English

中文

RIGOL

Quick Guide

DS2000E Series Digital Oscilloscope

Jun. 2017
RIGOL TECHNOLOGIES, INC.

English

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E-mail: service@rigol.com

Website: www.rigol.com

English

General Safety Summary

1. Only the exclusive power cord designed for the instrument and authorized for use within the local country could be used.
2. Ensure that the instrument is safely grounded.
3. Observe all terminal ratings.
4. Use proper overvoltage protection.
5. Do not operate without covers.
6. Do not insert objects into the air outlet.
7. Use the proper fuse.
8. Avoid circuit or wire exposure.
9. Do not operate the instrument with suspected failures.
10. Provide adequate ventilation.
11. Do not operate in wet conditions.
12. Do not operate in an explosive atmosphere.
13. Keep instrument surfaces clean and dry.
14. Prevent electrostatic impact.
15. Handle with caution.

Safety Notices and Symbols

Safety Notices in this Manual:

WARNING
Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

CAUTION
Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Terms on the Product:

DANGER	It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.
WARNING	It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.
CAUTION	It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

English

Safety Symbols on the Product:

Hazardous Voltage

Safety Warning

Protective Earth Terminal

Chassis Ground

Test Ground

Care and Cleaning

Care

Do not store or leave the instrument where it may be exposed to direct sunlight for long periods of time.

Cleaning

Clean the instrument regularly according to its operating conditions.

1. Disconnect the instrument from all power sources.
2. Clean the external surfaces of the instrument with a soft cloth dampened with mild detergent or water. When cleaning the LCD, take care to avoid scarifying it.

CAUTION

To avoid damage to the instrument, do not expose it to caustic liquids.

WARNING

To avoid short-circuit resulting from moisture or personal injuries, ensure that the instrument is completely dry before connecting it to the power supply.

English

Document Overview

This manual gives you a quick review about the front and rear panel of DS2000E series, the user interface, and the basic operation method.

Tip
For the latest version of this manual, download it from the official website of **RIGOL** (www.rigol.com).

Format Conventions in this Manual

1. Front panel key: The key on the front panel is denoted by the format of "Key Name (Bold) + Text Box" in the manual. For example, **Utility** indicates the "Utility" key on the front panel.
2. Menu softkey: The menu softkey is denoted by the format of "Menu Word (Bold) + Character Shading". For example, **System** denotes the "System" menu softkey under **Utility**.
3. Operation step: The next step of operation is denoted by an arrow "→". For example, **Utility** → **System** denotes that first press **Utility**, and then press the **System** softkey.

Content Conventions in this Manual

DS2000E series includes the following models. Unless otherwise specified, this manual takes DS2202E as an example to introduce DS2000E series and its basic operations.

Model	Analog Bandwidth	No. of Channels
DS2102E	100 MHz	2
DS2202E	200 MHz	2

General Inspection

English

1. Inspect the packaging

If the packaging has been damaged, do not dispose the damaged packaging or cushioning materials until the shipment has been checked for completeness and has passed both electrical and mechanical tests.

The consigner or carrier shall be liable for the damage to the instrument resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the instrument.

2. Inspect the instrument

In case of any mechanical damage, missing parts, or failure in passing the electrical and mechanical tests, contact your **RIGOL** sales representative.

3. Check the accessories

Please check the accessories according to the packing lists. If the accessories are damaged or incomplete, please contact your **RIGOL** sales representative.

English

Product Overview

Based on the UltraVision technology, DS2000E is a digital oscilloscope with high performance. It is equipped with extremely high memory depth, wide dynamic range, superb waveform capture rate, and comprehensive trigger functions. It also features hardware waveform recording function and good display effects. As a rare debugging instrument, it has been widely applied to various industries and fields, such as communications, aerospace, defense, embedded systems, computers, research, and education. It is the excellent representative of the 200 MHz digital oscilloscope type with the most comprehensive functions and excellent specifications.

For descriptions of the front panel, refer to Figure 1 and Table 1; for descriptions of the rear panel, refer to Figure 2 and Table 2; and for descriptions of the main interface (display screen), refer to Figure 3 and Table 3.

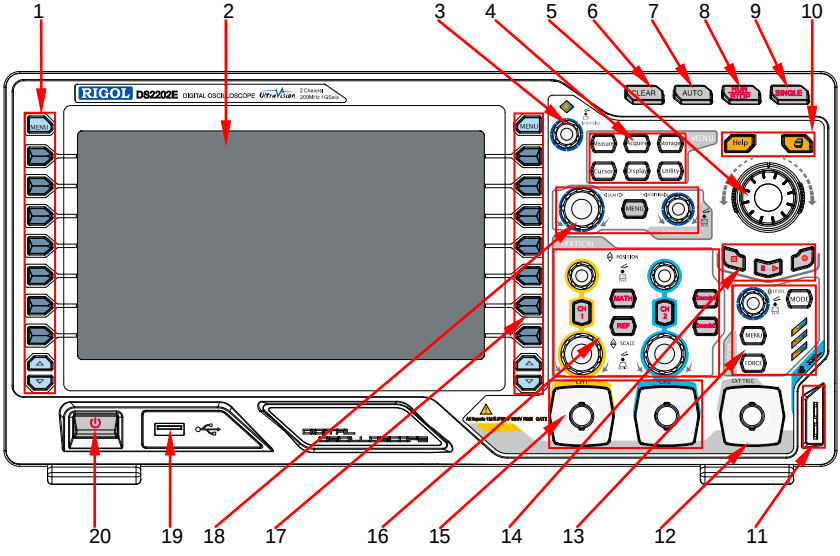


Figure 1 Front Panel

English

Table 1 Front Panel Description

No.	Description	No.	Description
1	Measurement Menu Softkeys	11	Compensation Signal Output Terminal/Ground Terminal
2	LCD	12	External Trigger Input Terminal
3	Multi-function Knob	13	Trigger Control Area
4	Function Keys	14	Waveform Recording/Playback Keys
5	Navigation Knob	15	Analog Channel Input Terminals
6	Clear Key	16	Vertical Control Area
7	AUTO Key	17	Function Menu Softkeys
8	Run/Stop Key	18	Horizontal Control Area
9	Single Trigger Control Key	19	USB HOST Interface
10	Help/Print Key	20	Power Key

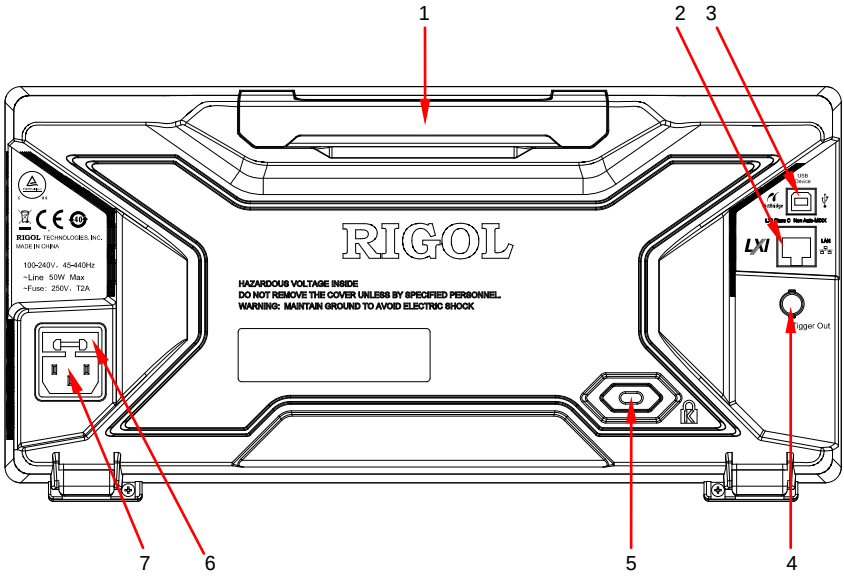


Figure 2 Rear Panel

English

Table 2 Rear Panel Description

No.	Description
1	Handle
2	LAN Interface
3	USB DEVICE Interface
4	Trigger Output Interface
5	Lock Hole
6	Fuse
7	AC Power Cord Connector

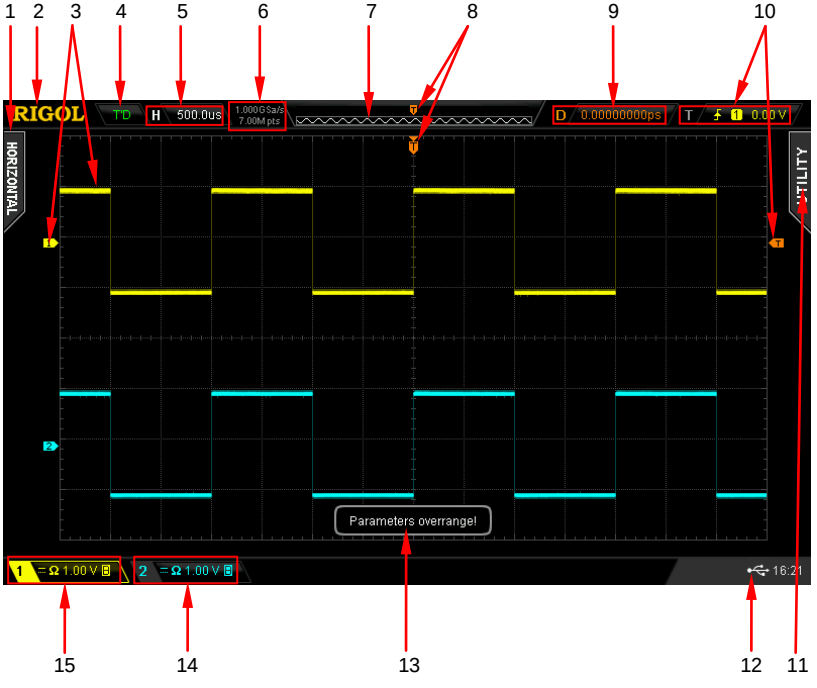


Figure 3 User Interface

Table 3 User Interface Icons

No.	Description	No.	Description
1	Auto Measurement Option	9	Horizontal Position
2	Company Logo	10	Trigger Setting
3	Analog Channel Label and Waveforms	11	Operation Menu
4	Operating Status	12	Notification Area
5	Horizontal Time Base	13	Message Box
6	Sample Rate and Memory Depth	14	CH2 Status Label
7	Waveform Memory	15	CH1 Status Label
8	Trigger Position		

To Prepare for Use

To Adjust the Supporting Legs

Adjust the supporting legs properly to use them as stands to tilt the oscilloscope upwards for stable placement of the oscilloscope as well as better operation and observation.

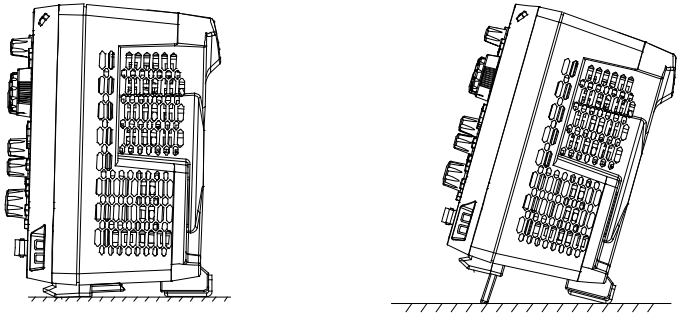


Figure 4 To Adjust the Supporting Legs

English

To Connect to AC Power

The power requirements of the oscilloscope are 100-240 V, 45-440 Hz. Please use the power cord provided in the accessories to connect the oscilloscope to the AC power source, as shown in the figure below. After you turn on the power switch, the oscilloscope is connected to power, and the Power key located at the lower left corner of the front panel is blinking.

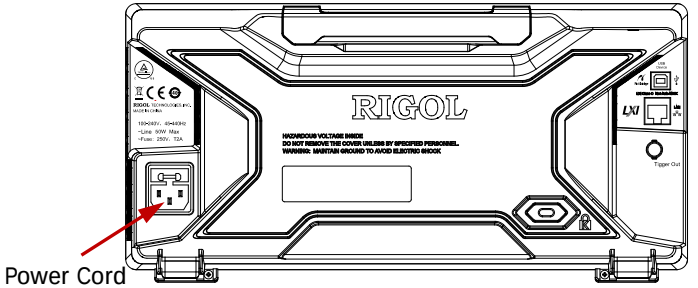


Figure 5 To Connect to AC Power

Turn-on Checkout

When the oscilloscope is connected to power, press the Power key at the lower-left corner of the front panel to start the oscilloscope. During the start-up process, the oscilloscope performs a series of self-tests. You can hear the switching sound of the relay. After the self-test, the welcome screen is displayed. The "Current Options" dialog box will be displayed if your instrument currently has installed the trial versions of the options. From this dialog box, you can view the type, the name, the version, and the remaining trial time of the option currently installed. The instrument is installed with the trial versions of the options before leaving factory. Its remaining trial time is about 2,000 minutes.

To Connect the Probe

English

RIGOL's DS2000E series is equipped with a passive probe. For details about the models of the probe, refer to *DS2000E DataSheet*. For detailed technical information of the probes, please refer to the corresponding Probe User's Guide.

To Connect the Probe:

1. Connect the BNC terminal of the probe to an analog channel input of the oscilloscope at the front panel.
2. Connect the ground alligator clip of the probe to the circuit ground terminal and then connect the probe tip to the circuit point under test.

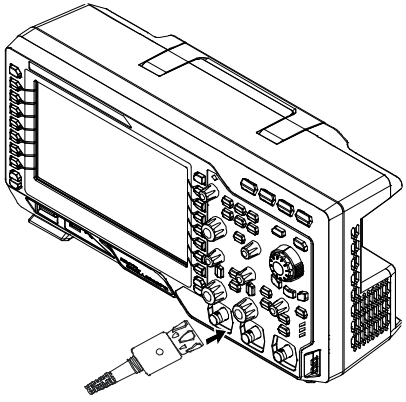


Figure 6 To Connect the Probe

English

Function Inspection

1. Press **Storage** → **Default** to restore the oscilloscope to its default configuration.
2. Connect the ground alligator clip of the probe to the "Ground Terminal" as shown in the figure below.
3. Use the probe to connect the input terminal of CH1 of the oscilloscope and the "Compensation Signal Output Terminal" of the probe.

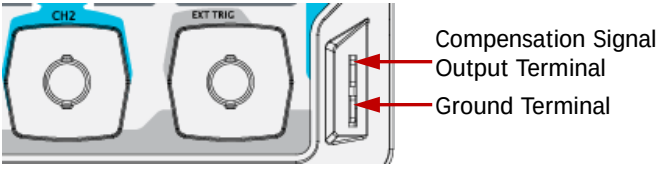


Figure 7 Compensation Signal Output Terminal/Ground Terminal

4. Set the probe attenuation to 10X, and then press **AUTO**.
5. Observe the waveform on the display. In normal condition, the square waveform as shown in the figure below should be displayed.

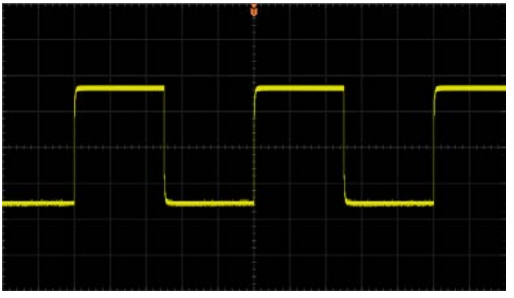


Figure 8 Square Waveform Signal

6. Use the same method to test the other channels. If the square waveforms actually shown do not match that in the figure above, please perform "**Probe Compensation**" introduced in the next section.

English

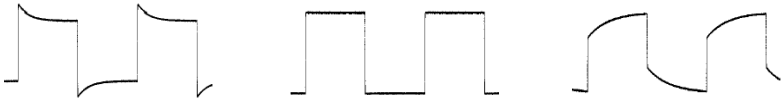
WARNING
To avoid electric shock when using the probe, please make sure that the insulated wire of the probe is in good condition. Do not touch the metallic part of the probe when the probe is connected to high voltage source.

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

Probe Compensation

When the probes are used for the first time, you should compensate the probes to make them match the input channels of the oscilloscope. Non-compensated or poorly compensated probes may cause measurement inaccuracy or errors. The probe compensation procedures are as follows:

1. Perform Step 1, 2, 3, and 4 in "**Function Inspection**".
2. Check the displayed waveforms and compare them with the following figures.



Over compensated Perfectly compensated Under compensated

Figure 9 Probe Compensation

3. Use a nonmetallic screwdriver to adjust the low-frequency compensation adjustment hole on the probe until the waveform is displayed as "Perfectly compensated" in the figure above.

English

To Use the Built-in Help System

The help system of this oscilloscope provides instructions for all the function keys (including the menu keys) on the front panel. Press **Help** to open the help interface. Press it again to close the interface. The help interface mainly consists of two sections. The left section is "Help Options", and you can select the "Button" or "Index" tab. The right section is "Help Display Area", which displays the help information.

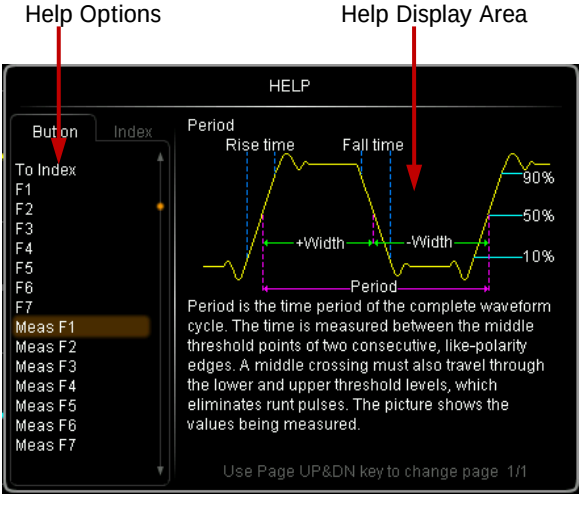


Figure 10 Help Information

Button:

By default, the "Button" tab is selected. Under the tab, you can view the corresponding help information in the "Help Display Area" by pressing the keys or menu softkeys (except the Power key, the multi-function knob, and the Page Up/Down key) on the front panel directly or rotating the multi-function knob to select the desired key name (the item currently selected is displayed with brown shading) in the "Help Options" area and then pressing down the knob.

To switch to the **Index** tab, use the multi-function knob to select "To Index" and then press down the knob.

English

Index:

Under the tab, you can use the multi-function knob to select the desired item (e.g. BW). The item currently selected is displayed with brown shading in the "Help Options" area. Then press down the knob to obtain the help information about the item.

To switch to the **Button** tab, use the multi-function knob to select "To Button" and then press down the knob.

English

Parameter Setting Method

The commonly used parameter setting methods for the DS2000E series are follows:

Method 1:

For the parameters with the sign  or  , rotate the multi-function knob  on the front panel directly to select the parameter item or modify the parameter value.

Method 2:

For the parameters with the sign  , first rotate the multi-function knob  on the front panel to select one item from the available choices, and then press down the multi-function knob  to select the item.

Method 3:

For the parameters with the sign  , rotate the navigation knob on the front panel to increase or decrease the value of the parameter. Use the inner knob to make a fine adjustment, the outer knob to make a coarse adjustment.

Method 4:

For the parameters without the above signs, press the desired menu softkey to switch between the parameter items. This method is applicable to the parameters with only two available options.

Tip

The above methods are commonly used in parameter settings. For other setting methods of certain parameters, refer to details in relevant chapters of *DS2000E User's Guide*.

English

Remote Control

DS2000E series digital oscilloscope can be connected to the PC via the USB, LAN, or GPIB interface to set up communication and realize remote control through the PC. The remote control can be realized by using SCPI (Standard Commands for Programmable Instruments) commands. DS2000E series digital oscilloscope supports two ways of remote control: user-defined programming and PC software (e.g. **RIGOL** Ultra Sigma).

More Product Information

1. **Obtain the device information**
   Press **Utility** → **System** → **System Info** to obtain the information of the instrument, including the manufacturer, model, serial number, software version number, and hardware version number.

2. **Check the option installation status**
   Press **Utility** → **Options** → **Installed** to view the options currently installed on the oscilloscope and their information. Press **Setup** to enter the option activation operation menu and input the serial number of the option that you've purchased.

For more information about this instrument, refer to the relevant manuals by logging in to the official website of **RIGOL** (www.rigol.com) to download them.
DS2000E User's Guide: introduces the functions of the instrument and the operation methods, remote control methods, possible failures and solutions in using the instrument, the technical specifications, and order information;
DS2000E Programming Guide: provides detailed descriptions of SCPI commands and programming examples of the instrument.
DS2000E Datasheet: provides the main features and technical specifications of the instrument.

RIGOL

快速指南

中文

DS2000E 系列数字示波器

2017 年 6 月
RIGOL TECHNOLOGIES, INC.

保证和声明

版权

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中文

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文档编号

QGA23001-1110

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电子邮箱：service@rigol.com

网址：www.rigol.com

一般安全概要

1. 请使用所在国家认可的本产品专用电源线。
2. 请确保产品可靠接地。
3. 查看所有终端额定值。
4. 请使用合适的过压保护。
5. 请勿开盖操作。
6. 请勿将异物插入排风口。
7. 请使用合适的保险丝。
8. 避免电路外露。
9. 怀疑产品出故障时，请勿进行操作。
10. 请保持适当的通风。
11. 请勿在潮湿环境下操作。
12. 请勿在易燃易爆的环境下操作。
13. 请保持产品表面的清洁和干燥。
14. 请注意防静电保护。
15. 请注意搬运安全。

安全术语和符号

本手册中的安全术语：

警告

警告性声明指出可能会造成人身伤害或危及生命安全的情况或操作。

注意

注意性声明指出可能导致本产品损坏或数据丢失的情况或操作。

产品上的安全术语：

DANGER	表示您如果不进行此操作，可能会立即对您造成危害。
WARNING	表示您如果不进行此操作，可能会对您造成潜在的危害。
CAUTION	表示您如果不进行此操作，可能会对本产品或连接到本产品的其他设备造成损坏。

产品上的安全符号：

高电压

安全警告

保护性接地端

壳体接地端

测量接地端

保养与清洁

保养

请勿将仪器放置在长时间受到日照的地方。

清洁

请根据使用情况定期对仪器进行清洁。方法如下：

1. 断开电源。
2. 用柔和的清洁剂或清水浸湿软布擦拭仪器外部。清洁带有液晶显示屏的仪器时，请注意不要划伤液晶显示屏。

注意

请勿使任何腐蚀性的液体沾到仪器上，以免损坏仪器。

警告

重新通电之前，请确认仪器已经干透，避免因水分造成电气短路甚至人身伤害。

文档概述

本文档用于指导用户快速了解DS2000E系列数字示波器的前后面板、用户界面及基本操作方法等。

中文

提示
本手册的最新版本可登陆 **RIGOL** 网址（www.rigol.com）进行下载。

文档格式的约定

1. 前面板按键：用带文本框的字符表示，例如：**Utility**
2. 菜单软键：用带底纹并加粗的文本表示，例如：**系统**
3. 操作步骤：用箭头“→”表示，例如：**Utility** → **系统**

文档内容的约定

DS2000E系列数字示波器包含以下型号。如无特殊说明，本手册以DS2202E为例说明DS2000E系列及其基本操作。

型号	模拟带宽	通道数
DS2102E	100 MHz	2
DS2202E	200 MHz	2

一般性检查

1. 检查运输包装

如运输包装已损坏，请保留被损坏的包装或防震材料，直到货物经过完全检查且仪器通过电性和机械测试。

因运输造成仪器损坏，由发货方和承运方联系赔偿事宜。**RIGOL**公司恕不进行免费维修或更换。

2. 检查整机

若存在机械损坏或缺失，或者仪器未通过电性和机械测试，请联系您的**RIGOL** 经销商。

3. 检查随机附件

请根据装箱单检查随机附件，如有损坏或缺失，请联系您的**RIGOL**经销商。

产品简介

中文

DS2000E 系列是一款基于 UltraVision 技术的高性能数字示波器，它具有极高的存储深度、超宽的动态范围、优异的波形捕获率和全面的触发功能，同时兼具硬件波形录制功能和良好的显示效果，是通信、航天、国防、嵌入式系统、计算机、研究和教育等众多行业和领域不可多得的调试仪器，是 200 MHz 带宽以内数字示波器中功能最齐全、指标最为优秀的代表。

前面板、后面板和主界面（显示屏）的简要介绍请分别参考图 1（具体说明见表 1）、图 2（具体说明见表 2）和图 3（具体说明见表 3）。

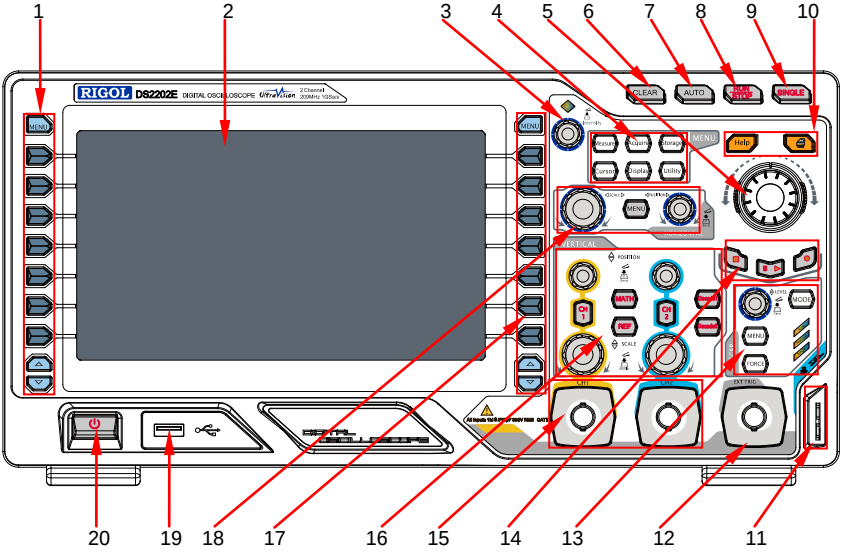


图 1 前面板

表 1 前面板说明

编号	说明	编号	说明
1	测量菜单软键	11	探头补偿信号输出端/接地端
2	LCD	12	外触发输入端
3	多功能旋钮	13	触发控制区
4	功能按键	14	波形录制/回放控制键
5	导航旋钮	15	模拟通道输入端

6	全部清除键	16	垂直控制区
7	波形自动显示	17	功能菜单软键
8	运行/停止控制键	18	水平控制区
9	单次触发控制键	19	USB HOST 接口
10	内置帮助/打印键	20	电源键

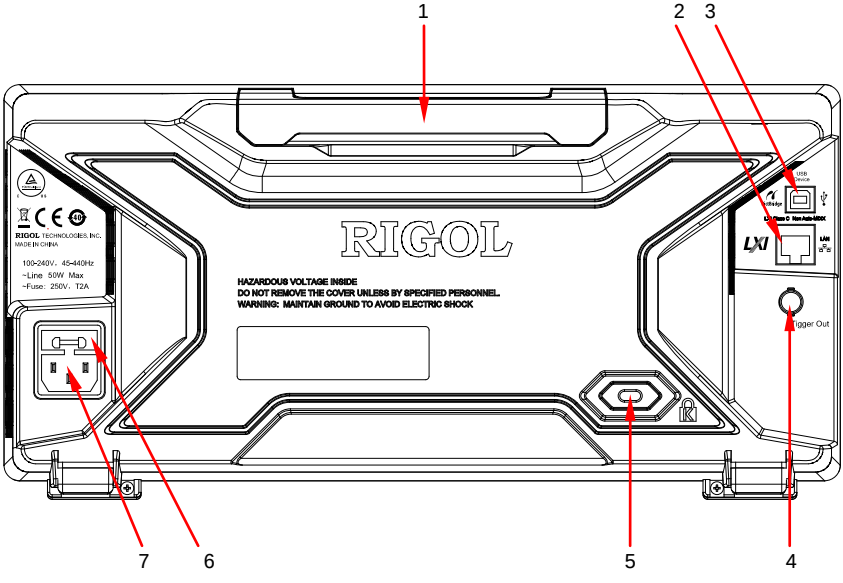


图 2 后面板

表 2 后面板说明

编号	说明
1	手柄
2	LAN 接口
3	USB DEVICE 接口
4	触发输出接口
5	锁孔
6	保险丝
7	AC 电源连接器

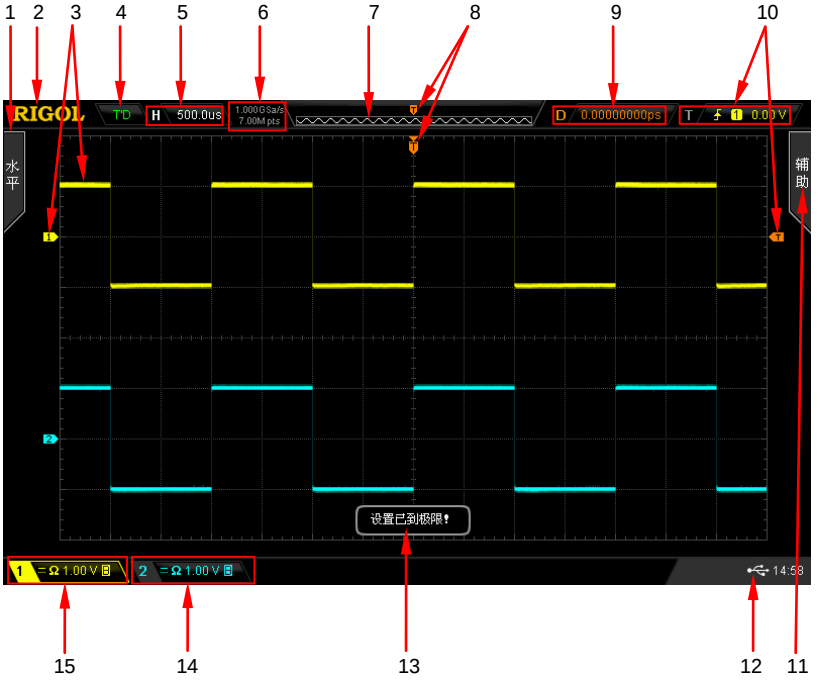


图 3 用户界面

表 3 用户界面标识

编号	说明	编号	说明
1	自动测量选项	9	水平位移
2	公司商标	10	触发设置
3	通道标签和波形	11	操作菜单
4	运行状态	12	通知区域
5	水平时基	13	消息框
6	采样率和存储深度	14	CH2 状态标签
7	波形存储器	15	CH1 状态标签
8	触发位置		

使用前准备

调节支撑脚

适当的调整支撑脚，将其作为支架使示波器向上倾斜，以稳定放置示波器，便于更好的操作和观察显示屏。

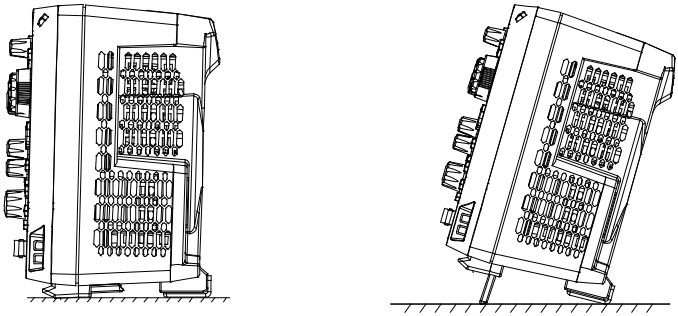


图 4 调节支撑脚

连接电源

本示波器可输入交流电源的规格为：100-240 V，45-440 Hz。请使用附件提供的电源线按下图所示将示波器连接到电源中。示波器处于通电状态，前面板左下角的电源键 呈呼吸状态。

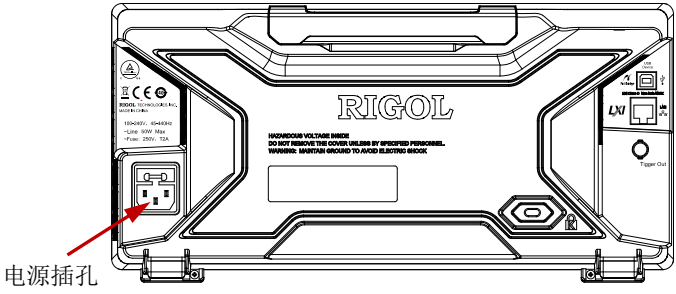


图 5 连接电源

开机检查

当示波器处于通电状态时，按前面板左下角的电源键 即可启动示波器。开机过程中示波器执行一系列自检，您可以听到继电器切换的声音。自检结束后出现开机画面，如果您的仪器安装有选件的试用版本，屏幕将弹出“当前选件”对话框，您可以查看当前安装的选件类型、选件名称、选件版本和剩余时间。仪器出厂时我们将为用户提供选件的试用版本，剩余时间约为 2000 分钟。

连接探头

RIGOL 为 DS2000E 系列示波器提供无源探头，探头的具体型号请参考《DS2000E 系列数据手册》。有关探头的详细技术信息请参考相应的探头用户手册。

连接探头：

1. 将探头的 BNC 端连接至示波器前面板的模拟通道输入端。
2. 将探头接地鳄鱼夹连接至电路接地端，将探针连接至待测电路测试点。

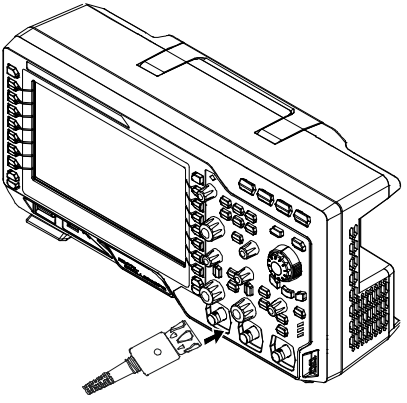


图 6 连接探头

功能检查

1. 按 **Storage** → **默认设置**，将示波器恢复为默认配置。
2. 将探头的接地鳄鱼夹连接至如下图所示的“接地端”。
3. 使用探头连接示波器的通道 1（CH1）输入端和“补偿信号输出端”。

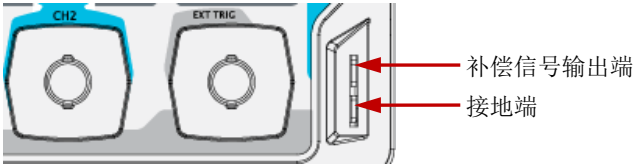


图 7 补偿信号输出端/接地端

4. 将探头衰减比设定为 10X，然后按 **AUTO** 键。
5. 观察示波器显示屏上的波形，正常情况下应显示下图所示的方波：

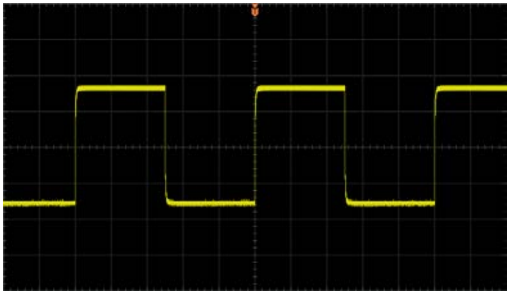


图 8 方波信号

6. 用同样方法检查其他通道。如实际显示的方波形状与上图不相符，请执行下一节“**探头补偿**”。

警告
为避免使用探头时被电击，请首先确保探头的绝缘导线完好，并且在连接高压源时不要接触探头的金属部分。

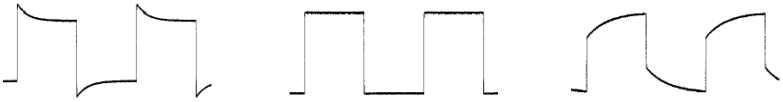
提示
探头补偿信号仅作探头补偿调整之用，不可用于校准。

探头补偿

首次使用探头时，应进行探头补偿调节，使探头与示波器输入通道匹配。未经补偿或补偿偏差的探头会导致测量误差或错误。探头补偿步骤如下：

中文

1. 执行上一节“**功能检查**”中的步骤 1、2、3 和 4。
2. 检查所显示的波形形状并与下图对比。



补偿过度　　补偿正确　　补偿不足

图 9 探头补偿

3. 用非金属质地的改锥调整探头上的低频补偿调节孔，直到显示的波形如上图“补偿正确”。

使用内置帮助系统

本示波器的帮助系统提供了前面板各功能键（包括菜单键）的说明。按 **Help** 键打开帮助界面，再次按下则关闭。帮助界面主要分两部分，左边为“帮助选项”，可使用“Button”或“Index”方式选择，右边为“帮助显示区”。

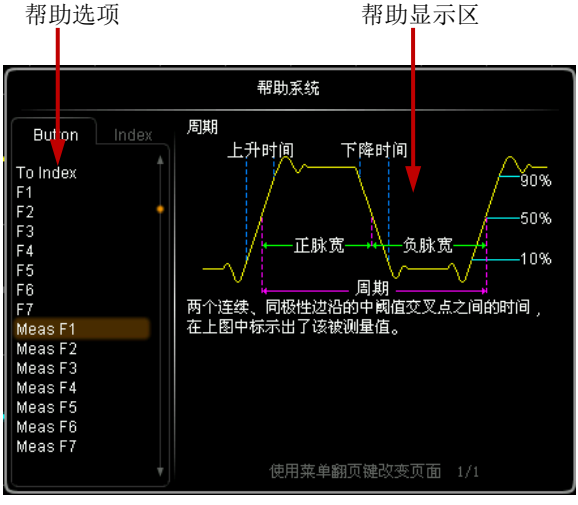


图 10 帮助信息

Button 方式：

默认方式。该方式下，您可以直接按前面板上的按键（电源键 、多功能旋钮 和菜单翻页键 / 除外），或者旋转多功能旋钮 选择按键名称，即可在“帮助显示区”中获得相应的帮助信息。

旋转多功能旋钮 选择“To Index”后按下旋钮可切换到 **Index** 方式。

Index 方式：

该方式下，使用多功能旋钮 选择需要获得帮助的选项（例如“带宽限制”），当前选中的选项显示为棕色，按下旋钮，即可在“帮助显示区”中获得相应的帮助信息。

旋转多功能旋钮 选择“To Button”后按下旋钮可切换到 **Button** 方式。

参数设置方法

DS2000E 系列数字示波器常用的参数设置方法如下。

中文

方法一：

对于菜单上显示  或  的参数，直接旋转前面板上的多功能旋钮  即可选择参数项或修改参数值。

方法二：

对于菜单上显示  的参数，请首先旋转前面板上的多功能旋钮  进行选择，然后再按下多功能旋钮 选中参数。

方法三：

对于菜单上显示  的参数，表示可旋转前面板上的导航旋钮增大或减小数值；内层旋钮可微调，外层旋钮可粗调。

方法四：

对于菜单上无图标显示的参数，直接按相应的菜单软键即可切换设置所需的参数（此方法适用于只有两个可选选项的参数）。

提示

上述方法是示波器常用的参数设置方法。若某些参数有其他设置方法，将在《DS2000E系列用户手册》的相关章节中详细介绍。

远程控制

DS2000E 系列数字示波器支持通过 USB 接口、LAN 接口和 GPIB 接口与计算机进行通信从而实现远程控制。远程控制基于 SCPI（Standard Commands for Programmable Instruments）命令集实现。DS2000E 系列数字示波器支持两种远程控制方式：用户自定义编程和使用 PC 软件（如 **RIGOL** Ultra Sigma）。

更多产品信息

1. **获取设备信息**
   按 **Utility** → **系统** → **系统信息**，您可获取设备信息，包括厂商、产品型号、产品序列号和软硬件版本号。

2. **查看选件安装状态**
   按 **Utility** → **选件**，按 **当前选件** 软键，可查看示波器当前已安装的选件及其相关信息；按 **选件安装** 软键，输入新购买的选件序列号进行选件安装。

欲了解本产品更多信息，请查阅相关手册（您可登录**RIGOL**网站（www.rigol.com）下载）。

《DS2000E系列用户手册》：提供本产品的功能介绍及操作方法、远程控制方法、在使用过程中可能出现的故障及处理方法、性能指标以及订货信息。

《DS2000E系列编程手册》：提供本产品的SCPI命令集以及编程实例。

《DS2000E系列数据手册》：提供本产品的主要特色和技术指标。