulses. CAT III meters are designed to protect against transients in fixed equipment installations at the distribution level; CAT IV meters are designed to protect against transients from the primary supply level (overhead or underground utility service).

Contacting Fluke

To contact Fluke, call one of the following telephone numbers:

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit http://register.fluke.com.

To view, print, or download the latest manual supplement, visit http://us.fluke.com/usen/support/manuals

Safety Information

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test. See Table 1 for a list of symbols used on the Meter and in this manual.

⚠⚠ Warning

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

- **Read all safety information before you use the Product**
- **Examine the case before you use the Product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.**
- **Do not use test leads if they are damaged. Examine the test leads for damaged insulation and measure a known voltage.**
- **Do not use the Meter around explosive gas, vapor, or in damp or wet environments.**
- **Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.**
- **Only use probes, test leads, and accessories that have the same measurement category, voltage, and amperage ratings as the Product.**
- **Keep fingers behind the finger guards on the probes.**
- **Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Comply with local and national safety codes. Use personal protective equipment (approved rubber gloves, face protection, and flame-resistant clothes) to prevent shock and arc blast injury where hazardous live conductors are exposed.**
- **Do not work alone.**

- **Do not apply more than the rated voltage between the terminals or between each terminal and earth ground.**
- **Limit operation to the specified measurement category, voltage, or amperage ratings.**
- **Use Product-approved measurement category (CAT), voltage, and amperage rated accessories (probes, test leads, and adapters) for all measurements.**
- **Measure a known voltage first to make sure that the Product operates correctly.**
- **Use the correct terminals, function, and range for measurements.**
- **Measure for hazardous voltage without the Low-Pass Filter.**
- **Do not use the Product if it operates incorrectly.**
- **Replace the battery when the low battery indicator ( ) shows to prevent incorrect measurements.**
- **Remove the batteries if the Product is not used for an extended period of time, or if stored in temperatures >50 °C. If the batteries are not removed, battery leakage can damage the Product.**
- **The battery door must be closed and locked before you operate the Product.**
- **Remove all probes, test leads, and accessories before the battery door is opened.**
- **Do not use the Product if it is damaged.**
- **Disable the Product if it is damaged.**

Table 1. Symbols

Symbol	Description
	WARNING.RISK OF DANGER.
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Consult user documentation.
	AC (Alternating Current)
	DC (Direct Current)
	Double Insulated
	Battery (Low battery when shown on display.)
	Earth
	Fuse
	Conforms to relevant Australian EMC standards.
	Conforms to European Union directives.
	Conforms to relevant South Korean EMC Standards.
	Certified by CSA Group to North American safety standards.
	Certified by TÜV SÜD Product Service.
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.
	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.

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

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 (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.			

AC Voltage Measurement with Low-Pass Filter (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)

AC Voltage Measurement (1577)

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	Specification (1587) [1] ±(% of Rdg + Counts)	Specification (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] Specification applies to both positive and negative polarities.			

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	Specification (1587) ±(% of Rdg + Counts)	Specification (1577) ±(% of Rdg + Counts)
600.0 mV dc	0.1 mV	±(0.1 % + 1)	±(0.2 % + 1)

DC and AC Current Measurement

Range		Resolution	Specification (1587) ±(% of Rdg + Counts)	Specification (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	Specification (1587) [1] +(% of Rdg + Counts)	Specification (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] Specifications 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 % Rdg + 3 counts)

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	Specification ±(% 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	Specification ±(% 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)
9999 µF	1 µF	

Temperature Measurement (all 1587 models)

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

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

Insulation Test

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

Insulation Measurement (1587/1587 FC)

Output Voltage	Display Range	Resolution	Test Current	Specification ±(% of Rdg + Counts)
50 V (0 % to +20 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ	±(3 % + 5)
	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)
	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)
	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)
	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)
	60 to 600 MΩ	1 MΩ		
	0.6 to 2.0 GΩ	100 MΩ		±(10 % + 3)

Insulation Measurement (1577)

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

Insulation Measurement (1587T)

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

Insulation Measurement (1587C FC)

Output Voltage	Display Range	Resolution	Test Current	Specification ±(% of Rdg + Counts)
50 V (-10 % to +10 %)	0.01 to 6.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ	±(3 % + 5)
	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)
250 V (-10 % to +10 %)	0.1 to 60.0 MΩ	0.1 MΩ	1 mA @ 250 kΩ	±(1.5 % + 5)
	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)
	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)
	60 to 600 MΩ	1 MΩ		
	0.6 to 2.0 GΩ	100 MΩ		±(10 % + 3)

Basic Maintenance

This basic maintenance section of the manual contains tests and procedures that require no equipment other than the Meter and some consumables such as fuses and batteries. Also, internal access is limited to the battery and fuse compartment.

Static Awareness

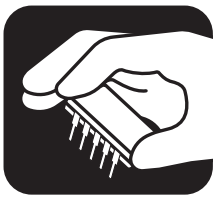
Semiconductors and integrated circuits can be damaged by electrostatic discharge during handling. This notice explains how to minimize damage to these components.

1. Understand the problem.
2. Learn the guidelines for proper handling.
3. Use the proper procedures, packaging, and bench techniques.

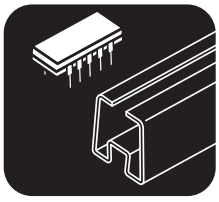
Follow these practices to minimize damage to static sensitive parts.

⚠ Warning

To prevent electric shock or personal injury. De-energize the product and all active circuits before opening a product enclosure, touching or handling any PCBs or components.



- Minimize handling.
- Handle static-sensitive parts by non-conductive edges.
- Do not slide static-sensitive components over any surface.
- When removing plug-in assemblies, handle only by non-conductive edges.
- Never touch open-edge connectors except at a static-free work station.



- Keep parts in the original containers until ready for use.
- Use static shielding containers for handling and transport.
- Avoid plastic, vinyl, and Styrofoam® in the work area.

- Handle static-sensitive parts only at a static-free work station.
- Put shorting strips on the edge of the connector to help protect installed static-sensitive parts.
- Use anti-static type solder extraction tools only.
- Use grounded-tip soldering irons only.

Cleaning

When cleaning is necessary, wipe the Meter with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture on the terminals can affect readings.

Testing the Batteries Under Load

⚠⚠Warning

To avoid electrical shock or personal injury, replace the batteries as soon as the battery indicator (🔋) appears. A weak battery can cause false readings.

Before testing the batteries, turn the Meter to ṽ. If 🔋 appears on the display, the batteries are weak; replace them. If the display is blank, batteries may not be present in the Meter, or they may be completely discharged; install new batteries.

The following procedure tests the batteries under load:

1. Depress the HOLD while turning the rotary switch to **INSULATION**.
2. Read the display. The displayed voltage should be 5.2 V or greater. If voltage is lower than 5.2 V, replace the batteries and repeat this test.

Testing the Fuse

⚠⚠Warning

To avoid electrical shock or injury, remove the test leads and any input signals from the Meter before replacing the fuse.

Test the fuse as described below and illustrated in Figure 1. If the fuse is defective, see *Replacing the Batteries and/or Fuse* later in this manual.

1. Insert a test probe in the V Ω input terminal.
2. Turn the rotary switch to Ω and verify the Meter is in Auto Range.
3. Insert the probe in the mA input terminal. If the display reading is OL, the fuse is defective; replace the fuse.

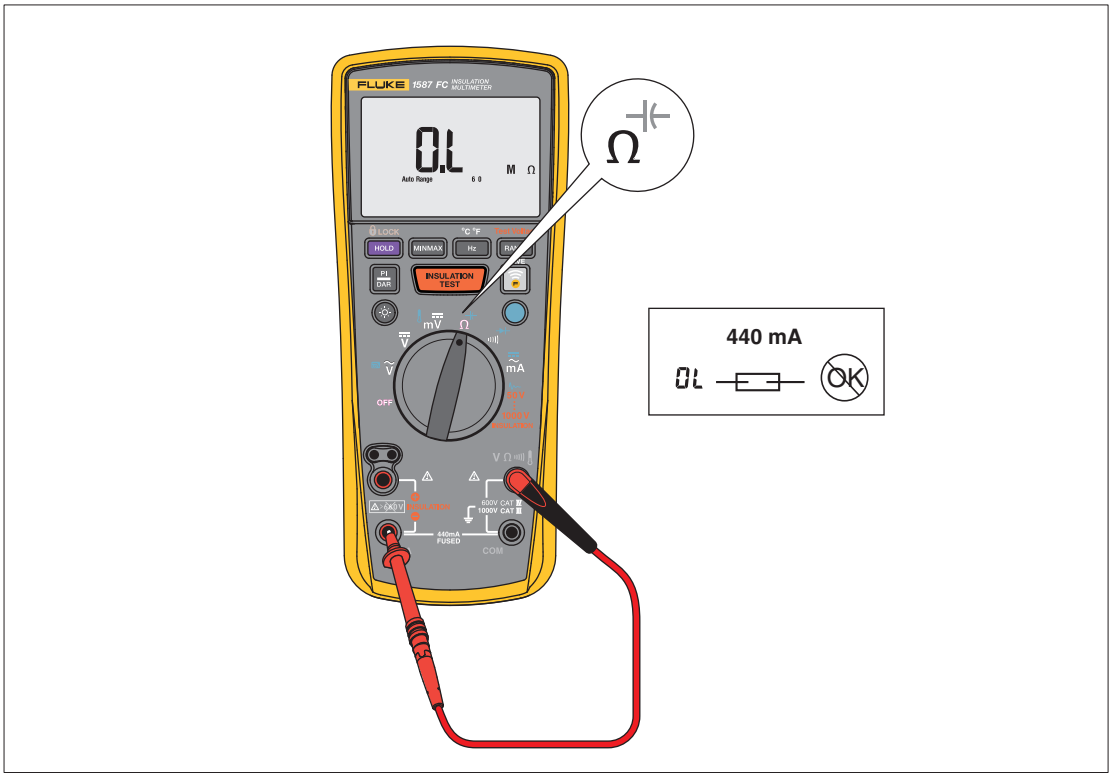


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Figure 1. Testing the Fuse

Replacing the Batteries and/or Fuse

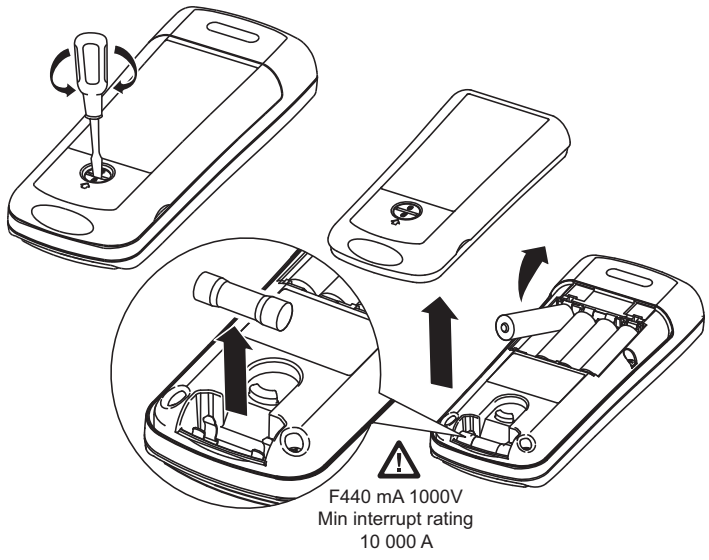
Use the following procedure and Figure 2 to replace the batteries and/or the fuse:

⚠⚠Warning

To avoid electrical shock, personal injury, or damage to the Meter observe the following warnings:

- **Replace the batteries as soon as the battery indicator (🔋) appears. A weak battery can cause false reading.**
- **Use ONLY fuses with the amperage, interrupt, voltage, and speed ratings specified.**
- **Before removing the battery cover, turn the rotary switch to OFF, and then, remove the test leads from the front-panel terminals.**

1. Remove the yellow rubber boot from the Meter. Use the thumb-hole to press on the rear of the Meter and peel the boot from the Meter.
2. Using a standard screwdriver, release the battery door from the Meter; turn the battery-door lock until the unlock symbol aligns with the arrow.
3. Lift the bottom of the battery door away from the Meter to access the fuse and battery compartment.
4. Remove and replace the batteries and/or fuse as shown in Figure 2.
5. Re-install the battery door and secure it by turning the battery door lock until the lock symbol (🔒) aligns with the arrow.
6. Position the bottom of the Meter in the bottom of the boot, and press the top of the instrument firmly into of the boot.



Fuse, Fast, 440 mA, 1000 V, Min Interrupt Rating 10000 A	Fluke PN 943121
Battery, 1.5 V AA Alkaline, NEDA 15A, IEC LR6	Fluke PN 376756

Figure 2. Replacing the Batteries and Fuse

Testing the Display

The display is an LCD comprised of a series of characters and segments for providing the user with a variety of information. To test the LCD and all of its segments proceed as follows:

1. Set the rotary switch to **OFF**.
2. Depress HOLD and turn the function switch to ṽ.
3. While continuing to depress HOLD, verify that the lit display segments match those shown in Figure 3.

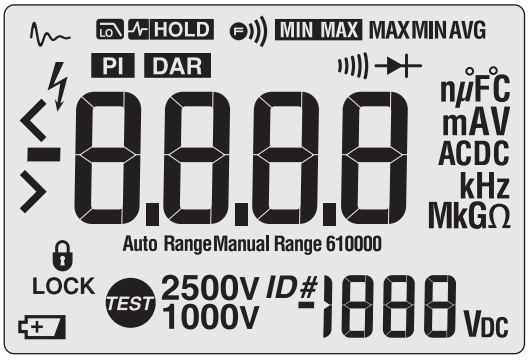


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Figure 3. LCD Display Test

Testing the Backlight

The display backlight is a toggle function controlled by the ☼ key. Each press of ☼ causes the backlight to change states, for example, on to off or off to on. To test the backlight, press ☼ twice to verify that the toggle function is working. Turn the backlight off.

Testing the Keypad

The keypad consists of keys located above the rotary function switch. To test the keypad, turn the rotary switch to ṽ and momentarily press each of the seven keys. Each press of an operational key will cause the Meter to beep. No beep in response to a key press indicates a defective keypad.

Reset the Meter by turning the rotary switch to OFF and, then, to any other position.

Disassembling and Reassembling the Meter

This section of the manual provides instructions for disassembling and reassembling the Meter. The instructions are limited to major replaceable assemblies and do not include component-level detail. See Figure 4 for an exploded view of the major assemblies. Also, the emphasis is placed on disassembly. When necessary, the procedure includes critical hints for reassembly.

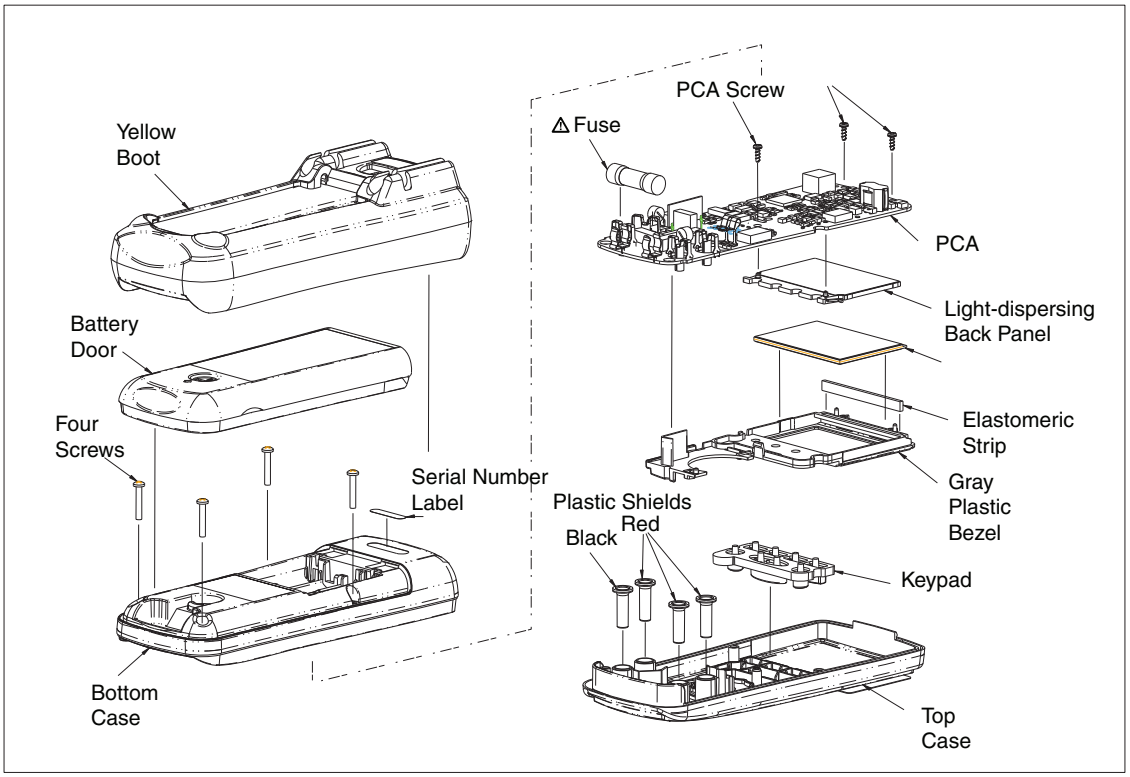

Figure 4. Disassembling the Meter

Removing the Boot

The standard Meter comes equipped with a snug-fitting yellow rubber boot. The boot helps protect the Meter from rough handling and is normally left on the Meter. The first step in disassembling the Meter is to remove the boot.

Use the following procedure to remove the boot:

1. Looking at the front of the Meter, place your thumbs on the top corners of the boot and firmly grasp the Meter.
2. Using both thumbs, push the boot up and over both corners of the Meter.
3. Continue pushing on the boot until both of its inside corners are resting on top of the Meter.
4. Now, rest the heel of one hand behind the display, and place all four fingers of the same hand along the upper front edge of the boot.
5. Firmly grasp the Meter with the other hand, and using your fingers, peel the boot over the top of the Meter.
6. Slide the Meter up and out of the boot.

When installing the boot, position the bottom of the Meter in the bottom of the boot, and press the top of the instrument firmly into of the boot.

Removing the Battery Door

⚠⚠Warning

To avoid the risk of electrical shock, turn the rotary switch to OFF, and remove the test leads from the front-panel terminals before removing the battery cover.

With the boot removed, the next step in disassembling the Meter is to remove the battery door. Use the following procedure to remove the door:

1. Locate the black slotted lock on the lower rear of the Meter.
2. Using a standard screwdriver, turn the battery-door lock until the unlock symbol (🔓) aligns with the arrow. The door is now unlocked.
3. Lift the bottom of the battery door away from the Meter. Removing the battery door provides access to the fuse and battery compartment.
4. If necessary, remove and replace the batteries and/or fuse as shown in Figure 2.

When you install the battery door, first, slide the top of the door into position, and then, secure it by turning the battery door lock until the lock symbol (🔒) aligns with the arrow.

Removing the Bottom Case

With the battery door removed, the next step in disassembling the Meter is to remove the bottom case. Use the following procedure to remove the bottom case:

Note

When removing the back case, it is not necessary to remove the fuse or the batteries.

1. Locate the four Phillips head screws on the bottom case, two next to the batteries and two next to the fuse.
2. Using a Phillips screwdriver, remove the four screws.
3. Separate the front and bottom cases at the fuse-end of the Meter. Tilt the freed end of the case up, and lift it away from the top case.

To install the bottom case, first, position and press together the display-end of the top and bottom cases. Then, prior to installing all four screws, press the fuse-end of the cases together.

Removing the PCA

With the bottom case removed, the next step in disassembling the Meter is to remove the printed circuit assembly (PCA). Refer to Figure 4 and use the following procedure to remove the PCA:

1. One Phillips screw attaches the PCA to the top case. Locate the screw near the center of the PCA, and remove it.
2. Two chrome-plated springs on the PCA form an electrical connection (clip) to the two recessed INSULATION (+) terminals on the top case. Break these

connections by carefully pulling each of the springs back and away from the terminals. See Figure 5.

3. With one hand over the PCA, roll the top case over (face up) and lift it away from the PCA.

Note

Three red and one black plastic shields are used to isolate the user from the input terminals. With the PCA removed, these shields are loose and can fall away from the PCA.

4. Remove and set aside all four shields for use during reassembly.

⚠⚠Warning

To avoid risk of electrical shock, make sure the plastic input terminals are properly positioned on the PCA before attaching it to the top case.

To install the PCA:

1. With the PCA face-up, place all four plastic shields into position on the PCA.
2. Lower the top case onto the PCA, and roll both parts over (PCA up).
3. Connect (snap) the chrome-plated springs to the INSULATION terminals.
4. Install the screw that attaches the PCA to the top case.

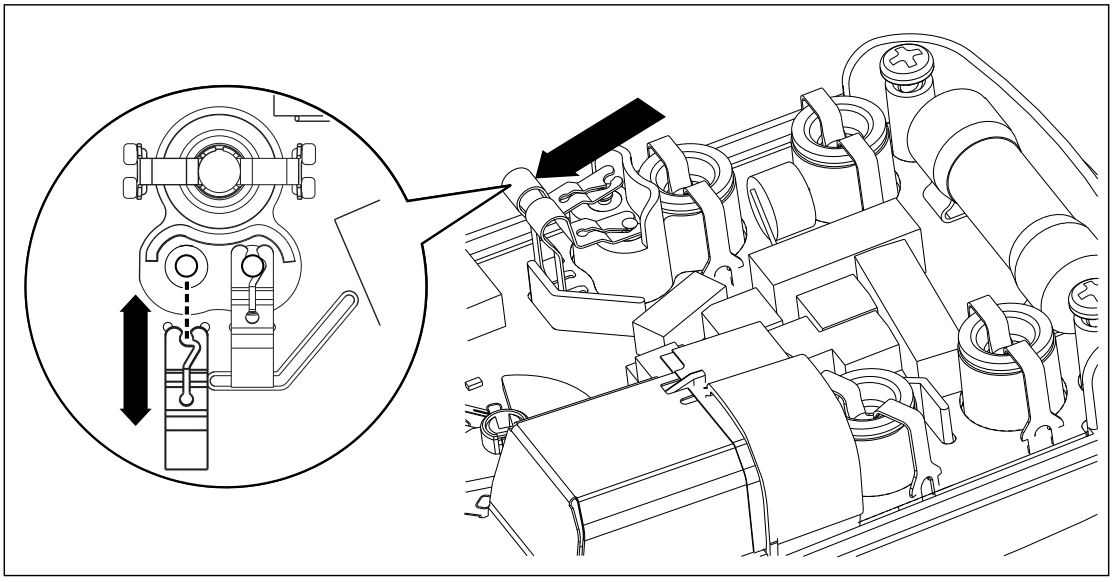

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Figure 5. Insulation Terminal Clips

Removing the LCD

With the PCA removed, the final step in disassembling the Meter is to remove the LCD assembly from the PCA. Refer to Figure 6 and use the following procedure to remove the LCD assembly:

1. Remove the two screws from the display end of the PCA.
2. Hold the PCA face down with the fuse-end of the PCA toward you. Locate the screw-hole near the center of the assembly. This hole is the one used to attach (with a screw) the PCA to the top case.
3. Now, locate the gray plastic tab just above and to the left of the hole. Using your thumbnail press the tab down and toward the display end of the PCA. This will release the LCD assembly from the PCA.

⚠ Caution

To avoid damaging the plastic guide pins on the LCD assembly, keep the LCD assembly parallel to the PCA when separating the two parts.

4. Without tilting the PCA, lift it straight up and away from the LCD assembly.
5. To keep loose parts from falling away from the LCD assembly, keep it face-down, and set it in a safe place.

Replacing the LCD

The LCD assembly consists of four pieces as shown in Figure 6:

- Translucent light-dispersing back panel
- Flexible elastomeric conducting strip
- Plastic Bezel for housing the assembly's components
- Glass LCD display

With the LCD assembly removed from the PCA, use the following procedure to replace the LCD:

1. Lift the translucent light-dispersing back panel off of the plastic bezel.
2. Remove the elastomeric strip from its slot in the bezel.
3. Remove the old glass LCD display from the bezel.

Note

Make sure the new LCD display is clean (free of lint and finger prints) before placing it in position in the bezel.

4. Position the new glass LCD display in the bezel; the silver face should face the rear, and the stepped portion of the glass should be directly under the elastomeric slot on the bezel.
5. Drop the elastomeric strip into its slot on the bezel.
6. Position the translucent light-dispersing back panel over the silver side of the glass LCD display. Make sure the guide pins on the light dispersing back panel are facing up and that they are on the side opposite the elastomeric strip.
7. While holding the LCD assembly (face down) in one hand, position the PCA (fuse side up) over the bezel; match the guide holes in the PCA with the plastic guide pins on the bezel and the translucent light dispersing back

panel. After the LCD assembly is in position, lock it in place by pressing (below the display) the bezel against the PCA; listen for the tab on the bezel to snap (lock) into position on the PCA.

8. Secure the PCA to the LCD assembly by installing the two screws that attach the PCA to the bezel. These screws also ensure contact between the glass LCD display, the elastomeric strip, and the PCA.

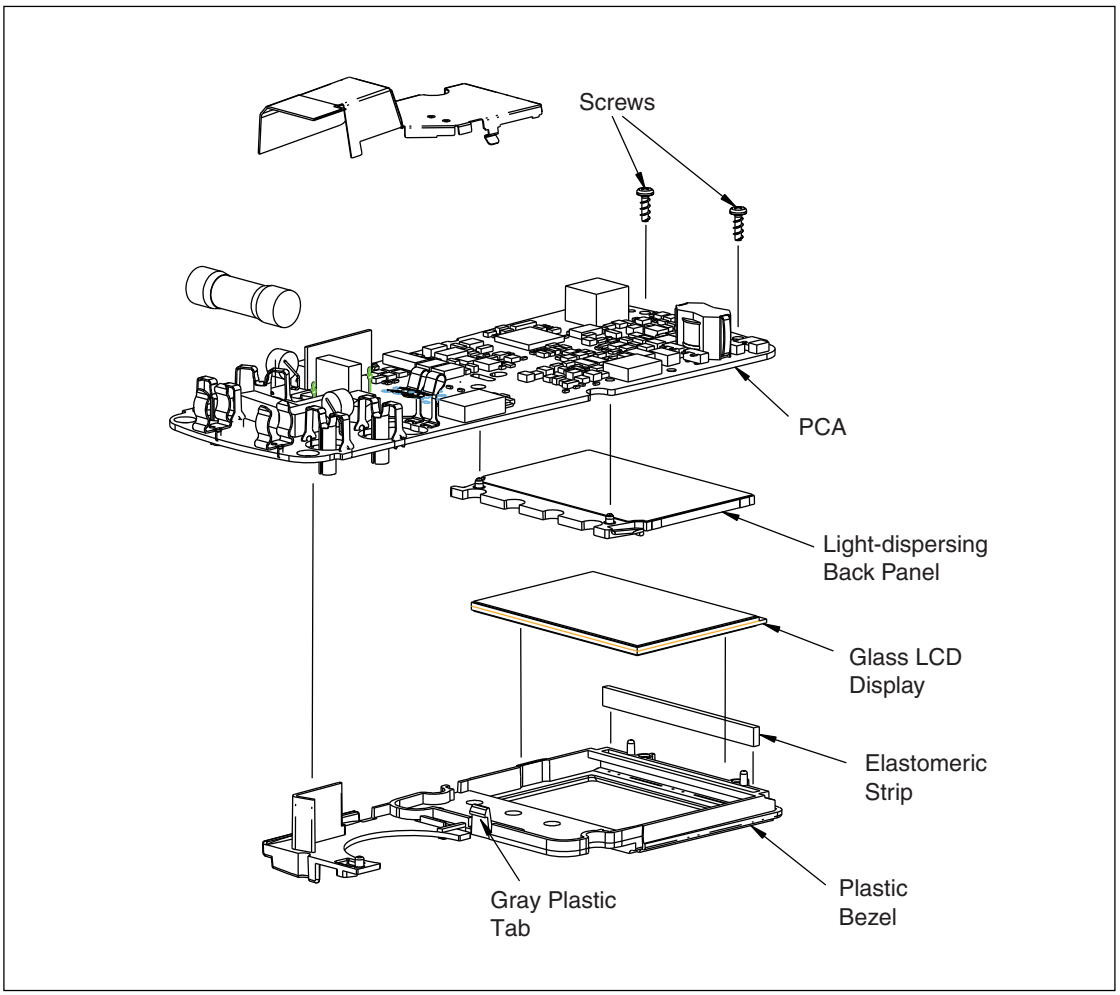

Figure 6. Accessing the LCD

Reassembling the Meter

To reassemble the Meter, logically reverse the previous disassembly procedures. In the process, make sure to re-establish all electrical connections; specifically, the elastomeric strip for the LCD, the red and black plastic shields for the input terminals, and the two spring contacts for the Insulation Test Probe. Also make sure all parts are correctly aligned and positioned; do not force-fit any of the parts into position.

Required Tools and Equipment

Table 2 lists the require equipment for performing the Performance Test and Calibration adjustments. If a recommended model is not available, use a substitute with equivalent or better specifications.

Table 2. Required Tools and Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	**AC Voltage Range**: 0 V to 1000 V Accuracy: ±0.25 % Frequency Range: 50 Hz to 5 kHz Accuracy: ±3% **DC Voltage:** 0 V to 1000V Accuracy: ±0.075 % **Current Range:** 0 mA to 600 mA Accuracy: AC mA = ±0.38 % Frequency: 45 Hz to 1 kHz DC mA = ±0.058 % **Frequency Source:** 100 Hz to 100 kHz Accuracy: ±0.028 % Amplitude: 5 V Accuracy: ±5 % **Ohms Range:** 0 MΩ to 50 MΩ Accuracy: ±0.23 % **Capacitance Range:** 700 nF to 8000 µ F Accuracy:±0.35% **Insulation Resistance:** 500 kΩ to 1.7 GΩ Accuracy: ±0.9 %	Fluke 9100 w/135 option (or equivalent)
DMM (Test DMM)	**DC Volts:** 0 V to 1000 V Accuracy: ±5 % **DC Current:** 0 mA to 2 mA Accuracy: ±1 %	Fluke 189 (or equivalent)
Power Supply	**DC Volts:** 0 to 15V	Generic Lab Supply
HV Probe (Divider)	**DC Voltage Range:** 1 kV to 5 kV Accuracy: 1 % **Division ratio:** 1000:1 **Input resistance:** 1000 MΩ	Fluke 80k-6
Thermocouple	K Type with Dual Banana connector	Fluke 80BK
Thermocouple Mini-Connector	K Type	Fluke 80CK-M

Performance Test

The following series of tests comprise a performance test for verifying the accuracy of the Meter (UUT) and its performance level. The performance test is recommended as an acceptance test for incoming inspection and as a calibration procedure for periodically ensuring the accuracy of the Meter. Fluke recommends running the performance test at least once a year.

No adjustments are required during the performance test, and it is not necessary to open the case. If the Meter does not pass all parts of the performance tests, repair and/or calibration adjustment are required. A calibration adjustment procedure is given later in this manual. If significant repairs are required, contact Fluke as described toward the front of this manual. If user repairs are appropriate, refer to the list of user-replaceable parts toward the end of this manual

Testing DMM Functions

Use the following procedure to verify the accuracy of the measurement functions.

1. Connect the Calibrator to the **V Ω** and **COM** input terminals on the UUT.
2. Turn the rotary switch to the function listed in each step of Table 3.
3. Apply the input level for each step listed in Table 3.
4. Compare the reading on the UUT display with the Display Reading in Table 3.

   If the display reading falls outside of the range shown in Table 3, the UUT does not meet specification.

Table 3. DMM Accuracy Tests

Step	UUT Function	UUT Range	UUT Input Level	UUT Display Reading	
				1577	1587 FC/1587
1	mV ac	600.0 mV	30 mV, 60Hz	29.4 to 30.6	29.4 to 30.6
2	V ac	6.000V	3V, 60Hz	2.937 to 3.063	2.967 to 3.033
3	V ac	6.000V	3V, 400Hz	n/a	2.937 to 3.063
Push ◯ (blue) for 1 second for low-pass filter band-pass test					
4	V ac	6.000V	3V, 400Hz	n/a	2.817 to 3.063
5	V ac	6.000V	3V, 800Hz	n/a	1.680 to 2.670
Push ◯ (blue) for 1 second to remove low-pass filter					
6	V ac	60.00V	60V, 50Hz	58.77 to 61.23	59.37 to 60.63
7	V ac	600.0V	600V, 50Hz	587.7 to 612.3	593.7 to 606.3
8	V ac	1000V	1000V, 50 Hz	977 to 1023	n/a
9	V ac	1000V	1000V, 1 kHz,	n/a	977 to 1023
10	Hz, V ac	99.99 Hz	*10 Hz, 0.15V	n/a	9.98 to 10.02
11	Hz, V ac	99.99 kHz	*95kHz, 0.15V	n/a	94.89 to 95.11

Table 3. DMM Accuracy Tests (cont)

Step	UUT Function	UUT Range	UUT Input Level	UUT Display Reading	
				1577	1587 FC/1587
12	Hz, V ac	99.99 kHz	*90 kHz, 2V	n/a	89.90 to 90.10
13	V dc	6.000 V	0.3 V	0.298 to 0.302	0.298 to 0.302
14	V dc	6.000 V	6 V	5.986 to 6.014	5.993 to 6.007
15	V dc	60.00 V	60 V	59.86 to 60.14	59.93 to 60.07
16	V dc	600.0 V	-600.0 V	-601.4 to -598.6	-600.3 to -599.7
17	V dc	1000 V	1000 V	996 to 1004	997 to 1003
18	mV dc	600.0 mV	3 mV	2.9 to 3.1	2.9 to 3.1
19	mV dc	600.0 mV	30 mV	29.9 to 30.1	29.9 to 30.1
20	mV dc	600.0 mV	-600 mV	-601.3 to 598.7	-600.7 to -599.3
21	Ohms	600.0 Ω	0	-0.2 to 0.2	-0.2 to 0.2
22	Ohms	600.0 Ω	600 Ω	592.6 to 607.4	594.4 to 605.6
23	Ohms	6.000 kΩ	6000 Ω	5.926 to 6.074	5.944 to 6.056
24	Ohms	60.00 kΩ	60.00 kΩ	59.26 to 60.74	59.44 to 60.56
25	Ohms	600.0 kΩ	600.0 kΩ	592.6 to 607.4	594.4 to 605.6
26	Ohms	6.000 MΩ	6.000 MΩ	5.926 to 6.074	5.944 to 6.056
27	Ohms	50.00 MΩ	50.00 MΩ	48.97 to 51.03	49.22 to 50.78
28	Capacitance	1000 nF	700 nF	n/a	690 to 710
29	Capacitance	9999 μF	8000 μF	n/a	7814 to 8186
30	Continuity	n/a	103	Beeper off	Beeper off
31	Continuity	n/a	23	Beeper on	Beeper on
32	Diode	n/a	2.5 V	n/a	2.447 to 2.553
33	mA ac	60.00 mA	3 mA, 45 Hz	2.92 to 3.08	2.93 to 3.07
34	mA ac	600.0 mA	400 mA, 60 Hz	391.8 to 408.2	393.8 to 406.2
35	mA dc	60.00 mA	60.00 mA	59.38 to 60.62	59.86 to 60.14
36	mA dc	600.0 mA	400.0 mA DC	395.8 to 404.8	399 to 401

* To ensure accurate frequency use the Calibrator Frequency mode.

Testing Temperature Function (1587 FC/1587 Only)

Use the following procedure to verify that the UUT measures temperature within the published specification.

1. Connect the K-Type thermocouple to the temperature input of the UUT (V Ω ⋯ 🌡) and temperature calibrator.

Note

To ensure an accurate measurement the UUT and thermocouple connector must be at the same temperature.

2. After connecting the thermocouple to the UUT and the Calibrator, allow the junctions to stabilize before recording the display reading. Depending on temperature gradients this could take several minutes.
3. Turn the rotary switch to 🌡 mV⎓, and press ◯ to select temperature mode.
4. Put the calibrator in the thermocouple function, and set the output temperature to 23 °C.

   The UUT display reading should be within the limits of 21.8 °C to 24.2 °C.

Testing the Discharge Circuit

The following Discharge Circuit Test is a safety-related test that verifies input jack wiring to the PCA, the RSOB contacts, RSOB pads on the PCA, and other active discharge components on the PCA.

⚠ Caution

To prevent damage to the Test DMM DO NOT press INSULATION TEST during the following procedure.

1. Connect the Test DMM to the **INSULATION** terminals (+ and -) on the UUT.
2. Set the Test DMM to measure resistance.
3. Turn the rotary switch to **INSULATION**.
4. Verify that the Test DMM reading is between 2500 Ω and 3500 Ω .

Testing the Insulation Function

⚠⚠ Warning

To avoid electric shock hazard at the INSULATION output terminals, do not press INSULATION TEST when the rotary switch is set to INSULATION.

⚠ Caution

To prevent damage to the calibrator do not use the 5500A or other standard calibrators for the insulation tests.

⚠ Caution

To prevent damage to the 9100A make sure it is in the Insulation Test mode prior to pushing INSULATION TEST.

Insulation Resistance Accuracy Test

To test the Insulation Resistance accuracy, sequentially complete the test steps in Table 4, using the following procedure.

1. Connect the **INSULATION** output terminals on the UUT to the calibrator.
2. Set the calibrator to the Insulation Resistance Test Mode.
3. Turn the rotary switch to **INSULATION**.
4. Set the voltage range on the UUT; see Table 4.
5. Apply the Calibrator Output to the UUT; see Table 4.
6. Press INSULATION TEST on the UUT.
7. Verify that the display reading is within the limits given in Table 4.

Table 4. Insulation Resistance Accuracy Test

Step	UUT Voltage Range	Calibrator Resistance Range	Calibrator Output	UUT Display Reading	
				Limit Low	Limit High
1	500 V	60.0 MΩ	0.500 MΩ	0.0	1.0
2	500 V	500 MΩ	450 MΩ	438	462
3	500 V	500 MΩ	600 MΩ	>550	>550
4	1000 V	2.0 GΩ	1.7 GΩ	1.2	2.2
5	1000 V	600 MΩ	600 MΩ	586	614
1587 FC/1587 Only					
6	1000 V	60.0 MΩ	1 MΩ	0.5	1.5
7	50 V	6.00 MΩ	100 kΩ	0.05	0.15
8	50 V	50.0 MΩ	45 MΩ	43.1	46.9
9	100 V	6.00 MΩ	100 kΩ	0.05	0.15
10	100 V	100 MΩ	95 MΩ	87	103
11	250 V	60.0 MΩ	250 kΩ	0.0	0.8
12	250 V	250 MΩ	225 MΩ	217	233

Insulation Function, External Sense

The following test verifies that the UUT will sense a voltage >30 V when present on the circuit under test.

1. Connect the UUT **INSULATION** output terminals to the calibrator voltage output terminals.
2. Turn the rotary switch to the **INSULATION** function.
3. Apply 35 V, 50 Hz to the UUT.
4. Verify that the UUT displays >30 V in the primary display.

Insulation Function, Source Voltage Accuracy Test

The following test verifies the accuracy of the source voltage for the insulation function.

⚠Caution

To prevent damage to the Test DMM use a HV Probe (Divider) with the Test DMM when testing the 1000V range of the UUT.

1. Connect the output of the HV Probe to the V – Com inputs on the Test DMM and turn the rotary switch to mV⎓.
2. Connect the input of HV Probe to the INSULATION output terminals on the UUT as shown in Figure 7.
3. Set the rotary switch to INSULATION.
4. Refer to Table 5, and complete steps 1 through 5. For each step, select the specified range on the UUT, press INSULATION TEST, and verify that the voltage readings on both the UUT (lower right hand corner) and the DMM are within the limits shown in the table.

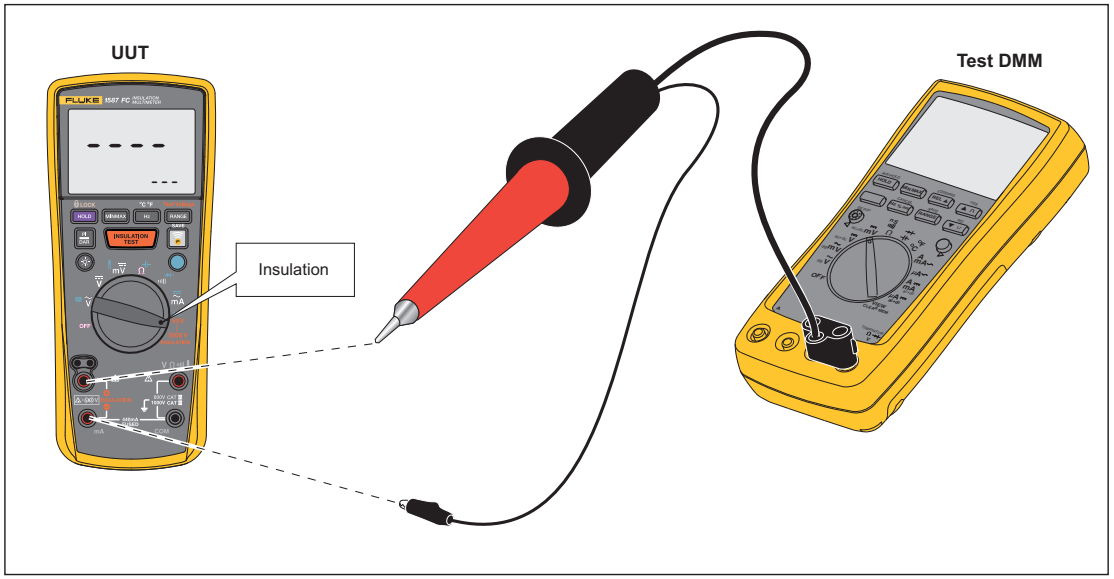

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Figure 7. Source Voltage Accuracy Test

Table 5. Insulation Mode, Source Voltage Accuracy Tests

Step	Function	Range	Test DMM Display Reading	UUT Display Reading
1	Insulation	500 V	500.0 to 600.0	500 to 600
2	Insulation	1000V	1000.0 to 1200.0	1000 to 1200
1587 FC/1587 Only				
3	Insulation	50V	50.0 to 60.0	50 to 60
4	Insulation	100V	100.0 to 120.0	100 to 120
5	Insulation	250V	250.0 to 300.0	250 to 300

I Nominal Test

The following test verifies the ability of the UUT to maintain the nominal insulation test current while loaded.

1. Connect the Test DMM and Calibrator to the UUT INSULATION terminals as shown in Figure 8.
2. Set the Calibrator to the Insulation Resistance Test Mode.
3. Set the output resistance on the Calibrator 1 MΩ.
4. Set the Test DMM to measure µA DC
5. Set the UUT to INSULATION, 1000V range.
6. Press INSULATION TEST on the UUT. The Test DMM reading should be greater than 1000.0 µA.

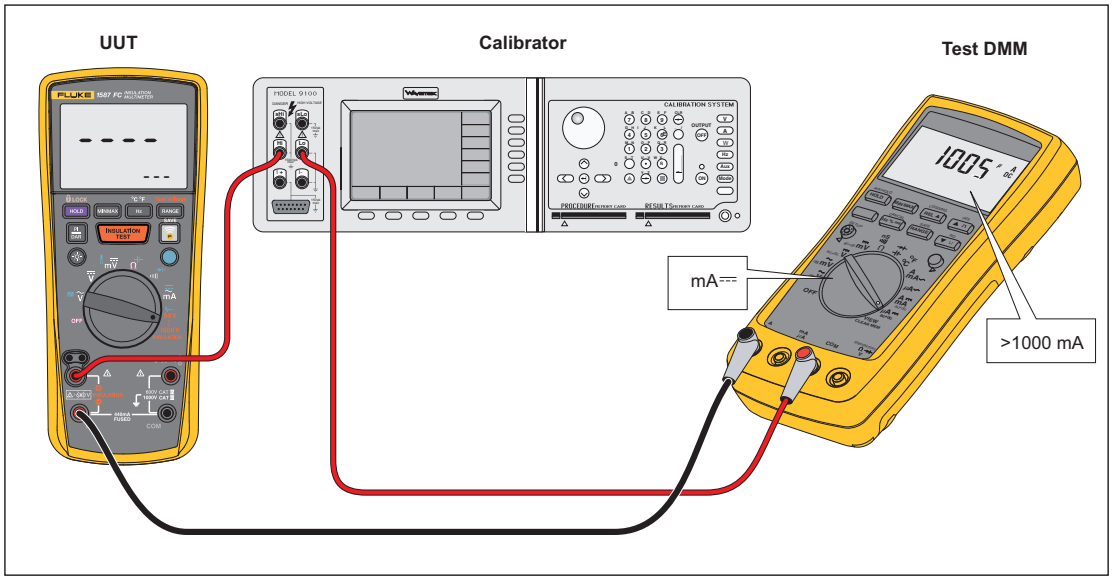


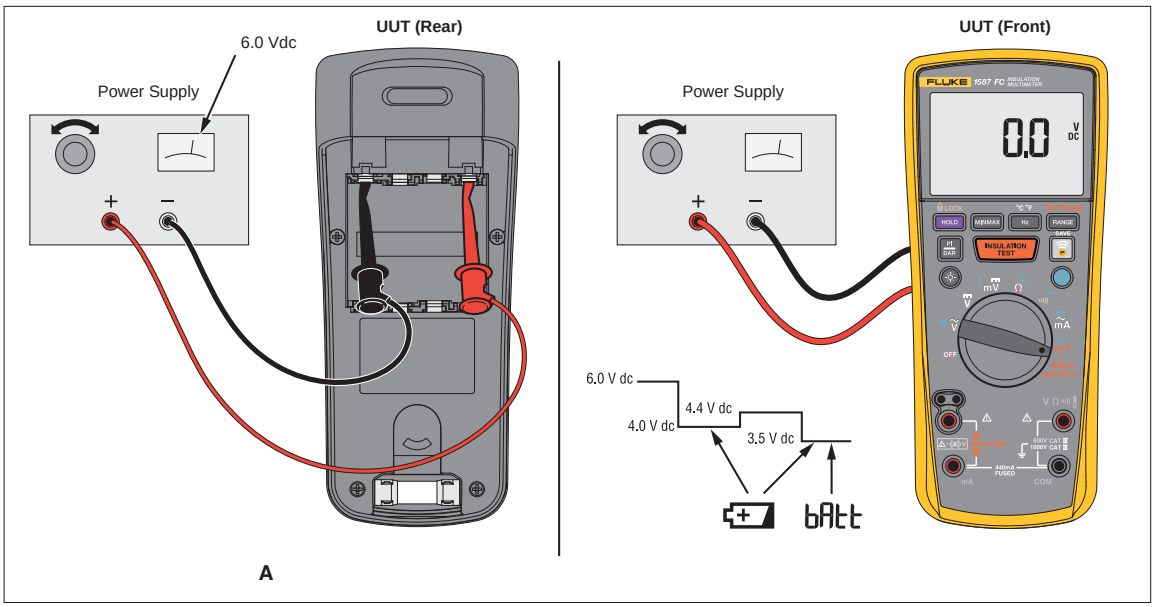
Figure 8. I Nominal Test

Low-Battery Test - DMM Function

The following test verifies the accuracy of the low-battery indicator (🔋) on the UUT during DMM operations.

1. Remove the batteries from the battery compartment on the UUT.
2. Connect a 6-volt adjustable Power Supply between the positive and negative battery terminals of the UUT as shown in Figure 9.
3. Turn the rotary switch to V⎓.
4. Slowly reduce the Power Supply output while observing the display on the UUT. Verify that the low-batter indicator (🔋) appears when the voltage is at 4.0 V
5. Now slowly increase the Power Supply output while observing the display on the UUT. Verify that the low-battery indicator (🔋) on the UUT goes out at 4.4 V.
6. Slowly reduce the Power Supply output while observing the display on the UUT. Verify that the UUT displays bAtt at 3.5 V.

7. Turn the rotary switch to **OFF** to reset the display.



ebp08f.eps

Figure 9. Low-Battery Test Connections

Low-Battery Test - INSULATION Function

The following procedure verifies the accuracy of the low-battery indicator (🔋) during insulation operation.

⚠⚠Warning

To avoid shock hazard DO NOT press INSULATION TEST during the following procedure.

1. Remove the batteries from the battery compartment.
2. Connect a 6-volt adjustable Power Supply between the positive and negative battery terminals of the UUT as shown in Figure 9-A.
3. Set the Power Supply output to 6 V, and turn the rotary switch to **INSULATION**.
4. Slowly turn the Power Supply output down while observing the display on the UUT. Verify that the low-battery indicator (🔋) appears when the voltage is at 5.2 V
5. Continue to reduce the Power Supply output while observing the display on the UUT. Verify that bAt appears on the display when the supply voltage reaches 4.0 V.

Note

bAt will appear in the lower display. bAtt will still appear in the prinmary display when the supply reaches 3.5 V just as it does in DMM functions.

6. Turn the rotary switch to **OFF** to reset the display.
7. Remove the Power Supply, and install the batteries and the battery door.

Calibration Adjustment Procedure

The following sections comprise the Calibration Adjustment Procedure. The procedure is meant to bring the UUT back into specification following repair of the UUT or when the UUT fails the Performance Test. The required equipment is listed earlier in Table 2.

The Meter features closed-case calibration adjustment using known reference sources. During the procedures, known reference source values are applied to the meter; the Meter calculates correction factors and stores them in nonvolatile memory.

Calibration Adjustment Counter

The Meter contains a calibration adjustment counter. The counter is incremented each time a Calibration Adjustment Procedure is completed. The value in the counter can be recorded and used to show that no adjustments have been made during a calibration cycle.

Use the following steps to view the calibration counter on the UUT.

1. While holding down HOLD on the UUT, turn the rotary switch from **OFF** to ⏦. The UUT should display ϟ CAL.
2. Press HOLD once to see the calibration counter. For example n001.
3. Turn the rotary switch to **OFF**.

Calibration Adjustment Password

To start the Calibration Adjustment Procedure, the correct four-digit password must be entered. The password can be changed or reset to the default as described in following paragraphs. The default password is 1234.

Changing the Password

Use these steps to change the password on a UUT with SN >32980000:

1. While holding down HOLD on the UUT, turn the rotary switch from **OFF** to ⏦. The UUT displays ϟ CAL.
2. Press HOLD once to see the calibration counter.
3. Press HOLD again to start the password entry. The UUT displays ????.

   The following keys represent the digit indicated below when entering or changing the password:

HOLD = 1	MINMAX Unused	Hz Unused	RANGE = 2
PI DAR Unused	INSULATION TEST = 4		Unused
☼ = 3			◯ = 5

4. Press the four keys to enter the old password. If changing the password for the first time, enter HOLD (1), RANGE (2), ☼ (3), and INSULATION TEST (4).
5. Press RANGE to change the password. The UUT displays ---- if the old password is correct. If the password is not correct, the UUT emits a double beep, displays ???? and the password must be entered again. Repeat step 4.

6. Press the four keys representing the new password.
7. Press HOLD to store the new password.

Use these steps to change the password on a UUT with SN <32980000:

8. While holding down ☼ on the UUT, turn the rotary switch from **OFF** to Ṽ. The UUT displays ϟ CAL.
9. Press HOLD once to see the calibration counter.
10. Press HOLD again to start the password entry. The UUT displays ????.

    The following keys represent the digit indicated below when entering or changing the password:

    HOLD = 1 | MINMAX Unused | Hz Unused | RANGE = 2

    ☼ = 3 | INSULATION TEST = 4 | ◯ = 5

11. Press the four keys to enter the old password. If changing the password for the first time, enter HOLD (1), RANGE (2), ☼ (3), and INSULATION TEST (4).
12. Press RANGE to change the password. The UUT displays ---- if the old password is correct. If the password is not correct, the UUT emits a double beep, displays ???? and the password must be entered again. Repeat step 4.
13. Press the four keys representing the new password.
14. Press HOLD to store the new password.

Restoring the Default Password

If the calibration password is forgotten, the default password (1234) can be restored using the following steps.

1. Turn the rotary switch from **OFF** to Ṽ.
2. Remove the back case from the UUT. Leave the PCA in the top case.
3. Apply 6.0 V across the battery pads (XBT1) + and – on the back of the PCA. See Figure 10.

⚠⚠Warning

To avoid electrical shock or personal injury, remove the test leads and any input signal before removing the back case from the UUT.

4. Short across the CAL keypad on the back of the PCA. See Figure 10. The UUT should beep. The default password is now restored.
5. Remove the 6.0 V supply and install the back case on the UUT.

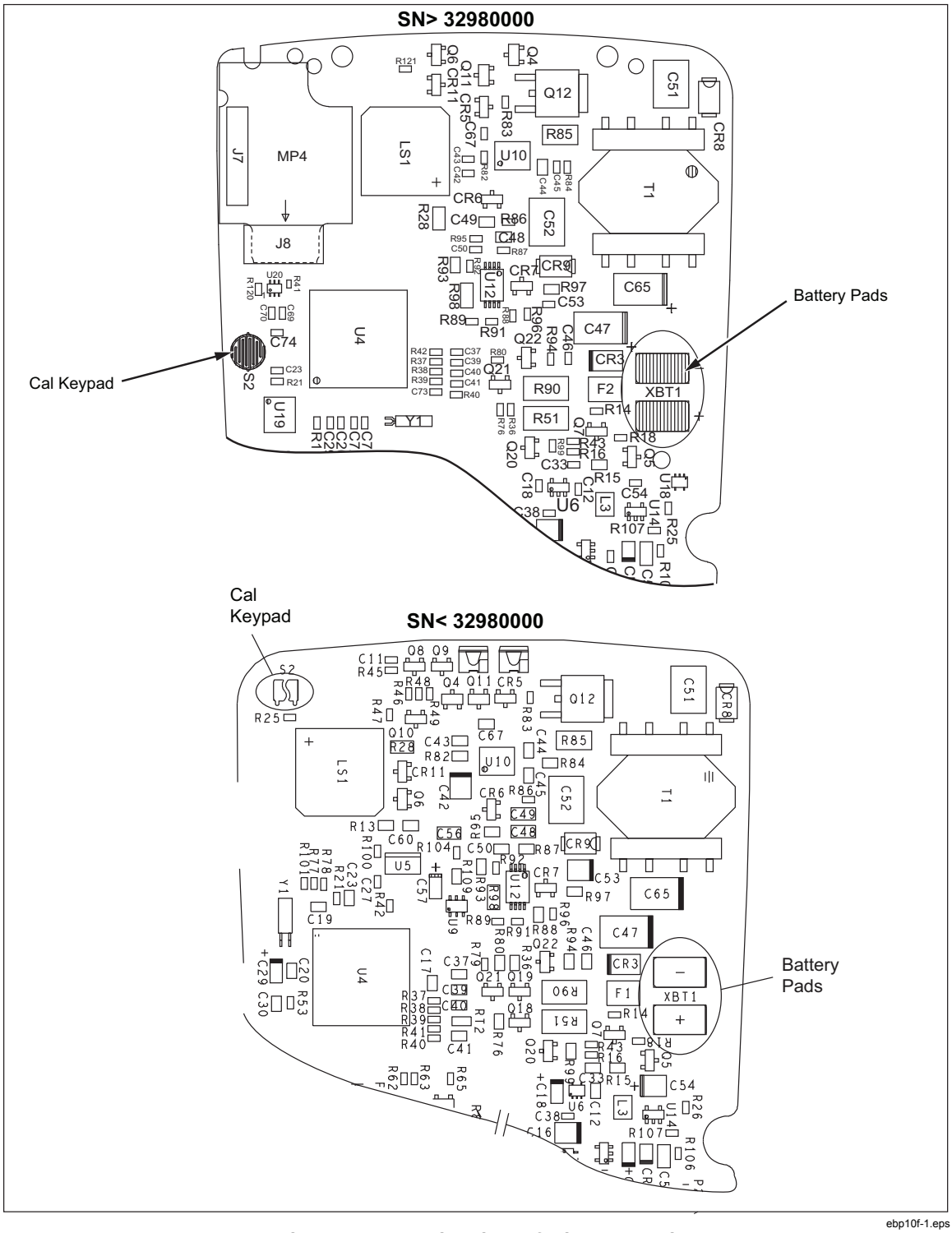


Figure 10. Restoring the Default Password

Meter Keys Used in the Calibration Steps

The Meter keys behave as follows when performing the Calibration Adjustment Procedure. This may be of help determining why a calibration step is not accepted and for determining the input value without referring to Table 6.

☼ Press and hold to show the measured value. The measurement value is not calibrated so it may not match the input value. This is normal.

INSULATION TEST Press and hold to display the required input amplitude.

HOLD Press and hold to display the frequency of the required input.

◯ Store the calibration value and advance to the next step. This key is also used to exit the calibration mode after the calibration-adjustment sequence is complete.

Calibration Adjustment

Use the following steps to make calibration adjustments to the UUT. Complete the adjustment procedure before turning the UUT off; otherwise, the new calibration constants will not be saved.

1. While holding down HOLD, turn the rotary switch from **OFF** to . The UUT displays CAL.
2. Press HOLD once to see the calibration counter, for example, n0001.
3. Press HOLD again to start the password entry. The UUT displays ????.
4. Press four keys to enter the password.
5. Press HOLD to go to the first calibration step. The UUT displays 0001 if the password is correct. If the password is not correct, the UUT emits a double beep, displays ???? and the password must be entered again. Repeat step 4.
6. Use Table 6, Table 7, or Table 8 according to the serial number and model of your Meter. Apply the input value listed for each calibration adjustment step. For each step, position the rotary switch and apply the input to the terminals as indicated in the table.
7. After each input value is applied, press ◯ to accept the value and proceed to the next step (0002 and so forth).

Note

After pressing ◯, wait until the step number advances before changing the calibrator source or turning the rotary switch. If the rotary switch is not in the correct position, or if the measured value is not within the anticipated range of the input value, the UUT emits a double beep and will not continue to the next step. Some adjustment steps take longer to execute than others (10 to 15 seconds). For these steps, the UUT will beep when the step is complete. Not all steps have this feature.

8. After the final step, the display shows End to indicate that the calibration adjustment is complete. Press ◯ to go to meter mode.

Note

Set the calibrator to Standby prior to changing the function switch position and/or after completing adjustment of each function. If the calibration adjustment procedure is not completed correctly, the UUT will not operate correctly.

Table 6. Calibration Adjustment Steps for Models with SN <32980000

Switch Position (Function)	Input Terminal	Calibration Adjustment Step	Input Value
AC Volts	V/COM	C-01	600.0 mV, 60 Hz
		C-02 (Model 1587 only) [1]	600.0 mV, 5 kHz
		C-03	6.000 V, 60 Hz
		C-04 (Model 1587 only) [1]	6.000 V, 5 kHz
		C-05	60.00 V, 60 Hz
		C-06 (Model 1587 only) [1]	60.0 V, 5 kHz
		C-07	600.0 V, 60 Hz
		C-08 (Model 1587 only) [1]	600.0 V, 2 kHz
DC Volts		C-09	6.000 V, 0 Hz
		C-10	60.00 V, 0 Hz
		C-11	600.0 V, 0 Hz
DC Millivolts		C-12	600.0 mV, 0 Hz
		C-13	60.00 mV, 0 Hz
Ohms		C-14	600.0 Ω
		C-15	6.000 kΩ
		C-16	60.00 kΩ
		C-17	600.0 kΩ
		C-18	6.000 MΩ
		C-19	0.000 Ω
		C-20	50.0 MΩ
Continuity		C-21	600.0 Ω
Diode Test		C-22(Model 1587 only) [1]	6.000 V, 0 Hz
milliamps	mA/COM	C-23	60.00 mA, 60 Hz
		C-24	400.0 mA, 60 Hz
		C-25	60.00 mA, 0 Hz
		C-26	400.0 mA, 0 Hz
Insulation	mA/COM	C-27	1.0 mA, 0 Hz
⚠⚠Warning **To avoid electrical shock hazard, remove all test leads from the UUT before performing the following step.**			
Insulation	None [2]	C-28	None (press BLUE to start internal cal)

Notes:

[1] Calibration step will be skipped on Model 1577.

[2] Internal HV output calibration. Ensure no lead is inserted in Insulation (+) jack.

Table 7. Calibration Adjustment Steps for 1587 FC/1587 Models with SN >32980000

Switch Position (Function)	Input Terminal	Calibration Adjustment Step	Input Value
AC Volts	V/COM	C-01	600.0 mV, 60 Hz
		C-02	600.0 mV, 5 kHz
		C-03	6.000 V, 60 Hz
		C-04	6.000 V, 5 kHz
		C-05	60.00 V, 60 Hz
		C-06	60.0 V, 5 kHz
		C-07	600.0 V, 60 Hz
		C-08	600.0 V, 2 kHz
DC Volts		C-09	6.000 V, 0 Hz
		C-10	60.00 V, 0 Hz
		C-11	600.0 V, 0 Hz
DC Millivolts		C-12	600.0 mV, 0 Hz
		C-13	60.00 mV, 0 Hz
Ohms		C-14	600.0 Ω
		C-15	6.000 kΩ
		C-16	60.00 kΩ
		C-17	600.0 kΩ
		C-18	6.000 MΩ
		C-19	0.000 Ω
		C-20	50.0 MΩ
Continuity		C-21	600.0 Ω
Diode Test		C-22	6.000 V, 0 Hz
milliamps	mA/COM	C-23	60.00 mA, 60 Hz
		C-24	400.0 mA, 60 Hz
		C-25	60.00 mA, 0 Hz
		C-26	400.0 mA, 0 Hz
Insulation	mA/COM	C-27	1.0 mA, 0 Hz
⚠⚠Warning **To avoid electrical shock hazard, remove all test leads from the UUT before performing the following step.**			
Insulation	None [1]	C-28	None (press BLUE to start internal cal)

Notes:
[1] Internal HV output calibration. Ensure no lead is inserted in Insulation (+) jack.

Table 8. Calibration Adjustment Steps for 1577 Models with SN >32980000

Switch Position (Function)	Input Terminal	Calibration Adjustment Step	Input Value
AC Volts	V/COM	C-01	600.0 mV, 60 Hz
		C-02	6.000 V, 60 Hz
		C-03	60.00 V, 60 Hz
		C-04	600.0 V, 60 Hz
		C-05	6.000 V, 0 Hz
		C-6	60.00 V, 0 Hz
DC Volts		C-07	600.0 V, 0 Hz
		C-08	600.0 mV, 0 Hz
		C-09	60.00 mV, 0 Hz
DC Millivolts		C-10	600.0 Ω
		C-11	6.000 kΩ
Ohms		C-12	60.00 kΩ
		C-13	600.0 kΩ
		C-14	6.000 MΩ
		C-15	0.000 Ω
		C-16	50.0 MΩ
		C-17	600.0 Ω
Continuity		C-18	60.00 mA, 60 Hz
Diode Test		C-19	400.0 mA, 60 Hz
milliamps	mA/COM	C-20	60.00 mA, 0 Hz
		C-21	400.0 mA, 0 Hz
		C-22	1.0 mA, 0 Hz
		C-22	1.0 mA, 0 Hz
Insulation	mA/COM	C-28	None (press BLUE to start internal cal)
⚠⚠Warning **To avoid electrical shock hazard, remove all test leads from the UUT before performing the following step.**			
Insulation	None [1]	C-28	None (press BLUE to start internal cal)

Notes:
[1] Internal HV output calibration. Ensure no lead is inserted in Insulation (+) jack.

Service and Parts

User service is limited to replacing parts. Table 9 identifies the parts available for replacement and Figure 11 shows the location of each part. To order replacement parts refer to *Contacting Fluke* earlier in this manual.

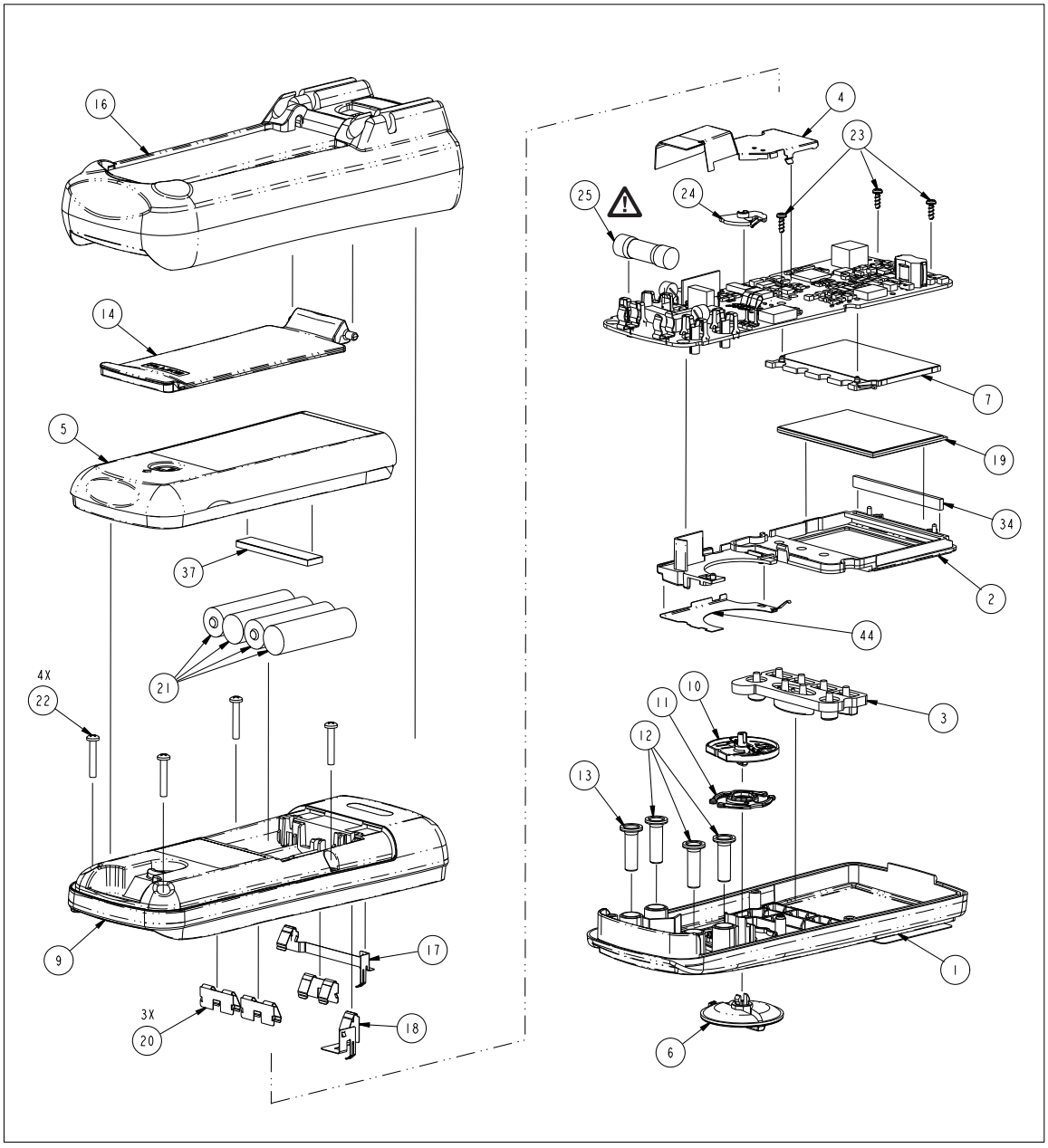


Figure 11. 1587 FC/1587/1577 Replacement Parts

Table 9. 1587 FC/1587/1577 Replacement Parts

Item	P/N	Qty	Ref Des	Description
1	2277944	1	MP1	1577, Case Top
1	2277926	1	MP1	1587, Case Top
1	4637584	1	MP1	1587 FC, Case Top
2	2277971	1	MP2	1577, Bracket, Mask
2	2277967	1	MP2	1587, Bracket, Mask
2	4637600	1	MP2	1587 FC, Bracket, Mask
3	2281339	1	MP3	1577, Keypad
3	2281342	1	MP3	1587, Keypad
3	4636055	1	MP38	1587 FC Keypad
4	2277892	1	MP4	15x7, Shield, Bottom
5	2386438	1	MP5	1577, Door, Battery
5	2277998	1	MP5	1587, Door, Battery
6	2278007	1	MP6	15x7, Knob
7	2168609	1	MP7	15x7, Backlight
9	4693718	1	MP9	15x7, Bottom Case
10	2278018	1	MP10	15x7, Housing Assy, RSOB
11	2278029	1	MP11	15x7, Detent Spring
12	2278128	3	MP12-14	15x7, Insulator, Receptacle, Red
13	2278137	1	MP15	15x7, Insulator, Receptacle, Black
14	2278143	1	MP16	15x7, Tilt Stand
16	2278162	1	MP18	15x7, Holster
17	2281317	1	MP19	15x7, Battery Contact, Negative
18	2281321	1	MP20	15x7, Battery Contact, Positive
19	4681923	1	MP21	15x7, LCD, Display (SN >32980000)
	2141295		MP21	15x7, LCD, Display (SN <32980000)
20	666435	3	MP22-24	15x7, Battery Contact, Dual
21	376756	4	MP40-43	15x7, Battery, 1.5 V, 2.24 AH, 15 A, Alkaline, AA,14X50 mm
22	832246	4	H26-29	15x7, Screw, 5-14, 0.750, Pan, Phillips, Blk, Thread Forming
23	642931	3	H30-32	15x7 Screw, 4-14, 0.312, Pan, Phillips, Zinc, Thread Forming
24	822676	1	MP32	15x7, Contact, PTF
25	943121	1	⚠ F1	15x7, Fuse, 0.406X1.375 Inches, 0.440A, 1000V, Fast
26*	2070140	1	MP26	15x7, TL224 Test Leads RA2S
27*	1273113	1	MP25	15x7, Thermocouple Assembly, Type K, 3 feet
28*	2000757	1	MP28	15x7, Probe, Multifunction
30*	2099044	1	MP30	15x7, Probe, Test, Banana Jack, 4mm Tip, Red
31*	2427138	1	MP31	15x7, Probe, Test, Banana Jack, 4mm Tip, Black
32*	1958646	1	MP47	15x7, Alligator Clip, Ex-Large Blk, IEC1010
33*	1958654	1	MP33	15x7, Alligator Clip, Ex-Large Red, IEC1010
34	2396462	1	MP34	15x7, Connector, Elastomeric

Table 9. 1587 FC/1587/1577 Replacement Parts (Cont.)

Item	P/N	Qty	Ref Des	Description
37	2401066	1	MP37	15x7, Absorber, Shock
41*	2416504	1	MP51	15x7, Hard Case, Molded
43*	1942029	1	MP53	15x7, Probe Cap, Gs-38 Red
44	2416177	1	MP54	15x7, Shield, Top
46*	NA	1	MP56	15x7 Manual, Calibration
47*	2401011	1	MP57	15x7, CD, Manual Set
* Not Shown				