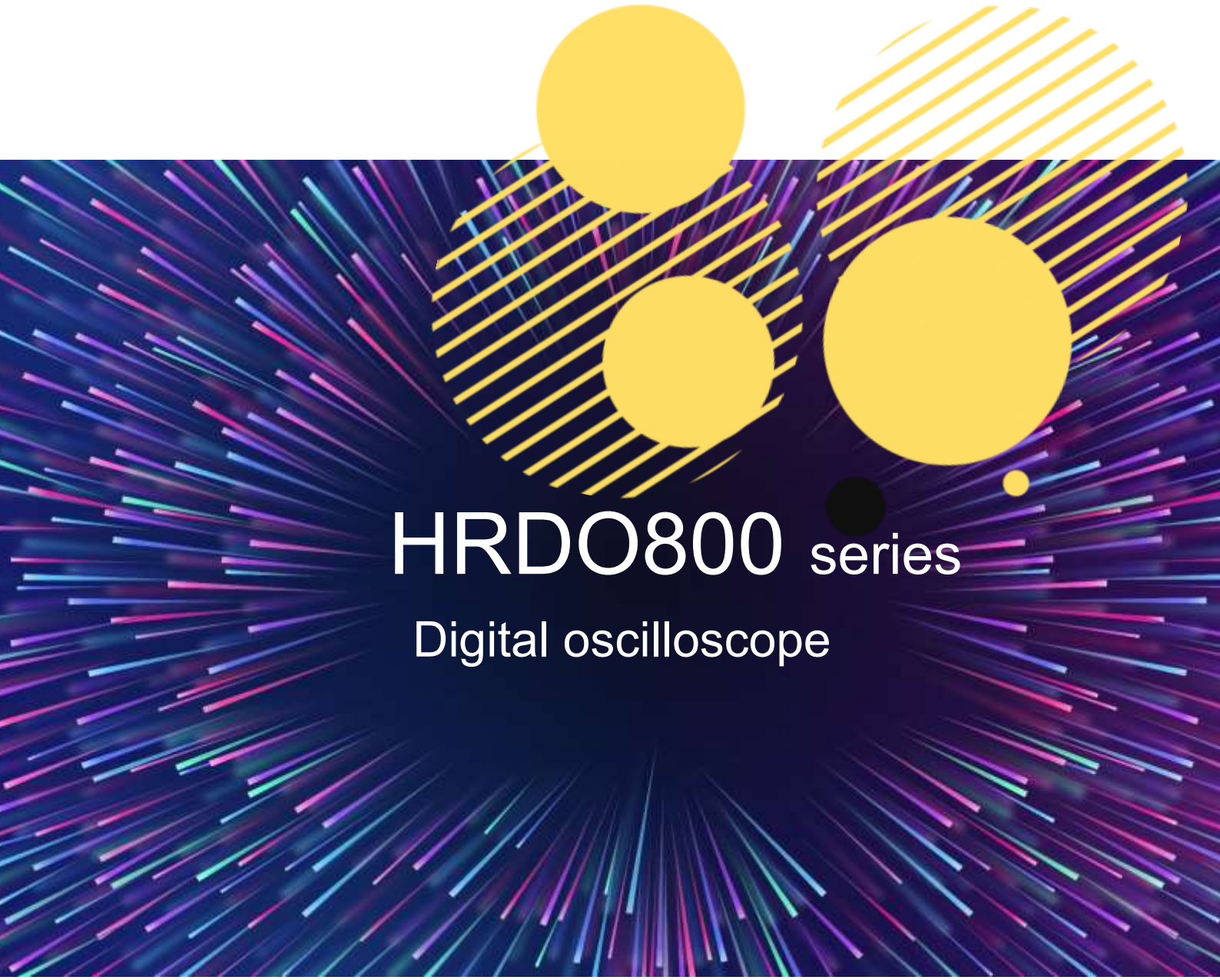
Hantek



HRDO800 series

Digital oscilloscope

Quick Guide

202607

Warranties and Declarations

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Product certification

Hantek certified HRDO800 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 Electronic 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 requirement

1.1 Summary of general security issues

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.

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- **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:

Hazardous Voltage	Safety Warning
	

1.3 Measurement category

Measurement category

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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 Ventilation Requirement

This oscilloscope uses a fan to force cooling. Please make sure that the air intake and exhaust areas are free from obstructions and have free air. When using the oscilloscope in a bench-top or rack setting, provide at least 10 cm clearance beside, above and behind the instrument for adequate ventilation.



Note:

Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

1.5 Working Environment

Temperature

Operating: 0°C to 50°C
Non-operating: -30°C to 70°C

Humidity

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- Operating:
  Below +30°C: ≤95%RH (without condensation)
  +30°C to +40°C: ≤75%RH (without condensation)
  +40°C to +50°C: ≤45%RH (without condensation)
- Non-operating:
  Below 65°C: ≤95% RH (without condensation)



Warning:

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

Altitude

Operating: below 3 km
Non-operating: below 15 km

Installation (Overvoltage) Category

This product is powered by mains conforming to installation (overvoltage) category II.



Warning:

Ensure that no overvoltage (e.g. from lightning) reaches the product. Otherwise, the operator may be in danger of receiving electric shock.

Installation (Overvoltage) Category Definitions

Installation (overvoltage) category I refers to signal level which is applicable to equipment measurement terminals connected to the source circuit. Among these terminals, precautions are done to limit the transient voltage to a low level. Installation (overvoltage) category II refers to the local power distribution level which is applicable to equipment connected to the AC line (AC power).

Pollution Degree

Pollution Degree 2

Pollution Degree Definition

- **Pollution Degree 1:** No pollution or only dry, nonconductive pollution occurs. The pollution has no effect. For example, a clean room or air-conditioned office environment.
- **Pollution Degree 2:** Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected. For example, indoor environment.
- **Pollution Degree 3:** Conductive pollution or dry nonconductive pollution that becomes conductive due to condensation occurs. To be found in industrial environment or construction sites (harsh environments). For example, sheltered outdoor environment.
- **Pollution Degree 4:** The pollution generates persistent conductivity caused by

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conductive dust, rain, or snow. For example, outdoor areas.

Security level

Class 1 - Grounded products

1.6 Care and Cleaning

Care:

Do not expose the LCD to direct sunlight for a long time when storing or placing the oscilloscope.

Cleaning:

If the oscilloscope and probe are inspected frequently as required by operating conditions, clean the outer surface of the instrument by following the following steps:
1) Use a lint - free cloth to remove the dust outside the oscilloscope and probe. Please be careful to avoid scratching the smooth display filter material.
2) Clean the oscilloscope with a soft cloth soaked in water. For a more thorough cleaning, use a aqueous solution of 75% isopropyl alcohol.



Note:

In order to avoid damaging the surface of oscilloscope or probe, do not use any corrosive reagent or chemical cleaning reagent.



Warning:

Before powering on the device again, ensure that the device is dry enough to avoid electrical short circuit or personal injury caused by moisture.

1.7 Environmental Considerations

The following symbols indicate that the product complies with the requirements of WEEE Directive 2002/96/EC.



Equipment recovery:

Producing the device requires the extraction and use of natural resources. Some substances contained in the equipment may be harmful to the environment or human health if the product is not disposed of properly. In order to avoid the release of harmful substances into the environment and reduce the use of natural resources, it is

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recommended that appropriate methods be used to recycle this product to ensure that most of the materials can be correctly reused.

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2 Document overview

This document describes how to quickly understand the front and back panels, user interfaces, and basic operation methods of the HRDO800 series digital oscilloscopes.

Tip:

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

Document number:

202607

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, **[Utility]** is for 

.

2 Menu

Use "menu text (bold) + color" to represent a label or a menu option. For example, **Sound** means turn on or off sound of the machine operation.

3 Operation steps

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

Document content conventions:

HRDO800 series tablet oscilloscope consists of the following models. Unless otherwise specified, this manual uses HRDO834XG as an example to describe the HRDO800 series and basic operations.

Model	Channel	Sampling Rate	Bandwidth	Signal Source
HRDO802X	2	1.25GSa/s	80MHz	-
HRDO804X	4	1.25GSa/s	80MHz	-
HRDO812X	2	1.25GSa/s	120MHz	-

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Model	Channel	Sampling Rate	Bandwidth	Signal Source
HRDO822X	2	1.25GSa/s	250MHz	-
HRDO824X	4	1.25GSa/s	250MHz	-
HRDO832X	2	1.25GSa/s	300MHz	-
HRDO834X	4	1.25GSa/s	300MHz	-
HRDO802XG	2	1.25GSa/s	80MHz	1
HRDO804XG	4	1.25GSa/s	80MHz	1
HRDO812XG	2	1.25GSa/s	120MHz	1
HRDO814XG	4	1.25GSa/s	120MHz	1
HRDO822XG	2	1.25GSa/s	250MHz	1
HRDO824XG	4	1.25GSa/s	250MHz	1
HRDO832XG	2	1.25GSa/s	300MHz	1
HRDO834XG	4	1.25GSa/s	300MHz	1
HRDO824X	4	1.25GSa/s	250MHz	-

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3 General examination

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

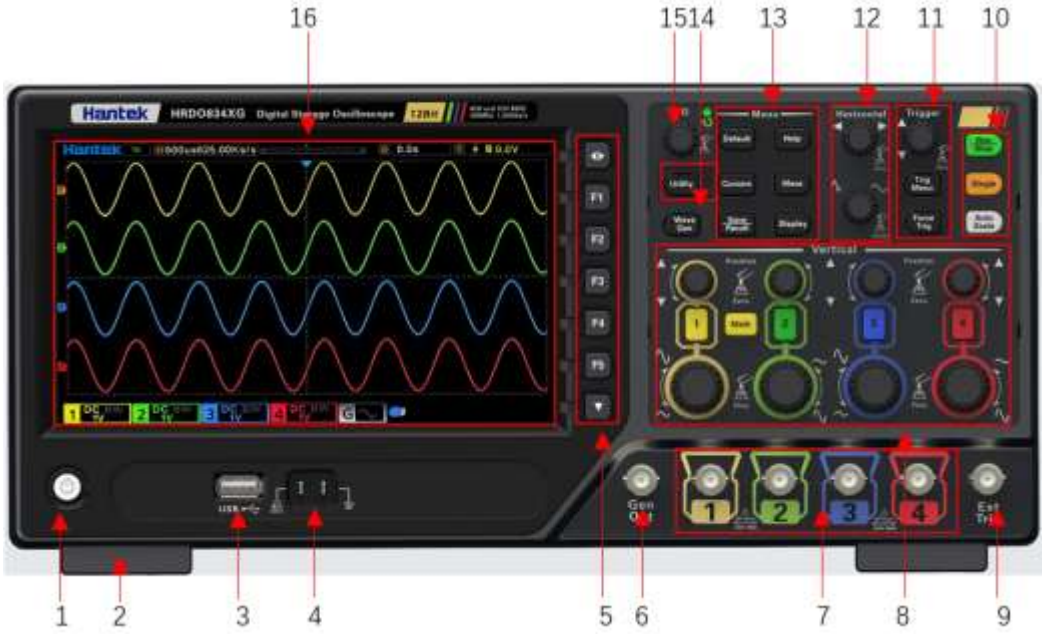
If you find the instrument is damaged, not working properly, or unable to pass the performance test, please contact the dealer responsible for this business.

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4 Product Overview

HRDO800 series digital oscilloscope has comprehensive functions and outstanding performance, with a sampling rate of 1.25GSa/s and a maximum bandwidth of 300MHz across the entire range. Built in arbitrary waveform generator, capable of outputting 5 standard waveforms and supporting custom arbitrary waveform output; Standard configuration includes 7 triggering modes including edge, pulse, slope, timeout, window, interval, and under amplitude, as well as 5 bus analysis and protocol decoding functions including UART, LIN, CAN, SPI, and IIC; 32 automatic measurement and threshold measurement functions, with test results supporting statistical analysis; Standard SCPI remote control instructions, convenient for users to build testing systems.

4.1 Front Panel Overview



No.	Description
1	Power Key
2	Bracket
3	USB HOST Interface
4	Probe Compensation Signal Output Terminal/Ground Terminal
5	Menu Selection Key
6	Gen Out

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7	Analog Channel Input
8	Vertical Control System, Waveform Control System
9	Ext Trig
10	Quick Keys for Operating Mode
11	Trigger Control System
12	Horizontal Control System
13	Menu Function Buttons
14	Wave Gen
15	Multi Functional Knob
16	Display

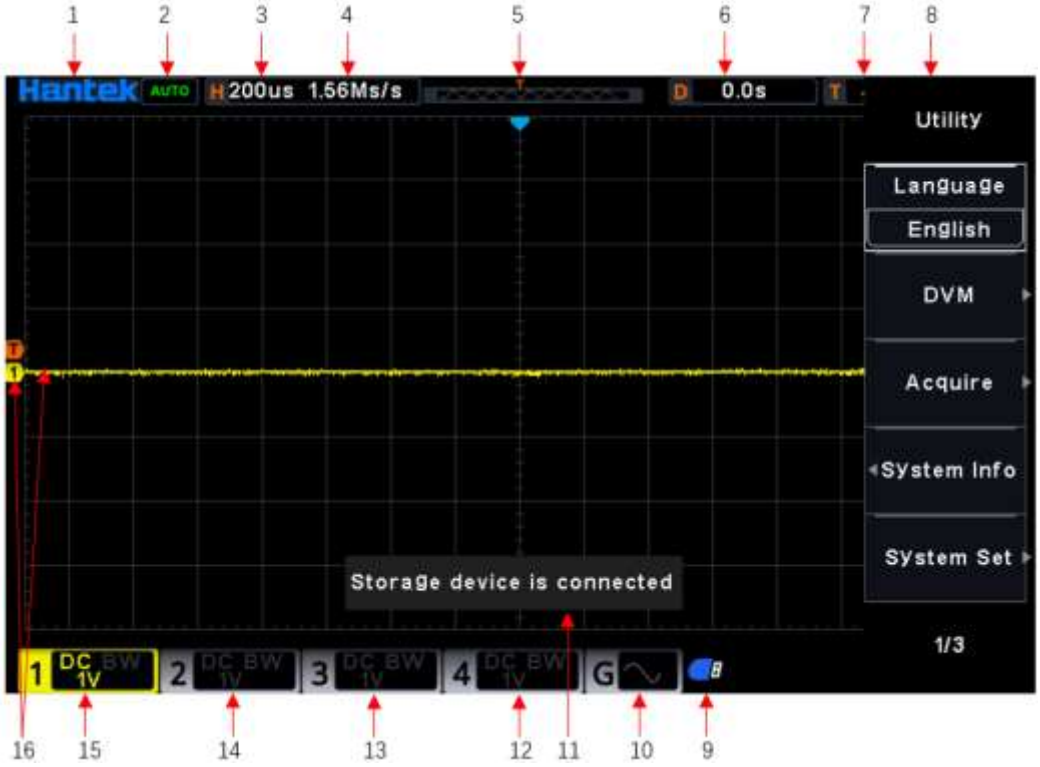
4.2 Rear Panel Overview



No.	Description
1	USB DEVICE
2	Power Socket

3	Handle

4.3 User Interface



1. **Hantek logo:**

   Representing the Hantek trademark.

2. **Running status:**

   The operating status of the oscilloscope includes READY, TD, STOP, and AUTO.

3. **Horizontal time base:**

   Represents the length of time represented by each grid on the horizontal axis of the screen. The horizontal knob can be used to modify this parameter.

4. **Sampling rate:**

   Display the current sampling rate of the analog channel. The sampling rate will change with the variation of the horizontal time base.

5. **Trigger Position Marker:**

   Display the trigger position of the waveform in the waveform memory and on the screen.

6. **Horizontal displacement:**

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Adjust parameters through the horizontal knob to display specific horizontal position values.

7. **Trigger level:**

   Display the current trigger level of the analog channel.

8. **Operation menu:**

   Press the menu button in the key area to open the corresponding menu.

9. **USB:**

   If the icon is lit or activated, it indicates that the USB drive is connected.

10. **Signal generator:**

    Display the open status of the signal generator.

11. **Message box:**

    Display prompt message.

12. **CH4 status label:**

    Display the status of CH4. Show the vertical scale, channel coupling, and bandwidth limit of CH4.

13. **CH3 status label:**

    Display the status of CH3. Show the vertical scale, channel coupling, and bandwidth limit of CH3.

14. **CH2 status label:**

    Display the status of CH2. Show the vertical scale, channel coupling, and bandwidth limit of CH2.

15. **CH1 status label:**

    Display the status of CH1. Show the vertical scale, channel coupling, and bandwidth limit of CH1.

16. **Simulate channel labels/waveforms:**

    Different channels are labeled with different colors, and the channel labels and waveform colors are consistent.

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5 Preparation before use

1. To Adjust the Supporting Legs

There is a bracket design at the bottom of the machine, and the bracket should be adjusted appropriately to tilt the oscilloscope slightly upwards, which can better stabilize the placement of the oscilloscope and facilitate observation and operation. When not using the machine, simply close the bracket.

2. To Connect to AC Power

The specifications of the AC power supply that this oscilloscope can input are: 100-120V, 50/60Hz; 100-240V, 50/60Hz. Please connect the oscilloscope to the power supply using the power cord provided in the attachment, as shown in the figure.



Warning:

To avoid electric shock, ensure that the instrument is correctly grounded.

3. Turn-on Checkout

When the machine is properly plugged in and the oscilloscope is powered on, press the power button in the lower left corner of the front panel to start the oscilloscope. During the startup process, all the button lights on the front panel will light up for a few seconds, and the oscilloscope will perform a series of self checks. After the self check is completed, the startup screen will appear.

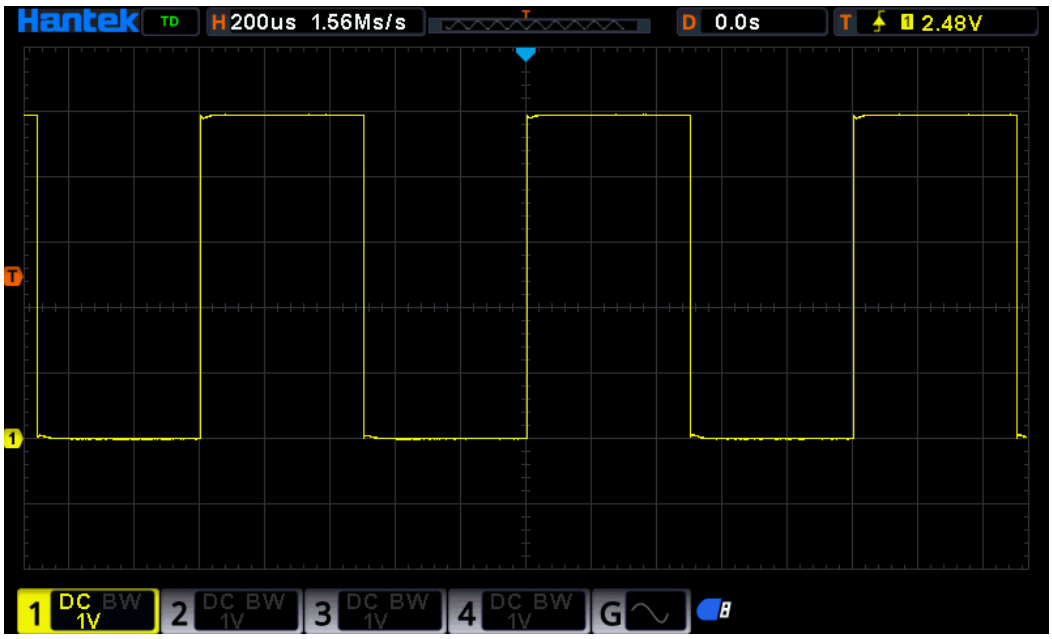
4. Function Inspection

- Click on **[Default]** in the button area to restore the oscilloscope to its factory settings.
- Connect the grounding crocodile clamp wire of the probe to the grounding terminal in the figure below.
- Connect the probe to the input terminal of channel 1 and the compensation signal output terminal marked in the figure below.

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- Set the probe attenuation ratio to X10 and click on the button area **[Auto Scale]**.
- Observe the pictures on the waveform to see if the square wave signal is displayed normally. As shown in the following figure.



- Check CH2,CH3,CH4 channels using the same method. If the square wave waveform displayed in the time base does not match the figure above, you can follow the instructions in the section on Probe Compensation.

Warning:

To avoid electric shock when using the probe, please make sure that the insulated wire of the probe is in good condition. Do not touch the metallic part of the probe when the probe is connected to high voltage source.

Tip:

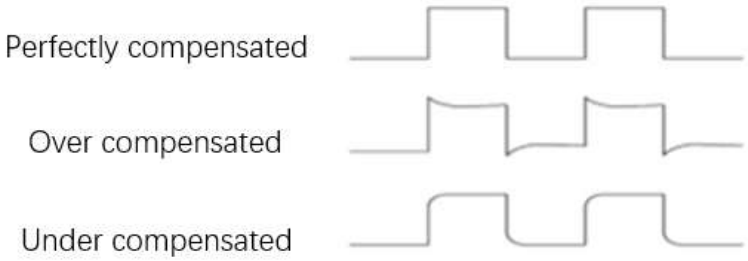
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The probe compensation signal can only be used for probe compensation adjustment and cannot be used for calibration.

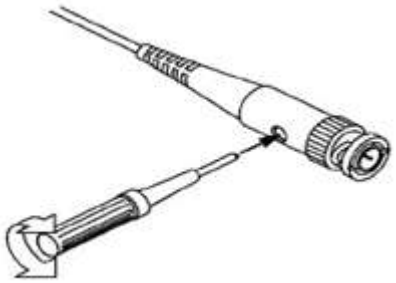
5. Probe Compensation

When connecting the probe to any input channel for the first time, this adjustment is required to match the probe with the input channel. Uncompensated or offset probes can lead to measurement errors or errors.

- Perform the first four steps of the previous section on "Function Check".
- Compare the waveform with the figure below.



- If necessary, use a non-metallic screwdriver to adjust the variable capacitance on the probe until the waveform displayed on the screen is "Perfectly compensated" as shown in the figure above. If necessary, repeat this step. The adjustment method is shown in the following figure.



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6 Remote Control

The oscilloscope can be remotely controlled in the following three methods:

1. User-defined programming:

Users can program and control the oscilloscope through the standard SCPI (Standard Commands for Programmable Instruments) command. For detailed instructions on commands and programming, please refer to the HRDO800 Programming Manual.

2. Using IO software:

Users can use IO software to send commands for remote control of the oscilloscope. It is recommended to use the PC software IO provided by Keysight. You can log in to the Keysight official website (www.keysight.com) to download the software.

Operating steps:

- Establish communication between the oscilloscope and the computer.
- Run IO and search for oscilloscope resources.
- Open the remote command control panel and send commands.

This oscilloscope can communicate with a PC through the following interfaces:

- Controlled through USB

This chapter will provide a detailed introduction to how to use the IO software provided by Keysight to remotely control the oscilloscope through various interfaces.



Note:

Before connecting the communication cable, please turn off the instrument to avoid damaging its communication interface.

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7 More Product Information

Obtain the device information

Click on **[Utility]** -> **System Info** this oscilloscope, you can obtain the machine model, serial number, software version, and hardware version.

View the option information and the option installation

For more information on this product, please refer to the relevant manual (you can download it from Hantek's official website (www.hantek.com)).

- HRDO800 User Manual: Provides an introduction to the functions and operation methods of this product, remote control methods, possible faults and handling methods during use, and ordering information.
- HRDO800 Programming Manual: Provides the SCPI command set for this product.
- HRDO800 Data Manual: Provides the main features and technical indicators of this product.

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