FLUKE

15B+/17B+/18B+

Digital Multimeters

Users Manual

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Introduction

The Fluke 15B+/17B+/18B+ Digital Multimeters (the Product) are 4000 count instruments. The Product is battery powered with a digital display.

Except where noted, the descriptions and instructions in this Users Manual apply to all of 15B+/17B+/18B+.

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

Contact Fluke

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

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

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Safety Information

General Safety Information is in the printed Safety Information document that ships with the Product and at www.fluke.com. More specific safety information is listed where applicable.

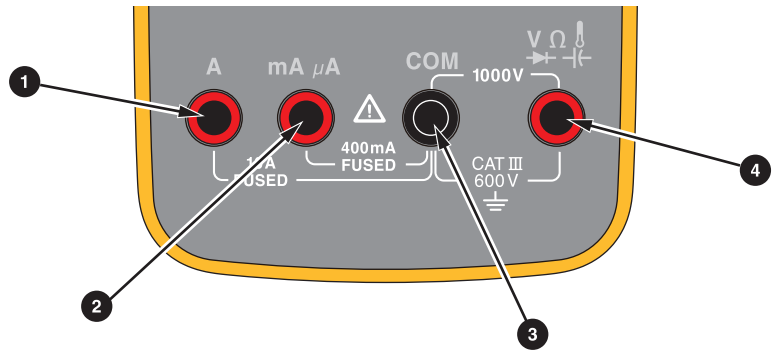
A **Warning** identifies hazardous conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Review the safety information and comply with the safe working practices.

Product Overview

Table 1 shows the terminals on the Product.

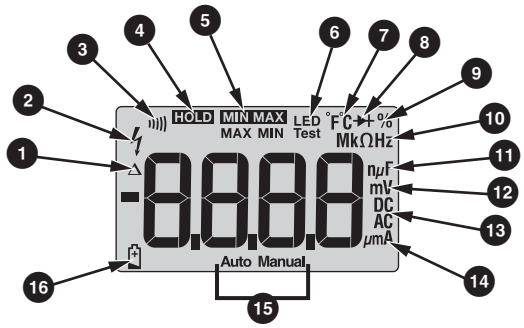
Table 1. Terminals



Item	Description
1	Input terminal for ac and dc current measurement to 10 A and frequency (17B+/18B+) measurements.
2	Input terminal for ac and dc microamp and milliamp measurements to 400 mA and frequency (17B+/18B+) measurements.
3	Common (return) terminal for all measurements.
4	Input terminal for voltage, resistance, continuity, diode, capacitance, frequency (17B+/18B+), duty cycle (17B+/18B+), temperature (17B+ only), and LED test (18B+ only) measurements.

Table 2 shows the display of the Product.

Table 2. Display



Item	Description	Item	Description
1	Relative measurement is enabled (17B+ only).	9	Duty cycle is selected (17B+/ 18B+).
2	High voltage	10	Resistance or Frequency (17B+/ 18B+) is selected.
3	Continuity is selected.	11	Farads for capacitance.
4	Display Hold is enabled.	12	millivolts or volts
5	MIN or MAX mode is enabled (17B+ only).	13	dc or ac voltage or current
6	LED test is enabled (18B+ only).	14	microamp, milliamp, or amp
7	Fahrenheit or Celsius is selected (17B+ only).	15	Auto range mode or Manual range mode is enabled.
8	Diode test is selected.	16	Battery is low and should be replaced.

Auto Power Off

The Product automatically powers off after 20 minutes of inactivity.

To restart the Product, turn the rotary switch back to the OFF position and then to a necessary position.

To disable the Auto Power Off function, hold down ▭ when turning on the Product, until PoFF shows on the display.

Note

When you disable the Auto Power Off function, LoFF *also shows on the display. The Auto Backlight Off function is also disabled.*

Auto Backlight Off

The backlight automatically turns off after 2 minutes of inactivity.

To disable the Auto Backlight Off function, hold down ▭ when turning 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 having to reset the range. You can override auto ranging by selecting the range manually.

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 RANGE.

Note

Each push of RANGE increments the range. When the highest range is reached, the Meter wraps to the lowest range.

To exit the manual range mode, push and hold RANGE for two seconds.

Data Hold

⚠⚠ Warning

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

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

Relative Measurements (17B+ 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 measured reading 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 for to return to normal operation.

MIN MAX Mode (17B+ Only)

To set the Product to MIN MAX mode (available for all functions except resistance, capacitance, frequency, duty cycle, and diode):

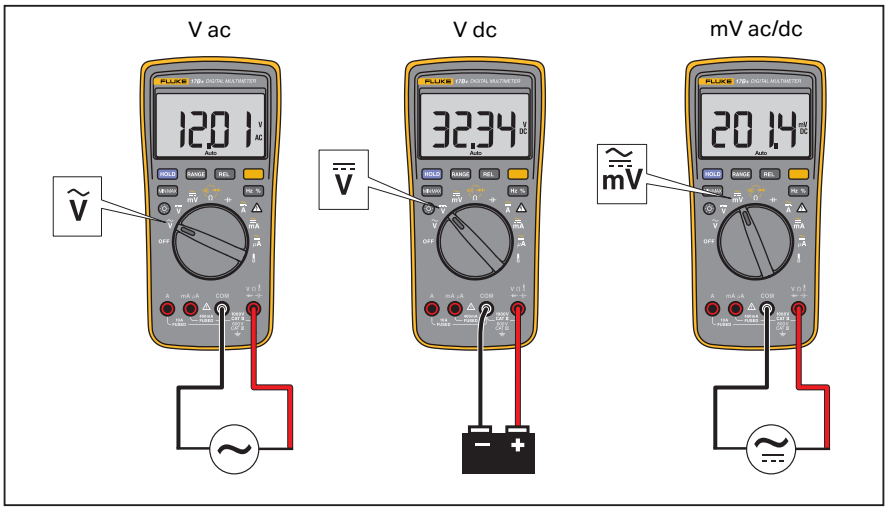
1. Push MIN MAX once to set the Product to MAX mode.
2. Push MIN MAX again to set the Product to MIN mode.
3. Push MIN MAX for 2 seconds to return to normal operation.

Measure AC and DC Voltage

To measure ac and dc voltage:

1. Turn the rotary switch to $\tilde{V}$, $\overline{\tilde{V}}$, or $\overline{\tilde{mV}}$ to choose ac or dc.
2. Push ▭ to toggle between mVac or mVdc voltage measurement.
3. Connect the red test lead to the $V\Omega$ 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 1.
5. Read the measured voltage on the display.

Figure 1. Measure AC and DC Voltage



Measure AC or DC Current

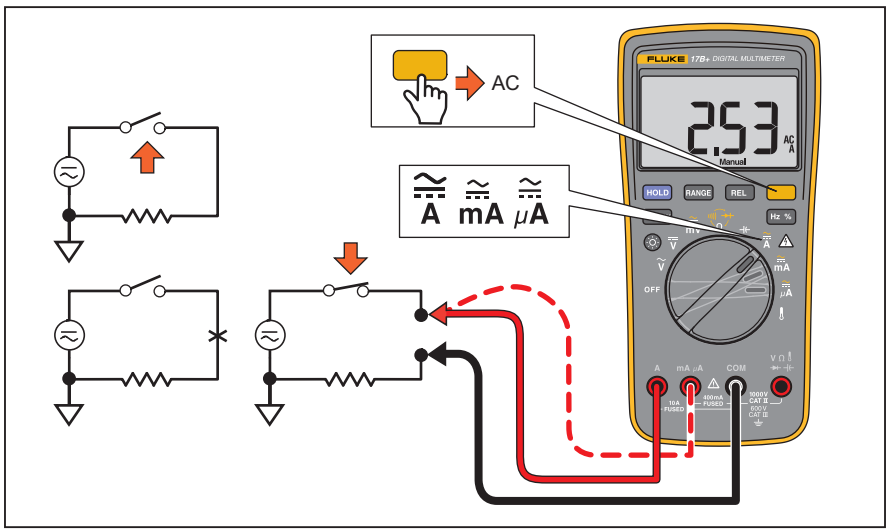
⚠⚠ Warning

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 ⎓A, ⎓mA, or ⎓µA.
2. Push ▭ 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 2.
4. Break the circuit path to be measured. Then connect the test leads across the break and apply power.
5. Read the measured current on the display.

Figure 2. Measure AC and DC Current



Measure Resistance

To measure resistance:

1. Turn the rotary switch to Ω. Make sure power is disconnected from the circuit to be measured.
2. Connect the red test lead to the V Ω terminal and the black test lead to the COM terminal, as shown in Figure 3.
3. Measure the resistance by touching the probes to the desired test points of the circuit.
4. Read the measured resistance on the display.

Test for Continuity

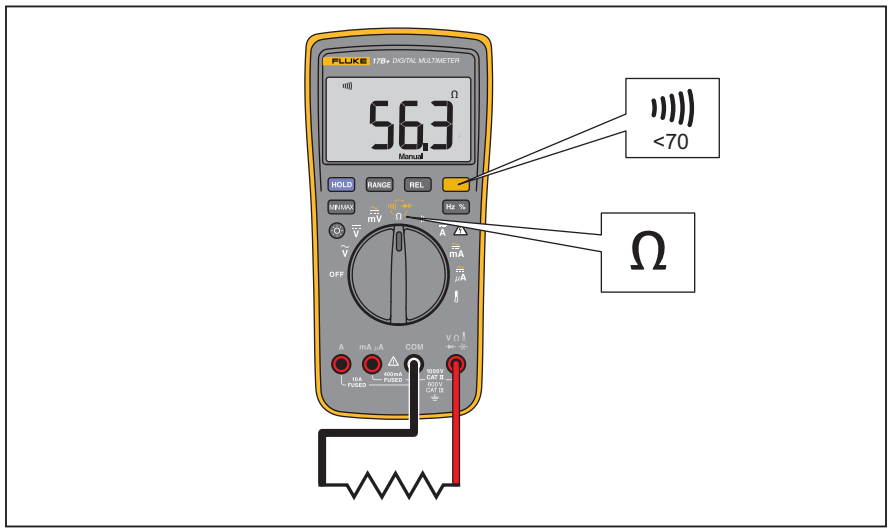
To test for continuity:

1. With the resistance mode selected, push ▭ once to activate the continuity beeper.

   If the resistance is <70 Ω, the beeper will sound continuously, designating a short circuit.

2. See Figure 3.

Figure 3. Measure Resistance/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:

1. Turn the rotary switch to ⋙.
2. Push ▭ twice to activate Diode Test.
3. Connect the red test lead to the 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 being tested.
5. Read the forward bias voltage value on the display.

   If the polarity of the test leads is reversed with diode polarity, the display reading shows OL. This can be used 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:

1. Turn the rotary switch to ⊣⊢.
2. Connect the red test lead to the V Ω ⊣⊢ terminal and the black test lead to the COM terminal.
3. Touch the probes to the capacitor leads.
4. After allowing the reading to stabilize (up to 18 seconds), read the capacitance value on the display.

Measure Temperature (17B+ only)

To measure temperature:

1. Turn the rotary switch to 🌡.
2. Plug the thermocouple into the V Ω ⊣⊢ and **COM** terminals of the Product.
3. Ensure that the thermocouple plug marked with "+" is inserted into the V Ω ⊣⊢ terminal on the Product.
4. Read the temperature on the display.
5. Push [ ] to switch between °C and °F.

Measure Frequency and Duty Cycle (17B+/18B+ Only)

The Product can measure frequency or duty cycle while making either a voltage or a current measurement. Push [Hz %] to change the Product to frequency or duty cycle.

To measure:

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

Hazardous Voltage Alert LED (17B+ Only)

To alert you to the presence of a potentially hazardous voltage, when the Product detects a voltage ≥30 V or a voltage overload (OL), the Hazardous voltage alert LED (⚠) below [Hz %] turns on (17B+ only).

Note

The hazardous voltage alert LED turns on at Frequency/Duty cycle test when the Product is in the voltage functions (volts ac/dc and millivolts).

Test LEDs (18B+ Only)

⚠ Caution

To prevent possible damage to the Product or to the equipment under test, disconnect all test leads from any hazardous voltage before you switch to the LED TEST function.

The Product tests Light Emitting Diodes (LEDs) either through the LED test socket on the Meter or through the test leads.

Note

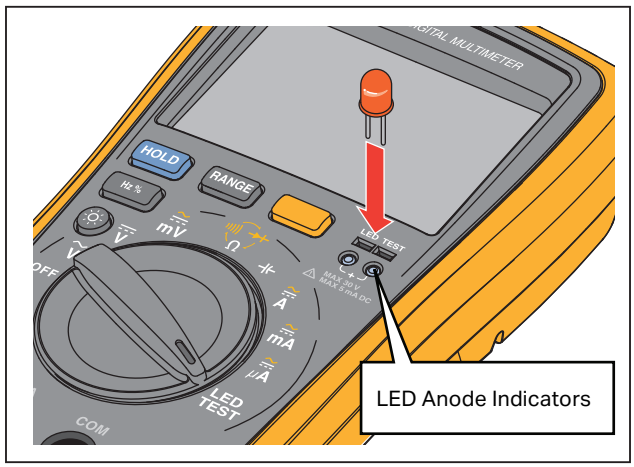
Do not use the LED Test mode to do LED aging tests.

To test an LED mounted in the test socket:

1. Turn the rotary switch to LED TEST.
2. Place the leads of the LED into the holes of the LED test socket on the front of the Meter as shown in Figure 4.

If the LED is good, the Product will illuminate the LED under test and an anode indicator will illuminate to indicate the (+) pin. If the LED is broken, the LED will not illuminate and neither of the anode indicators will illuminate. If the LED is a short circuit, the LED will not illuminate, and both anode indicators will illuminate.

Figure 4. LED Test Sockets



Maintenance

Beyond replacing batteries and fuses, 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:

- **Remove the input signals before you clean the Product.**
- **Use only specified replacement fuses.**
- **Have an approved technician repair the Product.**

For safe operation and maintenance of the Product:

- **Repair the Product before use if the batteries leak.**
- **Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid.**

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 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 replacing the fuses.

To test:

1. Turn the rotary switch to Ω.
2. Plug a test lead into the V Ω terminal and touch the probe to the **A** or **mA/µA** terminal.
   - A good **A** terminal fuse reads approximately 0.1 Ω. A good **mA/µA** terminal fuse reads less than 10 kΩ.
   - 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*.

Replace Batteries and Fuses

⚠⚠ Warning

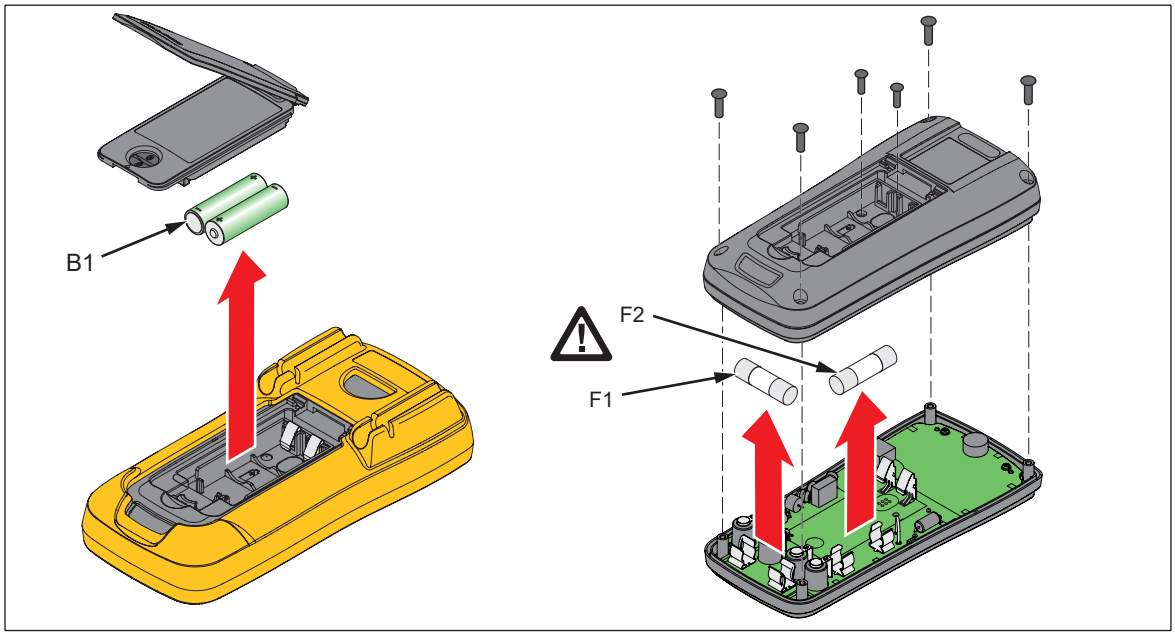
To prevent false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (🔋) appears.

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

Disconnect test leads before opening the case or the battery door.

To replace the batteries or the fuses, see Figure 5.

Figure 5. Replace Batteries and Fuses



Product Disposal

Dispose of the Product 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 and dispose of batteries separately.
- If this Product has an integral battery, put the entire Product in the electrical waste.

Service and Parts

If the Product fails, first check the batteries and fuse, and then review this manual to make sure that you are operating the Product correctly.

Replacement parts are listed in Table 3.

Table 3. Replacement Parts

Item Description	Part Number
Battery, IEC LR6	376756
Battery door assembly, English	4413666
Battery door assembly, Chinese	4413653
TL75-4201, test leads with two caps	4306653
Fuse, 0.440 A, 1000 V, FAST	943121
Fuse, 11A, 1000 V, FAST	803293
Holster	4368113

General Specifications

Display (LCD)..... 4000 counts, updates 3/sec
Battery Life ..... 500 hours minimum (50 hours in LED Test mode without load. The hours with load depends on the type of LED under test.)
Temperature Coefficient..... 0.1 X (specified accuracy) /°C (<18 °C or >28 °C)
Size (HxWxL)..... 183 mm x 91 mm x 49.5 mm
Weight ..... 455 g

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:
±([% of Reading] + [Number of Least Significant Digits]).

AC and DC Voltage

Function	Range	Resolution	Accuracy		
			15B+	17B+	18B+
AC Volts (40 Hz – 500 Hz)[1] V~	4.000 V	0.001 V	1.0 % + 3	1.0 % + 3	1.0 % + 3
	40.00 V	0.01 V			
	400.0 V	0.1 V			
	1000 V	1 V			
AC Millivolts mV~	400.0 mV	0.1 mV	3.0 % +3	3.0 % + 3	3.0 % + 3
DC Millivolts mV⎓	400.0 mV	0.1 mV	1.0 % + 10	1.0 % + 10	1.0 % + 10
DC Volts V⎓	4.000 V	0.001 V	0.5 % +3	0.5 % +3	0.5 % +3
	40.00 V	0.01 V			
	400.0 V	0.1 V			
	1000 V	1 V			

[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

Function	Range	Resolution	Accuracy		
			15B+	17B+	18B+
AC Current µA (40 Hz – 400 Hz) µA~	400.0 µA	0.1 µA	1.5 % + 3	1.5 % + 3	1.5 % + 3
	4000 µA	1 µA			
AC current mA (40 Hz – 400 Hz) mA~	40.00 mA	0.01 mA	1.5 % + 3	1.5 % + 3	1.5 % + 3
	400.0 mA	0.1 mA			
AC current A[1] (40 Hz – 400 Hz) A~	4.000 A	0.001 A	1.5 % + 3	1.5 % + 3	1.5 % + 3
	10.00 A	0.01 A			
DC current µA µA⎓	400.0 µA	0.1 µA	1.5 % + 3	1.5 % + 3	1.5 % + 3
	4000 µA	1 µA			
DC current mA mA⎓	40.00 mA	0.01 mA	1.5 % + 3	1.5 % + 3	1.5 % + 3
	400.0 mA	0.1 mA			
DC current A[1] A⎓	4.000 A	0.001 A	1.5 % + 3	1.5 % + 3	1.5 % + 3
	10.00 A	0.01 A			

[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+	17B+	18B+
Diode Test[1]	2.000 V	0.001 V	10 %		
Temperature	50.0 °C to 400.0 °C	0.1 °C	NA	2 % +1 °C	NA
	0 °C to 50.0 °C			2 °C	
	-55.0 °C to 0 °C			9 % +2 °C	
Resistance (Ohms) Ω	400.0 Ω	0.1 Ω	0.5 % + 3	0.5 % + 3	0.5 % + 3
	4.000 kΩ	0.001 kΩ	0.5 % + 2	0.5 % + 2	0.5 % + 2
	40.00 kΩ	0.01 kΩ	0.5 % + 2	0.5 % + 2	0.5 % + 2
	400.0 kΩ	0.1 kΩ	0.5 % + 2	0.5 % + 2	0.5 % + 2
	4.000 MΩ	0.001 MΩ	0.5 % + 2	0.5 % + 2	0.5 % + 2
	40.00 MΩ	0.01 MΩ	1.5 % + 3	1.5 % + 3	1.5 % + 3
Capacitance[2]	40.00 nF	0.01 nF	2 % + 5	2 % + 5	2 % + 5
	400.0 nF	0.1 nF	2 % + 5	2 % + 5	2 % + 5
	4.000 µF	0.001 µF	5 % + 5	5 % + 5	5 % + 5
	40.00 µF	0.01 µF	5 % + 5	5 % + 5	5 % + 5
	400.0 µF	0.1 µF	5 % + 5	5 % + 5	5 % + 5
	1000 µF	1 µF	5 % + 5	5 % + 5	5 % + 5
Frequency[3] (10 Hz to 100 kHz) Hz	50.00 Hz	0.01 Hz	NA	0.1 % + 3	0.1 % + 3
	500.00 Hz	0.1 Hz			
	5.000 kHz	0.001 kHz			
	50.00 kHz	0.01 kHz			
	100.0 kHz	0.1 kHz			
Duty Cycle[2]	1 % to 99 %	0.1 %	NA	1 % typical [4]	1 % typical[4]

[1] Typically, open circuit test voltage is 2.0 V and short circuit current is <0.6 mA.
[2] 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).
[3] All ac, Hz, and duty cycle are specified from 1 % to 100 % of range. Inputs below 1 % of range are not specified.
[4] Typical means when the frequency is at 50 Hz or 60 Hz and the duty cycle is between 10 % and 90 %.

LED Test and Continuity Threshold

Function	Lighting Range	Measurement Range	Resolution	Accuracy
LED V_F Test[1] (LED Test Socket)	1.00 to 6.00 V	NA	NA	NA
LED V_F Test[2] (Test Leads)	1.00 to 6.00 V	1.00 to 6.00 V	0.01 V	10 %
Continuity Threshold	NA	NA	NA	70 Ω

[1] Open circuit test voltage is ±12 V and short-circuit current is <±5 mA (typical).
[2] Open circuit test voltage is ±12 V and short-circuit current is <±3 mA (typical).
[3] VF measurement with driving current under 2.2 ±0.4 mA.

Input Characteristics

Function	Overload Protection	Input Impedance (Nominal)	Common Mode Rejection Ratio	Normal Mode Rejection Ratio
AC Volts	1000 V[1]	>10 MΩ, <100 pF	>60 dB at dc, 50 Hz or 60 Hz	--
AC Millivolts	400 mV	>1 MΩ, <100pF	>80 dB at dc, 50 Hz or 60 Hz	--
DC Volts	1000 V[1]	>10 MΩ, <100 pF	>100 dB at dc, 50 Hz or 60 Hz	>60 dB at dc, 50 Hz or 60 Hz
DC Millivolts	400 mV	>1 MΩ, <100pF	>80 dB at dc, 50 Hz or 60 Hz	--

[1] 10^6 V Hz Max