

# Keysight U1452A/ U1452AT/U1451A Insulation Tester

Quick Start  
Guide

## Contacting Keysight

[www.keysight.com/find/assist](http://www.keysight.com/find/assist)  
(worldwide contact information for repair and service)

## Safety and EMC Information

This meter is safety-certified in compliance with IEC/EN 61010-1, IEC/EN 61010-2-030, IEC/EN 61010-2-033, CAN/CSA-C22.2 No. 61010-1, CAN/CSA-C22.2 No. 61010-2-030, CAN/CSA-C22.2 No. 61010-2-033, UL Std. No. 61010-1, UL Std. No. 61010-2-030 and UL Std. No. 61010-2-033.

EMC designed in compliance with IEC 61326-1/EN 61326-1, CISPR11/EN55011 Group 1 Class A, ICES/NMB-001, and AS/NZS CISPR 11. Use with standard or compatible test probes.

## Safety Notices






### CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

### WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

## Safety Symbols

	Earth (ground) terminal
	Equipment protected throughout by double insulation or reinforced insulation
	Caution, risk of electric shock
	Caution, risk of danger (refer to the instrument manual for specific Warning or Caution information)
<b>CAT III 1000 V</b>	Category III 1000 V overvoltage protection
<b>CAT IV 600 V</b>	Category IV 600 V overvoltage protection
	Do not use in distribution systems with voltages higher than 600 V

For further safety information details, refer to the  
*Keysight U1452A/U1452AT/U1451A Insulation Tester User's Guide.*

## Standard accessories included in your purchase

The following accessories are shipped standard with the U1452A, U1452AT, and U1451A testers:

- ✓ Hard carrying case
- ✓ Alligator clips (red and black)
- ✓ Test leads (red and black)
- ✓ 19 mm probes (red and black)
- ✓ 4 mm probes (red and black)
- ✓ IR to USB cable
- ✓ Four 1.5 V AA alkaline batteries
- ✓ Certificate of Calibration

Model U1452A also includes the following accessories:

- ✓ Remote switch probe and adapter

If any item is missing or damaged, keep the shipping materials and contact the nearest Keysight Sales Office.

### NOTE

The descriptions and instructions in this guide apply to the U1452A, U1452AT, and U1451A Insulation Tester.

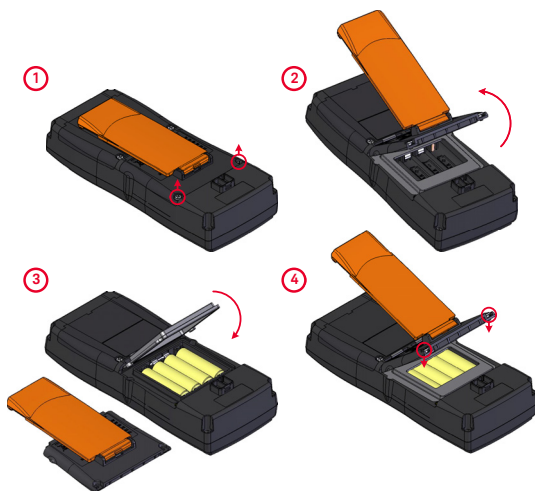
Model U1452A appears in all illustrations. The word *tester* is used to represent all models.

All related documents and software are available for download at [www.keysight.com/find/hhTechLib](http://www.keysight.com/find/hhTechLib).

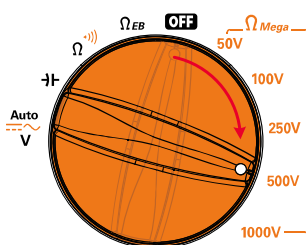
## Install or Change the Batteries

The tester is powered by four 1.5 V AA alkaline batteries (included in the shipment).

Before installing or changing the batteries, pull from a corner and stretch the orange rubber holster to remove it.

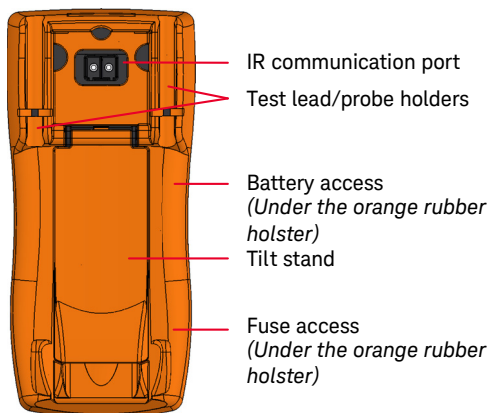
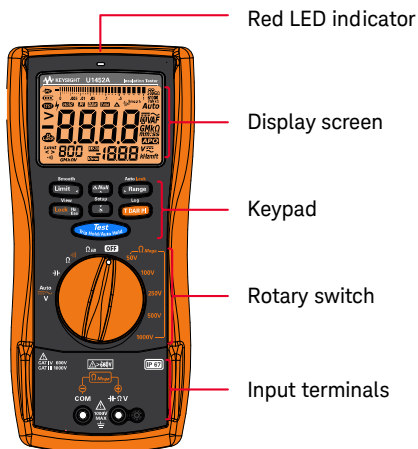


## Turn On the Tester



Turn the rotary switch from the **OFF** position to any other position to begin making measurements.










## The Tester at a Glance



## Using the Rotary Switch

### NOTE

Press [**T DAR PI**] to select the alternate measurement function(s) or test methods for insulation resistance tests.

Legend	Measurement function	Model		
		U1452A	U1452AT	U1451A
 $\Omega_{Mega}$ 50V	50 V insulation resistance test, T, DAR, PI <sup>[a]</sup>	✓	✓	-
 $\Omega_{Mega}$ 100V	100 V insulation resistance test, T, DAR, PI <sup>[a]</sup>	✓	✓	-
 $\Omega_{Mega}$ 250V	250 V insulation resistance test, T, DAR, PI <sup>[a]</sup>	✓	-	✓
 $\Omega_{Mega}$ 500V	500 V insulation resistance test, T, DAR, PI <sup>[a]</sup>	✓	-	✓
 $\Omega_{Mega}$ 1000V	1000 V insulation resistance test, T, DAR, PI <sup>[a]</sup>	✓	-	✓
 $\Omega_{EB}$	Earth-bond resistance, T	✓	✓	✓
 $\Omega_{\text{continuity}}$	Resistance, Continuity	✓	✓	✓
	Capacitance	✓	✓	✓
 Auto V	Auto (V), DC V, AC V	✓	✓	✓









[a] DAR and PI tests for models U1452A and U1452AT only.





### WARNING

Remove the test leads from the measuring source or target before changing the rotary switch position.

Refer to the *U1452A/U1452AT/U1451A User's Guide* for a complete list and description of all rotary switch labels.

# Using the Keypad





Legend	Key response when pressed for:	
	Less than 1 second	More than 1 second
	<b>IR Test:</b> Initiates an insulation test <sup>[a]</sup> as long as [Test] is held (  is shown) – the tester sources (outputs) a high voltage and measures insulation resistance	
	<b>EBR Test:</b> Initiates an earth-bond resistance test <sup>[b]</sup> as long as [Test] is held (  is shown)	
	<b>Trig Hold:</b> Freezes the present reading in the display <sup>[c]</sup>	<b>Auto Hold:</b> Automatically freezes the present reading once the reading is stable <sup>[c]</sup>
 	<b>Lock:</b> Locks the insulation test or earth-bond resistance test <sup>[d]</sup>	
	<b>Hz:</b> Displays the frequency (when the rotary switch is in the <b>V</b> position)	<b>View (U1452A and U1452AT):</b> Enters the Log review menu
	<b>Esc:</b> Discards the changes made in the Setup menu	
 	Selects the <b>alternate</b> measurement function(s)	
	<b>T/Time:</b> Configures the tester for a timed test <sup>[d][e]</sup>	
	<b>DAR (U1452A and U1452AT):</b> Configures the tester for a dielectric absorption ratio test <sup>[a][e]</sup>	<b>Log (U1452A and U1452AT):</b> Starts the data Log
	<b>PI (U1452A and U1452AT):</b> Configures the tester for a polarization index test <sup>[a][e]</sup>	
	<b>Limit:</b> Enables Limit comparison	<b>Smooth:</b> Enables Smooth

Legend	Key response when pressed for:	
	Less than 1 second	More than 1 second
 	<b>Range:</b> Sets a manual range <b>Leak (U1452A and U1452AT):</b> Displays the leakage current <sup>[d]</sup>	<b>Auto:</b> Enables autoranging
	<b>Null:</b> Enables Null	-
	<b>*</b> : Enable or disable the LCD backlight	<b>Setup:</b> Enters the Setup menu

- [a] When the rotary switch is in one of the  $\Omega$  Mega position.
- [b] When the rotary switch is in the  $\Omega$  EB position.
- [c] When the rotary switch is **NOT** in one of the  $\Omega$  Mega or the  $\Omega$  EB position.
- [d] When the rotary switch is in one of the  $\Omega$  Mega or the  $\Omega$  EB position.
- [e] Press [Test] to start the test.

## Using the Input Terminals

**WARNING** To avoid damaging this device, do not exceed the input limit.

Rotary position	Input terminals	Overload protection
		1000 Vrms
$\Omega$  		1000 Vrms for short circuit <0.3 A
$\Omega$ EB $\Omega$ Mega 50V $\Omega$ Mega 100V $\Omega$ Mega 250V $\Omega$ Mega 500V $\Omega$ Mega 1000V		440 mA/1000 V, 30 kA fast-acting fuse



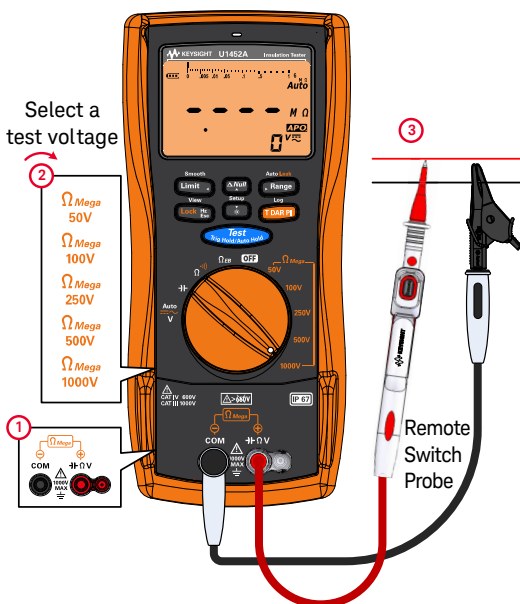
# Insulation Resistance (IR) Test

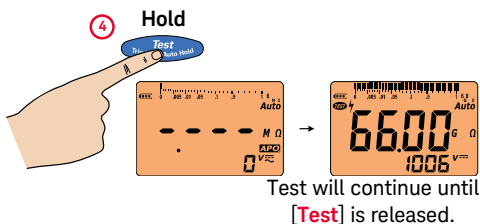
Ensure that the device-under-test (DUT) is de-energized before performing any resistance measurement.

The tester automatically detects if the circuit is energized. If the external voltage is detected to be greater than 30 V, the test is inhibited and the voltage hazard symbol (⚡) is shown on the display.

## CAUTION

**DO NOT** perform insulation resistance test in distribution systems with voltages higher than 600 V.

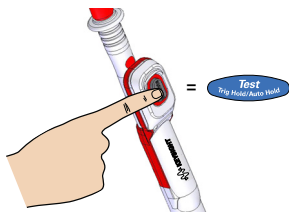




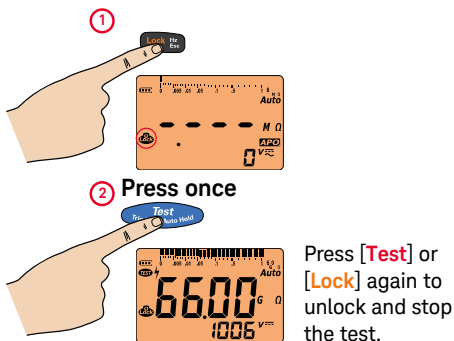
NOTE

When an insulation test is in progress, the red LED indicator at the top of the tester will blink every 2 seconds (if the Limit function is not enabled).

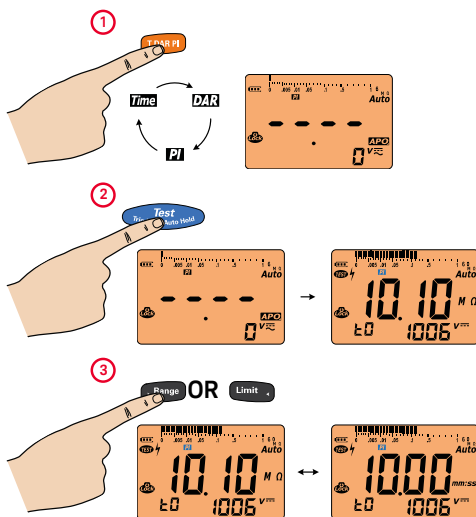
### Using the Remote Switch Probe



### Locking the Test for IR/EBR Tests



# Performing PI/DAR/T Tests



**Polarization Index (PI) = IR<sub>10 minutes</sub>/IR<sub>1 minute</sub>**

**Dielectric Absorption Ratio (DAR) = IR<sub>60 seconds</sub>/IR<sub>30 seconds</sub>** (default; can be changed to IR<sub>60 seconds</sub>/IR<sub>15 seconds</sub> in Setup)

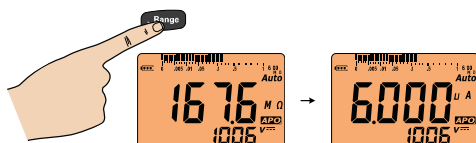
**Timed (T) = IR<sub>1 minute</sub>** (default; can be changed in Setup)

## NOTE

- Press **[Range]** or **[Limit]** to toggle the display between the timer and the measured value during PI, DAR, or T tests.
- Err** is shown on the display if the IR is greater than the maximum range or less than 0.001 MΩ after t1/t15/t30; if the test is interrupted by the user; or if the tester's battery is low.

## Viewing Leakage Current

Press [**Range**] after the IR test to view the leakage current; or press [**Range**] during the IR test to view the leakage current if the IR test is locked (see [page 10](#)).



### NOTE

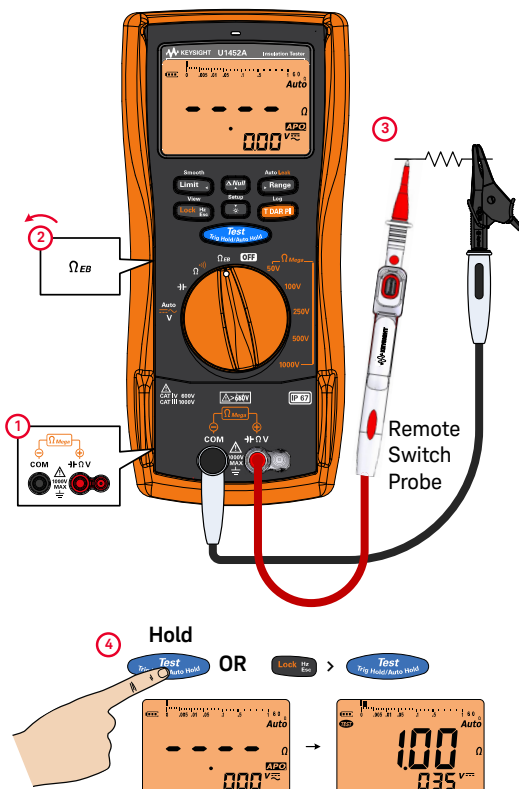
#### Viewing the leakage current for DAR, PI, or T tests:

Press [**Range**] first before selecting the PI, DAR, or T test. Then, press [**Test**] to view leakage current.

# Earth-Bond Resistance (EBR) Test

## CAUTION

The tester automatically detects if the circuit is energized. If the external voltage is detected to be greater than 2 V, the test is inhibited. Disconnect the tester and remove power from the circuit before proceeding.

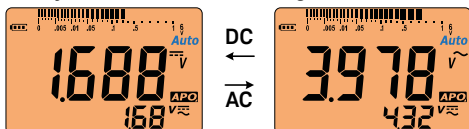


## Voltage Measurements

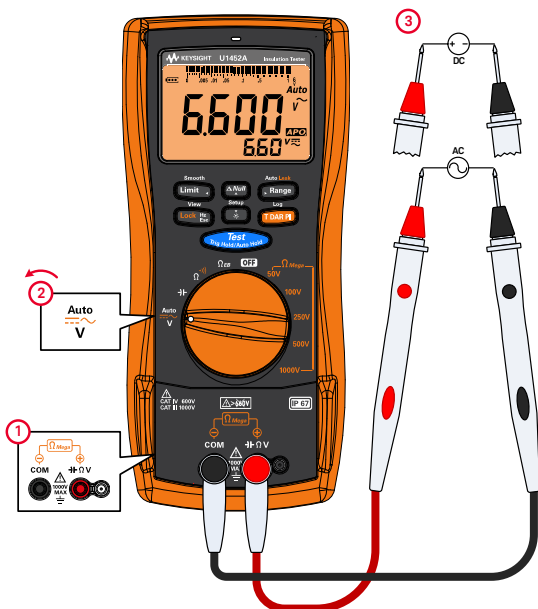
The **Auto** function is able to automatically

- Identify the signal component (AC or DC) of an electrical source to be indicated on the primary display, and
- Select a suitable measurement range according to the AC+DC reading

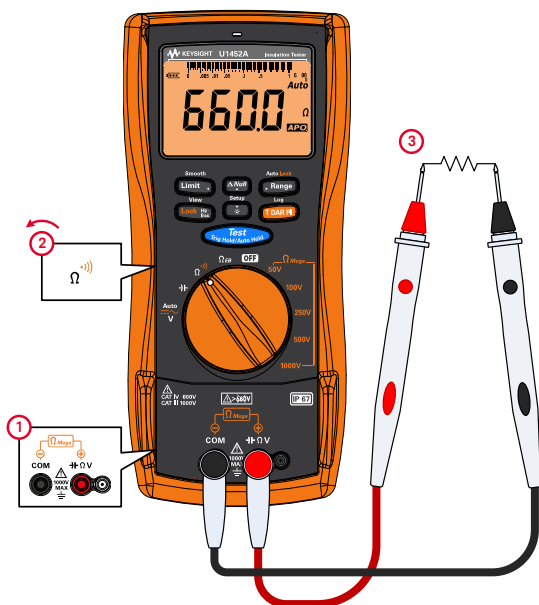
The symbol **Auto** blinks during the identification



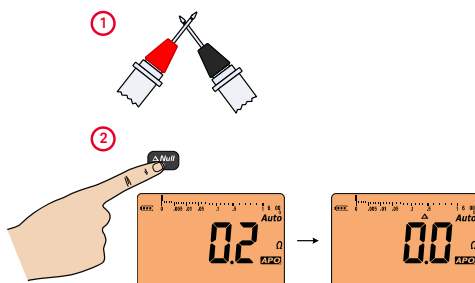
The AC+DC value is shown in the secondary display



# Resistance Measurement

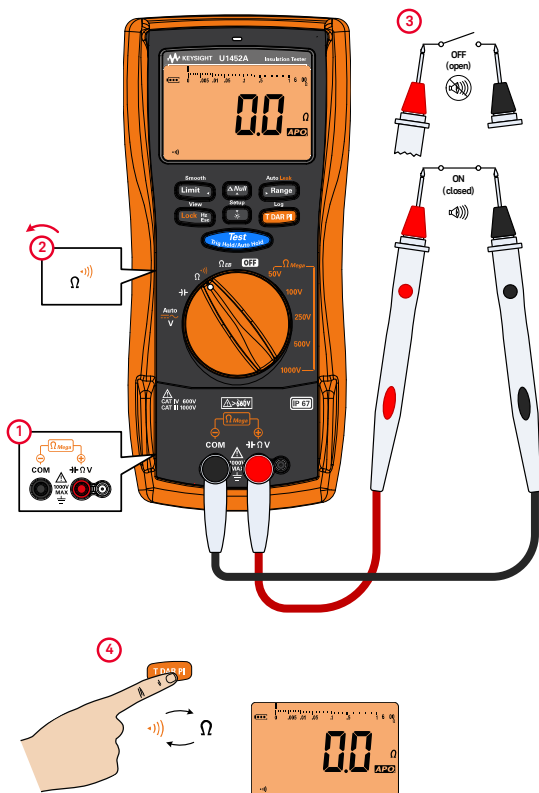


## Removing Test Lead Resistance



## Continuity Test

**CAUTION** To avoid possible damage to your tester or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before performing continuity tests.



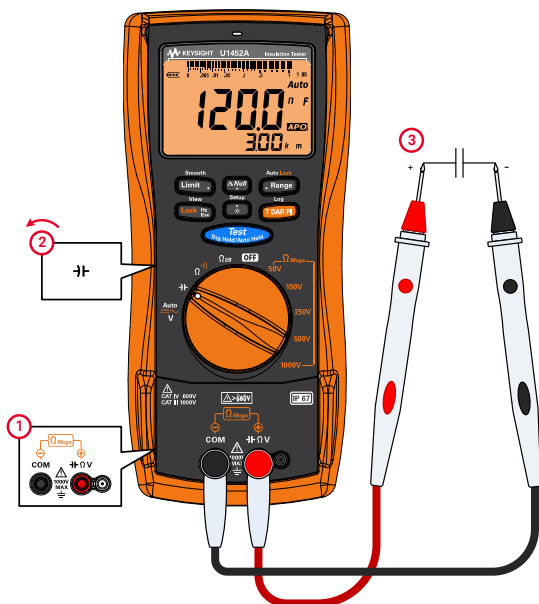


# Capacitance Measurement

## CAUTION

To avoid possible damage to the tester or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.

Before proceeding with capacitance measurements, first use the **DC V** function to confirm that the capacitor is fully discharged.



## NOTE

The cable length equivalent of the circuit under test is shown in the secondary display. The default scale is 1 km per 40 nF.

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This information is subject to change without notice. Always refer to the Keysight website for the latest revision.

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