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PicoScope® 4444

High-resolution differential PC oscilloscope

QUICK START GUIDE

快速入门指南

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1 English

1.1 Introduction

Thank you for purchasing a PicoScope 4444 differential PC oscilloscope, a highly flexible differential oscilloscope suitable for a wide range of voltage measurement applications.

This guide explains how to install the PicoScope software and connect and set up your oscilloscope. For further information on the software, please refer to the *PicoScope 6 User's Guide*; for technical data relating to the oscilloscope itself, see the *PicoScope 4444 Data Sheet*: both are included as PDF files on the software disk and are available for download from www.picotech.com/downloads. You can also access the *PicoScope 6 User's Guide* from the Help menu within the PicoScope software.

1.2 Safety information

To prevent possible electrical shock, fire, personal injury, or damage to the product, carefully read this safety information before attempting to install or use the product. In addition, follow all generally accepted safety practices and procedures for working with and near electricity.





The product has been designed and tested in accordance with the European standard publication EN 61010-1:2010, and left the factory in a safe condition. The following safety descriptions are found throughout this guide:

A **WARNING** identifies conditions or practices that could result in injury or death.

A **CAUTION** identifies conditions or practices that could result in damage to the product or the equipment to which it is connected.

1.2.1 Symbols

These safety and electrical symbols may appear on the product or in this guide.

Symbols	Description
	Direct current
	Alternating current
	Earth (ground) terminal
	Frame or chassis terminal

The terminal can be used to make a measurement ground connection. The terminal is NOT a safety or protective earth.



Equipment protected throughout by double insulation or reinforced insulation



Caution, possibility of electric shock



Caution

Appearance on the product indicates a need to read these safety and operation instructions



Static awareness

Static discharge can damage parts

CAT

EN 61010 overvoltage category



Do not dispose of this product as unsorted municipal waste



WARNING

To prevent injury or death, use the product only as instructed and use only the accessories that have been supplied or recommended. Protection provided by the product may be impaired if used in a manner not specified by the manufacturer.

1.2.2 Maximum input ranges

Observe all terminal ratings and warnings marked on the product.

The full-scale measurement range is the maximum voltage that the PicoScope 4444 can accurately measure. The common-mode range is the maximum voltage that can be applied to both differential inputs with respect to the the scope chassis or ground. The overvoltage protection range is the maximum voltage that can be applied without damaging the instrument.

	Input range	Overvoltage protection
Full-scale measurement	±50 V	±100 V DC + AC peak
Common-mode	±50 V	±100 V DC + AC peak



WARNING

To prevent electric shock, do not attempt to measure voltages outside the specified full-scale measurement or common-mode ranges above.

**WARNING**

Signals exceeding the voltage limits in the table below are defined as “hazardous live” by EN 61010. To prevent electric shock, take all necessary safety precautions when working on equipment where hazardous live voltages may be present.

Signal voltage limits of EN 61010-1:2010


± 70 V DC	33 V AC RMS	± 46.7 V pk max.
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**WARNING**

To prevent injury or death, the oscilloscope must not be directly connected to hazardous live signals as defined by EN 61010. To measure such voltages, use a differential probe specifically rated for this use, such as the PicoConnect 442 1000 V CAT III differential probe.

**CAUTION**

Exceeding the overload protection range of the oscilloscope and its recommended accessories can cause permanent damage to the oscilloscope and other connected equipment.

If the signal voltage exceeds the measurement input range, the PicoScope software displays the red overrange indicator  in the top left corner of the display, with the message “Channel overrange”. A smaller version appears next to the vertical axis of the affected channel. The waveform will be clipped: no data outside the measurement input range will be shown. In the software, increase the input range of the affected channel until the indicator disappears.

If the common-mode voltage of the differential input exceeds the scope’s common-mode input range, the yellow common-mode overrange indicator  appears, with the message “Common-mode overrange”. Again, a smaller version appears next to the vertical axis of the affected channel. Exceeding the common-mode input range of the scope causes inaccurate measurements and can lead to severe signal distortion.

1.2.3 Grounding**WARNING**

The oscilloscope’s ground connections through the USB cable and through the ground terminal are for measurement purposes only. The oscilloscope does not have a protective safety ground.

WARNING

Never connect the ground terminal (chassis) to any electrical power source. To prevent personal injury or death, use a voltmeter to check that there is no significant AC or DC voltage between the oscilloscope ground and the point to which you intend to connect it.

**CAUTION**

Applying a voltage to the ground input is likely to cause permanent damage to the oscilloscope, the attached computer, and other equipment.

CAUTION

To prevent measurement errors caused by poor grounding, always use the high-quality USB cable supplied with the oscilloscope.

1.2.4 External connections**WARNING**

To prevent injury or death, only use the power cord and adaptor supplied with the product. These are approved for the voltage and plug configuration in your country.

USB connection	Voltage (V)	DC power input Current (A pk)	Total power (W)
USB 3.0	5 V	3 A	15 W

Depending on the combined power requirements of the accessories connected to it, the PicoScope 4444 can operate with or without a DC power input. If the USB connection alone is insufficient to power all the accessories connected, the PicoScope 6 software will prompt you to connect the DC power supply.

1.2.5 Environment**WARNING**

To prevent injury or death, do not use in wet or damp conditions, or near explosive gas or vapor.

**CAUTION**

To prevent damage, always use and store your oscilloscope in appropriate environments, as specified below.

	Storage	Operating	Quoted accuracy
Temperature	-20 °C to +60 °C	0 °C to 45 °C	15 °C to 30 °C
Humidity	5% to 95% RH (non-condensing)	5% to 80% RH (non-condensing)	N/A

	Storage	Operating	Quoted accuracy
Altitude		Up to 2000 m	
Pollution degree		Pollution degree 2	

1.2.6 Care of the product

The product contains no user-serviceable parts. Repair, servicing and calibration require specialized test equipment and must only be performed by Pico Technology or an approved service provider. There may be a charge for these services unless covered by the Pico five-year warranty.



WARNING

To prevent injury or death, do not use the product if it appears to be damaged in any way, and stop use immediately if you are concerned by any abnormal operations.

WARNING

When cleaning the product, use a soft cloth and a solution of mild soap or detergent in water. To prevent electric shock, do not allow water to enter the oscilloscope casing; this will also cause damage to the electronics inside.



CAUTION

Do not tamper with or disassemble the oscilloscope, connectors or accessories. Internal damage will affect performance.

1.3 Conformance

1.3.1 FCC notice

This equipment has been tested and found to comply with the limits for a **Class A digital device**, pursuant to **Part 15 of the FCC Rules**. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference which the user will be required to correct at their own expense.

1.3.2 CE notice

The PicoScope 4444 PC oscilloscope meets the intent of the EMC directive **2014/30/EU** and is designed, tested, and certified to the **EN 61326-1:2013 Class B Emissions and Basic Immunity** standard.

The oscilloscope also meets the intent of the **Low Voltage Directive 2014/35/EU** and is designed to the **BS EN 61010-1:2010 / IEC 61010-1:2010** (safety requirements for electrical equipment for measurement, control, and laboratory use) standard.

1.4 Included with your PicoScope

Your PicoScope 4444 is supplied with the items shown below.

Item	Order code
PicoScope 4444 high-resolution differential oscilloscope	PQ088
PicoScope 6 software CD	DI025
PicoScope 4444 Quick Start Guide	-
Universal power supply	PS011
USB 3.0 cable, 1.8 m	TA155

A number of accessories are available, including a selection of voltage and current probes and D9-BNC adaptors. See the *PicoScope 4444 Data Sheet*, available from www.picotech.com/downloads, for more information.

Convenient pre-configured kits are available from our distributors. Alternatively, you can devise your own configuration at:

www.picotech.com/oscilloscope/picoscope-4000-series

1.5 Minimum system requirements

To make sure your PicoScope 4444 oscilloscope operates correctly, you must have a computer with the system requirements shown in the table below. The performance of the oscilloscope will improve with a more powerful PC and will benefit from a multi-core processor.

	Specifications
Operating system	Microsoft Windows 7, 8 or 10. Linux or OS X* 32-bit and 64-bit versions.
Processor	
Memory	As required by the operating system
Free disk space	
Ports	One free USB 2.0 or USB 3.0 port

* Linux and OS X both require PicoScope Beta software, available from www.picotech.com/downloads.

1.6 Installing your oscilloscope

- 1a. (Recommended: install from web) Go to www.picotech.com/downloads, select the **PicoScope 4000 Series** and the **PicoScope 4444** model, then select the latest version of the **PicoScope 6** software. Download and double-click the installer to run it.
- 1b. (Alternative: install from CD) Insert the Pico software disk into your CD drive. If Windows asks you what to do with the CD, select **Run Pico.exe**.
2. In the PicoScope installer, select the language you wish to use.
3. Follow the on-screen instructions to install the PicoScope software. Do not connect the oscilloscope until the installation is complete.
4. Connect the oscilloscope to the PC using the USB cable supplied.
5. Wait for Windows to install the oscilloscope. While doing so it will display a message in the taskbar saying either "new device" or "PicoScope 4444 oscilloscope installed".
6. Run the software by clicking the new **PicoScope 6** icon on your Windows desktop. For more information on the software, please refer to the *PicoScope 6 User's Guide*, which you can find on the software CD, download from www.picotech.com/downloads or access from the Help menu within the software.



1.7 Connecting accessories to the PicoScope 4444

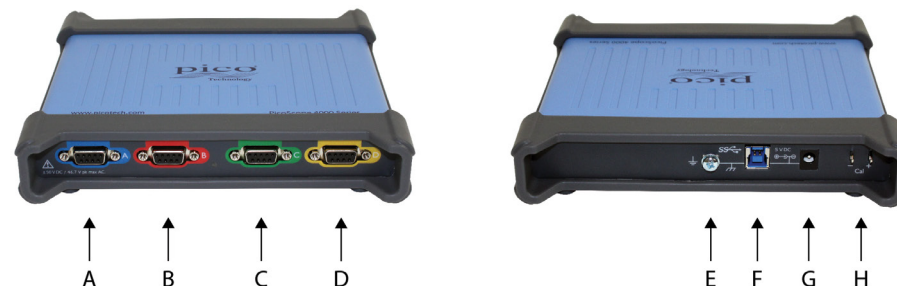


WARNING

To prevent electric shock or damage to the unit, only connect Pico Technology D9-type accessories directly to the oscilloscope. BNC-type accessories should only be used in conjunction with the TA271 or TA299 D9(m)-BNC(f) adaptors. Use of any alternative connectors is dangerous and will invalidate the warranty.

Visit www.picotech.com for more information about approved accessories and how to order them.

1.7.1 Connector diagram



1.8 Using the TA299 D9-dual BNC adaptor



The TA299 D9-dual BNC adaptor allows you to make differential measurements using two single-ended probes with BNC connectors.

The PicoScope 4444 will identify the TA299 adaptor, but not the probes connected to it. Use the **Channel Options** menu in the PicoScope 6 software to set up your probes, and compensate them using the pins on the back of the scope unit.

1.8.1 Compensating a pair of probes for common-mode voltages

This example uses two MI007 probes set to 10:1 attenuation, but applies to any single-ended attenuating probes with BNC connectors: just remember to adjust the **Probes** settings accordingly.

1. Connect the TA299 adaptor to the scope channel
2. Connect two single-ended oscilloscope probes to the TA299 adaptor
3. Open the **Channel Options** menu and select the correct attenuation factor for your probe. For 10:1 probes, this will be **x10**.
4. Set the **Coupling** control to DC
5. Set the **Input Range** to ± 5 V
6. Set the **Trigger Mode** control to **Auto**
7. Decide which probe will be the positive probe and which will be the negative probe
8. Connect the **positive probe** to **Cal +** and attach its ground clip to **Cal -**
9. Attach the **negative probe's** ground clip to the negative probe tip
10. A square wave will appear on the PicoScope 6 display
11. Adjust the **Collection Time** until the display contains one cycle of the square wave signal
12. Adjust the **positive probe**: trim it until the waveform is as near ideal as possible, with no overshoot or undershoot visible
13. Without disconnecting the positive probe, connect the **negative probe** to **Cal +** and attach its ground clip to **Cal -**
14. Set the **Trigger Mode** to **None**
15. Trim the **negative probe**: aim for a null signal, with the amplitude as close to zero as possible
16. With both probes compensated, you are now ready to test your signal

1.9 Using the TA271 D9-BNC adaptor



The TA271 D9-BNC adaptor converts the differential input of the PicoScope 4444 to a single-ended input. This allows you to connect conventional accessories such as single-ended and differential voltage probes or current probes. The adaptor grounds the negative input of the channel.

The PicoScope 4444 will identify the TA271 adaptor, but not the probe connected to it. Use the **Channel Options** menu in the PicoScope 6 software to set up your probe. If necessary, follow the steps below to compensate your probe using the pins on the back of the scope unit.

1.9.1 Compensating a single-ended probe

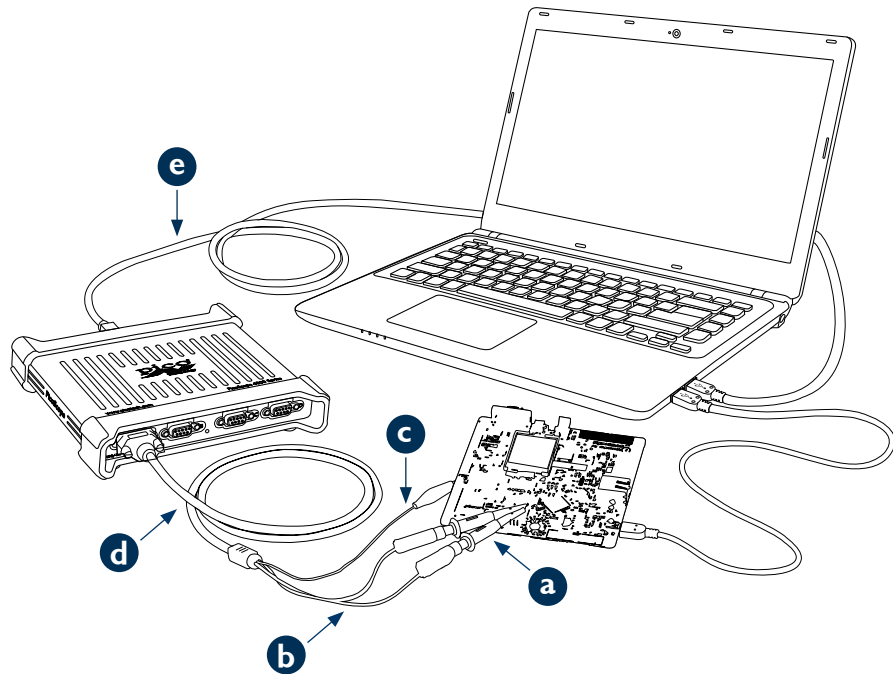
1. Find the probe compensation pins (marked **Cal**) on the back of the PicoScope 4444 unit
2. Connect the probe tip to **Cal +** and the ground lead to **Cal -**
3. Follow the probe manufacturer's instructions to compensate your probe

1.10 Using the PicoConnect 441 1:1 differential probe

1.10.1 Installing your PicoConnect 441 probe

Follow these instructions to install and start using your differential probe.

- 1. Plug the D9(m) connector into an input channel of the PicoScope 4444 differential oscilloscope.
- 2. Using the appropriate probe accessories, connect the input leads to the circuit under test.

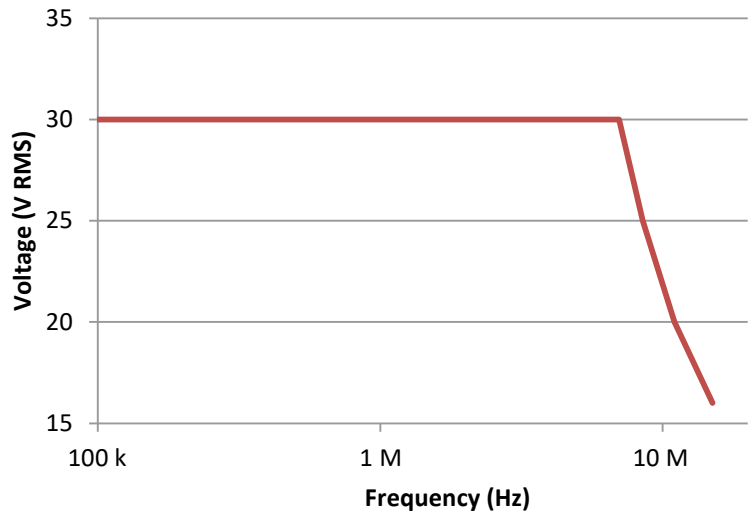


- a. TA327 and TA328 unshrouded 4 mm sprung hooks
- b. Input leads of the PicoConnect 441 probe
- c. Ground lead of the PicoConnect 441 probe
- d. Output lead of the PicoConnect 441 probe
- e. TA155 Pico blue USB cable

1.10.2 PicoConnect 441 probe specifications

Input	
Working voltage	50 V DC, 42.4 V peak AC
Overload voltage	100 V DC + peak AC
Connector	1 x red, 1 x black 4 mm plugs, unshrouded. Crocodile clip on screen/ground.
Output	
Connector	D9(m) with screw locks. Only for connection to PicoScope 4444 differential oscilloscope.
General	
Bandwidth (-3 dB)	15 MHz
Overall length	1.2 m

1.10.3 Differential input voltage derating



1.11 Using other Pico D9 accessories

A number of other current and voltage probes are available that connect directly to the input channels of the PicoScope 4444. Each probe is supplied with its own User's Guide, which you should refer to for full operating instructions.

1.12 Free newsletter

Pico Technology sends out a free monthly test and measurement newsletter by email. This gives news of product launches, software upgrades and application notes, as well as hints and advice. We treat your email address and other details as confidential and will not pass them to any third party. To subscribe, visit:

www.picotech.com/newsletter

1.13 Software updates and replacements

The latest versions of all Pico software and manuals can be downloaded free of charge from:

www.picotech.com/downloads

If you require a new software disk, please contact Pico Technology or your distributor.

1.14 Oscilloscope specifications

The PicoScope 4444 Data Sheet contains the latest specifications for your oscilloscope. We suggest that you print a copy of the specification table and keep it for easy reference.

www.picotech.com/downloads

1.15 Technical support

Regularly updated technical support information can be found at the Pico Technology technical support website and users' forum here:

www.picotech.com/support

1.16 Warranty and returns

Your PicoScope 4444 oscilloscope device is supplied with a five-year return-to-manufacturer warranty. All accessories are guaranteed for one year from the date of purchase.

You may also return your oscilloscope or any accessories for any reason within 14 days of purchase for a refund. For terms and conditions, visit:

www.picotech.com/about



8 简体中文

8.1 简介

感谢您购买 PicoScope 4444 差分 PC 示波器，这是一款高度灵活的差分示波器，适用于各种电压测量应用。

本指南解释如何安装 PicoScope 软件以及连接和设置示波器。有关软件的更多信息，请参阅《PicoScope 6 用户指南》；有关与示波器本身相关的技术数据，请参阅 PicoScope 4444 数据页：二者均以 PDF 文件形式包含在软件光盘上，也可从 www.picotech.com/downloads 下载。您还可以从 PicoScope 软件内部的“帮助”菜单访问《PicoScope 6 用户指南》。

8.2 安全信息

为防止可能发生的电击、火灾、人身伤害或产品损坏，请仔细阅读这些安全信息，然后再尝试安装或使用本产品。此外，请遵循普遍公认的所有用电工作安全做法和程序。

本产品根据欧洲标准出版物 EN 61010-1:2010 设计和测试，出厂时状态安全。本指南包含下列安全说明：

警告 表示存在可能造成人身伤害或死亡的条件或做法。

小心 表示存在可能造成相连产品或设备损坏的条件或做法。

8.2.1 符号

这些安全和电气符号可能出现在产品上或本指南中。

符号	描述
	直流电
	交流电
	地线接线柱
	机架或机箱接线柱
	设备由双重绝缘或加强绝缘装置全程保护
	小心，可能存在电击风险
	小心

接线柱可用于接地测量。接线柱不是安全装置或保护性接地。

产品上出现此符号表示需要阅读这些安全和操作说明。



注意静电

静电可能会损坏部件

CAT

EN 61010 过压分类



请勿将此产品当作未分类的城市垃圾处理



警告

为防止造成人身伤亡，必须按指示使用产品，且仅使用提供或建议的附件。如果未按制造商指定的方式使用产品，则产品所提供的保护会受到影响。

8.2.2 最大输入范围

遵循产品上标注的所有终端额定值和警告。

满刻度测量范围是指 PicoScope 4444 可以精确测量的最大电压。共模范围是指可以应用到与示波器机箱或接地相关的两个差分输入的最大电压。过压保护范围是指可以应用但不会造成设备损坏的最大电压。

	输入范围	过压保护
满刻度测量	±50 V	±100 V DC + AC 峰值
共模	±50 V	±100 V DC + AC 峰值



警告

为了防止电击，切勿尝试测量以上指定满刻度测量范围或共模范围之外的电压。



警告

超过下表中的电压限值的信号在 EN 61010 标准中被定义为“危险带电”。为防止电击，操作可能存在危险电压的设备时，请采取所有必需的安全预防措施。

EN 61010-1:2010 的信号电压限值

±70 V DC	33 V AC RMS	±46.7 V pk 最大值
----------	-------------	----------------



警告

为了防止受伤或死亡，示波器不能直接连接到 EN 61010 中定义的危险带电信号。要测量此类电压，请使用为此类应用特别规定额定值的差分探针，如 PicoConnect 442 1000 V CAT III 差分探针。



小心

超出示波器及其推荐的附件的过载保护范围可能会对示波器和其他所连接的设备造成永久损坏。

如果信号电压超出测量输入范围，则 PicoScope 软件将在显示屏的左上角显示红色过压指示符 **!**，并带有“通道过压”消息。受影响通道的垂直轴旁边将出现在更小的版本。波形将被剪切：测量输入范围之外的数据将不会被显示。在软件中，增大受影响通道的输入范围直至指示符消失。

如果差分输入的共模电压超出示波器的共模输入范围，则黄色共模过压指示符 **!** 将出现，并带有“共模过压”消息。同样，受影响通道的垂直轴旁边将出现在更小的版本。超出示波器的共模输入范围会导致测量不精确，并可能导致信号严重变形。

8.2.3 接地



警告

示波器通过 USB 电缆和接地接线柱进行接地的目的是仅用于测量。示波器无防护性安全接地装置。

警告

永远不要将接地接线柱（机箱）连接到任何电源。为防止人身伤害或死亡，请使用电压表检查示波器的接地端与要连接的点之间是否存在明显交流或直流电压。



小心

向接地输入施加电压很可能对示波器、连接的电脑和其他设备造成永久损害。

小心

为防止接地不良引起测量误差，请始终使用示波器随附的高质量 USB 线缆。

8.2.4 外部连接



警告

为防止人身伤害或死亡，仅使用产品随附的电源线和适配器。它们是您所在的国家批准的电压和插头配置。

USB 连接	电压 (V)	DC 电源输入 电流 (A pk)	总功率 (W)
USB 3.0	5 V	3 A	15 W

根据其所连接的附件的组合电源要求，PicoScope 4444 可以在带有或不带 DC 电源输入的情况下工作。如果仅靠 USB 连接已足够为已连接的所有附件提供电源，则 PicoScope 6 软件会提示您连接到 DC 电源。

8.2.5 环境



警告

为防止人身伤害或死亡，请勿在潮湿的条件下或者附近有爆炸性气体或蒸汽时使用。



小心

为防止损坏，请始终在适当的环境中使用和存储示波器，如下面所指定。

	存储	工作	引述的精度
温度	- 20 °C 至 + 60 °C	0 °C 至 45 °C	15 °C 至 30 °C
湿度	相对湿度 5% 至 95% (非冷凝)	相对湿度 5% 至 80% (非冷凝)	不适合
海拔		最高 2000 米	
污染度		污染等级 2	

8.2.6 产品照管

本产品不含可由用户维修的部件。维修、保养和校准需要专用的测试设备且必须仅由 Pico Technology 或获批的服务提供商执行。如果不在 Pico 五年质保范围内，这些服务可能需要收费。



警告

为防止人身伤害或死亡，请勿使用出现任何损坏的产品；如果您担心出现任何异常操作，请立即停止使用。

警告

清洁产品时，请使用软布以及温和肥皂溶液或洗涤剂水。为了防止电击，切勿让示波器外壳进水，因为这样会损坏内部的电子元件。



小心

请勿乱动或拆卸示波器、连接器或配件。内部损坏会影响性能。

8.3 一致性

8.3.1 FCC 声明

本设备经过测试，证明符合 **FCC 规则第 15 章** 中关于 **A 类数字设备** 的限制条件。这些限制旨在提供合理的保护，防止设备在商业环境中运行时免受有害干扰。此设备产生、使用并能辐射无线电频率能量，因此，如果不按照说明书安装和使用，可能对无线电通信造成有害干扰。在居住区域使用此设备可能会造成有害干扰，要求用户自己出资对此纠正。

8.3.2 CE 声明

PicoScope 4444 PC 符合 EMC 指令 2014/30/EU 的设计意图，其设计、测试和认证均符合 EN 61326-1:2013 B 类辐射与基本抗扰性标准。

该示波器还符合低压指令 2014/35/EU 的意图，并根据 BS EN 61010-1:2010 / IEC 61010-1:2010（测量、控制和实验室用电气设备安全要求）标准进行设计。

8.4 PicoScope 随附物品

您的 PicoScope 4444 随产品提供如下物品：

项目	订购代码
PicoScope 4444 高分辨率差分示波器	PQ088
PicoScope 6 软件光盘	DI025
PicoScope 4444 快速入门指南	-
通用电源	PS011
USB 3.0 电缆，1.8 米	TA155

提供大量附件，包括电压和电流探针选择以及 D9-BNC 适配器。有关更多信息，请参阅 PicoScope 4444 数据页，可从 www.picotech.com/downloads 下载。

我们的经销商提供方便的预配置套件。或者，您可以在以下地方设计自己的配置：

www.picotech.com/oscilloscope/picoscope-4000-series

8.5 最低系统要求

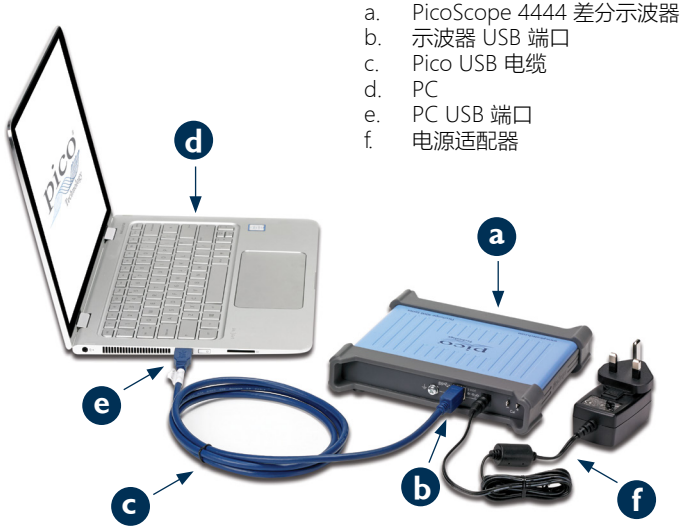
为了确保您的 PicoScope 4444 示波器能够正常工作，您必须具备符合以下表格中系统要求的一台计算机。计算机的配置越高（采用多核处理器），示波器的性能就越好。

	规格
操作系统	Microsoft Windows 7、8 或 10。 Linux 或 OS X* 32 位和 64 位版本。
处理器	如操作系统所需
内存	
可用磁盘空间	一个免费的 USB 2.0 或 USB 3.0 端口
端口	

* Linux 和 OS X 均要求 PicoScope 测试版软件，可从 www.picotech.com/downloads 下载。

8.6 安装示波器

- 1a. （推荐从 Web 安装）转到 www.picotech.com/downloads，选择 PicoScope 4000 Series 和 PicoScope 4444 型号，然后选择最新版本的 PicoScope 6 软件。下载并双击安装程序运行它。
- 1b. （或者：从 CD 安装）将 Pico 软件光盘插入您的 CD 驱动器。如果 Windows 询问您如何运行光盘，请选择 **Run Pico.exe**。
2. PicoScope 安装程序，选择您要使用的语言。
3. 按照屏幕上的说明安装 PicoScope 软件。安装完成之前请勿连接示波器。
4. 使用配套提供的 USB 缆线将示波器连接至 PC。
5. 等待 Windows 安装示波器。这样操作时，工具栏中将显示消息“新设备”或“PicoScope 4444 示波器已安装”。
6. 通过单击 Windows 桌面上的新建 **PicoScope 6** 图标运行软件。有关软件的更多信息，请参阅《PicoScope 6 用户手册》，您可以在光盘上找到该手册，从 www.picotech.com/downloads 下载或从软件内部的“帮助”菜单访问。



8.7 将附件连接到 PicoScope 4444

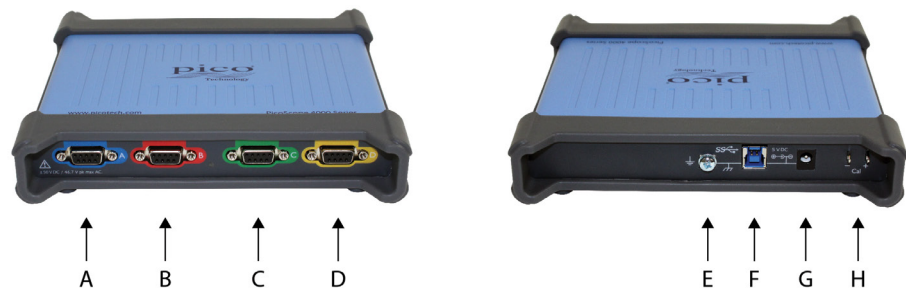


警告

为了防止电击或设备损坏，只能将 Pico Technology D9 型附件直接连接到示波器上。BNC 型附件只能与 TA271 或 TA299 D9(m)-BNC(f) 适配器一起使用。使用任何其他连接器非常危险并将导致保修失效。

有关经过认证的附件和如何订购它们的更多信息，请访问 www.picotech.com。

8.7.1 连接器示意图



- A. 输入通道 A
- B. 输入通道 B
- C. 输入通道 C
- D. 输入通道 D
- E. 接地接线柱
- F. USB 3.0 端口
- G. DC 电源插座。供与所提供的 AC 适配器一起使用。
- H. 探针补偿针脚

8.8 使用 TA299 D9 双向 BNC 适配器



TA299 D9-双向 BNC 适配器允许您使用两个单端探针和 BNC 连接器来进行差分测量。

PicoScope 4444 将识别 TA299 适配器，但不能识别与之连接的探针。使用 PicoScope 6 软件中的**通道选项菜单**来设置您的探针，并使用示波器设备背面的针脚来进行补偿。

8.8.1 对探针对的共模电压进行补偿

此示例使用两个设置为 10:1 衰减的 MI007 探针，但适用于带 BNC 连接器的任何单端衰减探针：只需记住相应地调整**探针**设置。

1. 将 TA299 适配器连接到示波器通道
2. 将两个单端示波器探针连接到 TA299 适配器
3. 打开 **通道选项**菜单并为您的探针选择正确的衰减因子。对于 10:1 探针，该值将为 **x10**。
4. 将**耦合控制**设置为 DC
5. 将**输入范围**设置为 $\pm 5\text{ V}$
6. 将**触发模式**控制设置为**自动**
7. 确定哪个探针将为正极探针，哪个将为负极探针
8. 将**正极探针**连接到 **Cal +** 并将其接地线夹连接到 **Cal -**
9. 将**负极探针**的接地线夹连接到负极探针针尖
10. PicoScope 6 显示屏上将显示方波
11. 调整**采集时间**直至显示屏包含方波信号的一个周期
12. 调整**正极探针**：调整直至波形尽量接近理想，没有明显的过冲或下冲
13. 在不断开正极探针的情况下，将**负极探针**连接到 **Cal +** 并将其接地线夹连接到 **Cal -**
14. 将**触发模式**设置为**无**
15. 调整**负极探针**：目的是获得空信号，其振幅尽量接近零
16. 对两个探针进行补偿后，您现在可以测试信号了

8.9 使用 TA271 D9-BNC 适配器



TA271 D9-BNC 适配器将 PicoScope 4444 的差分输入转换为单端输入。这样将允许您连接单端和差分电压探针或电流探针等常规附件。适配器在通道的负极输入上接地。

PicoScope 4444 将识别 TA271 适配器，但不能识别与之连接的探针。使用 PicoScope 6 软件中的**通道选项**菜单来设置您的探针。如果必要，请按照以下步骤使用示波器设备背面的针脚来补偿您的探针。

8.9.1 补偿单端探针

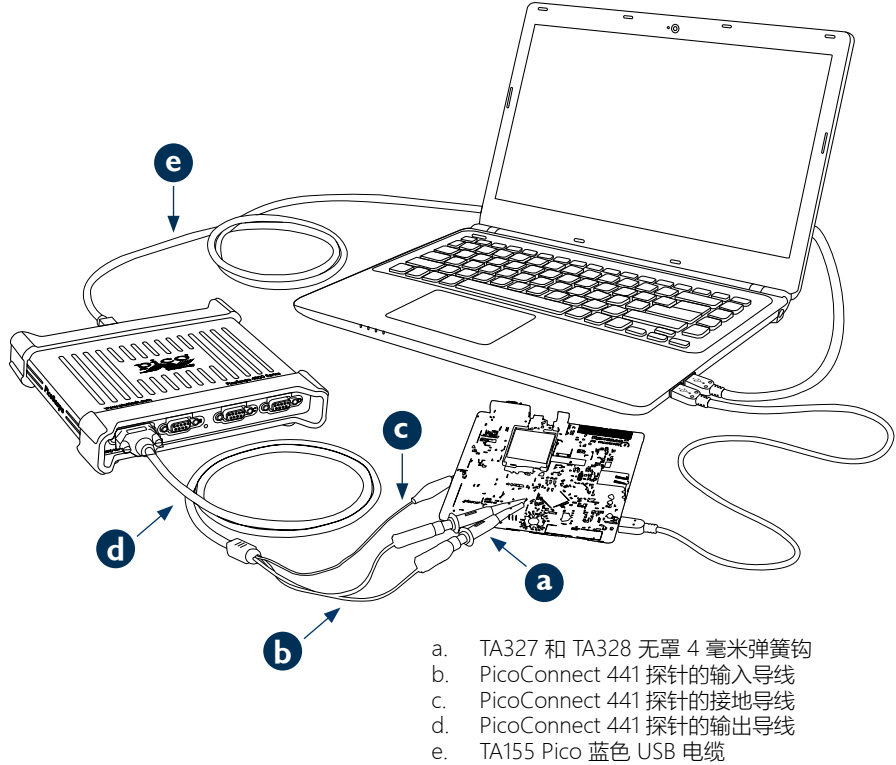
1. 找到 PicoScope 4444 设备背面上的探针补偿针脚（标记为 **Cal**）
2. 将探针针尖连接到 **Cal +** 并将接地导线连接到 **Cal -**
3. 按照探针制造商的说明来补偿您的探针

8.10 使用 PicoConnect 441 1:1 差分探针

8.10.1 安装 PicoConnect 441 探针

按照这些说明来安装探针并开始使用您的差分探针。

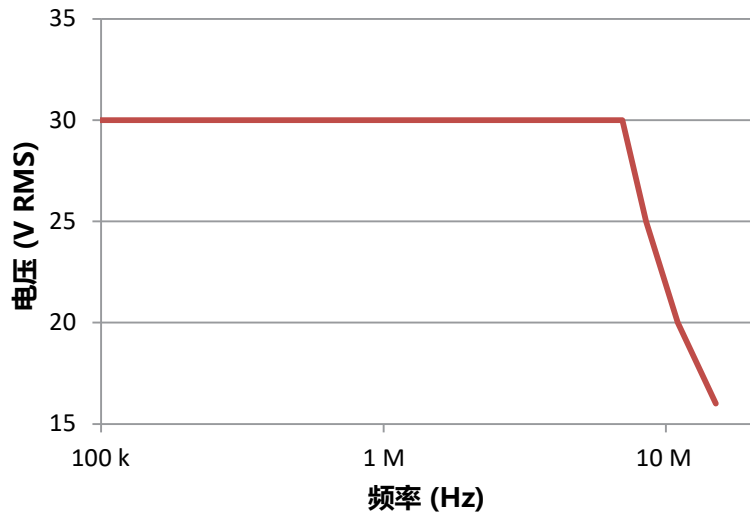
1. 将 D9(m) 连接器插入 PicoScope 4444 差分示波器的输入通道
2. 使用适当的探针附件，将输入导线连接到正在进行测试的电路



8.10.2 PicoConnect 441 探针规格

输入	
工作电压	50 V DC、42.4 V 峰值 AC
过载电压	100 V DC + 峰值 AC
连接器	1 x 红色、1 x 黑色 4 毫米插座，无罩。屏幕/地面上的弹簧线夹。
输出	
连接器	带螺丝锁定的 D9(m)。仅用于连接到 PicoScope 4444 差分示波器。
常规	
带宽 (-3 dB)	20 MHz
总体长度	1.2 米

8.10.3 差分输入电压降额



8.11 使用其他 Pico D9 附件

提供许多其他电流和电压探针，可连直接接到 PicoScope 4444 的输入通道。每种探针均提供有自己的《用户指南》，您应参考这些指南来获取完整的操作说明。

8.12 免费通讯期刊

Pico Technology 通过电子邮件发送每月免费测试和测量通讯期刊。为您提供有关产品首发、软件升级、应用说明、提示及建议等方面的信息。我们将您的电子邮件和其他信息视为保密信息，不会传递给任何第三方。若要订阅，请访问：

www.picotech.com/newsletter

8.13 软件升级和更新

所有 Pico 软件和手册的最新版本均可从以下网址免费下载：

www.picotech.com/downloads

如果需要新的软件光盘，请联系 Pico Technology 或您的经销商。

8.14 示波器规格

PicoScope 4444 数据页包含示波器的最新规格。我们建议您打印一份该规格表并保存好，以便于参考。

www.picotech.com/downloads

8.15 技术支持

Pico Technology 技术支持网站及用户论坛提供定期更新的技术支持信息：

www.picotech.com/support

8.16 质保与退回

您的 PicoScope 4444 示波器设备提供有五年的返厂维修质保。所有附件从购买之日起保修一年。

购买后 14 日内，对于示波器或任何附件，均可无理由退货。有关条件和条款，请访问：

www.picotech.com/about



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