

FLUKE®

15B MAX/17B MAX

Digital Multimeters

Users Manual

(English)

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Table of Contents

Title	Page
Introduction.....	1
Contact Fluke	1
Safety Information	1
Instrument Overview.....	2
Auto Sleep	4
Auto Backlight Off.....	4
Measurements.....	4
Manual and Auto Range Selection.....	5
Data Hold.....	5
Relative Measurements (17B MAX only)	6
MIN MAX Mode (17B MAX Only)	6
Measure AC and DC Voltage	6
Measure AC or DC Current.....	7
Input Alert™ Feature	8
Measure Resistance	8
Test for Continuity	9
Test Diodes	9
Measure Capacitance	10
Measure Temperature (17B MAX only).....	10
Measure Frequency and Duty Cycle (17B MAX Only)	10

15B MAX/17B MAX

Users Manual

Hazardous Voltage Alert LED (17B MAX only).....	11
Maintenance.....	11
General Maintenance	12
Test Fuses.....	12
Replace Batteries and Fuses.....	13
Service and Parts	14
TL31 Test Leads	14
Test Small Components in Circuit.....	15
Test CAT III Applications.....	15
Specifications.....	16
General Specifications	16
Accuracy Specifications.....	18
AC and DC Voltage	18
AC and DC Current.....	19
Diode Test, Temperature, Resistance, Capacitance, Frequency, and Duty Cycle.....	20
Continuity Threshold.....	21
Input Characteristics	22

Introduction

The 15B MAX/17B MAX Digital Multimeters (the Product) are 6000 count instruments. The Product is battery powered with a digital display.

Except where noted, the descriptions and instructions in this manual apply to all each Product version.

Unless otherwise identified, all illustrations show the 17B MAX.

Contact Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: www.fluke.com

To register your product, view, print, or download the latest manual or manual supplement, go to our website.

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Safety Information

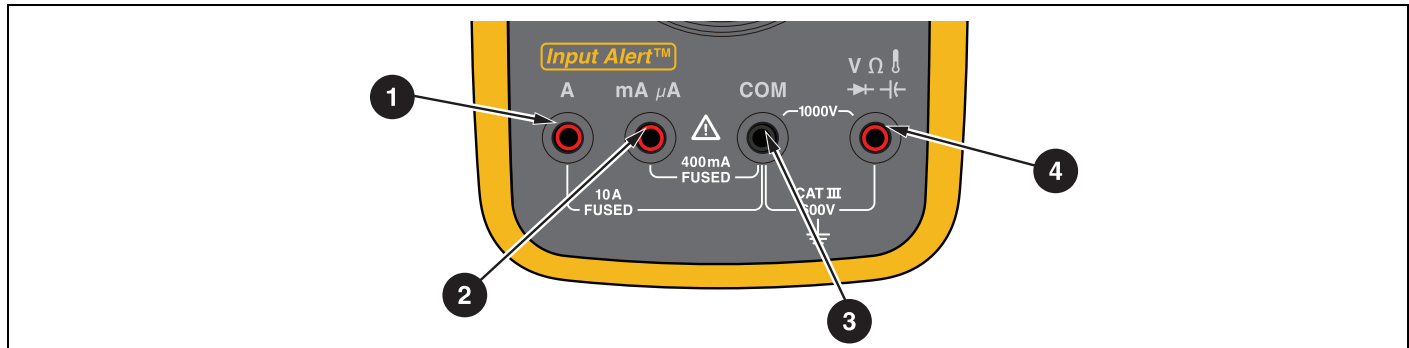
A **Warning** identifies hazardous conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

General Safety Information is in the printed Safety Information document that shipped with the Product. It can also be found online at www.fluke.com. More specific safety information is listed in this manual where applicable.

Instrument Overview

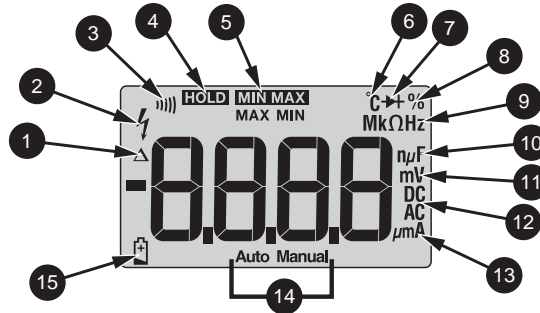
See [Figure 1](#) for a description of each of the Product terminals. See [Figure 2](#) for a description of the Product display.

Figure 1. Terminals



Item	Description
1	Input terminal for ac and dc current measurement to 10 A and frequency (17B MAX only) measurements.
2	Input terminal for ac and dc microamp and milliamp measurements to 400 mA and frequency (17B MAX only) measurements.
3	Common (return) terminal for all measurements.
4	Input terminal for voltage, resistance, continuity, diode, capacitance, frequency (17B MAX only), duty cycle (17B MAX only), and temperature (17B MAX only) measurements.

Figure 2. Display



Item	Description	Item	Description
1	Relative measurement is enabled (17B MAX only)	9	Resistance or Frequency selected (17B MAX only)
2	High voltage	10	Farads for capacitance
3	Continuity selected	11	Millivolts or volts
4	Display hold enabled	12	DC or ac voltage or current
5	MIN or MAX mode enabled (17B MAX only)	13	Microamp, milliamp, or amp
6	Celsius (17B MAX only)	14	Auto range mode or Manual range mode activated.
7	Diode test selected	15	Low battery. Replace battery.
8	Duty cycle selected (17B MAX only)		

Auto Sleep

To power the Product on, turn the rotary switch from **OFF** to the necessary position. The Product automatically sleeps after 20 minutes of inactivity.

To wake the Product, push any keypad to go back to the original function.

To disable the Auto Sleep function, hold down as you turn on the Product, until the display shows **PoFF**.

Note

*When you disable the Auto Sleep function, the display shows **LoFF** and the Product also disables the Auto Backlight Off function.*

Auto Backlight Off

The backlight automatically turns off after 2 minutes of inactivity.

To disable the Auto Backlight Off function, hold down  as you turn on the Product, until **LoFF** shows on the display.

Measurements

Warning

To prevent possible electrical shock, fire, or personal injury, disconnect power and discharge all high-voltage capacitors before you measure resistance, continuity, capacitance, or a diode junction.


Manual and Auto Range Selection


The Product has both manual and auto range options. In the Auto Range mode, the Product selects the best range for the input detected. This allows you to switch test points without the need to reset the range. Select the range manually to override Auto Range.

By default, the Product uses the Auto Range mode in measurement functions that have more than one range and shows Auto Range on the display.

To enter the Manual Range mode, push .

Note



Each push of  increments the range. When you reach the highest range, the Product wraps to the lowest range.

To exit Manual Range mode, push and hold  for 2 seconds.

Data Hold

Warning

To prevent possible electrical shock, fire or personal injury, do not use the HOLD function to measure unknown potentials. When you engage HOLD, the display does not change when a you measure a different potential.

To hold the present reading, push . Push  again to resume normal operation.

Relative Measurements (17B MAX only)

The Product allows relative measurements for all functions except frequency, resistance, continuity, duty cycle, and diode.

To do relative measurements:

1. With the Product in the desired function, touch the test leads to the circuit on which you want future measurements to be based.
2. Push **REL** to store the measurement as the reference value and activate the relative measurement mode.

The difference between the reference value and subsequent reading shows on the display.

3. Push **REL** to return to normal operation.

MIN MAX Mode (17B MAX Only)

To set the Product to MIN MAX mode (available for all

functions except resistance, capacitance, frequency, duty cycle, and diode):

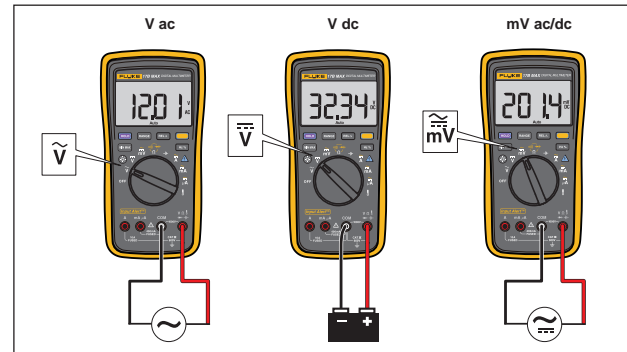
1. Push **MIN MAX** once to set the Product to MAX mode.
2. Push **MIN MAX** again to set the Product to MIN mode.
3. Hold **MIN MAX** for 2 seconds to return to normal operation.

Measure AC and DC Voltage

To measure ac and dc voltage:

1. Turn the rotary switch to \tilde{V} , \bar{V} , or \overline{mV} to choose ac or dc.
2. Push **□** to toggle between mVac or mVdc voltage measurement.
3. Connect the red test lead to the V_{Ω} terminal and the black test lead to the **COM** terminal.
4. Touch the probes to the correct test points of the circuit to measure the voltage, as shown in [Figure 3](#).
5. Read the measured voltage on the display.

Figure 3. Measure AC and DC Voltage



Measure AC or DC Current

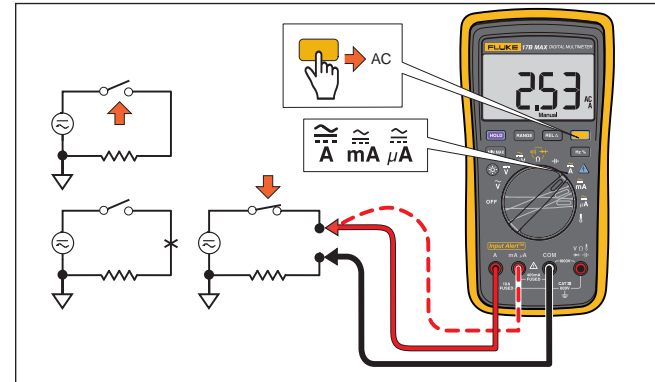
⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, remove circuit power before you connect the Product in the circuit when you measure current. Connect the Product in series with the circuit.

To measure ac or dc current:

1. Turn the rotary switch to \tilde{A} , $m\tilde{A}$, or $\mu\tilde{A}$.
2. Push \square to toggle between ac or dc current measurement.
3. Connect the red test lead to the **A** or **mA** μA terminal based on the current to be measured and connect the black test lead to the **COM** terminal. See [Figure 4](#).
4. Break the circuit path to be measured. Connect the test leads across the break and then apply power.
5. See the display for the measured current.


Figure 4. Measure AC and DC Current



Input Alert™ Feature

⚠ Caution

To prevent circuit damage and a possible blown current fuse, do not place the probes across (in parallel with) a powered circuit when a lead is plugged into a current terminal. This causes a short circuit because the resistance through the Product current terminals is very low.

If a test lead is plugged into the **mA/μA** or **A** terminal, but the rotary switch is not set to the correct current position, the beeper chirps, the warning alert LED ⚠ (17B MAX only), HOLD and  buttons rapidly flash. See [Figure 5](#). This is to stop you from attempting to measure voltage, continuity, resistance, capacitance, or diode values when the leads are plugged into a current terminal.

Note


*To prevent false input alert warnings, keep the **mA/μA** and **A** terminals free of metallic debris.*

Figure 5. Input Alert Indicators



Measure Resistance

To measure resistance:

1. Turn the rotary switch to  and disconnect power from the circuit under test.
2. Connect the red test lead to the V_{Ω} terminal and the black test lead to the **COM** terminal, as shown in [Figure 6](#).
3. Touch the probes to the desired test points of the circuit to measure the resistance.
4. See the display for the measured resistance.

Test for Continuity

To test for continuity:


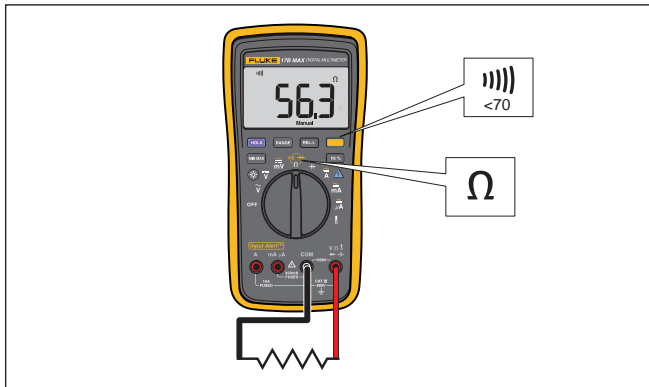
1. Select resistance mode.
2. Push  once to activate the continuity beeper. If the resistance is $<70\ \Omega$, the beeper sounds continuously which designates a short circuit. See [Figure 6](#).

Figure 6. Measure Resistance and Continuity





Test Diodes

Caution

To prevent possible damage to the Product or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before you test diodes.

To test a diode:



1. Turn the rotary switch to .
2. Push  twice to activate Diode Test.
3. Connect the red test lead to the V_{Ω} terminal and the black test lead to the **COM** terminal.
4. Connect the red probe to the anode side and the black test lead to the cathode side of the diode under test.
5. See the display for the forward bias voltage value.
6. If you reverse the polarity of the test leads with diode polarity, the display reading shows **OL**. Use this reading to distinguish the anode and cathode sides of a diode.

Measure Capacitance

Caution



To prevent damage to the Product, disconnect circuit power and discharge all high-voltage capacitors before you measure capacitance.

To measure capacitance:


1. Turn the rotary switch to .
2. Connect the red test lead to the  terminal and the black test lead to the **COM** terminal.
3. Touch the probes to the capacitor leads.
4. Allow the indication to stabilize, see the display to read the capacitance value.



Measure Temperature (17B MAX only)

To measure temperature:


1. Turn the rotary switch to .
2. Plug the K type thermocouple plug marked **+** into the  terminal, and the other plug into the **COM** terminal of the Product.
3. See the display for the temperature value.

Measure Frequency and Duty Cycle (17B MAX Only)


The Product can measure frequency or duty cycle while it makes either a voltage or a current measurement. Push  to change the Product to frequency or duty cycle.

1. When the Product is in the required function (ac voltage or ac current), push .
2. See the display for the frequency of the signal.
3. To make a duty cycle measurement, push  again.
4. See the display for the percent of duty cycle.

Hazardous Voltage Alert LED (17B MAX only)

To alert you to the presence of a potentially hazardous voltage, the hazardous voltage alert LED () illuminates when the Product detects ≥ 30 V or a voltage overload (**OL**).

Note

The hazardous voltage alert LED () illuminates at Frequency/Duty cycle test when the Product is in ac or dc volt or millivolt modes.

Maintenance

Beyond battery and fuse replacement, do not attempt to repair or service the Product unless you are qualified to do so and have the relevant calibration, performance test, and service instructions. The recommended calibration cycle is 12 months.

Warning

To prevent possible electrical shock, fire, or personal injury, and for safe operation and maintenance of the product, read [Safety Information](#).

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

To clean the terminals:



1. Turn the Product off and remove the test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with isopropyl alcohol and work it around the inside of each input terminal.

Test Fuses

Warning

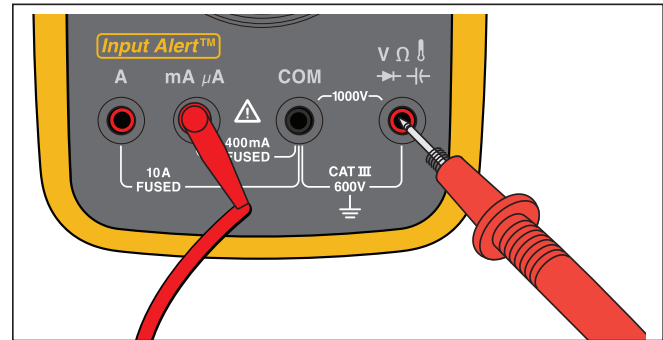
To prevent electric shock or injury, remove the test leads and any input signals before you replace the fuses.

To test the fuses:

1. Turn the rotary switch to .
2. Plug a test lead into the **A** or **mA μ A** terminal and touch the probe to the  terminal. See [Figure 7](#).
 - A good **A** terminal fuse reads $<0.5 \Omega$.
 - A good **mA μ A** terminal fuse reads $<10 \text{ k}\Omega$.

- If the display reads **OL**, replace the fuse and test again.
- If the display shows any other value, have the Product serviced. See [Service and Parts](#).

Figure 7. Test Fuses



Replace Batteries and Fuses

⚠⚠ Warning

To prevent false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (🔋) appears.

To prevent damage or injury, install **ONLY** replacement fuses with the specified amperage, voltage, and interrupt ratings.

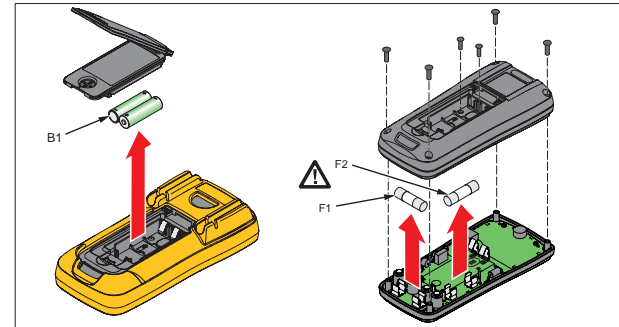
Disconnect test leads before you open the case or the battery door.

Dispose of old devices in a professional and environmentally sound manner.

- Delete personal data on the Product before disposal.
- Remove batteries that are not integrated into the electrical system before disposal. Dispose of batteries separately.

To replace the batteries or fuses, see [Figure 8](#).

Figure 8. Replace Batteries and Fuses



Service and Parts

If the Product fails:

1. Make sure the batteries are charged.
2. Test the fuses.
3. Review this manual to make sure that you correctly operate the Product.

Replacement parts are listed in [Table 1](#).

Table 1. Replacement Parts

Item Description	Part No.
Battery, IEC LR6	376756
Battery door assembly	5338510
TL31, test leads with two caps and fine tips	5343862 or 5595980
TL75, test leads with two caps	4306653
Fuse, 0.440 A, 1000 V, FAST	943121
Fuse, 11 A, 1000 V, FAST	803293
Holster	4368113

TL31 Test Leads

Warning

To prevent possible electrical shock, fire or personal injury:

- **Do not use test leads if they are damaged. Examine the test leads for damaged insulation, exposed metal, or if the wear indicator shows. Check test lead continuity.**
- **Use the test leads with caution and install the protective cap to prevent injury.**

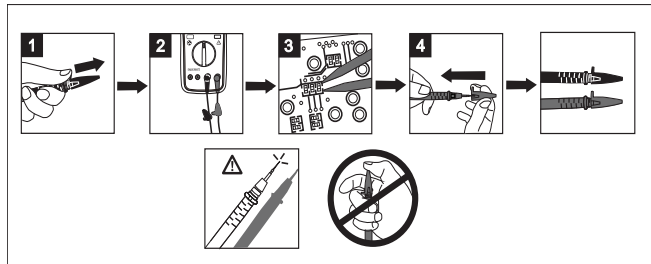
The TL31 Test Leads that come with the Product 15B MAX-02, 15B MAX KIT, 17B MAX-02, and 17B MAX KIT have fine tips to test small components of the circuit. With the protective cap properly installed, use the leads for CAT III applications.

Test Small Components in Circuit

To test small components in the circuit, see [Figure 9](#):

1. Push up from the bottom of the protective caps with thumb to remove both caps.
2. Fluke recommends that you clamp the caps on the test cables close to DMM.
3. Connect the bare tips to small components on the circuit to do the measurement.
4. When you finish the test, reinstall the protective caps.

Figure 9. Test Small Components in Circuit



Test CAT III Applications

For CAT III applications, see [Figure 10](#):

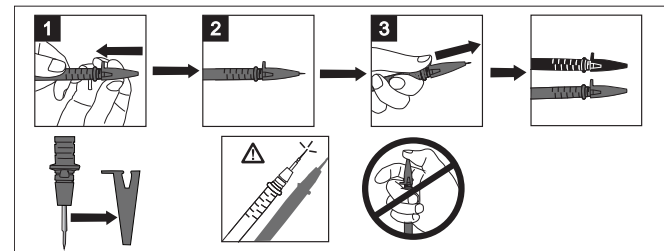
1. Twist the protective caps and then push them firmly onto the lead body. The end of the probe should come out of the cap end.

⚠ Warning

To prevent possible personal injury, do not push the protective cap onto the lead body with your thumb.

2. When you finish the test, push the cap back up to hide the tip to reinstall the protective caps.

Figure 10. Probe Position for CAT III Applications



Specifications

General Specifications

Maximum voltage between any Terminal and Earth Ground	.....600 V
Maximum differential voltage between V and COM terminals	.....1000 V
Display (LCD)	.....6000 counts, updates 3/sec
Battery Type	.....2 AA, IEC LR6
Battery Life	.....500 hours minimum
Temperature	
Operating	.....0 °C to 40 °C
Storage	.....-30 °C to 60 °C
Relative Humidity	
Operating Humidity	.....Non-condensing (<10 °C); ≤90 % RH at 10 °C to 30 °C; ≤75 % RH at 30 °C to 40 °C
Operating Humidity, 40 MΩ range	.....≤80 % RH at 10 °C to 30 °C; ≤70 % RH at 30 °C to 40 °C

Altitude	
Operating	.....2000 m
Storage	.....12 000 m
Temperature Coefficient	.....0.1 X (specified accuracy) /°C (<18 °C or >28 °C)
⚠ Fuse protection for current inputs	
	.....0.44 A, 1000 V, IR 10 kA
	.....11 A, 1000 V, IR 20 kA
Size (HxWxL)	.....183 mm x 91 mm x 49.5 mm
Weight	.....455 g
Ingress Protection	.....IEC 60529: IP40
Safety	
General	.....IEC 61010-1: Pollution Degree 2
Measurement	.....IEC 61010-2-033: CAT III 600V
Electromagnetic Environment	.....IEC 61326-1: Portable

Electromagnetic Compatibility (EMC)

International IEC 61326-1: Portable Electromagnetic Environment
CISPR 11: Group 1, Class A

Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.

Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Emissions that exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object.

Korea (KCC) Class A Equipment (Industrial Broadcasting & Communication Equipment)

Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

USA (FCC) 47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.

Accuracy Specifications

Accuracy is specified for 1 year after calibration, at operating temperatures of 18 °C to 28 °C, relative humidity at 0 % to 75 %. Accuracy specifications take the form of: \pm [(% of Reading) + [Number of Least Significant Digits]].

AC and DC Voltage

Function	Range	Resolution	Accuracy	
			15B MAX	17B MAX
AC Volts (40 Hz to 500 Hz) ^[1] \tilde{V}	6.000 V 60.00 V 600.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	1.0 % + 3	1.0 % + 3
AC Millivolts \tilde{mV}	600.0 mV	0.1 mV	3.0 % + 3	3.0 % + 3
DC Millivolts $\overline{\overline{mV}}$	600.0 mV	0.1 mV	1.0 % + 10	1.0 % + 10
DC Volts $\overline{\overline{V}}$	6.000 V 60.00 V 600.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	0.5 % + 3	0.5 % + 3




[1] All ac, Hz, and duty cycle are specified from 1 % to 100 % of range. Inputs below 1 % of range are not specified.

AC and DC Current

Burden voltage (typical value)
 AC/DC Current μA : $100 \mu\text{V} / \mu\text{A}$
 AC/DC Current mA : $2 \text{mV}/\text{mA}$
 AC/DC Current A : $0.03 \text{V}/\text{A}$

Function	Range	Resolution	Accuracy	
			15B MAX	17B MAX
AC Current μA (40 Hz to 400 Hz) $\tilde{\mu\text{A}}$	400.0 μA 4000 μA	0.1 μA 1 μA	1.5 % + 3	1.5 % + 3
AC Current mA (40 Hz to 400 Hz) $\tilde{\text{mA}}$	40.00 mA 400.0 mA	0.01 mA 0.1 mA	1.5 % + 3	1.5 % + 3
AC Current A ^[1] (40 Hz to 400 Hz) $\tilde{\text{A}}$	4.000 A 10.00 A	0.001 A 0.01 A	1.5 % + 3	1.5 % + 3
DC Current μA $\overline{\mu\text{A}}$	400.0 μA 4000 μA	0.1 μA 1 μA	1.5 % + 3	1.5 % + 3
DC Current mA $\overline{\text{mA}}$	40.00 mA 400.0 mA	0.01 mA 0.1 mA	1.5 % + 3	1.5 % + 3
DC Current A ^[1] $\overline{\text{A}}$	4.000 A 10.00 A	0.001 A 0.01 A	1.5 % + 3	1.5 % + 3
[1] 10 A duty cycle <7 minutes on, 20 minutes off.				

Diode Test, Temperature, Resistance, Capacitance, Frequency, and Duty Cycle

Function	Range	Resolution	Accuracy	
			15B MAX	17B MAX
Diode Test ^[1] 	2.000 V	0.001 V	10 %	10 %
Temperature ^[6] 	50.0 °C to 400.0 °C 0 °C to 50.0 °C -55.0 °C to 0 °C	0.1 °C	NA	2 % + 1 °C 2 °C 9 % + 2 °C
Resistance (Ohms) ^[2] Ω	400.0 Ω 4.000 kΩ 40.00 kΩ 400.0 kΩ 4.000 MΩ 40.00 MΩ	0.1 Ω 0.001 kΩ 0.01 kΩ 0.1 kΩ 0.001 MΩ 0.01 MΩ	0.5 % + 3 0.5 % + 2 0.5 % + 2 0.5 % + 2 0.5 % + 2 1.5 % + 3	0.5 % + 3 0.5 % + 2 0.5 % + 2 0.5 % + 2 0.5 % + 2 1.5 % + 3
Capacitance ^[3] 	40.00 nF 400.0 nF 4.000 μF 40.00 μF 400.0 μF 2000 μF	0.01 nF 0.1 nF 0.001 μF 0.01 μF 0.1 μF 1 μF	2 % + 5 2 % + 5 5 % + 5 5 % + 5 5 % + 5 5 % + 5	2 % + 5 2 % + 5 5 % + 5 5 % + 5 5 % + 5 5 % + 5

Function	Range	Resolution	Accuracy	
			15B MAX	17B MAX
Frequency ^[4] (10 Hz to 100 kHz)	50.00 Hz 500.0 Hz 5.000 kHz 50.00 kHz 100.0 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz 0.1 kHz	NA	0.1 % + 3
Duty Cycle ^[4]	1 % to 99 %	0.1 %	NA	1 % typical ^[5]
<p>[1] Typically, open circuit test voltage is 2.0 V and short circuit current is <0.6 mA. [2] Typical open circuit test voltage: 0.54 V. Maximum short circuit current: 1.8 mA. [3] Specifications do not include errors due to test lead capacitance and capacitance floor (may be up to 1.5 nF in the 40 nF range). [4] All ac, Hz, and duty cycle are specified from 1 % to 100 % of range. Input below 1 % of range are not specified. [5] Typical means when the frequency is at 50 Hz or 60 Hz and the duty cycle is between 10 % and 90 %. [6] Use type K thermocouple.</p>				

Continuity Threshold

Function	Threshold
Continuity Threshold	70 Ω

Input Characteristics

Function	Overload Protection	Input Impedance (Nominal)	Common Mode Rejection Ratio	Normal Mode Rejection Ratio
AC Volts	1000 V ^[1]	>10 M Ω , <100 pF	>60 dB at 50 Hz or 60 Hz	-
AC Millivolts	1000 V ^[1]	>1 M Ω , <100 pF	>80 dB at 50 Hz or 60 Hz	-
DC Volts	1000 V ^[1]	>10 M Ω , <100 pF	>100 dB at 50 Hz or 60 Hz	>60 dB at 50 Hz or 60 Hz
DC Millivolts	1000 V ^[1]	>1 M Ω , <100 pF	>80 dB at 50 Hz or 60 Hz	-
[1] 10 ⁶ V Hz max				