

FLUKE®

312, 316, 318

Clamp Meter

Users Manual

PN 1989445

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Safety Information – Read first

⚠ Warnings: Read Before Using

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.
- Do not use the Meter in wet environments.
- Inspect the Meter before using it. Do not use the Meter if it appears damaged. 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.
- 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 power source.
- Use caution when working with voltages above 33 V ac rms, 46.7 V ac peak, or 70 V dc. These voltages pose a shock hazard.
- 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 your 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 a single 9 V battery, properly installed in the Meter case, to power the Meter.
- Replace the battery as soon as the low battery indicator (🔋) appears to avoid false readings that can lead to electric shock and injury.
- 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. Industrial protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors were exposed.
- Do not hold the Current Probe anywhere beyond the tactile indicator (see Figure 1).

Environmental Conditions:

Altitude: up to 2000 meters.

Operating temperature: 0 °C ~ 30 °C, up to 90 % RH, non-condensing

30 °C ~ 40 °C, up to 80% RH, non-condensing









Storage temperature: -10 °C ~ 60 °C, battery removed

Pollution Degree: 2

Measurement Categories: CAT III (600 V), CAT II (1000 V)

Electromagnetic Compatibility: 3 V/m, performance criterion B

Explanation of Symbols

	Risk of danger. Important information. Refer to operation instructions.
	Risk of electric shock.
	Application and removal from hazardous live conductors permitted.
	Double insulated.
	Battery
	Earth Ground
	Alternating current
	Direct current
CAT II	Equipment is designed to protect against transients from energy-consuming equipment supplied from the fixed installation, such as televisions, personal computers, portable tools, and other household appliances.
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.
CE	Complies with European standards EN/IEC 61010-1 2 nd Edition and EN/IEC 61010-02-032

General Specifications

Digital Display: 3-3/4 digits with maximum reading of 3999

Analog Display: Fast 42-segment analog bar graph display

Overload: Displays **OL** when input signal exceeds measuring limit in 40 A, 400 A, resistance, and continuity functions.

Note

In Volts and Amps, the LCD may continue to display values above the indicated measuring limit (up to 4000 counts). Refer to specifications for measuring limits.

Sample Rate: 2 times/sec for digital display; 20 times/sec for analog bar graph


Low Battery Indication: Displays  when the battery is below its required voltage

Power Source: 9 V battery, NEDA1604 or 6F22 or 006P

Battery Life:

(Alkaline):

33 hrs typical in **A**

65 hrs typical in )

100 hrs typical in **V**, Ω

Auto Power Off: The Meter will power itself off if there is no push button or rotary function switch operation for 30 minutes. Turn the rotary switch to “OFF” before turning the Meter on again.

To deactivate this feature, press the Peak button and keep it pressed down while powering up the Meter.

Clamp Opening Size:

312: 36 mm (1.42 inches)

316, 318: 40 mm (1.57 inches)

Dimensions (L x W x H): 254 x 66 x 37 mm (10 x 2.60 x 1.45 inches)

Weight: 422 g (14.9 ounces) (battery included)

Included Accessories: Users manual, carrying case, test leads, 9 V battery

Approvals: , EN61010 600 V CAT III, 1000 V CAT II, CMC

Electrical Specifications

The accuracy specification is defined as \pm (% reading + digits) at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}^1$.

Function	Range	Resolution	Accuracy (% reading + digits)	
			312	316 & 318
AC Amps ² (50 ~ 500 Hz)	40.00 A 400.0 A 1000 A	0.01 A 0.1 A 1 A	1.9 % ± 5	1.9 % ± 5 (50 ~ 60 Hz)
				2.5 % ± 5 (60 - 500 Hz)
DC Amps	40.00 A 400.0 A 1000 A	0.01 A 0.1 A 1 A	-	2.5 % ± 10
AC Volts ² (50 ~ 500 Hz)	400.0 V 750 V	0.1 V 1 V	1.2 % ± 5	1.5 % ± 5
DC Volts	400.0 V 1000 V	0.1 V 1 V	0.75 % ± 2	1 % ± 2
Resistance (ohms)	400.0 Ω 4000 Ω	0.1 Ω 1 Ω	1 % ± 3	1 % ± 3
Continuity	On at < 50 Ω			
Diode Test	Up to 2 V			
Min Max	500 ms acquisition time			
Input Impedance	10 MΩ			
Auto Shut-off	After 30 min ± 2 min. Disabled in Min Max. Can be disabled as a power up option (hold down the peak button)			
Auto range	Available in the following measurement functions: Volts & Ohms (Amps for 312 only)			
Overload Protection	600 Vrms per EN61010 CAT III 600 V			
1. Temperature Coefficient: 0.1 x (specified accuracy) / °C (< 18 °C or > 28 °C)				
2. True rms for ac voltage and ac amps accuracy is specified from 5 % to 100 % of range. Crest factor (50 ~ 60 Hz) is 3.0 max in the 40 A and 400 A ranges and 1.4 max in the 1000 A range (318 only).				
3. The measurement time for current above 400 A is limited to 5 minutes followed by a cooling off time of 15 minutes.				

Instrument Overview
Feature Locations

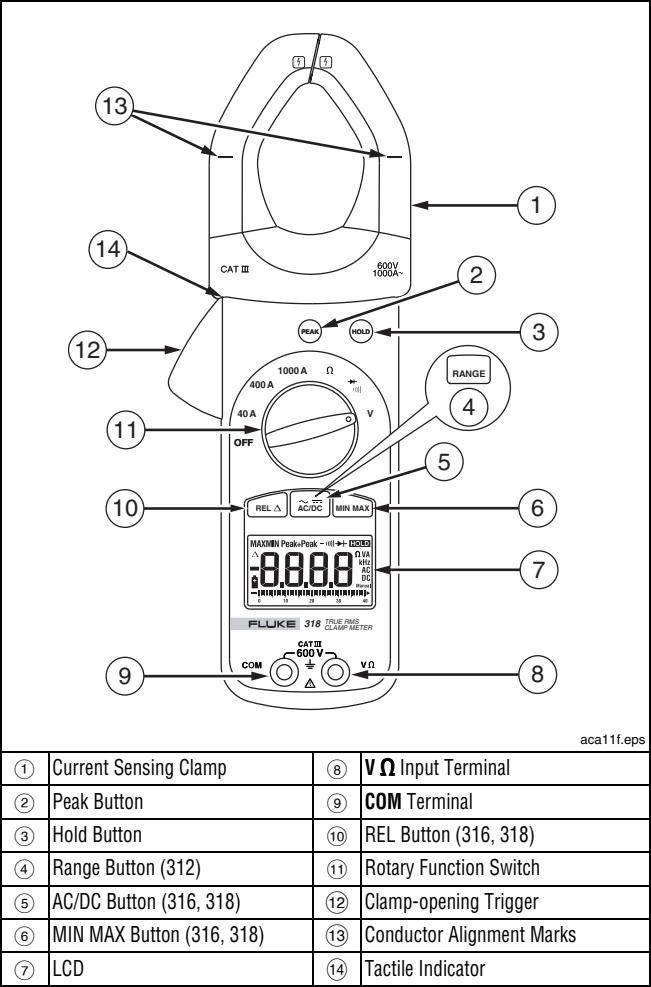


Figure 1. Feature Locations (318 shown)

Symbol Definition

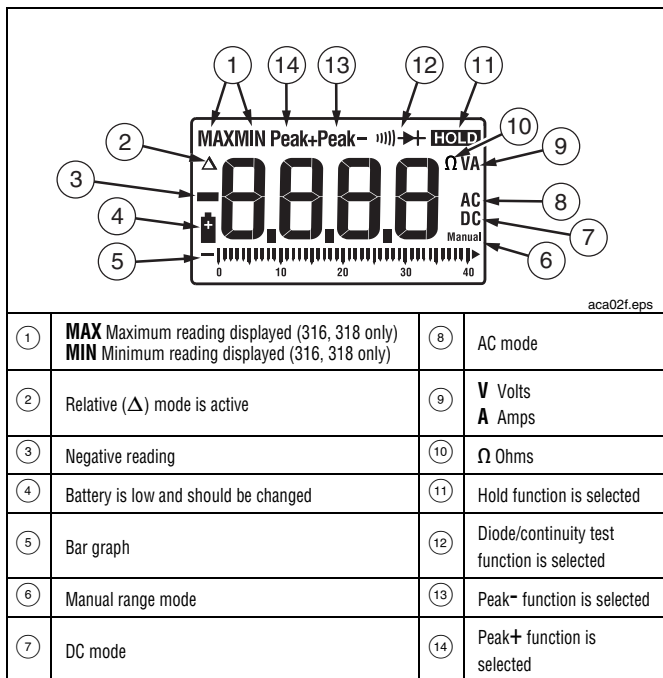



Figure 2. LCD Explanation

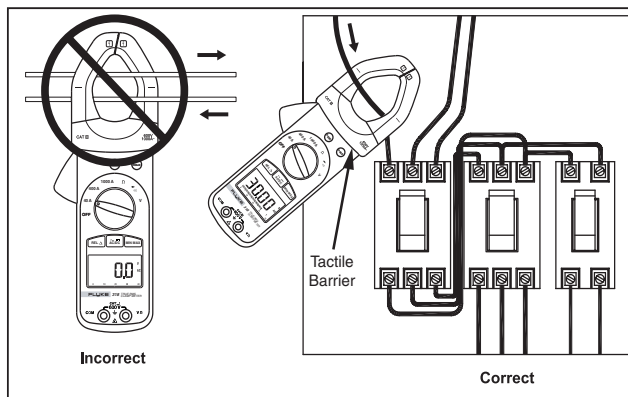
Making Measurements

⚠ Warning

- When measuring current, center the conductor in the clamp using the alignment marks on the clamp.
- To avoid electrical shock when making current measurements, disconnect the test leads from the Meter.
- The bargraph is for reference only; it does not show the actual measured value or range. Use the main display to read the actual measured value and range.

Measuring AC Current



1. Turn the rotary function switch to the proper current range.
2. Press  (316, 318 only) to measure ac current if necessary.
3. Open the clamp by pressing the clamp-opening trigger and insert the conductor to be measured into the clamp.
4. Close the clamp and center the conductor using the alignment marks.
5. View the reading on the LCD.




aca13f.eps

Figure 3. Connecting the Clamp Meter (318 shown)

Measuring DC Current (316, 318 only)

1. Turn the rotary function switch to the proper current range.
2. Press  to measure dc current.
3. To ensure accuracy, wait for the reading to stabilize then press  to zero the reading.
4. Open the clamp by pressing the clamp-opening trigger and insert the conductor to be measured into the clamp.
5. Close the clamp and center the conductor using the alignment marks.
6. View the reading on the LCD.

Measuring AC and DC Voltage

1. Turn the rotary function switch to **V**.
2. Choose ac or dc by pressing  (316, 318 only).

When using a 312 Meter:

- turn the rotary function switch to \tilde{V} when measuring ac voltage
 - turn the rotary function switch to \overline{V} when measuring dc voltage
3. Connect the black test lead to the **COM** terminal and the red test lead to the **VΩ** terminal.
 4. Measure the voltage by touching the probes to the desired test points of the circuit.
 5. View the reading on the LCD.

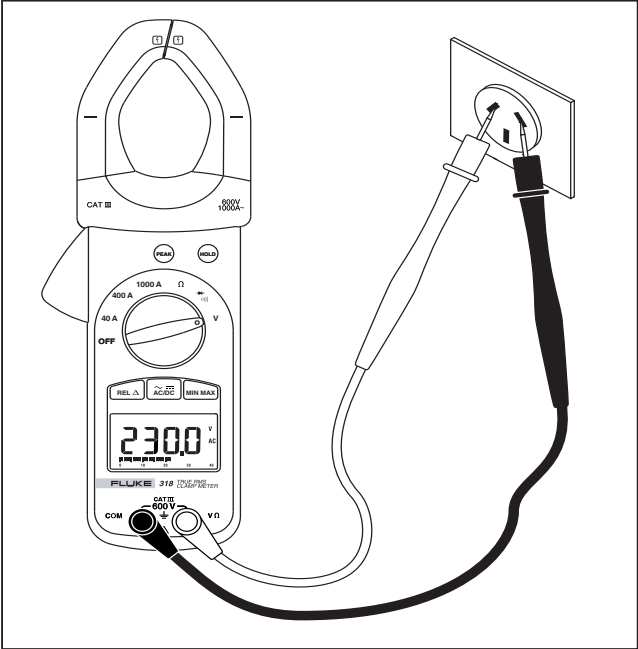
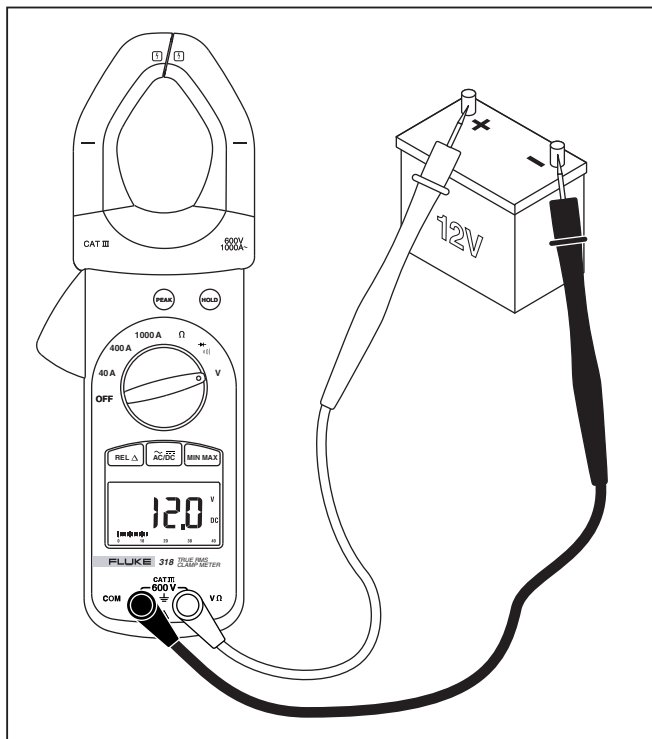


Figure 4. AC Voltage Measurement (318 shown)



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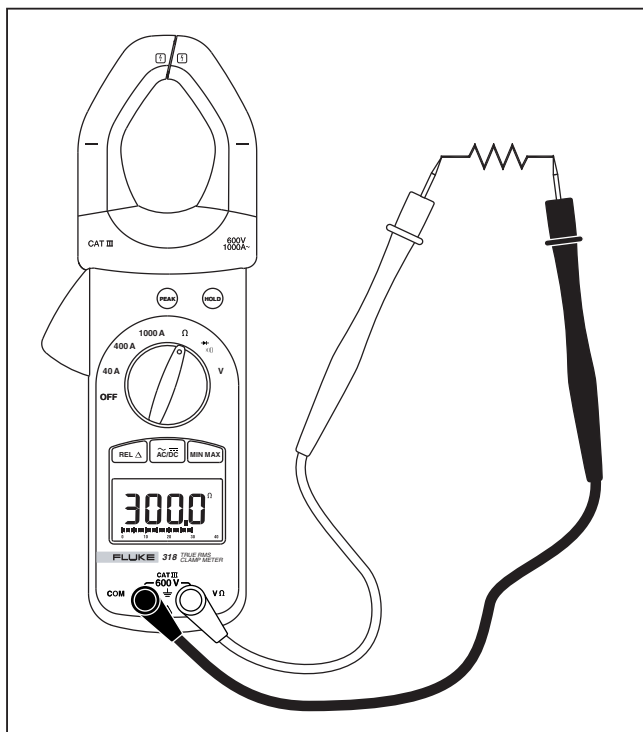
Figure 5. DC Voltage Measurement (318 shown)

Measuring Resistance

⚠ Warning

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

1. Turn the rotary function switch to Ω . Remove power from the circuit being tested.
2. Connect the black test lead to the **COM** terminal and the red test lead to the **V Ω** terminal.
3. Measure the resistance by touching the probes to the desired test points of the circuit.
4. View the reading on the LCD.




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Figure 6. Measuring Resistance (318 shown)

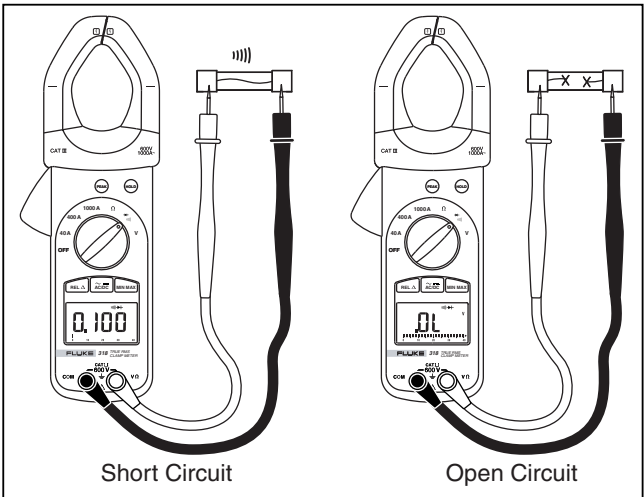
Testing Continuity

⚠ 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.

1. Turn the rotary function switch to . Remove power from the circuit being tested.
2. Connect the black test lead to the **COM** terminal and the red test lead to the **VΩ** terminal.
3. Connect the probes across the circuit or component to be tested.

If the resistance is under 50 Ω, the beeper will sound continuously, designating a short circuit. If the Meter reads OL, the circuit is open.



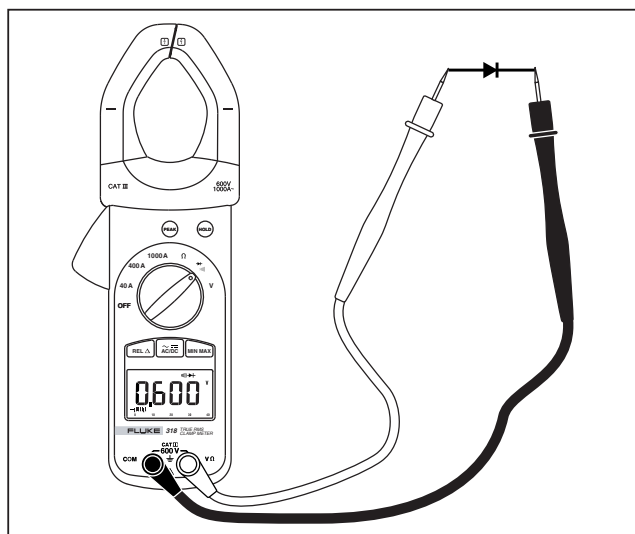
aca17f.eps

Figure 7. Measuring Continuity (318 shown)

Diode Test**⚠ Warning**

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

1. Turn the rotary function switch to \rightarrow (diode symbol). Remove power from the circuit being tested.
2. Connect the black test lead to the **COM** terminal and the red test lead to the **V Ω** terminal.
3. Connect the black test lead to the cathode side and the red test lead to the anode side of the diode being tested.
4. Read forward bias voltage value on the LCD.
5. If the polarity of the test leads is the reverse of the diode polarity, the LCD reading shows “OL”. This can be used for distinguishing the anode side and cathode side of a diode.



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Figure 8. Diode Test (318 shown)

⚠ Warning

Dangerous voltages may be present at the input terminals and may not be displayed.

Data Hold

To hold the present reading, press the HOLD button. Press the button again to return to the live reading.

Peak

The Meter has a 1 ms peak feature for use with ACA, DCA (316, 318), ACV, and DCV functions. Before making a peak hold measurement, the peak feature must be calibrated as follows:





1. Press and hold the peak button for 2 seconds. The CAL indicator appears on the LCD to show that the offset has been calculated and stored by the Meter.
2. After calibration, press the peak button once to enter Peak+ mode and begin displaying Peak+ values.
3. Press the Peak button again to enter Peak- mode and begin displaying Peak- values.
4. Press the Peak button for 2 seconds to return to normal operation.

If the rotary function switch is changed following calibration, the calibration steps must be repeated before making another peak measurement.




Note

The peak mode continuously updates the LCD to show maximum magnitudes. Smaller magnitudes are not displayed.



MIN MAX (316, 318 only)

1. Press  once to set the Meter to MAX mode.
2. Press  again to set the Meter to MIN mode.
3. Press  again and the Meter displays the present reading while keeping track of the MAX and MIN value. This mode is also indicated by the blinking **MAXMIN** symbol on the LCD.
4. Pressing  for more than 2 seconds sets the Meter back to normal operation.


REL (Δ) (316, 318 only)

1. Press  to set the zero to the present reading. The difference between the reference reading and subsequent readings is displayed.
2. Press  again and the Meter displays the reference reading. The blinking Δ on the LCD also indicates this mode.
3. Press  for more than 2 seconds to return the Meter to normal operation.

Range (312 only)

Press  to select the manual range mode. **Manual** shows on the LCD, and the Meter remains in the same range. To exit manual-range mode and return to the auto-range mode, press and hold  for 1 second.

Changing the Battery

When the battery voltage drops below the value required for proper operation, the battery symbol () appears on the LCD.

1. Before changing the battery, switch the Meter off and disconnect the test leads.
2. Open the back cover using a screwdriver.
3. Replace the battery with a new 9 V battery.
4. Close the back cover and fasten the screws.

Cleaning the Meter

Periodically clean the Meter by wiping it with a dry cloth. Do not use abrasives or solvents on this instrument.

Maintenance

Warning

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

Caution

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