Instructions

Tektronix

A610
500 Amp AC/DC Current Probe

070–8881–00

First Printing: October 1993

Printed in the U.S.A.

Tektronix, Inc., P.O. Box 1000, Wilsonville, OR 97070

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Product Description

The A610 is designed to extend the AC and DC current ranges of multimeters up to 500 amps by using Hall effect technology. It is compatible with multimeters having AC and DC volts functions with an input resistance ≥1 MΩ.

General Safety Summary

Observe Maximum Working Voltage

Do not use the A610 above 440 VAC.

Do Not Operate in Wet/Damp Conditions

To avoid personal injury or damage to this product from electric shock, do not operate this product in wet/damp conditions.

Do Not Operate in an Explosive Atmosphere

To avoid personal injury or fire hazard, do not operate this product in an explosive atmosphere.

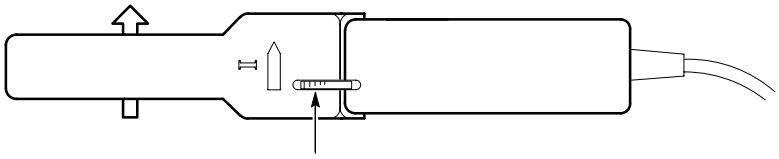
Do Not Immerse in Liquids

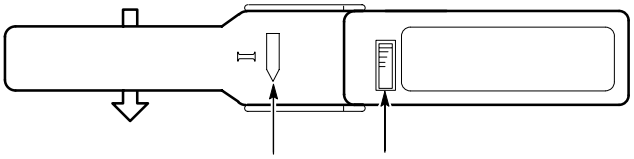
Clean the probe using a damp cloth. Refer to the cleaning instructions on page 11.

Do Not Use if Damaged

If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Controls





I + −	**Current Flow Symbol** This arrow shows the probe's polarity convention for measuring current flowing from positive to negative.
	ZERO Adjustment Rotate to adjust the probe output to zero when there is no current present. It may also be used to offset a DC signal component. Zeroing is not needed for AC measurements unless your instrument cannot isolate a DC component (if present).
	0/1 (ON/OFF) Slide the switch from 0 (off) to 1 (on) to power the probe.

Operating Basics

Before using the probe, the batteries must be installed. See the battery installation instructions on page 10.

WARNING. *Do not clamp the probe onto circuits with voltages greater than 440 VAC. Personal injury or damage to the probe may result.*

Always connect the probe to the instrument before clamping onto the circuit under test.

1. Connect the black lead to the meter **COM**, and the red lead to the **VΩ** input. Set the meter to the DC Volts position. See Figure 1 for connection to a Tektronix DM 254.

   With the probe **0/1** switch in the **0 (OFF)** position, check that the multimeter indicates at least –100 mV. If the magnitude of the reading is greater than –100 mV (for example: –80 mV), replace both batteries.

   If the voltage reading is correct, but the probe does not work, check the polarity of the batteries and try again. If the probe still does not work, call the toll-free number on page 14 for help.

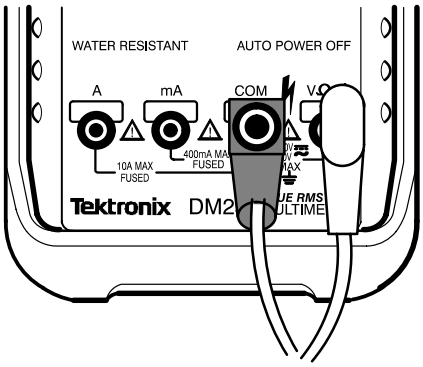


Figure 1: Meter Connections

2. Move the **0/1** switch to the **1 (ON)** position to power the probe.
3. Use the **ZERO** adjustment to zero or offset the probe output.
4. Connect the probe to the circuit by opening the jaws and clamping around the conductor. *Grabbing both the "hot'" and neutral wires may give you a zero reading.* See Figure 2.

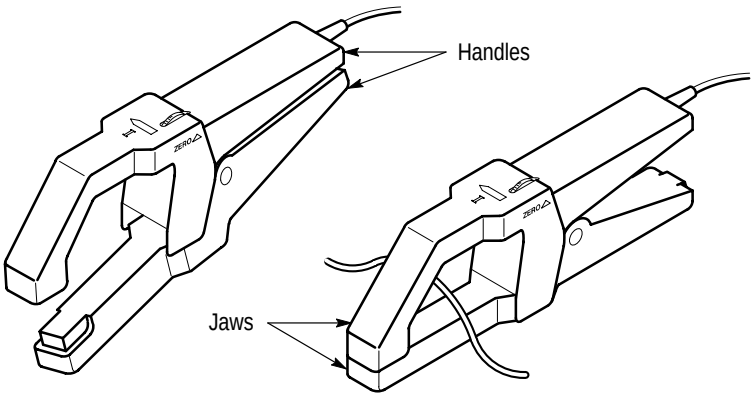


Figure 2: Connecting the A610

5. Adjust the meter as necessary to get a useable reading.

To measure only AC current, set the meter to measure AC volts.

To measure DC current, set the meter to measure DC volts. Note the current convention arrow on the probe to get the proper polarity reading.

Each millivolt displayed on the meter indicates an ampere of current in the circuit. For example: an 80 mV reading = 80 Amps in the circuit.

(Remember to unclamp the probe from the conductor before disconnecting it from your meter or instrument.)

To increase the measurement sensitivity of the A610, loop additional turns of the wire under test through the jaws. See Figure 3. The sensitivity of the A610 will be multiplied by the number of loops in the jaws. For example: 1 mV/A X 4 turns = 4 mV/A.

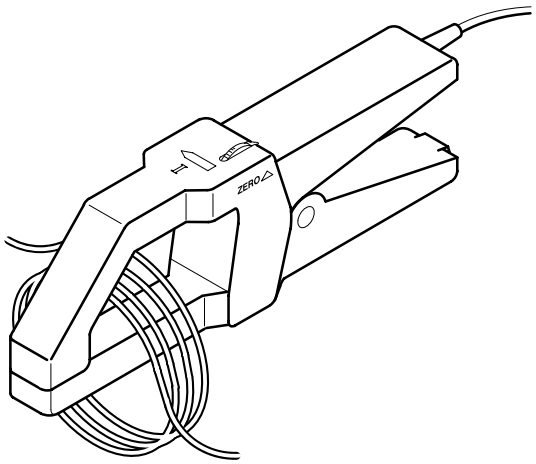


Figure 3: Increasing the A610 Sensitivity

Functional Check

Follow the function check procedure to determine if your probe is working properly.

AC Current

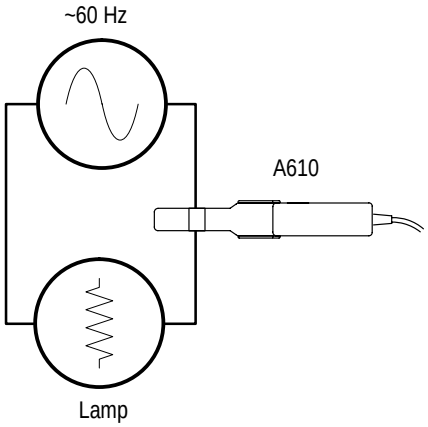


Figure 4: Basic AC Test Circuit

To check your current probe, you will need a known AC voltage and resistance. For example, measured 60 Hz line voltage and an incandescent lamp of known approximate wattage are adequate. See Figure 4. *The power consumption of the lamp is usually printed on the lamp. The lamp used should be designed for the test voltage.*

1. Connect the probe to the instrument.
2. Connect the lamp to the line voltage.
3. Measure the line voltage at the lamp.

4. Clamp the probe around one of the wires and measure the current. (Additional loops may be necessary to get a reasonable reading. See the *Operating Basics* section.)
5. Use the provided formulas to calculate current and error.

$$Current_{calculated} = \frac{Power_{known}}{Voltage_{measured}}$$

$$\%\ Error = \left[1 - \frac{Current_{measured}}{Current_{calculated}}\right] \times 100$$

For example: given measured line voltage of 115 VAC, a 60 watt light bulb, and 510 mA of measured current, find the calculated current.

$$\frac{60\ watts}{115\ VAC} = 522\ mA_{calculated}$$

$$\left[1 - \frac{510\ mA_{measured}}{522\ mA_{calculated}}\right] \times 100 = 2.3\%\ Error$$

An error of ±10% is acceptable, and a good indication that the probe and meter are functioning properly.

The linearity of the probe can be checked by the method used to increase measurement sensitivity. By increasing the number of loops in the jaws, the measured current should increase proportionately.

DC Current

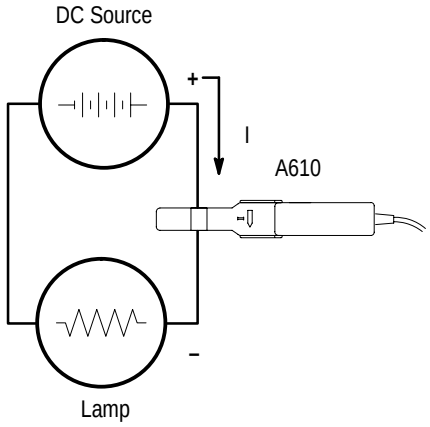


Figure 5: Basic DC Test Circuit

To check your current probe, you will need a known DC voltage and resistance; for example, an automobile headlight and battery are suitable. See figure 5. *The power consumption of the headlamp should be printed on the lamp. The lamp used should be designed for the test voltage.*

1. Connect the probe to the instrument and zero it.
2. Clamp the probe around one of the wires to the light and zero the current reading.
3. Turn on the light.
4. Measure the current drawn by the light. (Additional loops may be necessary to get a reasonable reading. See the *Operating Basics* section.)
5. Measure the battery voltage at the light.
6. Use the formulas below to calculate current and error.

$$Current_{calculated} = \frac{Power_{known}}{Voltage_{measured}}$$

$$\%\ Error = \left[1 - \frac{Current_{measured}}{Current_{calculated}}\right] \times 100$$

For example: given a measured battery voltage of 12.5 VDC, a 40 watt (12 volt) light bulb, and 3.15 A of measured current, find the per cent error from the calculated current.

$$\frac{40\ watts}{12.5\ VDC} = 3.2\ A_{calculated}$$

$$\left[1 - \frac{3.15\ A_{measured}}{3.2\ A_{calculated}}\right] \times 100 = 1.6\%\ Error$$

An error of ±10% is acceptable, and a good indication that the probe and meter are functioning properly.

The linearity of the probe can be checked by the method used to increase sensitivity. By increasing the number of loops in the jaws, the measured current should increase proportionately.

Maintenance

Battery Notes

The A610 uses two AAA batteries. Refer to page 12 for a detailed battery description.

As the batteries in the A610 are drained, significant gain errors may occur. Check the batteries using the procedure on page 3.

Battery Installation

1. Remove the probe from the circuit.
2. Using a small tool, open the battery compartment by gently prying back on the cover clip and letting the battery compartment open.
3. While observing polarity, install the batteries into the compartment as shown in Figure 6.
4. Close the compartment by pressing the compartment back into the handle until the cover clip snaps into place.

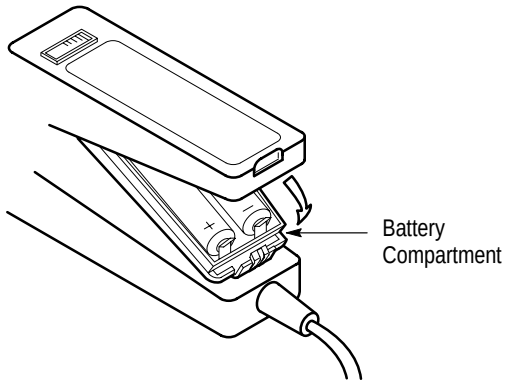


Figure 6: A610 Battery Compartment

Cleaning

To clean the probe body, use a soft cloth dampened in a solution of mild detergent and water. To clean the core, open the jaw and clean the exposed core surfaces with a cotton swap dampened with isopropyl alcohol (isopropanol) or ethyl alcohol (fotocol or ethanol). Lubricate the jaws mating surfaces with a light oil.

Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents.

Do not immerse the probe in liquids or use abrasive cleaners.

Preparation for Shipment

If the original packaging is unfit for use or not available, use the following packaging guidelines:

1. Use a corrugated cardboard shipping carton having inside dimensions at least one inch greater than the probe dimensions. The box should have a carton test strength of at least 200 pounds.
2. Put the probe into a plastic bag or wrap to protect it from dampness.
3. Place the probe into the box and stabilize it with light packing material.
4. Seal the carton with shipping tape.

Specifications

These characteristics apply to a A610 probe installed on a Tektronix DM254 multimeter in an environment within the limits described in Table 3. For best results, a true RMS multimeter should be used.

Table 1: Electrical Characteristics

Output	1 mV/A
Accuracy	±5% from 2 to 100 A ±1A ±7% from 100 to 500 A
Maximum Working Current	500 A_{PEAK}
Maximum Working Voltage	440 V_{RMS} (650 VDC + AC_{PEAK})
Frequency Range	DC to 440 Hz
Battery Type and Life	1.5V (AAA) NEDA 24A, IEC LR03 150 hours minimum (2 each))

Table 2: Physical Characteristics

Dimensions	195 mm x 66 mm x 34 mm (7.68 x 2.60 x 1.34 inches)
Maximum Conductor Size	30 mm (1.18 inches)
Cable Length	1.5 m (5 feet)
Weight	380 g (13 oz) with batteries

Table 3: Environmental Characteristics

Temperature	
Working	0°C to +50°C (+32° to +122°F)
Storage	–20°C to +80°C (–4° to +176°F)
Humidity	0° C to 40° C, 95% humidity
	40° C to 50° C, 45% humidity

Replaceable Parts

The A610 is shipped with the following item(s):

- these instructions
  Tektronix part number 070-8881-00
- two 1.5V, AAA batteries
  ANSI/NEDA number 24A
  IEC number LR03

The A610 does not have any user repairable assemblies. If you should have trouble with your probe, contact you local Tektronix Service Center or representative for help.

For other needs or questions, please call this toll-free number:

1-800-TEK-WIDE, extension 2400
(1-800-835-9433, extension 2400)

If you are outside North America, please contact the Tektronix office or distributor nearest you.