

Keysight U1401B Handheld Multi-Function Calibrator/Meter

Quick Start
Guide

Contacting Keysight

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

Safety and EMC Information

This instrument is safety and EMC certified in compliance with:

- IEC 61010-1:2001/
EN61010-1:2001 (2nd Edition)
- Canada: CAN/CSA-C22.2 No.
61010-1-04
- USA: ANSI/UL 61010-1:2004
- IEC61326-2-1:2005/
EN61326-2-1:2006
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS
CISPR11:2004

Measurement Category II 150 V,
Pollution Degree 2. 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
	Double insulation
	Caution, risk of electric shock
	Caution, risk of danger
CAT II 150V	Category II 150 V overvoltage protection

For further safety information details, refer to the
Keysight U1401B Handheld Multi-Function Calibrator/Meter User's Guide.

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The following items are included with your multimeter:

- ✓ Protective holster
- ✓ Rechargeable battery pack (1.2 V NiMH AA × 8)
- ✓ Power cord and AC power adapter
- ✓ Silicone test leads, alligator clips, and a yellow test lead for mA simulation
- ✓ Certificate of calibration
- ✓ Printed Quick Start Guide

If anything is missing or damaged, please contact the nearest Keysight Sales Office.

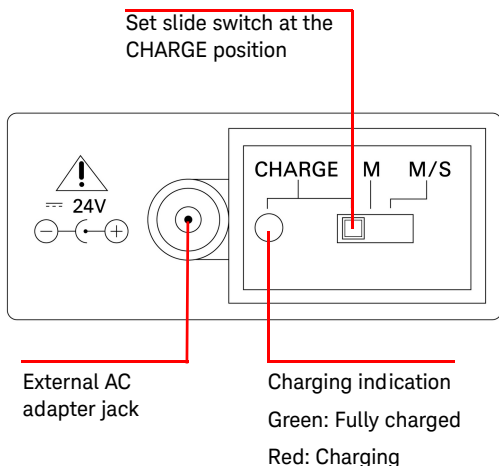
NOTE

Your multimeter is capable of remote data logging. To use this feature, you will need an IR-USB cable (U5481A, purchased separately) and the Keysight GUI Data Logger Software (downloadable from www.keysight.com/find/hhTechLib).

WARNING

Ensure the terminal connections are correct for that particular measurement selection before starting any measurement. To avoid damage to the device, do not exceed the input limit.

Recharging the Batteries



Charge the batteries immediately when the low battery annunciator starts flashing. It is strongly recommended that you use only the specified type of 24 V AC adapter to charge these rechargeable batteries.

- 1 Power down the instrument and disconnect all the test leads from the terminals.
- 2 Plug the AC adapter into the jack on the side panel.
- 3 Set the slide switch at the **CHARGE** position.
- 4 The red light indicates that the batteries are being recharged.

- 5 When the batteries have been fully recharged, the green light turns on. Remove the AC adapter and set the slide switch at the **M** or **M/S** position.

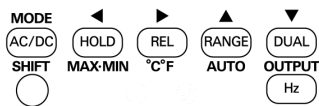
WARNING

Do not discharge a battery by shorting it or subjecting it to reverse polarity. Do not mix different types of battery. Make sure a battery is rechargeable before charging it.

CAUTION

Do not turn the rotary switch while the instrument is being recharged because a DC 24 V supply is applied to the charging terminal.

Functions and Features

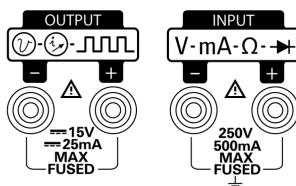


Action	Steps
Selects AC, DC, or AC+DC measurement	Press AC/DC
Toggles peak hold mode on and off	Press and hold AC/DC for > 1 s
Freezes the measured value	With data hold mode enabled, press HOLD . Press and hold HOLD for > 1 s to exit.
Enters or exits the refresh hold mode	With refresh hold mode enabled, press HOLD
Enters or exits the dynamic recording mode	Press and hold HOLD for > 1 s
Offsets the measured value	Press REL
Selects the measurement range	Press RANGE
Turns on autorange	Press and hold RANGE for > 1 s
Turns on dual display	Press DUAL
Turns on the frequency measurement function	Press Hz
Enables the shifted functions of the keypad	Press SHIFT
Toggles the backlight on or off	Press and hold SHIFT for > 1 s

Action	Steps
Selects output mode and range for voltage and current output	With rotary switch at  or  , and with SHIFT mode enabled, press MODE
Selects parameter adjustments for square wave output	With rotary switch at  , and with SHIFT mode enabled, press MODE
Selects a digit or the polarity to be adjusted	With SHIFT mode enabled, press ◀ or ▶
Adjusts a digit or the polarity	With SHIFT mode enabled, press ▲ or ▼
Toggles the output state on and off	With SHIFT mode enabled, press OUTPUT

Input/Output Terminals and Overload Protection

The output terminals are protected with DC 30 V overload protection. The overload protection limits of the input terminals are shown in the table below



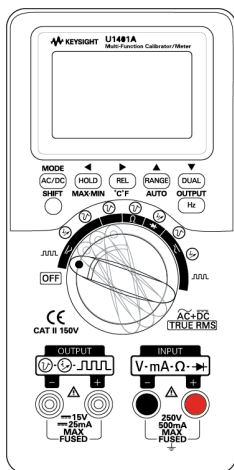
Functions	Overload Protection
AC/DC voltage measurement	250 Vrms
Resistance measurement and continuity test	
Temperature measurement	
AC/DC current measurement	250 V/630 mA, fast-acting fuse

Charging the battery

A new rechargeable battery comes in a discharged condition and must be charged before use (refer to the *U1401B User's and Service Guide* for charging instructions). Upon initial use (or after a prolonged storage period) the rechargeable battery may require three to four charge/discharge cycles before achieving maximum capacity. To discharge, simply run the multimeter using the rechargeable battery's power until it shuts down or until the low battery warning appears.

In some instances, the multimeter may indicate that the charging is complete after ten minutes or so when charging a new rechargeable battery. This is a normal phenomenon with rechargeable batteries. Remove the rechargeable battery from the device, re-insert it and repeat the charging procedure.

Performing Voltage Measurements



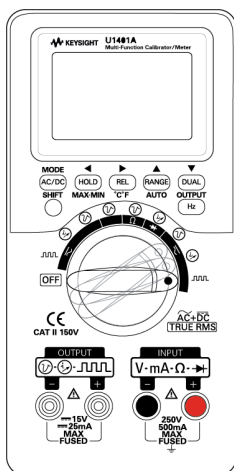
Measuring AC voltage

- 1 Set the rotary switch to $\sim$ V or mV. Press **AC/DC** to select **AC**.
- 2 Connect the red (+) and black (-) test leads to the **INPUT** terminals.
- 3 Probe the test points and read the display.
- 4 Press **DUAL** to display dual measurements.

Measuring DC voltage

- 1 Set the rotary switch to  **V** or **mV**. Press  to select **DC**.
- 2 Connect the red (+) and black (–) test leads to the **INPUT** terminals.
- 3 Probe the test points and read the display.
- 4 Press  to display dual measurements.

Performing Current Measurements



Measuring AC current

- 1 Set the rotary switch to $\sim$ mA. Press **AC/DC** to select **AC**.
- 2 Connect the red (+) and black (-) test leads to the **INPUT** terminals.
- 3 Probe the test points in series with the circuit and read the display.

Measuring DC current

- 1 Set the rotary switch to $\sim$ mA. Press **AC/DC** to select **DC**.
- 2 Connect the red (+) and black (-) test leads to the **INPUT** terminals.

- 3 Probe the test points in series with the circuit and read the display.

Percentage scale of DC mA measurement

With the rotary switch at  mA, another option selectable with the  key is the percentage scale of DC mA measurement.

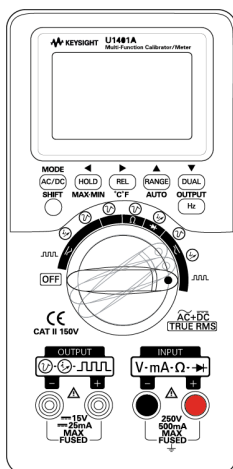
Frequency measurement

During AC/DC voltage or AC/DC current measurement, you can measure the signal frequency by pressing  at any time.

Performing Resistance Measurement and Continuity Test

CAUTION

Disconnect circuit power and discharge all high-voltage capacitors before measuring resistance to prevent possible damage to the instrument or the device under test.



- 1 Set the rotary switch to Ω .
- 2 Connect the red (+) and black (–) test leads to the **INPUT** terminals.
- 3 Probe the resistor (or shunt) leads and read the display.
- 4 To perform continuity test, press **AC/DC** to toggle the audible continuity function *on* or *off*.

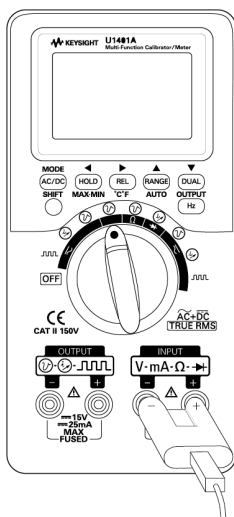
For continuity test, the instrument will beep if the resistance is less than the values indicated below:

Measurement range	Resistance threshold
500.00 Ω	10 Ω
5.0000 k Ω	100 Ω
50.000 k Ω	1 k Ω
500.00 k Ω	10 k Ω
5.0000 M Ω	100 k Ω
50.000 M Ω	1 M Ω

Performing Temperature Measurements

WARNING

- Before measuring the temperature of a circuit or device, disconnect its power.
 - The bead type thermocouple probe is suitable for measuring temperature from $-40\text{ }^{\circ}\text{C}$ to $204\text{ }^{\circ}\text{C}$ in PTFE compatible environments. The probes may emit toxic gas above this temperature range.
-



- 1 Set the slide switch to the **M** position to disable the output.
- 2 Set the rotary switch to **mV**.
- 3 Press and hold **REL** for more than 1 second.

- 4 Plug the thermocouple probe (with adapter) into the **INPUT** terminals.
- 5 Touch the surface to be measured with the thermocouple probe and read the display.

Best practices:

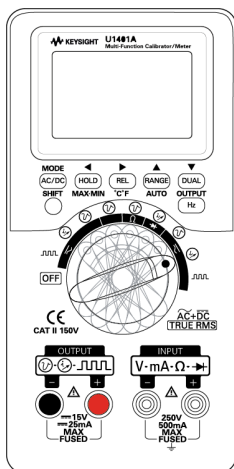
- Do not bend the thermocouple leads at sharp angles. Repeated bending may break the leads.
- Do not immerse the thermocouple probe in any liquid.
- Clean the surface to be measured and make sure that the probe is securely touching the surface.

NOTE

The U1401A can generate and measure signals simultaneously.

While the **SHIFT** mode is enabled, pressing **OUTPUT** disables the U1401A output by placing it in the standby mode (**SBY**). Pressing **OUTPUT** again toggles the output on (**OUT**).

Frequency and Frequency Counter Measurements



Constant voltage output

- 1 Set the rotary switch to any one of the  positions.
- 2 Press **SHIFT**. The **SHIFT** annunciator appears.
- 3 Press **MODE** to cycle through ± 1.5 V, ± 15 V, **SCAN** ± 1.5 V, **SCAN** ± 15 V,  ± 1.5 V, and  ± 15 V output modes.
- 4 Select ± 1.5 V or ± 15 V.
- 5 Press **OUTPUT** to output the signal.

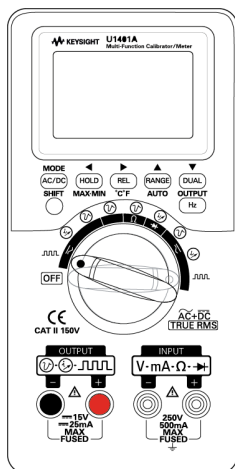
Constant current output

- 1 Set the rotary switch to any one of the  positions.
- 2 Press **SHIFT**. The **SHIFT** annunciator appears.
- 3 Press **MODE** to cycle through ± 25 mA, **SCAN** ± 25 mA, and  ± 25 mA output modes.
- 4 Select ± 25 mA.
- 5 Press **OUTPUT** to output the signal.

Autoscan and autoramp outputs

The voltage and current outputs can also be generated in predefined steps or ramp. Refer to the User's and Service Guide for the detailed procedures.

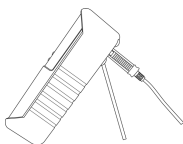
Square Wave Output



- 1 Set the rotary switch to .
- 2 Press **SHIFT**. The **SHIFT** annunciator appears.
- 3 Press **MODE** to cycle through the adjustment modes for frequency () , duty cycle () , pulse width () , and amplitude (Level). Select a parameter to adjust.
- 4 Press **▲** or **▼** to adjust the parameter value.
- 5 Press **OUTPUT** to output the square wave signal.

Tilt Stand

The instrument can be raised to a standing position by means of a tilt stand.



CAUTION

Degradation of some product specifications can occur in the presence of ambient electromagnetic (EM) fields and noise that are coupled to the powerline or I/O cables of the instrument. The instrument will self-recover and operate to all specifications when the source of ambient EM field and noise are removed or when the instrument is protected from the ambient EM field or when the instrument cabling is shielded from the ambient EM noise.

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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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Edition 5, June 1, 2017

Printed in Malaysia



U1401-90047

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