USER MANUAL

GCM-407

600A True RMS Digital Clamp Meter

- Max AC 600A/750V, DCV 1000V Input
- Max 6000 counts, Max/Min/Data Hold, REL
- Capacitance Measurement
- NCV Non Contact AC Voltage Detect
- Auto Range, Auto Power Off
- LCD Backlight and LED Flashlight

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8x15cm

Contents

I. Overview

GCM-407 is a portable, true 6000 count, auto range clamp ammeter with a simulation bar. Featuring a large scale integrated circuit, Σ/Δ analog-digital converter, full-function on-screen display, full-range overload protection and a unique design has given this specific clamp ammeter superior performance. The clamp ammeter is applicable to the following measurements: AC/DC voltage, AC current, resistance, diode, continuity, capacitance, data-hold, maximum/minimum value measurement, relative value measurement, flashlight function, VFC function, NCV function, under-voltage display and an automatic shutdown function.

The instruction manual includes relevant safety information and warning indicators. Please read them carefully and strictly observe all warnings and notes.

⚠ Warning:
Prior to using the clamp meter, please read the relevant "Safety operation guidelines" carefully.

II. Open-case Inspection

Unpack and take out the instrument. Carefully check that the following accessories are not damaged or missing.
1.An operating instruction manual
2.Test leads
3.Carrying case

If anything is missing or damaged, please contact your GW Instek distributor. If the instrument is not used in an appropriate manner the safety protections could be impaired. The unit can be used for MAINS measurements up to CATII 1000V or CATIII 600V according to IEC 61010-031.

III. Safety Operation Guidelines

Please note the “warning signs” and notes. Warnings indicate a condition or action that may cause a threat to the user or may damage the instrument or the equipment under test.

This meter complies with EN61010-1, 61010-2-032, 61010-2-033, Pollution Degree 2, Overvoltage Category (CATII 1000V, CATIII 600V) and double insulation standards.
Conforms to UL STD 61010-1 and IEC STD 61010-2-032
Certified to CSA STD C22.2 No.61010-1 and 61010-2-032.

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1.
CAT II: Applicable to test and measurement circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.
CAT III: Applicable to the test and measurement circuits connected to the distribution part of the building’s low-voltage MAINS installation.
1. Check the clamp ammeter and test leads before use. Refrain from using the clamp if the clamp is damaged in anyway.

Do not use the clamp meter if the test lead insulation is damaged, if the case insulation is damaged, if the LCD is not functioning or if the clamp meter is not functioning properly.

2. Do not use the clamp meter if the rear cover or battery cover is not in place. Failure to do so may cause electric shock.
3. Keep fingers behind the finger guard. Do not touch any bare wires, conductors, unused input terminals, or circuits that are being measured when the clamp meter is in operation.
4. Make sure the function switch is in the correct position prior to measurement. Do not change ranges when using the clamp meter to prevent damaging the meter.
5. Refrain from applying more than DC1000V/ AC750V to the clamp meter to prevent electric shock to the user and damage to the clamp meter.
6. Be careful when measuring RMS voltages greater than 30DCV or 30ACV as electric shock can occur.
7. Do not measure voltages or current higher than the allowable input values. Set the function range switch to the highest range possible if the magnitude of the measured value is not known. Before measuring resistors, diodes or continuity in a circuit, the circuit should be powered down and all capacitors in the circuit should be completely discharged or the measurement results could be inaccurate.

8. When the LCD display shows the icon, "🪫", it indicates that the battery should be replaced to ensure the measurement accuracy. Take out the battery from the clamp meter when the meter has not been used for a long time.
9. Refrain from altering the internal wiring of the clamp meter to prevent damage to the meter or harm to the operator.
10. Refrain from storing or using the clamp meter in the environments with explosive elements, flammables, high temperatures, high humidity or strong electromagnetic fields.
11. Clean the clamp meter case with a soft cloth and neutral detergents. Do not use abrasive materials or solvents to prevent corroding the case, damage to the instrument and to prevent danger to the operator.

IV. Electrical Symbols

⧈	Dual insulation
⏚	Ground
⚠	Warning prompt
~	AC (Alternating current)
⎓	DC (Direct current)
•))	Buzzer on-off
▶|	Diode
⊣⊢	Capacitance
≂	AC or DC (Alternating current or direct current)
⚠	Danger! High voltage!
CE	Complies with EU standards
	This symbol signifies the product complies with both USA and Canadian requirements

V. External Construction (See Figure 1)

1. Clamp head: A device used to measure AC current and convert current into voltage.
2. Clamp body: Designed to safely protect the operator from touching dangerous areas.
3. Trigger. Press the trigger to open the clamp head. When the trigger is released the clamp head closes.
4. Function dial: Selects the measurement function or range.
5. Function keys: HOLD, MAX/MIN, REL.
6. LCD display area: Displays the measured data and the function icons.
7. Input Terminals: Input terminals for measurements other than AC current measurement.

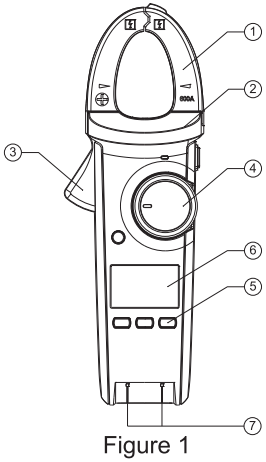

Figure 1

VI. LCD Display (See Figure 2)

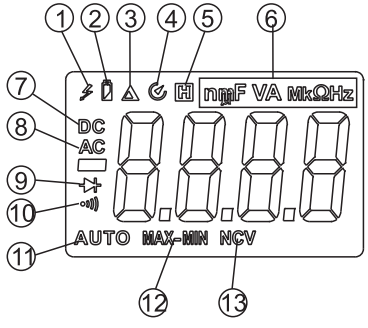

Figure 2

1	High voltage prompt
2	Battery low voltage prompt
3	Relative value prompt
4	Auto shutdown prompt
5	Data hold prompt
6	Unit prompt
7	DC signal prompt
8	AC signal prompt
9	Diode prompt
10	Open/Short or Continuity prompt
11	Auto range prompt
12	Max./Min measurement prompt
13	Non-contact AC voltage sensing prompt

VII. Key Functions

1. SELECT

Tap the SELECT key to select measurement modes.

2. HOLD

Press the HOLD key to enter the data hold measurement mode. Press the key again to exit this mode.

Long-press the HOLD key to turn the backlight on. If the HOLD key is long-pressed again within 15 seconds, the backlight will be turned back off. The backlight will automatically turn off after 15 seconds.

3. MAX/MIN

Pressing the MAX/MIN key will toggle the measurement between the maximum and minimum measurement mode. “MAX” or “MIN” will be displayed on the LCD when in the maximum or minimum measurement mode. This measurement mode is applicable for AC voltage, AC current and resistance measurements.

Long-press the MAX/MIN key to exit from maximum/minimum measurement.

4. REL

Pressing the REL key enters the relative measurement mode. In the relative measurement mode the main display will show the measured value minus the reference value. The reference value is obtained from the current measurement when the REL key is pressed. This function is only applicable for AC voltage, AC current, resistance and capacitance measurement. Press the REL key again to exit the relative measurement mode. The LCD will display “Δ” when in this mode.

5. FLASHLIGHT

Long-press this key to turn the flashlight function on.

Press the this key to turn the flashlight function off.

VIII Technical Indicators

1. General Specifications

Liquid crystal display: Displays 6000 counts maximum.

Polarity display: Automatic positive and negative polarity display.

Overload display: “OL”, “-OL”.

Low voltage display: “Figure 2” indicates that the battery voltage is lower than the working voltage, indicating that the battery should be replaced.

Sampling rate: Approximately 3 samples/sec.

Sensor type: Coil induction.

Test Position Error:
An additional reading error of ±1.0% may occur when the measured wired is not clamped into the center of the clamp head.
Impact Resistance Strength:
1m fall impact.
Maximum Clamp Head Diameter:
30mm
Maximum Diameter of Conductor Allowed:
30mm
Electromagnetic Field Impact:
Using this meter near electromagnetic fields may result in an unstable display or inaccurate readings.
Power:
3 AAA 1.5V zinc manganese batteries.

Dimensions:
228mmx77mmx41mm;
Weight:
About 265g (inclusive of the battery).
2. Environment Constraints:
Working environment: Indoor
Altitude: 2000m
Safety codes: IEC61010-1; IEC61010-2-032; CAT II 1000V, CAT III 600V;
Pollution grade: 2;
Operating humidity and temperature: 0ºC ~ 30ºC (not greater than 80%RH), 30ºC ~ 40ºC (not greater than 75%RH), 40ºC ~ 50ºC (not greater than 45%RH).
Storage humidity and temperature: -20ºC ~ 60ºC (not greater than 80% RH).

3. Electrical Specifications
Accuracy: ±(% of reading + digits)
Calibration interval: 1 year.
Ambient temperature: 23ºC±5ºC.
Ambient humidity: ≤80% RH
Temperature coefficient: 0.1x(accuracy)/ºC

1. AC Current ($\tilde{A}$)

Range	Resolution	Accuracy	Overload protection
6.000A	0.001A	±(2.5%+30)	600A
60.00A	0.01A	±(2.5%+5)	
600.0A	0.1A		

Display: True RMS AC current: applicable for ranges from 10% to 100%.
Frequency response: 50Hz ~ 60Hz;
The measurement accuracy of non-sinusoidal current waveforms should be 5% higher.

2. AC Voltage ($\tilde{V}$)

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	±(1.2%+5)	1000V DC 750V AC
60.00V	0.01V		
600.0V	0.1V		
750V	1V	±(1.5%+5)	

Display: True RMS AC voltage; applicable for ranges from 10% to 100%.
Voltage: Input impedance ≥ 10MΩ;
Frequency response: 40~400Hz

3. DC Voltage (⎓V)

Range	Resolution	Accuracy	Overload protection
600.0mV	0. 1mV	±(1.0%+8)	1000V DC 750V AC
6.000V	0.001V	±(0.8%+1)	
60.00V	0.01V	±(0.8%+3)	
600.0V	0.1V		
1000V	1V	±(1.0%+3)	

Input impedance ≥10MΩ

4. Resistance (Ω)

Range	Resolution	Accuracy	Overload protection
600.0Ω	0.1Ω	±(1.2%+2)	1000V DC 750V AC
6.000kΩ	0.001kΩ	±(1.0%+2)	
60.00kΩ	0.01kΩ		
600.0kΩ	0.1kΩ		
6.000MΩ	0.001MΩ	±(1.2%+2)	
60.00MΩ	0.01MΩ	±(1.5%+5)	

5. Continuity Test ( ))))

Range	Resolution	Accuracy	Overload protection
600. 0Ω	0. 1Ω	Buzzer beeps when <30Ω	1000V DC 750V AC
		Open-circuit voltage is about 1.2V	

6. Diode Test (▶|-)

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	Open-circuit voltage is approx. 3.3V, measurable PN forward bias ≤ 3V. Silicon PN typical forward bias is approx. 0.5~0.8V.	1000V DC 750V AC

7. Capacitance (⊣⊢)

Range	Resolution	Accuracy	Overload protection
99.99nF	0.01nF	±(4.0%+25)	1000V DC 750V AC
999.9nF	0.1nF	±(4.0%+5)	
9.999uF	0.001uF		
99.99uF	0.01uF		
999.9uF	0.1uF		
9.999mF	0.001mF	±(10%)	
59.99mF	0.01mF	For reference only	

8. NCV

Range	Accuracy
NCV	⩾100Vrms；⩽10mm (LED/Buzzer indication)

IX. Measurement Operation Instructions

1. AC Current Measurement (see Figure 3)

1) Set the switch to AC current mode and press the trigger to open the clamp head. Position the conductor in the clamp head and slowly release the trigger until the clamp head is completely closed. Be sure the conductor is clamped to the center of the clamp head, otherwise additional errors may be introducted. Only one current conductor should be measured at a time. Measuring two or more current conductors may result in erroneous measurement readings.
2) Read the AC value directly from the display.

⚠Note:

- Be sure the conductor to be measured is clamped at the center of the clamp head, if not, an additional reading error of ±1.0% may result.

- The true RMS AC current meaurement accuracy is based on sinusoidual waveforms. For non-sinusoidal waveforms, adjust the accuracy as follows:
  Crest factor 1.4 ~ 2.0: additional ±1.0%
  Crest factor 2.0 ~ 2.5: additional ±2.5%
  Crest factor 2.5 ~ 3.0: additional ±4.0%

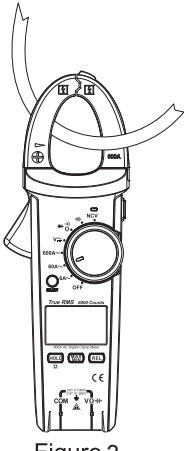

Figure 3

2. AC Voltage Measurement (see Figure 4)

1) Insert the red test lead in the “V” input jack and the black test lead in the “COM” input jack.
2) Rotate the function dial to the AC voltage measurement function and connect the test leads in parallel to the load to be measured.
3) Read the AC voltage from the display.

⚠Note:

- Do not input voltages greater than AC 750V. Higher voltages may damage the meter.
- Be aware that higher voltages can cause electric shock.
- After all measurement operations are completed, disconnect the test leads from the EUT.
- When the measured voltage is greater than the safety voltage of 30VAC, the LCD will display a high voltage warning prompt, “ϟ”. When voltages greater than the AC 750V range are input, the meter warning prompt, “ϟ”, will flash and the meter will automatically buzz intermittently.

- The true RMS AC voltage meaurement accuracy is based on sinusoidual waveforms. For non-sinusoidal waveforms, adjust the accuracy as follows:
  Crest factor 1.4 ~ 2.0: additional ±1.0%
  Crest factor 2.0 ~ 2.5: additional ±2.5%
  Crest factor 2.5 ~ 3.0: additional ±4.0%

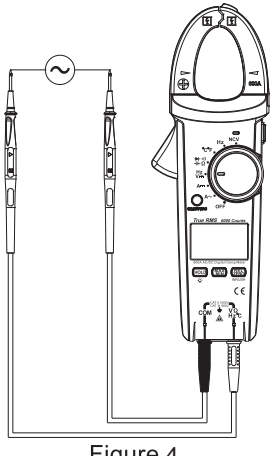

Figure 4

3. DC Voltage Measurement (See Figure 5)

1) Insert the red test lead into the “V” input jack and the black test lead into the “COM” jack.
2) Rotate the function dial to the DC voltage measurement mode and connect the test leads in parallel to the load to be measured.
3) Directly read the measured voltage from the display.

⚠Note:

- Do not input voltages greater than 1000V DC. Measuring voltage greater than 1000V DC may damage the meter.
- Be aware that higher voltages can cause electric shock.
- After all measurement operations are completed, disconnect the test leads from the EUT.
- When the measured voltage is greater than the safety voltage of 30VDC, the LCD will display a high voltage warning prompt, “ϟ”. When voltages greater than DC 1000V range are input, the meter warning prompt, “ϟ”, will flash and the meter will automatically buzz intermittently.

4. Resistance Measurement (See Figure 6)

1) Insert the red test lead into the “Ω” input jack and the black test lead into the “COM” jack.
2) Rotate the function dial to the “Ω” measurement mode. Press the SELECT key to select resistance measurement, “Ω”, and connect the test leads in parallel to the resistance to be measured.
3) Directly read the measured resistance from the display.

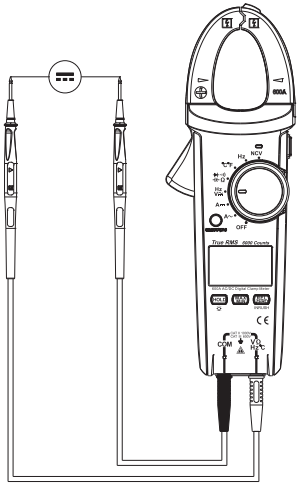

Figure 5

⚠Note:

- If the open circuit resistance or the resistance being measured exceeds the maximum range of the meter, the display will show “OL”.
- When measuring at the 600mV range, the REL function (relative measurement function) must be used to obtain a precise measurement reading; To use the REL function, short the test leads and press the REL key to obtain a reference value. The displayed resistance value will now be equal to the measured resistance minus the reference value.

- Before measuring in-circuit resistors, turn off the power from the circuit and discharge any capacitors for best measurement results.

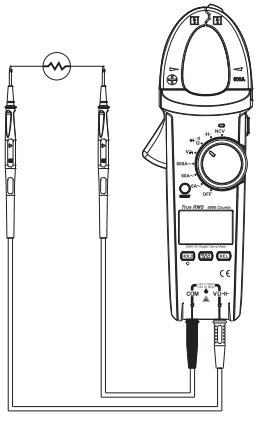

Figure 6

5. Continuity Test (see Figure 7)

1) Insert the red test lead into the "Ω" input jack and the black test lead in the "COM" input jack.
2) Rotate the function selection switch to the "•))" measurement mode. Press the SELECT key to select "•))" continuity measurement. Connect the test leads in parallel with the EUT. When the measured resistance is <30Ω, the circuit is judged as conductive and the buzzer will sound.
3) Read the resistance value from the display.

⚠Note:

- When checking in-circuit open/short conditions make sure power is turned off and all capacitors are discharged before measurement.
- With respect to the circuit continuity measurement, the open circuit voltage is approximately -3.5V with a 600Ω range.
- Do not input voltages higher than 30VDC or 30VAC or personal injury may occur.
- After completing all measurement operations, disconnect the test leads from the measured circuit.

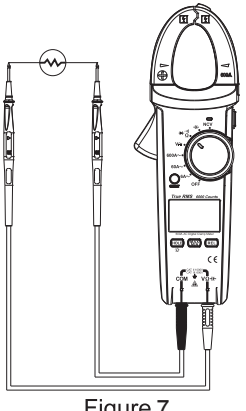

Figure 7

6. Diode Measurement (See Figure 8)

1) Insert the red test lead into the "Ω" input jack and the black test lead into the "COM" input jack. The polarity of the red and black test lead is "+" and "-', respectively.
2) Rotate the function dial to the "⊣◀" measurement mode. Press SELECT to select the diode measurement "⊣◀". Read the approximate forward bias voltage drop accross the PN junction. For silicon PN junction diodes, the voltage drop is typically 500~800mV.

⚠Note:

- "OL" will be displayed when the measured diode is open-circuited or the polarity of the diode is inverted (reverse biased).
- Before measuring diodes, the power to the circuits should be turned off and all capacitors should be discharged to ensure measurement accuracy.
- The open circuit test voltage for the diode measurement is approximately 3.5V.
- Do not input voltages higher than 30VDC or 30VAC or personal injury may result.
- After completing all measurement operations, disconnect the test leads from the measured circuit.

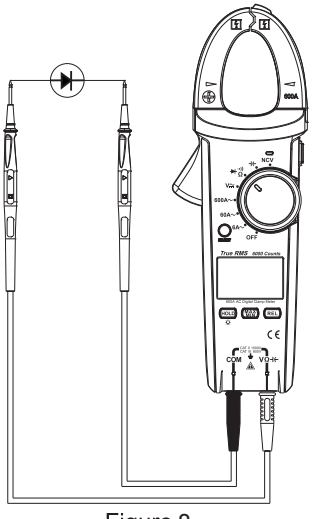

Figure 8

7. Capacitance Measurement (See Figure 9)

1) Insert the red test lead into the "⊣⊢" input jack and the black test lead into the "COM" input jack. Capacitance should be measured using the REL function mode.
2) Rotate the function dial to the "⊣⊢" measurement mode to select capacitance. Connect the test leads in parallel with the two terminals of the capacitor.
3) Read the measured capacitance from the display. Use the shortest test leads possible to reduce the impact caused by distributed capacitance.

⚠ Note:

- If the measured capacitance is shorted or the capacitance exceeds the maximum range of the meter, the display will show “OL”. It takes a longer time to correctly measure capacitances over 600uF.
- To ensure measurement accuracy, discharge all residual charge from the capacitor under test before connecting the capacitor to the meter. This is particulary important for capactors with high voltages to prevent damage to the meter or to prevent personal injury.
- After completing measurement operations, disconnect the test leads from the EUT.

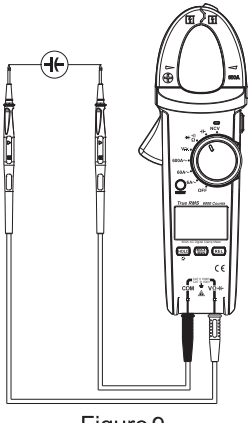

Figure 9

8. Non-contact AC Voltage Sensing NCV (See Figure 10)

In order to sense whether there is AC voltage or an electromagnetic field present, place the front -end of the clamp meter near the conductor to be tested (distance <10mm). When the electric field voltage is ≥100VAC, the display will indicate up to four levels, “-”, “--”, “---”, “----”, based on the sensed voltage.

The buzzer will beep continuosly and the NCV LED will flash red.

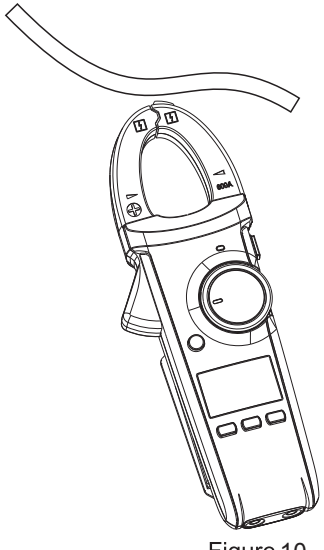

Figure 10

9. Power (OFF)

Turns the instrument off.

10. Automatic Shutdown Function

If the function dial is not turned or a key is not pressed on the clamp within a 15 minute window, the display will turn off and the clamp will enter a low power state. To wake the meter up, press any key.

Press the SELECT key to turn on the unit with the automatic shutdown disabled.

X. Maintenance and Upkeep (See Figure 11)

Warning: To prevent electric shock, keep the protective caps on the test leads when not in use.

1. General Maintenance

a. The clamp meter should be maintained by qualified personnel or return the unit to the GW Instek service center.

b. Clean the outer case with a soft cloth. Do not use cleaning agents containing abrasive materials or solvents.

2. Installation or Replacement of Batteries

3 AAA 1.5V batteries power the product. Please install or replace batteries as follows:

a. Shut down the clamp meter and remove the test leads.

b. Place the unit face down and unscrew the screw from the battery cover. Remove battery cover and replace the batteries. Take note of the polarity indicated in the battery compartment.

c. Only install batteries of the correct type and rating.

d. After installing the new batteries, re-install the battery cover.

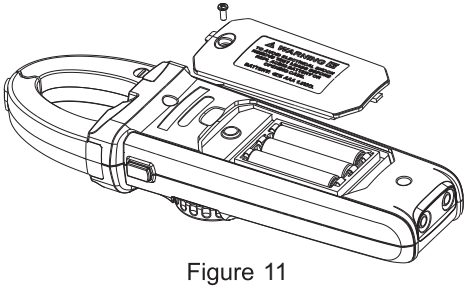

Figure 11

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