

I. Overview

JT2004 mini digital clamp meter features high reliability, high safety, and high accuracy in a mini size. The circuit design of the complete machine takes the large scale integrated circuit Σ/Δ analog-digital converter as core, and it is supported with full-range over-load protection circuit. It is applicable to measure DC voltage, AC voltage, frequency, resistance, capacitance, diode, circuit on-off, temperature as well as non-contact AC/DC current and non-contact AC voltage /electromagnetic field. The voltage & current true virtual value response, full-range over-load protection, reliable measurement accuracy and unique appearance design make the JT2004 a new generation of practical electrotechnical/ electric measuring instrument with more excellent performance.

II. OOBA (Out-of-Box Audit)

Open the package box and take out the instrument. Please carefully check whether or not the following accessories are missing or damaged. If any is missing or damaged, please contact the supplier immediately.

- 1. Instructions one copy
- 2. AAA battery 1.5V..... two pieces
- 3. Probe one pair
- 4. Temperature probe one pair

III. Safety Instructions

The instrument is designed in conformity with CE certification, EN 61010-1, 61010-2-032 and 61010-2-033 of EU (pollution level 2), measurement category CAT II 600V and CAT III 300V as well as double insulation safety standard. Before using, please read the operation instruction and follow all the safety instructions:

It complies with UL STD. 61010-1, 61010-2-032, 61010-2-033. Certified to CSA STD. C22.2 NO. 61010-1, IEC STD 61010-2-032, 61010-2-033

CAT II: It is applicable to test and measuring circuits connected directly to the utilisation points (socket outlets and similar points) of the low-voltage mains installation.

CAT III: It is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage mains installation, before using and following all the safety instructions.

1. Please, follow the operation instruction in order to use the clamp meter. Otherwise, the protection provided by the instrument is likely to be weakened.
2. According to the national laws and regulations, personal protective equipment must be worn to prevent injuries caused by an electric shock, an arc discharge, etc., when working in the environment with bare live wire.
3. Please, do not reach beyond any position outside the protective shell of the current clamp meter.
4. Before each use, check whether there are cracks or damages on the shell of the current clamp meter and the output cable and whether there is any part under poor connection. Pay attention to the insulation layer surrounding the clamp mouth.
5. Before removing the battery cover, please make sure to remove the clamp meter from all live circuits, and disconnect the leading wire.

6. It is prohibited to use this clamp meter on circuits with a voltage rating higher than 600V (CATII 600V), or a frequency rating above 400Hz.
7. The measurement category classification standard CAT II 600V /CAT III 300V and pollution level 2 must not be violated.
8. Be sufficiently careful when working in a environment with bare wires. Contact with wires might lead to an electric shock.
9. Special attention shall be paid to 60V DC (direct current), 30V AC (alternating current effective value) or 42V AC (peak value), because there is a risk of electric shock.
10. If the probe needs to be replaced, the ones with the same CAT II 600V/CAT III 300V level according to IEC 61010-031 shall be adapted.
11. Before measuring, the function switch must be placed at the correct position. Tap positions are not permitted to be switched during measurement, so as to prevent the instrument from damage.
12. Before it is used in high voltage circumstances, it is necessary to measure the known voltage, such as a socket for civil use, to confirm the reliability of the instrument and prevent misleading or damaged instrument.

IV. Electrical Symbols

	Danger: high voltage		Warning
	DC (direct current)		Double insulation
	AC (alternating current)		Grounding
	Current/Ampere		Voltage/Volt
	Meet EU (European Union) standards		
	The application around and removal from UNINSULATED HAZARDOUS LIVE conductors is permitted		
	This symbol signify the product complies with with both USA and Canada requirements		

V. Comprehensive Code

1. The maximum misoperation protection voltage between the input terminal and grounding is 600V.
2. The maximum over-load protection current of the clamp head terminal is 200A.
3. Maximum indication: 2,000 Counts, 2-3 times of updating per second. Over-range indicates "OL".
Diode: around 3.2V
Measuring range: automatic
Polarity: automatic
Working temperature: 0°C~40°C
Relative humidity: 0°C~30°C: ≤75%, 30°C~40°C: ≤50%
Storage temperature: -10°C~50°C
4. Electromagnetic compatibility:
In radio-frequency field of 1V/m: total accuracy = dedicated accuracy+5%; as for radio-frequency field over 1V/m, there is no dedicated index.
5. Working altitude: 0-2,000m
6. Built-in battery: AAA 1.5V x 2 pieces
7. Low battery: LCD displays " " symbol.

VI. Drawing for Product Panel (Figure 1)

1. Clamp head.
2. Protective shield.
3. Clamp head trigger: press the trigger to open the clamp head.
4. NCV indicator light: if induced AC electric field intensity and induced distance meet the indicated values, the alarm will go off and the indicator light will flash.

5. Function selection knob switch: turning this knob switch to switch to relevant functions on the panel.
6. HOLD/ key: used to lock the measured readings. Hold the key for 2 seconds to turn on or off the backlight.
7. ZERO key: used for DCA reset and measurement of voltage/current/resistance/capacitance relative value.
8. SELECT key: used for function selection at compound tap positions, such as ACV/Hz/DCV, resistance/circuit on-off/diode/capacitance, °C/°F, etc.
9. LCD display screen: displaying interface of measurement function, symbol, value, etc.
10. Positive end jack: when testing voltage and resistance/circuit on-off/capacitance/diode and measuring the temperature with the probe, insert the red probe/temperature probe into this jack.
11. COM end jack: when testing voltage, and resistance/circuit on-off/capacitance/diode and measuring the temperature with the probe, insert the black probe/temperature probe into this jack.
12. Clamp head geometric center indication mark.

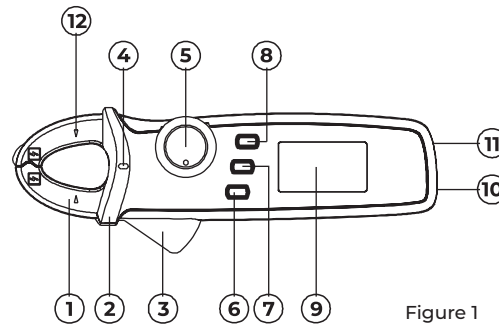


Figure 1

VII. Description of Symbols (Figure 2)

	Symbol	Description
1		Prompt of real valid value measuring status
2		Prompts of alternating current/direct current
3		Negative readings
4		Prompt of diode measurement
5		Prompt of circuit on-off measurement
6		Prompt of data-hold
7	$\Omega, k\Omega, M\Omega$	Units of resistance: ohm, kilohm and megaohm
8	Hz, kHz, MHz	Units of frequency: hertz, kilohertz and megahertz
9	mV, V	Units of voltage: millivolt and volt
10	mA, A	Units of current: milliampere and ampere
11	nF, μ F, mF	Units of capacitance: nanofarad, microfarad and millifarad
12		Prompt of non-contact AC voltage sensing
13		Prompt of automatic range
14		Prompt of base number reset/relative measurement
15		Prompt of under-voltage of built-in battery
16		Prompt of auto-OFF

VIII. Operation Instructions

1. Measuring of AC Voltage/Frequency/DC Voltage

- Select the AC voltage/frequency or the DC voltage tap position.
 - Insert the red probe into the red jack (positive end), and insert the black probe into the black jack (COM end).
 - Touch the measured part with the red and black probes, such as a power socket (Figure 2).
 - Read the measured value from the LCD screen.
- △ When measuring the voltage or frequency, the maximum input voltage is 600V (AC/DC), and this must not to be exceeded. Otherwise, it is possible to cause an electric shock and damage the instrument.

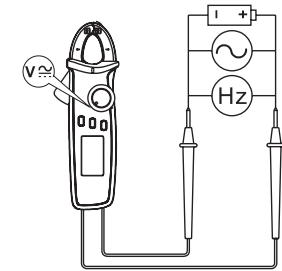


Figure 2

2. Measuring of Resistance/Circuit on-off/ Diode/ Capacitance

- Select the corresponding functions.
 - Insert the red probe into the red jack (positive end), and insert the black probe into the black jack (COM end).
 - Connect the probe in parallel to the measured part (Figure 3).
 - Read the measured value from LCD screen.
- △ Do not input a voltage rating higher than DC 60V or AC 30V when measuring the range of resistance/ capacitance/ diode, in order to avoid personal injury or damage the instrument.

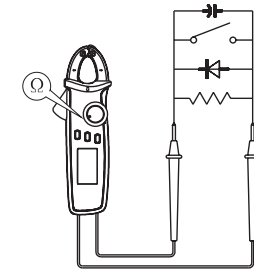


Figure 3

3. Measuring of AC/DC Current (Figure 4)

- 1) AC current
 - Select the geometric center position of AC current tap position. Make sure the left and right clamp heads are completely closed, with no gap between them. Read the measured data from the LCD.
- 2) DC current
 - Select DC current tap position.
 - Press the ZERO reset key before measuring to clear the readings to zero.
 - Open the clamp head, clasp the wire (single wire), and put the wire in the geometric center indicated in the clamp head. Make sure that the left and right clamp heads are completely closed, without gaps between them.

- Read the measured data from the LCD. If the reading is positive, it means that current flows from the positive end marked on the clamp head to the negative end, and vice versa. Take out the probe when measuring the current, in order to avoid an electric shock.

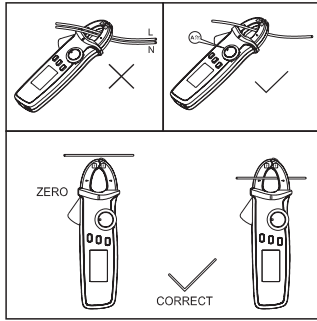


Figure 4

4. Measuring of NCV Non-contact Electric Field (Figure 5)

The front end of clamp head can be used for sensing at 8-15mm from the tested object, in order to detect the existence of AC voltage or electromagnetic field. When the simulating value of AC voltage: \leq threshold voltage of 100V, it displays "EF"; $>$ threshold voltage of 100V, LCD will display "-", i.e., "--", "---", and "----" corresponding to the sensing voltage. Meanwhile, the buzzer will ring with differentiated rhythms and the NCV light will flash, to distinguish the intensity of the electric field. When measuring range is switched to the NCV measuring, the measuring probe shall be pulled out to avoid an electric shock.

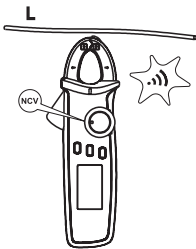


Figure 5

5. Measuring of Temperature

- Temperature sensor: only applicable to K type temperature sensor.
- Switch to select the temperature of the tap position.
- Input end open circuit instrument displays OL, and displays ambient temperature in case of short circuit.
- Connect to K type temperature sensor with the black probe into the COM end and the red probe into the °C end to measure °C or °F values. °F=1.8°C +32
Caution: the K type (nickel-chromium to nickel-silicon) point thermocouple temperature sensor configured is only applicable to the measurement of the temperature below 230°C/446°F. Measuring of higher temperature shall be performed with the K type temperature sensor with the applicable measuring range.

6. Other Functions

- Holding the HOLD key for 2 seconds to turn on or off the LCD backlight.
- Auto-OFF
If the knob switch is not operated for 15 minutes during the process of measuring, the instrument will start "Auto-OFF" to save energy.

During auto-OFF status, click any key to turn on the instrument, or turn the knob switch to OFF and restart it again. Auto-OFF means that the instrument enters super-low power consumption status.

- Stop auto-OFF:
Hold SELECT key, and then connect and start the instrument, 5 times of buzzing will be given out to prompt that the auto-OFF function will be cancelled. The auto-OFF function will be resumed when the instrument is switched off and then is restarted.
- The buzzer will give out 5 times of alarm around 1 minute before starting the auto-OFF status, and will give out 1 long alarm before turning it off. When auto-OFF function is cancelled, the buzzer will give out 5 times of alarm every 15 minutes.
- Buzzer: the buzzer will give out a short "beep" (about 0.25 second) if pressing any key or switching to valid functions. In tap positions, if the tested circuit is in sound conductivity ($\leq 10\Omega$), the buzzer will keep ringing. When the measured AC/DC voltage is higher than 600V or current is higher than 200A, the buzzer will also give out continuously interrupted "Beep" sound to warn against over-range.
- Low voltage detection: when the voltage is lower than 2.5V, the low battery symbol "⏻" will be displayed, when measuring accuracy might be reduced, and new battery shall be used in time. If the voltage is lower than 2.2V, the instrument will only show the low battery symbol after starting, but it will not work.
- When battery supply voltage is reduced to 2.6V, the LCD backlight will be dim or cannot be started, but the measuring function can still be available.

IX. Technical Indexes

Accuracy: $\pm(a\% \text{ reading} + b \text{ word count})$, warranty period is 1 year. Ambient temperature: 23°C \pm 5°C (73.4 °F \pm 9°F), relative humidity: $\leq 75\%$

1. Measuring of DC Voltage

Measuring Range	Resolution Ratio	Accuracy
200.0mV	0.1mV	$\pm(1\%+8)$
2.000V	1mV	$\pm(0.7\%+3)$
20.00V	10mV	$\pm(0.7\%+3)$
200.0V	100mV	$\pm(0.7\%+3)$
600V	1V	$\pm(0.7\%+3)$

⚠ Voltage input impedance: about 10M Ω . (Due to the high input impedance, the instable digit might be displayed in open circuit with 200mV measuring range, but such digit will be able to be measured stably in case of connection to tested source with an internal resistance lower than 10M Ω . However, the influence of measured source on measuring reading shall be considered.)

⚠ Maximum voltage input: $\pm 600V$.

2. Measuring of AC Voltage

Measuring Range	Resolution Ratio	Accuracy
2.000V	1mV	$\pm(1.0\%+3)$
20.00V	10mV	$\pm(1.0\%+3)$
200.0V	100mV	$\pm(1.0\%+3)$
600V	1V	$\pm(1.2\%+3)$

⚠ Voltage input impedance is all around 10M Ω .
⚠ Maximum voltage input: 600Vrms.

- Display true virtual value. Frequency response: 45-400Hz
- Accuracy assurance range: 5-100% measuring range, with less than 10 residual counts allowable in case of short circuit.

- The following deviation shall be added to calculate non-sinusoidal wave based on crest factor:
 1. Crest factor is 1-2: add 3%.
 2. Crest factor is 2-2.5: add 5%.
 3. Crest factor is 2.5-3: add 7%.

3. Measuring of Frequency

Functions	Measuring Range	Resolution Ratio	Accuracy
ACV frequency Hz	10Hz-60kHz	0.001Hz-0.1kHz	$\pm(0.1\%+4)$

4. Measuring of Resistance

Measuring Range	Resolution Ratio	Accuracy
200.0 Ω *	0.1 Ω	$\pm(1.0\%+2)$
2.000k Ω	1 Ω	$\pm(1.0\%+2)$
20.00k Ω	10 Ω	$\pm(1.0\%+2)$
200.0k Ω	100 Ω	$\pm(1.0\%+2)$
2.000M Ω	1k Ω	$\pm(1.2\%+3)$
20.00M Ω	10k Ω	$\pm(1.5\%+5)$

⚠ *Measuring range: measured value=displayed value-probe short circuit value
Open circuit voltage: around 1V
Overload protection: 600V-PTC

5. \rightarrow Circuit on-off and \rightarrow Measuring of Diode

Measuring Range	Resolution Ratio	Remarks
\rightarrow	0.1 Ω	When circuit off resistance value is $\geq 150\Omega$, buzzer will not ring; when the resistance is set as $\leq 10\Omega$ on under sound circuit conductivity, the buzzer will ring continuously.
\rightarrow	1mV	Open circuit voltage is around 3.2V; silicon PN junction normal voltage is around 0.5-0.8V.

⚠ Overload protection: 600V-PTC

6. Measuring of Capacitance

Measuring Range	Resolution Ratio	Accuracy
2nF	1pF	$\pm(4\%+10)$
20.00nF-200.0 μ F	10pF-100nF	$\pm(4\%+5)$
2.000mF-20.00mF	1 μ F-10 μ F	± 10

⚠ Overload protection: 600V-PTC

- For tested capacitance of $\leq 1 \mu F$, it is suggested to test under ZERO mode to ensure the measuring accuracy.

7. Measuring of DC Current

Measuring Range	Resolution Ratio	Accuracy
20.00A	10mA	$\pm(2\%+3)$
200.0A	100mA	$\pm(2\%+3)$

⚠ Overload protection: 200A

- Due to the existence of the earth and other magnetic fields, and in order to ensure the accuracy of measuring readings, ZERO key shall be pressed before measuring.

8. Measuring of AC current

Measuring Range	Resolution Ratio	Accuracy
20.00A	10mA	$\pm(2.5\%+8)$
200.0A	100mA	$\pm(2.5\%+8)$

⚠ Overload protection: 200A

- Accuracy assurance range: 5-100% measuring range, with less than 20 residual counts allowable in case of 2A open circuit.
- Display true virtual value. Frequency response: 50-60Hz
- The following deviation shall be added to calculate nonsinusoidal wave according to crest factor:
 - a) Crest factor is 1-2: add 3%.
 - b) Crest factor is 2-2.5: add 5%.
 - c) Crest factor is 2.5-3: add 7%.

9. Measuring of Temperature

Functions	Measuring Range	Resolution Ratio	Accuracy
°C	-40~0°C	1°C	± 3
	>0~100°C		$\pm(1.0\%+3)$
	>100~1000°C		$\pm(2.0\%+3)$
°F	-40~32°F	1°F	± 5
	>30~212°F		$\pm(1.5\%+5)$
	>212~1832°F		$\pm(2.5\%+5)$

X. Maintenance and Repair

⚠ Warning: please be sure to cut off the power supply before opening the rear cover of the instrument, and pull out the probe from the jack and the tested circuit.

1. General Maintenance

- The shell shall be regularly deaned with a wet cloth and a cleanser. Abradant or solvent shall not be used.
- If there are abnormalities in the instrument, stop using and send it for repair.
- If validation or repair is needed, the instrument shall be sent to be repaired by a qualified professional maintenance staff or the designated maintenance department.

2. Battery Replacement (as shown in Figure 6)

- If LCD displays the low battery symbol "⏻", the internal battery shall be replaced immediately. Otherwise it will influence the accuracy of measuring.
- Battery specification: AAA 1.5v x 2pieces

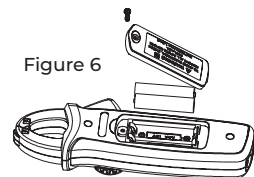


Figure 6

Operation Sequence

1. Turn the power switch to "OFF" position, and remove the probe from the jack.
2. Unscrew the screw in the rear battery cover. Take out the batteries as shown in the figure.
3. Replace 2PCS new batteries (specification: AAA 1.5V).