

Operation Manual for USB Autoscope Lite

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

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1. Purpose

The USB Autoscope Lite is used for troubleshooting of various electronic vehicle systems, such as ignition and timing system. The USB Autoscope Lite 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 12 Mbit/s (*Full-SPEED*) port of a Windows laptop or PC. The Windows version should be XP SP2 or higher.

2. Technical characteristics of the USB Autoscope Lite

2.1 General

- PC interface type – USB 2.0 12 Mbit/s (*Full-SPEED*)
- Device supply source – from USB
- Current consumption from USB – no more than 120 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 channels – 8
- Number of universal analog inputs – 6
- Number of inputs for high-voltage transducers – 2
- Number of inputs for the synchronization transducer – 1
- Voltage range
 - analog inputs 1...4 – ± 15 V
 - analog inputs 5, 6 – ± 150 V
- Input impedance – 1 M Ω
- ADC resolution – 12...14 bit ¹
- Maximum sampling frequency for channel:
 - in 1 channel sub mode – 250 kHz
 - in 2 channel sub mode – 125 kHz
 - in 4 channel sub mode – 50 kHz
 - in 8 channel sub mode – 25 kHz

2.3 Software

- Supported operating systems – Windows XP SP2 / SP3, Windows Vista, Windows 7, Windows 8 / Windows 8.1 / Windows 10
- Main features – Displaying mode + recording + measuring in real time simultaneously.
- Number of channels – Selectable 1, 2, 4, 8
- Scale parameters:
 - 1 channel sub mode – 0.1 mS / Div...1 S / Div. with step 1-2-5
 - 2 channel sub mode – 0.2 mS / Div...1 S / Div. with step 1-2-5
 - 4 channel sub mode – 0.5 mS / Div...1 S / Div. with step 1-2-5
 - 8 channel sub mode – 1 mS / Div...1 S / Div. with step 1-2-5

¹ The nominal signal digitizing depth is 12 bit, increasing up to 14 bit with slower digitizing speeds.

- Voltage sensitivity setting ²:
 - for input voltage range $\pm 15\text{ V}$ – 5 mV / Div ... 10 V / Div. with step 1-2-5
 - for input voltage range $\pm 150\text{ V}$ – 50 mV / Div ... 100 V / Div. with step 1-2-5
 - when using high voltage probes – 50 V / Div ... 100 kV / Div. with step 1-2-5
- Trigger modes:
 - auto
 - normal
 - wait
 - single
 - none
- 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

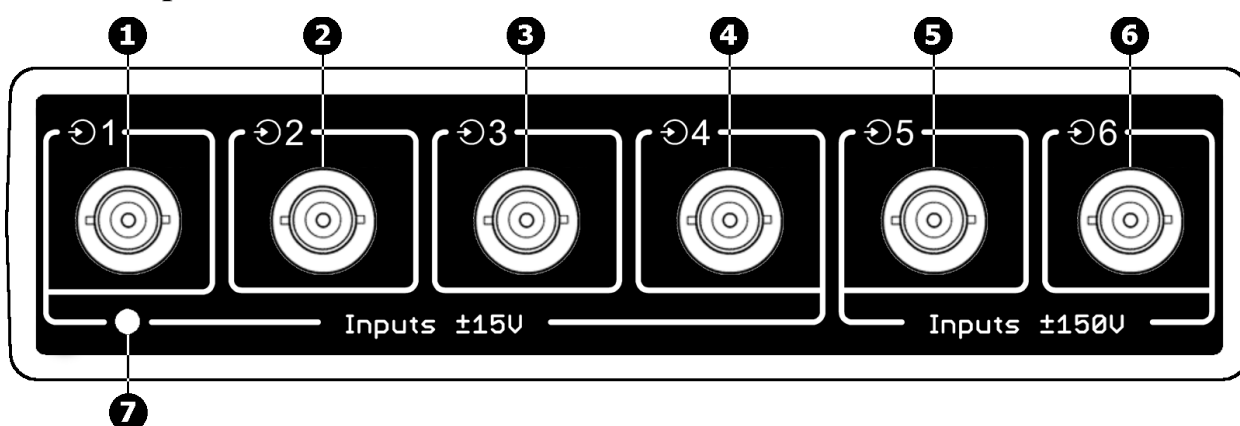
2.4 Parameters of the USB port's galvanic isolation

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

- Galvanic isolation resistance – not less than 10 G Ω
- Galvanic isolation capacitance – not more than 70 pF
- Galvanic isolation test voltage – 1 kV for 1 minute

² The value of the maximum voltage sensitivity depends on the sampling frequency.

2.5 Front panel elements



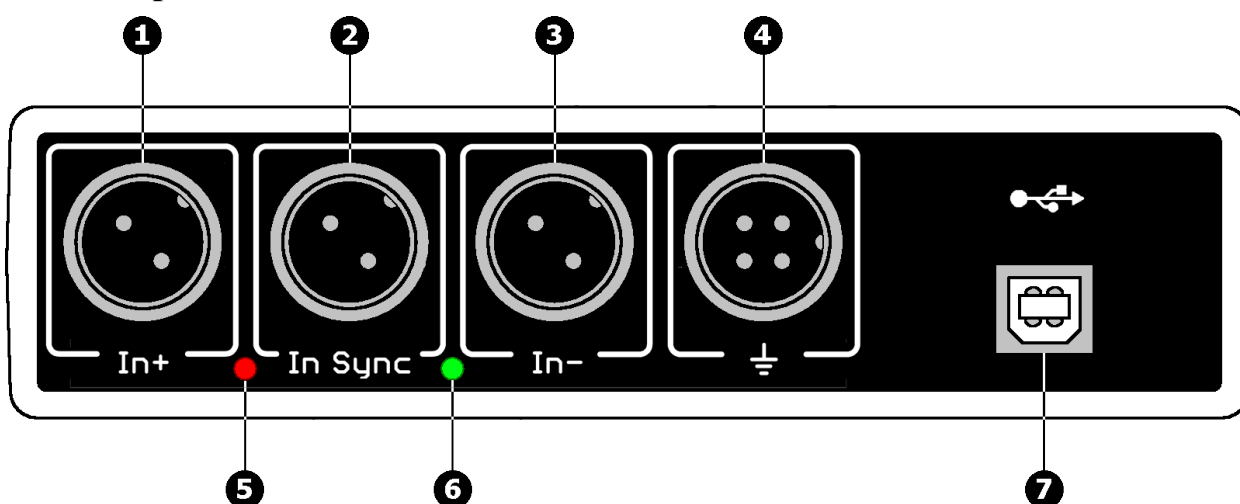
Front panel of the USB Autoscope Lite.

1...4 Connections for analog inputs 1...4. Input voltage range ± 15 V.

5...6 Connections for analog inputs 5...6. Input voltage range ± 150 V.

7 USB status indicator.

2.6 Back panel elements



Back panel of the USB Autoscope Lite.

1, 3 Connections "In+" and "In-" are used for connection of high voltage probes. The signals from the high voltage probes are inversely summed and go to the analog input 8.

2 Connection "In Synchro" is used for the synchronization (trigger) transducer that is used to detect ignition spark. The signal from the transducer goes to the analog input 7 through a peak detector.

4 Device ground connection. Used to connect device ground to vehicle ground on the diagnosed vehicle.

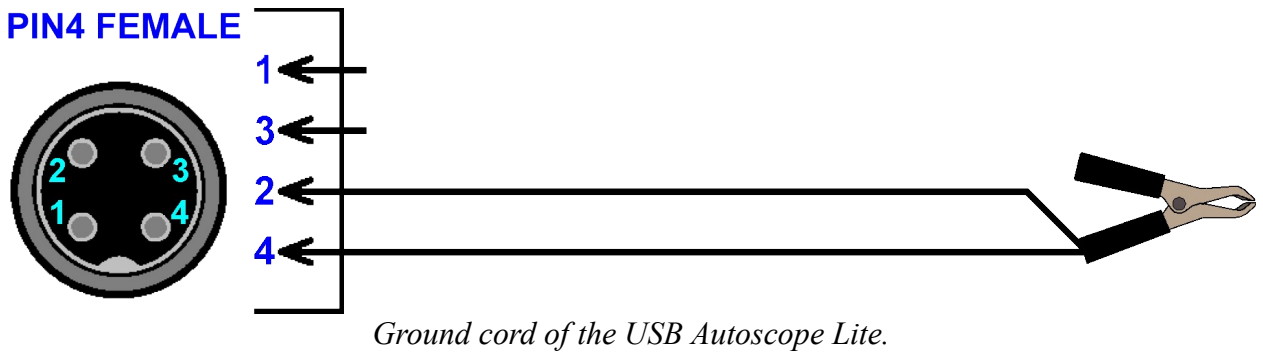
5, 6 Pulse polarity indicator from synchronization transducer.

7 USB connection. Used for connection of the USB Autoscope Lite to USB 2.0 12 Mbit/s (*Full-SPEED*) port of a laptop or PC. The connection uses a USB 2.0 type A-B cable.

2.7 Ground cord

Signal measurements on the analog inputs of the USB Autoscope Lite are recommended to perform relatively to the black alligator clip of the ground cord. Therefore, before starting the measurement, the cable must be connected to the back of the device connector (ground) and the black alligator clip must be connected to vehicle ground on the diagnosed vehicle. When working with high-voltage probes, this connection is necessary.

In case of breakage of the cable, it can be repaired or manufactured according to the diagram below.



- 2 Signal ground.
- 4 Common ground of the high-voltage transducers.

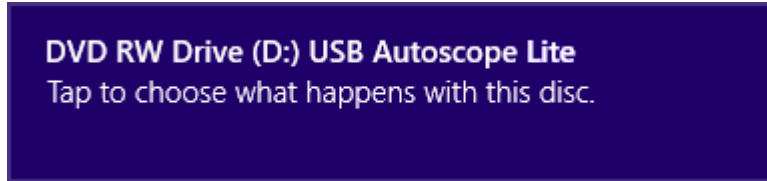
3. Preparing the computer for use with the USB Autoscope Lite

3.1 Minimum Laptop or PC requirements

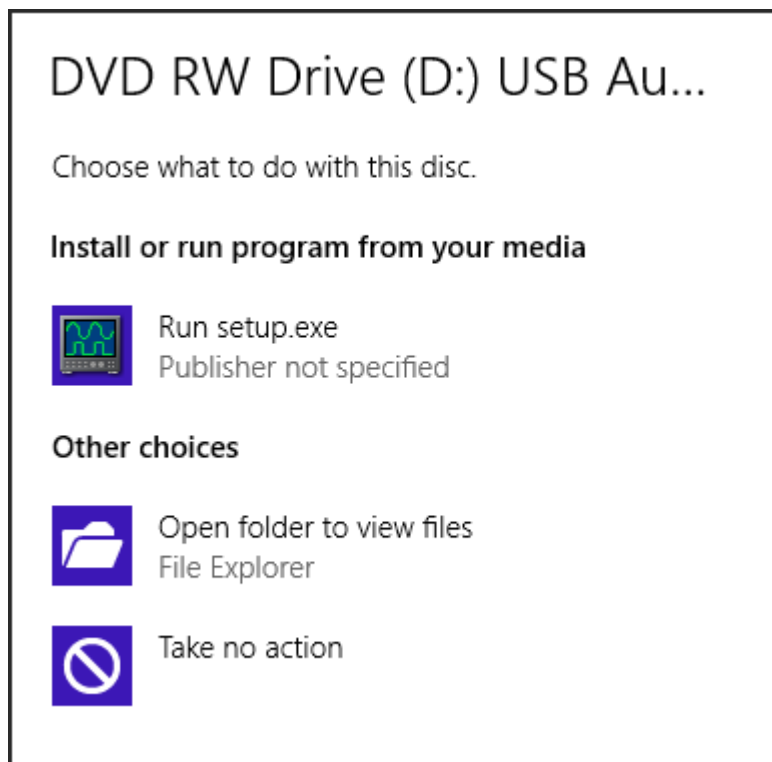
- Processor – Pentium II 500 MHz
- RAM (random-access memory) – 512 MB
- Hard disk drive – 10 GB of free disk space, data-transfer protocol at least UDMA 66
- Optical disc drive – CD-ROM for software installation
- PC interface – port USB 2.0 12 Mbit/s (*Full-SPEED*)
- Video adapter – AGP or PCI Express
- Monitor – SVGA
- Operating system – Windows XP SP2 / SP3, Windows Vista, Windows 7 or Windows 8 / Windows 8.1 / Windows 10
- 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.

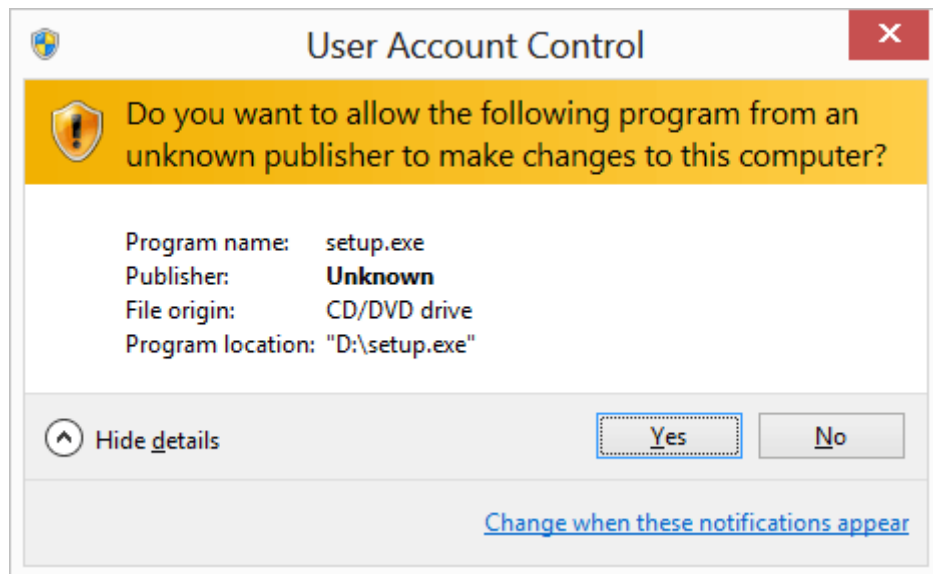


Choose the option "Run setup.exe".

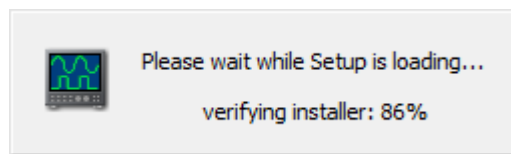


If after inserting installation CD in the optical disk drive of computer nothing happens, browse through the disc and open the program setup file, called "Setup.exe". The drive letter your computer uses for the optical drive, often D:\Setup.exe or E:\Setup.exe

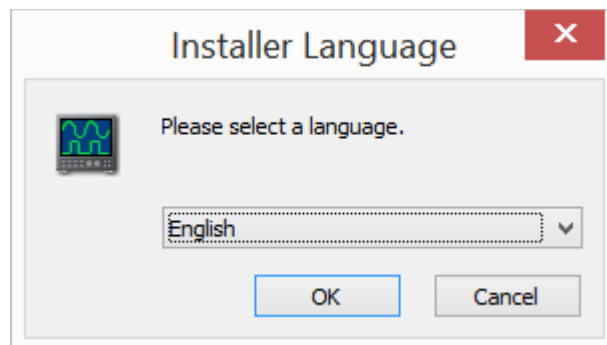
- If a pop up about unknown publisher of "setup.exe" appears, click "Yes".



- You may have to wait while the installer verifies.

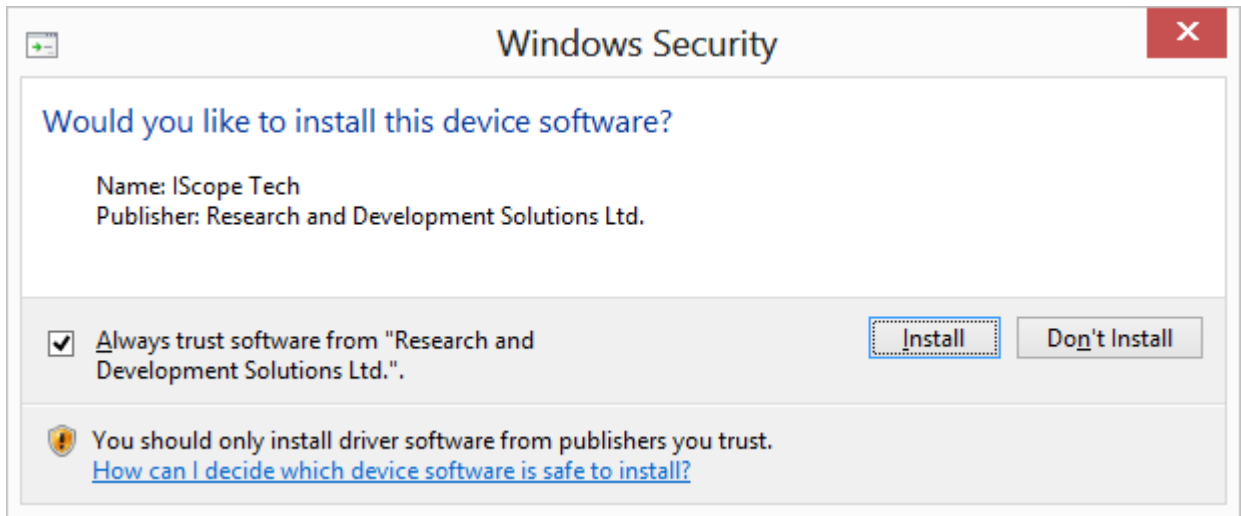


- In the window "Installer Language", change the installation language if desired.

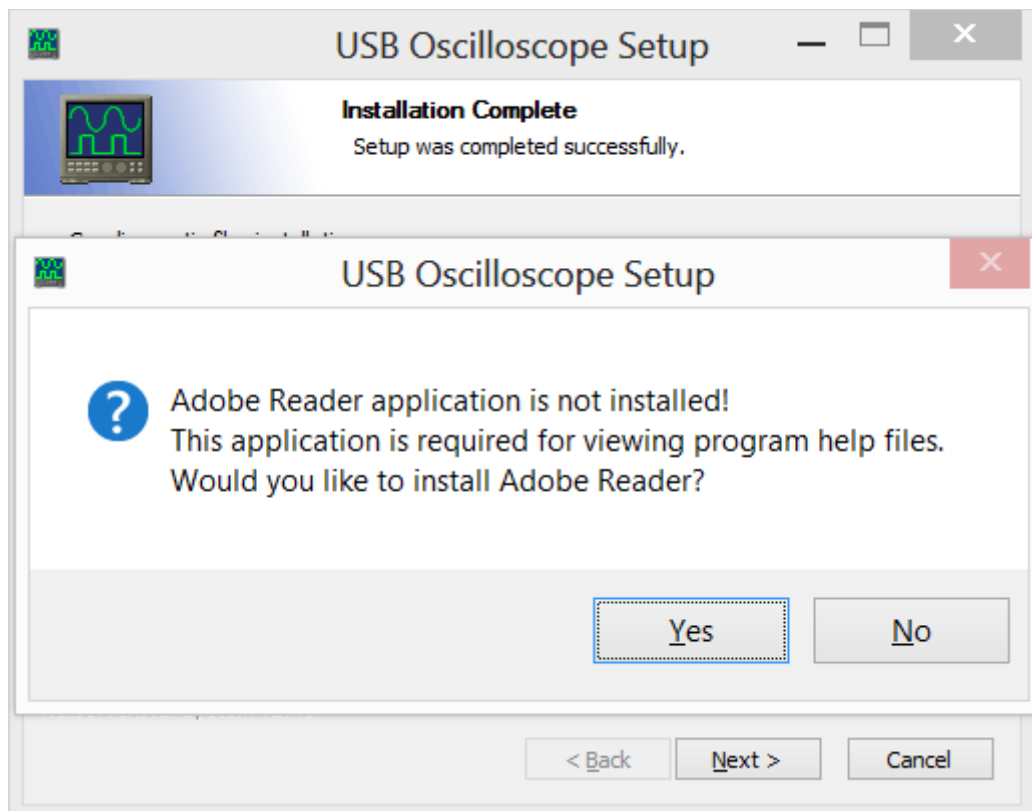


- Then, follow the installation instructions, changing parameters only when required.

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

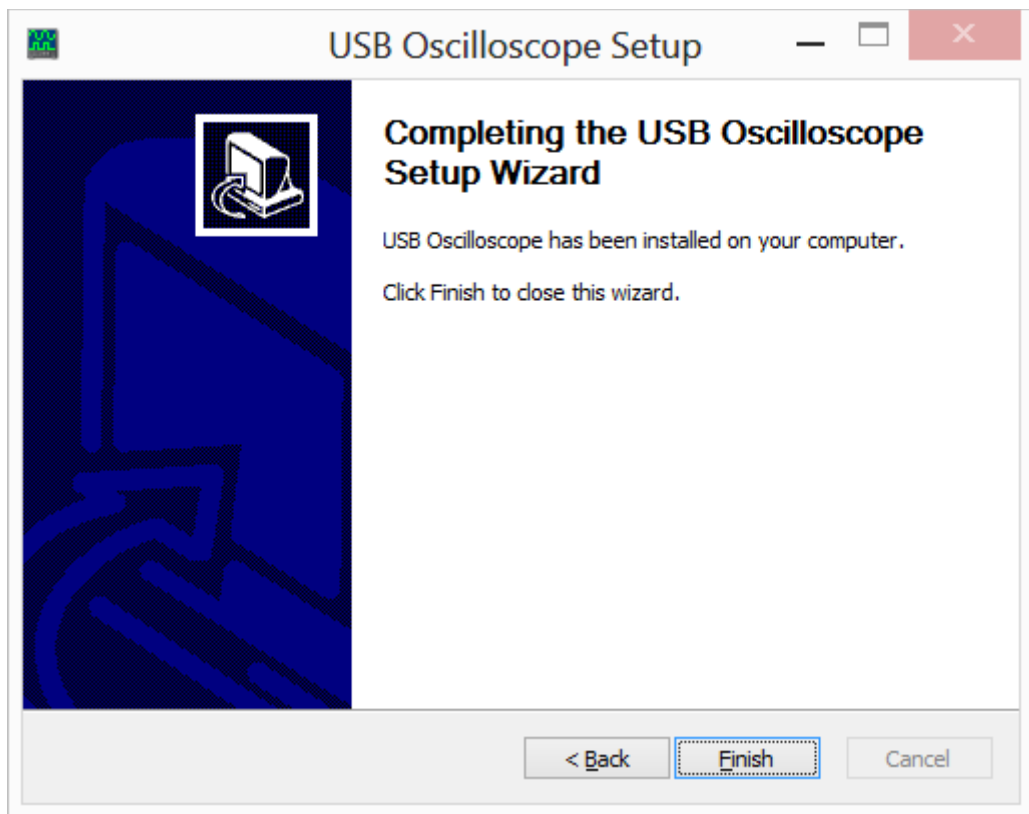


- If the message "Windows can't verify the publisher of this driver software" appears, choose the option "Install this driver software anyway".
- If a message about the need to install "Adobe Reader" or "Adobe Flash Player ActiveX" software appears, agree and install the suggested program.



Installation of the additional software may take several minutes.

- Press the "Finish" button.

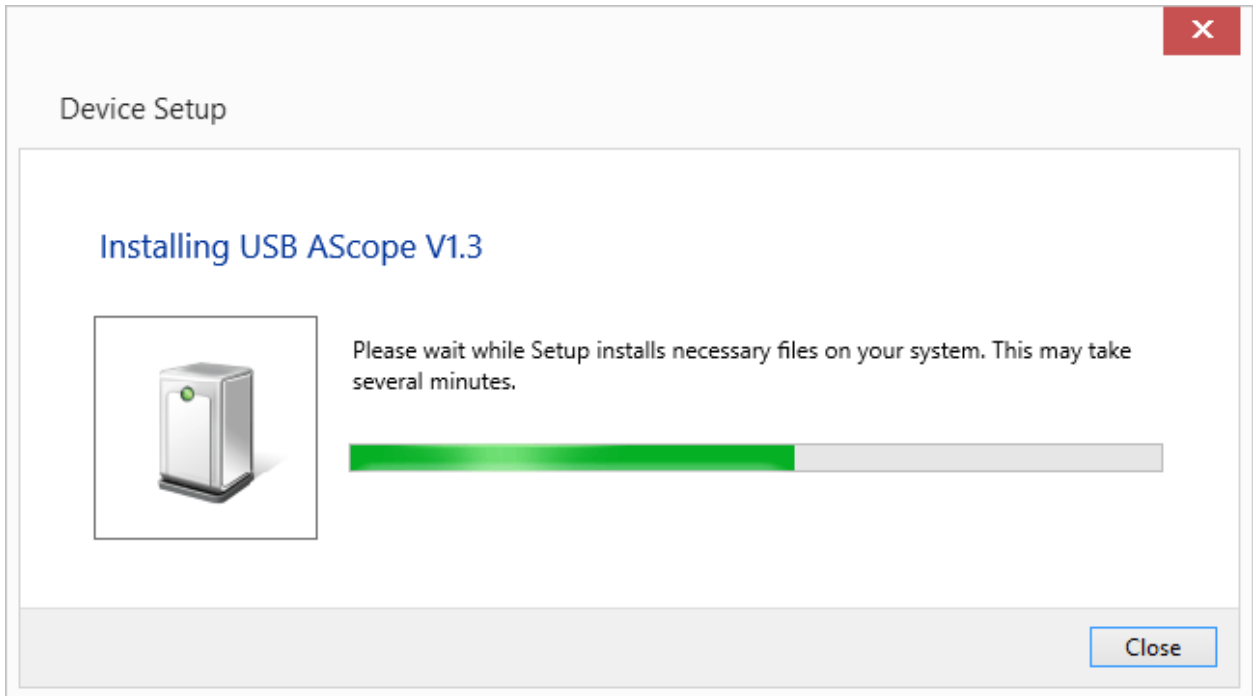


Now the USB Oscilloscope software is installed completely and drivers are presetting.

3.3 Installation of the device drivers

Connect the device to USB 2.0 12 Mbit/s (Full-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 12 Mbit/s (*Full-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.
- Before the measurements, the black alligator clip from the USB Autoscope Lite's ground cord must be connected to vehicle ground on the diagnosed vehicle. The preferred connection point is a vehicle body ground on the diagnosed vehicle. If an older vehicle, use the engine ground. The signal measurements on the analog inputs are relative to vehicle ground, because the vehicle ground is connected to the common ground of the device through the black alligator clip of the ground cord.

Note that in some cases signal ground and ground of vehicle body are not at the same potential. One example would be Lambda or Oxygen sensor ground on GM vehicles. This can skew voltage readings if not taken in to account. In such cases a differential mode can be used, connect one channel to the signal and another channel to the signal ground.

- 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 Lite using a separate multi stranded copper wire with a cross section of more than 0.5 mm^2 .

5. Manufacturer limited warranty

The manufacturer guarantees the performance of the USB Autoscope Lite during its warranty period.

Warranty period for the main unit USB Autoscope Lite is 24 months from the date of sale.

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.

6. Troubleshooting

6.1 The device does not turn on

- The device is not connected to USB 2.0 12 Mbit/s (Full-SPEED) port of the host computer.
Connect the device to USB 2.0 12 Mbit/s (Full-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 Full-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 12 Mbit/s (Full-SPEED) port of the personal computer is broken.
Try another port or computer.

6.2 "USB transfer error"

If in the process of working with the device in the USB Oscilloscope window the message USB transfer error 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 Full-SPEED USB".