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Introduction

The Fluke model 1507 and model 1503 are battery-powered insulation testers (the Tester). Although this manual describes the operation of both Models 1507 and 1503, all illustrations and examples assume use of model 1507.

The Tester measures or tests the following:

- AC / DC Voltage
- Earth-Bond Resistance
- Insulation Resistance

Contacting Fluke

Fluke Corporation open information, go to our v

To register your product latest manual or manual

+1-425-446-5500

fluke-info@fluke.com.

Safety Information

General Safety Information that shipped www.fluke.com. More s where applicable.

Use the Tester only as Otherwise, the protection impaired.

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.

Unsafe Voltage

To alert you to the presence of a potentially hazardous voltage, when the Tester detects a voltage ≥ 30 V in insulation test, ≥ 2 V in resistance, or a voltage overload (OL), the $\frac{f}{\text{}}$ symbol is displayed.

Battery Saver™ (Sleep Mode)

The Tester enters the “Sleep mode” and blanks the display if there is no function change or button press for 10 minutes. This is done to conserve battery power. To resume operation, turn the rotary switch to OFF and then turn to any function.

The 10-minute timer is disabled during any insulation resistance or earth bond resistance measurement. The time period starts immediately following any measurement.

Rotary Switch Position

Turn the Tester on by selecting a function. The Tester presents a function (range, measurement) on the display. Press the blue button to select any function (labelled with blue text). The selections are shown in Figure 1.

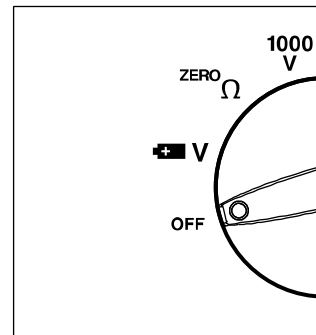



Figure 1. R

Table 1. Rotary Switch Selections

Switch Position	Measurement Function
OFF	Turn off the Tester.
 V	AC or DC voltage from 0.1 V to 600.0 V.
ZERO Ω	Ohms from 0.01 Ω to 20.00 k Ω .
1000 V 500 V 250V 100V 50V	Ohms from 0.01 M Ω to 10.0 G Ω for the Model 1507 and 0.01 to 2000 M Ω for the Model 1503. Performs insulation tests with 50, 100, 250, 500 and 1000 V dc source on the 1507 or 500 and 1000 V dc source on the 1503.

Buttons and Indicators

Use the buttons to activate the function selected with the rotary switch. The buttons and indicators on the front panel are active. The buttons and indicators are described in Table 2.

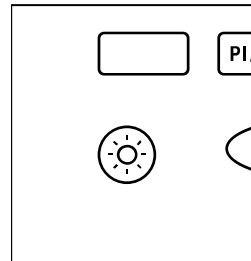










Figure 2. Buttons and Indicators

Table 2. Buttons and Indicators

Button/ Indicator	Description
	Press the blue button to select alternate measurement functions.
	Press to configure the Tester for a polarization index or dielectric absorption ratio test. The test will start when you press the TEST button.
	Sets a pass/fail limit for insulation tests.
	Test lock. When pressed before the TEST button, the test remains active until you press the lock or test button again to release the lock.
	Turns the backlight on and off. The backlight goes off after 2 minutes.

Button/ Indicator	
	Initiates an insulation test when the switch is in INS position. Pressing the Tester starts the test and measures insulation resistance. Initiates a resistance test when the switch is in the RES position.
	Unsafe voltage warning. Appears when the voltage is greater (ac or dc) than the selected switch position. Also appears when the voltage is greater than the selected switch position. Also appears on the display when insulation resistance is less than the selected limit.
	Pass indicator. Appears when the insulation resistance is greater than the selected limit.

Understanding the Display

Display indicators are shown in Figure 3 and described in Table 3. Error messages that may appear on the display are described in Table 4.

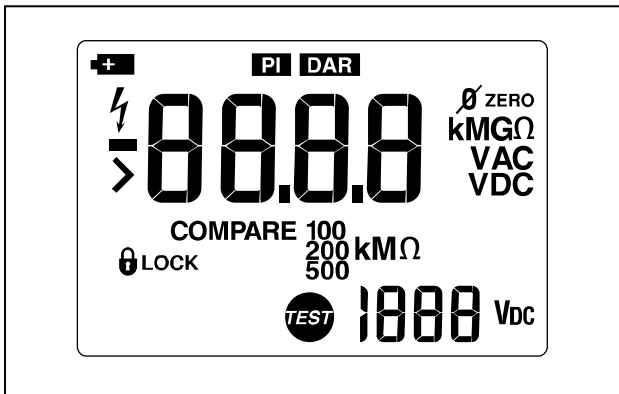


Figure 3. Display Indicators

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Table 3

Indicator	
LOCK	Indi test
- >	Min
	Uns
	Lo tim + dis
	T c s re th a

Table 3 Display Indicators (cont.)

Indicator	Description
PI DAR	Polarization index or dielectric absorption ratio test is selected.
ZERO	Ohms lead zero is active.
VAC, VDC, Ω, kΩ, MΩ, GΩ	Measurement units
8888	Primary display
V_{DC}	Volts
1888	Secondary display
COMPARE	Indicates selected pass/fail compare value.
TEST	Insulation test indicator. Appears when insulation test voltage is present.

Table 4. Err

Message	
bdt	Appears on the secondary display to indicate that the device is not in a reliable operating mode. The device will not operate at all units. The bdt also appears on the primary display.
>	Indicates an over-range condition.
CAL Err	Invalid calibration.

Input Terminals

Input terminals are shown in Figure 4 and described in Table 5.

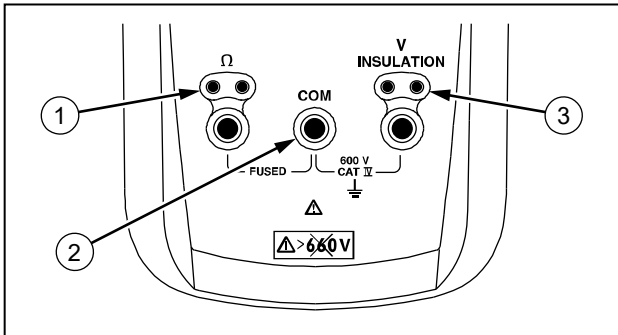


Figure 4. Input Terminals

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


Table 5. Input

Item	
①	Input termina
②	Common (ret
③	Input termina

Power-Up Optio

Holding a button down activates a power-up o to use additional featur select a power-up optio button indicated while switch position. Power- Tester is turned **OFF**. Table 6.

Table 6. Power-Up Options

Button	Description
	<p> switch position turns on all LCD segments.</p> <p>^{ZERO}Ω switch position displays the software version number.</p> <p>¹⁰⁰⁰V switch position displays the model number.</p>
	<p>Starts the Calibration mode. The Tester displays [RL] and enters Calibration mode when the button is released.</p>

Note

Power Up options are active when the button is pressed.

Making Measurements

The figures on the following measurements.

When connecting the test lead connect the common (COM) the live lead; when removing live lead before removing the



To avoid electric shock the Tester, disconnect discharge all high-volt testing.

Measuring Volts

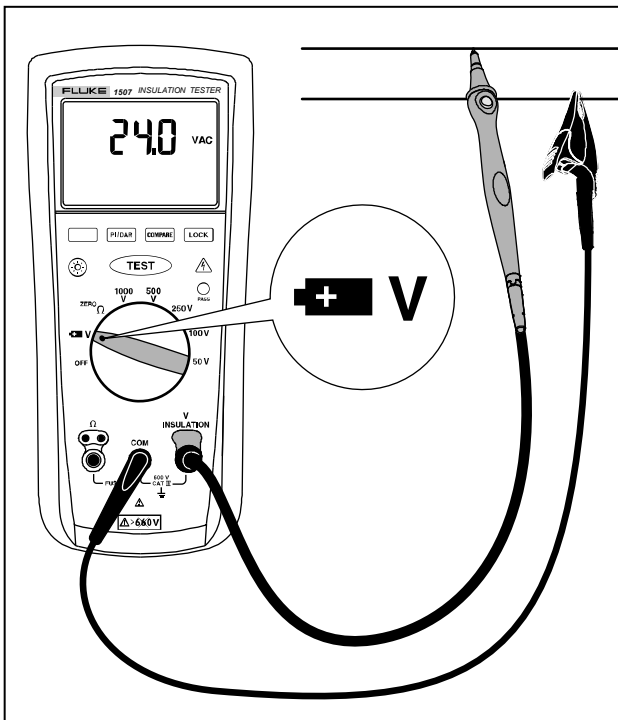


Figure 5. Measuring Volts

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Measuring Earth-B

Resistance tests should be performed on de-energized circuits. Testing the Fuse later energized circuit while

Measurements can be taken on impedances of adjacent conductors connected in parallel.

To measure resistance

1. Insert test probes into the test points. See Figure 6.
2. Turn the rotary switch to the resistance setting.
3. Short the ends of the test probes together. The Tester measures the resistance and reads the value on the display. The probe resistance is subtracted from the reading. The Tester is turned off when the resistance is measured.
4. Connect the probes to the test points. The Tester automatically measures the resistance.

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- The primary display shows ---- until you press the **TEST** button and a valid resistance reading is obtained.
 - The high voltage symbol (⚡) along with a primary display of >2 V warns if voltage greater than 2 V ac or dc is present. In this condition, the test is inhibited. Disconnect the Tester and remove power before proceeding.
 - If the Tester chirps when you press the **TEST** button, the test is inhibited because voltage is present at the probes.
5. Push and hold the **TEST** button to start the test. The **TEST** icon appears on the lower portion of the display until you release the **TEST** button. The resistance reading appears on the primary display until a new test is started or a different function or range is selected.

When resistance is higher than the maximum display range, the Tester displays the $>$ symbol and the maximum resistance for the range.

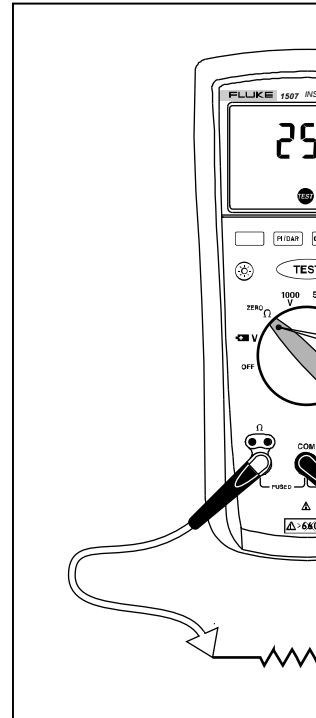


Figure 6. Measuring R

Measuring Insulation Resistance

Insulation tests should only be performed on de-energized circuits. To measure insulation resistance set up the Tester as shown in Figure 7 and follow the steps below:

1. Insert test probes in the **v** and **com** input terminals.
2. Turn the rotary switch to the desired test voltage.
3. Connect the probes to the circuit to be measured. The Tester automatically detects if the circuit is energized.
 - The primary display shows ---- until you press **TEST** and a valid insulation resistance reading is obtained.
 - The high voltage symbol (f) along with a primary display of >30 V warns if voltage more than 30 V ac or dc is present. In this condition, the test is inhibited. Disconnect the Tester and remove power before proceeding.

4. Push and hold **TEST**. The primary display shows the resistance under test. The high voltage symbol (f) appears. The **TEST** button is lit. The display until **TEST**.

When resistance is out of range, the Tester displays maximum resistance.

5. Keep the probes connected. Press **TEST** button. The primary display shows the resistance through the Tester. Press **TEST** on the primary display to select a different function or to stop the test. If a different function is detected.

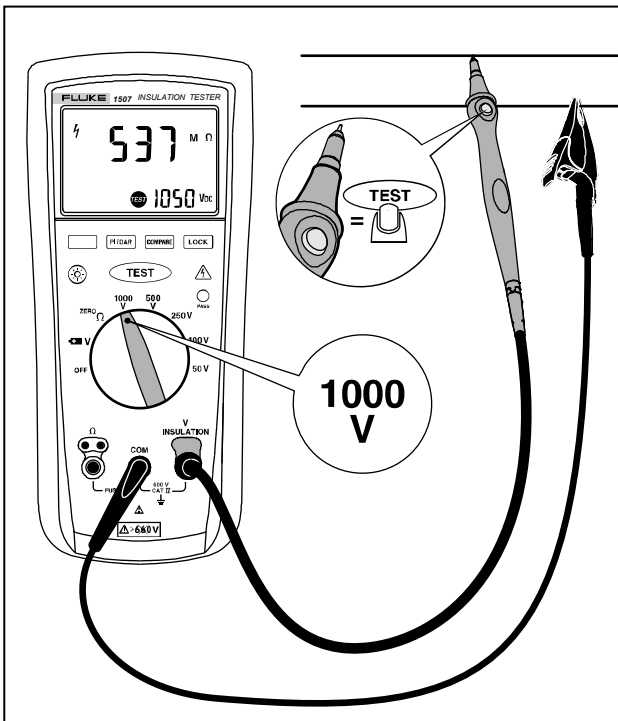


Figure 7. Measuring Insulation Resistance

Measuring Polarization Index (PI) and Dielectric Absorption Ratio (DAR) (Fluke 1507)

Polarization Index (PI) is the ratio of 1-minute insulation resistance to the 1-minute insulation resistance. Dielectric Absorption Ratio (DAR) is the ratio of 1-minute insulation resistance to 30-second insulation resistance.

Insulation tests should only be performed on unenergized circuits. To measure the polarization index and dielectric absorption ratio:

1. Insert test probes in the terminals.

Because of the time required for PI and DAR tests, use of test leads is recommended.

2. Turn the rotary switch to the 1000 V position.
3. Press the **PI/DAR** button to measure the polarization index and dielectric absorption ratio.

4. Connect the probes to the circuit to be measured. The Tester automatically detects if the circuit is energized.
 - The primary display shows ---- until you press the **TEST** button and a valid resistance reading is obtained.
 - The high voltage symbol (f) along with a primary display of >30 V warns if voltage greater than 30 V ac or dc is present. If high voltage is present, the test is inhibited.
5. Press and release **TEST** to start the test. During testing, the secondary display shows the test voltage applied to the circuit under test. The high voltage symbol (f) along with a primary display showing the resistance in M Ω or G Ω . The **TEST** icon appears on the lower portion of the display until the test is finished.

When the test is completed, the test voltage is displayed on the primary display. The test will automatically stop if the Tester detects a voltage greater than the test voltage. If either voltage was greater than the test voltage, the 1-minute value will be displayed on the primary display with

- When resistance is outside the primary display range, the maximum resistance and the maximum voltage are displayed.
- To interrupt a test, press and release **TEST** to stop the test. When the test is completed, the test voltage is displayed on the primary display. The test will automatically stop if the Tester detects a voltage greater than the test voltage. If either voltage was greater than the test voltage, the 1-minute value will be displayed on the primary display with

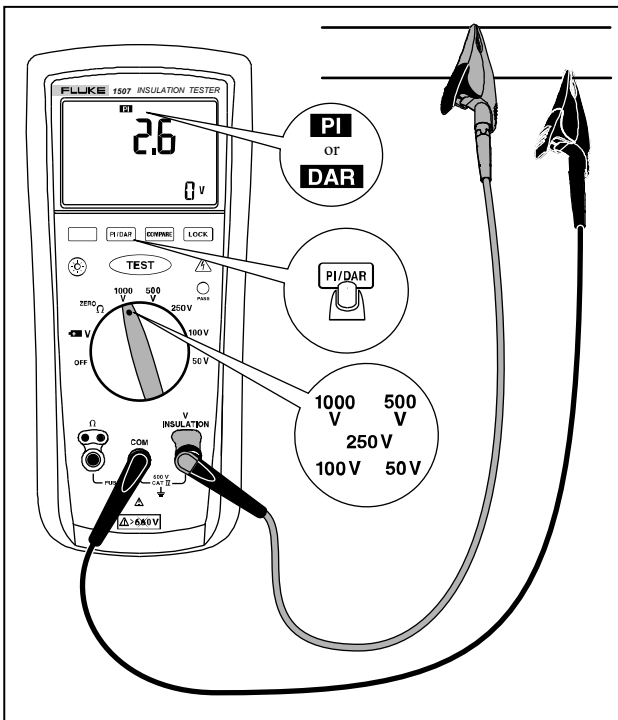
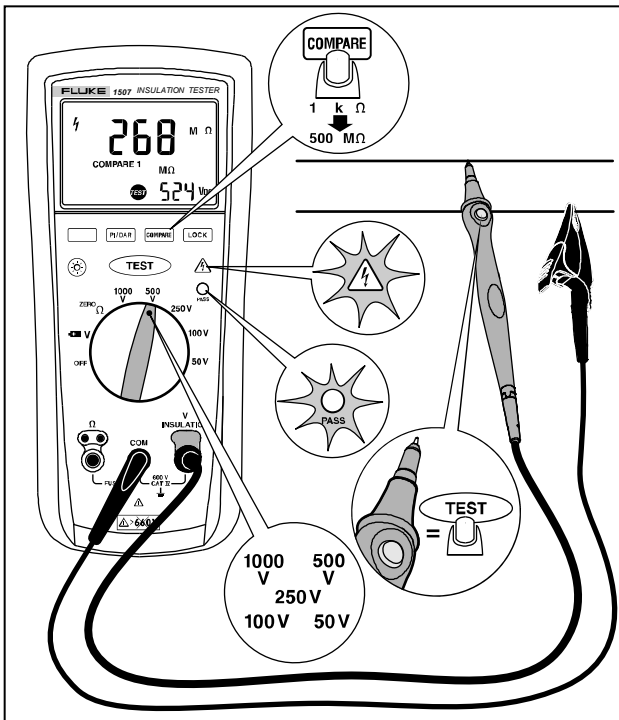


Figure 8. Measuring Polarization Index and Dielectric Absorption Ratios

Using the Compare (1507)

Use the Compare function to compare test results for the insulation measurement function:

1. Press the **COMPARE** button to set the compare value. You can choose from 1 MΩ, 2 MΩ, 5 MΩ, 10 MΩ, 200 MΩ, and 500 MΩ.
2. Perform insulation tests as described in the manual.
3. The green pass indicator will light up if the test value is greater than the compare value.
4. Press and hold the **COMPARE** button to disable the Compare function. The indicator will turn off when you start a new compare value.



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Figure 9. Using the Compare Function

Cleaning

Periodically wipe the case with a clean, dry cloth and detergent. Do not use water or other liquids. Avoid moisture in the terminals. Clean the probes for drying before using.

Testing the Battery

The Tester continuously monitors the battery level. A low battery icon (⚡) indicates minimal battery life left.

1. Turn the rotary switch to the battery test position with the probes inserted.
2. Press the blue button to initiate the battery test. The voltage of the measured battery is displayed for 2 seconds and then returns.

Testing the Fuse

⚠ ⚠ Warning

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

Test the fuse as described below and shown in Figure 10. Replace the fuse as shown in Figure 11.

1. Turn the rotary switch to the ^{ZERO}Ω position.
2. Press and hold **TEST**. If the display reading is FUSE, the fuse is bad and should be replaced.

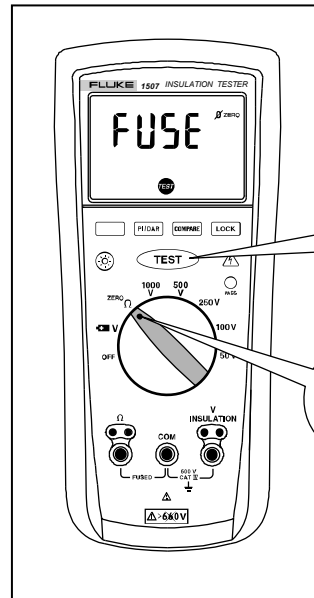


Figure 10. Test

Replacing the Batteries and Fuse

Replace the fuse and batteries as shown in Figure 11. Follow the steps below to replace the batteries.

⚠ ⚠ Warning

To avoid shock, injury, or damage to the Tester:

- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (🔋) appears.
- Use **ONLY** fuses with the amperage, interrupt, voltage, and speed ratings specified.
- Turn the rotary switch to **OFF** and remove the test leads from the terminals.

1. Remove the battery door by using a standard screwdriver to turn the battery door lock until the unlock symbol aligns with the arrow.
2. Remove and replace the batteries.
3. Replace the battery door and secure by turning the battery door lock until the lock symbol aligns with the arrow.

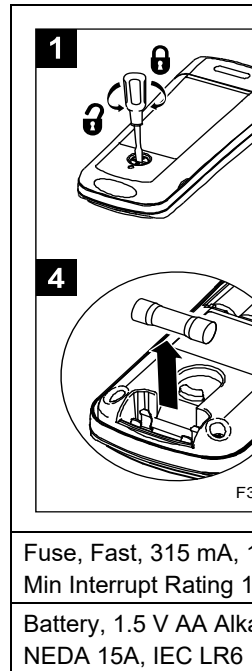


Figure 11. Replacing the Fuse and Batteries

Specifications

Safety specifications are in the *Safety Information* that shipped with the Product.

Battery Life	Insulation test use: Tester can perform at least 1000 insulations per battery at room temperature. These are standard tests with a duty cycle of 5 seconds on and 25 seconds off. Resistance Measurement: Tester can perform at least 2500 earth-bond resistance measurements with a duty cycle of 5 seconds on and 25 seconds off. These are standard tests of 1 Ω 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 8.0 in L)
Weight	550 g (1.2 lb)
Ingress Protection Rating	IEC 60529: IP40
Over-Range Capability	110 % of range
Accessories	TL224 Leads TP74 Probes with Protective Caps Alligator Clips PN 1958654 (red) and PN 1958646 (black) Holster Remote Probe with Protective Cap

AC/DC Voltage Measurement

Accuracy

Range	Resolution	
600.0 V	0.1 V	

Input Impedance.....3 M Ω (nominal), <100 pF

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

Overload Protection.....600 V rms or dc

Earth-bond Resistance Measurement

Range	Resolution	
20.00 Ω	0.01 Ω	
200.0 Ω	0.1 Ω	
2000 Ω	1 Ω	
20.00 k Ω	0.01 k Ω	

[1] Accuracies apply from 0 to 100% of range.

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Overload Protection	2 V rms or dc
Open Circuit Test Voltage	>4.0 V, <8 V
Short Circuit Current	>200.0 mA

Insulation Specifications

Measurement Range.....	0.01 M Ω to 10 G Ω model 1507, 0.01 M Ω to 2000 M Ω model 1503
Test Voltages	50, 100, 250, 500, 1000 V dc model 1507, 500 and 1000 V ac model 1503
Test Voltage Accuracy	+20 %, -0 %
Short-Circuit Test Current	1 mA nominal
Auto Discharge.....	Discharge time <0.5 second for C = 1 μ F or less
Live Circuit Detection:	Inhibit test if terminal voltage >30 V prior to initialization
Maximum Capacitive Load.....	Operable with up to 1 μ F load.

Model 1507

Output Voltage	Display Range	Resolution	Test Current
50 V dc (0 % to + 20 %)	0.01 to 20.00 MΩ	0.01 MΩ	1 mA @ 50 kΩ
	20.0 to 50.0 MΩ	0.1 MΩ	
100 V dc (0 % to + 20 %)	0.01 to 20.00 MΩ	0.01 MΩ	1 mA @ 100 kΩ
	20.0 to 100.0 MΩ	0.1 MΩ	
250 V dc (0 % to + 20 %)	0.01 to 20.00 MΩ	0.01 MΩ	1 mA @ 250 kΩ
	20.0 to 200.0 MΩ	0.1 MΩ	
500 V dc (0 % to + 20 %)	0.01 to 20.00 MΩ	0.01 MΩ	1 mA @ 500 kΩ
	20.0 to 200.0 MΩ	0.1 MΩ	
	200 to 500 MΩ	1 MΩ	
1000 V dc (0 % to + 20 %)	0.1 to 200.0 MΩ	0.1 MΩ	1 mA @ 1 MΩ
	200 to 2000 MΩ	1 MΩ	
	2.0 to 10.0 GΩ	0.1 GΩ	

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Model 1503

Output Voltage	Display Range	Resolution	Test Current
500 V dc (0 % to + 20 %)	0.01 to 20.00 MΩ	0.01 MΩ	1 mA @ 500 kΩ
	20.0 to 200.0 MΩ	0.1 MΩ	
	200 to 500 MΩ	1 MΩ	
1000 V dc (0 % to + 20 %)	0.1 to 200.0 MΩ	0.1 MΩ	1 mA @ 1 MΩ
	200 to 2000 MΩ	1 MΩ	

IEC 61557 Specification

The following tables are a requirement for European labeling.

Measurement	Intrinsic Uncertainty	Op
Volts	± (2.0 % + 3)	
Earth-Bond Resistance	± (1.5 % + 3)	
Insulation Resistance	Depends on test voltage and range. See Insulation Test specifications.	

[1] This specification comes from the standard and indicates the maximum amount allowable

IEC 61557 Influence Variables and Uncertainties

Earth-Bond Resistance Influence Variable	Designation per EN61557	Uncertainty for Insulation Resistance^[1]
Supply Voltage	E2	5 %
Temperature	E3	5 %

[1] Specification confidence level 99 %.

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The following tables can be used to determine the maximum or minimum display values considering operating error per IEC 61557.

Insulation Resistance Maximum and Minimum Display Values

50 V		100 V		250 V		500 V	
Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value	Minimum Display Value
0.05	0.07	0.05	0.07	0.05	0.07	0.05	0.07
0.06	0.08	0.06	0.08	0.06	0.08	0.06	0.08
0.07	0.09	0.07	0.09	0.07	0.09	0.07	0.09
0.08	0.10	0.08	0.10	0.08	0.10	0.08	0.10
0.09	0.12	0.09	0.12	0.09	0.12	0.09	0.12
0.1	0.13	0.1	0.13	0.1	0.13	0.1	0.13
0.2	0.26	0.2	0.26	0.2	0.26	0.2	0.26
0.3	0.39	0.3	0.39	0.3	0.39	0.3	0.39
0.4	0.52	0.4	0.52	0.4	0.52	0.4	0.52
0.5	0.65	0.5	0.65	0.5	0.65	0.5	0.65

Insulation Resistance Maximum and Minimum Display Values (cont.)

50 V		100 V		250 V		500
Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value
0.6	0.78	0.6	0.78	0.6	0.78	0.6
0.7	0.91	0.7	0.91	0.7	0.91	0.7
0.8	1.04	0.8	1.04	0.8	1.04	0.8
0.9	1.17	0.9	1.17	0.9	1.17	0.9
1.0	1.30	1.0	1.30	1.0	1.30	1.0
2.0	2.60	2.0	2.60	2.0	2.60	2.0
3.0	3.90	3.0	3.90	3.0	3.90	3.0
4.0	5.20	4.0	5.20	4.0	5.20	4.0
5.0	6.50	5.0	6.50	5.0	6.50	5.0
6.0	7.80	6.0	7.80	6.0	7.80	6.0

Insulation Resistance Maximum and Minimum Display Values (cont.)

50 V		100 V		250 V		500 V	
Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value	Minimum Display Value	Limit Value	Minimum Display Value
7.0	9.10	7.0	9.10	7.0	9.10	7.0	9.10
8.0	10.40	8.0	10.40	8.0	10.40	8.0	10.40
9.0	11.70	9.0	11.70	9.0	11.70	9.0	11.70
10.0	13.0	10.0	13.0	10.0	13.0	10.0	13.0
20.0	26.0	20.0	26.0	20.0	26.0	20.0	26.0
30.0	39.0	30.0	39.0	30.0	39.0	30.0	39.0
40.0	52.0	40.0	52.0	40.0	52.0	40.0	52.0
-	-	50.0	65.0	50.0	65.0	50.0	65.0
-	-	60.0	78.0	60.0	78.0	60.0	78.0
-	-	70.0	91.0	70.0	91.0	70.0	91.0
-	-	80.0	104.0	80.0	104.0	80.0	104.0

Earth-Bond Resistance Maximum Display Values

Limit Value	Maximum Display Value	Limit Value	Maximum Display Value	Limit Value
0.4	0.28	7.0	4.9	100.0
0.5	0.35	8.0	5.6	200.0
0.6	0.42	9.0	6.3	300.0
0.7	0.49	10.0	7.0	400.0
0.8	0.56	20.0	14.0	500.0
0.9	0.63	30.0	21.0	600.0
1.0	0.7	40.0	28.0	700.0
2.0	1.4	50.0	35.0	800.0
3.0	2.1	60.0	42.0	900.0
4.0	2.8	70.0	49.0	1000.0
5.0	3.5	80.0	56.0	2000.0
6.0	4.2	90.0	63.0	-