ENGLISH

CL390

INSTRUCTION MANUAL

400A AC/DC Auto-Ranging Digital Clamp Meter

True RMS
Measurement Technology

-40° – 1832°F
-40° – 1000°C

- AC/DC CURRENT
- HIGH VISIBILITY DISPLAY
- NON-CONTACT VOLTAGE TESTING
- DC MICRO-AMPS
- AUTO-RANGING
- DATA & RANGE HOLD
- TEMPERATURE

600V ≂ ⎓
400A ≂ ⎓
40MΩ

2 m

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

KLEIN TOOLS

CE

ETL LISTED C US
Intertek
5001748

CAT III
600V

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GENERAL SPECIFICATIONS

Klein Tools CL390 is an automatically ranging true root mean square (TRMS) digital clamp meter that measures AC/DC current via the clamp, AC/DC voltage, DC microamps, resistance, continuity, frequency, capacitance, tests diodes via test-leads, and temperature via a thermocouple probe. It features a high visibility, reverse contrast LCD display that optimizes viewability both in dark or bright ambient lighting.

- **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:** 10.26 oz. (291 g) including batteries
- **Calibration:** Accurate for one year
- **Auto Power-Off (APO):** After approx. 5 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

  CAT III: *Measurement category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.*
- **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	0.001V	±(1.5% + 5 digits)
	40.00V	0.01V	±(1.2% + 5 digits)
	400.0V	0.1V	
	600V	1V	±(1.5% + 5 digits)
DC Voltage (V DC)	400.0mV	0.1mV	±(1.0% + 8 digits)
	4.000V	0.001V	±(0.8% + 3 digits)
	40.00V	0.01V	
	400.0V	0.1V	
	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)	40.00A	0.01A	±(2.0% + 9 digits)
	400.0A	0.1A	
DC Current (A DC)	40.00A	0.01A	±(2.0% + 9 digits)
	400.0A	0.1A	

Frequency Range: 50 to 60Hz
Minimum Current Measurable: 0.3A AC or DC

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

Maximum Input: 600V AC RMS or 600V DC

Resistance	400.0Ω	0.1Ω	±(1.2% + 5 digits)
	4.000kΩ	0.001kΩ	±(1.2% + 3 digits)
	40.00kΩ	0.01kΩ	
	400.0kΩ	0.1kΩ	
	4.000MΩ	0.001MΩ	
	40.00MΩ	0.01MΩ	±(2.0% + 5 digits)

Maximum Input: 600V AC RMS or 600V DC

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ELECTRICAL SPECIFICATIONS

Function	Range	Resolution	Accuracy
Capacitance	40.00nF	0.01nF	±(4% + 25 digits)
	400.0nF	0.1nF	±(4% + 8 digits)
	4.000µF	0.001µF	
	40.00µF	0.01µF	
	400.0µF	0.1µF	
	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% ≤1000kHz	0.1%	±1.5% (Range: 10% – 90%)

Maximum Input: 600V AC RMS or 600V DC
Voltage Range: 8V to 240V AC RMS
Pulse Width: >0.1ms, must be zero-crossing signal.

OTHER MEASUREMENT APPLICATIONS

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

- **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
- **Auto Power off:** After ~5 minutes of inactivity.
- **Over Limit:** "**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.

⚠ WARNINGS

- 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 test leads are fully seated into jacks, 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/DC Current	Ω	Resistance (in Ohms)
NCV	Non-Contact Voltage tester	•))	Audible Continuity
⧈	Double Insulated Class II	µA⎓	DC Microamps
⚠	Warning or Caution	⚠	Risk of Electrical Shock
▶|	Diode	⊣⊢	Capacitance
Hz	Frequency	%	Duty-cycle
V	Voltage (Volts)	A	Amperage (Amps)
°F °C	Temperature (Fahrenheit / Celsius)	SEL	Select
+	Positive	–	Negative
COM	Common	⏚	Ground
☼	Backlight Brightness	OFF	Power Off

SYMBOLS ON LCD

AC	AC (Alternating Current)	DC	DC (Direct Current)
▬	Negative Reading	H	Data Hold
AUTO	Auto Ranging	MAX	Maximum Value Hold
F	Farrads	▶|	Diode
NCV	Non-Contact Voltage Tester		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	ZERO	DC Current Zero Function
⚡	Hazardous Voltage Indicator	△	Relative Mode
MIN	Minimum Value Hold	MAX	Maximum Value Hold
MAX-MIN	Difference between MAX and MIN values		

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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. "RANGE" button
7. "MAX/MIN" button
8. "REL/ZERO" button
9. HOLD/Brightness 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. The Auto-Power Off icon will be visible in the display. By default, the meter will automatically power OFF after 5 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 Auto-Power OFF functionality press and hold the "SEL/NCV" 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 SECONDARY FUNCTIONS)
Pushing the SEL/NCV button (12) activates the secondary function for each application accessible by the function selector switch (2). For voltage and current (excluding DC uA), it toggles between AC and DC. For the other functions, it switches between °F and °C, between Hz and % Duty-cycle, and between Continuity, Resistance, Capacitance and Diode-Test. The default function for each application is printed on the meter in white; the secondary function or functions for each setting is printed on the meter in orange.

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 BRIGHTNESS
Press and hold the HOLD/Brightness button (9) to toggle between high and low brightness for the backlight. By default, the meter will use the low brightness setting.

RANGE
The meter defaults to auto-ranging mode for voltage and resistance measurements. This mode automatically determines the most appropriate measurement range for the testing that is being conducted. The AUTO icon will be visible in the display. To manually force the meter to measure in a different range, use the "RANGE" button (6).

1. Press the "RANGE" button (6) to manually select measurement range (AUTO is deactivated on the LCD). Repeatedly press the "RANGE" button (6) 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 (6) for more than two seconds (AUTO is reactivated).

FUNCTION BUTTONS

MAX/MIN

The "MAX/MIN" function can be used when measuring with voltage, current, resistance, temperature, and DC µA functions. When the "MAX/MIN" button (7) is pressed, the meter keeps track of the Maximum and Minimum values, and the difference between the Maximum and Minimum values while continuing to take samples.

1. When measuring, press "MAX/MIN" button (7) to toggle between the Maximum value (MAX), the Minimum value (MIN), and the difference between Maximum and Minimum (MAX-MIN) values. "**MAX**", "**MIN**", or "**MAX-MIN**" will appear on the display, indicating the value being shown. If a new maximum or minimum occurs the display updates with that new value.
2. Press "MAX/MIN" button (7) for more than two seconds to return to normal measuring mode.

RELATIVE MODE

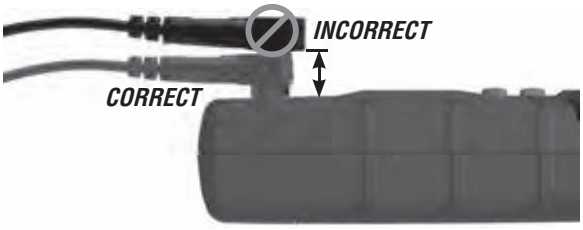
REL Measurement: Press REL/ZERO (8) to initiate measurement relative to the current reading. The REL icon will be present on the display. Subsequent measurements are displayed relative to the original measurement. (Applies to AC/DC Voltage, AC Current, Capacitance, DC µA, and Temperature). Press REL/ZERO (8) again to exit relative mode.

DC ZERO Function: When measuring DC current with the clamp, press REL/ZERO to activate the DC current zero function. This will set the display to zero by subtracting the current value as an offset. The ZERO icon will be present on the display. Press REL/ZERO (8) again to exit DC current zero mode.

OPERATING INSTRUCTIONS

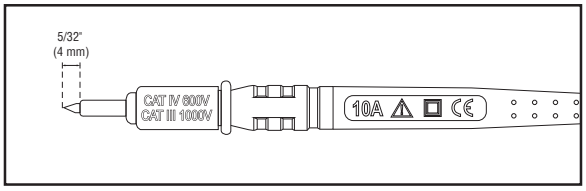
CONNECTING TEST LEADS

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.



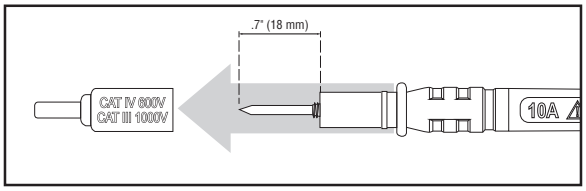
TESTING IN CAT III MEASUREMENT LOCATIONS

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.



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OPERATING INSTRUCTIONS

AC/DC 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 400A setting.
2. Place clamp around wire. The current measurement will be shown in the display.

NOTE: *The meter defaults to AC measurement. Press the SEL/NCV button to toggle between AC and DC modes. The AC or DC icon on the display indicates which mode is selected.*

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

NOTE: *If non-zero values are displayed prior to measuring in DC current mode, a DC zero offset correction is required. With meter in DC current mode, press the REL/ZERO button (8) to activate the DC current ZERO function.* **ZERO** *icon will be present on the display. Subsequent DC current measurements automatically subtract the offset correction for improved accuracy. Press REL/ZERO button (8) to return to normal measuring mode.*

NOTE: *Do not use DC current function if the Magnetic Hanger accessory is attached to the back of the meter. Interferences from the magnet can lead to inaccurate measurements.*

⚠ ***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 SEL/NCV button (12) to toggle between AC and DC modes. The **AC** or **DC** icon on the LCD indicates which mode is selected.

Black lead Red lead

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, this indicates negative polarity for DC voltage.*

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.*

NOTE: *When voltages in excess of 25V AC or 60V DC are measured the hazardous voltage indicator will be present on the display.*

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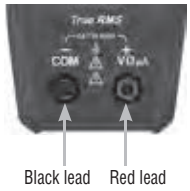
OPERATING INSTRUCTIONS

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 "SEL/NCV" 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.***

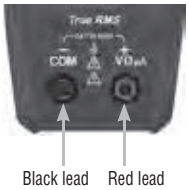
OPERATING INSTRUCTIONS

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 "SEL/NCV" button (12) repeatedly until the resistance icon* **Ω** *appears 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 "**OL**" This is normal.*

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

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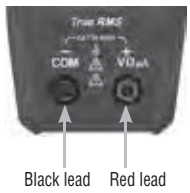
OPERATING INSTRUCTIONS

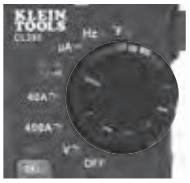
CAPACITANCE

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. To measure capacitance, press the "SEL/NCV" button (12) repeatedly until* ***nF*** *appears on the display.*

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.





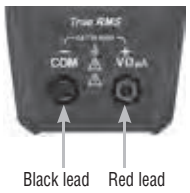
OPERATING INSTRUCTIONS

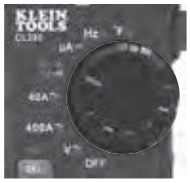
DIODE TEST

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 "SEL/NCV" button (12) repeatedly until the diode icon appears on the display.*

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.

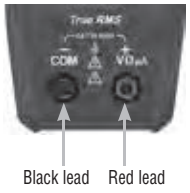


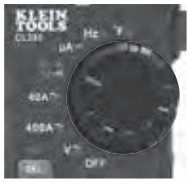


µA DC CURENT (LESS THAN 200 µA)

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 DC µA setting. The "**µA**" and "**DC**" icons will appear on the display.
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 200µA.***





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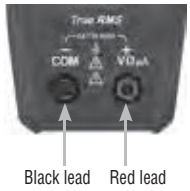
OPERATING INSTRUCTIONS

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 "SEL/NCV" button (12) once. Ensure that the appropriate icon (either* **Hz** *or* **%***) appears on the display.*

2. Measure by connecting test leads across the circuit.

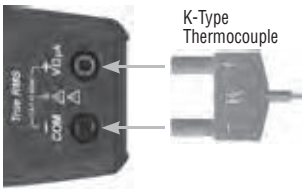


TEMPERATURE

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 "SEL/NCV" 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.***