HTC™

DIGITAL CLAMP METER

User Manual

21-S

SAFETY STATEMENT

⚠Warning

Read this manual before using the instrument.

"Warning" mark indicates the condition and operation which may cause danger to users.

"Caution" mark refers to the condition and operation which may cause damage to the instrument or equipment.

⚠Warning

In order to avoid possible electric shock or personal injury and other safety accidents, please abide by the following specifications:

- Please read this manual carefully before using the instrument, and pay special attention to safety warning information.
- Strictly observe the operation of this manual and use this instrument. Otherwise, the protection function of the instrument may be damaged or weakened.
- Please be careful if the measurement exceeds 30V AC true RMS, 42V AC peak or 60V DC. There may be danger of electric shock at this kind of voltage.
- Voltage applied between terminals or between

each terminal and grounding point shall not exceed the rated value.

- By measuring the known voltage to check whether the meter work is normal, if it is not normal or damaged, do not use it again.
- Before using the instrument, please check whether there are cracks in the instrument shell or plastic parts damaged. If so, please do not use again.
- Before using the instrument, please check whether the probe is cracked or damaged. If so, please replace the same type and the same electrical specifications.
- Do not exceed the lowest rated Category of Measurement (CAT) rating in products, probes or accessories.
- Do not measure the current when the probe is inserted into the input jack.
- Don't work alone.
- Please comply with local and national safety code. Wear personal protection equipment (such as approved rubber gloves, masks and flame retardant clothes, etc.) to prevent being damaged by electric shock and electric arc due to exposed hazardous live conductor.
- When it shows low battery indicator, please

replace the battery in time in case of any measurement error.

- Do not use the instrument around explosive gas, steam or in wet environment.
- When using the probe, please put your fingers behind the finger protector of the probe.
- When measuring, please connect the neutral wire or the ground wire firstly, then connect the live wire; When disconnecting, please disconnect the live wire firstly, then disconnect the neutral wire and ground wire.
- Before opening the outer cabinet or battery cover, please remove the probe on the instrument. Do not use the instrument in the circumstances that the instrument is taken apart or battery cover is opened.
- It only meets the safety standards when the instrument is used together with the supplied probe. If the probe is damaged and needs to replace, the probe with same model number and same electrical specifications must be used for replacement.

	High voltage warning
	AC (Alternating current)
	DC (Direct current)
	AC or DC
	Warning, important safety signs
	Ground
	Equipment with double insulation / reinforced insulation protection
	Low battery
CE	Product complies with all relevant European laws
INRUSH	Inrush current measurement
	The additional product label shows that do not discard this electrical/electronic product into household garbage.

Overview

A new generation of true RMS high performance intelligent digital clamp meters that combine a wide range of functions to make your work easier, more efficient and safer.

It is capable of measuring AC/DC voltage, AC/DC current, inrush current, frequency, duty cycle, resistance, capacitance, temperature, diode, continuity, NCV and more.

Instrument panel description

1 CV probe

2 Clamp

3 Flashlight

4 Alarm Indicator LED

5 Trigger

6 Display screen

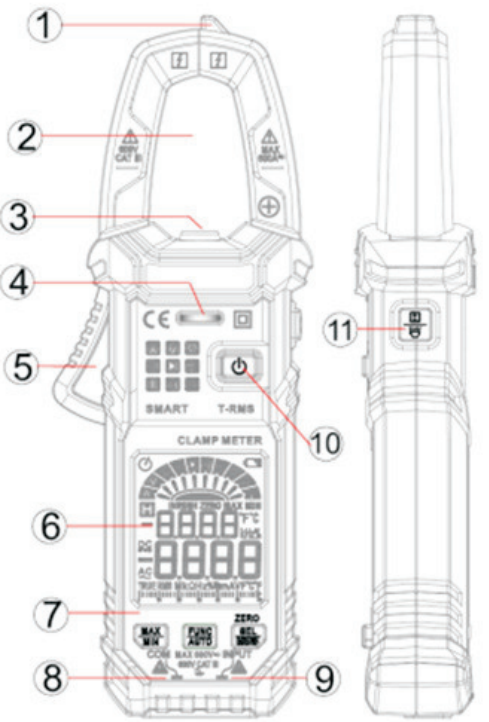
7 Function button

8 Black meter pen socket

9 Red meter pen socket

10 Power button

11 Data hold/Flashlight key



Function button:

Gear function selection/intelligent measurement button

Maximum/Minimum Value button

Function selection/inrush current measurement button

Measurement Operation

⚠ Warning

- Do not measure voltages above 600V as this may damage the meter.
- When measuring high voltage, pay special attention to safety, so as not to be subjected to electric shock or personal injury.
- Before use, test known voltages or currents with the meter to confirm that the meter is fully functional.

Power on/off

1) Press and hold the ⏻ key for about 2 seconds to turn on.
2) The meter automatically performs a self-test when switched on and displays "CAL", do not press the trigger to open the clamp at this time.
3) Until the buzzer beeps "beep, beep, beep" to indicate the completion of the self-test.

4) The meter is only available for measurement.

5) When the measurement is finished, press and hold the key for about 2 seconds to switch off the meter.

Maximum/minimum value measurement

1) Press button to switch on the maximum and minimum value measurement.

2) Press button again to cycle through the maximum and minimum values.

3) Press the button and hold it for more than 2 seconds to exit the maximum and minimum measurement.

Note: This function does not work with inrush current, continuity, diode, frequency/duty cycle, temperature, NCV/Live functions.

Flashlight on/off

Press the button and hold for more than 2 seconds to turn the flashlight on or off.

Data hold

Press the button to enable or disable the data hold function.

Auto Power off

If there is no operation within 15 minutes after starting up, the meter will automatically shut down to save battery energy.

Cancel Auto Power off

1) Press and hold the FUNC AUTO key, then press the key to turn on the instrument power and then release FUNC AUTO the key, the display will have no " " symbol and the automatic switch-off function will be cancelled.

2) Restart the machine to restore the automatic shutdown function. The display displays the " " symbol.

Note: After the automatic shutdown function is disabled, you need to manually power off the meter.

SMART measurement mode

The meter enters smart mode by default. Can measure AC and DC voltage, AC and DC current, resistance, continuity, the instrument automatically identify the measurement signal.

1) Press the button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Don't need to select the measurement function, directly measure the AC/DC voltage, AC/DC current,

resistance, continuity, the instrument automatically identify and measure. The current is measured with the clamp, and the other measurements are taken from the pen input.

3) Read the measurement results from the display screen. The frequency is displayed when the AC signal is measured.

Note1 : Minimum identifiable DC current 0.8A.

: Minimum identifiable AC current 0.5A.

: Minimum identifiable AC/DC voltage 0.8V.

Note2 Automatic identification priority: resistance, DC voltage, AC voltage, DC current, AC current.

Professional measurement mode

AC/DC current measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to "A", and press the SEL INRUSH button to select AC or DC current measurement function.

3) In the DC current measurement function, if the display is not zero when the instrument is not

measuring, press and hold the " SEL INRUSH " key to clear zero, display "ZERO" and then measure.

4) Then press the trigger to open the clamp, clamp the conductor to be tested, slowly release the trigger until the clamp are completely closed, and determine whether the conductor to be tested is clamped in the center of the pliers, if the conductor is not in the center of the pliers, additional errors will occur.

5) Read the measurement results from the display screen. The frequency is also shown on the display when measuring AC current.

Note: AC clamp meter without DC current measurement function; AC/DC clamp meter with this function

AC inrush current measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to "A", and press the SEL INRUSH button to select inrush current measurement function and display the symbol "INRUSH".

3) Then press the trigger to open the clamp, clamp the conductor to be tested, slowly release the trigger until the clamp are completely closed, and determine

whether the conductor to be tested is clamped in the center of the pliers, if the conductor is not in the center of the pliers, additional errors will occur.

4) Turn on the device to be tested (such as the motor) and then trigger the measurement by the surge current.

5) Read the measurement results from the display screen.

Note: The measuring range of inrush current is 5～600A.

AC/DC voltage measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to "V", and press the SEL INRUSH button to select AC or DC voltage measurement function.

3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.

4) Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel).

5) Read the measurement result on the screen. When the AC voltage is measured, the frequency is displayed on the display screen.

Resistance measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.
2) Press FUNC AUTO button, set the pointer to the "Ω" position.
3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.
4) Contact the probe to the measured circuit or resistance.
5) Read the measurement result on the screen.

Continuity test

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.
2) Press FUNC AUTO button, set the pointer to the "))) " position.
3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.
4) Contact the probe to the measured circuit or resistance.
5) If the resistance or circuit of the measured resistance is less than 50Ω, the buzzer sounds and the alarm

indicator light is green, the screen displays the resistance.

Diode test

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.
2) Press button, set the pointer to the " ⏩ " position.
3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.
4) Touch the diode anode with the red probe, the black probe contacts the diode cathode.
5) Read the measurement result on the screen.
6) If the probe polarity is opposite to the diode polarity, the meter shows "OL", which can be used to distinguish the anode and cathode.

AC/DC mV measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display and enter the intelligent measurement mode.
2) Press FUNC AUTO button, set the pointer to "mV", and press the SEL INRUSH button to select AC or DC voltage measurement

function.

3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.

4) Connect the meter in parallel to the power supply or load to be tested.

5) Read the measurement result on the screen. When the AC voltage is measured, the frequency is displayed on the display screen.

Frequency/duty measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to the "Hz/%" position.

3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.

4) Connect the meter in parallel to the power supply or load to be tested.

5) Read the measurement result on the screen.

Capacitance measurement

1) Press the ⏻ button to turn on the power supply of

the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to the " ⊣⊢ " position.

3) Insert the red probe in “INPUT” jack, insert the black probe in “COM” jack.

4) Contact the probe to the measured circuit or Capacitance.

5) Read the measurement results from the display screen after the display is stable.

Note: The stability time of large capacitance is relatively long

Temperature measurement

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.

2) Press FUNC AUTO button, set the pointer to the " °C°F" position.

3) Insert the K-type thermocouple into the instrument, the positive pole (red) of the thermocouple into the “INPUT” jack, and the negative pole (black) into the “COM” input.

4) Contact the thermocouple probe with the measured object and read the results from the display screen.

⚠ Warning

When measuring temperature with thermocouple, the probe of thermocouple can't touch the charged object, otherwise it may damage the instrument and may suffer electric shock or personal injury.

⚠ Note :

It takes a long time for the cold end of thermocouple to be restored in the instrument to achieve thermal balance with the environment.

Non-contact AC Voltage Detection (NCV)

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.
2) Press FUNC AUTO button, set the pointer to the "NCV/Live" position.
3) Then NCV probe gradually approaches the detected point.
4) When the weak electric field signal is induced, the "--L" symbol will be displayed, the beep will emit a slow beep sound, and the green LED indicator will light up.
5) When the strong electric field signal is induced, the

"--H" symbol will be displayed, the beep will emit a fast beep sound, and the red LED indicator will light up.

Note: Before using the NCV function, remove the stylus. Otherwise, the detection accuracy will be affected.

Single probe live wire detection (LIVE)

1) Press the ⏻ button to turn on the power supply of the meter. After the self-test is completed, the meter will display Auto and enter the intelligent measurement mode.
2) Press FUNC AUTO button, set the pointer to "NCV/Live" position, and press the SEL INRUSH button to select "Live" measurement function.
3) Insert the red probe into the "INPUT" jack and remove the black probe.
4) Contact the red probe with the conductor under test
5) When a low voltage is detected the character "---L" is displayed, the beeper emits a slow beeping tone and the green LED lights up.
6) When a high voltage is detected, the "--H" character is displayed, the buzzer emits a fast beeping sound, and the red LED indicator lights up. Under normal circumstances, the detected line is "LIVE" line at this

time.

General Technical Specifications

- Environment condition of using:

  CAT.III 600V

  Pollution level ±2

  Altitude < 2000m

  Working environment temperature and humidity: 0~40°C (<80% RH, <10°C non-condensing).

  Storage environment temperature and humidity: -10~60°C (<70% RH, remove the battery).

- Temperature coefficient:

  0.1x accuracy/°C (<18°C or >28°C).

- MAX. Voltage between terminals and earth ground: 600V
- Display: 6000 counter readout. Automatically display the unit symbols according to the shift of the measurement function.
- Over range indication: it displays "OL".
- Low battery indication: when the battery voltage is lower than the normal working voltage, "  " will be displayed.

- Input polarity indication: automatically display "—".
- Power: 3 x 1.5V AAA batteries.

Accuracy Specifications

The accuracy applies within one year after the calibration.

Reference condition: the environment temperature 18°C to 28°C, the relative humidity is no more than 80%
accuracy: ±（reading + word）

DC voltage

Range	Resolution	Accuracy
600mV	0.1mV	± (0.5%reading+5)
6V	0.001V	
60V	0.01V	
600V	0.1V	

Input impedance : 10MΩ. Maximum input voltage: 600V

AC voltage

Range	Resolution	Accuracy
600mV	0.1mV	± (0.8%reading+5)
6V	0.001V	
60V	0.01V	
600V	0.1V	

Input impedance : 10MΩ Maximum input voltage: 600V.
Frequency Response : 40Hz ~ 1kHz(TRMS).

DC current

Range	Resolution	Accuracy
60A	0.01A	± (2.5% reading +5)
600A	0.1A	

Maximum input current: 600A.
AC clamp meter without DC current function.

AC current

Range	Resolution	Accuracy
60A	0.01A	50~60Hz : ± (2.5%reading + 5) Other : ± (3.0%reading + 10) Inrush current : ± (5.0%reading+10)
600A	0.1A	

Maximum input current: 600A.
Frequency Response : 40Hz ~ 400Hz(TRMS).

Resistance

Range	Resolution	Accuracy
600Ω	0.1Ω	± (1% reading +5)
6kΩ	0.001kΩ	
60kΩ	0.01kΩ	
600kΩ	0.1kΩ	
6MΩ	0.001MΩ	
60MΩ	0.01MΩ	

Continuity

	<50Ω, the buzzer sounds and the green indicator LED on.	Test Voltage Approx. 1V Overload protection : 250V

Diode

	It displays the approximate forward voltage value of the diode.	Reverse DC voltage is about 3V Overload protection: 250V

Capacitance

Range	Resolution	Accuracy
6nF	0.001nF	± (4.0% reading +5)
60nF	0.01nF	
600nF	0.1nF	
6μF	0.001μF	
60μF	0.01μF	
600μF	0.1μF	
6mF	0.001mF	
60mF	0.01mF	

Overload protection: 250V.
The above accuracy does not include the error caused by the pen capacitance.

Frequency/Duty

Range	Resolution	Accuracy
100Hz	0.01Hz	±(1.0%reading+3)
1000Hz	0.1Hz	
10kHz	0.001kHz	
100kHz	0.01kHz	
1000kHz	0.1kHz	
10MHz	0.001MHz	±(3.0%reading+3)
1～99%	0.1%	

Overload protection: 250V.

The "mV" gear voltage measurement frequency :

1) Range: 10Hz ~ 2 kHz
2) Sensitivity of signal: >50mV(RMS), sine wave

The "V" gear voltage measurement frequency :

1) Range: 10Hz ~ 2 kHz
2) Sensitivity of signal: >0.5V(RMS), sine wave

The current measurement frequency :

1) Range:10Hz ~ 2 kHz
2) Sensitivity of signal: >12A(RMS), sine wave

The "Hz/%" gear :

1) Frequency range: 5Hz ~ 10MHz
2) Voltage range: >2.5V RMS (The higher the frequency, the higher the voltage)

Temperature

Unit	Resolution	Accuracy	
ºC	1ºC	-40ºC~ 10ºC	± 3˚C
		10ºC ~ 100ºC	± 2˚C
		100ºC ~ 1000ºC	± 2.0%
ºF	1ºF	-40ºF~50ºF	± 6˚F
		50ºF~ 212ºF	± 4˚F
		212ºF~ 1832ºF	± 2.0%

Note: The above accuracy does not include the error of thermocouple probe.

Maintenance

⚠ Warning

To avoid electric shock, remove the test probe before opening the battery cover or back cover

General maintenance

- Maintenance and service of this instrument must be carried out by professional qualified maintenance personnel or maintenance department.
- Use wet cloth or mild detergent regularly to clean the shell. Do not use abrasives or solvents. Wipe the contacts in the socket with a clean cotton swab soaked in alcohol.

Battery Installation or Replacement

The meter uses three AAA 1.5V batteries. Please install or replace the batteries according to the following steps.

1) Turn off the power of the instrument and remove the probe

2) Use screwdriver to unscrew the screw that fixes the battery cover and remove the battery cover.

3) Remove the old battery and install the new battery according to the polarity of the battery marked in the battery box.

4) After installing the new battery, cover the battery cover and lock the screw.

⚠ Warning

- To avoid the possibility of electric shock or personal injury caused by incorrect reading, replace the battery immediately when the "🔋" sign is displayed on the display screen.
- Please use the same type of batteries, do not use substandard batteries.
- In order to ensure safe operation and maintenance of the instrument, please take out the battery when not in use for a long time, in order to prevent damage to the product caused by battery leakage.