FLUKE®

15B & 17B

Multimeters

Users Manual

PN 1991246
October 2002 Rev. 4, 1/10

LIMITED WARRANTY AND LIMITATION OF LIABILITY

This Fluke product will be free from defects in material and workmanship for one year from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Fluke's behalf. To obtain service during the warranty period, return the unit to point of purchase with a description of the problem.

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15B & 17B Multimeters

Introduction

⚠⚠Warning

To avoid electric shock or personal injury, read "Safety Information" and "Warning and Precautions" before using the Meter.

The Fluke Model 15B and Model 17B Multimeters (hereafter referred to as "the Meter") are 4,000 count instruments.

The Meter is battery powered with a digital display.

Except where noted, the descriptions and instructions in this Users Manual apply to both the Model 15B and Model 17B Multimeters.

Unless otherwise identified, all illustrations show the Model 17B.

Safety Information

The Fluke Model 15B and 17B comply with IEC 1010-1 CAT I 1000 V, CAT II 600 V, and CAT III 300 V overvoltage standards. See Specifications.

Use the Meter only as specified in this manual, otherwise the protection provided by the Meter may be impaired.

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user.

A **Caution** identifies conditions and actions that may damage the Meter or the equipment under test.

International symbols used on the Meter and in this manual are explained in Table 1.

Safe Working Practices

Review the safety information and comply with the safe working practices on pages 2 and 3.

⚠⚠Warnings and Precautions

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, comply with the following practices:

- ⇒ **Before using the Meter, inspect the case. Do not use the Meter if it is damaged. Look for cracks or missing plastic. Pay particular attention to the insulation around the connectors.**
- ⇒ **Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before using the Meter.**
- ⇒ **Verify a Meter's operation by measuring a known voltage. Do not use the Meter if it operates abnormally. Protection may be impaired. When in doubt, have the Meter serviced.**
- ⇒ **Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.**
- ⇒ **Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.**
- ⇒ **Use the proper terminals, function, and range for your measurements.**
- ⇒ **Do not operate the Meter around explosive gas, vapor, or dust.**
- ⇒ **When using the probes, keep the fingers behind the finger guards.**
- ⇒ **When making connections, connect the common test lead before connecting the live test lead; when disconnecting, disconnect the live test lead before disconnecting the common test lead.**
- ⇒ **Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.**
- ⇒ **Do not use the Meter in a manner not specified by this manual or the safety features of the Meter may be impaired.**
- ⇒ **For all dc functions, including manual or auto-ranging, to avoid the risk of shock due to possible improper reading, verify the presence of any ac voltages by first using the ac function. Then select a dc voltage range equal to or greater than the ac range.**

⚠⚠ Warnings and Precautions (Continued)

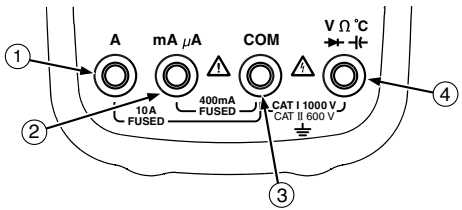
- ⇒ **Before measuring current, check the Meter's fuses (see "Testing the Fuses") and turn OFF power to the circuit before connecting the Meter to the circuit.**
- ⇒ **Do not operate the Meter with the case (or part of the case) removed.**
- ⇒ **Use only two AA batteries, properly installed in the Meter case, to power the Meter.**
- ⇒ **Replace the battery as soon as the battery indicator ( ) appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.**
- ⇒ **Do not measure voltages above 600 V in Category II, or 300 V in Category III installations**.
- ⇒ **When in REL mode the Δ symbol is displayed. Caution must be used because hazardous voltage may be present.**
- ⇒ **Remove test leads from the Meter before opening the Meter case or battery door.**
- ⇒ **When servicing the Meter, use only specified replacement parts.**

Table 1. International Electrical Symbols

~	AC (Alternating Current)	⏚	Earth Ground
⎓	DC (Direct Current)	⎓	Fuse
≅	AC or DC	⧈	Double Insulated
⚠	Safety Information	⚠	Shock Hazard
▭	Battery	CE	Complies with EU directives
⏩	Diode	⏚	Capacitance
CAT II	IEC Measurement Category II – CAT II equipment is designed to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portable tools, and other household circuits.	CAT III	IEC Measurement Category III – CAT III equipment is designed to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.		

Instrument Overview

Terminals



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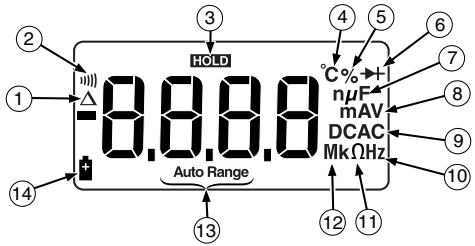
Item	Description
1	Input terminal for AC and DC current measurements to 10A and frequency (17B only) measurements.
2	Input terminal for AC and DC microamp and milliamp measurements to 400 mA and frequency (17B only) measurements.
3	Common (return) terminal for all measurements.
4	Input terminal for voltage, resistance, continuity, diode, capacitance, frequency (17B only) and temperature (17B only) measurements.

Display



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Item	Description
1	Relative mode is active
2	Continuity selected
3	Display Hold is enabled
4	Temperature is selected
5	Duty Cycle is selected
6	Diode test is selected
7	**F** – Farads for capacitance
8	**A, V** – amps or volts
9	**DC, AC** – dc or ac voltage or current
10	**Hz** – Frequency is selected
11	**Ω** – Ohms is selected
12	**m, M, k** – decimal prefix
13	Auto range selected
14	Battery is low and should be changed

Battery Saver

The Meter enters the “Sleep mode” and blanks the display if the Meter is not used and the input is inactive for 30 minutes. Press any button or turn the rotary switch to wake the Meter up. To disable the Sleep mode, hold down the YELLOW button while turning the Meter on.

Making Measurements

Manual Ranging and Auto Ranging

The Meter has both manual and auto range options. In the auto range mode, the Meter selects the best range for the input detected. This allows you to switch test points without having to reset the range. You can override auto ranging by selecting the range manually.

The Meter defaults to the auto range mode in measurement functions that have more than one range. When the Meter is in the auto range mode, **Auto Range** is displayed.

To enter and exit the manual range mode:

1. Press RANGE.
   Each press of RANGE increments the range. When the highest range is reached, the Meter wraps to the lowest range.
2. To exit the manual range mode, press and hold RANGE for two seconds.

⚠⚠ Warning

Dangerous voltages may be present at the input terminals and may not be displayed.

Data Hold

To hold the present reading, press HOLD. Press HOLD again to resume normal operation.

Relative Measurements (17B only)

The Meter will display relative measurements in all functions except frequency.

1. With the Meter in the desired function, touch the test leads to the circuit on which you want future measurements to be based.
2. Press REL to store the measured value as the reference value and activate the relative measurement mode. The difference between the reference value and subsequent reading is displayed.
3. Press REL for more than 2 seconds to return the Meter to normal operation.

Measuring AC and DC Voltage

To minimize improper reading of an unknown voltage containing either ac or ac + dc voltage components, first select the ac voltage function on the meter making particular note of the ac range required for a good measurement. Next manually select the dc function with

the dc range that either matches or is higher than the previously noted ac range. Using this procedure minimizes the effects of ac transients while making accurate dc measurements.

1. Choose ac or dc by turning the rotary switch to Ṽ, V̿, or mV̿.
2. Connect the red test lead to the terminal and the black test lead to the **COM** terminal.
3. Measure the voltage by touching the probes to the desired test points of the circuit.
4. Read the measured voltage on the display.

Note

The only way to access the 400 mV range is by manual ranging.

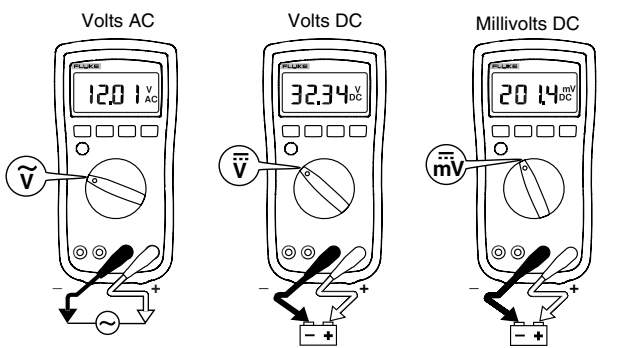

Figure 1. Measuring AC and DC Voltage

Measuring AC or DC Current

1. Turn the rotary switch to Ã, mA, or μA.
2. Toggle between ac or dc current measurement by pressing the YELLOW button.
3. Connect the red test lead to either the **A**, or **mA μA** terminal based on the current to be measured and connect the black test lead to the **COM** terminal.
4. Break the circuit path to be measured. Then connect the test leads across the break and apply power.
5. Read the measured current on the display.

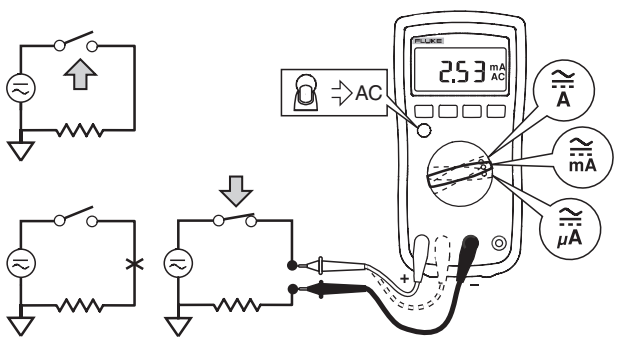

Figure 2. Measuring AC and DC Current

Measuring Resistance

⚠⚠ Warning

To avoid electrical shock or damage to the Meter when measuring resistance or continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

1. Turn the rotary switch to Ω. Make sure power is disconnected from the circuit to be measured.
2. Connect the red test lead to the VΩ terminal and the black test lead to the **COM** terminal.
3. Measure the resistance by touching the probes to the desired test points of the circuit.
4. Read the measured resistance on the display.

Testing for Continuity

With the resistance mode selected, press the YELLOW button twice to activate the continuity beeper. If the resistance is under 50 Ω, the beeper will sound continuously, designating a short circuit. If the meter reads OL, the circuit is open.

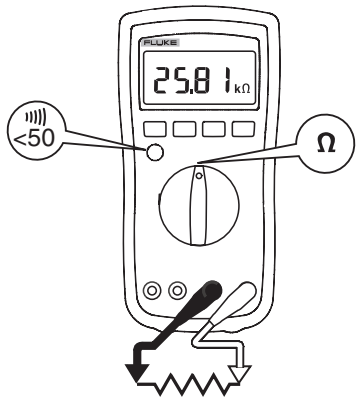

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Figure 3. Measuring Resistance/Continuity

Testing Diodes

⚠⚠ Warning

To avoid electrical shock or damage to the Meter when testing diodes in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

1. Turn the rotary switch to .
2. Press the YELLOW function button once to activate Diode Test.
3. Connect the red test lead to the terminal and the black test lead to the **COM** terminal.
4. Connect the red probe to the anode side and the black test lead to the cathode side of the diode being tested.
5. Read the forward bias voltage value on the display.
6. If the polarity of the test leads is reversed with diode polarity, the display reading shows OL. This can be used to distinguish the anode and cathode sides of a diode.

Measuring Capacitance

⚠ Caution

To avoid damage to the Meter, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.

1. Turn the rotary switch to .
2. Connect the red test lead to the terminal and the black test lead to the **COM** terminal.
3. Touch the probes to the capacitor leads.
4. After allowing the reading to stabilize (up to 15 seconds), read the capacitance value on the display.

Measuring Temperature (17B only)

1. Turn the rotary switch to ℃.
2. Plug the thermocouple into the Meter's and **COM** terminals, insuring the thermocouple plug marked with a + symbol is inserted into the terminal on the Meter.
3. Read the temperature in degrees centigrade on the display.

Measuring Frequency and Duty Cycle (17B only)

The Meter can measure Frequency or Duty Cycle while making either an AC Voltage or AC Current measurement. Pressing the Hz % button will switch the meter to manual range. Select appropriate range before measuring frequency or duty cycle.

1. With the Meter in the desired function (AC Voltage or AC Current), press the Hz % button.
2. Read the frequency of the AC signal on the display.
3. To make a duty cycle measurement, press the Hz % button again.
4. Read the percent of duty cycle on the display.

Maintenance

Beyond replacing batteries and fuses, do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions. The recommended calibration cycle is 12 months.

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings.

To clean the terminals

1. Turn the Meter **OFF** and remove the test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with isopropyl alcohol and work around the inside of each input terminal.
4. Use a new swab to apply a light coat of fine machine oil to the inside of each terminal.

Testing the Fuses

⚠⚠ Warning

To avoid electric shock or injury, remove the test leads and any input signals before replacing the fuses.

1. Turn the rotary switch to Ω.
2. Plug a test lead into the VΩC terminal and touch the probe to the **A** or **mA μA** terminal.

- A good **A** terminal fuse is indicated by a reading between 000.0 Ω and 000.1 Ω. A good **mA μA** terminal fuse is indicated by a reading between 0.990 kΩ and 1.010 kΩ.
- If the display reads OL, replace the fuse and test again.
- If the display shows any other value, have the Meter serviced. See “Service and Parts” later in this manual.

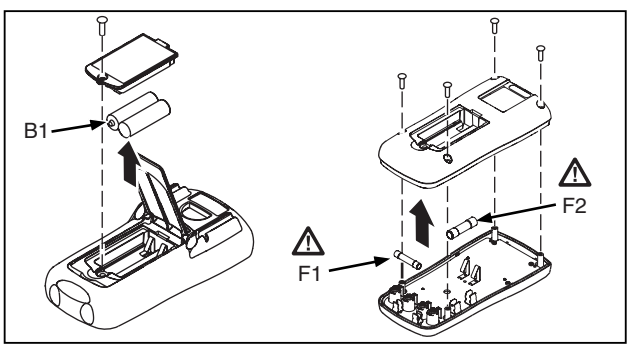
Replacing the Batteries and Fuses

⚠⚠ Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (▬) appears.

To prevent damage or injury, install ONLY replacement fuses with the specified amperage, voltage, and interrupt ratings.

Disconnect test leads before opening the case or the battery door.



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⚠ F1 Fuse, 500 mA, 1000V, 50 kA interrupt rating	Fluke PN 1989732
⚠ F2 Fuse, 11A, 1000 V, 20 kA interrupt rating	Fluke PN 803293
⚠ F2 Fuse, 10A, 1000 V, 30 kA interrupt rating	Fluke PN 1989726 (alternate)
B1 Battery, 2 X AA Alkaline NEDA 15A, IEC LR6	Fluke PN 376756
Battery Door	Fluke PN 1884065

Service and Parts

If the Meter fails, first check the batteries and fuses, then review this manual to make sure that you are operating the Meter correctly.

To contact Fluke call:

+86-10-65123435 ext 15 in China
+91-11-450-94781/98200 29770 in India
+81-3-3434-0181 in Japan
+85-276-6196 in Singapore
+1-425-446-5500 anywhere in the world

Visit Fluke's Web site at **www.fluke.com**

General Specifications

Maximum Voltage between any Terminal and Earth Ground:	1000V
Display:	Digital: 4000 count updates 3/sec
Temperature:	Operating: 0 °C to 40 °C, Storage: -30 °C to 60 °C indefinitely (to -40 °C for 100 hours)
Operating Altitude:	0 to 2000 meters
Temperature Coefficient:	0.1 X (specified accuracy)/ °C (<18 °C or >28 °C)
Electromagnetic Compatibility:	Complies with FCC Part 15, Class B, IEC 61326, 3 V/m, performance criterion B
Rated Transient Overvoltage:	4 kV (1.2 x 50 µs) Peak for measurement Categories I, II, and III.
Relative Humidity:	Noncondensing < 10 °C 90 % from 10 °C to 30 °C; 75 % from 30 °C to 40 °C
Relative Humidity, 40 MΩ Range:	80 % from 10 °C to 30 °C; 70 % from 30 °C to 40 °C
Battery Type:	2 X AA, NEDA 15A, IEC LR6
Battery Life:	Alkaline: 500 Hours
Size (H x W x L):	180 mm x 89 mm x 51.5 mm (with holster)
Weight:	425 grams
Certifications:	CMC, CE
Safety Compliance:	IEC 61010-1, 2000 CAT I 1000 V, CAT II 600 V, and CAT III 300 V overvoltage standards

Overvoltage installation categories per IEC 61010-1, 2000: The Meter is designed to protect against transients in these catagories:

CAT I	From high-voltage low-energy sources, e.g., electronic circuits or a copy machine.
CAT II	From equipment supplied from the fixed installation, e.g., TVs, PCs, portable tools and household appliances.
CAT III	From equipment in fixed equipment installations, e.g., installation panels, feeders and short branch circuits, and lighting systems in large buildings.

Accuracy Specifications

Accuracy is specified for 1 year after calibration, at operating temperatures of 18 °C to 28 °C, relative humidity at 0 % to 75 %. Accuracy specifications take the form of: ±([% of Reading] + [Number of Least Significant Digits])

Function	Range	Resolution	Accuracy	
			Model 15B	Model 17B
AC Volts (40 to 500 Hz) 	400.0 mV [1]	0.1 mV	3.0 % + 3	3.0 % + 3
	4.000 V 40.00 V 400.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	1.0 % + 3	1.0 % + 3
DC Millivolts 	400.0 mV	0.1 mV	1.0 % + 10	1.0 % + 10
DC Volts 	4.000 V 40.00 V 400.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	0.5 % + 3	0.5 % + 3
Diode Test [2] 	1.000 V	0.001 V	10 %	
Temperature [3] **°C** (K-type thermocouple)	50 °C to 400 °C 0 °C to 50 °C -55 °C to 0 °C	0.1 °C	NA	2 % + 1 °C ± 2 °C 9 % + 2 °C

[1] Manual Range only.

[2] Diode test open circuit test voltage is 1.1 V to 1.6 V and short circuit current is < 0.6 mA (typical).

[3] Temperature specifications do not include thermocouple errors. After inserting the thermocouple plug into the meter, allow several minutes for thermal stabilization. The thermocouple supplied with this unit covers a temperature range of -40 °C to +260 °C. For probes that provide coverage outside this range, see the Fluke Accessories Brochure.

Function	Range	Resolution	Accuracy	
			Model 15B	**Model 17B**
Resistance (Ohms) Ω	400.0 Ω 4.000 kΩ 40.00 kΩ 400.0 kΩ 4.000 MΩ 40.00 MΩ	0.1 Ω 0.001 kΩ 0.01 kΩ 0.1 kΩ 0.001 MΩ 0.01 MΩ	0.5 % + 3 0.5 % + 2 0.5 % + 2 0.5 % + 2 0.5 % + 2 1.5% + 3	0.5 % + 3 0.5 % + 2 0.5 % + 2 0.5 % + 2 0.5 % + 2 1.5% + 3
Capacitance [1] ⊣⊢	50.00 nF 500.0 nF 5.000 µF 50.00 µF 100.0 µF	0.01 nF 0.1 nF 0.001 µF 0.01 µF 0.1 µF	2 % + 5 2 % + 5 5 % + 5 5 % + 5 5 % + 5	2 % + 5 2 % + 5 5 % + 5 5 % + 5 5 % + 5
Frequency **Hz** (10 Hz – 100 kHz)	50.00 Hz 500.0 Hz 5.000 kHz 50.00 kHz 100.0 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz 0.1 kHz	NA	0.1 % + 3
Duty Cycle	0.1 % to 99.9 %	0.1 %	NA	1 % typical [2]

[1] Specifications do not include errors due to test lead capacitance and capacitance floor (may be up to 1.5 nF in the 50 nF range). For the 17B, errors can be reduced by using the relative feature.

[2] For values between 10 % and 90 % duty cycle at 50 Hz.

Function	Range	Resolution	Accuracy	
			Model 15B	**Model 17B**
AC Current (40 to 200 Hz) **μA**	400.0 μA 4000 μA	0.1 μA 1 μA	1.5 % + 3	1.5 % + 3
AC Current (40 to 200 Hz) **mA**	40.00 mA 400.0 mA	0.01 mA 0.1 mA	1.5 % + 3	1.5 % + 3
AC Current (40 to 200 Hz) **A**	4.000 A [1] 10.00 A	0.01 A 0.01 A	1.5 % + 3	1.5 % + 3
DC Current **μA**	400.0 μA 4000 μA	0.1 μA 1 μA	1.5 % + 3	1.5 % + 3
DC Current **mA**	40.00 mA 400.0 mA	0.01 mA 0.1 mA	1.5 % + 3	1.5 % + 3
DC Current **A**	4.000 A [1] 10.00 A	0.01 A 0.01 A	1.5 % + 3	1.5 % + 3

[1] When in the 4A range, display will show 4000 counts, please ignore the last digit.

Function	Overload Protection	Input Impedance (Nominal)	Common Mode Rejection Ratio	Normal Mode Rejection
AC Volts	1000 V [1]	>10 MΩ <100 pF	>60 dB at dc, 50 or 60 Hz	_
DC Volts	1000 V [1]	>10 MΩ <100 pF	>100 dB at dc, 50 or 60 Hz	>45 dB at 50 or 60 Hz

[1] 10^6 V Hz Max