

Tektronix®

A622 100 Amp AC/DC Current Probe Instructions

Register now!
Click the following link to protect your product.
www.tek.com/register



070-8883-06

Copyright © Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its subsidiaries or suppliers, and are protected by national copyright laws and international treaty provisions. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, see the *Service safety summary* that follows the *General safety summary*.

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

This product shall be used in accordance with local and national codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

To avoid fire or personal injury

Observe all terminal ratings.

To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not exceed the Measurement Category (CAT) rating and voltage or current rating of the lowest rated individual component of a product, probe, or accessory. Use caution when using 1:1 test leads because the probe tip voltage is directly transmitted to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not connect a current probe to any wire that carries voltages above the current probe voltage rating.

Do not operate without covers.

Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry.

Do not touch exposed connections and components when power is present.

Replace batteries properly

Replace batteries only with the specified type and rating.

Do not operate in wet/damp conditions.

Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Remove the input signals before you clean the product.

Probes and test leads

Connect and disconnect properly.

Connect the probe output to the measurement product before connecting the probe to the circuit under test. Connect the probe reference lead to the circuit under test before connecting the probe input. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement product.

Do not connect a current probe to any wire that carries voltages or frequencies above the current probe voltage rating.

Inspect the probe and accessories.

Before each use, inspect probe and accessories for damage (cuts, tears, or defects in the probe body, accessories, or cable jacket). Do not use if damaged.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock.

Do not touch exposed connections.

Do not service alone.

Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power.

To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on.

Dangerous voltages or currents may exist in this product. Remove battery before removing protective panels, soldering, or replacing components.

Terms in this manual

These terms may appear in this manual:



Warning: Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION: Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

Symbols on the product



When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product.



CAUTION
Refer to Manual



Double
Insulated



Connection and
disconnection to
hazardous bare
wire permitted

Compliance information

This section lists the safety and environmental standards with which the instrument complies. This product is intended for use by professionals and trained personnel only; it is not designed for use in households or by children.

Questions about the following compliance information may be directed to the following address:

Tektronix, Inc.

PO Box 500, MS 19-045

Beaverton, OR 97077, USA

tek.com

Safety compliance

This section lists the safety standards with which the product complies and other safety compliance information.

EU declaration of conformity – low voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union:

Low Voltage Directive 2014/35/EU.

- EN 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements
- EN 61010-2-032. Particular requirements for handheld current clamps for electrical measurement and test equipment

U.S. nationally recognized testing laboratory listing

- UL 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements

Canadian certification

- CAN/CSA-C22.2 No. 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements

Additional compliances

- IEC 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements
- IEC 61010-2-032. Particular requirements for handheld current clamps for electrical measurement and test equipment

Equipment type

Test and measuring equipment.

Safety class

Class 2

Pollution degree description

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.

- Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
- Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution degree rating

Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor, dry location use only.

IP rating

IP20 (as defined in IEC 60529).

Measurement and overvoltage category descriptions

Measurement terminals on this product may be rated for measuring mains voltages from one or more of the following categories (see specific ratings marked on the product and in the manual).

- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category IV. For measurements performed at the source of low-voltage installation.



Note: Only mains power supply circuits have an overvoltage category rating. Only measurement circuits have a measurement category rating. Other circuits within the product do not have either rating.

Environmental compliance

This section provides information about the environmental impact of the product.

Product end-of-life handling

Observe the following guidelines when recycling an instrument or component:

Equipment recycling

Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2012/19/EU and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Tektronix Web site (www.tek.com/productrecycling).

Getting Started

Overview

The A622 current probe enables a general purpose oscilloscope to display AC and DC current signals up to 100 amps Peak (70 A RMS). The A622 current probe can also make AC and DC measurements with a multimeter by using the BNC-to-banana plug adapter available as a recommended accessory (see [Replaceable Parts](#) on page 15).

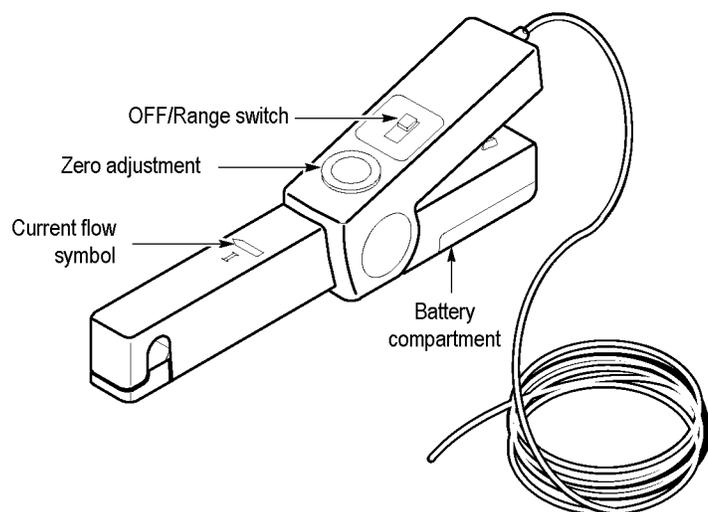
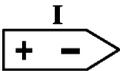
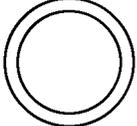
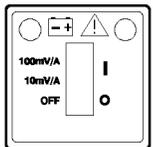
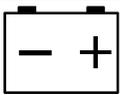


Figure 1: A622 AC/DC Current Probe

The following table highlights the controls and indicators on the A622 current probe.

Table 1: A622 controls and indicators

Control/Indicator	Description
	Current flow symbol. The arrow shows the polarity convention of the probe 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 can 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).
	OFF/Range switch. Slide the switch from OFF to either the 10 mV/A or 100 mV/A range. When either range is selected, the probe is turned on, and the green battery indicator lights. If the indicator does not light, see Battery Notes on page 11.
	Battery indicator. The green battery indicator lights when the probe is turned on. For more information, see Battery Notes on page 11.
	Overload indicator. The red overload indicator lights if the measured signal is greater than the selected range capacity. Switch the probe to 10 mV/A if possible, or remove the probe from the circuit.

Operating Basics

Before using the probe, the batteries must be installed; see [Battery Installation](#) on page 11.



Warning: Personal injury or damage to the probe can result if you clamp the probe onto circuits with voltages greater than 600 VAC. Do not clamp the probe onto circuits with higher voltages. Always connect the probe to the instrument before clamping onto the circuit under test.

1. Connect the probe BNC connector to the oscilloscope input. Start by setting the oscilloscope channel vertical coupling to DC volts and the vertical deflection to 0.1 V/div.
2. Move the **OFF/Range** switch to the **10 mV/A** or **100 mV/A** position to power on the probe.

The A622 current probe has a green LED power/battery indicator. If the LED does not light, replace the battery.

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. See [Figure 2](#) on page 9.



Note: Clamping around both the "hot" and neutral wires may give you a zero reading.

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

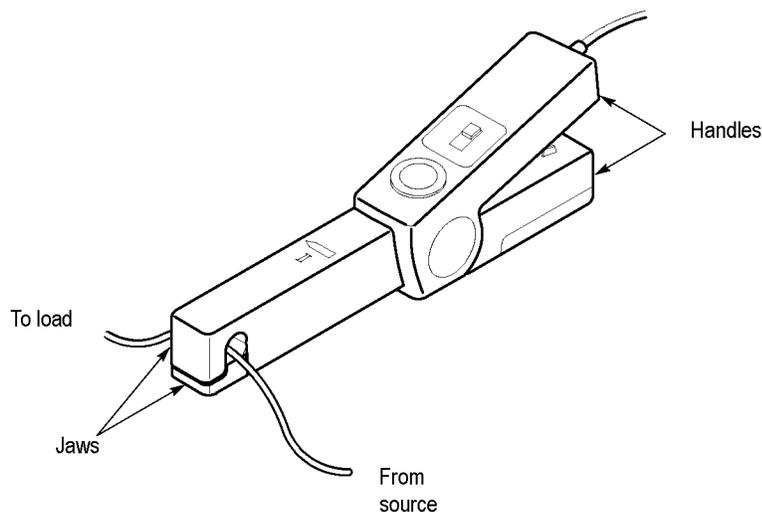


Figure 2: Connecting the A622 current probe

5. Adjust the probe and channel as necessary to get a clear view of the signal. Set the channel to DC volts to see both the AC and DC currents; set the channel to AC to see the AC current only.

The current drawn by some devices looks much different than that of others. While the RMS current may be low, the momentary peaks can be quite high. The following figures shows the difference between the line current drawn by a resistive load and a motor controller.

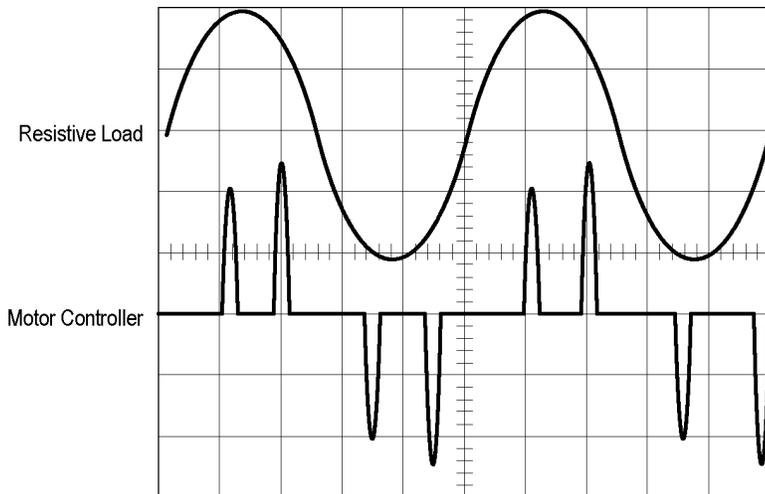


Figure 3: Typical current waveforms

If you are using the A622 current probe with a multimeter, connect the probe with the recommended BNC-to-banana adapter. Connect the black lead to the meter **COM**, and the red lead to the **V Ω** input.

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.

To increase the measurement sensitivity of the A622 current probe, loop additional turns of the wire under test through the jaws. See [Figure 4](#) on page 10. The sensitivity of the A622 current probe is multiplied times the number of loops in the jaws. For example: 10 mV/A \times 4 turns = 40 mV/A.



CAUTION: To prevent damage to the probes, do not force the jaw closed. If you cannot close the jaw around the conductor(s), either reduce the number of conductors you are measuring, or, if possible, take your measurement on a smaller conductor.

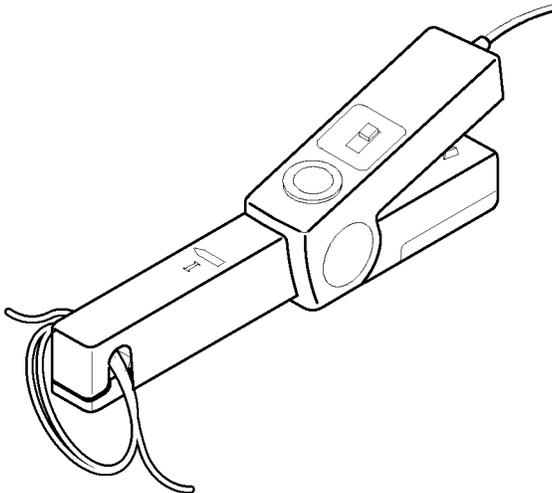


Figure 4: Increasing the sensitivity

Maintenance

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 swab dampened with isopropyl alcohol (isopropanol). Lubricate the jaws mating surfaces with a light oil.

Do not clean with solvents or abrasives. Do not immerse the probe.

Battery Notes

The A622 current probe uses a single 9 V battery. Refer to [Table 2](#) on page 12.

As the battery in the A622 current probe is drained, significant gain errors can occur. The green LED will continue to light until a low battery voltage of 6.5 V is reached.

If probe gain errors are detected, replace the battery with a fresh one.

Battery Installation

1. Remove the probe from the circuit.
2. Open the battery compartment by loosening the captive screw and sliding the cover off (see [Figure 5](#) on page 11).
3. While observing polarity, attach the battery to the battery connector.
4. Replace the cover and lightly tighten the screw to hold the cover in place.

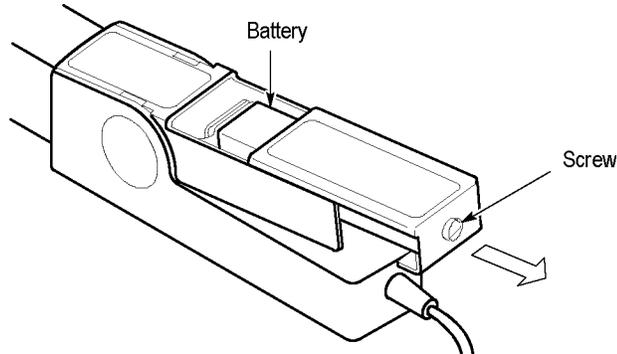


Figure 5: A622 battery compartment

Specifications

These characteristics apply to an A622 AC/DC Current Probe installed on a Tektronix TDS 220 oscilloscope. The oscilloscope must be warmed up for at least 20 minutes and be in an environment within the specified limits in [Table 5](#) on page 13.

Table 2: Electrical Characteristics

Current Ranges	10/100 mV/A
DC Accuracy, typical	$\pm 3\% \pm 50$ mA at 100 mV/A (50 mA to 10 A peak range) $\pm 4\% \pm 50$ mA at 10 mV/A (500 mA to 40 A peak range)
Gain versus frequency, typical	Figure 6 on page 13
Maximum Working Current	Table 3 on page 12
Maximum Working Voltage ¹	Table 3 on page 12 30 Vrms, 42 Vpk, 60 VDC, for voltages above these limits, use insulated conductors only.
Maximum Float Voltage	Table 3 on page 12
Frequency Range	DC to 100 kHz (-3 dB)
Battery Type and Life, typical	9V NEDA 1604A, IEC 6LR61 40 hours minimum (1 each)
DC signal linearity, typical	Figure 8 on page 14
Phase shift, typical	Figure 9 on page 14

Table 3: Voltage and current ratings

Rating	Maximum working current (A)		Maximum working voltage (V)	Maximum floating
	Range 10 mV/A	Range 100 mV/A		
DC	100 ²	10	600	600
DC + peak AC	100 ²	10	600	600
AC peak	100	10	600	600
AC peak-peak	200	20	1200	-
RMS CAT III	70.7	7.07	600	600
RMS CAT II	70.7	7.07	600	600
RMS CAT I	70.7	7.07	600	600

Table 4: Physical Characteristics

Characteristic	Description
Dimensions	231 mm x 36 mm x 67 mm (9.09 x 1.42 x 2.64 inches)
Maximum Conductor Size	11.8 mm (0.46 inches)
Cable Length	2 m (6.6 feet)
Table continued...	

¹ An insulated conductor is any conductor that is surrounded by an insulating material that is capable of isolating the voltage present on the conductor. Lacquer coatings like those typically found on transformer windings do not provide sufficient, reliable insulation for use with current probes. The lacquer coating can be easily nicked or damaged, which compromises the insulating capabilities of the lacquer coating.

² See frequency derating information in [Figure 7](#) on page 13.

Characteristic	Description
Weight	330 g (12 oz) with battery

Table 5: Environmental Characteristics

Characteristic	Description
Temperature	Operating: 0 °C to +50 °C (+32 °F to +122°F) Storage: -20 °C to +80°C (-4 °F to +176°F)
Humidity	0 °C to 40 °C, 95% humidity 40 °C to 50 °C, 45% humidity
Pollution Degree	2

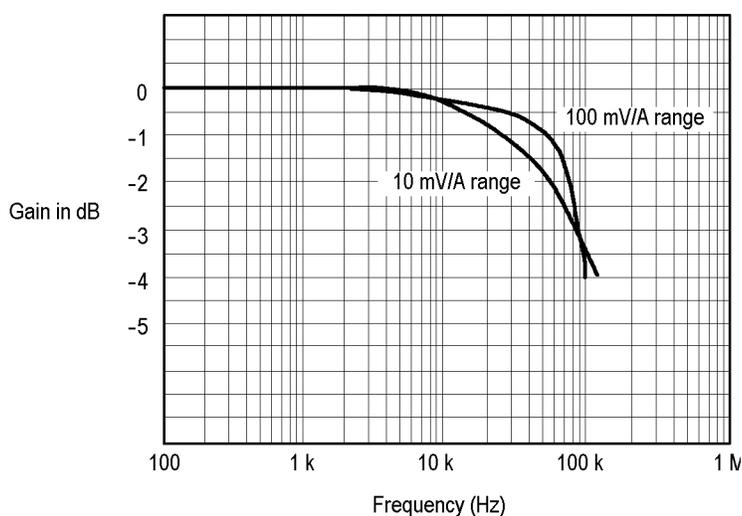


Figure 6: Gain versus frequency at 1 A peak, typical

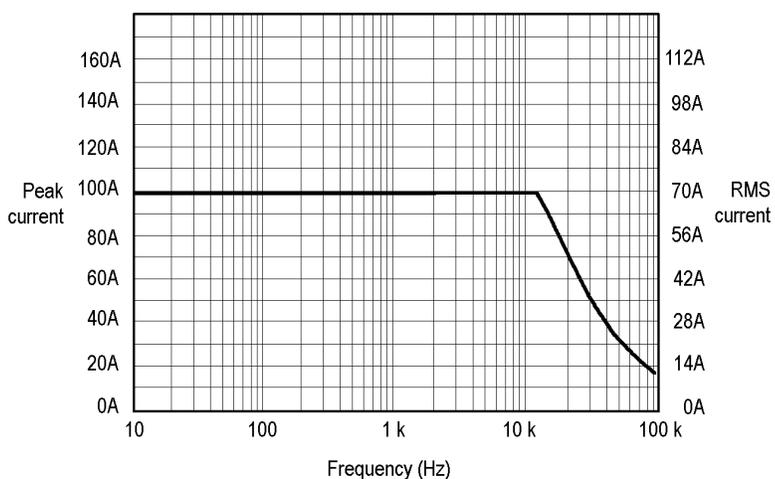


Figure 7: Maximum current versus frequency

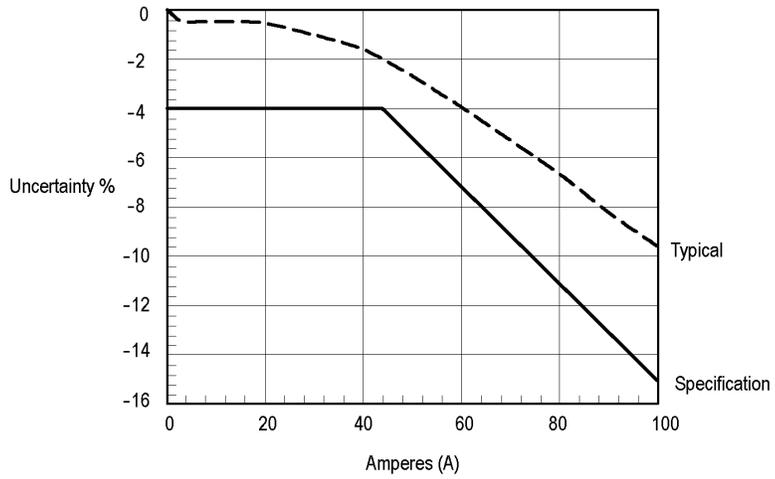


Figure 8: DC signal linearity in the 10 mV/A range, typical

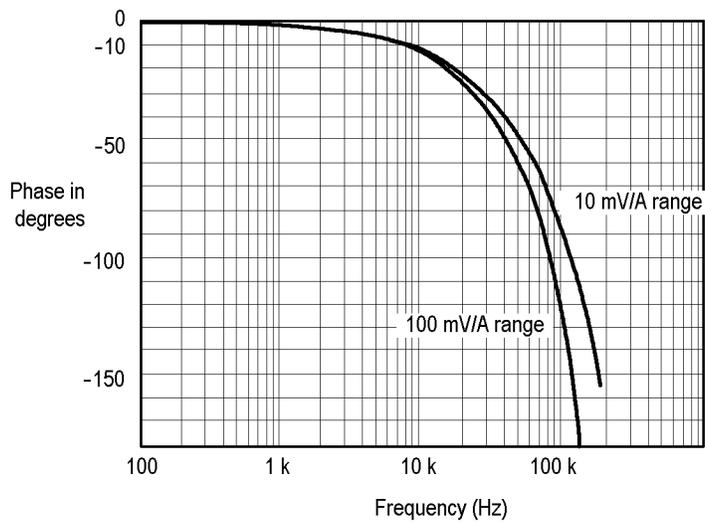


Figure 9: Phase versus frequency at 1 A peak, typical

Preparation for Shipment

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

1. Use a sturdy shipping carton having inside dimensions at least one inch greater than the probe dimensions.
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.

Replaceable Parts

The A622 AC/DC Current Probe is shipped with the following items:

- These instructions Tektronix part number 070-8883-XX
- One 9V battery Tektronix part number 146-0017-XX ANSI/NEDA number 1604A IEC number 6LR61

Recommended accessory for use with DMMs:

- One BNC to banana plug adapter Tektronix part number 012-1450-XX

The A622 does not have any user repairable assemblies. If you should have trouble with your probe, contact your local Tektronix Service Center or representative for help.



洛克儀器股份有限公司 Lock Instrument Co. Ltd
(台北公司) 235 新北市中和區中正路764號6樓 TEL : 886-2-32346000
(新竹公司) 300 新竹市北區光華二街72巷79號 TEL : 886-3-5324199
官方網站: www.lockinc.com.tw 網路商店: www.pcstore.com.tw/lock