PicoScope 4000 Series

PC Oscilloscopes

User's Guide

Contents

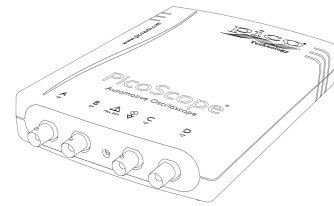# 1   Welcome

Thank you for buying a Pico Technology product!

The PicoScope 4000 Series of PC Oscilloscopes from Pico Technology is a range of compact units designed to replace traditional bench-top models costing many times the price. This guide covers the various PicoScope 4000 Series Oscilloscopes.

The following models are available in the PicoScope 4000 series:

PicoScope 4262	5 MHz 16-bit 2-channel oscilloscope
PicoScope 4224	20 MHz 12-bit 2-channel oscilloscope
PicoScope 4224 IEPE	20 MHz 12-bit 2-channel IEPE oscilloscope
PicoScope 4424	20 MHz 12-bit 4-channel oscilloscope
PicoScope 4226	50 MHz 12-bit 2-channel oscilloscope
PicoScope 4227	100 MHz 12-bit 2-channel oscilloscope

Here are some of the benefits provided by your new PicoScope 4000 Series PC Oscilloscope:

- **Portability:** Take the unit with you and plug it in to any Windows PC.
- **Performance:** Up to 16-bit resolution, large buffer with up to 32 M samples, fast USB 2.0 interface.
- **Flexibility:** Use as an oscilloscope, spectrum analyser or high-speed data acquisition interface.
- **Programmability:** The PicoScope 4000 series API lets you write your own programs, in your chosen programming language, to control all the features of the scope.
- **Long-term support:** Software upgrades are available to download from our website. You can also call our technical specialists for support. You can continue to use both of these services free of charge for the lifetime of the product.
- **Value for money:** You don't have to pay twice for all the features that you already have in your PC. The PicoScope 4000 Series scope unit contains the special hardware you need and nothing more.
- **Convenience:** The software makes full use of the large display, storage, user interface and networking built in to your PC.
- **IEPE capability:** The PicoScope 4224 two-channel IEPE (Integrated Electronics Piezo Electric) model allows you to connect industry-standard sensors such as accelerometers and microphones without requiring an external IEPE power supply.

Programming with the PicoScope 4000 Series

An Application Programming Interface (API) is supplied free of charge with the PicoScope 4000 Series scopes. You can download and install it from our website at www.picotech.com. The software includes a Programmer's Guide in PDF format.

2   Introduction

2.1   Safety symbols

The following symbols appear on the top cover of the PicoScope 4000 Series PC Oscilloscope.

Symbol 1: Warning triangle

This symbol indicates that a safety hazard exists on the indicated connections if correct precautions are not taken. Read all safety documentation associated with the product before using it.

Symbol 2: Equipotential

This symbol indicates that the outer shells of the indicated BNC connectors are all at the same potential (shorted together). You must therefore take necessary precautions to avoid applying a potential across the return connections of the indicated BNC terminals. Such a potential could cause a large current to flow, resulting in damage to the product or connected equipment, or both.

2.2   Safety warning

We strongly recommend that you read the general safety information below before using your oscilloscope for the first time. Safety protection built in to equipment may cease to function if the equipment is used incorrectly. This could cause damage to your computer, or lead to injury to yourself and others.

Maximum input range. Do not exceed the "Overvoltage protection" range stated in the Specifications table for your model of oscilloscope. Contact with voltages outside the protection range may cause permanent damage to the unit.

Mains voltages. Pico Technology products are not designed for use with mains (line) voltages. To measure mains, use a differential isolating probe specifically rated for mains use.

Magnetic Fields. PicoScope oscilloscopes can be adversely affected by strong magnetic fields. It is advised that strong magnets be kept away from the oscilloscope unit.

Safety grounding. PicoScope 4000 Series PC Oscilloscopes connect directly to the ground of a computer through the USB cable provided to minimise interference.

As with most oscilloscopes, avoid connecting the ground input to any potential other than ground. If in doubt, use a meter to check that there is no significant AC or DC voltage between the ground input of the oscilloscope and the point to which you intend to connect it. Failure to check may cause damage to your computer or injury to yourself and others.

The product does not have a protective safety ground.

2.3   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 in which case the user will be required to correct the interference at his or her own expense.

For safety and maintenance information see the safety warning.

2.4   CE notice

The PicoScope 4000 Series PC Oscilloscopes meet the intent of the EMC directive 2004/108/EC and have been designed to EN61326-1 (2006) Class A Emissions and Immunity standard.

PicoScope 4000 Series PC Oscilloscopes also meet the intent of the Low Voltage Directive 2006/95/EC and have been designed to meet the BS EN 61010-1:2001 IEC 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use standard.

2.5   Software licence conditions

The material contained in this software release is licensed, not sold. Pico Technology Limited grants a licence to the person who installs this software, subject to the conditions listed below.

Access. The licensee agrees to allow access to this software only to persons who have been informed of these conditions and agree to abide by them.

Usage. The software in this release is for use only with Pico products or with data collected using Pico products.

Copyright. Pico Technology Ltd. claims the copyright of, and retains the rights to, all material (software, documents etc.) contained in this release. You may copy and distribute the PicoScope and PicoLog software and drivers with no modifications, additions or omissions. You may copy and modify the SDK example programs.

Liability. Pico Technology and its agents shall not be liable for any loss, damage or injury, howsoever caused, related to the use of Pico Technology equipment or software, unless excluded by statute.

Fitness for purpose. Because no two applications are the same, Pico Technology cannot guarantee that its equipment or software is suitable for a given application. It is your responsibility, therefore, to ensure that the product is suitable for your application.

Mission-critical applications. This software is intended for use on a computer that may be running other software products. For this reason, one of the conditions of the licence is that it excludes usage in mission-critical applications such as life-support systems.

Viruses. This software was continuously monitored for viruses during production, but you are responsible for virus-checking the software once it is installed.

Support. If you are dissatisfied with the performance of this software, please contact our technical support staff, who will try to fix the problem within a reasonable time. If you are still dissatisfied, please return the product and software to your supplier within 14 days of purchase for a full refund.

Upgrades. We provide upgrades, free of charge, from our web site at www.picotech. com. We reserve the right to charge for updates or replacements sent out on physical media.

2.6   Trademarks

Windows is a registered trademark or trademark of Microsoft Corporation in the USA and other countries.

Pico Technology Limited and PicoScope are trademarks of Pico Technology Limited, registered in the United Kingdom and other countries.

PicoScope and Pico Technology are registered in the U.S. Patent and Trademark Office.

ICP® ICP is an acronym for "integrated circuit piezoelectric", and is a registered trademark of PCB Group, Inc.

2.7   Warranty

Pico Technology warrants upon delivery, and for a period of 5 years unless otherwise stated from the date of delivery, that the Goods will be free from defects in material and workmanship.

Pico Technology shall not be liable for a breach of the warranty if the defect has been caused by fair wear and tear, wilful damage, negligence, abnormal working conditions or failure to follow Pico Technology's spoken or written advice on the storage, installation, commissioning, use or maintenance of the Goods or (if no advice has been given) good trade practice; or if the Customer alters or repairs such Goods without the written consent of Pico Technology.

2.8   Company details

|	
Address:	Pico Technology
	James House
	Colmworth Business Park
	St Neots
	Cambridgeshire
	PE19 8YP
	United Kingdom
Phone:	+44 (0) 1480 396 395
Fax:	+44 (0) 1480 396 296
Email:	
Technical Support:	support@picotech.com
Sales:	sales@picotech.com
Web site:	www.picotech.com

3   Product information

3.1   Pack contents

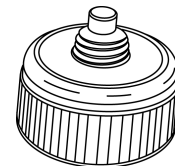Your PicoScope 4000 Series PC Oscilloscope kit or product pack contains the following items:

Part	Kit Order Code, PP...								Description
	478	479	492	493	695	671	672	799	
	1		1						PicoScope 4224
		1		1					PicoScope 4424
						1			PicoScope 4226
							1		PicoScope 4227
					1				PicoScope 4224 IEPE
								1	PicoScope 4262
MI007	2	4				2		2	x1/x10 60 MHz probes
MI103							2		x1/x10 250 MHz probes
MI106	1	1	1	1	1	1	1	1	USB 2.0 cable
DI025	1	1	1	1	1	1	1	1	Software and reference CD
DO115	1	1	1	1	1	1	1	1	Installation Guide
MI144	1	1				1	1		Carry case

3.2   Optional extras

Part	Description	
TA095	IEPE accelerometer with BNC connector	(for use with IEPE oscilloscope only)
TA096	Mounting magnet for IEPE accelerometer	
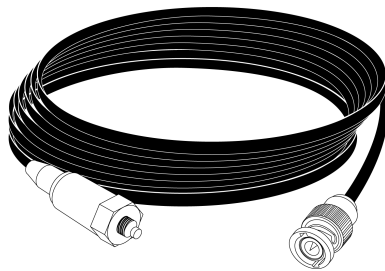
TA095   TA096

3.3 Minimum PC requirements

To ensure that your PicoScope 4000 Series PC Oscilloscope operates correctly, you must have a computer with at least the minimum system requirements to run one of the supported operating systems, as shown in the following table. The performance of the software will increase with more powerful PCs, including those with multi-core processors.

Item	Specification
Operating system	Windows XP SP2 Windows Vista Windows 7
	32 bit and 64* bit versions supported
Processor	As required by Windows
Memory	
Free disk space	
Ports	USB

* While the driver will run on a 64 bit operating system, the driver itself is 32 bit, and therefore will run as 32 bit.

3.4   Installation instructions

```
                          IMPORTANT
        Do not connect your PicoScope 4000 Series
                  scope device to the PC before you
                  have installed the Pico software.
                     If you do, Windows might not
              recognise the scope device correctly.
```

Procedure
- Follow the instructions in the USB Oscilloscope Installation Guide included with your product package.
- Connect your PC Oscilloscope to the PC using the USB cable supplied.

Checking the installation

Once you have installed the software and connected the PC Oscilloscope to the PC, start the PicoScope software. PicoScope should now display any signal connected to the scope inputs. If a probe is connected to your oscilloscope, you should see a small 50 or 60 hertz signal in the oscilloscope window when you touch the probe tip with your finger.

Moving your PicoScope PC Oscilloscope to another USB port

- Windows XP SP2

When you first installed the PicoScope 4000 Series PC Oscilloscope by plugging it into a USB port, Windows associated the Pico driver with that port. If you later move the oscilloscope to a different USB port, Windows will display the "New Hardware Found Wizard" again. When this occurs, just click "Next" in the wizard to repeat the installation. If Windows gives a warning about Windows Logo Testing, click "Continue Anyway". As all the software you need is already installed on your computer, there is no need to insert the Pico Software CD again.

- Windows Vista and Windows 7

The process is automatic. When you move the device from one port to another, Windows displays an "Installing device driver software" message and then a "PicoScope 4000 series PC Oscilloscope" message. The PC Oscilloscope is then ready for use.
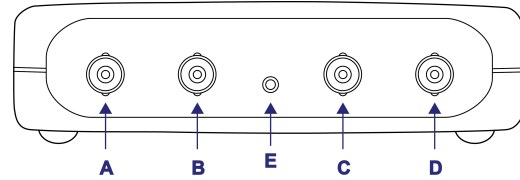
3.5 Connections for the standard models

Standard oscilloscope connectors

PicoScope 4000 Series PC Oscilloscopes have BNC oscilloscope connectors. The inputs have an impedance of 1 MΩ, so they are compatible with all standard scope probes including x1, x10 and x1/x10 attenuated types.
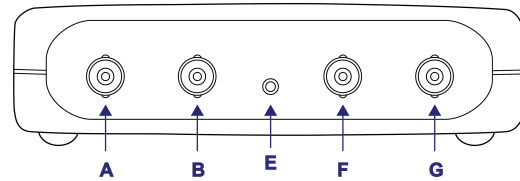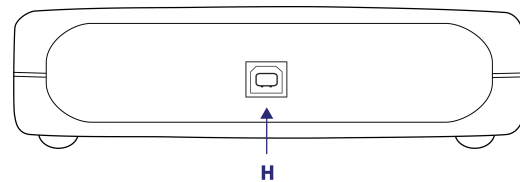
Connector diagrams
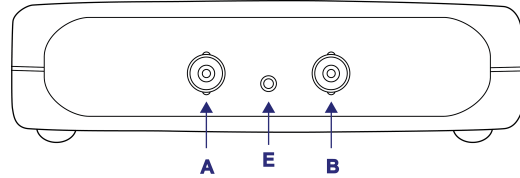
PicoScope 4224

Front panel
A. Input channel A
B. Input channel B
C. Input channel C
D. Input channel D
E. LED: shows when the oscilloscope is sampling data
F. External trigger input
G. Function generator/arbitrary waveform generator output

PicoScope 4424

PicoScope 4226
PicoScope 4227

Rear panel
H. USB 2.0 port

3.6   Connections for the PicoScope 4262
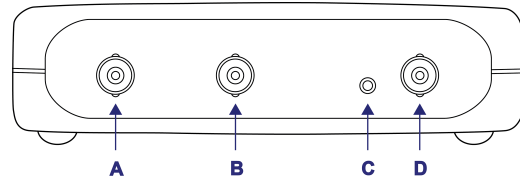
Standard oscilloscope connectors

The PicoScope 4262 PC Oscilloscope has BNC oscilloscope connectors. The inputs
have an impedance of 1 MΩ, so they are compatible with all standard scope probes
including x1, x10 and x1/x10 attenuated types.

Connector diagrams

<u>Front panel</u>
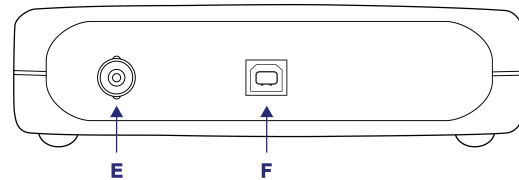A. Input channel A
B. Input channel B
C. LED: shows when the
     oscilloscope is sampling
     data
D. Function generator/
     arbitrary waveform
     generator output

PicoScope 4262

<u>Rear panel</u>
E. External trigger input
F. USB 2.0 port

3.7   Connections for the PicoScope 4224 IEPE

Standard oscilloscope connectors

The [PicoScope 4224 IEPE](#) PC Oscilloscope has two BNC oscilloscope connectors. The inputs have an impedance of 1 MΩ, so they are compatible with all standard scope probes including x1, x10 and x1/x10 attenuated types. When used in IEPE Interface Mode, the connector outputs are rated at 4 mA (up to 24 V).

Please note the [PicoScope 4224 IEPE](#) has a smaller voltage range than the standard Picoscope 4224. Please refer to [IEPE Specifications](#) for more detail.

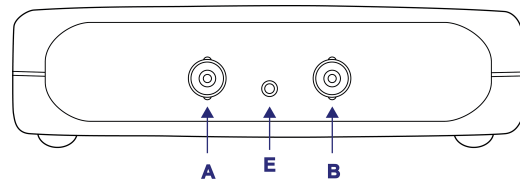⚠️ Ensure no voltage is present when selecting IEPE Interface Mode, and no voltage is applied when in use. Failure to comply with this warning could result in damage to the PicoScope 4224 IEPE PC Oscilloscope unit.
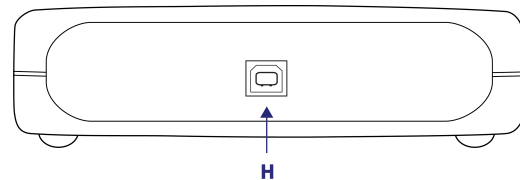
Connector diagrams

Front panel

A. Input channel A
B. Input channel B
E. LED: shows when the oscilloscope is sampling data

[PicoScope 4224 IEPE](#)

Rear panel
H. USB 2.0 port

3.8 Specifications for the standard models

Oscilloscope model	PicoScope 4224	PicoScope 4424	PicoScope 4226	PicoScope 4227
Inputs				
Number of channels	2	4	2	2
Analog bandwidth	DC to 20 MHz (10 MHz on ±50 mV range)		DC to 50 MHz	DC to 100 MHz
Impedance (nominal)	1 MΩ // 22 pF		1 MΩ // 16 pF	
Coupling	Software-selectable AC/DC			
Voltage ranges	±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V, ±50 V, ±100 V**		±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V	
Overload protection	±200 V		±100 V	
Vertical resolution	12 bits			
Sampling				
Timebases (real-time sampling)	100 ns/div to 200 s/div		100 ns/div to 200 s/div	50 ns/div to 200 s/div
Maximum sampling rate (real-time sampling) One channel in use Two channels in use 3 or 4 channels in use	80 MS/s 80 MS/s -	80 MS/s 80 MS/s [*1] 20 MS/s	125 MS/s 125 MS/s -	250 MS/s 125 MS/s -
Maximum sampling rate (equivalent-time sampling)	-		10 GS/s	
Buffer size	32 MS shared between enabled channels			
Performance specifications				
Time base accuracy	50 ppm			
Trigger re-arm time	1 µs on fastest time base			
DC accuracy	1% of full scale			
Trigger resolution	1 LSB			
Function generator/Arbitrary waveform generator				
Connector	-		BNC	
Standard waveforms			Sine, square, triangle, DC voltage, sin(x)/x, Gaussian, half sine	
Frequency range			100 kHz	
Resolution			12 bits	
Buffer size			8192 samples	
DAC sample rate			20 MS/s	
Accuracy			1%	
Output range			±250 mV to ±2 V	
Output offset range			±1 V	
Max. combined output			±2.5 V	
Output resistance			600 Ω	
Overload protection			±10 V	

*1: 80 MS/s with channels A+C, A+D, B+C, B+D, 20 MS/s for other combinations.
**Different ranges apply to the PicoScope 4224 IEPE. See Section 3.8 for detailed information.

Oscilloscope model	PicoScope 4224	PicoScope 4424	PicoScope 4226	PicoScope 4227
External trigger				
Connector	-		BNC	
Modes			Rising/falling edge	
Bandwidth			100 MHz	
Impedance			1 MΩ ∥ 8 pF ±2 pF	
Voltage range			±50 mV to ±20 V	
Coupling			DC	
Overload protection			±100 V	
Digital trigger				
Modes	None, auto, repeat, single, rapid (segmented memory)			
Basic triggers	Rising, falling			
Advanced triggers	Edge, window, pulse width, window pulse width, dropout, window dropout, interval, logic, runt pulse			
Environment				
Operating environment Temperature range (for stated accuracy) Humidity	0 °C to 45 °C 20 °C to 30 °C 5% to 80% RH non-condensing			
Storage environment Temperature range Humidity	-20°C to +60°C 5% to 95% RH non-condensing			
PC connection	USB 2.0. Compatible with USB 1.1.			
Power supply	5 V @ 0.5 A max. (from USB port)			
Dimensions	200 mm x 140 mm x 38 mm			
Weight	< 0.5 kg			
Compliance	European EMC and LVD standards RoHS and WEEE FCC Rules Part 15 Class A			

3.9 Specifications for the PicoScope 4262

PicoScope 4262	
Inputs	
Number of channels	2
Analog bandwidth	> 5 MHz (4 MHz on ±20 mV range, 3 MHz on ±10 mV range)
Bandwidth limiter	Full or 200 kHz
Input impedance	1 MΩ ±2% ∥ 15 pF ±2 pF
Coupling	AC/DC
Voltage Range	±10 mV, ±20 mV, ±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V
DC accuracy	±0.25% (±0.5% on ±50 mV range , ±1% on ±20 mV range, ±2% on ±10 mV range)
Rise time (calculated)	70 ns (88 ns on ±20 mV range, 117 ns on ±10 mV range)
Overvoltage protection	±50 V (DC + AC Peak)
Sampling	
Maximum sampling rate (real-time) One channel in use Two channels in use	10 MS/s 10 MS/s
Resolution	16 bits
Buffer size	16 MS
Timebase accuracy	±50 ppm
Trigger resolution	1 LSB
Dynamic Performance	
Crosstalk	Better than 50,000:1
Total harmonic distortion	−95 dB typical @ 10 kHz, −1 dBfs input
SFDR	102 dB typical @ 10 kHz, −1 dBfs input
Noise	8.5 µV RMS
Pulse response	< 1% overshoot, all ranges
Bandwidth flatness	±0.2 dB, DC to full bandwidth
Triggers	
Modes	None, auto, repeat, single, rapid (segmented memory), ETS
Basic triggers	Rising, falling
Advanced triggers	Edge, window, pulse width, window pulse width, dropout, window dropout, interval, logic, runt pulse
Trigger re-arm time	< 10 µs on fastest timebase
Trigger sensitivity	Digital triggering provides 1 LSB accuracy up to full bandwidth of scope.
External trigger	
Connector	BNC on rear panel
Types	Edge, pulse width, dropout, interval, logic, delayed
Bandwidth	5 MHz
Impedance	1 MΩ ±2% ∥ 15 pF ±2 pF
Threshold ranges	±5 V & ±500 mV
Coupling	DC
Overvoltage protection	±50 V

Function generator	
Connector	BNC on front panel
Standard output signals	Sine, square, triangle, DC, ramp, sin(x)/x, Gaussian, half sine, white noise, PRBS
Sweep modes	Up, down, dual with selectable frequency range and sweep time
Standard signal frequency	DC to 20 kHz
Output frequency accuracy	±50 ppm
Output frequency resolution	< 0.01 Hz
Output voltage range	±1 V
Output voltage adjustment	Signal amplitude and offset adjustable in approx 100 μV steps within overall ±1 V range
Amplitude flatness	< 0.1 dB to 20 kHz
SFDR	102 dB typical @ 10 kHz, −1 dBfs input
Output impedance	600 Ω
Arbitrary Waveform Generator	
Update rate	192 kS/s
Buffer size	4096 samples
Resolution	16 bits (20 bits enhanced)
Bandwidth	20 kHz
Rise time (10% to 90%)	11 μs
Environment	
Operating environment Temperature range (for stated accuracy) Humidity	0 °C to 45 °C (20 °C to 30 °C) 5 to 80% RH, non-condensing
Storage environment Temperature range Humidity	−20 °C to +60 °C 5 to 95% RH, non condensing
PC connection	USB 2.0 hi-speed
Dimensions	210 x 135 x 40 mm (including connectors)
Weight	< 0.5 kg
Compliance	European EMC and LVD standards RoHS and WEEE FCC Rules part 15 subpart B

3.10   Specifications for the PicoScope 4224 IEPE

PicoScope 4224 IEPE	Passive Probe Mode	IEPE Interface Mode
Inputs		
Number of channels	2	
Analog bandwidth	DC to 20 MHz (10 MHz on ±50 mV range)	1.6 Hz to 20 MHz (10 MHz on ±50 mV range)
Impedance (nominal)	1 MΩ ∥ 22 pF	1 MΩ ∥ 1 nF
Coupling	Software-selectable AC/DC	-
Voltage Range	±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V	
Output	-	4 mA up to 24 V
Overload protection	±100 V	
Vertical resolution	12 bits	
Sampling		
Timebases (real-time sampling)	100 ns/div to 200 s/div	
Maximum sampling rate (real-time sampling) One channel in use Two channels in use	80 MS/s 80 MS/s	
Buffer size	32 MS shared between enabled channels	
Performance specifications		
Time base accuracy	50 ppm	
Trigger re-arm time	2.5 µs on fastest time base	
DC accuracy	1% of full scale	
Trigger resolution	1 LSB	
Digital trigger		
Modes	None, auto, repeat, single, rapid (segmented memory)	
Basic triggers	Rising, falling	
Advanced triggers	Edge, window, pulse width, window pulse width, dropout, window dropout, interval, logic, runt pulse	
Environment		
Operating environment Temperature range (for stated accuracy) Humidity	0 °C to 45 °C 20 °C to 30 °C 5% to 80% RH non-condensing	
Storage environment Temperature range Humidity	-20°C to +60°C 5% to 95% RH non-condensing	
PC connection	USB 2.0. Compatible with USB 1.1.	
Power supply	5 V @ 0.5 A max. (from USB port)	
Dimensions	200 mm x 140 mm x 38 mm	
Weight	< 0.5 kg	
Compliance	European EMC and LVD standards RoHS and WEEE FCC Rules Part 15 Class A	

4   Glossary

AC/DC switch. To switch between AC coupling and DC coupling, select AC or DC from the control on the PicoScope toolbar. The AC setting filters out very low-frequency components of the input signal, including DC, and is suitable for viewing small AC signals superimposed on a DC or slowly changing offset. In this mode you can measure the peak-to-peak amplitude of an AC signal but not its absolute value. Use the DC setting for measuring the absolute value of a signal.

Analog bandwidth. The input frequency at which the measured signal amplitude is 3 decibels below the true signal amplitude.

Buffer size. The size of the oscilloscope buffer memory, measured in samples. The buffer allows the oscilloscope to sample data at a fast sampling rate before transferring the data to the computer at a slower rate. Once the buffer fills up, the scope must stop sampling, so on longer time bases the buffer size places an upper limit on the sampling rate that can be used.

IEPE Interface Mode When in this mode the connected probes are powered by a current from the two BNC IEPE connectors.

Integrated Circuit Piezoelectric (ICP® *Registered to the PCB Group*). See IEPE.

Integrated Electronics Piezoelectric (IEPE). An industry standard for accelerometers and other sensors with built-in electronics. IEPE connections use a DC current to power a small pre-amplifier embedded in the probe, enabling the use of long cables without a remote power supply. 'ICP' is one of several proprietary names for the same system.

Equivalent-time sampling (ETS). A specialised sampling mode that can be used to increase the effective sampling rate of an oscilloscope as long as the signal is a stable, repetitive waveform. A single sample is collected during one cycle of the waveform. The scope then re-arms and re-triggers on another cycle of the waveform, and collects another sample with a slight time offset relative to the previous one. Over a large number of cycles, enough samples are collected to display a high-resolution picture of the waveform. Also called sequential sampling.

GS/s. Gigasamples (billions of samples) per second.

Maximum sampling rate. A figure indicating the maximum number of samples the oscilloscope can acquire per second. The higher the sampling rate of the oscilloscope, the more accurate the representation of the high-frequency details in a fast signal. "MS/s" is an abbreviation for megasamples (millions of samples) per second.

MS/s. Megasamples (millions of samples) per second.

Oversampling. The process of taking measurements more frequently than the requested sample rate, and then combining them to produce the required number of samples. If, as is usually the case, the signal contains a small amount of noise, this technique can increase the effective vertical resolution of the oscilloscope.

PC Oscilloscope. A virtual instrument formed by connecting a PicoScope 4000 Series oscilloscope to a computer running the PicoScope software.

PicoScope 4000 Series. Pico Technology's high-resolution PC Oscilloscopes.

PicoScope software. A program that accompanies all Pico PC Oscilloscopes. It turns your PC into an oscilloscope, spectrum analyser and measuring instrument.

Real-time sampling. The normal operating mode of a digital oscilloscope. The scope collects a single, unbroken sequence of samples at or below its maximum sampling rate. Compare with equivalent-time sampling.

(Vertical) Resolution (bit). The number of bits used to digitise an input signal. The higher the resolution, the smaller the voltage change that can be detected.

Time base. The time base controls the time intervals marked on the horizontal divisions of the scope view. There are ten divisions across the scope view, so the total time across the view is ten times the time base per division.

USB 1.1. Universal Serial Bus (Full Speed). This is a standard port used to connect external devices to PCs. A typical USB 1.1 port supports a data transfer rate of 12 megabits per second, so is much faster than an RS232 COM port.

USB 2.0. Universal Serial Bus (Hi-Speed). This is a standard port used to connect external devices to PCs. A typical USB 2.0 port supports a data transfer rate 40 times faster than USB 1.1 when used with a USB 2.0 device, but can also be used with USB 1.1 devices.

Voltage range. The range of input voltages that the oscilloscope can measure. For example, a voltage range of ±100 mV means that the oscilloscope can measure voltages between -100 mV and +100 mV. Input voltages outside this range will not damage the instrument as long as they remain within the protection limits stated in the relevant specifications table.

Index

A

Accuracy   12, 14, 16
Analog bandwidth   12, 14, 16

B

Bandwidth (analog)   12, 14, 16
BNC connector   9, 10, 11
Buffer size   12, 14, 16

C

Calibration   2
CE notice   3
Company information   5
Compliance   12, 14, 16
Connections   9, 10, 11
Contact details   5

D

Dimensions   12, 14, 16
Disk space   7

E

EMC Directive   3

F

FCC notice   3

G

Grounding   2

I

IEPE   11, 14, 16
Input range, maximum   2, 12, 14, 16
Inputs   12, 14, 16
Installation   8

L

LED   9, 10, 11
Low Voltage Directive   3

M

Mains voltages   2

O

Operating environment   12, 14, 16
Operating system   7
Oscilloscope probe   9, 10, 11
Outputs   12, 14, 16
Overload protection   12, 14, 16

P

PC connection   12, 14, 16
Pico Technical Support   5
PicoScope 4000 Series   1
PicoScope software   8
Power supply   12, 14, 16
Processor   7

R

Repairs   2
Resolution, vertical   12, 14, 16

S

Safety
    symbols   2
    warning   2, 3
Sampling rate   12, 14, 16
Scope probe   9, 10, 11
Signal generator   12, 14, 16
Software licence conditions   4
Specifications   12, 14, 16
Storage environment   12, 14, 16
System memory   7
System requirements   7

T

Technical support   5
Test equipment   2
Trademarks   4
Trigger
    bandwidth   12, 14, 16
    external   12, 14, 16

U

USB   7
    changing ports   8

V

W

Pico Technology

James House
Colmworth Business Park
ST. NEOTS
Cambridgeshire
PE19 8YP
United Kingdom
Tel: +44 (0) 1480 396 395
Fax: +44 (0) 1480 396 296
www.picotech.com

ps4000.en-5

05.09.11