PicoScope® 9400 Series

Sampler-extended real-time oscilloscopes

QUICK START GUIDE

Contents

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Introduction

Thank you for purchasing a PicoScope 9400 Series sampler-extended real-time oscilloscope. The instruments are two- or four-channel, high-bandwidth 5 GHz or 16 GHz oscilloscopes with up to 1 or 2.5 TS/s random equivalent-time sampling rate. This guide explains how to install the PicoSample 4 software and connect your PicoScope. It also contains important safety information and advice on accessing user manuals and technical support.

We recommend that you follow Steps 1 to 3 in order:

Step 1:   Install the PicoSample 4 software
Step 2:   Read the PicoScope 9400 Series safety information
Step 3:   Connect the PicoScope

Step 1: Installing the PicoSample 4 software

1.1   System requirements

To ensure that PicoSample 4 operates correctly, you must use a computer with the system requirements shown in the table below.

Item	Specifications
Operating system	Microsoft Windows 8 or 10, 32-bit and 64-bit versions
Processor, memory, free disk space	As required by the operating system
Ports	USB 2 or 3

1.2   Installing the software

1.   Run the `PicoSample-4_Setup.exe` file directly from the flash drive provided with your PicoScope.

2.   Follow the on-screen instructions to install the software. Do not connect the PicoScope until the installation is complete.

3.   You can try out the software by clicking the new **PicoSample 4** icon on your desktop and then selecting the demo device.

For more information on the software, please refer to the built-in help.

Step 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 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use) and and EN 61010-2-30: 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 safety and electrical symbols may appear on the product or in this guide.

Symbol	Description	
⏚	Chassis terminal	
⚡	Possibility of electric shock	Appearance on the product indicates a need to read these safety and operation instructions.
⚠	Caution	
♲	Do not dispose of this product as unsorted municipal waste	

⚡ WARNING

This product and accessories are for professional use by trained and qualified technicians only. To prevent injury or death use the product only as instructed and use only accessories that have been supplied or recommended. Protection provided by the products may be impaired if used in a manner not specified by the manufacturer.

2.2   Maximum terminal ratings

Observe all terminal ratings and warnings marked on the product.

The table below and/or markings on the product indicate the full-scale measurement range and overvoltage protection range. The full-scale measurement ranges are the maximum voltages that can be accurately measured by the instrument and the overvoltage protection ranges are the maximum voltages that will not damage the instrument.

⚡ WARNING

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

Model	Input/output	Overvoltage protection	Full-scale range
All	Channels **CH1** to **CH2/CH4**	±1.4 V (DC + peak AC)	±800 mV
PicoScope 9402	**DIRECT** trigger input	±3 V (DC + peak AC)	±1 V
PicoScope 9404-16	**PRESCALE** trigger input	±2 V (DC + peak AC)	2 V p-p
PicoScope 9402-16		3 V p-p	
PicoScope 9404	**CAL** output	±2 V (DC + peak AC)	±1 V pk
PicoScope 9404	**TRIGGER** output		±750 mV pk
All	Clock recovery **DATA** and **CLK** outputs (optional)		±150 mV pk typ.

⚡ 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.

⚡ WARNING

To prevent injury or death, do not directly connect the PicoScope to the mains (line power).

⚡ 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.

⚠ CAUTION

To avoid causing permanent damage to the oscilloscope and other connected equipment, do not exceed the overvoltage protection range on any cable, connector or accessory.

2.3   Grounding

⚡ WARNING

The PicoScope's ground connection through the USB cable is for measurement purposes only. The PicoScope 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 PicoScope ground and the point to which you intend to connect it.

⚠ CAUTION

To avoid causing permanent damage to the PicoScope, the attached computer, and other equipment, do not apply a voltage to the ground input.

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

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.

Model	External DC power supply		
	Voltage	Current (no accessories)	Current (with accessories)
PicoScope 9404-05 PicoScope 9404-16	12 V DC ± 5%	2.7 A max.	3.3 A max.
PicoScope 9402-05 PicoScope 9402-16		1.8 A max.	–

⚠ CAUTION

Take care to avoid mechanical stress or tight bend radii for all connected leads, including all coaxial leads and connectors. Mishandling will cause deformation of sidewalls, and will degrade performance and accuracy.

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.

	Storage	Operating	Quoted accuracy
Temperature	−20 °C to +50 °C	+5 °C to +40 °C	+15 °C to +25 °C
Humidity	Up to 95 %RH (non-condensing)	Up to 85 %RH (non-condensing) at +25 °C	
Altitude	Up to 2000 m		
Pollution degree	2		

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.

⚠ WARNING

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

When cleaning the PicoScope, use a soft cloth, moistened if necessary with a solution of mild soap or detergent in water. To prevent electric shock, do not allow water to enter the casing, as this will compromise the electronics or insulation inside.
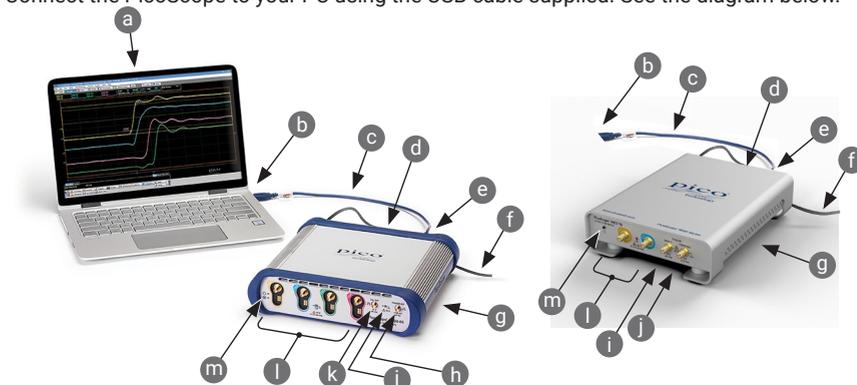
⚠ CAUTION

Do not block the air vents at the back of the PicoScope as overheating will damage the instrument.

Do not insert any objects through the air vents as internal interference will cause damage to the instrument.

To prevent dirt ingress, fit dust caps to all unmated connectors and remove them only during connection.

Step 3: Connecting your PicoScope SXRTO

1. Make sure that you have installed the PicoSample 4 software. This is necessary to allow you to operate the PicoScope.

2. If the software is running in demo mode, close it before you connect the PicoScope.

3. Connect the PicoScope to your PC using the USB cable supplied. See the diagram below.

a. PC
b. PC USB port
c. Pico USB cable
d. Clock recovery CLK and DATA outputs (optional)
e. PicoScope USB and LAN ports
f. DC power cable
g. PicoScope device
h. Trigger output
j. Prescaled trigger input[1]
k. Calibration signal output
l. Input channels[2] 1−4
m. Power and status LEDs

[1] 16 GHz model only
[2] 50 Ω input impedance. With power and control interfaces for future accessories.

b. PC USB port
c. Pico USB cable
d. Clock recovery CLK and DATA outputs (optional)
e. PicoScope USB port
f. DC power cable
g. PicoScope device
i. Direct trigger input
j. Prescaled trigger input[1]
l. Input channels[2] 1−2
m. Power and status LED

4. Wait for your computer to install the device. While doing so it will display a message or icon in the taskbar telling you it has found the device.

5. Run the software by clicking the new **PicoSample 4** icon on your desktop. PicoSample 4 will automatically detect and identify your PicoScope.

6. In the **Connect Device** dialog that appears, select the PicoScope and click **Connect Device**. Once the device is connected, you can use the oscilloscope.

For more detailed instructions on setting up your PicoScope device, download the *User's Guide* and *Data Sheet*.

Input and output connections

The *PicoScope 9400 Series User's Guide* contains a detailed description of input and output connections.

Front-panel indicator (PicoScope 9402 models)

Flashing green while intializing. Steady green when connected to USB port. Steady amber while waiting for trigger. Flashing amber while triggering.

Front-panel indicators (PicoScope 9404 models)

Upper LED: Red when oscilloscope uninitialized. Flashing green while intializing. Steady green when correctly set up.

Lower LED: Flashing green while searching for USB connection. Flashing red while searching for LAN connection. Flashing amber indicates triggering.

LAN connection instructions (PicoScope 9404 models only)

Default IP address: 192.168.0.221

To change the IP address:

1. Connect the oscilloscope's USB port to the PC.
2. Click **Help > About… > TCP/IP Properties**. The **TCP/IP Properties** dialog opens.
3. If changes are required, click **Set New TCP / IP Properties** and in the **Confirm** dialog click **OK**. Enter the desired address in the second **TCP/IP Properties** dialog.

To switch to the LAN interface:

1. Make any necessary adjustments to the LAN settings under the **System** menu.
2. Make sure that there is no USB connection.
3. Turn off the scope.
4. Connect the LAN connector to your Local Area Network (LAN).
5. Turn on the scope.

Additional information

Documentation

The *Data Sheet* contains the latest specifications for your PicoScope device. We recommend that you download a copy and keep it for easy reference. For detailed information on operating and installing your product, you should consult its *User's Guide*. You can download PDF copies of all documentation relevant to your oscilloscope, including the *Programmer's Guide*, from www.picotech.com/downloads.

Software updates and replacement

You can download the latest versions of the PicoSample 4 software free of charge from www.picotech.com/downloads.

Writing your own software

A software development kit with all the drivers and other files you will need to develop your own custom programs is installed with the PicoSample 4 software. Pico also maintains repositories of examples in various programming languages on GitHub, at github.com/picotech.

Technical support

Regularly updated technical support information can be found on the Pico Technology technical support web page and users' forum at www.picotech.com/tech-support.

Warranty and returns

Your oscilloscope is supplied with a five-year return-to-manufacturer warranty. Accessories are guaranteed for one year from the date of purchase. You may also return your PicoScope for any reason within 14 days of purchase for a refund. For terms and conditions, visit www.picotech.com/about.

Free newsletter

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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.