Hantek

Tablet1000 series

Tablet oscilloscope

Quick Guide

2022.05

Warranties and Declarations

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Product certification

Hantek certified Tablet1000 series oscilloscope to meet China's national industry standards and has passed the CE certification.

Contact us

If you have any questions when using the products of Qingdao Hantek Electronics Co., LTD., you can obtain service and support through the following ways:
Email: service@hantek.com, support@hantek.com
Website: http://www.hantek.com

1 Safety requirements

1.1 Summary of general safety matters

Read the following safety precautions carefully to avoid injury and to prevent damage to this product or any product connected. To avoid possible dangers, please use this product in accordance with the regulations.

- **Only professionally authorized personnel can perform repairs.**

- **Use the right power cable.**

   Use the power cable approved by the country in which the product is used only.

- **Connect and disconnect correctly.**

   Before connecting the probe to the circuit being measured, please connect the probe to the oscilloscope first. Before disconnecting the probe from the oscilloscope, please disconnect the probe and the circuit under test first.

- **Ground the product.**

   To avoid electric shocks, the product is grounded through a grounding conductor of the power cable. The grounding conductor must be connected to the ground before connecting the input or output terminals of the product. Ensure that the product is properly grounded.

- **Connect the probe properly.**

   The ground wire of the probe is the same as the ground potential. Do not connect the ground wire to high voltage.

- **View all terminal rating values.**

   To avoid fire or excessive current, please check all rating values and signs on the product. Please consult the product manual for details of the rating values before connecting the product.

- **Do not operate with the cover open.**

   Do not run the product with the cover or panel open.

- **Avoid circuit exposure.**

   Do not touch exposed connectors and components after power is switched on.

- **Do not operate if the product is suspected to be faulty.**

   If you suspect that the product has been damaged, please ask qualified maintenance personnel to check it.

- **Maintain proper ventilation.**

- **Do not operate in a humid environment.**

- **Do not operate in inflammable or explosive environment.**

- **Please keep the product surface clean and dry.**

Warning:

Equipment that meets Class A requirements may not provide adequate protection

for broadcast services in residential environments.

1.2   Security terms and signs

Security terms in this manual:

Warning:

Indicates that the operation may not cause immediate damage to you.

Note:

Indicates that the operation may cause damage to the product or other property.

Safety terms on products:

Warning:

Indicates a potential hazard may be caused to you if you do not perform this operation.

Safety signs on the product:

警告

1.3   Measurement category

Measurement category

This instrument can be used for measurement under class I.

Warning:

This instrument is only allowed to be used in the specified measurement class.

Measurement class definition

- **Class I refers to measurements taken on a circuit not directly connected to the main power supply.** For example, measurements made on circuits that are not exported from a main power supply, especially from a protected (internal) main power supply. In the latter case, the instantaneous stress will change. Therefore, the user should understand the instantaneous capacity of the instrument.
- **Class II refers to measurements taken on a circuit directly connected to low-voltage instruments.** For example, measurements made on household appliances, portable tools, and similar equipment.
- **Class III refers to measurements taken on construction equipment.** For example, measurements made on switchboards, circuit breakers, circuits (including cables, busbars, junction boxes, switches, sockets) in fixed equipment, as well as equipment for industrial use and certain other equipment (for example, fixed motors permanently connected to fixed instruments).
- **Class IV refers to measurements taken at the source of low-voltage equipment.** For example, measurements made on electricity meters, primary overcurrent protection equipment, and pulse control units.

1.4   Working conditions

Temperature

Operating temperature: 0°C -50°C
Storage temperature: -20°C -70°C

Humidity

≤+104℉ (≤+40°C): Rh≤90%
106℉ to 122℉ (+41°C to 50°C): Humidity≤60%

Warning:

To avoid short circuit or electric shock, do not operate the instrument in a humid environment.

Altitude

Operating and not operating: 3,000m (10,000 ft).
Random vibration: 0.31g RMS at 50Hz to 500Hz, 10 minutes per axial direction.
Not operating: 2.46g RMS from 5Hz to 500Hz, 10 minutes per axial direction.

Installation (Overvoltage) Class This product is powered by a main power supply

conforming to Installation (overvoltage) Class II.

Warning:

Ensure that no overvoltage (such as voltage caused by lightning) reaches the product. Otherwise, the operator may suffer electric shocks.

Installation (overvoltage) class definition

Class I refers to the signal level, which is applicable to the measuring terminal of the instrument connected to the source circuit. Measures have been taken to limit the instantaneous voltage to the corresponding low level.
Class II refers to the local distribution level, which is applicable to instruments connected to the mains (AC) supply.

Pollution level

Level 2

Pollution level definition

- **Level 1:** No pollution, or only dry non-conductive pollution. This pollution level has no impact. For example: clean room or air-conditioned office environment.
- **Level 2:** Generally, only dry non-conductive pollution. Temporary conduction due to condensation may sometimes occur. For example: general indoor environment.
- **Level 3:** Conductive pollution, or dry non-conductive pollution becoming conductive due to condensation. For example, an outdoor environment with a canopy.
- **Level 4:** Permanent conductive pollution through conductive dust, rain, or snow. For example: outdoor places.

Security level

Level 1 - Grounded products

1.5   Maintenance and cleaning

Maintenance:

Do not make the LCD exposed to direct sunlight for a long time when placing the oscilloscope.

Cleaning:

Regularly check the oscilloscope and probe according to the requirements of the operating conditions, please follow the following steps to clean the outer surface of the instrument:

1) Using a lint-free cloth to remove the dust from the outside of the oscilloscope and

probe. Please be careful to avoid scratching the smooth display filter material.

2) Using a soft cloth soaked with water to clean the oscilloscope. For more thoroughly clean, use 75% isopropyl alcohol aqueous solvent

Note:

To avoid damage to the oscilloscope or the surface of the probe, please do not use any corrosive reagent or chemical cleaning reagent.

Warning:

Before repowering, please make sure the instrument is completely dry, to avoid electrical short circuit or even personal injury caused by moisture.

1.6   Environmental precautions

The following sign indicates that this product conforms to the requirements set out by the WEEE Directive 2002/96/EC.

Equipment recycling:

Producing the instrument requires the extraction and use of natural resources.   Some substances contained in the instrument may be harmful to the environment or human health if the product is not disposed of properly. To avoid the release of harmful substances into the environment and reduce the use of natural resources, it is recommended that appropriate methods be used to recycle this product to ensure that most of the materials can be correctly reused.

2 Document overview

This document is used to guide the user to quickly understand the front and back panels, user interfaces, and basic operation methods of the Tablet1000 series digital oscilloscopes.

Tip:

The latest version of this manual can be downloaded at (http://www.hantek.com).

Document number:

202205

Software version:

Software upgrade may change or increase product functionalities, please pay attention to Hantek website for the latest version.

Document format conventions:

1   Virtual keys and main interface icons

Use **[name]** to represent virtual keys and main interface icons. For example, **[HOME]** is for , **[OSC]** is for .

2   Menu

Use "menu text (bold) + color" to represent a label or a menu option. For example, **Basic Settings** means to click the "Basic Settings" option on the current operation interface to enter the function configuration menu of "Basic Settings".

3   Operation steps

Use ">" to represent the next step. For example, **Utility**> **Acquire** means click **Utility** label before clicking **Acquire** menu.

Document content conventions:

Tablet1000 series tablet oscilloscope consists of the following models. Unless otherwise specified, this manual uses TO1254D as an example to describe the Tablet1000 series and basic operations.

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1112	2	110MHz	250MSa/S	-	-
TO1112C	2	110MHz	250MSa/S	-	Yes
TO1112D	2	110MHz	250MSa/S	25MHz	Yes

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1152	2	150MHz	1GSa/S	-	-
TO1202	2	200MHz	1GSa/S	-	-
TO1252	2	250MHz	1GSa/S	-	-
TO1152C	2	150MHz	1GSa/S	-	Yes
TO1202C	2	200MHz	1GSa/S	-	Yes
TO1252C	2	250MHz	1GSa/S	-	Yes
TO1152D	2	150MHz	1GSa/S	25MHz	Yes
TO1202D	2	200MHz	1GSa/S	25MHz	Yes
TO1252D	2	250MHz	1GSa/S	25MHz	Yes
TO1154	4	150MHz	1GSa/S	-	-
TO1204	4	200MHz	1GSa/S	-	-
TO1254	4	250MHz	1GSa/S	-	-
TO1154C	4	150MHz	1GSa/S	-	Yes
TO1204C	4	200MHz	1GSa/S	-	Yes
TO1254C	4	250MHz	1GSa/S	-	Yes
TO1154D	4	150MHz	1GSa/S	25MHz	Yes
TO1204D	4	200MHz	1GSa/S	25MHz	Yes
TO1254D	4	250MHz	1GSa/S	25MHz	Yes
TO1154AUTO	4	150MHz	1GSa/S	25MHz	Yes
TO1204AUTO	4	200MHz	1GSa/S	25MHz	Yes

Model	Channel	Bandwidth	Sampling rate	Signal source	Multimeter
TO1254AUTO	4	250MHz	1GSa/S	25MHz	Yes

Table 2.1 Model21

3 <u>General checking</u>

Check the shipping package

After receiving the oscilloscope, please follow the following steps to check the instrument: Check whether there is any damage caused by transportation: If the packaging cartons or protective foam pads are seriously damaged, please keep them until the whole machine and accessories pass the electrical and mechanical testing.

Check the accessories

The details of the accessories are provided in Appendix A: Accessories at the end of the user manual. If you find any accessory missing or damaged, please contact the dealer responsible for this business.

Check the machine

If you find the instrument is damaged, not working properly, or unable to pass the performance test, please contact the dealer responsible for this business.

4 Product introduction

The new generation of handheld tablet oscilloscope, TO1000 series: Using 7 inch industrial specification TFT-LCD 800*480 resolution liquid crystal display, supporting multi-touch capacitive operation; Three functions, which are oscilloscope, signal source, multimeter; Two or four analog channels; Built-in signal source supporting 25MHz standard waveform output, a variety of built-in arbitrary waves; Data recording function provided by the multimeter, which can monitor and record voltage, current, resistance and other data changes for a long time and generate the trend chart; Standard 9V2A/5V3A/12V1.5A charger, Type - C input interface, can share a charging device with a mobile phone; Powered by 4 or 2 18650 lithium batteries; With a supporting stand, able to use and place anywhere.

4.1 Front panel
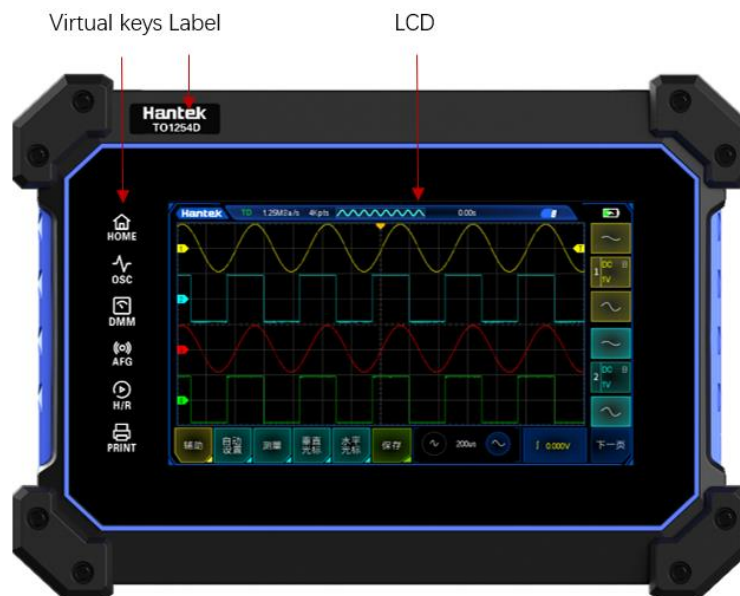
Figure 4.1 Front panel41

1 Trademark Label
2 Touch button
3 LCD

4.2 Rear panel

Figure 4.2 Rear panel42

1 The supporting stand

4.3 User interface
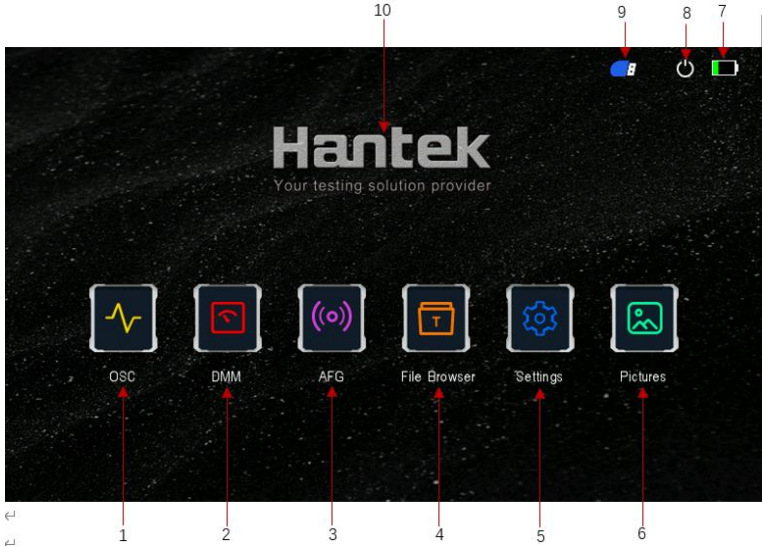
Figure 4.3 User interface43

1 Oscilloscope   6 Pictures

2 Multimeter	7 Battery
3 Signal source	8 Power switch
4 File Browsing	9 USB icon
5 Settings	10 Hantek icon

5 Preparation before use

5.1   Connect the power supply

The oscilloscope is equipped with 4 3.7V 2600 mAh batteries.

Press the power button, the buzzer rings, and the instrument starts up. Press the power button again, the instrument shuts down. Before starting, please make sure the batteries have enough power.

When the battery box on the screen is blank, it indicates that the battery is about to run out.

When the battery level is lower than 3.5V, the oscilloscope will prompt "shut down after 30s". Tap the screen to cancel the popup box. "Shutdown after 20 seconds" and "shutdown after 10 seconds" will appear subsequently. To avoid automatic shutdown due to insufficient power supply, please charge in time.

If the power button is pressed and the buzzer rings continuously but the oscilloscope doesn't respond, it may indicate that the battery power may be exhausted. Please charge in time.

You can charge the oscilloscope in the following ways:

Charge the oscilloscope through the power adapter: connect the oscilloscope to the power socket through the USB data cable and the power adapter in accessories for charging.

When charging, if the machine is not started, the indicator light of the power button will be on; If the machine is turned on, the battery box on the screen will change (slow charge , quick charge).

When the battery is full, the oscilloscope will stop charging automatically.

5.2   Boot check

Press the power button   at the bottom of the right panel to start the instrument.

Shutdown:

- Tap the shutdown icon at the top of the main interface to shut down directly.

- In the boot state, press the power button to shut down directly.

5.3   Set the system language

This oscilloscope supports Chinese and English. Click **[HOME]** to enter the main interface and click **[Settings]** > **Language** to select the language.

⊕ 语言

The default language is English.

5.4   Functionality check

Click **[OSC]** to enter the oscilloscope interface. Click **Utility** > **Default** in the lower left corner of the screen to restore the oscilloscope to factory default configurations.

5.5   Probe compensation

Security

When using the probe, in order to avoid electric shock, fingers should be kept behind the safety ring. Do not touch the metal part on the top of the probe when the probe is connected to the high voltage power supply. Before any measurement, connect the probe to the oscilloscope and ground the ground end.
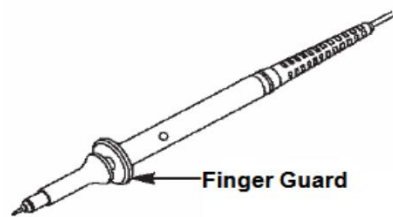
Figure 5.1 Probe51

Manual probe compensation

When the probe is connected to any input channel for the first time, perform this adjustment to match the probe to the input channel. Probes that are not compensated or compensated with bias can lead to measurement errors. To adjust the probe compensation, please follow the following steps:

1)   Connect one end of the probe to the CH1 channel and the other end to the AFG channel.

2)   Enter the oscilloscope interface, click **Utility** -> **probe calibrate**, and set the switch of the probe to 10X as prompted.

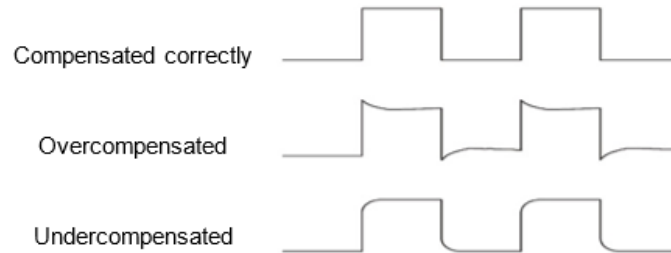3)   Check the shape of the displayed waveform

Compensated correctly

Overcompensated

Undercompensated

Figure 5.2 Probe compensation52

3) If necessary, adjust the variable capacitance on the probe with a non-metallic screwdriver until the waveform displayed on the screen is "compensated correctly" as shown above.
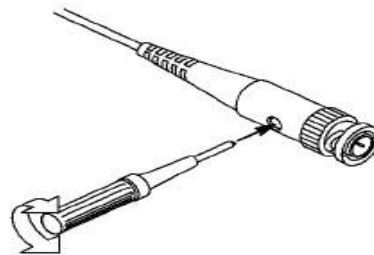If necessary, repeat Step 3. The adjustment method is shown in the following figure.

Figure 5.3 Adjusting the probe53

6 Touch screen gestures

This instrument is mainly operated directly on the built-in capacitive touch screen, supporting multi-touch operation, including touching, kneading and dragging. With simple, convenient, flexible and many other characteristics, providing better operation experience.

6.1 Touching

Tap a menu or function on the screen with your finger as shown in the following picture. The functions that touching can achieve are:

- Touch the menu on the screen to operate on the menu.
- Touch the virtual keyboard to set the name of an image or file.
- Touch the numeric keypad and set various parameters.
- Touch various keys, such as close, up, down, etc.

Figure 6.1 Touch gesture61

6.2 Kneading

Move two fingers together or apart. Kneading gestures allow you to zoom in and out of the waveform. Slide the close fingers apart to enlarge a waveform and slide the separated fingers closer together to shrink a waveform as the following figure shows. The functions that can be achieved by kneading are:

- Knead vertically to adjust the vertical gear of the waveform.
- Knead horizontally to adjust the horizontal gear of the waveform.

Figure 6.2 Kneading gesture62

6.3   Dragging

After holding down the target, drag to the desired position as shown in the following figure. The functions that can be achieved by dragging are:

- Drag the waveform to change the displacement and offset of the waveform.
- Drag the cursor to change the cursor position.
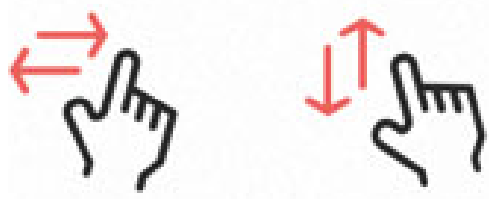- Drag the trigger to change the trigger position.

Figure 6.3 dragging63

7 <u>Setting parameters</u>

Use the touch screen to set the parameters of the instrument.

Click the parameter to be set, and the virtual keyboard will pop up. Set parameters through the keyboard.

Input a string

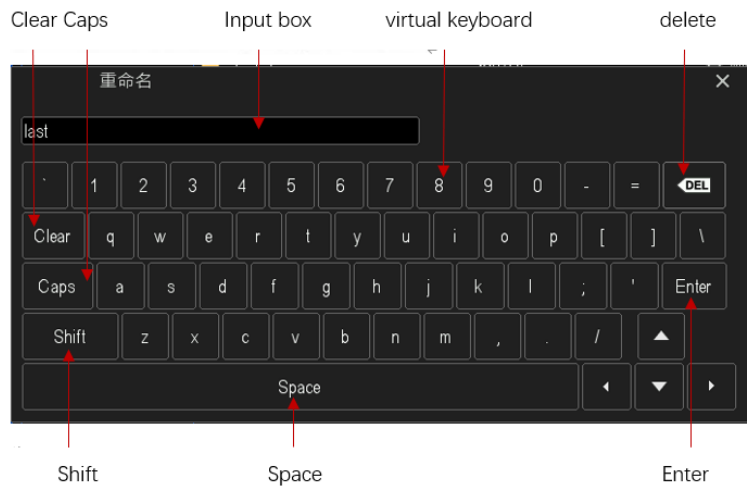When naming a file or folder, you need to enter a string as shown in the following figure.

Figure 7.1 Character keyboard71

1. Clear the name input box

   If the input box does not contain characters, go to the next step. If currently the input box contains characters, click "Delete" key to delete all the characters in sequence or click "Clear" key to remove all characters at a time.

2. Input uppercase letters

   To enter an uppercase letter, check whether the letters in the Virtual Keyboard are uppercase. If so, click the virtual keyboard to enter uppercase letters. Or you can click on the "Caps" key to switch to upper state, then click on the virtual keyboard to input uppercase letters. All input will be displayed in the input box.

3. Type lowercase letters

   Reference on one step, lowercase letters are default.

4. Enter a number or symbol

   The upper part of the virtual keyboard is digital areas. If you want to input symbols, you can click on the "Shift" key to switch digits into symbols. All input will be displayed in the input box.

5. Modify or delete characters that have been entered

   While input, you can modify or delete the entered characters. To delete entered characters, click the "Delete" key or "Clear" key on the virtual keyboard. To modify characters that has been entered, delete the characters and enter the characters again.

6. Input validation

   After input, click on the "Enter" button.

Input values

When modifying the parameters, the numeric keypad is used to input the desired value as shown in the following figure.
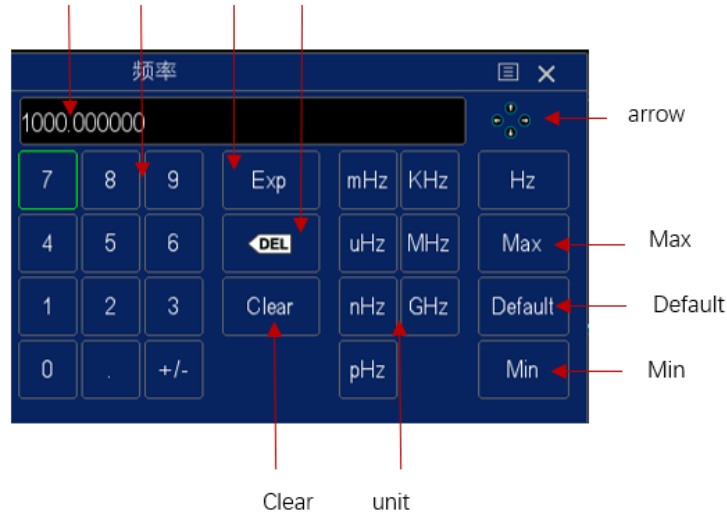

Figure 7.2 Numeric keypad72

Click on the digits or units in numeric keyboard to input them. After entering all the values and selecting the desired units, the numeric keypad is automatically turned off and the parameter setting is complete. You can also perform the following operations on the numeric keypad:

- Delete entered parameter value.
- Set the parameters to the maximum or minimum (sometimes especially referring to the maximum or minimum value under the current state).
- Set the parameter to the default value.
- Clear the parameter input box.
- Increase or decrease the number. Click to enter. Left and right arrows to determine the number, up and down arrows to increase or decrease the number. Long press the up and down arrows to change the number continuously.

8 Remote control

There are two main ways to control the instrument remotely:

1. Custom programming

The user can write programs to control the instrument with SCPI (Standard Commands for Programmable Instruments). For command and programming details, please refer to the Programming Manual of this series.

Steps:

● Download and install the IO software

Click the following website to download the latest IO software:

https//www.keysight.com/main/software.jspx?Ckey = 2175637 & lc = chi&cc = CN&nid = - 11143.0.00 & id = 2175637

Double-click the application to start the installation. Install the instrument step by step as prompted. The installation process may take several minutes.

After the installation is complete, the running IO software can be found in the lower right corner of the screen.

● Open IO - > Connection Expert - > Interaction IO, open the command window, and input commands with reference to the Programming Manual.
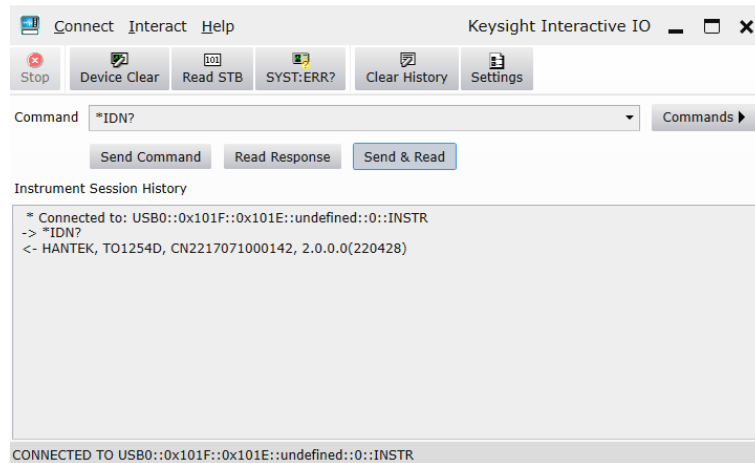
Figure 8.1 Command window81

2. Software

The user can use the upper computer software to control the instrument remotely. It is recommended to use the software provided by Hantek. You can go to Hantek website (http://www.hantek.com) to download the software.

Steps:

● Download and install the IO software

Click the following website to download the latest IO software:

https//www.keysight.com/main/software.jspx?Ckey = 2175637 & lc = chi&cc = CN&nid = - 11143.0.00 & id = 2175637

Double-click the application to start the installation. Install step by step as prompted. The installation process may take several minutes.

After the installation is complete, the running IO software can be found in the lower right corner of the screen.
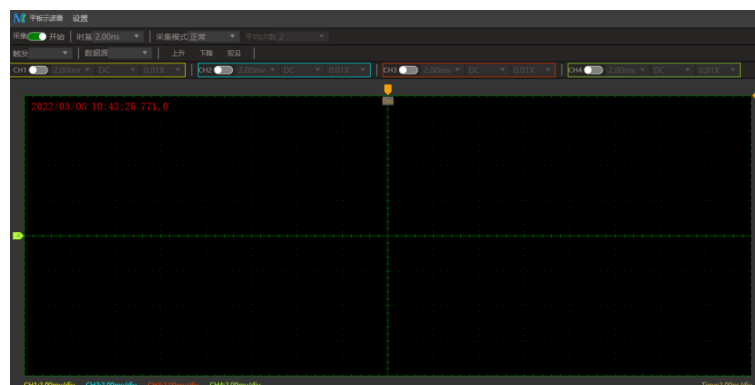
● Install the software, open the software.

Figure 8.2 Software window82

9 <u>More product information</u>

1 Obtain system information about the product

Click **Settings** > **System Information**. You can obtain the model, serial number, software version, hardware version, and firmware version of the instrument.

2 Check optional component information and installation

For more information, please refer to the relevant manual (you can go to Hantek website (http://www.hantek.com) to download).

- Tablet1000 UserManual: Provide the functions and operation methods, remote control methods, possible faults and troubleshooting methods, performance specifications, and ordering information of the product.
- Tablet1000 SCPIManual: Provide the SCPI command set for this product.
- Tablet1000 DataManual: Provide the main features and technical indicators of the product.