

RIGOL

快速指南

DS1000U 系列数字示波器

2014 年 1 月

RIGOL Technologies, Inc

保证和声明

版权

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文档编号

QGA14001-1110

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联系我们

如您在使用此产品或本手册的过程中有任何问题或需求，可与

RIGOL 联系：

电子邮箱：service@rigol.com 网址：www.rigol.com

一般安全概要

了解下列安全性预防措施，以避免受伤，并防止损坏本产品或与本产品连接的任何产品。为避免可能的危险，请务必按照规定使用本产品。

使用正确的电源线。

只允许使用所在国家认可的本产品专用电源线。

将产品接地。

本产品通过电源电缆的保护接地线接地。为避免电击，在连接本产品的任何输入或输出端子之前，请确保本产品电源电缆的接地端子与保护接地端可靠连接。

正确连接探头。

探头地线与地电势相同。请勿将地线连接至高电压。

查看所有终端额定值。

为避免起火和过大电流的冲击，请查看产品上所有的额定值和标记说明，请在连接产品前查阅产品手册以了解额定值的详细信息。

使用合适的过压保护。

确保没有过电压（如由雷电造成的电压）到达该产品。否则操作人员可能有遭受电击的危险。

请勿开盖操作。

请勿在仪器机箱打开时运行本产品。

使用合适的保险丝。

只允许使用本产品指定规格的保险丝。

避免电路外露。

电源接通后，请勿接触外露的接头和元件。

怀疑产品出故障时，请勿进行操作。

如果您怀疑本产品出现故障，请联络**RIGOL**授权的维修人员进行检测。任何维护、调整或零件更换必须由**RIGOL**授权的维修人员执行。

保持适当的通风。

通风不良会引起仪器温度升高，进而引起仪器损坏。使用时应保持良好的通风，定期检查通风口和风扇。

请勿在潮湿环境下操作。

为避免仪器内部电路短路或发生电击的危险，请勿在潮湿环境下操作仪器。

请勿在易燃易爆的环境下操作。

为避免仪器损坏或人身伤害，请勿在易燃易爆的环境下操作仪器。

请保持产品表面的清洁和干燥。

为避免灰尘或空气中的水分影响仪器性能，请保持产品表面的清洁和干燥。

防静电保护。

静电会造成仪器损坏，应尽可能在防静电区进行测试。在连接电缆到仪器前，应将其内外导体短暂接地以释放静电。

注意搬运安全。

为避免仪器在搬运过程中滑落，造成仪器面板上的按键、旋钮或接口等部件损坏，请注意搬运安全。

安全术语和符号

本手册中的术语。以下术语可能出现在本手册中：



警告

警告性声明指出可能会危害操作人员生命安全的条件和行为。



注意

注意性声明指出可能导致本产品损坏或数据丢失的条件和行为。

产品上的术语。以下术语可能出现在产品上：

危险

表示您如果进行此操作可能会立即对您造成危害。

警告

表示您如果进行此操作可能会对您造成潜在的危害。

注意

表示您如果进行此操作可能会对本产品或连接到本产品的其它设备造成损坏。

产品上的符号。以下符号可能出现在产品上：



高电压



请参阅手册



保护性接地端



壳体接地端



测量接地

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必要的检查

1. 检查是否存在因运输造成的损坏。

如发现包装纸箱或泡沫塑料保护垫严重破损，请先保留，直到整机和附件通过电性和机械性测试。

2. 检查整机。

如发现仪器外观破损，请和负责此业务的 **RIGOL** 经销商或 **RIGOL** 当地办事处联系。

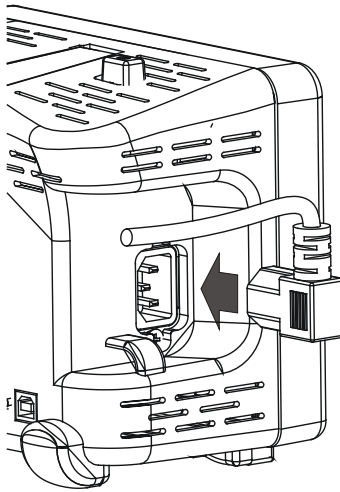
如果因运输造成仪器的损坏，请注意保留包装。通知运输部门和负责此业务的 **RIGOL** 经销商。**RIGOL** 会安排维修或更换。

3. 检查附件。

请根据装箱单检查附件。如发现附件缺少或损坏，请和负责此业务的 **RIGOL** 经销商或 **RIGOL** 的当地办事处联系。

如何连接电源

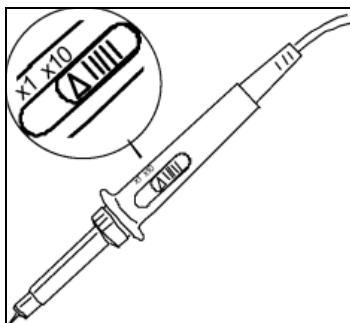
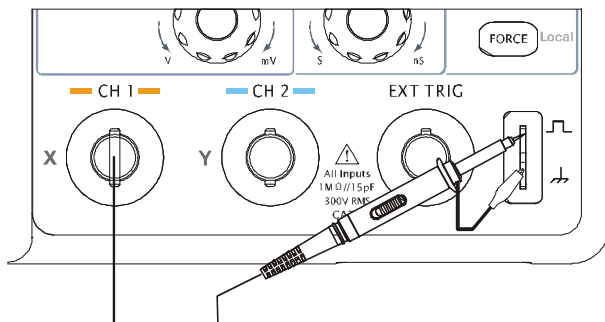
检查完仪器外观和附件后，请按如下图所示连接电源并给仪器上电。



电源线连接完毕后，按下仪器上面的电源键。请检查仪器是否已经正常启动，如没有启动，请检查电源线是否接触良好。如经前述检查无误后，仪器仍未启动，请联系 **RIGOL** 技术支持部或当地经销商进行解决。

如何连接探头或 BNC

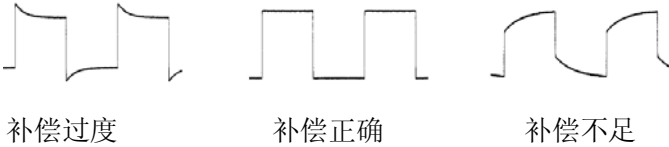
1. 连接探头



如上图所示，使用探头将信号接入 CH1（通道 1）的方法如下：
将探头上的开关设定为 10X，将探头连接器上的插槽对准 CH1 同轴电缆插接件（BNC）上的插口并插入，然后顺时针旋转拧紧探头。

如果您使用的是新探头，或所用探头首次与本仪器连接，请在使用之前进行探头补偿，方法如下：

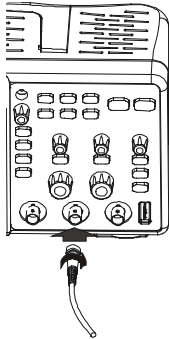
- (1) 将探头上的开关设定为 10X，并将示波器探头与 CH1 连接。将探头前端与探头补偿器的信号输出连接器相连，接地鳄鱼夹与探头补偿器的地线连接器相连。按 **CH1** 打开 CH1，将探头菜单衰减系数设定为 10X，然后按前面板的 **AUTO** 键。
- (2) 检查所显示波形的形状。



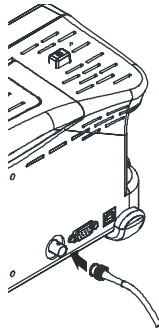
- (3) 如必要，请使用非金属质地的改锥调整探头上的可变电容，直到屏幕显示的波形如上图“补偿正确”。
- (4) 必要时，重复上述步骤。

2. 连接 BNC

将 BNC 同轴电缆对准前面板 BNC 插口并插入，然后顺时针旋转拧紧探头，如下图所示：



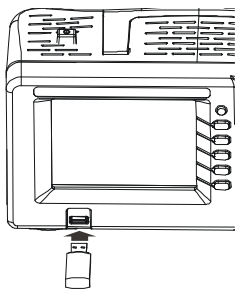
前面板 BNC 连接示意图



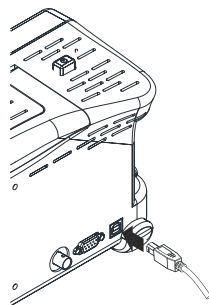
后面板 P/F 接口连接示意图

如何连接 USB 设备和 RS232 电缆

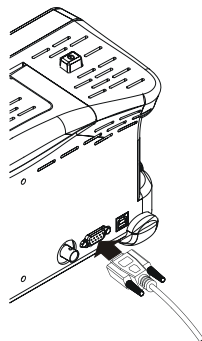
该数字示波器支持 USB 接口的存储设备和通过 USB 连接 PC 端主机或打印机，以及 RS232 串口通信。



前面板 USB Host 接口连接



后面板 USB Device 接口连接



RS232 接口连接

故障处理

1. 如果按下电源开关示波器仍然黑屏，没有任何显示：

- (1) 检查电源接头是否接好；
- (2) 检查电源开关是否打开；
- (3) 做完上述检查后，重新启动仪器；
- (4) 如果仍然无法正常使用本产品，请与 **RIGOL** 联系。

2. 采集信号后，画面中并未出现信号的波形：

- (1) 检查探头是否正常接在信号连接线上；
- (2) 检查信号连接线是否正常接在 BNC（即通道连接器）上；
- (3) 检查探头是否与待测物正常连接；
- (4) 检查待测物是否有信号产生（可将有信号产生的通道与有问题的通道接在一起来确定问题所在）；
- (5) 再重新采集信号一次。

3. 测量的电压幅度值比实际值大 10 倍或小 10 倍：

检查通道衰减系数是否与实际使用的探头衰减比例相符。

4. 有波形显示，但不能稳定下来：

- (1) 检查触发信源：检查触发面板的信源选择项是否与实际使用的信号通道相符；
- (2) 检查触发类型：一般的信号应使用“边沿触发”方式，视频信号应使用“视频触发”方式。只有应用适合的触发方式，波形才能稳定显示；
- (3) 尝试改变耦合为“高频抑制”和“低频抑制”显示，以滤除干扰触发的高频或低频噪声；
- (4) 改变触发灵敏度和触发释抑设置。

5. 按下 RUN/STOP 键无任何显示:

检查触发面板 (TRIGGER) 的**触发方式**是否在“普通”或“单次”档, 且触发电平超出波形范围。如果是, 将触发电平居中, 或者设置**触发方式**为“自动”档。另外, 按**自动设置** AUTO 按钮可自动完成以上设置。

6. 选择打开平均采样方式时间后, 显示速度变慢:

正常。

7. 波形显示呈阶梯状:

- (1) 此现象正常。可能水平时基档位过低, 增大水平时基以提高水平分辨率, 可以改善显示;
- (2) 可能**显示类型**为“矢量”, 采样点间的连线, 可能造成波形阶梯状显示。将**显示类型**设置为“点”显示方式, 即可解决。

RIGOL

Quick Guide

DS1000U Series Digital Oscilloscope

Jan. 2014

RIGOL Technologies, Inc

Guaranty and Declaration

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Product Certification

RIGOL guarantees this product conforms to the national and industrial standards in China as well as the ISO9001:2008 standard and the ISO14001:2004 standard. Other international standard conformance certification is in progress.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: service@rigol.com

Websites: www.rigol.com

General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injuries or damages to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only specified by this manual.

Use Proper Power Cord.

Only the power cord designed for the instrument and authorized by local country could be used.

Ground The Instrument.

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

Connect the Probe Correctly.

Do not connect the ground lead to high voltage since it has the isobaric electric potential as ground.

Observe All Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

Use Proper Overvoltage Protection.

Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might expose to danger of electrical shock.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Use Proper Fuse.

Please use the specified fuses.

Avoid Circuit or Wire Exposure.

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures.

If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by **RIGOL** authorized personnel.

Keep Well Ventilation.

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

Do Not Operate in Wet Conditions.

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

Do Not Operate in an Explosive Atmosphere.

In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

Keep Product Surfaces Clean and Dry.

To avoid the influence of dust and/or moisture in air, please keep the surface of device clean and dry.

Electrostatic Prevention.

Operate in an electrostatic discharge protective area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to release static before connecting.

Handling Safety

Please handle with care during transportation to avoid damages to buttons, knob interfaces and other parts on the panels.

Safety Terms and Symbols

Terms in this Manual. These terms may appear in this manual:



WARNING

Warning statements indicate the conditions or practices that could result in injury or loss of life.



CAUTION

Caution statements indicate the conditions or practices that could result in damage to this product or other property.

Terms on the Product. These terms may appear on the Product:

DANGER indicates an injury or hazard may immediately happen.

WARNING indicates an injury or hazard may be accessible potentially.

CAUTION indicates a potential damage to the instrument or other property might occur.

Symbols on the Product. These symbols may appear on the product:



**Hazardous
Voltage**



**Please
Refer to
Manuals**



**Protective
Earth
Terminal**



**Chassis
Ground**



**Test
Ground**

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Necessary Inspection

1. Inspect the shipping container for damage.

Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.

2. Inspect the instrument.

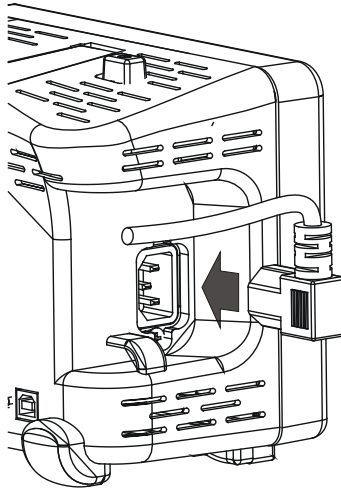
In case there is any mechanical damage or defect, notify the **RIGOL** Sales Representative. If the shipping container is damaged, or the cushioning materials show signs of stress, notify the carrier as well as the **RIGOL** sales office. Keep the shipping materials for the carrier's inspection.

3. Check the accessories.

Please check the accessories according to packing list. If the contents are incomplete or damaged notify the **RIGOL** Sales Representative.

How to Connect Power Cord

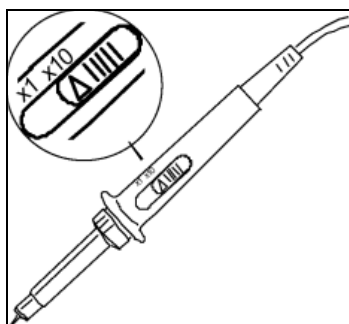
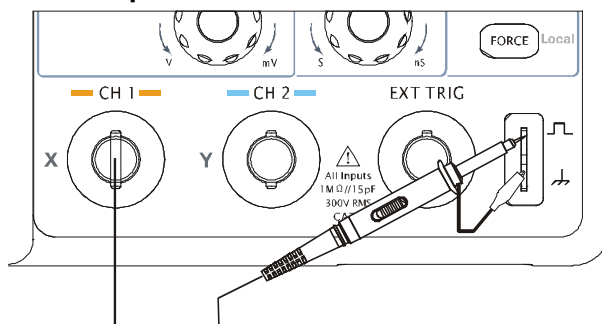
After inspecting the instrument and the accessories, connect the power cord as shown in the following figure.



Press the power key on the top of the oscilloscope. If the oscilloscope can not be powered on, check the power cord connection. If the oscilloscope still can not start up after the inspections, please contact **RIGOL** for help.

How to Connect Probe or BNC

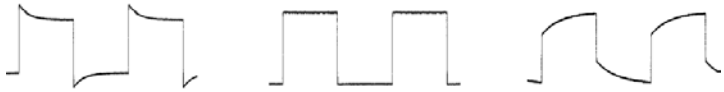
1. Connect the probe



As shown in the above figures, set the attenuation switch on the probe to 10X and connect the probe to Channel 1 on the oscilloscope, push and rotate clockwise to lock the probe in place.

If your probe is a new one, or it is the first time you connect to the oscilloscope, before use it, please do the following compensation operation:

- (1) Set the attenuation switch on the probe to 10X and connect the probe to Channel 1 on the oscilloscope. Attach the probe tip and ground lead to the PROBE COMP connector. Press **CH1**, and set the attenuation menu to 10X. Then press **AUTO**.
- (2) View the waveform displayed on the screen.

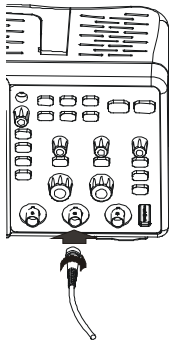


Over Compensated Correctly Compensated Under Compensated

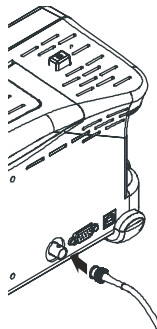
- (3) If necessary, use a non-metallic tool to adjust the variable capacitor of the probe for the flattest square wave (Correctly Compensated) being displayed on the oscilloscope.
- (4) Repeat if necessary.

2. Connect the BNC

As shown in the following figure, insert the the BNC cable to the BNC conector on the front panel, rotate clockwise to lock the BNC.



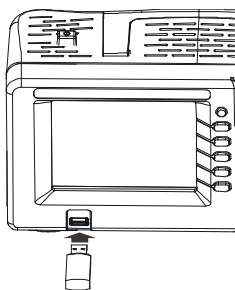
BNC Connection (Front Panel)



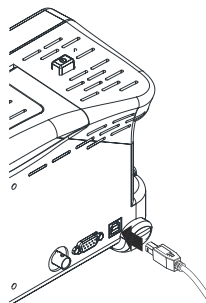
P/F Connection (Rear Panel)

How to Connect USB and RS232 Devices

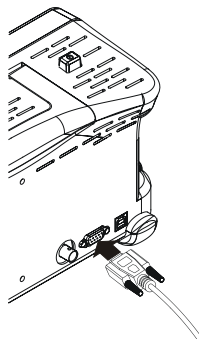
This oscilloscope support the USB flash drive and connections to PC or printer through USB. The instruments also support RS232 communication.



Connect USB Host



Connect USB Device



Connect RS232 Cable

Troubleshooting

1. After the oscilloscope is powered on, the screen remains dark (no display):

- (1) Check the power cord connection.
- (2) Ensure the power switch is turned on.
- (3) After the above inspection, restart the oscilloscope.
- (4) If the problem still remains, please contact **RIGOL** for help.

2. After the signal acquisition the waveform does not appear:

- (1) Check the probes connected with the signals.
- (2) Check the probes connected to the channels firmly.
- (3) Check the probes connected with the object being tested.
- (4) Check the circuit generates signal at the test point.
- (5) Repeat the acquisition.

3. The measurement result is 10 times higher or lower than the value expected.

Check if the probe attenuation is the same as the channel attenuation.

4. If the oscilloscope does not get a stable waveform display:

- (1) Check the **Trigger Source** and notice if it is set to the channel in use.
- (2) Check the **Trigger Type**. Use "Edge" for normal signals, and use "Video" for VIDEO signals.

-
- (3) Switch the **Coupling** into “HF Rejection” or “LF Rejection” in order to filter the noise which disturbs trigger.
 - (4) Adjust the trigger Sensitivity and the hold off time.

5. After pressing the RUN/STOP button, the oscilloscope does not display any waveform on screen.

Check whether the **Trigger Mode** is set to “Normal” or “Single” and see whether the trigger level is out of the signal range. If yes, set the trigger level in proper range by turning the LEVEL knob or pressing the 50% button. Or set the Trigger Mode as “AUTO”. Moreover, push AUTO button to display the waveform on screen.

6. After the Acquisition is set to “Averages” or Display Persistence is set ON, the waveform refreshes slowly.

It is normal in these settings.

7. The signal is displayed as ladder like waveform.

- (1) The time base setting maybe is too slow. Turn the horizontal SCALE knob to increase horizontal resolution to improve the display.
- (2) Maybe the display **Type** is set to “Vectors”, and set it to “Dots” mode to improve the display.