

**FLUKE®**

**353/355**

Clamp Meter

**Users Manual**



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**.NET**

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# Clamp Meter

## Introduction

The Fluke 353 and 355 are hand-held battery-operated Clamp Meters (*the Meter*). Both Meters measure ac, dc true rms, inrush current and frequency; The 355 also measures ac, dc, true rms voltage, and resistance.

The Meter ships with:

- TL224 Test leads (355 only)
- AC285 Clips (355 only)
- TP74 Test Probes (355 only)
- Soft carrying case
- 6 AA/LR6 Batteries, installed
- 353/355 Users Manual (7 languages)

## Contacting Fluke

To contact Fluke, call one of the following telephone numbers:

USA: 1-888-99-FLUKE (1-888-993-5853)

Canada: 1-800-36-FLUKE (1-800-363-5853)

Europe: +31 402-675-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-446-5500

Or visit Fluke's Web site at: [www.fluke.com](http://www.fluke.com).

Register the Meter at: <http://register.fluke.com>

## Safety Information













### Warnings: Read First

To avoid possible electric shock or personal injury:

- Use the Meter only as specified in this manual or the protection provided by the Meter might be impaired.
- Avoid working alone so assistance can be rendered.
- Never measure ac current while the test leads are inserted into the input jacks.
- Do not use the Meter in wet or dirty environments.
- Do not use the Meter if it appears damaged. Inspect the Meter before use. Look for cracks or missing plastic. Pay particular attention to the insulation around the connectors.
- Inspect the test leads before use. Do not use them if insulation is damaged or metal is exposed.
- Check the test leads for continuity. Replace damaged test leads before using the Meter.
- Have the Meter serviced only by qualified service personnel.
- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Do not hold the Meter anywhere beyond the tactile barrier. See Figure 1.
- When measuring current, center the conductor in the clamp. See Figure 1.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.
- Remove test leads from the Meter before opening the Meter case.
- Never operate the Meter with the back cover removed or the case open.
- Never remove the back cover or open the case of an instrument without first removing the test leads or the jaws from a live conductor.
- Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.
- Do not attempt to measure any voltage that might exceed the maximum range of the Meter- 600 V rms and 1 kHz or 1000 V dc.
- Use the proper terminals, function, and range for your measurements.

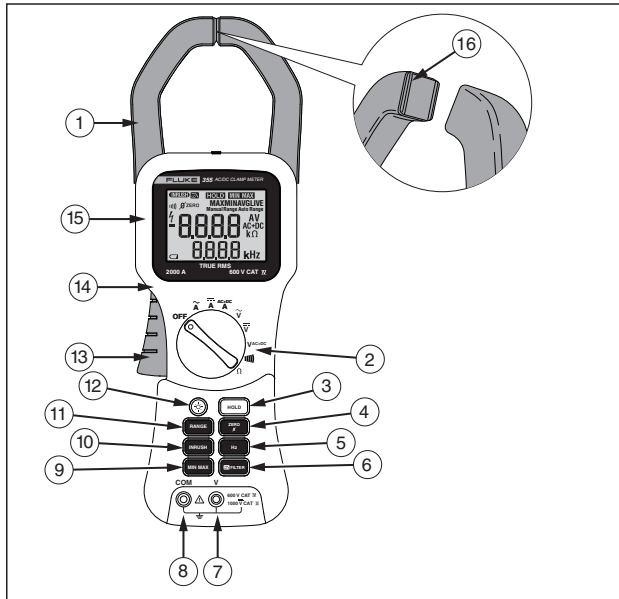
- Do not operate the Meter around explosive gas, vapor, or dust.
- When using probes, keep fingers behind the finger guards.
- When making electrical connections, connect the common test lead before connecting the live test lead; when disconnecting, disconnect the live test lead before disconnecting the common test lead.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, or diodes.
- Use only 6 AA/LR6 batteries, properly installed in the Meter case, to power the Meter.
- To avoid false readings that can lead to electrical shock and injury, replace the battery as soon as the low battery indicator (🔋) appears. Check Meter operation on a known source before and after use.
- When servicing, use only specified replacement parts.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Do not use the Meter if the wear indicator in the jaw opening is not visible. See Figure 1.

**Table 1. Explanation of Symbols**

Symbol	Explanation
	Risk of danger. Important information. Refer to operation instructions.
	Hazardous voltage
	Application and removal from hazardous live conductors permitted
	Double insulated
	Battery
	Earth Ground
	Alternating Current
	Direct Current
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's web site for recycling information.
	Conforms to requirements of European Union and European Free Trade
 N10140	Conforms to relevant Australian standards
CAT III	Equipment is designed to protect against transients in equipment in fixed-equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
CAT IV	Equipment is designed to protect against transients from the primary supply level, such as an electricity meter or an overhead or underground utility service.
 C US	Canadian Standards Association

**Features**

See Figure 1 and Tables 2 and 3 for a list of features.



fbq03.eps

**Figure 1. Feature Locations (355 shown)**

**Table 2. Features and Buttons**

Number	Description
①	Current sensing clamp
②	Rotary function switch
③	Hold button- freezes the display reading and releases the reading when pressed a second time
④	Zero button- Clears last reading from the display and establishes a baseline for ac + dc and dc current readings.
⑤	Hz button- press to see frequency in the secondary display.
⑥	Low Pass Filter button- Press to turn on the low pass filter. The filter eliminates high frequency noise such as from a ASD or VFD motor speed controller.
⑦	Volts/Ohm input terminal. (355 only)
⑧	Common input terminal. (355 only)
⑨	Min Max button -When first pressed, the Meter shows maximum input. With subsequent presses, the minimum and the average inputs are shown. Hold for 2 seconds to exit min max mode. This function works in current, voltage and Frequency modes when activated.
⑩	Inrush button- Press this button to enter inrush mode. Press it a second time to exit.
⑪	Range button- press to change range or to turn off auto range.

Table 2. Features and Buttons (cont.)

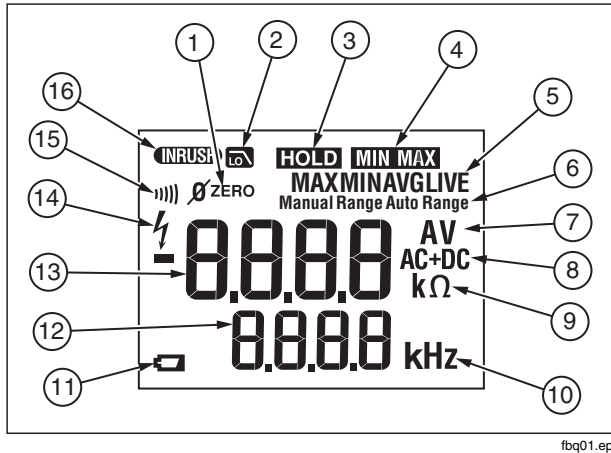
Number	Description
⑫	Backlight button - Turns the backlight on and off. The backlight goes off after 5 minutes.
⑬	Jaw release
⑭	Tactile barrier <b>⚠ ⚠ Warning: To avoid injury, do not hold the Meter anywhere above the tactile barrier.</b>
⑮	Display
⑯	Jaw wear indicator. <b>⚠ ⚠ Warning: To avoid injury, do not use the Meter if the wear indicator in the jaw opening is not visible.</b>
N/A	Auto Power Off- The Meter turns off if there is no button pushed or rotary function switch operation for 20 minutes. Turn the Meter off and on to restart the Meter. This feature is disabled when the Meter is in Min Max mode.

Table 3. Rotary Switch Positions

Rotary Switch Position 353/355			
Position	Function	Position	Function
OFF	Meter is powered down	$\tilde{A}$	AC current
$\bar{A}$	DC current	$^{AC+DC}A$	Combined ac + dc (true rms) current reading.
Additional Positions (355 Only)			
Position	Function	Position	Function
$\tilde{V}$	AC voltage	$\bar{V}$	DC voltage
$V^{AC+DC}$	Combined ac + dc (true rms) voltage reading.	)	Continuity
$\Omega$	Resistance		

## Display

Figure 2 and Table 4 explain the display.



**Figure 2. The Display**

**Table 4. Display**

Item	Explanation
①	Zero mode is active
②	Low pass filter is active
③	Hold mode is active
④	Min Max mode is active
⑤	Min, Max, Avg, or Live modes. Live mode is active with Min Max and designates the real-time reading.
⑥	Manual or Auto Range is active
⑦	Amps or Volts is active
⑧	AC and DC mode is active
⑨	Resistance mode is active
⑩	Frequency mode is active
⑪	Low Battery Symbol
⑫	Frequency display
⑬	Main display
⑭	Hazardous voltage present
⑮	Continuity symbol
⑯	Inrush mode is active

## Using the Meter

### ⚠️⚠️ Warning

To avoid electric shock or personal injury:

- When measuring current, center the conductor in the clamp.
- When making current measurements, disconnect the test leads from the Meter.
- Keep fingers behind Tactile Barrier. See *Meter Features*.

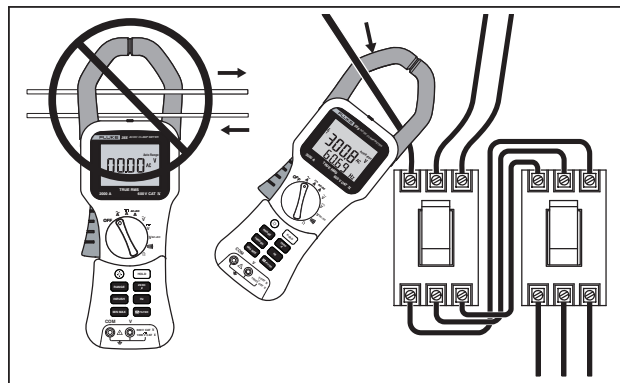
### Measuring AC or DC Current

To measure ac or dc current:

1. Turn the rotary function switch to the proper current setting  $\tilde{A}$ ,  $\overline{A}$ , or  $\overline{A}^{AC+DC}$ .
2. Open the clamp by pressing the jaw release and insert the conductor to be measured into the clamp.
3. Close the clamp and center the conductor using the jaw alignment marks.
4. View the current reading on the main display.
5. When measuring ac or ac + dc current, press **Hz** to view the frequency reading on the frequency display.

### ⚠️⚠️ Warning

To avoid possible electric shock or personal injury, if current is moving in opposite directions, place only ONE conductor into the clamp at a time. If current is moving in the same direction, more than one conductor may be placed into the clamp. See Figure 3.



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Figure 3. Connecting the Meter

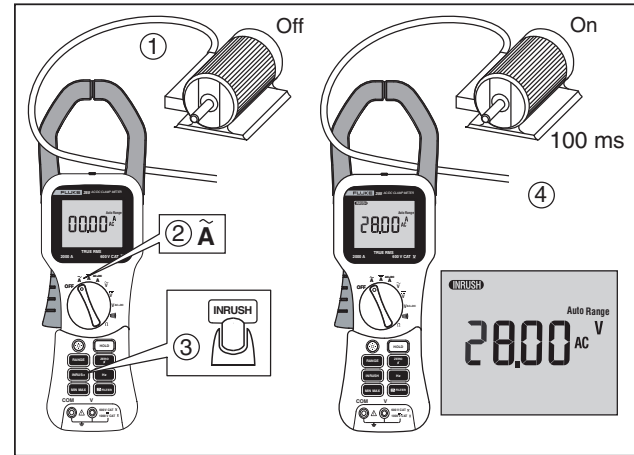


### **Measuring Inrush Current**

Inrush current is surge current that occur when an electrical device is first powered on. Once the device has reached its normal working condition, the current stabilizes. See Figure 4.

To capture the inrush current reading:

1. With the system under test powered down, place the source wire into the Meter jaws.
2. Turn the knob to  $\tilde{A}$ .
3. Press **INRUSH** on the Meter.
4. Power up the system under test. The inrush current is shown on the Meter display.



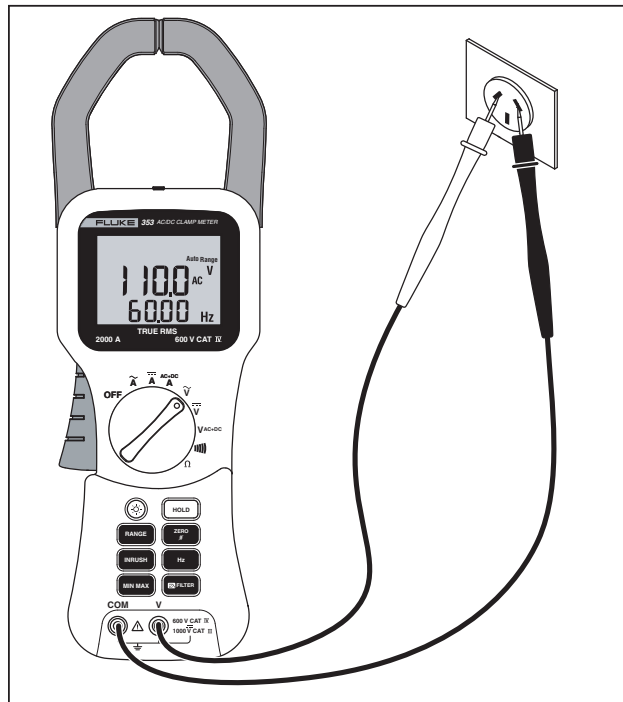
**Figure 4. Measuring Inrush Current**

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### Measuring AC and DC Voltage (355 only)

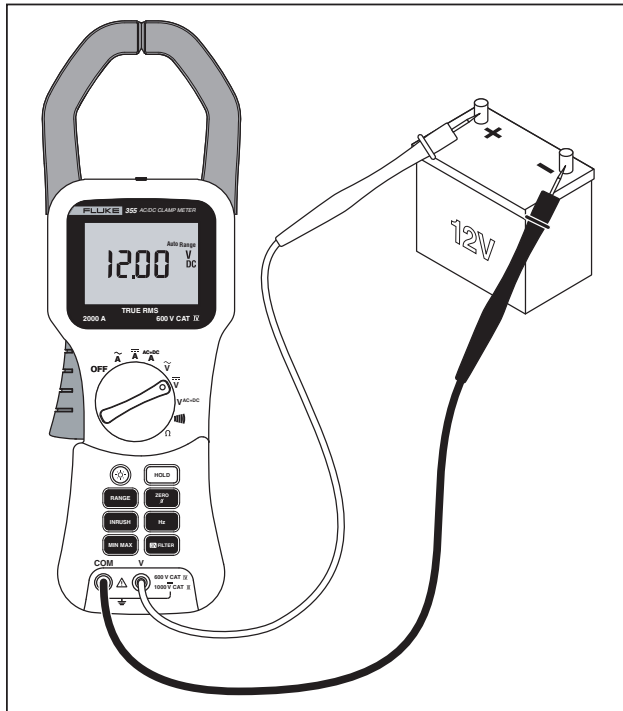
To measure ac or dc voltage:

1. Turn the rotary function switch to  $\overline{V}$ ,  $\overline{V}$ , or **VAC+DC**.
2. Connect the black test lead to the **COM** terminal and the red test lead to the **V** terminal. Before connecting the probes to the measurement points, add any clips to the probes that are necessary.
3. Measure the voltage by touching the probes to the desired test points of the circuit.
4. View the reading on the display.
5. When measuring ac voltage, press **Hz** to view the frequency reading on the frequency display. See Figures 5 and 6.



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Figure 5. AC Voltage Measurement



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**Figure 6. DC Voltage Measurement**

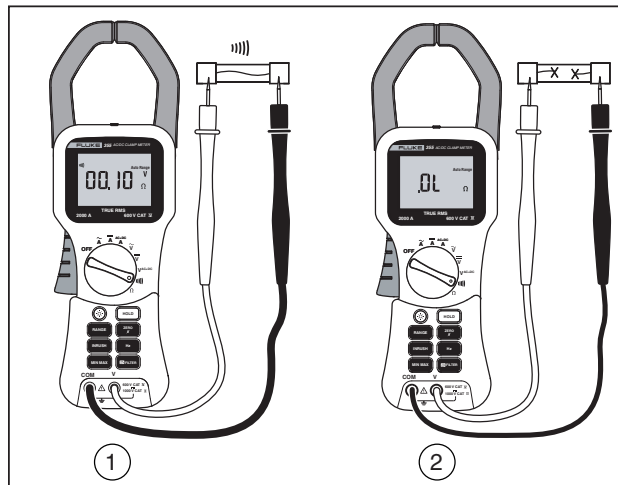
## Testing Continuity (355 only)

### ⚠ ⚠ Warning

To avoid electrical shock when testing continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

To test continuity:

1. Connect the black test lead to the **COM** terminal and the red test lead to the **V** terminal.
2. Remove power from the circuit being tested. Turn the rotary function switch to  $\text{|||}$ .
3. Connect the probes across the circuit or component to be tested.
4. If the resistance is  $< 30 \Omega$ , the beeper sounds continuously, designating a short circuit (①). If the display reads **OL**, the circuit is open (②) or above  $399.9 \Omega$ . See Figure 7.



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Figure 7. Measuring Continuity

**Measuring Resistance (355 only)**

**⚠ ⚠ Warning**

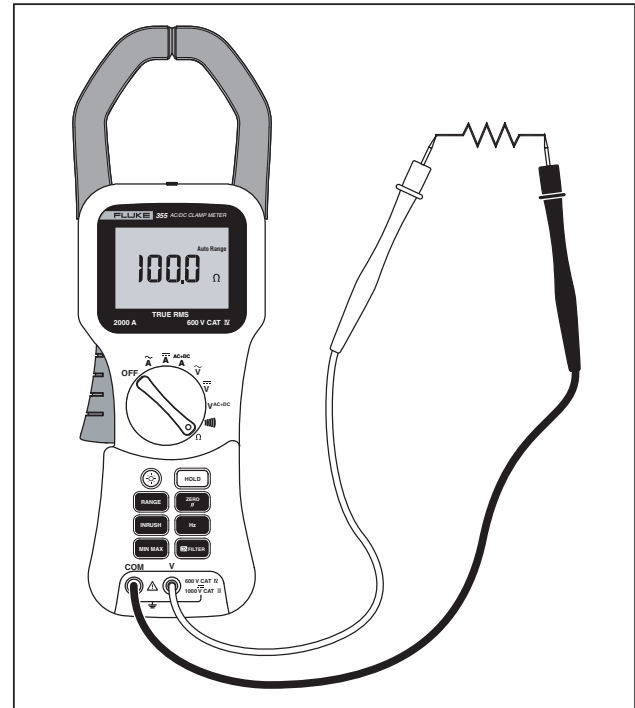
To avoid possible electric shock or personal injury, when measuring resistance in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

To measure resistance:

1. Turn the rotary function switch to  $\Omega$ .
2. Remove power from the circuit being tested.
3. Connect the black test lead to the **COM** terminal and the red test lead to the **V** terminal.
4. Measure the resistance by touching the probes to the desired test points of the circuit.
5. View the reading on the display. See Figure 8.

**⚠ ⚠ Warning**

To avoid electrical shock or personal injury, be aware that dangerous voltages may be present at the input terminals and may not be displayed



**Figure 8. Measuring Resistance**

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## Maintenance

### Warning

To avoid electrical shock, or personal injury:

- Repairs or servicing not covered in this manual should be performed only by qualified personnel.
- Disconnect test leads from the Meter before removing its back cover.
- Never use the Meter with the back cover removed.

### Caution

- To avoid contamination or static damage of the Meter, do not touch the circuit board without proper static protection.
- If the Meter is not going to be used for an extended time, remove the battery. Do not store the Meter in high temperature or high-humidity environments.


## Cleaning the Meter

### Caution

To avoid damaging the meter, do not use abrasives or solvents on this instrument.

Periodically clean the Meter by wiping it with a damp cloth.

### Changing the Batteries

When battery voltage drops below the value required for proper operation, the battery symbol () appears and the Meter beeps.

To change the batteries:

1. Turn the Meter off and disconnect the test leads.
2. Using a screwdriver, open the battery cover on the back of the Meter.
3. Replace the batteries with six new AA/LR6 batteries. Observe correct polarity when installing the batteries.
4. Close the back cover and tighten the screw.

### User Replaceable Parts

Refer to *Contacting Fluke* for more information.

- C43 Soft carrying case
- TL224 1.5 m silicone rubber test leads
- TP2 Test Probes
- AC285 Alligator Clips

## **Specifications**

### **Electrical Specifications**

#### **Current Measurement 10 Hz to 100Hz**

<b>Range</b>	<b>Resolution</b>	<b>Accuracy, A</b>	<b>Trigger Level for Inrush</b>	<b>Trigger Level for Hz Filter OFF</b>	<b>Trigger Level for Hz Filter ON</b>
40 A	10 mA	1.5 % rdg + 15 digits	0.50 A	2.50 A	0.50 A
400 A	100 mA	1.5 % rdg + 5 digits	5.0 A	2.5 A	2.5 A
2000 A; 1400 ac rms	1 A	1.5 % rdg + 5 digits	5 A	8 A	8 A

#### **Current Measurement 100.1 Hz to 1 kHz**

<b>Range</b>	<b>Resolution</b>	<b>Accuracy &gt; 10 A</b>
40 A	10 mA	3.5 % rdg + 15 digits
400 A	100 mA	3.5 % rdg + 5 digits
2000 A; 1400 ac rms	1 A	3.5 % rdg + 5 digits

**Voltage Measurement (355 only) 10 Hz to 100 Hz**

600 and 1000 V ranges have 10 % over range to 660 and 1100 V respectively.

Range	Resolution	Accuracy	Trigger Level for Hz Filter OFF	Trigger Level for Hz Filter ON
4 V	1 mV	1 % rdg + 10 digits	0.050 V	0.050 V
40 V	10 mV	1 % rdg + 5 digits	0.25 V	0.25 V
400 V	100 mV	1 % rdg + 5 digits	6 V	6 V
600 V AC RMS	1 V	1 % rdg + 5 digits	6 V	6 V
1000 V DC	1 V	1 % rdg + 5 digits	N/A	N/A

**Voltage Measurement (355 only) 100.1 Hz to 1 kHz**

600 and 1000 V ranges have 10 % over range to 660 and 1100 V

Range	Resolution	Accuracy
4 V	1 mV	3 % rdg + 10 digits
40 V	10 mV	3 % rdg + 5 digits
400 V	100 mV	3 % rdg + 5 digits
600 V AC RMS	1 V	3 % rdg + 5 digits

**Ohms Measurement (355 only)**

Range	Resolution	Accuracy
400 $\Omega$	0.1 $\Omega$	1.5 % + 5 digits
4 k $\Omega$	1 $\Omega$	1.5 % + 5 digits
40 k $\Omega$	10 $\Omega$	1.5 % + 5 digits
400 k $\Omega$	100 $\Omega$	1.5 % + 5 digits



**Continuity Beeper (355)**

On at  $\leq 30 \Omega$   
Off at  $\geq 100 \Omega$

**Frequency Measurement**

<b>Measurement Range</b>	5.0 Hz to 1 kHz
<b>Resolution</b>	0.1 Hz (15 Hz to 399.9 Hz) 1 Hz ( 400 Hz to 1 kHz)
<b>Accuracy 5.0 to 100 Hz</b>	0.2 % + 2 counts
<b>Accuracy 100.1 Hz to 1 kHz</b>	0.5 % + 5 counts
<b>Trigger Level</b>	Refer to current and voltage tables

**General Specifications**

**Batteries:** 6- 1.5 V AA NEDA 15 A or IEC LR6  
**Test Leads:** Rated to 1000 V  
**Weight:** 1.8 lb (.814 kg)  
**Jaw Size:** 2.28 inches (58 mm)  
**Dimensions (L x W x D):** 12 inches x 3.75 inches x  
2 inches (300 mm x 98 mm x 52 mm)  
**Safety Rating:** IEC 61010-2-032, 600 V CAT IV,  
1000 V CAT III

### Standards and Agency Approval Specifications

<b>Design Standards and Compliance</b>	EN61010-032 CAT IV 600 V, IEC/EN 61326-1:1997
<b>Agency Approvals</b>	CE, c <sub>US</sub> , N10140, 
<b>Over-voltage Category</b>	IEC61010-1 CAT III 1000 V, CAT IV 600 V

### Environmental Specifications

<b>Operating Temperature</b>	32 °F to + 122 °F (0 °C to +50 °C)
<b>Storage Temperature</b>	-4 °F to 140 °F (-20 °C to +60 °C)
<b>Operating Humidity</b>	0 to 95 % (non-condensing)
<b>Operating Altitude</b>	2000 m
<b>Storage Altitude</b>	10,000 m
<b>IP Rating</b>	42 (indoor use only)
<b>Drop Test Requirements</b>	1 m
<b>EMI, RFI, EMC</b>	FCC part 15, IEC/EN 61326-1:1997 class B, IEC/EN 61326:1997 3V/m, performance criteria B, EN61325
<b>Temperature Coefficients</b>	Current: 0.1 % of reading per °C outside 22-24 °C Voltage: 0.1 % of reading per °C outside 22-24 °C



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