

# 221D Mini Digital Clamp Meter

## User's Guide

This range clamp meter has been designed according to IEC-61010-2-032 concerning electronic measuring instruments with 600V CAT III and pollution 2.

The model HK221C clamp meter measures AC/DC Voltage, AC Current, Resistance, Capacitance, Frequency, Diode and Continuity Test, Temperature, and so on. It features a rugged design for heavy duty use. Proper use and care of this meter will provide many years of reliable service.

### INTRODUCTION


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To fully utilize this clamp meter, please keep this manual for reference carefully.




### SAFETY

⚠ This symbol indicates that the operator must refer to an explanation in the user's guide to avoid personal injury or damage to the meter.

- Before the measurements, the meter should be preheated to 30 seconds
- Inspect the condition of the test leads and the meter itself for any damage before operating the meter
- The meter can be only be used with the equipped test leads to meet the requirements of safety standards. If the test leads need to be replaced, it must be the same electrical specification of the original test leads.
- If the meter is operated in a noisy conditions, the readings of meter might be unstable, or even with the large errors due to interference.
- Always remove the test leads before replacing the battery or fuses.
- Use great care when making measurements if the voltages are greater 60VDC or 36V AC RMS, these voltages are considered a shock hazard.
- Always discharge capacitors and remove power from the device under test before performing Diode, Resistance or Continuity tests.
- To avoid damages to the meter, do not exceed the maximum limits of the input values shown in the specification.
- In case the device is going to be unused for an extended period of time, remove the batteries to prevent them from draining.
- When  icon appears at the display, please change the new battery to avoid wrong readings.

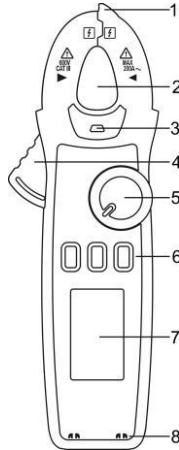
### Safety Symbols

⚠ This symbol indicates the user must refer to the manual for further information.

-  Earth ground
-  Double insulation
-  Dangerous voltage

### Controls and Jacks

1. NCV Sensor
2. Current clamp
3. NCV LED indicator
4. Clamp opening trigger
5. Rotary switch
6. Function buttons
7. LCD display
8. Input jacks




### Function Buttons Description

#### H - Data Hold Button

Slightly press this button to hold the reading in LCD display, push one more time to exit data hold function

#### SELECT - Function Selection Button

Press this button to shift functions between °C/F, /Ω/F, NCV/Live, DCV/ACV/Hz and so on.

#### - Backlight Button

Press the button for approx.3sec.to activate the LCD backlight, hold again to exit LCD backlight function

#### MAX/MIN Button

Shift button between max. value and min. value.


#### REL Button

Hold and press this button to activate the relative value measurement, the meter displayed value to be regarded as the reference value, after that the meter displayed value is the actual measured value to subtract this reference value. Hold this button again to exit the relative measurement function.

### TECHNICAL SPECIFICATIONS

#### General Specifications:

- Operating temperature:0~40 °C (<80%RH).
- Storage temperature:-10~60 °C (<70%RH, exclude batteries)
- Maximum input voltage between input socket and the earth:600VRMS.

- The measuring principle: double integral A/D conversion
- The sampling rate: about 2 times/sec
- Display: Max. reading 4000  
Based on measuring function to show function icons into the LCD automatically
- Range selection: auto ranging switch
- Over range indication: "OL"
- Input polarity: display "-"
- Low battery indication: Once the battery lowers the normal working voltage,  will be displayed in LCD
- Battery: 1.5V AAA\*2
- Max jaw opening capacity: φ19mm
- The maximum measured conductor size:φ19mm
- Dimension: 178(L)×60(W)×32(H)mm
- Weight: about 165g (include batteries)
- Accessory:  
User Manual – 1pc  
Test Leads – 1set  
Temperature probe – 1pc

### Measurement Specifications

Accuracy: ± (%readings + digit) , warranty period: 12 months  
Environment temperature: 18°C~28°C, humidity: ≤80%

\* Under AC current measurement, put the conductor under test in the middle of clamp for getting the accurate value.

#### AC Current (ACA)

Range	Resolution	Accuracy
4.000A	1mA	±(2.5%+10d)
40.00A	0.01A	
400.0A	0.1A	

Frequency response: TRMS 50Hz-60Hz

#### DC Voltage (DCV)

Range	Resolution	Accuracy
400.0mV	0.1mV	±(0.5%+3d)
4.000V	0.001V	
40.00V	0.01V	
400.0V	0.1V	
600V	1V	

Input impedance: 10MΩ

Max.input voltage:600V DC or 600V AC RMS.

#### AC Voltage (ACV)

Range	Resolution	Accuracy
4.000V	0.001V	±(1.0%+5d)
40.00V	0.01V	
400.0V	0.1V	
600V	1V	

Input impedance: 10MΩ

Frequency response: TRMS 40~1000Hz.



Max.input voltage: 600V DC 或 600V AC RMS.

#### Resistance (Ω)

Range	Resolution	Accuracy
400.0Ω	0.1Ω	±(1.0%+10d)
4.000kΩ	0.001KΩ	
40.00kΩ	0.01KΩ	
400.0kΩ	0.1KΩ	
4.000MΩ	0.001MΩ	±(0.8%+5d)
40.00MΩ	0.01MΩ	
40.00MΩ	0.01MΩ	±(2.0%+10d)

Overload protection: 250VDC or AC RMS

#### Diode and Continuity (/Ω))

Range	Resolution	Description
	0.001V	Display approximate forward voltage of diode, reverse shows "1" or "OL"
	0.1Ω	Built-in buzzer will be sounded if resistance is less than 70Ω±30Ω

Overload protection: 250VDC or AC RMS

#### Temperature (TEMP)

Range	-20°C ~ 1000°C	
Resolution	1°C	
Accuracy	-20°C~0°C	±( 5% + 4digit)
	0°C~400°C	±( 2% + 3digit)
	400°C~1000°C	±( 3% + 3digit)
Range	-4°F~1832°F	
Resolution	1°F	
Accuracy	-4°F~50°F	±(5% + 4digit)
	50°F~750°F	±( 2% + 3digit)
	750°F~1832°F	±( 3% + 3digit)

Overload protection: 250VDC or AC RMS

#### Frequency (Hz)

Range	Resolution	Accuracy
4Hz~10MHz	0.001Hz~0.01MHz	±(0.5%+2d)

Input amplitude: ≥5V (DC level is zero)

Overload protection: 250VDC or 250VAC RMS

#### Capacitance (F)

Range	Resolution	Accuracy
40nF	0.01nF	±(4.0%+25d)
400nF~400uF	0.1nF~0.1uF	±(4.0%+15d)
4mF	1uF	±(5.0%+25d)

Overload protection: 250VDC or AC RMS

### OPERATING INSTRUCTION

#### Current Measurement

- Set the rotary switch to proper current range
- Select the current range based on measurement
- Press the clamp opening trigger to open the jaws enclose one conducting wire, and close the jaws tightly
- Read the measured current value in the LCD display
- If display shows "OL", means overload, should select the higher range of measurement

⚠ NOTE: To avoid electrical shock and or damage to the meter, do not attempt to take any voltage measurement that might exceed 600V.

#### Voltage Measurement

- Set the rotary switch to proper voltage range
- Insert the black test lead plug into COM jack, insert red test lead plug into VΩ jack
- Press "SELECT" button to choose "DCV" or "ACV" measurement
- Touch the black test probe tip to the negative side of the circuit; touch the red test lead probe tip to the positive side of circuit
- Read the voltage value in the LCD display

⚠ NOTE:

- 1) The max. input DC voltage is 600V DC, to avoid electrical shock and/or damage the meter, do not attempt to take any voltage measurement that might exceed 600V DC
- 2) Unstable display may occur, especially at the low voltage range measurement (like 200mV/2V range), even no test leads insert at input terminals, and it is the normal situation and not influences the accuracy.

#### Resistance Measurement

- Set the rotary switch to  $\frac{\text{H}(\text{OH})}{\Omega}$  range, and press "SELECT" till  $\Omega$  measurement
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack.
- Touch the black test probe tip to one side of the resistance of under test; touch the red test probe tip to the other side
- Read the resistance value in the display

⚠ NOTE:

- 1) To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements
- 2) In order to ensure the best accuracy in measurement of low resistance, short the test leads before the measurement and subtract this resistance value of the test leads
- 3) Other components in parallel under the test may affect the accuracy of measured value

#### Diode Test

- Set the rotary switch to  $\frac{\text{H}(\text{OH})}{\Omega}$  range, and press "SELECT" button to  $\rightarrow$  measurement.
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack.
- Place the red test lead on the anode of diode and black test lead on the cathode of diode.
- The meter will show the approx. forward voltage of diode. Reverse voltage will indicate OL.

⚠ NOTE:

- 1) To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any diode tests
- 2) Other components in parallel under the test may affect the accuracy of measured value

#### Continuity Check

- Set the rotary switch to  $\frac{\text{H}(\text{OH})}{\Omega}$  range, and press "SELECT" button to  $\rightarrow$  measurement.
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack.
- Touch the test probe tips across the circuit or component under test
- If the resistance is  $<70\Omega \pm 30\Omega$ , the audible signal will be sounded

⚠ NOTE: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any continuity check

#### Capacitance Measurement

- Set the rotary switch to  $\frac{\text{H}(\text{OH})}{\Omega}$  range, and press "SELECT" to  $\rightarrow$  measurement
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack.
- Touch the test probe tips across the capacitance under test
- Read the capacitance value in the display

⚠ NOTE:

- 1) To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurement

- 2) Other components in parallel under the test may affect the accuracy of measured value
- 3) It is normal no return zero on small capacitance measurement, the test should subtract the corresponding displayed value and not affect measuring accuracy

#### Temperature Measurement

- Set the rotary switch to °C/°F range position
- Press "SELECT" to shift °C and °F
- The value of environmental temperature shows in display
- Insert the red terminal of temperature probe (K Type) into the VΩ jack, black terminal into COM jack, place the temperature probe tip where needed to measure
- Read the temperature value in the display

⚠ NOTE: Since cold-junction compensating circuit stalled inside meter, due to good sealing of meter, it takes long time to reach the thermal balance with the measuring environment, the meter needs to be placed in the measuring environments for a longer time to get the more accurate readings.

#### Frequency Measurement

- Set the rotary switch to the voltage range
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack.
- Press "Select" button to choose "Hz" measurement mode
- Touch the black test probe tip to one side of the frequency of under test; touch the red test probe tip to the other side
- Read the frequency value in the display

⚠ NOTE: The max. input voltage can not over AC250V.

#### Non-Contact Voltage Detection (NCV)

- Set the rotary switch to NCV Live range, and press "SELECT" to NCV measurement mode
- Contact the top part of meter with the circuit under test, the indicating LED will be flashed and audible signal will be sounded once detecting the voltage

⚠ NOTE:

- 1) The detection result is for reference, do not determine the voltage by NCV detection ONLY.
- 2) Detection may interfere by socket design, insulation thickness and other variable conditions.
- 3) The external interference sources, such as flashlight, motor, etc, may cause the wrong detection.

#### Line Test (Live Wire Recognition)

- Set the rotary switch to NCV Live range, and press "SELECT" to Live measurement
- Insert the black test lead plug into COM jack, and insert red test lead plug into VΩ jack
- Hold the insulation part of black test lead and not put into circuit under measurement; contact the red test lead to live wire, the buzzer of meter will be activated and red LED will be flickered, and the LCD display LIVE

⚠ NOTE:

- 1) When the circuit is in serious leakage (approx. over 15V), the red test lead even contact earth line, the buzzer of meter will be sounded and LED will be flickered.
- 2) Detection may interfere by socket design, insulation thickness and other variable conditions.
- 3) The external interference sources, such as flashlight, motor, etc, may cause the wrong detection.

### MAINTENANCE


⚠ WARNING

- To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.
- To avoid electric shock, do not operate the meter until the battery and fuse covers are in place and fastened securely.

#### Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent, do not use abrasives or solvents. If the meter is not be used for a long time, remove the battery and store it separately.

#### Battery Installation

To avoid the false readings, replace the battery as soon as the battery indicator  appears.

- 1) Turn power off and disconnect the test leads from the meter.
- 2) Open the rear battery cover by using screwdriver.
- 3) Insert the battery into battery holder, observing the correct polarity.
- 4) Put the battery cover back in place, secure with the screws.