Current Probe

GCP-0275 / GCP-0550 / GCP-2525 Series

USER MANUAL

REV. A

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

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Good Will Instrument Co., Ltd.
No. 7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan.

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SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to ensure your safety and to keep the instrument in the best possible condition.

Safety Symbols

These safety symbols may appear in this manual or on the Product name.

 WARNING	Warning: Identifies conditions or practices that could result in injury or loss of life.
	DANGER High Voltage
 (Note)	Attention required. Refer to the Manual
	Protective Conductor Terminal
	Earth (ground) Terminal
	Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

Safety Guidelines

Before using the device the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer.

To ensure safe operation and prevent personal injury or equipment damage, please read this manual carefully. Strict adherence to the following safety precautions is required.

⚠ CAUTION	• Please avoid touching bare conductors. • Do not touch the conductor to be measured and the sensor head when using the measurement. • When the oscilloscope is connected to other test terminals, the following points should be noted: • Between the test terminal connected to this instrument and other test terminals, please use basic insulation equipment with a voltage range and pollution degree. • If the basic insulation of the test terminal cannot be satisfied, the input voltage should not exceed the safe voltage. • Please refer to the precautions related to safety such as electric shock when connecting to the electric. • Avoid using the instrument with wet environment or wet hands to avoid electric shock accidents. • The current clamp is a part that is assembled and processed by a precision device consisting of a magnetic core and a highly sensitive component. It may be damaged by sudden changes in the

	surrounding temperature, external shocks, etc., so please be careful not to use it to avoid vibration or shock. • This machine does not have a waterproof or dustproof structure, so please do not use it in dusty environments and water-prone environments. • The upper and lower contact surfaces of the sensor head are made by a precision grinding process. Please pay attention to protection when using, if it is damaged, it will affect its function. • Do not disassemble the Current Probe you are qualified. • Protect the probe from adverse weather conditions, and this product is not waterproof, use with caution.
⚠ WARNING	To avoid short circuits and potentially life-threatening hazards, never attach the GCP-0275/GCP-0550/GCP-2525 to a circuit that operates at more than 600 V CAT II / 300 V CAT III, or over bare conductors.
Cleaning the instrument	• To prevent damage to the probe, do not expose it to aerosols, liquids, or solvents. When cleaning externally, avoid moisture inside the probe. • Never use chemical cleaners; They may damage the probe. Avoid chemicals containing gasoline, benzene, toluene, xylene, acetone, or similar solvents. • Clean the outer surface of the probe with a dry, lint-free cloth or a soft-bristled brush. If dirt remains, moisten with a soft cloth dampened with 75 % isopropanol solution and rinse with deionized water. Use only enough solution to moisten the cloth. Do not use abrasive compounds on any part of

	the probe.
Storage environment	• Location: Indoor • Temperature: 0 ℃ to 50 ℃ / 20 %RH to 75 %RH
Disposal 	Do not dispose this instrument as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.

OVERVIEW

Current Probe Series Overview

This device can be directly connected to the BNC input connector of a waveform measuring instrument, such as an oscilloscope or recorder. By clamping onto the conductor under test, it allows the current waveform to be easily captured and supports range switching. The probe features zero adjustment and degaussing functions, and provides 1 % accuracy under specified environmental conditions.

Series Lineup

The Current Probe Series includes three models.

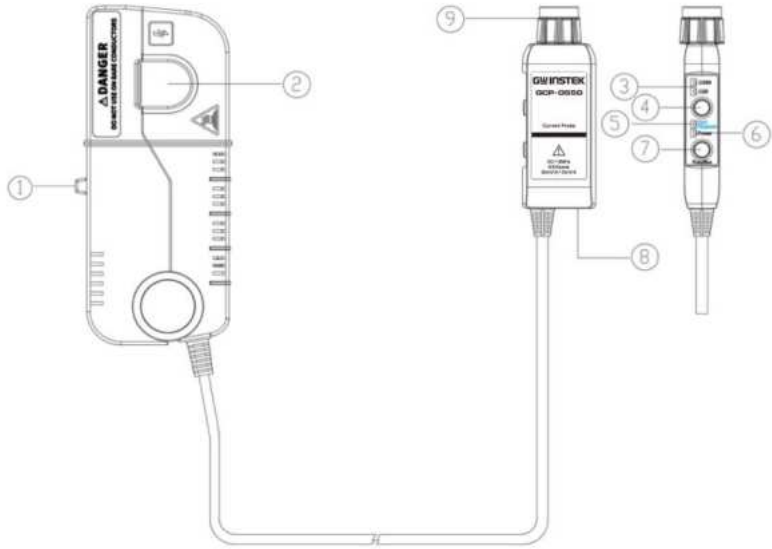
Model	GCP-0275	GCP-0550	GCP-2525
Bandwidth (-3 dB)	DC to 2 MHz	DC to 5 MHz	DC to 25 MHz
DC + Peak AC MAX. (non-continuous)	750 A	500 A	250 A
Rise Time	175 ns or less	70 ns or less	14 ns or less

Main Features

- Highly accurate current detection
- Easy current measurement
- Broadband frequency characteristics DC to 2 MHz (for GCP-0275)
- Broadband frequency characteristics DC to 5 MHz (for GCP-0550)
- Broadband frequency characteristics DC to 25 MHz (for GCP-2525)
- Supports range switching to expand the measurement range
- One-button zero adjustment

Appearance

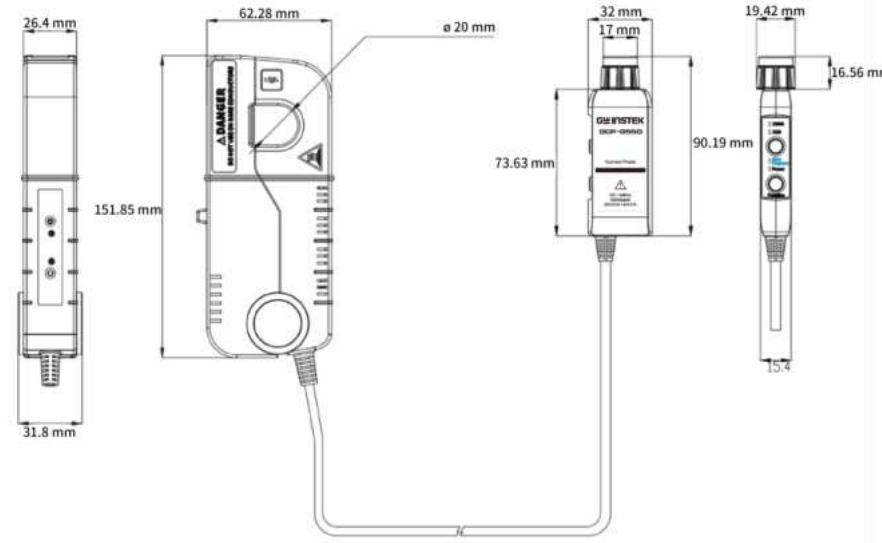
Main Structure

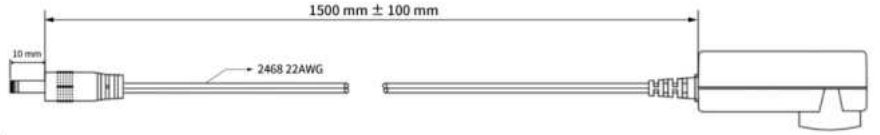


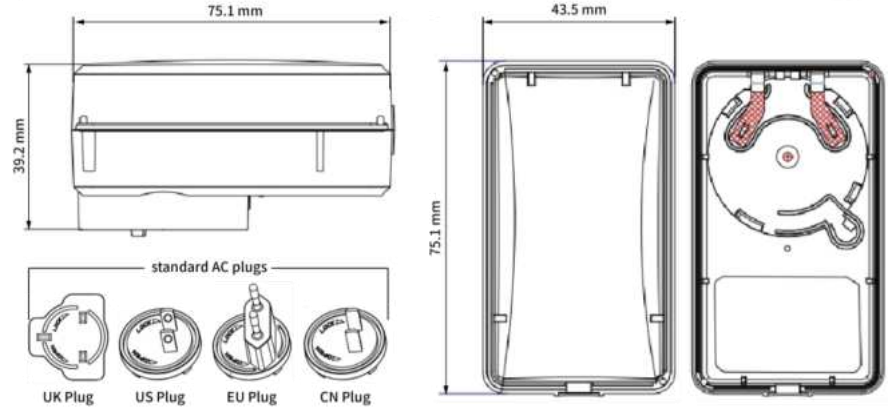
Item	Index	Description
1	Jaw switch push button	Push-up operation pushes the lever to the top and the probe jaw is locked. Pull-down operation pushes the lever to the bottom and the probe, jaw is loosened, clamp the conductor and start to measure.
2	Probe jaw	Make measured conductor current in the core. The sensor element is installed here to sense the conductor current, pay attention to avoid jaw collision and other high-temperature equipment and environment during measurement, to ensure the accuracy of the jaw measurement results.
3	Range switching indicator	Indicates the current range.

4	Range switching button	When the power is on, the default small range gear can be switched by pressing the button. GCP-0275→ 2 mV/A to 20 mV/A GCP-0550→ 5 mV/A to 50 mV/A GCP-2525→ 10 mV/A to 100 mV/A
5	Zero degauss indicator	Use with the Function button. (For details, see the introduction of Zero and degauss function)
6	Power supply indicator	The green light shows when the power is on, and the green light will flash if the jaw switch is not locked or trigger the over-temperature protection.
7	Function button	When the probe needs to reset to zero, short press the button; When degaussing is required, press and hold the button (press for 1 second to 3 seconds and then release). It will automatically reset to zero after degaussing is completed, and either degaussing or zeroing should be done with the jaws are locked and there is no current to be measured.
8	Power adapter interface	External power jack with DC 12 V / 2 A adapter (100 VAC to 240 VAC, 50 Hz / 60 Hz).
9	Output BNC connector	Standard BNC output interface, standard BNC coaxial cable can be connected to any manufacturer of oscilloscopes.

Mechanical Specifications







Model name	GCP-0275	GCP-0550	GCP-2525
Clamp Dia.	20 mm		
Current Probe Size	151.85 mm × 26.4 mm × 62.28 mm		
Probe to output box cable length	1600 mm ± 50 mm		
Adapter Size	75.1 mm × 43.5 mm × 39.2 mm		
Adapter Cable Length	1500 mm ± 100 mm		
Adapter Weight	116.8 g		

Packing List

Item	Quantity
Current Probe	1 piece
Power Adapter with Interchangeable Plugs	1 piece
AC Plug Changeable (CN/US/UK/EU)	1 set (4 pcs)
BNC to BNC Cable (with 50 ohm terminal)	1 piece
Packing List	1 piece
Declaration of Traceable Calibration	1 piece

INSTRUCTION

Notes Before Use

❶ Maximum Current Limit

Current probes have three maximum current ratings: pulsed, continuous, and Ampere-second product. Exceeding any of these ratings can saturate the probe core, which magnetizes the core and causes measurement errors. Refer to the specifications for the maximum current ratings of the probe.

- Maximum Pulsed Current (ImaxP) is the maximum peak value of pulsed current the probe can accurately measure, regardless of how short (within bandwidth limitations) the pulse duration is.
- Maximum Continuous Current (ImaxC) is the maximum current that can be continuously measured at DC or at a specified AC frequency. The maximum continuous current value is derated with frequency; as the frequency increases, the maximum continuous current rating decreases.
- The ampere-second product defines the maximum limit of linear operation of any current probe. For current pulses, this product is defined as the average current amplitude multiplied by the pulse duration. Over the ampere-second product, the core material of the probe coil becomes saturated. Since the saturated core cannot handle more current-induced

flux, there is no longer a constant ratio between the current input and the voltage output. As a result, waveform peaks are essentially "sliced" in the region that exceeds the ampere-product.

- The ampere-second product is also known as the rated maximum peak pulse current. This rating should not be exceeded during use, taking into account core saturation and secondary voltage accumulation that can damage the equipment.
- The maximum continuous input range of the probe is a fixed value formed by the temperature rise after the body itself heats up, please do not input more than this fixed value, it may damage the machine.
- The maximum continuous input range results in extremely unstable outputs, and continuous use beyond the maximum current can cause damage to the probe.

⚠ (Note)	The probe must be degaussed after measuring a current that exceeds the probe's maximum continuous current, maximum pulse current, or ampere-second product rating. Exceeding these ratings can magnetize the probe and cause measurement errors.

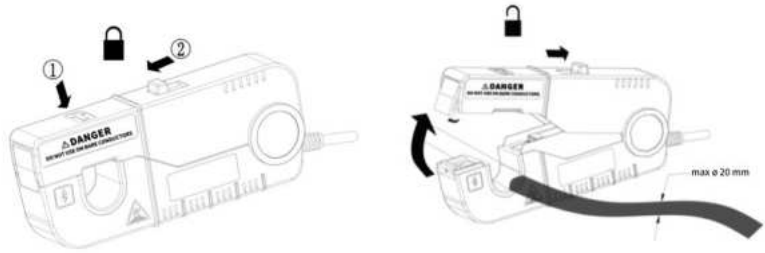
❷ Requirements For The Use Environment

- The current probe cannot be used in a high-temperature environment, which will affect the test progress and results
- When measuring, keep the probe away from potential sources of interference, such as transformers, power modules, etc. To check for interference, connect the probe to the oscilloscope or multimeter without any load, and observe whether there is any waveform or numerical output. If there is, it indicates the presence of an interference source.

Jaw Using

① Indicates the direction of the current. When measuring, if the current in the conductor flows in the same direction as indicated, the measured current value will be positive. If the current flows in the opposite direction, the measured current value will be negative.

② Jaw switch push button. When the switch is pushed to the top position, the jaws close and lock and testing can begin. When the switch is pushed to the bottom, the jaws unlock and open, allowing the measured conductor to be inserted.



(Note) The jaws can accept a wire diameter size of 20 mm

Zero And Degauss Function

- Current probe connect with the oscilloscope (oscilloscope's input impedance set to 1 MΩ)
- Locked the probe jaw
- Click the Function button to trigger the zero function. The Zero Degauss red indicator turns on, and after a few seconds, one beep sounds to indicate that zeroing is complete. The red light then turns off.
- Press and hold the Function button for 1 to 3 seconds, then release it to trigger the degauss and zero function. The Zero Degauss red indicator flashes twice, and then stays on. After a few seconds, two beeps are heard, and the red light turns off once the degaussing and zeroing are completed.

Tips:	After the degaussing /zeroing function is triggered, the duration of the red light display status is determined according to the adjustment time of the probe itself, there is no fixed time, but generally not more than 15 s, if it exceeds 15 s, it means that the function is invalid and needs to be repaired.

Oscilloscope Setting

- Coupling setting: It is recommended to set to DC coupling. If AC coupling is selected, the DC component will be filtered out, and the measured RMS value will be affected.
- Each model of high-frequency current probe has differential ratio, the oscilloscope sets the attenuation ratio = probe current's ratio, and the measured result is correct.
- When the oscilloscope input is set to high impedance (1 MΩ), no special cable is needed. If low impedance (50 Ω) is selected, a BNC coaxial cable with 50 Ω impedance must be used.

Measure Method

- Make sure that the above steps are correct before starting the measurement.
- Make the jaw switch to the bottom, open the jaw, put the measured conductor in the center of the jaw, and the direction of the current flowing through the measured conductor should be consistent with the current indication direction on the clamp shell, lock the jaw, and push up the jaw switch to the top.
- Make sure that the jaws are locked, the control box is connected to the oscilloscope, the oscilloscope selects the corresponding attenuation ratio, and selects a reasonable oscilloscope range to test and observe the waveform. For example, the GCP-0275 has a current transfer ratio of 2 mV/A in a small range, and if the oscilloscope is selected as a voltage range test, the attenuation ratio is adjusted to X 500. If the oscilloscope is selected as a current testing, the attenuation ratio is adjusted to X 1 first, and then to a current sensitivity of 500 A/V.
  (Different models of oscilloscopes may be different, but the common thing is that, for example, the GCP-0275 the vertical scale is adjusted to 2 mV/div at the X 1 voltage level, and the vertical scale is kept unchanged, and the vertical scale will change to 1 A/div when the oscilloscope is set correctly.)

FUNCTION DESCRIPTION

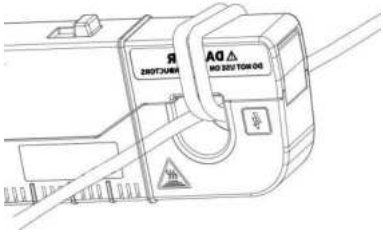
The BNC Control Box Indicator Flashes

Problems	Indicator	What to do
The Jaw switch push, to the top, but the green light is flashing	Green light is flashing	The jaws are not locked. Close the jaws first, then lock it by pushing the lever, and repeat the operation until the green light is normal.
The degaussing/zeroing function is abnormal: the output value fluctuates greatly	The red light flashed for more than 15 s	There is an unstable interference source in the test environment or the degaussing and zeroing function is triggered during the test
The Power indicator flashes and continuous beeping is heard	Power's green light keeps flashing	Stop testing and wait for the temperature to drop /avoid measuring too high current for a long time.

Small Current Measurement

If you are measuring a DC or low frequency AC signal with a very small current, you can increase the measurement sensitivity of your current probe by following these steps:

1. Wind several turns of the conductor under test around the probe as shown. The signal is multiplied by the number of turns around the probe.
2. To obtain the actual current value, divide the displayed amplitude by the number of turns.
3. For example, if a conductor is wrapped around the probe twice and the oscilloscope shows a reading of 60 ADC, the actual current flow is 60 A divided by 2 = 30 ADC.



⚠ (Note)	Winding more turns around the probe increases the insertion impedance and reduces the upper bandwidth limit of the probe.

APPENDIX

Specifications

Model	GCP-0275	GCP-0550	GCP-2525
Bandwidth (-3 dB)	DC to 2 MHz	DC to 5 MHz	DC to 25 MHz
DC + Peak AC MAX. (non-continuous)	750 A (*1)	500 A (*2)	250 A (*3)
Continuous Maximum Current (RMS)	500 Arms (Derating according to frequency shown in Figure 1)	350 Arms (Derating according to frequency shown in Figure 2)	170 Arms (Derating according to frequency shown in Figure 3)
Minimum Current	50 mA	20 mA	20 mA
Rise Time	175 ns or less	70 ns or less	14 ns or less
Conversion Ratio	2 mV/A (X 500) 20 mV/A (X 50)	5 mV/A (X 200) 50 mV/A (X 20)	10 mV/A (X 100) 100 mV/A (X 10)
Accuracy	2 mV/A : 1 % ± 1 mV 20 mV/A : 1 % ± 1 mV	5 mV/A : 1 % ± 1 mV 50 mV/A : 1 % ± 2 mV	10 mV/A : 1 % ± 1 mV 100 mV/A : 1 % ± 5 mV
Current Range (DC + Peak AC)	2 mV/A : 125 A to 750 A 20 mV/A : 50 mA to 150 A	5 mV/A : 50 A to 500 A 50 mV/A : 20 mA to 50 A	10 mV/A : 25 A to 250 A 100 mV/A : 20 mA to 25 A
Noise (RMS)	50 mA	20 mA	20 mA
Weight (Probe)	390 g	380 g	370 g
Size (Probe)	62.28 mm (W) × 151.85 mm (H) × 26.4 mm (D)		
Intended Output Load	1 MΩ		
Clamp Dia.	20 mm		
Power Supply	DC 12 V / 2 A		
Operating Temperature And Humidity	0 ℃ to 50 ℃ / 20 %RH to 75 %RH		
Insulated line Voltage	600 V CAT II / 300 V CAT III		

*1 750 A peak at pulse width of ≤ 30 µs

*2 500 A peak at pulse width of ≤ 30 µs

*3 250 A peak at pulse width of ≤ 30 µs

Figure 1
Derating according to frequency
(For GCP-0275)

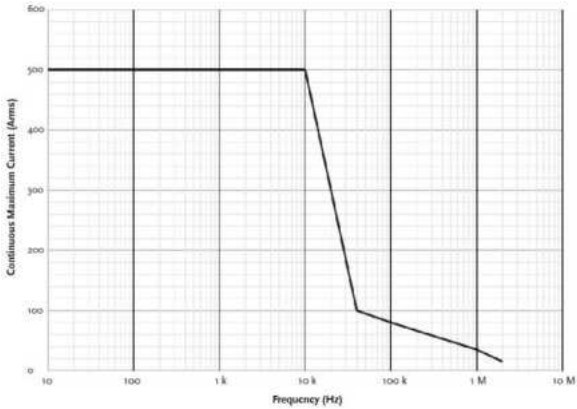


Figure 2
Derating according to frequency
(For GCP-0550)

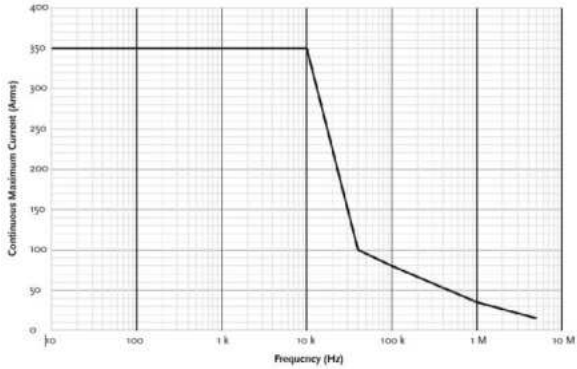
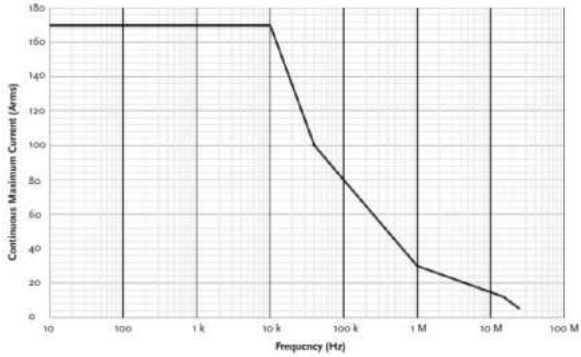


Figure 3
Derating according to frequency
(For GCP-2525)



Declaration Of Conformity

We
GOOD WILL INSTRUMENT CO., LTD.
declare that the below mentioned product
satisfies all the technical relations application to the product within the scope of council:
Directive: EMC; LVD; WEEE; RoHS
The product is in conformity with the following standards or other normative documents:

◎ **EMC**	
EN 61326-1 :	Electrical equipment for measurement, control and laboratory use — EMC requirements

Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4
Current Harmonics EN 61000-3-2 / EN 61000-3-12	Surge Immunity EN 61000-4-5
Voltage Fluctuations EN 61000-3-3 / EN 61000-3-11	Conducted Susceptibility EN 61000-4-6
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8
Radiated Immunity EN 61000-4-3	Voltage Dip/ Interruption EN 61000-4-11 / EN 61000-4-34

◎ **Safety**	
EN 61010-1 :	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
EN 61010-2-032 :	– Part 2-032: - Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement