FLUKE®

1550B
MegOhmMeter

Users Manual

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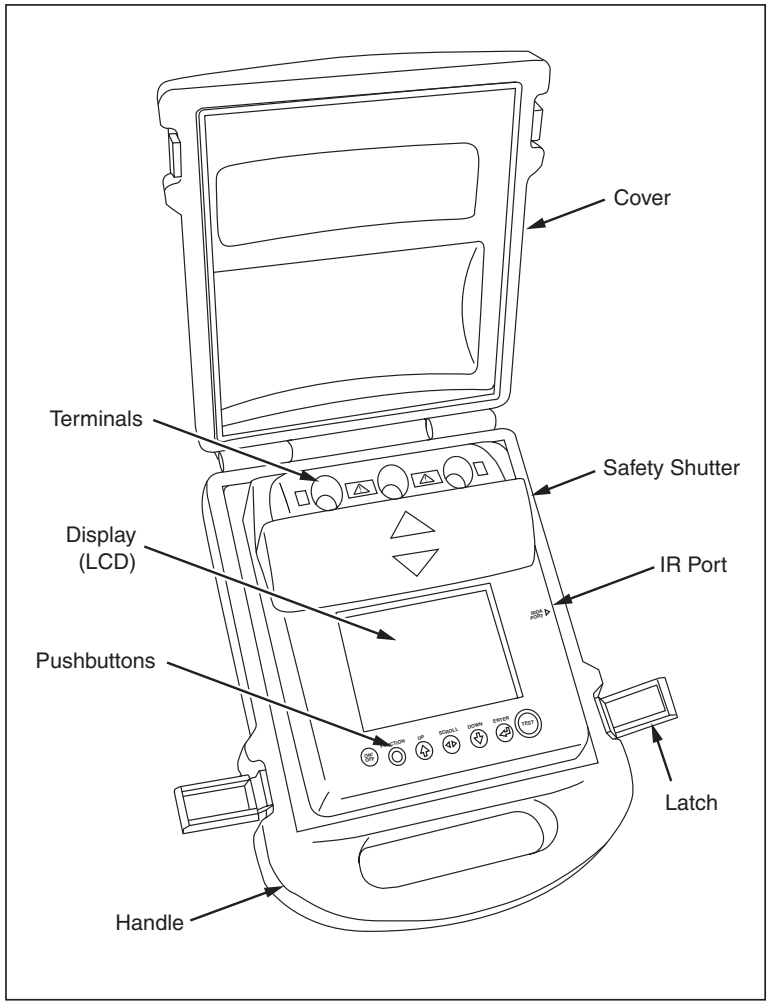

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Fluke 1550B MegOhmMeter

1550B MegOhmMeter Users Manual

Introduction

The Fluke 1550B MegOhmMeter (hereafter "the Meter") is a high voltage insulation tester for testing general circuits, including switchgear, motors, and cables.

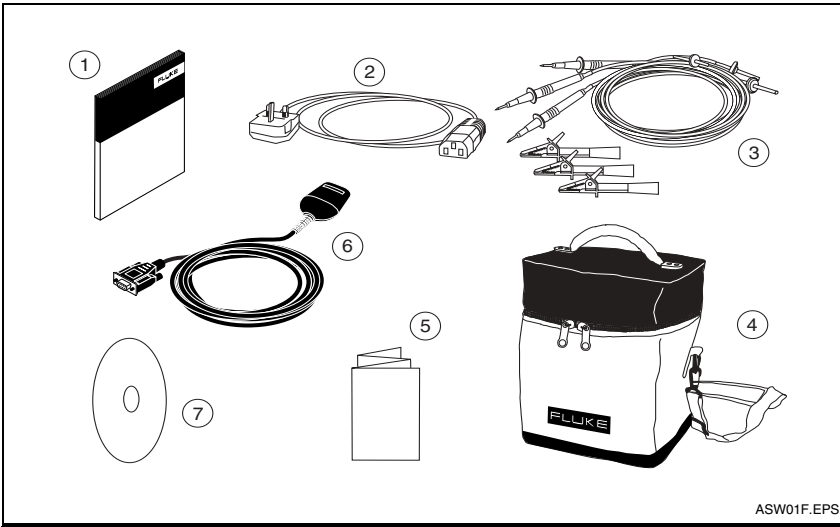
The Meter has the following features:

⇒ Large liquid crystal display (LCD) with text display
⇒ Five pre-set test voltage: 250 V, 500 V, 1000 V, 2500 V, and 5000 V
⇒ Programmable test voltage: 250 V to 5000 V (50/100 V steps)
⇒ Resistance measurement: 0 Ω to 1 TΩ
⇒ Polarization Index (PI) measurement
⇒ Dielectric Absorption Ratio (DAR) measurement
⇒ Ramp mode that linearly increases (100 V/s) the applied test voltage
⇒ Test timer and storage for test results with user settable ID tag
⇒ Breakdown voltage indication
⇒ Rechargeable lead-acid battery
⇒ Auto shutoff after 30 minutes of inactivity
⇒ Infrared (IR) port for downloading test data
⇒ PC software supplied

The Meter meets EN 61557 Parts 1 and 2; and EN 61010-1, CAT III 600 V Pollution Degree 2 standards. CAT III equipment is designed to protect against transients in equipment in fixed-equipment installations, such as distribution panels and lighting systems in large buildings.

Unpacking the Meter

The Meter comes with the items shown in Figure 1. If the Meter is damaged or an item is missing, contact the place of purchase immediately.



Item	Description
①	English Manual
②	AC Power Cord
③	⚠ Test Cables with Alligator Clips (red, black, green)
④	Soft Carrying Case
⑤	Quick Reference Card
⑥	Infrared Adapter with interface cable
⑦	CD containing Users Manual

Figure 1. Standard Items Provided

⚠⚠ Warning

Use only recommended test leads. The supplied test leads are for use with this instrument only. Do not use with other equipment

Safety Information

⚠⚠ Warning

Before and after testing, confirm that the Meter does not indicate the presence of a hazardous voltage. (See Figure 3.) If the Meter beeps continuously and a hazardous voltage is shown on the display, disconnect test leads and remove power from the circuit under test.

⚠⚠ Warning: Read Before Using the Meter

- **To avoid possible electric shock or personal injury:**
- **Use the Meter only as specified in this manual. Otherwise the protection provided by the Meter might be impaired.**
- **Do not disconnect the test leads before the test has been completed and the test voltage at the terminals has returned to zero. This ensures that any charged capacitance is fully discharged.**
- **Ensure there is no power to the circuit under test and that all circuit capacitances are fully discharged prior to testing with this instrument.**
- **Avoid working alone or around explosive gas, vapor or dust.**
- **Do not use the Meter in a wet environment.**
- **Inspect the test leads for damaged insulation or exposed metal. Check test lead continuity. Replace damaged leads. Do not use the Meter if it looks damaged.**
- **Use care when working above 30 V ac rms, 42 V ac peak and 60 V dc. Such voltages pose a shock hazard.**
- **When using the probes, keep your fingers behind the finger guards.**
- **Impedances of additional operating circuits connected in parallel can adversely affect measurements.**
- **Place test leads in proper input terminals.**
- **Do not use the Meter with any parts or cover removed.**
- **Use only Fluke approved replacement parts, and accessories as specified in this manual.**
- **Do not use the Meter if the safety shutter is impaired in any way. The safety shutter (see Frontispiece) prevents access to the test terminals and charger terminals at the same time.**
- **There are no user replaceable parts inside the instrument.**
- **Use the guard terminal only as specified in this manual. Do not allow other accessories or foreign objects to come into contact with the guard terminal as safety may be compromised.**
- **Do not use in distribution systems with voltages higher than 660 V.**

Symbols

Symbols on the Meter and in the manual are explained Table 1.

Table 1. Symbols

CE	Conforms to European Union standards.
TUV PRODUCT SERVICE GS	TUV GS
C SP US	This product complies with UL3111-1, CAN/CAS C22.2 No.1010.1 for Test and Measurement Equipment
⚠	Risk of danger. Important information. See Manual.
⚠	Potentially hazardous voltage
⧈	Equipment protected by double or reinforced insulation.
⚠ >660V	Do not use in distribution systems with voltages higher than 660 V.
⩘	Interference is present. Displayed value might be outside of specified accuracy.
▟	Ramp mode indicator
↯	Electrical breakdown
~	Volts AC
⏚	Earth Ground

Operating the Meter

Turning the Meter On and Off

To turn the Meter on and off:

1. Press (ON/OFF) to turn on the Meter.

   The Meter performs a self-check, self-calibration, displays the current software version, and starts in the Test Voltage mode.

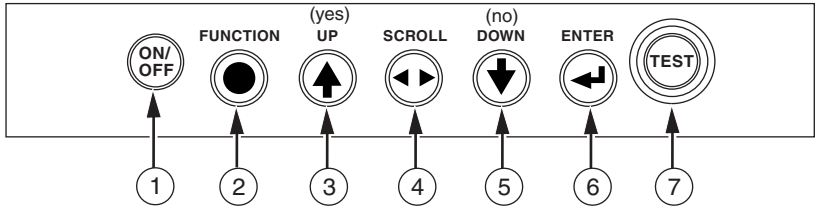
   At this point, you can:

   ⇒ Change test parameters
   ⇒ Start an insulation test
   ⇒ View stored test results
   ⇒ Download test results

2. Press (ON/OFF) again to turn off the Meter.

Using the Pushbuttons

Use the pushbuttons (Figure 2) to control operation of the Meter, select test results for viewing, and scroll through selected test results.

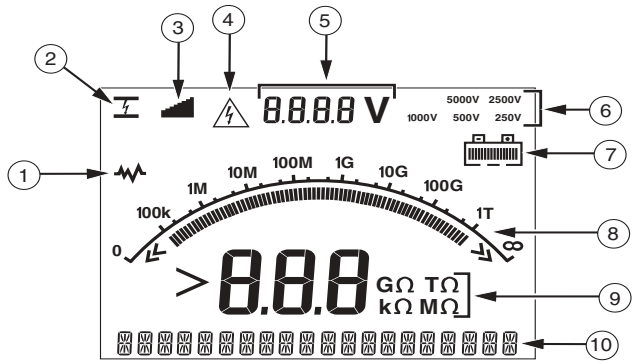


Item	Button	Description
①	ON/ OFF	Turns the Meter off and on.
②	FUNCTION	**Function button.** From Test Voltage mode, the Function button scrolls through Test Voltage selection, ramp test setup, time limit setup, and results (memory functions). While reviewing results, use the Function button to choose between the view and delete screens.
③	UP (yes)	**Up button.** Used to scroll through test voltages, stored test results, timer duration, and changing test tag ID characters. Also used to answer “yes” to yes/no prompts.
④	SCROLL	**Scroll button.** After you select a memory location, use the Scroll button to display the test parameters, test results stored in memory. These include voltage, capacitance, polarization index, dielectric absorption ratio, and current.
⑤	DOWN (no)	**Down button.** Used to scroll through test voltages, stored test results, timer duration, and memory locations. Also used to answer “no” to yes/no prompts.
⑥	ENTER	**Enter button.** Used from the RESULTS function to access stored data (memory locations). Also used form the TEST VOLTAGE function to enable incrementally setting the test voltage between 250 V and 5000V.
⑦	TEST	**Test button.** Starts and stops a test. Push and hold the button for 1 second to start a test. Push the button again to stop a test.

Figure 2. Pushbuttons

Understanding the Display

Display annunciators are shown and described in Figure 3.



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Item	Description
①	Interference present. Displayed readings may be outside the specified accuracy range.
②	Electrical breakdown in Ramp mode.
③	Ramp mode indicator.
④	Potentially hazardous voltage is present at the test terminals. ⚠⚠ **Warning: Before and after testing, confirm that the Meter does not indicate the presence of a hazardous voltage. If the Meter beeps continuously and a hazardous voltage is present, disconnect test leads and remove power from the circuit under test.**
⑤	Voltage sourced by the Meter or from the circuit under test that is present at terminals of the Meter.
⑥	Test voltage selection (250 V, 500 V, 1000 V, 2500 V, or 5000 V)
⑦	Battery charge status.
⑧	Bar graph display of insulation resistance.
⑨	Digital display of insulation resistance.
⑩	Text display. Indicates voltage, test current, capacitance, programmable test voltages, and menu options.

Figure 3. Display Features

Charging the Battery

⚠⚠ Warning

To avoid possible electric shock or personal injury, disconnect the test leads from the Meter before charging the battery.

Note

This Meter uses a rechargeable 12 V a lead-acid battery for power. Do not mix with the solid waste stream. Use a qualified recycler or hazardous materials handler to dispose of dead batteries. Contact your authorized Fluke Service Center for disposal and recycling information.

Storing rechargeable lead-acid batteries in a low-charged state could lead to reduced life and/or damage. Fully charge the battery before storing it for extended periods and check the charge at regular intervals.

The Meter uses a rechargeable 12 V lead-acid battery for power. You can recharge the battery using the AC power cord.

Fully charging the battery typically takes 12 hours. Avoid charging in extremes of temperature. Recharge the battery if the Meter has been stored for extended periods. Figure 4 shows how to connect the Meter to a power supply.

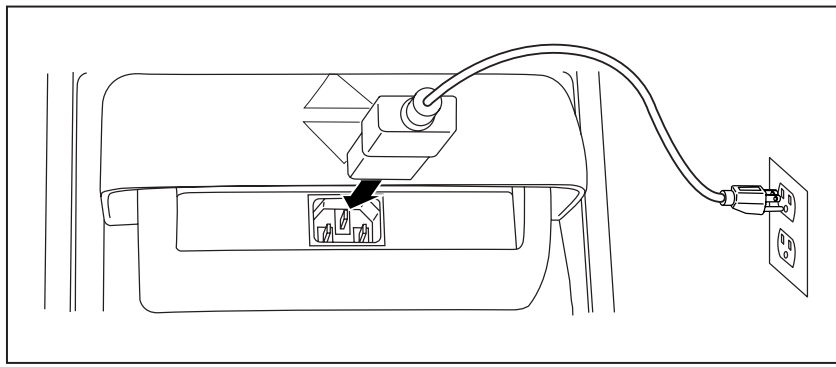

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Figure 4. Power Supply Connections

To recharge the battery using an AC power supply:

1. Turn off the Meter.
2. Disconnect the test leads from the Meter.
3. Rotate the safety shutter toward the top of the Meter to expose the power supply connection.
4. Connect the AC power cord to the IEC AC power socket (①) on the Meter.
5. Connect the other end of the power cord to an AC power supply. See “General Specifications” later in this manual for AC charger input specifications.
6. The LCD on the Meter displays CHARGING. When the Meter is in Charging mode, downloading is possible.

Using the Guard Terminal

Note

Insulation resistance is measured between the + and – output connections. The Guard terminal (G) is at the same potential as the negative (–) terminal but is not in the measurement path.

For most tests, only two test leads are used, connecting the positive (+) and negative (–) terminals on the Meter to the circuit under test. The Guard (G) terminal is left unconnected.

When measuring very high resistances, you can obtain more accurate readings by making a three-wire measurement using the Guard terminal. The Guard terminal is at the same potential as the negative (–) terminal, and can be used to prevent surface leakage or other unwanted leakage currents from degrading the accuracy of the insulation resistance measurement.

Figure 5 shows how to measure the resistance from one of the conductors to the outer shield. In this case, there is a leakage current along the surface of the inner insulation near the end of the cable. This leakage adds to the current that the negative terminal detects, and will cause the Meter to read a lower resistance than it should.

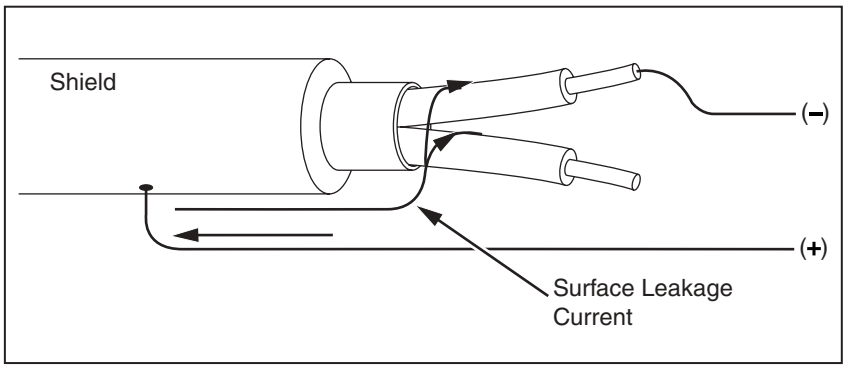

Figure 5. Surface Leakage Current

Figure 6 shows how to prevent surface current leakage by connecting a lead from the Guard terminal to a conductor wrapped around the inner insulation. The surface leakage current is directed to the Guard terminal. This removes the leakage current from the measurement path between the positive and negative terminals, and improves the accuracy of the test readings.

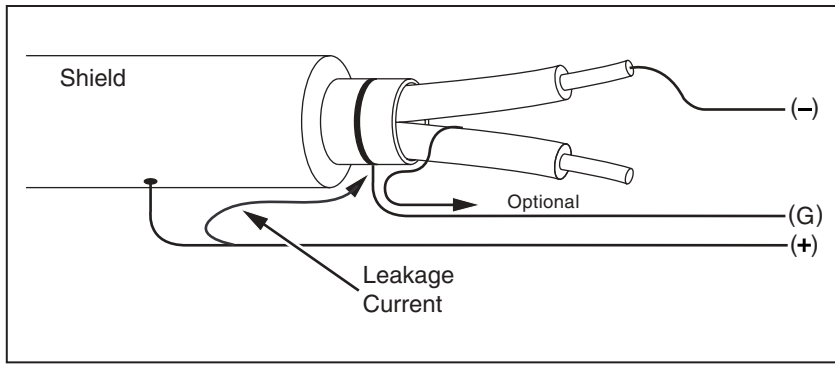

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Figure 6. Guard Terminal Connection

Figure 7 shows how to improve the measurement setup by connecting the Guard terminal to the unused wire and coupling it to the inner insulation. This insures that the Meter measures the leakage between the selected conductor and the outer shield, but eliminates the leakage path between conductors.

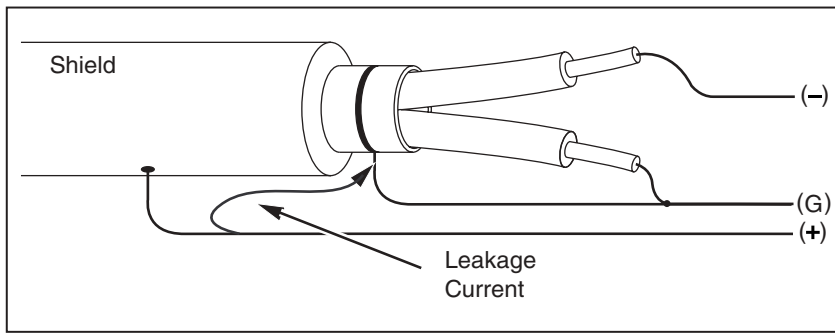

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Figure 7. Improved Guard Terminal Connection

Making Measurements

Connecting to the Circuit Under Test

⚠⚠ Warning

To avoid possible electric shock or personal injury:

- **Remove all power from the circuit under test and discharge circuit capacitance before testing a circuit with the Meter.**
- **Connect the test leads to the Meter inputs before connecting to the circuit under test.**
- **Before and after testing, confirm that the Meter does not indicate the presence of a hazardous voltage at the terminals. If the Meter beeps continuously and a hazardous voltage is shown on the display, disconnect test leads and remove power from the circuit under test.**

To connect to the circuit under test:

1. Rotate the safety shutter to expose the terminal connections.
2. Insert the test leads in the terminals shown (Figure 8), and connect the test leads to the circuit under test.

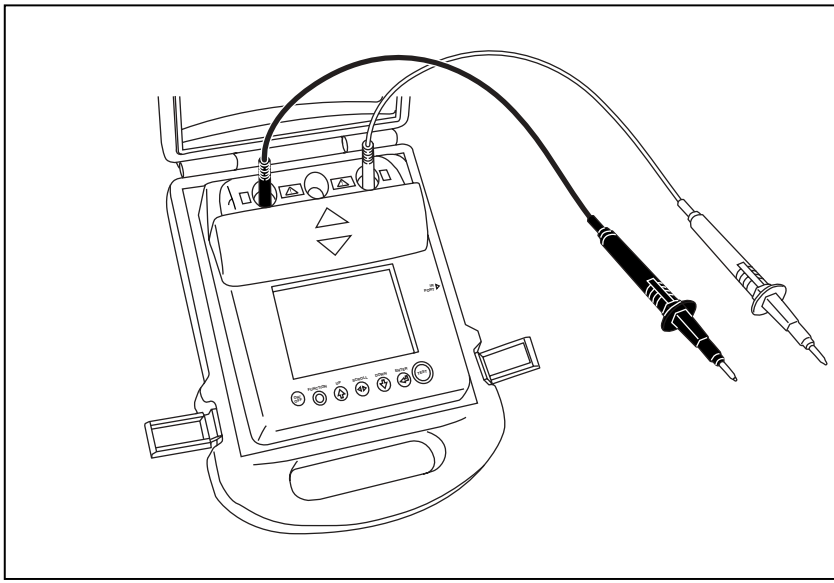

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Figure 8. Connecting to the Circuit Under Test

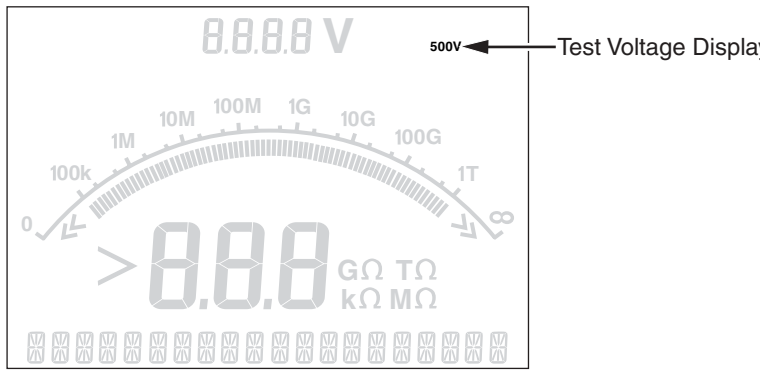
Options to Consider Before Making an Insulation Test

In addition to performing a basic insulation test, the Meter includes a series of features/functions that allow you to more precisely tailor the test to your requirements. These include defining a test voltage, selecting a ramp test, setting a time limit (duration) for the test, measuring polarization index (PI), measuring dielectric absorption ratio (DAR), and measuring capacitance. Each of these features is described in the following paragraphs. These features can be used in combination and should be set, cleared, or accounted for (as appropriate) before initiating an insulation test.

Selecting a Pre-set Test Voltage

To select a pre-set test voltage:

1. With the Meter turned on, press the FUNCTION button to select TEST VOLTAGE.



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2. Press the UP or DOWN button to scroll through the pre-set test voltage options (250 V, 500 V, 1000 V, 2500 V, and 5000 V).

   The selected test voltage appears in the upper-right of the display.

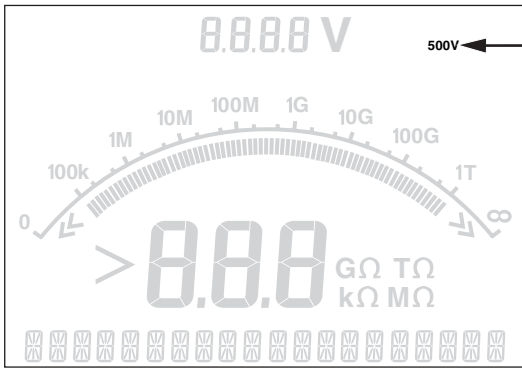
   Note

   The actual test voltage can be up to 10 % higher than the selected test voltage.

Programming a Test Voltage

To set a test voltage in between the pre-set test voltages proceed as follows:

1. With the Meter turned on, press the FUNCTION button to select TEST VOLTAGE.



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2. Press the UP or DOWN button to scroll through the pre-set test voltage options (250 V, 500 V, 1000 V, 2500 V, and 5000 V). Select the voltage closest to the level required.

   The selected test voltage appears in the upper-right of the display.

3. Press the ENTER button. TV=xxxxV appears flashing in the lower-left of the display.

4. Press the UP and DOWN buttons to increment and decrement the voltage. When the correct voltage level shows, **do not** press the ENTER button. Doing so will return the test voltage to the next lowest last pre-set voltage selection. Instead press the FUNCTION button to go to the next function.

   Note

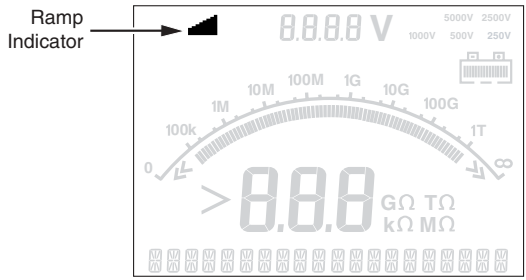
   The test voltage can be up to 10 % higher than the test voltage you select.

Selecting a Ramp or Steady-State Test

The ramp-test function is an automated test that checks insulation for a breakdown. During a ramp test, the output voltage starts at 0 V and increases linearly (100 V/s) until it reaches the specified test voltage or until a sudden drop in measured resistance is detected. Then, the Ramp stops, the test voltage drops to zero, and the voltage at the breakdown point is stored in memory on the Meter. All other test results are declared invalid if the test does not reach the specified test voltage. If the test successfully meets compliance without breakdown, then the only valid test results are test voltage and insulation resistance.

To enable or disable the ramp function proceed as follows:

1. With the Meter turned on, press the FUNCTION button to select the RAMP TEST function.



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2. Press UP or DOWN to toggle the Ramp on or off. When the ramp is on a blinking appears in the upper left-hand corner of the display.

Setting a Timed Test

You can control the length of an insulation test by setting a timer. The time (test duration) can be set in 1-minute increments up to 99 minutes. During a timed test, the time limit appears on the right bottom of the display, and the elapsed time is shown in the middle of the display. At the end of the elapsed time, the insulation test has been completed and the test is terminated.

To set a test time limit, proceed as follows:

1. With the Meter turned on, press the FUNCTION button to select the TIME LIMIT function.
2. Repeatedly press the UP button to increment and set the test time (in 1-minute intervals).

Polarization Index (PI)

As part of the insulation test, the Meter measures and stores polarization index (PI), when appropriate. Since, by definition, a polarization index test requires 10 minutes to complete, it is measured and stored as invalid data for all insulation tests under 10 minutes. When an insulation test is 10 minutes or more the polarization test is completed and stored. The results are available for display during a test by pressing the SCROLL button or by storing the test results and scanning the RESULTS fields. The field is identified by PI=.

$$PI = \frac{R \times 10\ min}{R \times 1\ min}$$

Dielectric Absorption Ratio

As part of the insulation test, the Meter measures and stores dielectric absorption ratio (DAR), when appropriate. Since, by definition, a DAR test requires 1 minute to complete, it is measured and stored as invalid data for all insulation tests under 1 minute. When an insulation test is 1 minute or more the DAR test is included in the results. The results are available for display during a test by pressing the SCROLL button or by storing the test results and scanning the RESULTS fields. The field is identified by DAR=.

$$DAR = \frac{R \times 1\ min}{R \times 30\,sec}$$

Capacitance

As part of the insulation test, the Meter measures and stores capacitance when appropriate. The results are available for display during a test by pressing the SCROLL button or by storing the test results and scanning the RESULTS fields. The field is identified by C=.

Performing an Insulation Test

⚠⚠ Warning

Measuring insulation resistance requires the application of potentially dangerous voltages to the circuit. This may include exposed bonded metalwork.

To avoid possible electric shock or personal injury:

- **Remove all power from the circuit under test and discharge circuit capacitance before testing a circuit with the Meter.**
- **Before proceeding, ensure that the installation is wired correctly and no personnel are endangered by any tests.**
- **First connect the test leads to the Meter inputs before you make connection to the circuit under test.**

To perform an insulation test use the following procedure:

1. With the Meter turned on, set the available measurement options to meet your test requirements. These include:
   - Test Voltage – Set range: 250V to 5000 V (50 V/100 V steps)
   - Ramp Test – Toggle on or off
   - Time Limit – No limit or from 1 to 99 minutes
2. Connect the probes to the circuit you want to test.

   ⚠⚠ Warning

   To avoid possible electric shock or personal injury: before and after testing, confirm that the Meter does not indicate the presence of a hazardous voltage at the terminals. If the Meter beeps continuously and a hazardous voltage is shown on the display, disconnect test leads and remove power from the circuit under test.
3. Press the TEST button for 1 second to start the insulation test.

   The Meter beeps 3 times as the test begins, and the ⚠ icon flashes on the display indicating potentially hazardous voltages may be present on the test terminals.

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   The digital display indicates the measured insulation resistance after the circuit has stabilized. The bar graph displays this value continuously (in real time) as a trend.

   Any of the following conditions will terminate an insulation test:

   - User stop (Pressing the TEST button).
   - Timer limit reached
   - Interference on the test circuit
   - Breakdown occurs with ramp test enabled
   - *Battery depleted*

   If breakdown occurs with ramp test enabled, press the ENTER button before going to step 4.

Following termination of an insulation test the Meter beeps when a potentially hazardous voltage remains on the test terminals due to charged-circuit capacitance or from the presence of an external voltage.

4. When the test is terminated, STORE RESULT? is displayed. If appropriate, store the test results as described in the next procedure. Otherwise, terminate the STORE RESULT? prompt by pressing the DOWN button. The results are not stored.

Storing the Test Results

Upon completion of an insulation test, the Meter displays STORE RESULT? as a prompt to save the measurement results for future use. The Meter includes enough memory to store the results of 99 insulation tests for future use.

To store the results of an insulation test use the following procedure:

1. Press UP to save the measurement results. The Meter will assign and display a sequential tag number (00 to 99) to identify the measurement. If the tag number is acceptable, press the ENTER button to store the data. If a different tagging convention is required, proceed as follows to provide a custom 4-character tag.

   a. Notice that an * is blinking on the display. This is the first of the four characters available for tagging the test results. Repeatedly press the scroll SCROLL button to cycle through the character positions.

   b. At each character position use the UP and DOWN buttons to assign a character (0-9, A-Z).

   c. Press the ENTER button to store the results.

Viewing Results Stored in Memory

Note

Parameters not appropriate for a test are shown as INVALID.

The Meter can store 99 sets of test data, including:

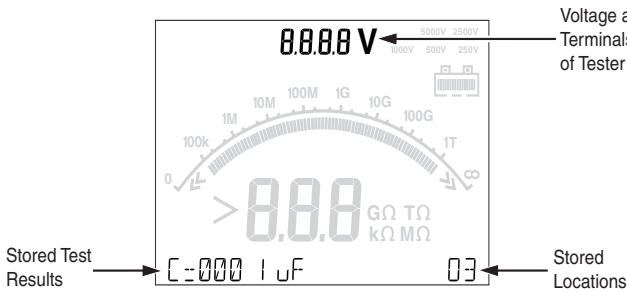
⇒ Tags
⇒ Ramp on or off
⇒ Insulation Resistance
⇒ Timer reading at termination of test (Timer)
⇒ Test Voltage Selected (TV)
⇒ Actual Test voltage (V)
⇒ Capacitance (C)
⇒ Polarization Index (PI)
⇒ Dielectric absorption ratio (DAR)
⇒ Test current (I)
⇒ Reason for ending the test
⇒ Limit – off or timer setting (1 to 99 minutes) (T. Limit)

To view stored test data:

1. With the Meter turned on, press the FUNCTION button to select the RESULTS function.

Note

When a voltage is present at the terminals, that voltage is always shown on the top-center of the display, regardless of whether that voltage is sourced by the Meter or is from the circuit under test.



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2. Press ENTER to access the test results storage locations. The ID tag location appears on the bottom-right of the display.
3. Press UP or DOWN to step through the stored locations.
4. Stop at the location you want to view.
5. Press SCROLL to view the stored test data for a specific test. Test data appears on the alphanumeric text display and on the LCD.
6. Press ENTER to return the Meter to Test Voltage mode.

Downloading Your Test Results

You can use Quicklink software to download all of your stored test data to a PC. An infrared adapter is supplied with the Fluke 1550B MegOhmMeter for use in downloading stored test data. Figure 9 shows the location of the IR port on the Meter.

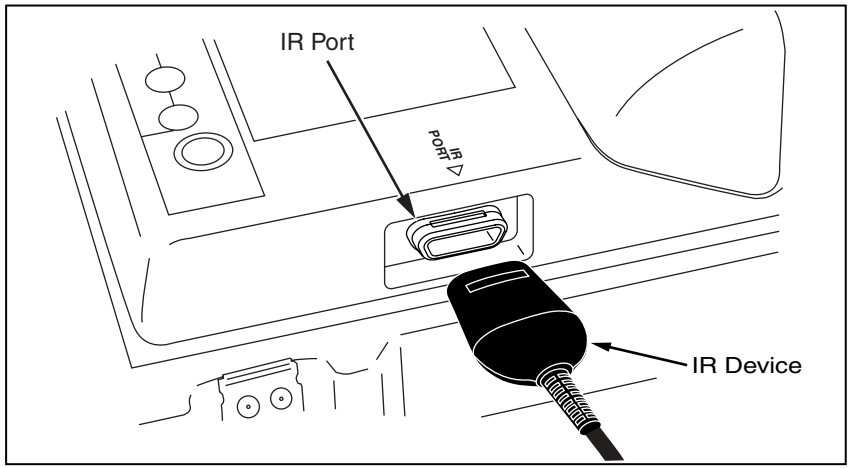

Figure 9. IR Port on 1550B MegOhmMeter

Installing the Quicklink Software

You need to install the Quicklink software on your PC to download stored test data.

To install the Quicklink software, insert the Quicklink disk in your PC and follow the installation instructions on the disk.

Downloading Results to PC

To download your test results to a PC:

1. Using the cable provided, connect the infrared adapter to an unused COM port on your PC.
2. Run the Quicklink software on your PC and click on the download icon.
3. Press ON/OFF to turn on the Meter.
4. Specify the PC COM port you are using on the Quicklink download dialog.
5. Click the “start” to initiate the download.

The download dialog shows the progress of the download as test results are received on the PC.

If errors are reported, repeat the download procedure.

Note

Verify that the download was successful before deleting the stored test results on the Fluke 1550B.

Note

Results data stored in the Meter can be deleted from the PC using the Quicklink application. See the Quicklink Help file for details.

Deleting Your Test Results

To delete all of the saved test results:

1. With the Meter turned on, press FUNCTION to select the RESULTS function.
2. Press ENTER to access the stored test results.
3. Press FUNCTION once to access the DELETE? function.
4. Press UP. The REALLY DEL? prompt appears.
5. Press DOWN to confirm the deletion or press ENTER to return to Test Voltage mode.
   When you press DOWN, all stored test results are permanently deleted.

Note

Individual test locations cannot be deleted, however, they can be overwritten.

⚠ Caution

The delete function deletes all of your stored test results.

Maintaining the Meter

⚠⚠ Warning

To avoid possible electric shock or personal injury, do not attempt to repair or service your Meter beyond what is described in this manual. Only qualified service personnel should service the product.

There are no user-replaceable parts inside the Meter.

Cleaning

⚠⚠ Warning

To avoid possible electric shock or personal injury, remove excess water from the cloth before cleaning the Meter to ensure that water does not enter any terminal.

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

Principle of Measurement and Resistance

The Meter measures insulation parameters and displays the results using with the following formulas.

Ohm's Law	Capacitance (charge)	PI (Polarization Index)	DAR (Dielectric absorption ratio)
$R = \frac{V}{I}$	$C = \frac{Q}{V}$	$PI = \frac{R \times 10\,\mathrm{min}}{R \times 1\,\mathrm{min}}$	$DAR = \frac{R \times 1\,\mathrm{min}}{R \times 30\,s}$

Replaceable Parts and Accessories

Table 2 lists the replaceable parts that are available for the Meter. Table 3 Identifies the Accessories available for use with the Meter.

Table 2. List of Replaceable Parts

Parts	Part No.
Test Lead – Red	1642584
Test Lead – Black	1642591
Test Lead – Green	1642600
Test Clip – Red	1642617
Test Clip – Black	1642621
Test Clip – Green	1642639
AC Power Cord (North America)	284174
AC Power Cord (Continental Europe)	769422
AC Power Cord (UK)	769455
AC Power Cord (Australia)	658641
AC Power Cord (S. Africa)	1552363
Soft Carrying Case	1642656
Infrared Cable Assembly	1578406
Users Manual CD	2099928
English Users Manual	2102980
Quick Reference Card	2099943

Table 3. 1550B Accessories

Accessories	Part No.
Extended Test Lead Set, 25 feet (7.6 meters)	2032761

Specifications

General Specifications

Display	75 mm x 105 mm	
Power	12 V lead-acid rechargeable battery. Yuasa NP2.8-12	
Charger Input (AC)	85 V to 250 V ac 50/60 Hz 20 VA This Class II (double insulated) instrument is supplied with a Class 1 (grounded) power cord. The protective earth terminal (ground pin) is not connected internally. The extra pin is for added plug retention only.	
Dimensions (H x W x L)	170 mm x 242 mm x 330 mm (6.7 in. x 9.5 in. x 13.0 in.)	
Weight	3.6 kg (7.94 lbs.)	
Temperature (operating)	–20 °C to 50 °C (–4 °F to 122 °F)	
Temperature (storage)	–20 °C to 65 °C (–4 °F to 149 °F)	
Humidity	80 % to 31 °C decreasing linearly to 50 % at 50 °C	
Altitude	2000 m	
Enclosure Sealing	IP40	
Input Overload Protection	600 V AC	
Electromagnetic Compatibility	EN 61326	
Certifications	CE TÜV SP	
Safety Compliance	EN 61010, EN 61557 Parts 1 and 2 IEC 61010-1, CAT III V 600, Pollution Degree 2	
Typical Battery Charge Capability Note At temperature extremes, the battery needs to be charged more frequently.	Test Voltages	Number of Tests
	250 V	4138
	500 V	3913
	1 kV	3462
	2.5 kV	2043
	5 kV	1000

Electrical Specifications

The meter's accuracy is specified for 1 year after calibration at operating temperatures of 0 °C to 35 °C. For operating temperatures outside the range (–20 °C to 0 °C and 35 °C to 50 °C), add ± .25 % per °C, except on the 20 % bands add ± 1 % per °C.

Insulation		
Test Voltage (DC)	Insulation Resistance Range	Accuracy (+/- reading)
250 V	<200 kΩ 200 kΩ to 5 GΩ 5 GΩ to 50 GΩ >50 GΩ	unspecified 5 % 20 % unspecified
500 V	<200 kΩ 200 kΩ to 10 GΩ 10 GΩ to 100 GΩ >100 GΩ	unspecified 5 % 20 % unspecified
1000 V	<200 kΩ 200 kΩ to 20 GΩ 20 GΩ to 200 GΩ >200 GΩ	unspecified 5 % 20 % unspecified
2500 V	<200 kΩ 200 kΩ to 50 GΩ 50 GΩ to 500 GΩ >500 GΩ	unspecified 5 % 20 % unspecified
5000 V	<200 kΩ 200 kΩ to 100 GΩ 100 GΩ to 1 TΩ >1 TΩ	unspecified 5 % 20 % unspecified

Bar graph range:	0 to 1 TΩ
Insulation test voltage accuracy:	-0 %, +10 % at 1 mA load current
Induced ac mains current rejection:	2 mA maximum
Charging rate for capacitive load:	5 seconds per µF
Discharge rate for capacitive load	1.5 s/µF

Leakage current measurement	
Range	Accuracy
1 nA to 2 mA	+/- (5 % + 2 nA)

Capacitive measurement	
Range	Accuracy
0.01 µF to 15.00 µF	+/- (15 % of reading + 0.03 µF)

Timer	
Range	Resolution
0 to 99 minutes	Setting: 1 minute Indication: 1 second
Live circuit warning	Warning range: 30 V to 660 V ac/dc, 50/60 Hz Voltage accuracy: +/- (5 % + 2 V)