150 Amp AC/DC Current Probe

GCP-500

150A DC / 100A RMS

DC-500kHz

INSTRUCTION MANUAL

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General Safety Instructions:

Read the following safety instructions to avoid injury and prevent damage to this product or any products connected to it. Use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement instrument.

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

Replace Batteries Properly. Replace batteries only with the proper type and rating specified.

Do Not Operate Without Covers. Do not operate this product without the covers or panels.

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

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Safety Terms and Symbols:

- **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.** These symbols may appear on the product:

  Attention refer to operation Instructions.

  This instrument has double insulation.

Getting Started:

The GCP-500 current probe enables a general purpose oscilloscope to display AC and DC current signals up to 150 amps Peak (100A RMS). The GCP-500 current probe can also make AC and DC measurements with a multimeter by using the BNC-to-banana plug adapter.

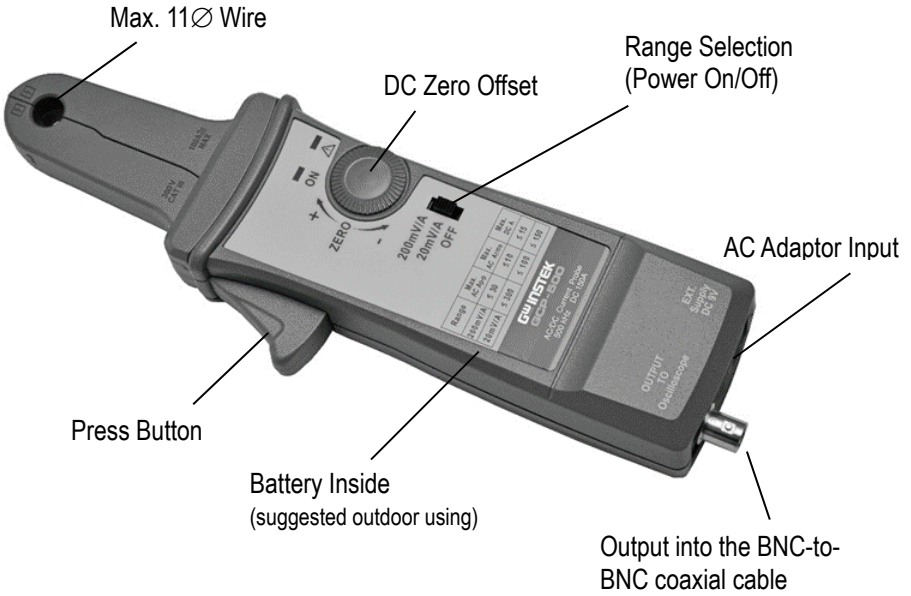
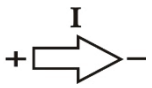
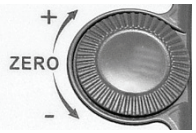
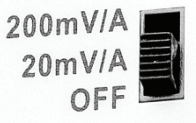


Figure 1. Shows the controls and indicators on the GCP-500 current probe.

Table 1: GCP-500 controls and indicators

Control/Indicator	Description
	**Current flow symbol.** The 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).
	**OFF/Range switch.** Slide the switch from OFF to either the 20 mV/A or 200mV/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 and Battery Installation on page11.
	Battery indicator. The green battery indicator lights when the probe is turned on. For more information, see Battery Notes and Battery Installation on page11.
	Overload indicator. The red overload indicator lights if the measured signal is greater than the selected range capacity. Switch the probe to 20 mV/A if possible, or remove the probe from the circuit.

Basic Operation:

Before using the probe, the batteries or specified power adaptor must be installed. See the battery installation instructions on page11.

⚠ WARNING!

Do not clamp the probe onto circuits with voltages greater than 600 VAC. Personal injury or damage to the probe may result.

Always connect the GCP-500 current probe output to the instrument before clamping onto the circuit under test.

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1. First connect the current probe BNC connector to BP-250 (double BNC connection cable) then connect to oscilloscope input. Start by setting the oscilloscope voltage input channel to DC volts, and the voltage sensitivity scale to 0.1 V/div.
2. Move the OFF/ Range switch to the 20 mV/A or 200 mV/A position to turn on the probe.
   (※The GCP-500 current probe has a green LED power/battery indicator. If the LED does not light, replace the battery or use specified power adaptor.)
3. Use the ZERO adjustment to zero or offset the probe output detection of residual magnetic DC charges.
4. Connect the probe to the circuit by opening the jaws and clamping around the conductor. See Figure 2.

   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 GCP-300 current probe.

5. Adjust the probe channel and oscilloscope's time base as necessary to get a clear and stable view of the signal. Set the oscilloscope input 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 different devices look much different than that of others. While the RMS current can only be used in low frequency current, the momentary peaks may be quite high. Figure 3 shows the difference between the line current drawn by a resistive load and a motor controller.

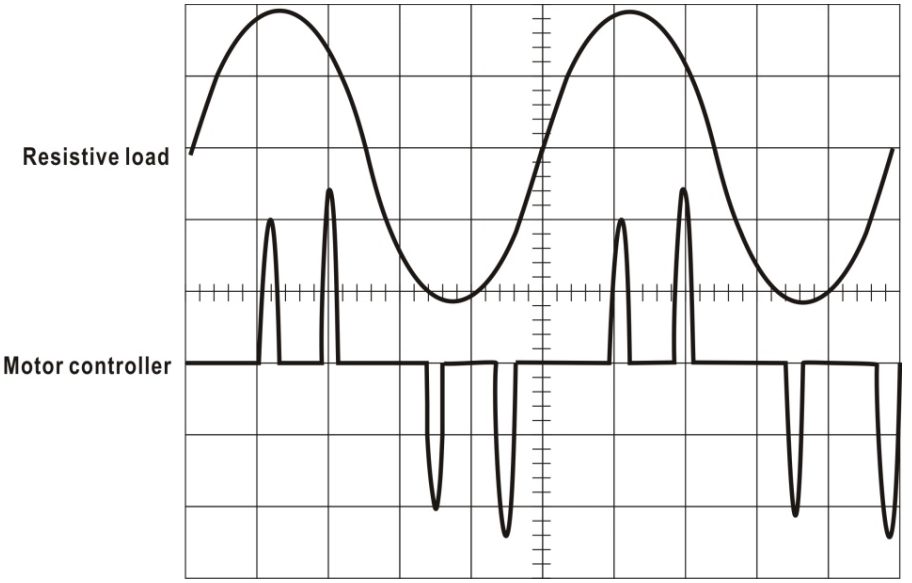

Figure 3. Typical current waveforms

Congratulations on your purchase of the GCP-500, a multifunctional current probe. When connecting to a digital meter, use the BNC-to-banana adapter. Connect the black lead to the meter COM (black letters on the meter), and the red lead to the VΩ input (red letters on the meter).

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 GCP-500 current probe, loop additional turns of the wire under test through the jaws. See Figure 4. The sensitivity of the GCP-500 current probe is multiplied times the number of loops in the jaws. For example: 200 mV/A X 4 turns = 800 mV/A.

Figure 4. Increasing the sensitivity

Maintenance:

Use the information in this section to properly maintain the operation of your GCP-500 AC/DC Current Probe.

1. Notes on Battery and Power Converter:

The GCP-500 current probe uses a single square 9 V battery. This machine is a high power product. Please use the specified alkaline battery.

As the battery in the GCP-500 current probe is drained, significant gain errors may 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.

As an alternative, an AC power converter can be used to avoid gain error due to poor battery durability. Switch to a square 9V battery only when there is no AC power supply available outdoors.

When using an AC power converter for an extended time, we suggest you remove the battery from the compartment. This is because heating will result in battery leakage, and battery electrolyte will rust the circuit board, thus creating major damage. Furthermore, batteries are high pollution products and therefore by reducing their usage, we will in turn protect the environment.

GCP-500 has in its design a priority external power circuit therefore it is safe to simultaneously install the battery and the external power supply. During usage, removing the external power supply will not produce waveform anomaly or any damage. However when external power is used for an extended time (more than 1 week), removal of battery is recommended. This will avoid leakage of battery since the quality of the batteries is something that is out of our control.

2. Battery Installation:

(1) Remove the probe from the circuit.

(2) Please push and open battery lid slightly from back of probe.

(3) While observing polarity, attach the new alkaline battery to the battery connector buttons and place the battery in the specified area.

(4) Please close battery lid properly.

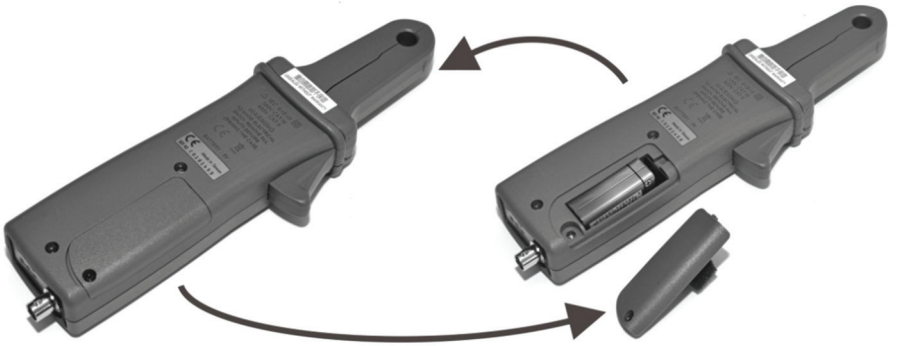

Figure 5. GCP-500 Battery Installation

3. Cleaning:

To clean the probe exterior, 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). Lubricate the jaws mating surfaces with light oil.

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

4. Preparation for Shipment

Our company has designed a special box to be used for GCP-500, convenient for storage and shipment. Please do not discard it.

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 packaging material.

(4) Seal the carton with shipping tape.

Specifications:

These characteristics apply to an adjusted GCP-500 AC/DC Current Probe installed on an oscilloscope of any brand. The oscilloscope must be warmed up for at least 20 minutes and be in an environment with the temperature at 10°C ~30°C and the humidity at 0~80%.

Table 2: Electrical Characteristics

Current Ranges	20/200 mV/A
DC Accuracy, typical	±3% ±30 mA at 200 mV/A (30 mA to 15 A peak range) ±4% ±300 mA at 20 mV/A (300 mA to 80 A peak range) ±15% max at 20 mV/A (80 A peak to 150 A peak range)
Gain versus frequency, typical	See Figure 6
Maximum Working Current	See Table 3
Maximum Working Voltage	See Table 3
Maximum Float Voltage	See Table 3
Frequency Range	DC to 500 kHz (-3 dB)
Rise Time	0.7 us (Typ.)
Load Impedance:	≥ 1MΩ, < 100pF
Battery Type and Life, typical	9V NEDA 1604A, IEC 6LR61 10 hours minimum (1 each)
DC signal linearity, typical	See Figure 8
Phase shift, typical	See Figure 9

NOTE: This clamp adapts to all measurement instruments which have a BNC input and an impedance of 1MΩ, < 100 pF.

Table 3: Voltage and current ratings

Rating	Maximum working current (A)		Maximum Working voltage (V)	Maximum floating voltage (V)
	Range 20 mV/A	**Range 200 mV/A**		
DC	150	15	600	600
DC + peak AC	150	15	600	600
AC peak	150	15	600	600
AC peak-peak	300	30	1200	-
RMS CAT III	100	10	600	600
RMS CAT II	100	10	600	600
RMS CAT I	100	10	600	600

*See Figure 7 for frequency derating.

Table 4: Physical Characteristics

Dimensions	280 mm x 70mm x 32 mm (11 x 2.8 x 1.3 inch)
Maximum Conductor Size	11 mm (0.43 inch)
Cable Length	100 cm(3.3 feet)
Weight	260 g (9.5 oz) (without battery)

Table 5: Environmental Characteristics

Temperature	
Working	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

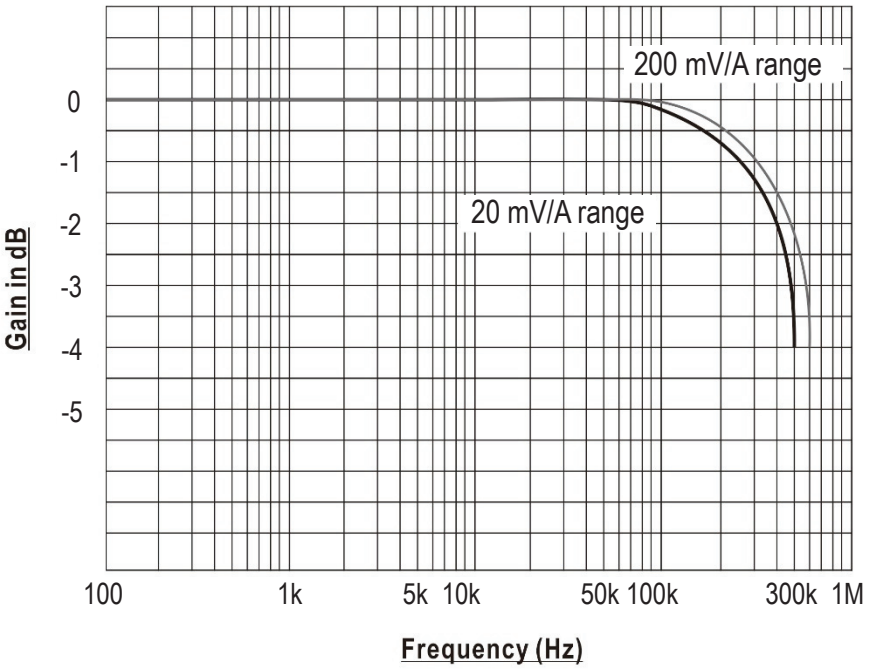

Figure 6. Gain versus frequency at 1 A peak, typical

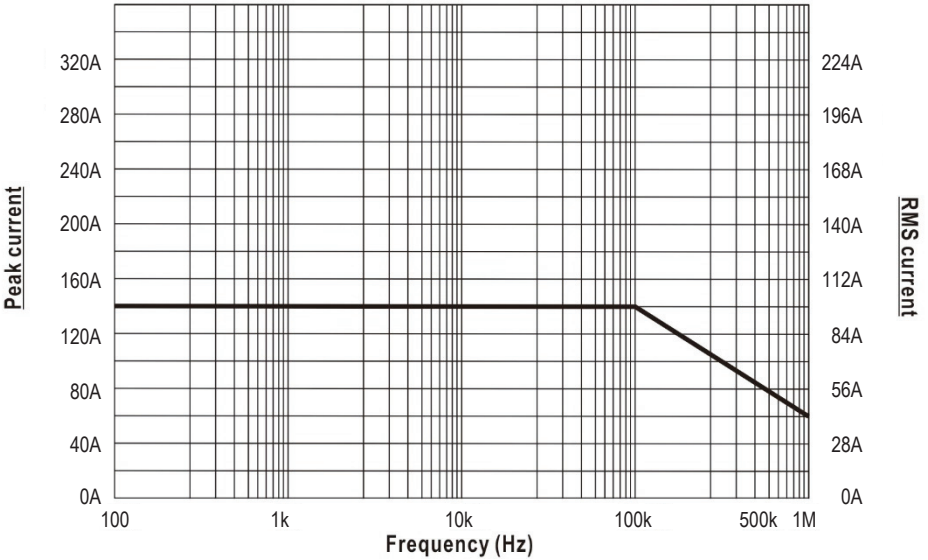

Figure 7. Maximum current versus frequency

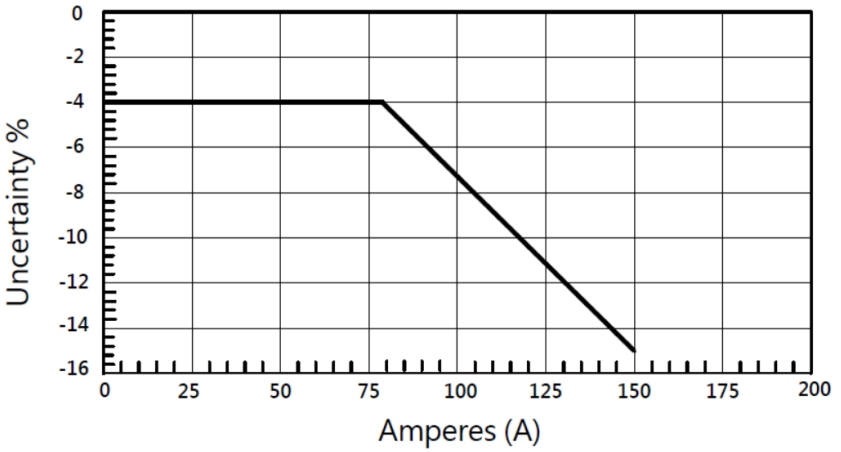

Figure 8. DC signal linearity in the 20 mV/A range, typical

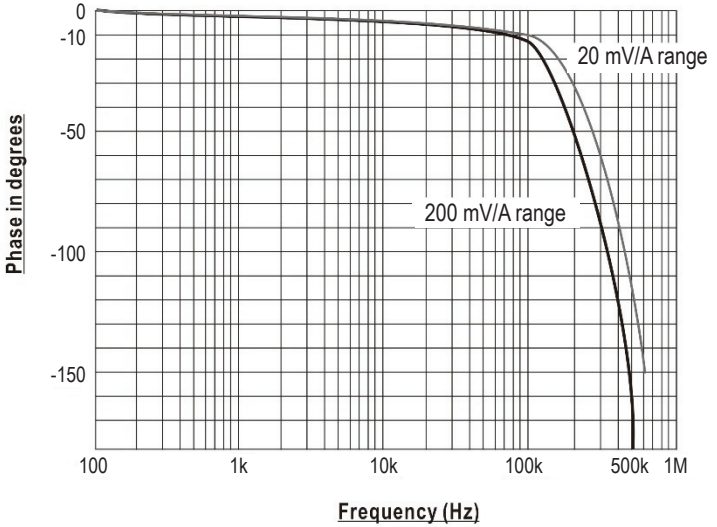

Figure 9. Phase versus frequency at 1 A peak, typical

Table 6: Certifications and compliances

EC Declaration of Conformity	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union:
-Low Voltage Directive	Low Voltage Directive 2014/35/EU **EN 61010-1: 2010 (Third Edition)** **EN 61010-2-032: 2012 (Third Edition)** **EN 61010-2-033: 2012 (First Edition)**
-EMC Directive	EMC Directive 2014/30/EU **EN 61326-1: 2013** **EN 61326-2-1: 2013** **EN 61326-2-2: 2013** **CISPR 11: 2009+1: 2010** **EN 61000-3-2: 2014** **EN 61000-3-3: 2013**

Replaceable Parts:

The GCP-500 AC/DC Current Probe is shipped with the following items:

One instruction manual (English version).

One BNC TO BNC Coaxial Cable Line, length 100cm

One AC power converter (AC voltage depending on region)

One BNC to banana plug adapter, designed with color fool proof design to avoid polarity mistake when connecting to digital meter (for use with digital meter).

The GCP-500 does not have any user repairable assemblies. If you should have trouble with your probe, contact your local Service Center or representative for help.