



# PicoScope® 2000 Series

Oscilloscopes and MSOs

USER'S GUIDE



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# English

## Introduction

Thank you for purchasing a PicoScope 2000 Series PC Oscilloscope. This oscilloscope is intended for the measurement of electrical signals to the limits specified in this guide and in the instrument's Data Sheet. For safe limits of accessories, refer to the documentation supplied by the manufacturer.

This guide explains how to install the PicoScope software and connect the oscilloscope to your computer. It also contains important safety information and advice on accessing user manuals and technical support. Please retain it for future reference.

For technical information relating to the oscilloscope, see the *PicoScope 2000 Series Data Sheet*, available from [picotech.com/library/documentation](http://picotech.com/library/documentation).

This guide covers the PicoScope 2204A, 2205A, 2205A MSO, 2206B, 2206B MSO, 2207B, 2207B MSO, 2208B, 2208B MSO, 2405A, 2406B, 2407B and 2408B. Documentation for other Pico products is available from [picotech.com/library/documentation](http://picotech.com/library/documentation).

We recommend that you use this document in the order it is presented:

- Step 1 Install the PicoScope software
- Step 2 Read the oscilloscope safety and conformance information
- Step 3 Connect the oscilloscope

## Step 1: Install the PicoScope software

### 1.1 System requirements

To ensure that PicoScope operates correctly, you must use 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, 32-bit and 64-bit versions Linux and macOS (beta software only), 64-bit versions See <a href="http://picotech.com/downloads">picotech.com/downloads</a> for details
Processor	As required by the operating system
Memory	
Free disk space	
Ports	USB 2.0 or USB 3.0 port(s)

### 1.2 Installing the software

- Go to [picotech.com/downloads](http://picotech.com/downloads), select **PicoScope 2000 Series** from the list on the left, then select your model and the latest **PicoScope** software from the lists that appear. Download and run the installer.
- In the PicoScope installer, select the language you wish to use.
- Follow the on-screen instructions to install the software. Do not connect the oscilloscope

*Continued overleaf*

device until the installation is complete.

- You can try out the software with a demo device now, by clicking the new **PicoScope** icon on your desktop.

For more information on the software, refer to the *A to Z of PC Oscilloscopes* at [picotech.com/library/a-to-z](http://picotech.com/library/a-to-z) or the software *User's Guide*, which you can download from [picotech.com/library/documentation](http://picotech.com/library/documentation) or access from the Help menu within the software.

## Step 2: Safety and conformance 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 harmonized standard publication EN 61010-1:2010+A1:2019 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use), and EN 61010-2-030: 2010 (Requirements for Testing and Measuring Circuits). The product 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 equipment to which it is connected.

### 2.1 Symbols

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

Symbols	Description
	Chassis terminal
	Possibility of electric shock
	Caution <sup>[1]</sup>
	Do not dispose of this product as unsorted municipal waste

[1] *Appearance on the product indicates a need to read the supplied safety and operating instructions.*

This oscilloscope is intended for the measurement of electrical signals up to the limits specified in this guide and in the *PicoScope 2000 Series Data Sheet*. For safe limits of accessories, please refer to the documentation supplied by the manufacturer.

### **WARNING**

To prevent injury or death use the product only as instructed. Protection provided by the product may be impaired if used in a manner not specified by the manufacturer.

## 2.2 Maximum input and output ratings

Observe all terminal ratings and warnings marked on the product. The marked voltage is the maximum that may be applied across that terminal without risk of personal injury or damage to the instrument.

The table below and markings on the instrument indicate the full-scale measurement range and overvoltage protection range for the PicoScope 2000 Series oscilloscopes. The full-scale measurement range is the maximum voltage that can be accurately measured by the instrument. The overvoltage protection range is the maximum voltage that will not damage the instrument.

### WARNING

To prevent electric shock, do not attempt to connect to or measure voltages outside of the specified full-scale measurement range.

Full scale measurement range	Overvoltage protection (DC + AC peak)		
	Input channels	Digital input channels (MSO)	Signal generator output
±20 V	±100 V	±50 V	±20 V

### WARNING

Signals exceeding the voltage limits in the table below are defined as "hazardous live" by EN 61010.

#### Signal voltage limits of EN 61010-1:2010+A1:2019

±60 V DC	30 V AC RMS	±42.4 V pk max.
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### WARNING

To prevent injury or death, do not directly connect the oscilloscope to hazardous live voltages.

To prevent electric shock, take all necessary safety precautions when working on equipment where hazardous live voltages may be present.

The following accessories can safely connect to and allow measurement of hazardous live voltages, up to either the instrument's full-scale measurement voltage multiplied by the applicable attenuation ratio or the accessory's marked maximum operating voltage, whichever is the lower:

- P2036 and P2056 10:1 passive high-impedance oscilloscope probes
- All Pico Technology-supplied high-voltage active probes

Accessories suited for connection to hazardous live voltages are clearly marked with their maximum allowable voltage and, where applicable, their CAT rating.

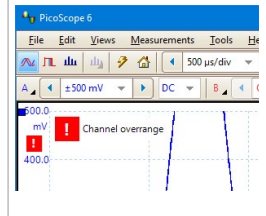
**⚠ WARNING**

To prevent electric shock, do not exceed the voltage rating marked on any accessory. If an accessory is not marked with a voltage rating on either the connector, cable or body, or if a protective finger guard is removed, then do not exceed the EN 61010 "hazardous live" limits above. When connecting one or multiple accessories and an instrument channel together, the lowest voltage rating in the chain applies to that channel.

To prevent injury or death, do not directly connect the oscilloscope to the mains (line power). To measure mains voltages, use only a differential isolating probe that is specifically CAT rated for mains or high-energy use, such as the TA041 listed on the Pico website. Such measurements must only be made by competent persons and appropriate safety training may be required.

If PicoScope detects a signal voltage exceeding the selected full scale measurement range, it is indicated on the measurement display. A red warning icon will appear in the upper left corner and next to the relevant channel's vertical axis.

In these conditions, displayed waveforms and measurements may be incorrect and the condition may be hazardous. Select a larger voltage range to achieve a within-range measurement and if the condition persists, to prevent injury or death, disable or otherwise safely disconnect from the source of overvoltage.

**⚠ CAUTION**

To avoid causing permanent damage to the oscilloscope and other connected equipment, do not exceed the voltage rating of any cable, connector or accessory.

## 2.3 Grounding

**⚠ WARNING**

The oscilloscope's ground connection through the USB cable is for measurement purposes only. The oscilloscope does not have a protective safety ground. Never connect the ground input (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**

To avoid causing permanent damage to the oscilloscope, the attached computer and other equipment, never apply a voltage to the ground input. To prevent measurement errors caused by poor grounding, always use the high-quality USB cable supplied with the oscilloscope.

## 2.4 External connections

*Note: the oscilloscope is powered through the USB connector. No additional power supply unit is required.*

**⚠ CAUTION**

Take care to avoid mechanical stress or tight bend radii for all connected leads. Mishandling will cause deformation and will degrade performance and measurement accuracy.

**2.5 Environment**

This product is suitable for indoor or outdoor use, in dry locations only.

Please contact Pico technical support if you would like any advice on integrating a PicoScope into your own product or application.

**⚠ 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.

	Storage	Operating	Quoted accuracy
Temperature	-20 °C to +60 °C	0 °C to 50 °C	15 °C to 30 °C
Humidity (non-condensing)	5 to 95 %RH (non-condensing)	5 to 80 %RH (non-condensing)	
Altitude	2000 m (maximum)		
Pollution degree	2 (maximum)		
EMC	EN61326-1 basic immunity. The radiated and conducted RF signals prescribed by this standard may cause interference of up to 4 vertical divisions peak to peak.		

**2.6 Care of the product**

The product contains no user-serviceable parts. Repair, servicing, and adjustment 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.

Inspect the instrument and all probes, connectors, cables and accessories before use for signs of damage.

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

**⚠ WARNING**

To prevent electric shock do not tamper with or disassemble the oscilloscope, case parts, connectors or accessories.

When cleaning the oscilloscope, use a soft cloth and a solution of mild soap or detergent in water. To prevent electric shock, do not allow liquids to enter the oscilloscope casing, as this will compromise the electronics or insulation inside.



## 2.7 Conformance



### General statement of conformity

The enclosed instrument has been calibrated in accordance with the manufacturer's verification procedure using standards that are traceable to UK national standards. The test location's quality management system complies with, and its calibration process is controlled under, ISO 9001:2015. The calibration processes are designed to certify that the instrument was within its published specification at the time of calibration. The measurements were made in a monitored environment.

A full calibration certificate including test data and traceable to national standards is available on request. Please refer to [picotech.com/products](http://picotech.com/products) for pricing.

### FCC notice

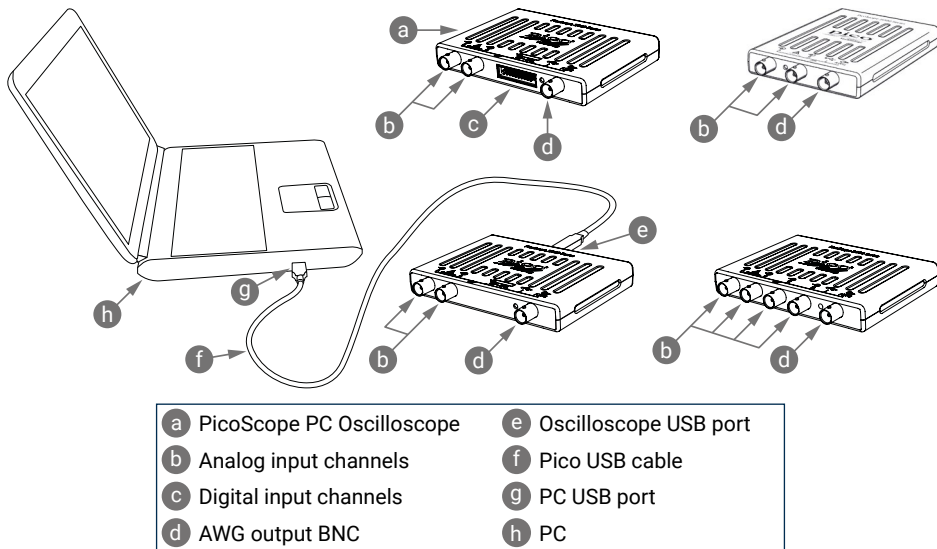
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to **Part 15 of the FCC Rules**. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment 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.

### CE and UKCA notices

The PicoScope 2000 Series oscilloscopes meet the intent of the CE EMC directive 2014/30/EU and UKCA SI2016/1091 EMC Regulations. This oscilloscope also meets the intent of the CE Low Voltage Directive 2014/35/EU and UKCA SI 2016/1101 Electrical Equipment (Safety) Regulations. For more information, please refer to your product's UKCA Declaration of Conformity or EU Declaration of Conformity, available for download from [www.picotech.com/downloads](http://www.picotech.com/downloads).

### Step 3: Connect your oscilloscope

1. Connect the oscilloscope to your PC using the USB cable supplied, as shown in the connection diagram below.

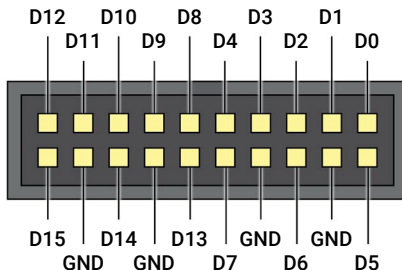


2. Wait for your computer to install the oscilloscope. While doing so it will display a message or icon in the task bar telling you it has found the device.
3. Run the PicoScope software.
4. If you wish to use a probe, connect one to Channel A. Touching the metal tip of the probe should cause a small 50 or 60 hertz signal to appear in the PicoScope window.

Once you have finished the basic installation, the *PicoScope 6 User's Guide* will provide further information about setting up and using your oscilloscope.

## Digital inputs on MSO models

The digital input pins of the 20-pin IDC header plug are shown below. The diagram is drawn as you look at the front panel of the oscilloscope.



To avoid crosstalk on the digital inputs when probing signals with very fast edges, always take extra care to:

- Keep leads carrying fast signals separate from other input leads.
- Keep leads carrying fast signals as close as possible to the ground leads.
- Connect all four black ground leads to the ground of the circuit under test.

## Useful information

### Documentation

The *PicoScope 2000 Series Data Sheet* contains the latest specifications for your oscilloscope. You can download PDF copies of this and all other documentation relevant to your oscilloscope from [picotech.com/library/documentation](http://picotech.com/library/documentation).

### Software updates

The PicoScope software can check for updates automatically, and notify you when any are available. Alternatively, you can download the latest version free of charge from [picotech.com/downloads](http://picotech.com/downloads).

### PicoLog software

Your PicoScope PC-based oscilloscope is also compatible with the PicoLog 6 data acquisition software, allowing it to function as a voltage-input data logger with a maximum sampling rate of 1 kS/s per channel. PicoLog 6 is available free of charge from [picotech.com/downloads](http://picotech.com/downloads).

### Writing your own software

PicoSDK®, a software development kit with all the drivers and other files you will need to develop your own custom programs, is available for download from [picotech.com/downloads](http://picotech.com/downloads).

Linux driver packages are available for download from [picotech.com/downloads/linux](http://picotech.com/downloads/linux).

The relevant files are included in the PicoScope software download for macOS, available from [picotech.com/downloads](http://picotech.com/downloads).

Pico also maintains repositories of examples for various programming languages on GitHub, at [github.com/picotech](http://github.com/picotech).

## Technical support

Regularly updated technical support information can be found on the Pico Technology technical support web page ([picotech.com/tech-support](http://picotech.com/tech-support)) and the Test & Measurement Forum ([picotech.com/support](http://picotech.com/support)). You can also email [support@picotech.com](mailto:support@picotech.com) or telephone **+44 (0) 1480 479 164** to contact our team directly.

## Certificate of conformity

If you require a certificate of conformity (CoC) for your PicoScope 2000 Series oscilloscope, you can obtain a PDF copy electronically by contacting our Technical Support team. Please provide the model and the serial number, which are both printed on the base of the instrument.

## Warranty and returns

Your PicoScope oscilloscope 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 for any reason within 14 days of purchase for a refund. For terms and conditions, visit [picotech.com/about](http://picotech.com/about).



## Legal information

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