# Digital Clamp Meter

Users Manual

Read this manual thoroughly before use

465/465A

# WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as battery. If the defect has been caused by a misuse or abnormal operating conditions, the repair will be billed at a nominal cost.

# SAFETY INFORMATION

This meter has been designed according to IEC 61010 concerning electronic measuring instruments with a measurement category ( CAT III 600V ) and Pollution degree 2.

## ⚠ Warning

**To avoid possible electric shock or personal injury, follow these guidelines:**

- Do not use the meter if it is damaged. Before you use

the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.

- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter where explosive gas, vapor, or dust is present.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When servicing the meter, use only specified replacement parts.
- Use caution when working with voltage above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Connect the common test lead before you connect the live test lead. When you disconnect test leads,

disconnect the live test lead first.

- Remove the test leads from the meter and the clamp from the clamped object before you open the battery cover or the case.
- Do not operate the meter with the battery cover or portions of the case removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator (  ) appears.
- To avoid electric shock, do not touch any naked conductor with hand or skin; and do not ground yourself while using the meter.
- Do not use the supplied test leads with other equipments.
- Do not use the meter if the meter, a test lead or your hand is wet.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Do not use the meter in a manner not specified by this manual or the safety features provided by the meter may be impaired.
- Remaining endangerment:
  When an input terminal is connected to dangerous

live potential, it is to be noted that this potential can occur at all other terminals!

- **CAT III -** Measurement Category III is for measurements performed in the building installation. Examples are measurements on distribution boards, circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to the fixed installation.
  Do not use the meter for measurements within Measurement Categories IV.

## Caution

**To avoid possible damage to the meter or to the equipment under test, follow these guidelines:**

- Disconnect circuit power and discharge all capacitors thoroughly before testing resistance, temperature, diode or continuity.
- Use the proper function, range and terminals for your measurements.
- Before turning the rotary switch to change functions, remove the test leads and the clamp jaws from the

circuit under test.

## Electrical symbols

~ Alternating Current

⎓ Direct Current

⚠ Caution, risk of danger, refer to the operating manual before use.

⚠ Caution, risk of electric shock.

⏚ Earth (ground) Terminal

CE Conforms to European Union directives

⧈ The equipment is protected throughout by double insulation or reinforced insulation.

⚡ Application around and removal from hazardous live conductors is permitted.

# INTRODUCTION

This meter is a compact 3 1/2-digit autorange digital clamp meter designed to measure DC and AC voltage, AC current, resistance, diode, continuity and temperature. It is easy to operate and is an ideal test tool.

# GENERAL SPECIFICATION

**Display:** 3 1/2 -digit LCD, with a max. reading of 1999

**Negative Polarity Indication:** Negative sign " – " shown on the display automatically

**Automatic zeroing function**

**Sampling Rate:** About 3 times/sec

**Error Caused By Improper Position:** 1% of reading

( **Note:** The conductor should be positioned in the center of the jaws to avoid this error. )

**Sensor:** Clamp-shape transformer for AC current measurements

**Jaw Opening Capability:** 37mm ( approx. )

**Max. Measurable Conductor**: Ø37mm ( approx. )

**Low Battery Indication:** "  " shown on the display

**Battery:** 1.5V battery, AAA or equivalent, 2 pieces

**IP Degree:** IP20

**Operating Environment:** Temperature: 0°C to 40°C
Relative Humidity: < 75%

**Storage Environment:** Temperature: -20°C to 60°C
Relative Humidity: < 85%

**Size:** 230mm × 79mm × 32mm

**Weight:** About 220g ( including batteries )

# SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C - 28°C, with relative humidity < 75%.

Accuracy specifications take the form of:

**± ([% of Reading]+[number of Least Significant Digits])**

## AC Voltage

| Range | Resolution | Accuracy | Overrange Indication |
|---|---|---|---|
| 2.000V | 1mV | ± (1.2% + 5) | "OL" shown on the display |
| 20.00V | 10mV | | |
| 200.0V | 100mV | | |
| 600V | 1V | ± (1.5% + 5) | ——— [1] |

**Input Impedance:** 10MΩ
**Max. Allowable Input Voltage:** 600V
**Frequency Response:** 40Hz - 400Hz
**Display:** Sine wave rms, average response

[1] If the voltage being measured is > 600V, the display may show the value of the voltage; but the measurement is dangerous.

## DC Voltage

| Range | Resolution | Accuracy | Overrange Indication |
|---|---|---|---|
| 200.0mV | 0.1mV | ± (0.8% + 3) | "OL" shown on the display |
| 2.000V | 1mV | ± (0.8% + 1) | |
| 20.00V | 10mV | | |
| 200.0V | 100mV | | |
| 600V | 1V | ± (1% + 3) | ——— [1] |

**Input Impedance:** 10MΩ.

**Max. Allowable Input Voltage:** 600V

[1] If the voltage being measured is > 600V, the display may show the value of the voltage; but the measurement is dangerous.

## AC Current

| Range | Reso-lution | Accuracy | Overrange Indication |
|---|---|---|---|
| 2.000A | 0.001A | ⩽ 0.4A: ± (5% + 20) | "OL" shown on the display |
| | | > 0.4A: ± (4% + 10) | |
| 20.00A | 0.01A | ⩽ 4A: ± (4% + 10) | |
| | | > 4A: ± (3% + 8) | |
| 200.0A | 0.1A | ± (2.5% + 5) | |
| 600A | 1A | | ——— [1] |

**Display:** Sine wave rms, average response

**Frequency Range:** 50 to 60Hz

**Max. Allowable Input Current:** 600A

[1] If the current being measured is > 600A, the display may show the value of the current; but the measurement is dangerous and the meter may be damaged, or the measurement error may be large.

## Resistance

| Range | Resolution | Accuracy | Overrange Indication |
|---|---|---|---|
| 200.0Ω | 100mΩ | ± (1.2% + 2) | "OL" shown on the display |
| 2.000kΩ | 1Ω | ± (1% + 2) | |
| 20.00kΩ | 10Ω | | |
| 200.0kΩ | 100Ω | | |
| 2.000MΩ | 1kΩ | ± (1.2% + 2) | |
| 20.00MΩ | 10kΩ | ± (1.5% + 2) | |

**Overload Protection:** 250V rms

## Continuity Test

| Range | Resolution | Description |
|---|---|---|
| •))) | 100mΩ | If the resistance is less than about 50Ω, the buzzer will sound.<br>If the resistance is between 50Ω and 120Ω, the buzzer may or may not sound.<br>If the resistance is more than 120Ω, the buzzer will not sound. |

**Overload Protection:** 250V rms

## Diode Test

| Range | Resolution | Description |
|---|---|---|
|  | 1mV | The approx. forward voltage drop of the diode will be shown on the display.<br>Open Circuit Voltage: About 1.48V. |

**Overload Protection:** 250V rms

## Temperature

| Range | Resolution | Accuracy | Overrange Indication |
|---|---|---|---|
| -20°C ~ 1000°C | 1°C | -20°C ~ 0°C: ± (4% + 5) | ——— [1] |
| | | 0°C ~ 400°C: ± (1% + 5) | |
| | | 400°C ~ 1000°C: ± (2% + 10) | |
| -4°F ~ 1832°F | 1°F | -4°F ~ 32°F: ± (4% + 9) | |
| | | 32°F ~ 752°F: ± (1% + 9) | |
| | | 752°F ~ 1832°F: ± (2% + 20) | |

[1] If the temperature being measured is out of the range of -20°C to 1000°C or -4°F to 1832°F, the display may show a reading; but the measurement error may be large or the thermocouple may be damaged.

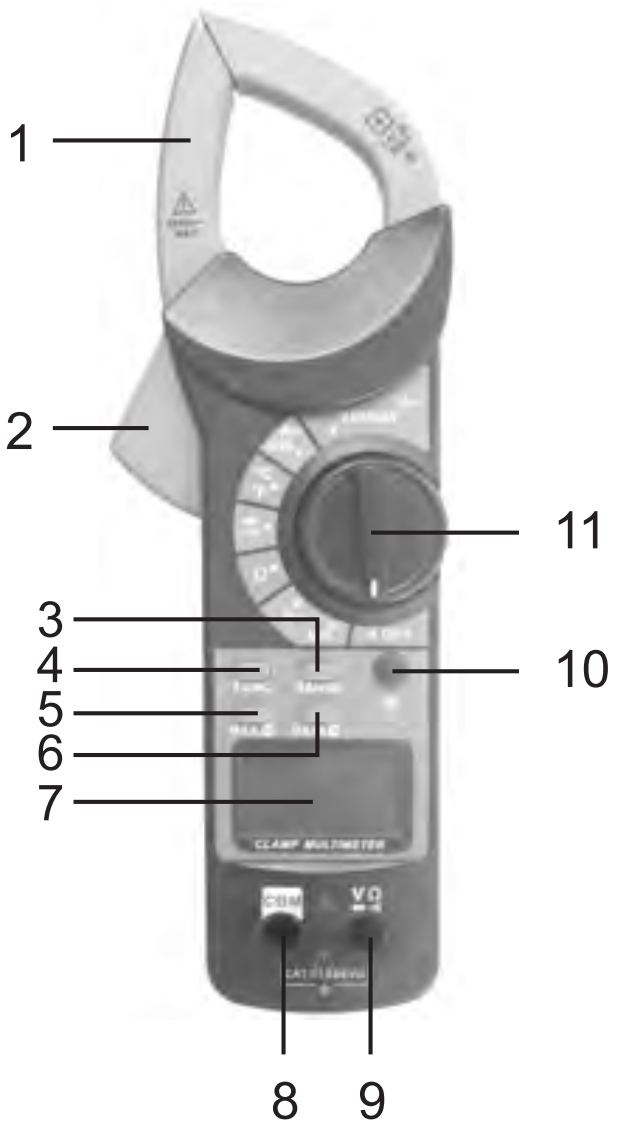
**Overload Protection:** 250V rms

**Note:**

1. Use K type thermocouple.

2. Accuracy does not include error of the thermocouple probe.
3. Accuracy specification assumes ambient temperature is stable to ±1°C. For ambient temperature changes of ±5°C, rated accuracy applies after 1 hour.

# FRONT PANEL



1. **Jaws**

   Used to clamp the conductor for ac current measurement. To get a more accurate reading, the conductor should be positioned in the center of the jaws.

2. **Trigger**

   Used to open/close the jaws.

3. **" RANGE " Button**

   Used to switch the meter between autorange mode and manual range mode as well as to select desired manual range.

4. **" FUNC. " Button**

   In temperature measurement function, pressing this " **FUNC.** " button switches between **°C** and **°F**.
   In diode or continuity test function, pressing this button switches between diode and continuity test function.

5. **" MAX. H " Button**

   Used to enter/exit MAX recording mode.

6. **" DATA H " Button**

   Used to enter/exit Data Hold mode.

7. **Display**

   3 1/2-digit LCD, with a max. reading of 1999 and

measurement unit indication.

**8. " COM " Terminal**

This terminal is a plug-in connector for the black test lead for all measurements except temperature and ac current measurements.

It is also a plug-in connector for the negative plug of K type thermocouple for temperature measurements.

**9. " VΩ→+•)) " Terminal**

This terminal is a plug-in connector for the red test lead for all measurements except temperature and ac current measurements.

It is also a plug-in connector for the positive plug of K type thermocouple for temperature measurements.

**10. " ☼ " Button**

To turn on or off the backlight, press and hold down this " ☼ " button for about 2 secs.

The backlight will turn off automatically about 15 secs later after it is turned on.

**11. Function/Range switch**

Used to select desired function and/or range as well as to turn on or off the meter.

To save battery power, set this switch to the " **OFF** " position when the meter is not in use.

## Introduction for the Built-in Buzzer:

With the rotary switch in any switch position except the **2/20A** position, the buzzer will sound a beep if pressing a button is effective. If the pressing is ineffective, the buzzer will not sound.

The buzzer will sound 5 short beeps about 1 minute before the meter turns off automatically and will sound a long beep before the meter turns off automatically.

## Effectiveness of Pressing a Button

With the rotary switch in a certain range position, not all the buttons are enabled. For more detailed information, see the following table.

| Rotary Switch Position | Buttons | | | |
|---|---|---|---|---|
| | RANGE | FUNC. | MAX. H | DATA H |
| V⎓ | ✓ | | ✓ | ✓ |
| V~ | ✓ | | ✓ | ✓ |
| Ω | ✓ | | | ✓ |
| ⊣◀ •)) | | ✓ | | ✓ |
| °C/°F | | ✓ | | ✓ |
| 2/20A | ✓ | | ✓ | ✓ |
| 200/600A | ✓ | | ✓ | ✓ |

" ✓ " represents " Enabled ".

# OPERATING INSTRUCTION

## Data Hold Mode

Press the " **DATA H** " button to hold the present reading on the display, " DATAH " will appear on the display as an indication.

To exit Data Hold mode, just press this button again. " DATAH " disappears.

## Manual Ranging and Autoranging

The meter defaults to autorange mode in functions which have both autorange mode and manual range mode. When the meter is in autorange mode, " **AUTO** " is displayed.

1. Press the " **RANGE** " button to enter manual range mode, the symbol " **AUTO** " will disappear.
   Each subsequent press of the " **RANGE** " button increases the range. After the highest range, the

meter wraps to the lowest range.

2. To exit manual range mode, press and hold down the " **RANGE** " button for about 2 sec. The meter returns to autorange mode and the symbol " **AUTO** " appears.

**Note:**
The " **RANGE** " button is enabled only in dc voltage, ac voltage, ac current, and resistance measurement functions.

## MAX Recording Mode

In DC voltage, AC voltage and AC current measurement functions, MAX recording mode is available. To use MAX recording mode:

Press the " **MAX.H** " button once. The meter enters MAX recording mode and " MAX H " appears on the display as an indication. In this mode, the meter detects maximum input value and displays and holds the maximum value on the display. When input goes above the maximum value, the meter displays and holds the new value on the display.

To exit MAX recording mode, just press this " **MAX.H** " button again or turn the rotary switch.

## Measuring DC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩ →+ •))** " terminal.
2. Set the function switch to V⎓ position.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display. The polarity of the red test lead connection will be indicated as well.

**Note:**

To avoid electric shock to you or damages to the meter, do not apply a voltage higher than 600V between the terminals.

## Measuring AC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩ →+ •))** " terminal.
2. Set the function switch to V~ position.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display.

**Note:**

To avoid electric shock to you or damages to the meter,

do not apply a voltage higher than 600V between the terminals.

## Measuring AC Current

1. Set the function switch to desired AC current range position.
2. Press the trigger and clamp the jaws around the conductor to be tested. Make sure that the jaws are perfectly closed.

   **Note:**

   - Each time only one conductor should be clamped. If you clamp two or more conductors, the reading will be wrong.
   - The conductor should be positioned in the center of the jaws in order to improve measurement accuracy.
   - To avoid electric shock, don't touch any naked conductor with hand or skin.
3. Read the reading on the display.

**Note:**

Remove all test leads from the meter before ac current measurement.

## Measuring Resistance

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩ →+•))** " terminal.
2. Set the function switch to Ω position.
3. Connect the test leads across the object to be tested.
4. Read the reading on the display.

**Note:**

1. For measurements > 1MΩ, the meter may take a few seconds to stabilize reading. This is normal for high resistance measurements.
2. When the input is not connected, i.e. at open circuit, " OL " will be shown on the display as an overrange indication.
3. Before measurement, disconnect all power to the circuit to be tested and discharge all capacitors thoroughly.

## Diode Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩ →+•))** " terminal. ( **Note:** The polarity of the red lead is positive " + ". )

2. Set the function switch to position. Then press the " **FUNC.** " button until the symbol " " appears on the display.
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode.
4. The display shows the approximate forward voltage drop of the diode.

## Continuity Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩ** " terminal.
2. Set the function switch to position. Then press the " **FUNC.** " button until " " appears on the display.
3. Connect the test leads across the circuit to be tested.
4. If the resistance is less than about 50Ω, the built-in buzzer will sound.

**Note:**

Before test, disconnect all power to the circuit to be tested and discharge all capacitors thoroughly.

# Measuring Temperature

**NOTE**

**To avoid possible damage to the meter or other equipment, remember that while the meter is rated for -20°C to +1000°C and -4°F to 1832°F, the K Type Thermocouple provided with the meter is rated to 250°C. For temperatures out of that range, use a higher rated thermocouple.**

**The K Type Thermocouple provided with the meter is a present, it is not professional and can only be used for non-critical reference measurements. For accurate measurements, use a professional thermocouple.**

1. Connect the negative " **−** " plug of the K type thermocouple to the " **COM** " terminal, and the positive " **+** " plug of the K type thermocouple to the " **VΩ →+•))** " terminal.
2. Set the function switch to **°C/°F** position. The press the " **FUNC.** " to select Fahrenheit or Celsius temperature measurement, the display will show the corresponding unit.
3. Connect the sensing end of the thermocouple to the object to be tested.
4. Wait until the reading is stable, then read the display.

## Auto Power off

If you have not operated the meter for about 15 minutes, the meter will turn off automatically and go into Sleep mode. To arouse the meter from sleep, turn the rotary switch or press a button.

If you press the " **DATA H** " button to arouse the meter from sleep, the automatic power-off feature will be disabled.

# MAINTENANCE

## Warning

Except replacing battery, never attempt to repair or service the meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

Store the meter in a dry place when not in use. Don't store it in an environment with intense electromagnetic field.

## General Maintenance

Periodically wipe the case with damp cloth and a little mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings. Clean the terminals as follows:

1. Set the rotary switch to **OFF** position and remove all test leads from the meter.
2. Shake out any dirt which may exist in the terminals.
3. Soak a new swab with alcohol.
4. Work the swab around in each terminal.

If the meter fails, check and replace ( as needed ) the batteries, and/or review this manual to verify proper use of the meter.

## Battery Replacement

### Warning

**To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator ( ) appears.**

**Before opening the battery cover or the case, turn off the meter and remove all test leads from the meter.**

When the symbol "  " appears on the display, the batteries are low and must be replaced immediately.

To replace the batteries, remove the screw on the battery cover and remove the battery cover. Replace the exhausted batteries with new ones of the same type ( 1.5V battery, AAA or equivalent ), make sure that the polarity connections are correct. Reinstall the battery cover and the screw.

# ACCESSORIES

**Manual:** 1 piece
**Test Lead:** 1 pair

# PRESENT

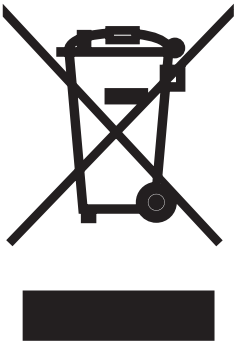
**K Type Thermocouple:** 1 piece

# NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the meter for any special application.

## DISPOSAL OF THIS ARTICLE

Dear Customer,
If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.



Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.