

Operation Manual for USB Autoscope III

Please read this manual thoroughly before attempting to operate the device.

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1. Purpose

The USB Autoscope III is used for troubleshooting of various electronic vehicle systems, such as ignition and timing system. The USB Autoscope III is also very useful for engine mechanical diagnostics. The device is universal in nature and not tied to any particular vehicle system or brand.

The device works in conjunction with the USB Oscilloscope program and connects to any USB 2.0 480 Mbit/s (*HI-SPEED*) port of a Windows laptop or PC. The Windows version should be XP SP2 or higher.

2. Technical characteristics of the USB Autoscope III

2.1 General

- PC interface type – USB 2.0 480 Mbit/s (*HI-SPEED*)
- Maximum (supported from the device – 25 MB/s side) data transfer speed
- Data FIFO buffer depth – 512 kB
- Device supply source – from USB
- Current consumption from USB
 - In operating mode – no more than 300 mA
 - At idle: – no more than 60 mA
- Device provides uninterrupted (frameless) data transfer of digitized data to the laptop or PC
- The stream of digitized data is stored directly on the hard disk of the laptop or PC in real time

2.2 Analog oscilloscope mode

- Number of analog inputs – 8
- Voltage range (switchable, two ranges)
 - analog inputs 1...4 – $\pm 6 / 30$ V
 - analog inputs 5, 6 – $\pm 60 / 300$ V
 - analog inputs 7, 8 – ± 6 V
- Input impedance – 1 M Ω
- ADC resolution – 12...16 bit¹
- Maximum sampling frequency for channel:
 - in 1 channel sub mode – 12.5 MHz
 - in 2 channel sub mode – 5.0 MHz
 - in 4 channel sub mode – 2.5 MHz
 - in 8 channel sub mode – 1.25 MHz

¹ The nominal signal digitizing depth is 12 bit, increasing up to 16 bit with slower digitizing speeds.

2.3 Logic analyzer mode ²

- Number of logic analyzer inputs – 8
- Voltage range for logic inputs – 0...5 V
- Modes – 2, 4, 8 channel analyzer
- Maximum sampling frequency for channel:
 - in 2 channel sub mode – 100 MHz
 - in 4 channel sub mode – 50 MHz
 - In 8 channel sub mode – 25 MHz
- Input impedance – 10 k Ω
(1 M Ω for signals below 5 V. 510 Ω for voltage levels in excess of 5 V)

2.4 Software

- Supported operating systems – Windows XP SP2 / SP3,
Windows Vista, Windows 7,
Windows 8 / Windows 8.1
- Main features – Displaying mode + recording + measuring in real time simultaneously
- Number of channels – Selectable 1, 2, 4, 8
- Scale parameters:
 - 1 channel sub mode – 2 μ S / Div...1 S / Div. with step 1-2-5
 - 2 channel sub mode – 5 μ S / Div...1 S / Div. with step 1-2-5
 - 4 channel sub mode – 10 μ S / Div...1 S / Div. with step 1-2-5
 - 8 channel sub mode – 20 μ S / Div...1 S / Div. with step 1-2-5
- Voltage sensitivity setting ³:
 - for input voltage range ± 6 V – 2 mV / Div ... 10 V / Div. with step 1-2-5
 - for input voltage range ± 30 V – 10 mV / Div ... 50 V / Div. with step 1-2-5
 - for input voltage range ± 60 V – 20 mV / Div...100 V / Div. with step 1-2-5
 - for input voltage range ± 300 V – 0.1 V / Div...100 V / Div. with step 1-2-5
 - when using high voltage probes – 20 V / Div...100 kV / Div. with step 1-2-5
- Trigger modes:
 - auto
 - normal
 - wait
 - single
 - none

² If it is desired to have the logic analyzer mode available it must be selected as an option during the USB Oscilloscope software installation. The device should be also equipped with the optional connector "Digital Inputs".

³ The value of the maximum voltage sensitivity depends on the sampling frequency.

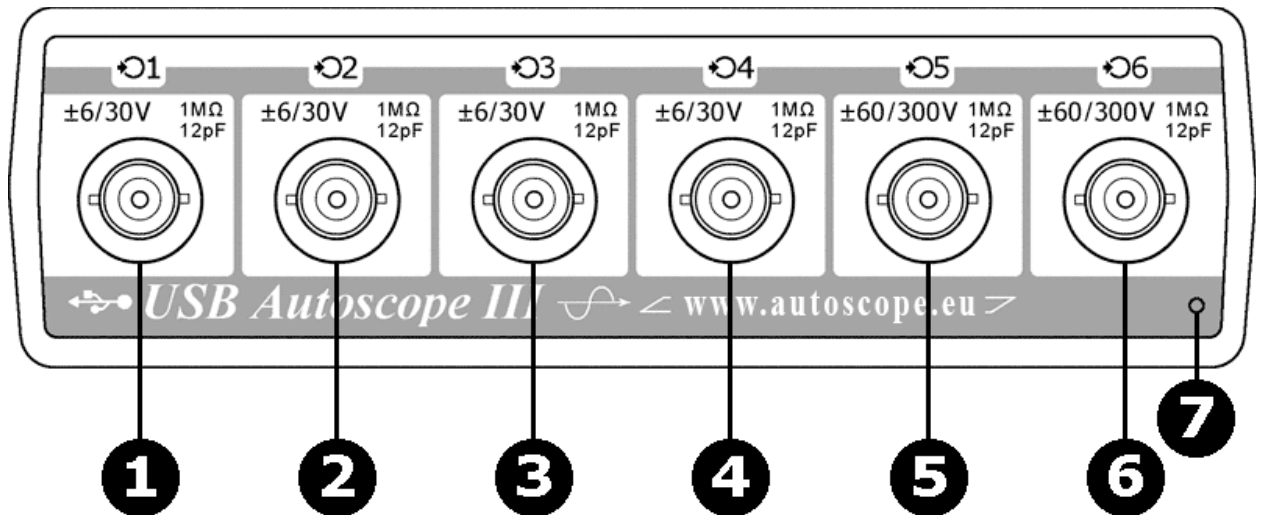
- Trigger parameters:
 - channel
 - front
 - level
 - level increasing threshold
 - threshold time
 - minimal interval
- Maximum file size depends on the file system:
 - FAT32 – 4 GB
 - NTFS – 16 TB
- Number of channels in logic analyzer – User selectable 2, 4, 8 mode
- Input sensitivity parameters for logic analyzer modes:
 - 2 channel sub mode – 0.2 μ S / Div...0.2 S / Div. with step 1-2-5
 - 4 channel sub mode – 0.5 μ S / Div...0.5 S / Div. with step 1-2-5
 - 8 channel sub mode – 1 μ S / Div ... 1 S / Div. with step 1-2-5
- Trigger modes in logic analyzer mode:
 - auto
 - wait
 - single
 - none
- Input options for the logic analyzer mode – combination level / front for different channels

2.5 Parameters of the USB port's galvanic isolation

USB Autoscope III has galvanic isolation of the USB port
(device inputs ground \diamond PC ground)

- Galvanic isolation resistance – not less than 20 G Ω
- Galvanic isolation capacitance – not more than 30 pF
- Galvanic isolation test voltage – 2 kV for 1 minute

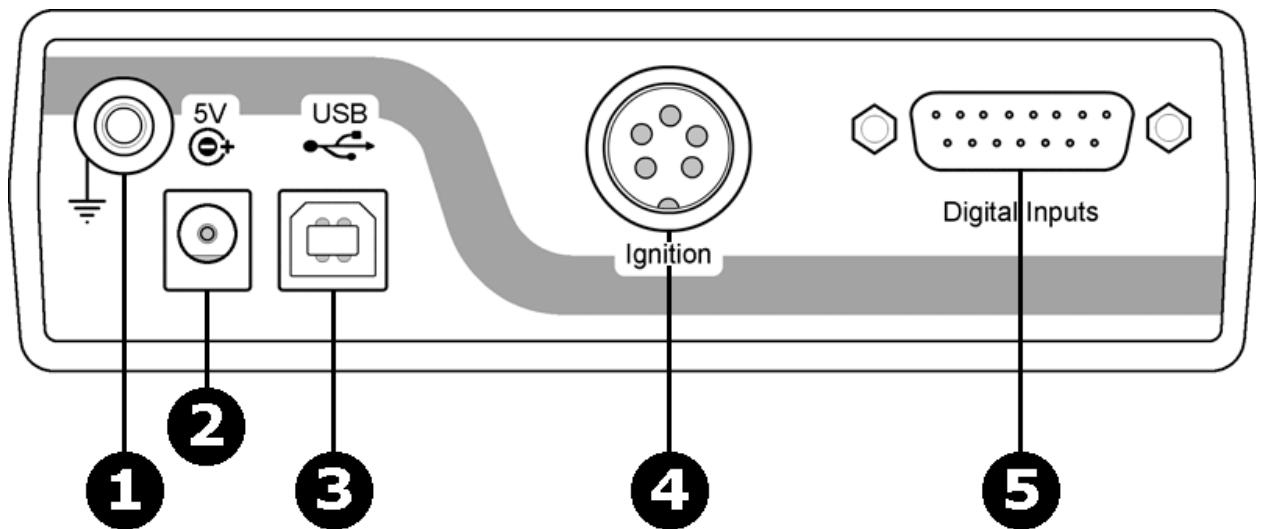
2.6 Front panel elements



Front panel of the USB Autoscope III.

- 1...4 Connections for analog inputs 1...4. Input voltage range $\pm 6 / 30$ V.
- 5...6 Connections for analog inputs 5...6. Input voltage range $\pm 60 / 300$ V.
- 7 USB status indicator.

2.7 Back panel elements

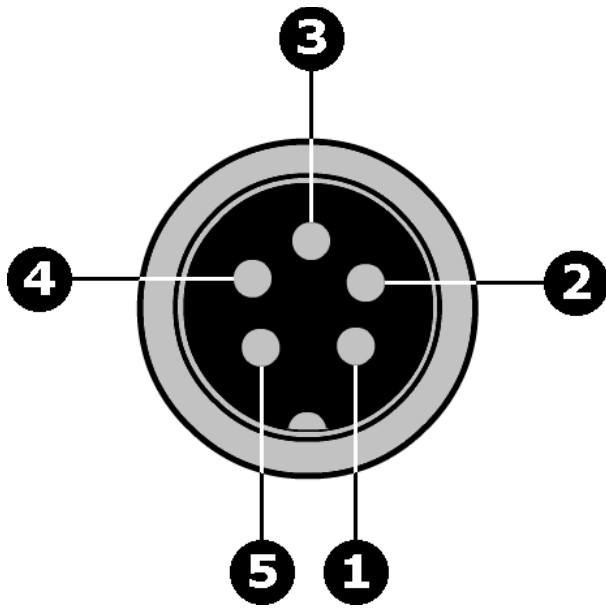


Back panel of the USB Autoscope III.

- 1 Device ground terminal.
- 2 5 V connection ⁴. Used for connection of an external power supply.
- 3 USB connection. Used for connection of the USB Autoscope III to USB 2.0 480 Mbit/s (*HI-SPEED*) port of a laptop or PC. The connection uses a USB 2.0 type A-B cable.
- 4 Ignition connection. Analog inputs 7, 8.
- 5 Digital Inputs connection ⁴. Logic inputs 1...8.

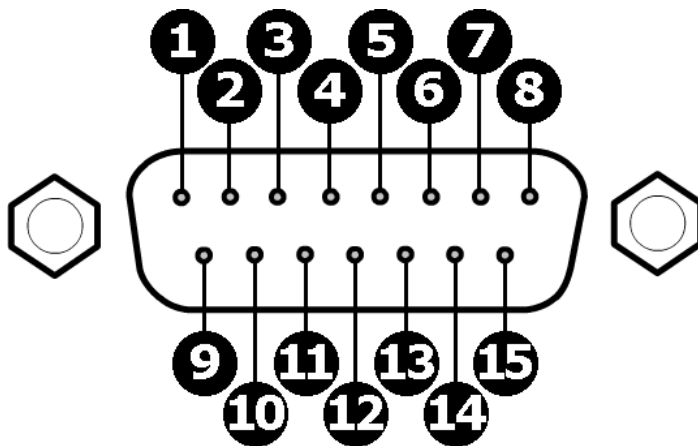
⁴ Installed optionally.

Connector "Ignition"



- 1 Analog input 8.
- 2 Device ground.
- 3 Not connected.
- 4 Device ground.
- 5 Analog input 7.

Connector "Digital Inputs"



- 1 Logic input 1.
- 2 Logic input 2.
- 3 Logic input 3.
- 4 Logic input 4.
- 5 Logic input 5.
- 6 Logic input 6.
- 7 Logic input 7.
- 8 Logic input 8.
- 9...15 Device ground.

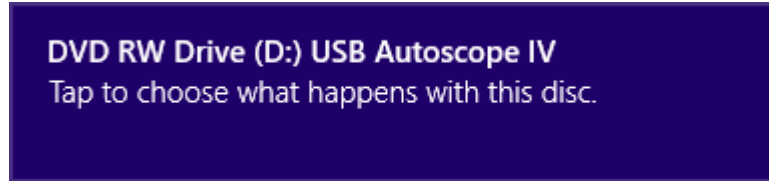
3. Preparing the computer for use with the USB Autoscope III

3.1 Minimum Laptop or PC requirements

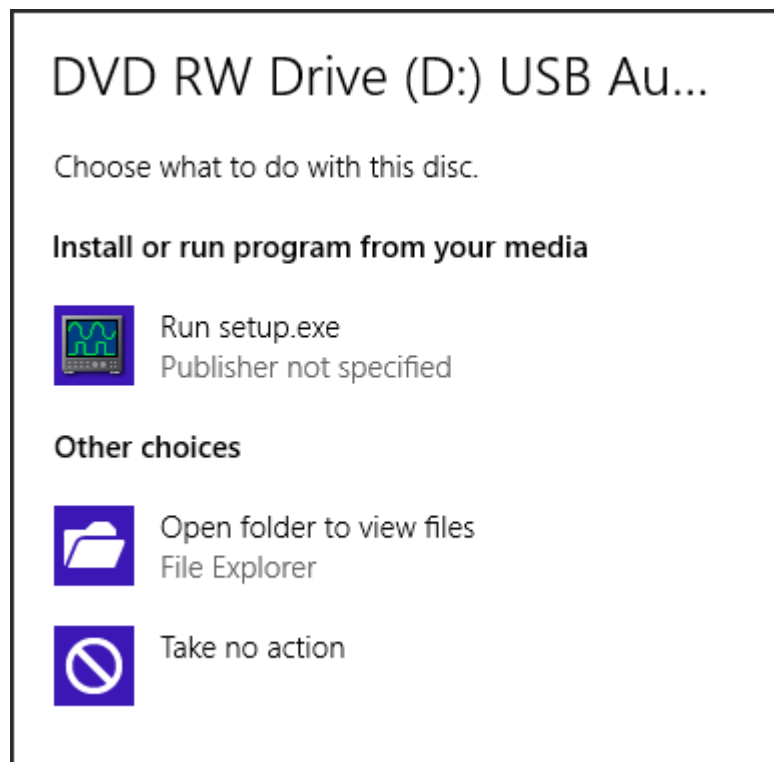
- Processor – Pentium IV 2 GHz
- RAM (random-access memory) – 1 GB
- Hard disk drive – 10 GB of free disk space, data-transfer protocol at least UDMA 100
- Optical disc drive – CD-ROM for software installation
- PC interface – port USB 2.0 480 Mbit/s (*HI-SPEED*)
- Video adapter – AGP or PCI Express
- Monitor – SVGA
- Operating system – Windows XP SP2 / SP3, Windows Vista, Windows 7 or Windows 8 / Windows 8.1
- Additional requirements – Any reasonably modern laptop or PC will be adequate

3.2 Installation of the USB Oscilloscope program and utilities

- Insert the installation CD disc in the optical disk drive of the computer.
- If the notification "Tap to choose what happens with this disk" appears, left-click the message screen.

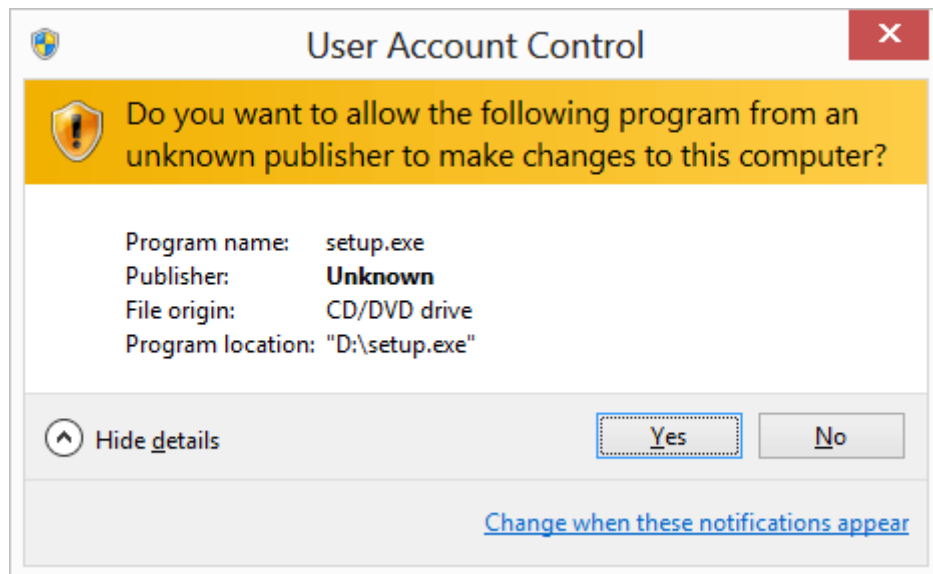


Choose the option "Run setup.exe".

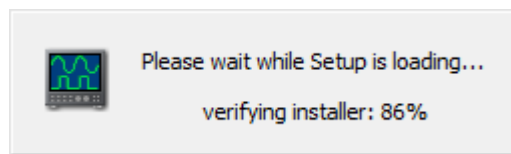


If after inserting installation CD in the optical disk drive of computer nothing happens, browse through the disc and open the program setup file, called "Setup.exe". The drive letter your computer uses for the optical drive, often D:\Setup.exe or E:\Setup.exe

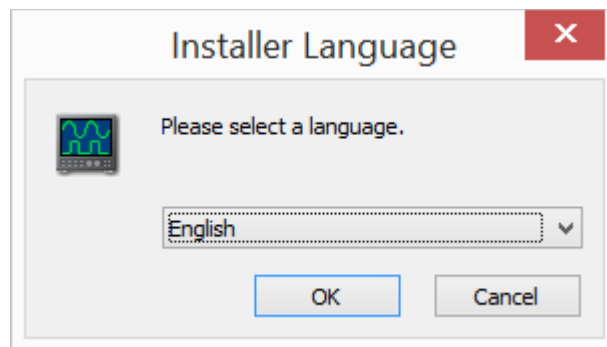
- If a pop up about unknown publisher of "setup.exe" appears, click "Yes".



- You may have to wait while the installer verifies.

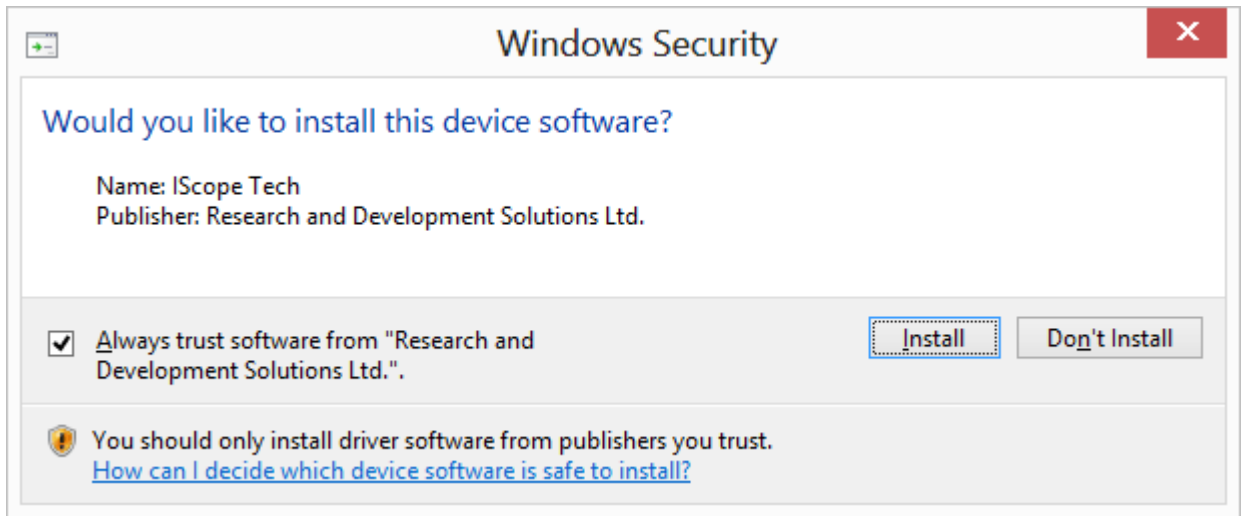


- In the window "Installer Language", change the installation language if desired.

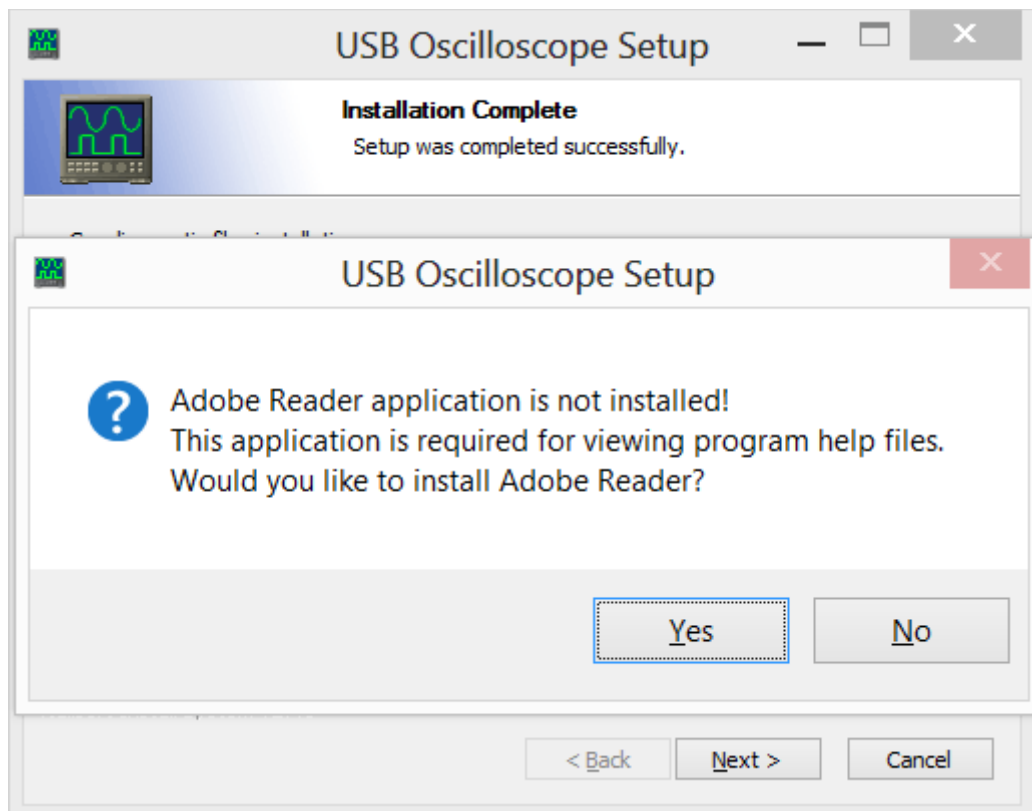


- Then, follow the installation instructions, changing parameters only when required.

- In window "Windows Security" activate option "Always trust software from..." then press button "Install".

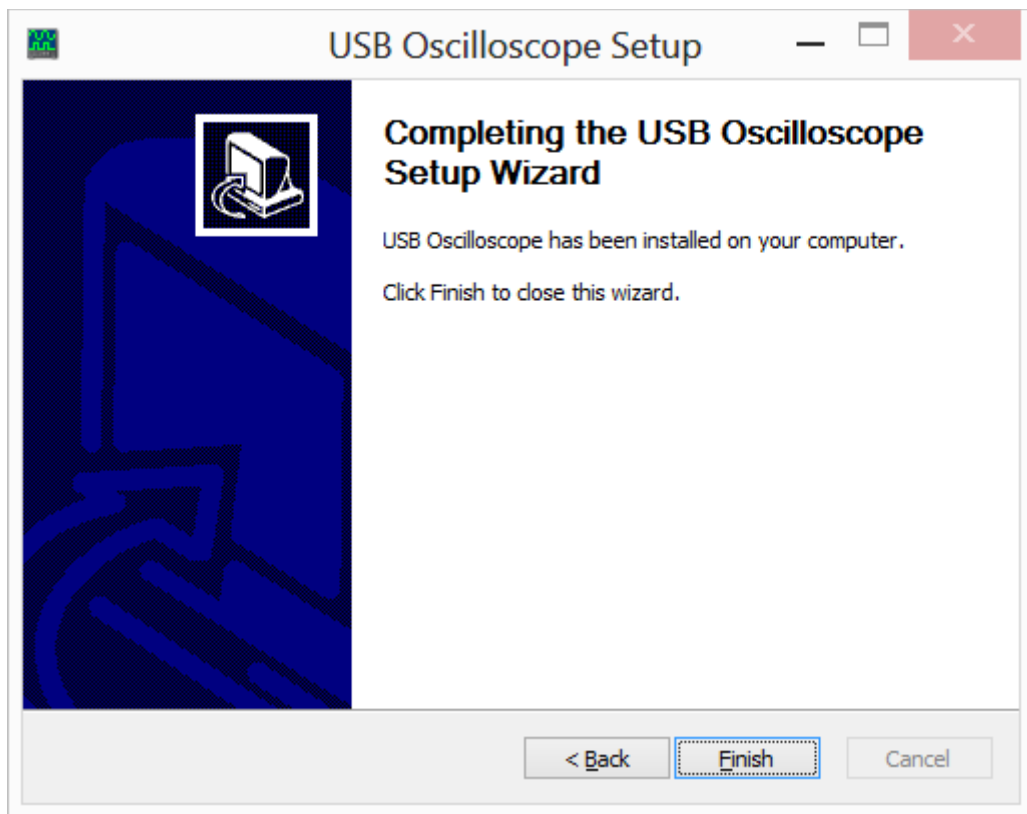


- If the message "Windows can't verify the publisher of this driver software" appears, choose the option "Install this driver software anyway".
- If a message about the need to install "Adobe Reader" software appears, agree and install the suggested program.



Installation of the "Adobe Reader" program may take several minutes.

- Press the "Finish" button.

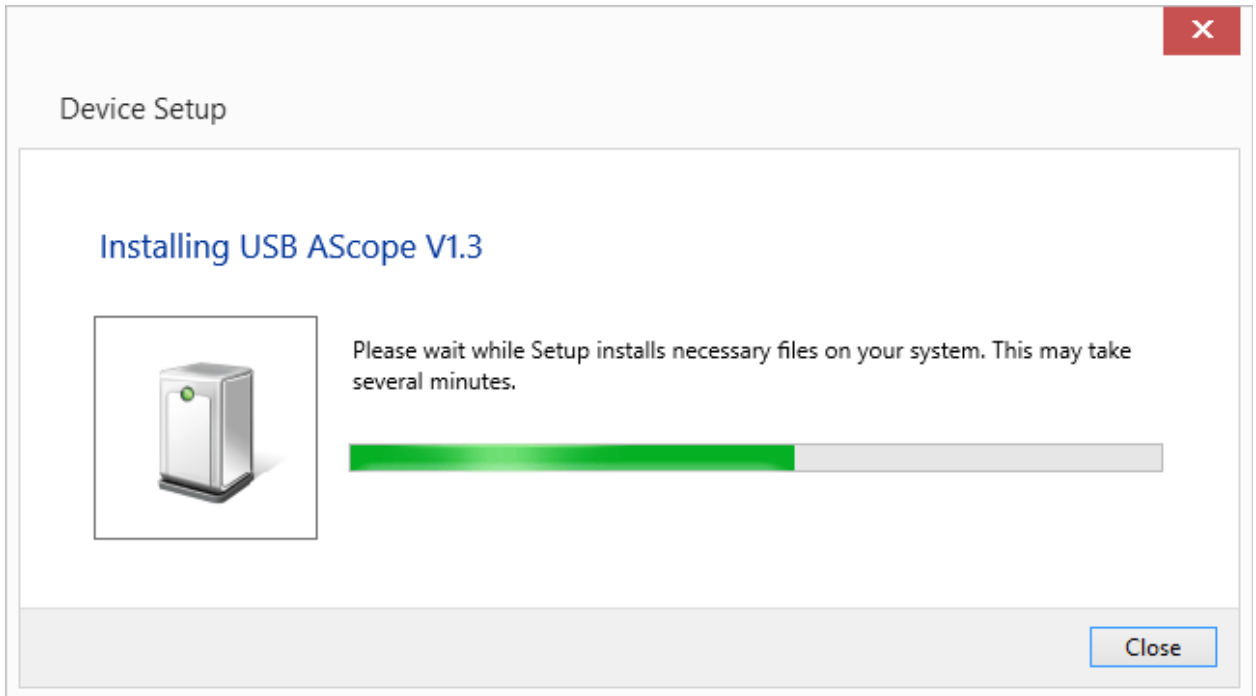


Now the USB Oscilloscope software is installed completely and drivers are presetting.

3.3 Installation of the device drivers

Connect the device to USB 2.0 480 Mbit/s (HI-SPEED) port of the laptop or PC only after installation of USB Oscilloscope software.

- Right after connection of the device to a USB 2.0 480 Mbit/s (*HI-SPEED*) port the installation of drivers will start automatically.



- After successful installation the user will get an installation report.

4. Preparing the device for use




- The device connects to a laptop or PC's USB port using a USB 2.0 A/B interface cable. The computer must have Microsoft Windows XP SP2 or higher operating system and have the USB Oscilloscope software installed.
- The black alligator clips from the USB Autoscope III's oscilloscope probes, cables and adapters must be connected to vehicle ground on the diagnosed vehicle (if an older vehicle, use the engine ground) at only one point.
- The device and it's cables must be placed as far as possible from the high voltage wires of the ignition system, the exhaust manifold, and the cooling system fan.
- The computer itself must be grounded using a separate multi stranded copper wire with a cross section of more than 0.5 mm^2 , otherwise a failure of the computer or device is possible. If a laptop running on its internal battery and with the main power supply disconnected is used, this requirement is unnecessary.
- In order to avoid distortion and / or damage to the data that are sent via the USB interface, due to electromagnetic interference from the vehicle's ignition system, it is recommended to ground the USB Autoscope III using a separate multi stranded copper wire with a cross section of more than 0.5 mm^2 .

5. USB Autoscope III kit description

Name	Appearance
<p>USB Autoscope III, USB 2.0 A/B interface cable, CD with software</p>	 <p>The image shows the USB Autoscope III device, a white rectangular box with six input channels labeled C1 through C6. Each channel has a specific range and impedance: C1 (±6/30V, 1MΩ, 12pF), C2 (±6/30V, 1MΩ, 12pF), C3 (±6/30V, 1MΩ, 12pF), C4 (±6/30V, 1MΩ, 12pF), C5 (±60/300V, 1MΩ, 12pF), and C6 (±60/300V, 1MΩ, 12pF). Below the device is a coiled grey USB 2.0 A/B interface cable with a black USB-A connector and a grey USB-B connector.</p>
<p>Probe oscilloscope probe, 2 pcs</p>	 <p>The image shows two oscilloscope probes. Each probe consists of a black cable with a red and a black alligator clip at one end and a metal probe tip at the other. The probes are coiled and shown from different angles.</p>
<p>Px35 in cylinder pressure transducer ⁵</p>	 <p>The image shows a Px35 in cylinder pressure transducer, which is a cylindrical metal component with a black handle and a threaded end.</p>
<p>Dx vacuum transducer</p>	 <p>The image shows a Dx vacuum transducer, which is a small cylindrical component with a black handle and a metal tip.</p>
<p>Dx Amplifier for vacuum transducer</p>	 <p>The image shows a Dx Amplifier for vacuum transducer, which is a cylindrical component with a black handle and a metal tip.</p>

⁵ Starting from 01.06.2014 instead of Px (-0.9...+6 Bar) the transducer Px35 (-0.95...+35 Bar) is supplied. If needed, the Px transducer can be purchased in addition to the Px35.

<p>Ignition Adapter for ignition system diagnosing, connecting cable PIN5-PIN5</p>	 <p>The image shows a black rectangular ignition adapter. It has a small LCD screen displaying a red waveform. Above the screen are two input ports labeled 'In+' (red) and 'In-' (green). Below the screen is an output port labeled 'Out'. A red and black alligator clip cable is connected to the 'In+' and 'In-' ports. A black cable with a BNC connector is connected to the 'Out' port. Another black cable with a BNC connector is also shown.</p>
<p>Cx capacitive transducer</p>	 <p>The image shows a cylindrical capacitive transducer with a red plastic connector at one end and a black cable with a BNC connector at the other.</p>
<p>Sync synchronization transducer</p>	 <p>The image shows a cylindrical synchronization transducer with a black plastic connector at one end and a black cable with a BNC connector at the other.</p>

<p>DIS Cx 6 capacitive probes</p>	 The image shows six capacitive probes. Three have red connectors and three have green connectors. They are arranged in two groups of three, with black cables connecting them to a central point.
<p>Cx-M universal capacitive probe</p>	 The image shows a single universal capacitive probe with a black cable and a red connector. A small black label with the text "Cx-M" is attached to the cable.
<p>Lx-M universal inductive probe</p>	 The image shows a single universal inductive probe with a black cable and a blue connector.

6. Manufacturer limited warranty

The manufacturer guarantees the performance of components supplied with the USB Autoscope III during their warranty period.

Warranty period for the main unit USB Autoscope III is 24 months from the date of sale, for transducers Px and Dx – 12 months.

During the warranty period, the manufacturer will at their discretion, replace or repair components that failed due to a manufacturing defect or during normal use. Failures caused by abuse or neglect, are not covered.

This warranty gives you specific legal rights and you may have other rights that vary, depending on where you reside.

7. Troubleshooting

7.1 The device does not turn on

- The device is not connected to USB 2.0 480 Mbit/s (HI-SPEED) port of the host computer.

Connect the device to USB 2.0 480 Mbit/s (HI-SPEED) port of the host laptop or PC.

- Faulty, low-speed or too long USB cable.

Change the USB cable to a quality high-speed USB 2.0 A/B interface cable of no more than 3 meters in length and with a label stating "CERTIFIED HI-SPEED USB".

- The driver for "Universal Serial Bus controller" is not installed.

Install the drivers for the motherboard that is in your computer.

- The USB 2.0 480 Mbit/s (HI-SPEED) port of the personal computer is broken.

Try another port or computer.

- The USB 2.0 480 Mbit/s (HI-SPEED) port of the personal computer does not provide enough current.

While in operate mode the current consumption does not exceed 350 mA which is well below the maximum allowable 500 mA for USB devices. However, some computers does not provide the required current. One of several possible reasons is a malfunction of the USB port's supply circuit. Try another port, or try to connect to a powered USB hub. The PC or laptop's power settings may have been set to limit the current available to the USB port. Try changing power settings, or use a powered hub.

7.2 "USB transfer error"

If in the process of working with the device in the USB Oscilloscope window the message USB transfer error message appears, it indicates distortion and/or damage to the data that are sent via the USB interface.

- The device and / or its USB cable placed too close to the source of electromagnetic interference.

Ground the device using a separate multi stranded copper wire with a cross section of more than 0.5 mm².

- Used faulty, low-speed or too long USB cable.

Change the USB cable to a quality high-speed USB 2.0 A/B interface cable of no more than 3 meters in length and with a label stating "CERTIFIED HI-SPEED USB".