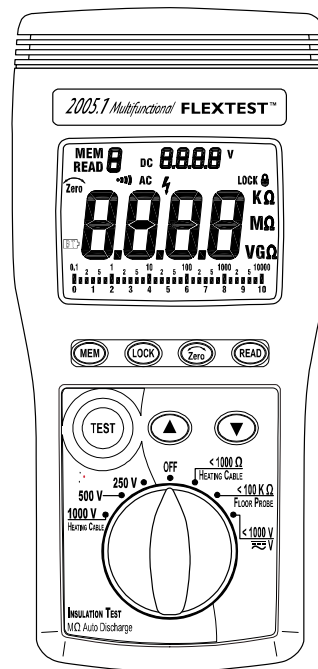


# FLEXTEST Multifunctional Tester


## FL2005.1 INSTRUCTION MANUAL



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## 1. SAFETY INFORMATION

- The circuit under test must be de-energized and isolated before connections are made except for voltage measurement.
- Verify operation prior to measuring hazardous voltages (voltage above 30V AC rms, 42V AC peak and 60V DC).
- Do not touch the circuit connections during a test.
- Disconnect the live test lead before disconnecting the neutral test lead.
- After insulation tests, to protect from electric shock, capacitive circuits must to be discharged.
- Do not use the meter if the low battery indicator (  ) is displayed.
- Test leads (including crocodile clips) must be in good order, clean and not broken nor cracked.
- Do not use the meter if it looks damaged.
- Do not use the meter around explosive gas, vapor or dust.
- Do not push test button before all connection and preparation is done. The instrument must only be used by suitably trained and competent persons.
- Do not use the meter with any parts or cover removed.
- Do not use the meter in a wet environment.
- **U.S. PAT. NO. 478,017**
- **JAPAN PAT. NO. 1180870**
- **CHINA PAT. NO. ZL02367250.1**

### Warnings and Safety symbols:



Caution refer to this manual before using the meter.



Dangerous voltages.



Meter is protected throughout by double insulation or reinforced insulation.



Comply with IEC1010-1

**When servicing, use only specified replacement parts.**

## 2. SPECIFICATIONS

### 2-1 General Information

#### *Environment conditions :*


- ① Installation Categories III 1000V
- ② Pollution Degree 2
- ③ Altitude up to 2000 meters
- ④ Indoor use only

#### **Safety Meets of IEC61010-1 and IEC61557**


Display : Dual display, 3-3/4 Digital readout with analog bar indication.

Sampling Rate : 1 sample/sec.

Manual data Memory and Read : Memory capacity 9 set.

Over Range Indicator : "  " will be displayed.

Low Battery Indication :

The (  ) will be displayed when the battery voltage drops below the operating voltage.

Operating Temperature and Humidity :

0°C to 50°C (32°F to 122°F) below 80% RH (noncondensing).

Temperature Coefficient : 0.10 x (specified accuracy)/ °C

Storage Temperature and Humidity :

-10°C to 60°C (14°F to 140°F) below 70% RH (noncondensing)

Battery : 6 x 1.5V Size "AA" battery.

Dimensions : 235 (L) x 116 (W) x 54(H) mm ,  
(9.3"L x 4.6"W x 2.1"H)

Weight : Approx. 520g (1.15 LB), including battery

Accessories : Test leads, 6pcs batteries, carrying case, instruction manual, reference card

## 2-2 Electrical Specifications

Accuracies are specified as:

$\pm(\dots\% \text{ of reading} + \dots \text{digits})$  at 23°C  $\pm 5^\circ\text{C}$ , below 80% RH.

### □ Insulation Resistance (M $\Omega$ )

Range	Resolution	Accuracy	Test Voltages
250V 2M $\Omega$ /20M $\Omega$ / 200M $\Omega$ /2G $\Omega$ /4G $\Omega$	2M $\Omega$ :1K $\Omega$ 20M $\Omega$ :10K $\Omega$ 200M $\Omega$ :100K $\Omega$ 2G $\Omega$ :1M $\Omega$ 10G $\Omega$ :10M $\Omega$	3%+5 (<1000M)	250V+30% ~ -0%
500V 4M $\Omega$ /40M $\Omega$ / 400M $\Omega$ /2G $\Omega$ /4G $\Omega$	4M $\Omega$ :1K $\Omega$ 40M $\Omega$ :10K $\Omega$ 400M $\Omega$ :100K $\Omega$ 2G $\Omega$ :1M $\Omega$ 10G $\Omega$ :10M $\Omega$	5%+5 (>1000M)	500V+30% ~ -0%
1000V 4G $\Omega$	1M $\Omega$		1000V+30% ~ -0%
Analog Bar Graph	0 to 10G $\Omega$		
Nominal Current	$\geq 1\text{mA}$		

### □ HEATING CABLE Resistance <1000 $\Omega$

Range	Resolution	Accuracy	Max. open Circuit Voltage	Overload Protection
999.9 $\Omega$	0.1 $\Omega$	1%+10	$\leq 3\text{V}$	600Vrms

### □ FLOOR PROBE Resistance

Range	Resolution	Accuracy	Max. open Circuit Voltage	Overload Protection
99.99K $\Omega$	0.01K $\Omega$	1%+5	$\leq 3\text{V}$	600Vrms

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### □ ~V AC Voltage (40Hz~500Hz)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
999V	1V	2%+3	9M $\Omega$	1000Vrms

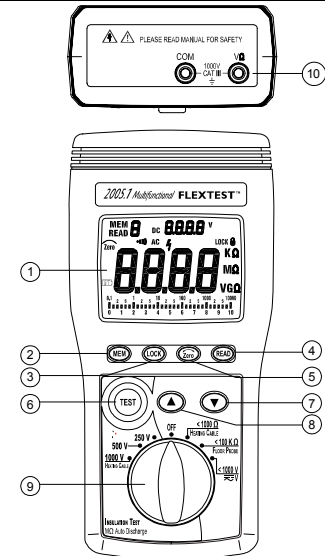
Sensitivity : 2V

### □ ---V DC Voltage

Range	Resolution	Accuracy	Input Impedance	Overload Protection
999V	1V	2%+3	9M $\Omega$	1000Vrms

Sensitivity : 2V

## 3. PARTS & CONTROLS



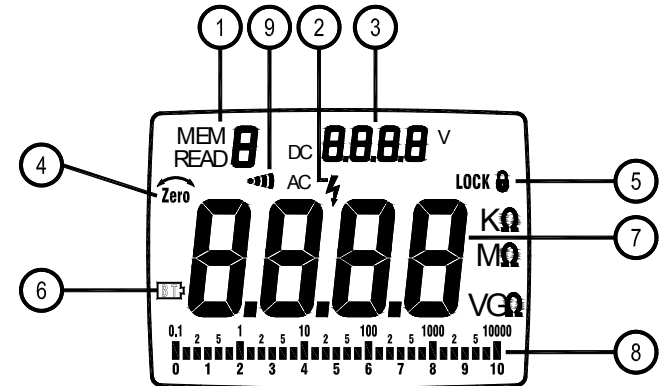
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- ① LCD display.
- ② MEM key: Manual data memory control key.
- ③ LOCK key: Locks the test Insulation Resistance ( $M\Omega$ ).
  - a) Press and hold down LOCK key than press TEST key enter to continuously  $M\Omega$  test mode, the "LOCK" icon appear on the display.
  - b) In  $M\Omega$  mode continuously applies the test voltage to the circuit to be tested. The beeper sounds every 2 seconds to remind you that you are in the LOCK mode.
  - c) Press the LOCK or TEST key to stop the test.
- ④ READ key: Manual memory data read control key.
- ⑤ **Zero** key: In **HEATING CABLE**  $<1000\Omega$  function, turns the test lead resistance compensation ON.
 

Touch the probe tips together, then press **Zero** key.

The **Zero** icon will appear on the display and the main display indicates  $0.0\Omega$ .
- ⑥ TEST key:
  - a). Used for  $M\Omega$  test functions.
  - b). Press and hold TEST key until the main display measurement has stabilized.
- ⑦ ⑧ **▼▲** keys : In READ mode, select the data memory location to display the data.
- ⑨ Rotary switch: To select a measurement function.
- ⑩ Input terminals.

**Display :**



- ① Manual data memory and read address indicator.
- ② In  $M\Omega$  ranges, high voltage warning symbol flashes.
- ③ In  $M\Omega$  functions indicates the test voltage applied to the circuit under test.
- ④ Zero symbol is on if test leads are zeroed out.
- ⑤ Lock symbol is on if the TEST mode is locked in  $M\Omega$  functions.
- ⑥ Low battery symbol.
- ⑦ Main display reading for all functions.
- ⑧ Analog bar graph displays  $M\Omega$  on a logarithmic scale and other functions on a linear scale. The value always tracks the main display.
- ⑨ In **HEATING CABLE**  $<1000\Omega$  function, the beeper symbol indicates input resistance  $<10\Omega$ .

## 4. BEFORE OPERATION



### Warning

- To avoid electrical shock remove test leads before opening case or battery cover. Do not operate with battery cover open.
- To avoid electrical shock when performing resistance tests, remove all power from the circuit to be measured.
- To avoid electrical shock, first connect the test leads to the meter inputs before you make connection to the circuit under test.
- To avoid electrical shock, do not touch test lead tips, test points or terminals when pressing TEST.

#### 4-1 How to connect test leads.

Connect the red test lead into the "V $\Omega$ " terminal and the black lead into the "COM" terminal.

#### 4-2 Battery Check & Replacement

- 1) If battery power is not sufficient, LCD will display "BT". Replacement of 6 pcs new batteries, type 1.5V size "AA" is required.
- 2) Use a screwdriver to unscrew the screw secured on battery cover. Take out the used batteries and replace 6 pcs new batteries.
- 3) Replace the battery cover and secure the screw.

#### 4-3 Test Leads Check

Set the range select switch to the **HEATING CABLE** range. Connect the crocodile clips with the test lead tips, Clip alligator clips with lead other. The indicator should read  $<0.5\Omega$ . When the leads are not connected the display will read infinity indicated by " $\infty$ ". This will ensure that test leads are under working condition.

#### 4-4 Manual Data Memory and Read Mode :

##### 1) Clear the manual memorized data

- ① Set the function switch to OFF position to turn off the meter.
- ② Press and hold down "MEM" key, and turn on the meter. Release the "MEM" key. When LCD shows "MEM CLr" mark, press "▼" key select "YES" or "NO", then press "MEM" key to exit this mode. To clean all of the memories, select "YES".

##### 2) Manual data memory

- ① Press "MEM" key each time, one set of reading will be stored to the memory. At this moment, LCD will show the "MEM" mark and the memory address number. Total memory size is 9 sets.
- ② When the memory is full, LCD will show "F" memory address number.

##### 3) Read Manual memory data

- ① Press "READ" key to enter READ mode, the LCD will show "READ" mark and the memory address number.
- ② Press "▲" or "▼" key to select the desired memory address number data for display.
- ③ Press "READ" key again to exit this mode.

## 5. $\overline{\sim}$ V VOLTAGE MEASUREMENT

- 1) Set the function switch to  $\overline{\sim}$ V position.
- 2) Connect red test lead to “ V $\Omega$  ” terminal and black test lead to “ COM ” terminal.
- 3) Connect the probe IN PARALLEL to the circuit to be measured.
- 4) Read the voltage value from the display. The meter indicates AC voltage on the main display.

## 6. FLOOR PROBE - RESISTANCE MEASUREMENT

- 1) Set the function switch to FLOOR PROBE position.
- 2) Connect red test lead to “ V $\Omega$  ” terminal and black test lead to “ COM ” terminal.
- 3) Connect the probe to floor probe wires.
- 4) Read the resistance value from the display.

## 7. HEATING CABLE <1000 $\Omega$ RESISTANCE MEASUREMENT

- 1) Set the function switch to HEATING CABLE <1000 $\Omega$  position.
- 2) Connect red test lead to “ V $\Omega$  ” terminal and black test lead to “ COM ” terminal.
- 3) Zero out the test lead resistance (see section 3.5 Zero key).
- 4) Connect the probes to the cable wires (black & white / red).
- 5) Read the resistance value from the display, if the resistance is <10 $\Omega$ , the meter will beep.

## 8. M $\Omega$ INSULATION RESISTANCE MEASUREMENTS

### 8-1 Measuring Insulation Resistance

Measuring insulation resistance requires the application of potentially dangerous voltage to the circuit. This may include exposed bonded metal work.

Before proceeding, ensure that the installation is correctly wired and no personnel are endangered by any test.

- 1) Set the function switch to the desired M $\Omega$  test voltage position.
- 2) Connect red test lead to “ V $\Omega$  ” terminal and black test lead to “ COM ” terminal.
- 3) The display will show “-----” until the TEST button is pushed. Press and hold the TEST key. The upper right display shows the test voltage applied to the circuit under test. The main display shows the resistance until a stable resistance reading is displayed on the main display.
- 4) Keep the probes on the test points when releasing the TEST key. The upper right display shows the measured resistance reading and the main display show “---”, while the circuit now discharges through the meter.
- 5) Verify that the circuit is completely discharged. Set the function switch to the other M $\Omega$  test voltage position. The upper right display shows the decreasing voltage, keep the probe touched to test points until the circuit is completely discharged and the display shows “0V”.

### 8-2 Using the LOCK Function to Measure Insulation Resistance

The LOCK function holds the test voltage on the probes. Use LOCK function to make long duration measurements, don't need to push and hold the TEST key.

- 1) Press and hold down LOCK key then press TEST key enter to LOCK mode. In this mode, a potentially dangerous voltage is continuously applied to the probes.

In this mode, if the probes are disconnected from the circuit, the meter cannot discharge any potentially dangerous capacitive voltages left on the circuit.

Ensure that the circuit is de-energized before connecting the test probes.

- 2) Press LOCK or TEST key to disable the Lock function.

## **9. BATTERY REPLACEMENT**

- 1) Set the function switch to OFF position.
- 2) Disconnect test leads from any power source.
- 3) Place the meter face down on a nonabrasive surface and loosen the two screws.
- 4) Take off the battery cover.
- 5) Remove the battery, replace with six new batteries.
- 6) Place the battery cover on and secure the two screws.

## **10. MAINTENANCE & CLEANING**

- 1) Repairs or servicing not covered in this manual should only be performed by qualified personnel.
- 2) Periodically wipe the case with a dry cloth.  
Do not use abrasives or solvents on this instrument.