**ENGLISH**

**CL320**

# INSTRUCTION MANUAL

## 400A AC Auto-Ranging Digital Clamp Meter

## *True RMS Measurement Technology*

-40° – 1832°F
-40° – 1000°C

- NON-CONTACT VOLTAGE TESTING
- AUTO-RANGING
- DATA HOLD
- RANGE HOLD
- TEMPERATURE
- AUDIBLE CONTINUITY

**600V ≂**
**400A ~**
**40MΩ**

**2 m**


TRMS | ≂V | ~A | Ω | mV | µA | NCV | •)) | °F°C | AUTO | RANGE | HOLD | Hz% | MAX/MIN | APO | 4000 LCD



Intertek 5001748

**CAT III 600V**

KLEIN TOOLS

## GENERAL SPECIFICATIONS

Klein Tools CL320 is an automatically ranging true root mean square (TRMS) digital clamp meter that measures AC current via the clamp, AC/DC voltage, DC microamps, resistance, continuity, frequency, capacitance, and tests diodes via test-leads, and temperature via a thermocouple probe.

- **Operating Altitude:** 6562 ft. (2000m)
- **Relative Humidity:** <95% non-condensing
- **Operating Temp:** 32° to 122°F (0° to 50°C)
- **Storage Temp:** 14° to 122°F (-10° to 50°C)
- **Accuracy:** Values stated at 65° to 83°F (18° to 28°C)
- **Temp Coefficient:** 0.1 x (Quoted Accuracy) per °C above 28°C or below 18°C, corrections are required when ambient working temp is outside of Accuracy Temp range
- **Dimensions:** 8.46" x 3.54' x 1.50" (215 x 90 x 38 mm)
- **Weight:** 11.04 oz. (313 g) including batteries
- **Calibration:** Accurate for one year
- **Auto Power-Off (APO):** After approx. 10 minutes of inactivity
- **Standards:** IEC EN 61010-1, 61010-2-032, 61010-2-033. IEC EN 61326-1, 61326-2-2.

  Conforms to UL STD.61010-1, 61010-2-032,61010-2-033; Certified to CSA STD.C22.2 NO. 61010-1, 61010-2-032,61010-2-033.
- **Pollution degree:** 2
- **Accuracy:** ± (% of reading + # of least significant digits)
- **Drop Protection:** 6.6 ft. (2m)
- **Safety Rating:** CATIII 600V, Class 2, Double insulation
- **Electromagnetic Environment:** IEC EN 61326-1. This equipment meets requirements for use in basic and controlled electromagnetic environments like residential properties, business premises, and light-industrial locations.

*Specifications subject to change.*

## ELECTRICAL SPECIFICATIONS

| Function | Range | Resolution | Accuracy |
|---|---|---|---|
| AC Voltage (V AC) | 400.0mV | 0.1mV | ±(1.8% + 5 digits) |
| | 4.000V | 1mV | ±(1.5% + 5 digits) |
| | 40.00V | 10mV | ±(1.2% + 5 digits) |
| | 400.0V | 100mV | |
| | 600V | 1V | ±(1.5% + 5 digits) |
| DC Voltage (V DC) | 400.0mV | 0.1mV | ±(1.0% + 8 digits) |
| | 4.000V | 1mV | ±(0.8% + 3 digits) |
| | 40.00V | 10mV | |
| | 400.0V | 100mV | |
| | 600V | 1V | ±(1.0% + 3 digits) |

**Input Impedance:** 10MΩ
**Frequency Range:** 45 to 400Hz
**Maximum Input:** 600V AC RMS or 600V DC

| | | | |
|---|---|---|---|
| AC Current (A AC) | 4.000A | 1mA | ±(2.5% + 30 digits) |
| | 40.00A | 10mA | ±(2.5% + 10 digits) |
| | 400.0A | 100mA | ±(2.0% + 10 digits) |

**Frequency Range:** 50 to 60Hz

| | | | |
|---|---|---|---|
| DC Microamps (µA DC) | 200 µA | 0.1 µA | ±(1.0% + 5 digits) |

**Maximum Input:** 600V AC RMS or 600V DC

| | | | |
|---|---|---|---|
| Resistance | 400.0Ω | 0.1Ω | ±(1.2% + 5 digits) |
| | 4.000KΩ | 1Ω | ±(1.2% + 3 digits) |
| | 40.00kΩ | 10Ω | |
| | 400.0kΩ | 100Ω | |
| | 4.000MΩ | 1kΩ | |
| | 40.00MΩ | 10kΩ | ±(2.0% + 5 digits) |

**Maximum Input:** 600V AC RMS or 600V DC

## ELECTRICAL SPECIFICATIONS

| Function | Range | Resolution | Accuracy |
|---|---|---|---|
| Capacitance | 40.00nF | 0.010nF | ±(4% + 25 digits) |
| | 400.0nF | 0.100nF | ±(4% + 8 digits) |
| | 4.000µF | 0.001µF | |
| | 40.00µF | 0.010µF | |
| | 400.0µF | 0.100µF | |
| | 4.000mF | 0.001mF | ±(5% + 9 digits) |

**Maximum Input:** 600V AC RMS or 600V DC

| | | | |
|---|---|---|---|
| Temperature °F | -40° to 10°F | 1°F | ±(1.2% + 7 digits) |
| | 11° to 1832°F | | ±(1.2% + 6 digits) |
| Temperature °C | -40° to -12°C | 1°C | ±(1.2% + 4 digits) |
| | -11° to 1000°C | | ±(1.2% + 3 digits) |

**Maximum Input:** 600V AC RMS or 600V DC

| | | | |
|---|---|---|---|
| Frequency | 10Hz to 60kHz | 0.001Hz to 0.01kHz | ±(0.1% + 5 digits) |
| Duty Cycle | 0.1% to 99.9% (≤100kHz) | 0.1% | ±1.5% (Range: 10% – 90%) |

**Maximum Input:** 600V AC RMS or 600V DC

### OTHER MEASUREMENT APPLICATIONS

***Maximum Input:** 600V DC or 600V AC RMS*

- **Diode Test:** Approx. 1mA, open circuit voltage ~3.0V DC
- **Continuity Check:** Audible signal <10Ω, max current 1.5mA
- **Sampling Frequency:** 3 samples per second
- **Overload:** 'OL' indicated on display
- **Polarity:** "-" on display indicates negative polarity
- **Display:** 3-3/4 digit, 4000 Count LCD

## ⚠ WARNINGS

***To ensure safe operation and service of the meter, follow these instructions. Failure to observe these warnings can result in severe injury or death.***

- Before each use verify meter operation by measuring a known voltage or current.
- Never use the meter on a circuit with voltages that exceed the category based rating of this meter.
- Do not use the meter during electrical storms or in wet weather.
- Do not use the meter or test leads if they appear to be damaged.
- Use only with CAT III or CAT IV rated test leads.
- Ensure meter leads are fully seated, and keep fingers away from the metal probe contacts when making measurements.
- Use caution when working with voltages above 25V AC RMS or 60V DC. Such voltages pose a shock hazard.
- To avoid false readings that can lead to electrical shock, replace batteries when a low battery indicator appears.
- Do not attempt to measure resistance or continuity on a live circuit.
- Always adhere to local and national safety codes. Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.
- To avoid risk of electric shock, disconnect leads from any voltage source before removing battery door.
- To avoid risk of electric shock, do not operate meter while battery door is removed.

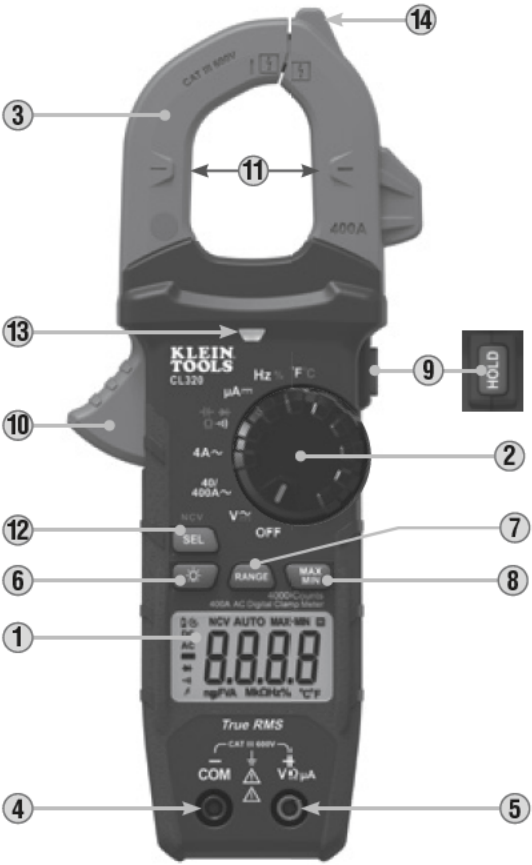
## SYMBOLS ON METER

| | | | |
|---|---|---|---|
| ~ | AC (Alternating Current) | ⎓ | AC/DC Current |
| ⎓ | DC (Direct Current) | Ω | Resistance (in Ohms) |
| ⧈ | Double Insulated Class II | •)) | Audible Continuity |
| ⚠ | Warning or Caution | ⏚ | Ground |
| ▶\|– | Diode | ⚠ | Risk of Electrical Shock |
| Hz | Frequency | ⊣⊢ | Capacitance |
| % | Duty-cycle | V | Voltage (Volts) |
| °F/°C | Temperature (Fahrenheit / Celsius) | A | Amperage (Amps) |
| COM | Common | NCV | Non-Contact Voltage Tester |
| % | Duty cycle | SEL | Select |
| ☼ | Backlight | Hz | Frequency |
| ⊣⊢ | Capacitance | ▶\|– | Diode Test |
| + | Positive | – | Negative |

## SYMBOLS ON LCD

| | | | |
|---|---|---|---|
| AC | AC (Alternating Current) | DC | DC (Direct Current) |
| – | Negative Reading | H | Data Hold |
| AUTO | Auto Ranging | MAX | Maximum Value Hold |
| MIN | Minimum Value Hold | | Auto Power Off |
| ▭ | Low Battery | •)) | Audible Continuity |
| °F | Degrees (Fahrenheit) | °C | Degrees (Celsius) |
| M | Mega (value x $10^6$) | k | kilo (value x $10^3$) |
| m | milli (value x $10^{-3}$) | µ | micro (value x $10^{-6}$) |
| n | nano (value x $10^{-9}$) | V | Volts |
| A | Amps | Ω | Ohms |
| Hz% | Frequency/Duty Cycle | | Auto Power-Off |
| NCV | Non-Contact Voltage Tester | ▶\|– | Diode Test |
| | Hazardous Voltage Indicator | | |

## FEATURE DETAILS




***NOTE: There are no user-serviceable parts inside meter.***

1. 4000 count LCD display
2. Function selector switch
3. Clamp
4. "COM" jack
5. "VΩμA" jack
6. Backlight button
7. "RANGE" button
8. "MAX/MIN" button
9. Data Hold button
10. Clamp trigger
11. Arrow markings
12. "SEL/NCV" button
13. NCV Light
14. NCV Sensing Antenna

## FUNCTION BUTTONS

### ON/OFF

To power ON the meter, rotate the Function Selector switch (2) from the OFF setting to any measurement setting. To power OFF the meter, rotate the Function Selector switch (2) to the OFF setting. By default, the meter will automatically power OFF after 10 minutes of inactivity. If the meter automatically powers-OFF while in a measurement setting, press any button to power the meter ON, or rotate Function Selector (2) switch to OFF, then power ON the meter. To deactivate the power OFF functionality press and hold the "SELECT" button (12) before powering ON from the OFF setting. When auto power OFF is deactivated, the Auto Power Off icon will not be visible in the display.

### SEL / NCV BUTTON (FOR NCV TESTING)

Press and hold the SEL/NCV button (12) to enter Non-contact Voltage Testing (NCV) mode to test for presence of AC voltage. The NCV icon and "**EF**" will be present on the display. Approach the conductor under test leading with the sensing antenna (14). In the presence of AC voltage, the red NCV light (13) will flash, audible signals (beeps) will sound, and dashes will appear on the display. As the NCV sensing antenna (14) approaches the voltage source, more dashes will be presented on the display and the frequency of the audible sound will increase. Release the SEL/NCV button to exit NCV testing mode.

***NOTE:*** *Only voltages of 40V AC or greater will be detected.*

### BACKLIGHT

Press Backlight button symbol (6) to turn ON or OFF the backlight. The backlight does not automatically power OFF.

### RANGE

The meter defaults to auto-ranging mode **AUTO**. This mode automatically determines the most appropriate measurement range for the testing that is being conducted. To manually force the meter to measure in a different range, use the "RANGE" button (7).

1. Press the "RANGE" button (7) to manually select measurement range (**AUTO** is deactivated on the LCD). Repeatedly press the "RANGE" button (7) to cycle through the available ranges, stopping once the desired range is reached.
2. To return to auto-ranging mode, press and hold the "RANGE" button (7) for more than two seconds (**AUTO** is reactivated).

## FUNCTION BUTTONS

### MAX/MIN

When the "MAX/MIN" button (8) is pressed, the meter keeps track of the Maximum and Minimum values and the difference between the Maximum and Minimum values as the meter continues to take samples.

1. When measuring, press 'MAX/MIN' button (8) to toggle between the Maximum value (MAX), the Minimum value (MIN), and the difference between Maximum and Minimum (MAX-MIN) values. If a new maximum or minimum occurs the display updates with that new value.
2. Press 'MAX/MIN' button (9) for more than two seconds to return to normal measuring mode.

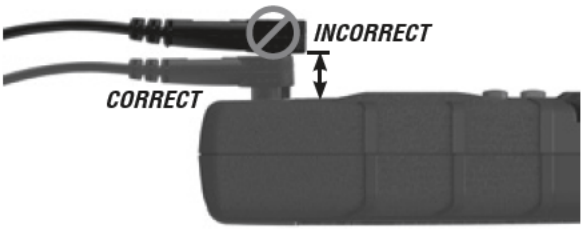
### DATA HOLD

Press HOLD (9) to hold the measurement on the display. Press HOLD (9) again to release the display to return to live measuring.

## OPERATING INSTRUCTIONS

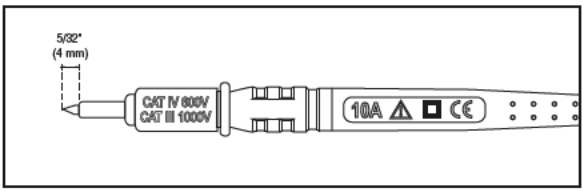
### CONNECTING TEST LEADS

Do not test if leads are improperly seated. Results could cause intermittent display readings. To ensure proper connection, firmly press leads into the input jack completely.



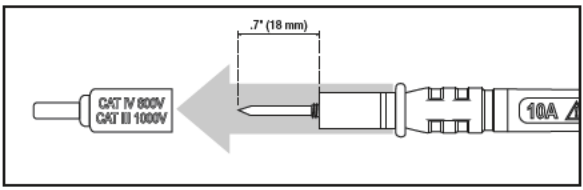

### TESTING IN CAT III MEASUREMENT LOCATIONS

Ensure the test lead shield is pressed firmly in place. Failure to use the CATIII / CATIV shield increases arc-flash risk.




### TESTING IN CAT II MEASUREMENT LOCATIONS

CAT III / CAT IV shields may be removed for CAT II locations. This will allow testing on recessed conductors such as standard wall outlets. Take care not to lose the shields.



## OPERATING INSTRUCTIONS

### AC CURRENT (LESS THAN 400A)

AC Current is measured by pressing the clamp trigger (10) to open the clamp and placing it around a current-carrying wire. When measuring, care should be taken to ensure that the clamp is completely closed with trigger (10) fully released, and that the wire passes perpendicularly through the center of the clamp in line with the arrow markings (11).


To measure current:

1. Rotate the Function Selector switch (2) to the 40/400 A setting.


2. Place clamp around wire. The current measurement will be shown in the display.

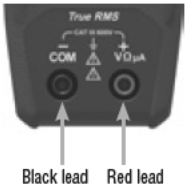
***NOTE:*** *If the measurement is less than 40A, rotate the Function Selector switch (2) to the 4A setting for improved resolution. If the measurement is less than 4A, the meter will auto-range to the 4A range.*


⚠ ***Disconnect test leads when measuring with the clamp.***

## OPERATING INSTRUCTIONS

### AC/DC VOLTAGE (LESS THAN 600V)

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the **V** ≂ setting for AC or DC measurements. The meter defaults to AC measurement. To measure DC, press the "SELECT" button (12) to toggle between AC and DC modes. The AC or DC icon on the LCD indicates which mode is selected. Note "**AC**" or "**DC**" on the display.





Apply test leads to the circuit to be tested to measure voltage. The meter will auto-range to display the measurement in the most appropriate range.

***NOTE:*** *If "–" appears on the LCD, the test leads are being applied to the circuit in reverse. Swap the position of the leads to correct this.*

***NOTE:*** *When in a voltage setting and the test leads are open, readings of order mV may appear on the display. This is noise and is normal. By touching the test leads together to close the circuit the meter will measure zero volts.*

## OPERATING INSTRUCTIONS

### CONTINUITY

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the Continuity/Resistance/Capacitance/Diode-Test setting.

***NOTE:*** *The meter defaults to Continuity testing in this mode. Ensure that the Continuity Testing icon is visible on the display. If not, press the "SELECT" button (12) repeatedly until the icon is shown.*

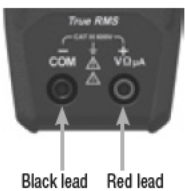
2. Remove power from circuit.
3. Test for continuity by connecting conductor or circuit with test leads. If resistance is measured less than 10Ω, an audible signal will sound and display will show a resistance value indicating continuity. If circuit is open display will show "**OL**'.



⚠ ***DO NOT attempt to measure continuity on a live circuit.***

### μA DC CURENT (LESS THAN 200 μA)

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the **μA⎓** setting.
2. Remove power from circuit and open circuit at measurement point.
3. Connect test leads in series with the circuit.
4. Apply power to the circuit to take the measurement.





⚠ ***DO NOT attempt to measure more than 200 μA.***

## OPERATING INSTRUCTIONS

### RESISTANCE MEASUREMENTS

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the Continuity/Resistance/Capacitance/Diode-Test setting.

***NOTE:*** *The meter defaults to Continuity testing in this mode. Press the "SELECT" button (12) once to enter Resistance testing mode. The Resistance icon Ω will appear on the display.*

2. Remove power from circuit.
3. Measure resistance by connecting test leads to circuit. The meter will auto-range to display the measurement in the most appropriate range.



***NOTE:*** *When in a Resistance setting and the test leads are open (not connected across a resistor), or when a failed resistor is under test, the display will indicate O.L. This is normal.*

⚠ ***DO NOT attempt to measure resistance on a live circuit.***

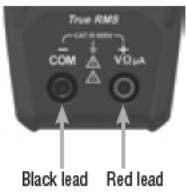
## OPERATING INSTRUCTIONS

### CAPACITANCE

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the Continuity/Resistance/Capacitance/Diode-Test setting.

***NOTE:*** *The meter defaults to Continuity testing in this mode. Press the "SELECT" button (12) twice to enter Capacitance testing mode. The Capacitance icon will appear on the display. The meter should read* ***0 nF*** *with test leads open.*

2. Remove power from circuit.
3. Measure capacitance by connecting test leads across the capacitor. The meter will auto-range to display the measurement in the most appropriate range.



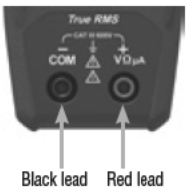

## OPERATING INSTRUCTIONS

### DIODE TEST

1. Insert RED test lead into VΩμA jack (5), and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the Continuity/Resistance/Capacitance/Diode-Test setting.

***NOTE:*** *The meter defaults to Continuity testing in this mode. Press the "SELECT" button (12) three times to enter Diode testing mode. The Diode icon will appear on the display.*

2. Touch test leads to diode. A reading of 200-800mV on display indicates forward bias, "**OL**" indicates reverse bias. An open device will show "**OL**" in both polarities. A shorted device will show approximately 0mV.



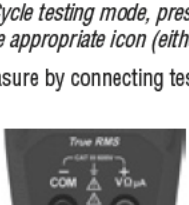


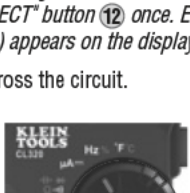
### FREQUENCY / DUTY-CYCLE

1. Insert RED test lead into VΩμA jack (5) and BLACK test lead into COM jack (4), and rotate function selector switch (2) to the Frequency/Duty-Cycle **Hz**% setting.

***NOTE:*** *The meter defaults to Frequency testing in this mode. To enter Duty-Cycle testing mode, press the "SELECT" button (12) once. Ensure that the appropriate icon (either* **Hz** *or %) appears on the display.*

2. Measure by connecting test leads across the circuit.



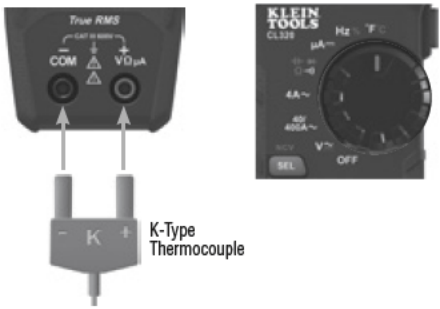
## OPERATING INSTRUCTIONS

### TEMPERATURE

1. Insert K-type thermocouple into the VΩμA (5) and COM (4) jacks (observe polarity markings on thermocouple and meter), and rotate function selector switch (2) to the Temperature °F°C setting.

***NOTE:*** *The meter defaults to Fahrenheit scale in this mode. To enter Celsius scale, press the "SELECT" button (12) once. Ensure that the appropriate icon (either °**F** or °**C**) appears on the display.*

2. To measure temperature, make contact between the thermocouple tip and the object being measured. When thermocouple tip and object are in thermal equilibrium, the measurement on the display will stabilize.




⚠ ***Remove thermocouple before switching meter to other measurement functions.***

⚠ ***The thermocouple included with the original purchase is suitable for temperatures below 446°F / 230°C only. To measure higher temperatures, a K-type thermocouple with the appropriate measurement range should be used.***

## MAINTENANCE

### BATTERY REPLACEMENT

When  indicator is displayed on LCD, batteries must be replaced.

1. Loosen captive screw and remove battery cover.
2. Replace 3 x AAA batteries (note proper polarity).
3. Replace battery cover and fasten screw securely.


⚠ ***To avoid risk of electric shock, disconnect leads from any voltage source before removing battery door.***

⚠ ***To avoid risk of electric shock, do not operate meter while battery door is removed.***

## CLEANING

Be sure meter is turned off and wipe with a clean, dry lint-free cloth. ***Do not use abrasive cleaners or solvents.***

## STORAGE

Remove the batteries when meter is not in use for a prolonged period of time. Do not expose to high temperatures or humidity. After a period of storage in extreme conditions exceeding the limits mentioned in the General Specifications section, allow the meter to return to normal operating conditions before using.

## WARRANTY

**www.kleintools.com/warranty**

## DISPOSAL / RECYCLE

Do not place equipment and its accessories in the trash. Items must be properly disposed of in accordance with local regulations. Please see **www.epa.gov** or **www.erecycle.org** for additional information.