Devices

Korlan USB2CAN User Guide

High quality isolated USB to CAN interface

1.0v 2019-04-02

Table of Contents

Changes history

Date	Change list
2019-04-02	Initial release

1. Introduction

With Korlan USB2CAN you can monitor a CAN network, write a CAN program and communicate with industrial, medical, automotive or other CAN based device. It comes in two different versions: DB9 or OBD2.

The Korlan CANBUS USB adapter connects a CAN bus to the USB port of any device running Linux or Windows operating system, which also supplies the power to the adapter (no power supply needed). In the downloads section now you can find all the related drivers and software applications and even Windows 7 64-bit kernel driver, which was added recently.

1.1 Usage warning

Your use of this device must be done with caution and a full understanding of the risks!

This warning is presented to inform you that the operation of this device may be dangerous. Your actions can influence the behaviour or a can-based distributed embedded system and depending on the application, the consequences of your improper actions could cause serious operation malfunction, loss of information, damage to equipment and physical injury to yourself or others.

1.2 Technical specification

| Connectors	
Computer	USB 2.0 Full speed, Type A connector
CAN	D-SUB, 9 pins. CAN-CIA standard interface pin assignment or OBD2, 16 pins. Standard interface pin assignment.
CAN	
Specification	ISO 11898-2 High-speed CAN
	2.0A (standard format) and 2.0B (extended format)
Bit rates	50, 50, 100, 125, 250, 500, 800, 1000 Kbit/s or user definable
Controller	ARM 32bit Cortex-M0 (STM32F072)
Transceiver	TI ISO1050
Galvanic isolation	Up to 2.5kV, separate for each CAN channel
Termination	None
Measures	
Size	110 x 36.7 x 16.2 mm (L x W x H), no cable
Weight	DB9 version: 100g with cable, OBD2 version: 140g with cable
Environment	
Operating temperature	From -35ºC to +55ºC
Relative humidity	15-90%, not condensing
Usage	Indoor only
Other	
Available drivers	Windows 2000, Windows XP, Windows Vista, Windows 7, Windows 10, Linux
3rd party ptotocol support	Driver for VSCP protocol
	Open source CANAL API DLL for Windows
	Linux SocketCAN compatible

2. USB2CAN converter

2.1 CAN connector pinout

Figure 2-1. DB9 connector

Figure 2-2. OBD2 connector
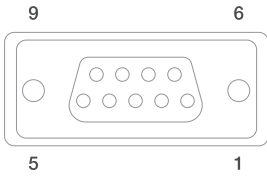
Pin	Signal	Description
1	-	No connection
2	CANL	CANL bus line (dominant low)
3	CAN GND	CAN Ground
4	-	No connection
5	CAN_SHLD	Connected to CAN GND via 100 Ω /0.1uF
6	CAN GND	CAN Ground
7	CANH	CANH bus line (dominant high)
8	-	No connection
9	-	No connection
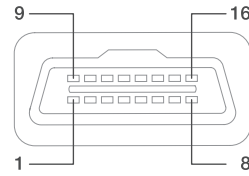
Pin number	Description
4	GND
5	GND
6	CAN Bus High
14	CAN Bus LOW

Note: All other pins on OBD2 are not used and not connected.

2.2 LED indication

Korlan USB2CAN has three LEDs (Power, Error, Info) for device status indication. Device status Indication modes are listed in the table below.

1 LED (Power)
2 LED (Error)
3 LED (Info)

PWR
ERR
INFO

LED	Status description
Only Power LED on	Device powered on.
Info LED on, Error LED off	There is no driver detected at host device.
Error LED on, Info LED off	CAN interface is not enabled on a host device.
Info and Error LED on	CAN interface enabled, device is ready to receive or send data.
Error and Info LED blinking	CAN send/ receive data.

2.3 CAN bus termination

A High-speed CAN bus (ISO 11898-2) must be terminated on both ends with 120 Ohms. Standard termination example.
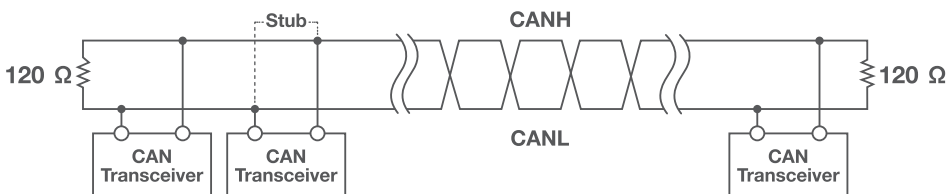
The 120-Ω characteristic impedance twisted-pair cable must be terminated with an impedance of the same value to minimized reflected waves that occur from miss-matched impedances. Bad terminal may cause signal reflections and the transceivers of the connected CAN nodes (CAN- interface, control device) may not work.

The USB2CAN does not have an internal termination. Device must be used on a terminated CAN bus.

2.4 Testing modes

There are three testing modes supported by Korlan USB2CAN:

• Loopback
• Silent
• Silent loopback

1 Loopback mode

is used to test if the device is operational when only one device is available. If Korlan USB2CAN is in loopback mode, everything what is sent through the CAN interface is send back to device. It is like the CAN interface TX pins are connected to its RX pins.

2 Silent mode

means the interface only listens to the CAN bus. This means the unit does not even provide an ACK frame when a message is placed on the CAN bus correctly.

3 Silent loopback

is self test mode which can be used in a working CAN system without interfering with it.

3. Work on Linux

3.1 Driver and configuration

The Korlan USB2CAN converter is supported by mainline Linux since version 3.9. It works with Linux distributions like Ubuntu and Debian with no additional driver installation. For older version driver must be built manually.

Recommended Linux distributions:
• Ubuntu 14.04 or newer
• Debian 8 (Jessie) or newer

If the driver is correctly loaded, CAN interface should be seen when issuing the command sudo ip link.

Set can0 interface speed to 125 Kbps:

```
sudo ip link set can0 up type can bitrate 125000 sample-point 0.875
```

Set to can0 to "steady" state (steady green led):

```
sudo ip link set can0 up
```

To bring down interface (steady red led):

```
sudo ip link set can0 down
```

To get more information about configuration options type:

```
sudo ip link set can0 type can help
```

3.2 Tools- can-utils (send/receive CAN packets)

The programs allow to get CAN communications instantly using two commands "cansend" and "candump".

Command to install tool:

```
sudo apt-get install can-utils
```

Send byte of information (0102030405060708) to can device with id = "01010101":

```
cansend can0 01010101#0102030405060708
```

Receive everything on can0 interface:

```
candump can0
```

3.3 Tools- dfu-util (USB2CAN Firmware upgrade)

For dfu-util tool is recommended for USB2CAN firmware upgrade. The tool is used to upload firmware from PC to device over USB. The tool is available for download on 8devices WEB page.

3.4 Test code example

Code example is available to download from a WEB (USB2CAN_TEST.py)

Two CAN bus interfaces need to be connected on same computer together (Ex.: connect two USB2CAN usb ports to a computer and connect can ports together). The code sends random from one interface to another and checks if the
received data is valid.

To use the code go to terminal and launch command:

```
python USB2CAN_TEST [can interface 1] [can interface 2] [number of packets] [baudrate]
```

Example to send 100 random data packets from interface can0 to can1 at a 125 Kbps baudrate:

```
python USB2CAN_TEST.py can0 can1 100 125000
```

Testing was done using Ubuntu Linux distribution. Other distributions may require additional configuration.

3.5 Firmware upgrade

Instal dfu-util (>= 0.9)

```
sudo apt-get install dfu-util
```

Switch to internal bootloader using the set_dfu utility provided with the firmware:

```
sudo ./set_dfu
```

Flash new firmware as root:

```
sudo dfu-util -a 0 -s 0x8008000 -D USB2CAN-v2.0.bin
```

4. Work on Windows

4.1 Windows XP driver installation

Download drivers files from 8devices WEB page:

• 32-bit - USB2CAN Windows 32-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

• 64-bit - USB2CAN Windows 64-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

Plug Korlan USB2CAN device to computer USB connection. Info LED should be on, Error LED should be off.

Use Hardware wizard, which will start after You plug device to PC.
It can be started manually by pressing: Start – Control Panel – Add Hardware.

1 When Hardware wizard starts, choose "No, not this time" and press next:

2 Then choose "Install from a list or specific location":
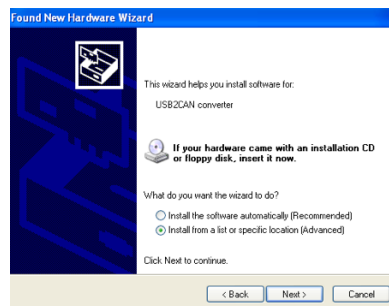
3 Choose "Search for the best driver in these locations", browse for drivers location and press next:
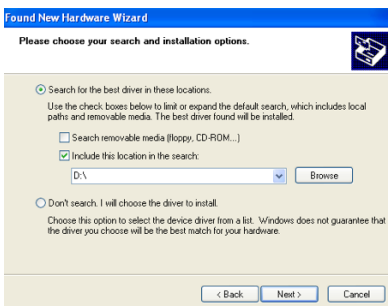
4 You will receive warning from Windows. Choose "Continue Anyway":
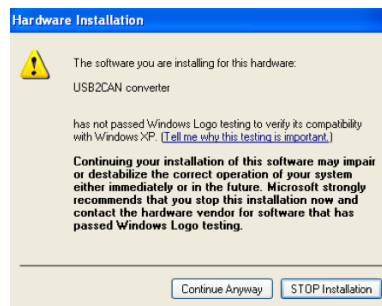
5 When installation completed press "Finish":
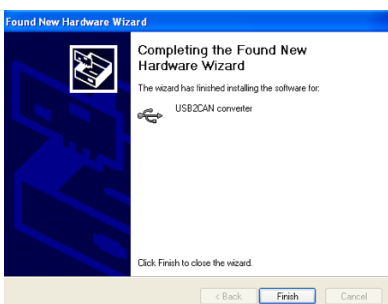
If the driver installation was successful, Korlan USB2CAN Info LED should be off, Error LED should be on. Run USB2CAN test application (can be downloaded from 8devices WEB page). Test application should find all USB to CAN devices connectd to PC and their serial numbers. Insert the device's serial number you would like to use and press **"Open".**
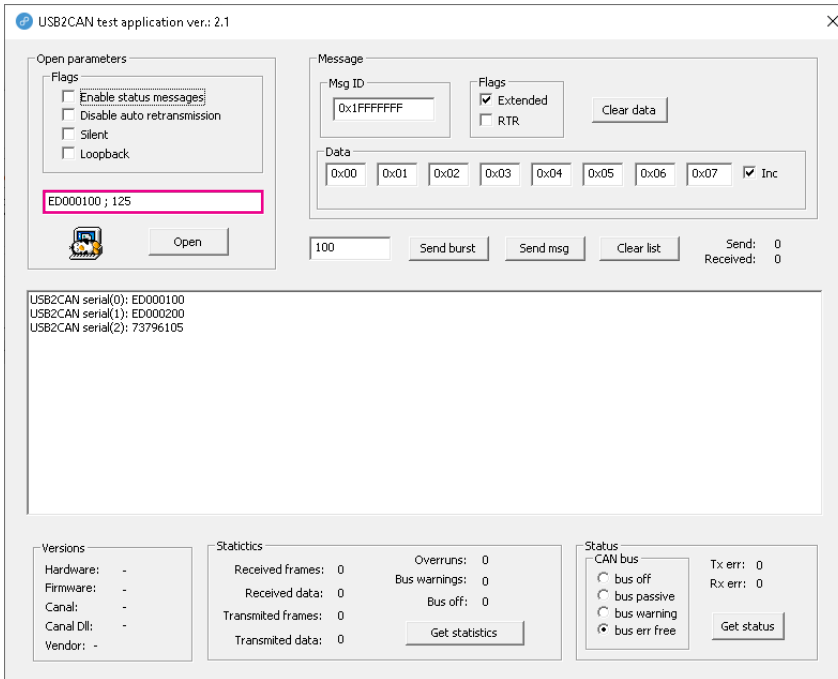
4.2 Windows 7 driver installation

Download drivers files from 8devices WEB page:

• 32-bit - USB2CAN Windows 32-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

• 64-bit - USB2CAN Windows 64-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

Plug USB2CAN device to computer USB connection. Info LED should be on, Error LED should be off. Use Hardware wizard, which will start after You plug device to PC.
It can be started manually by pressing **"Start"** button and then run Device manager by writing **"Device manager"** in search field
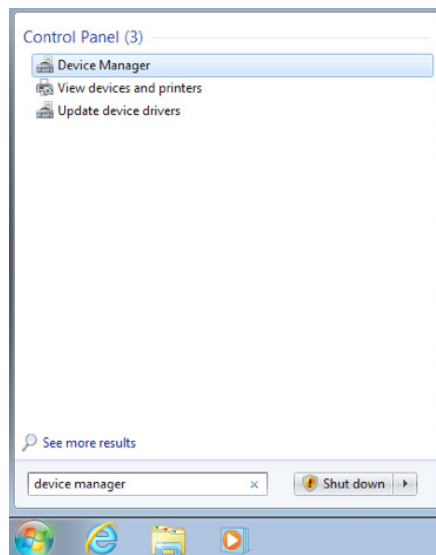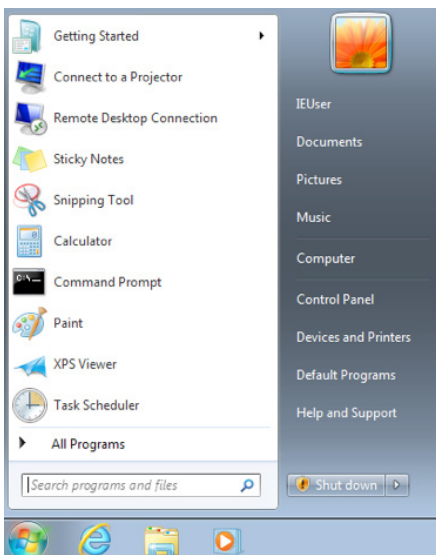
1   Choose sub2can device:
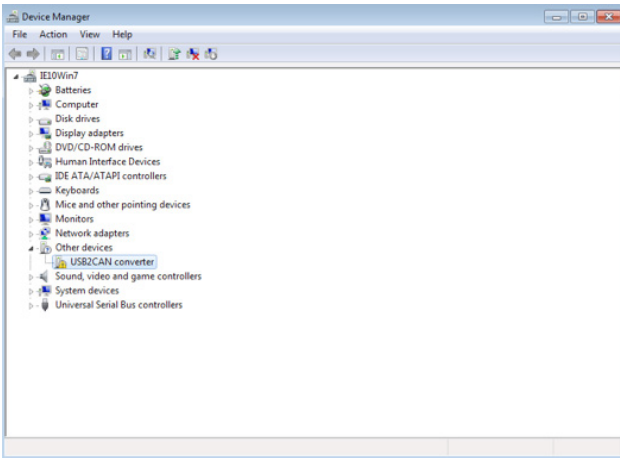
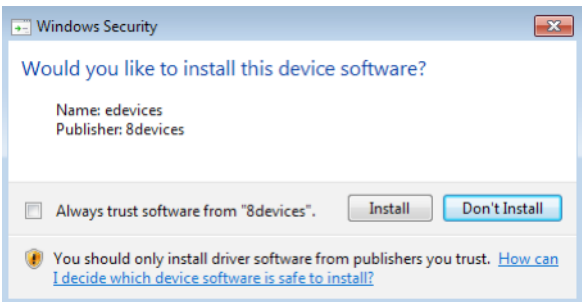**2**   Press "Update Driver":
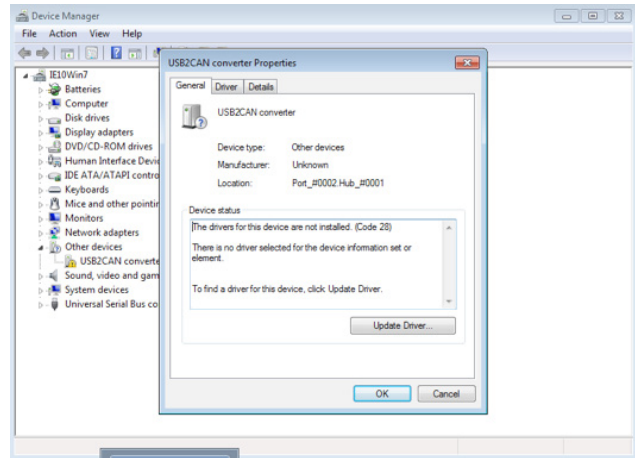
3   Choose "Browse my computer for driver software":
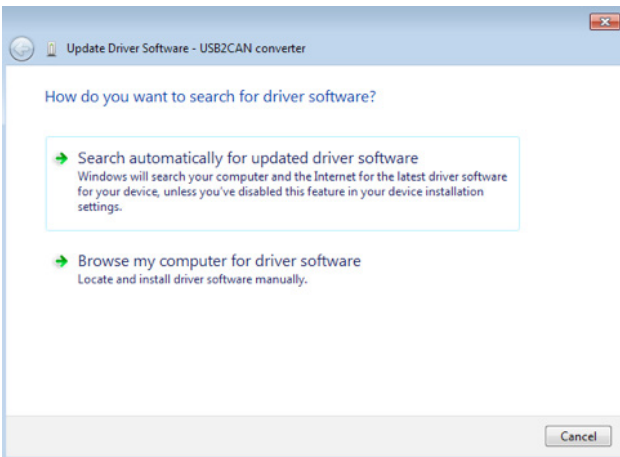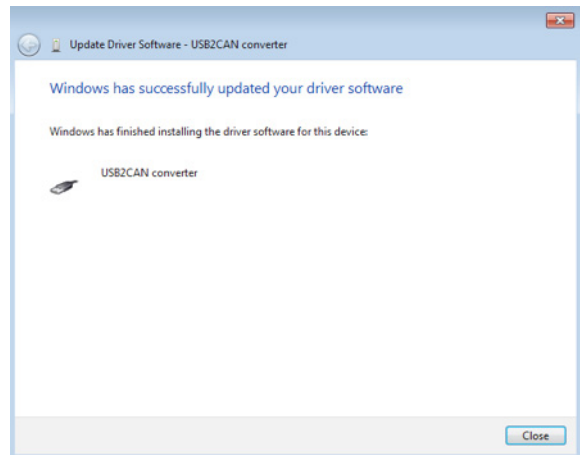

4   Browse for drivers location on Your computer:
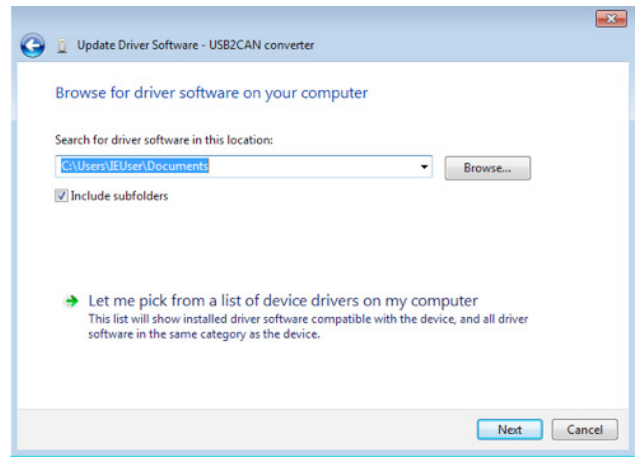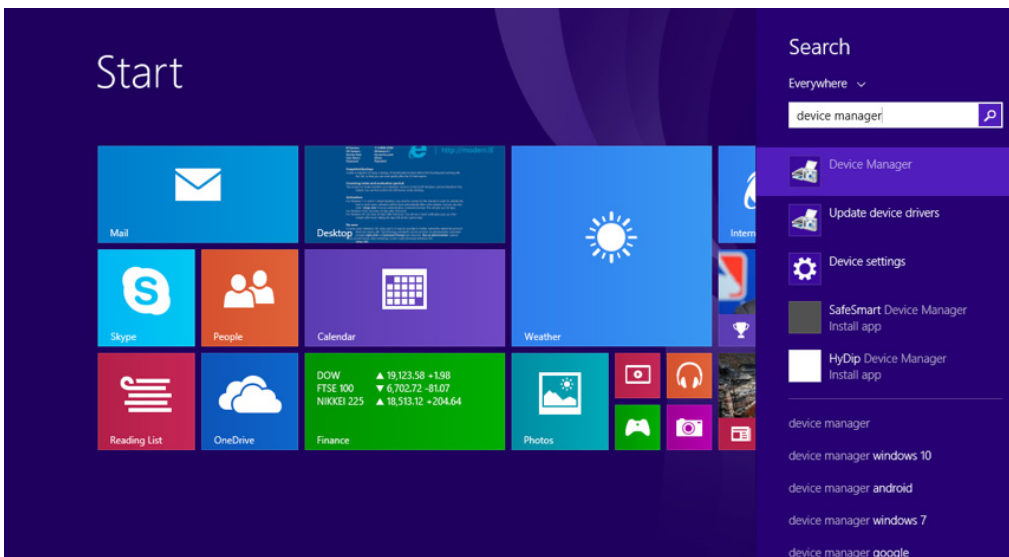

5   Will pop-up Windows Security message. Press "Install":

6   Finish installation:

If the driver installation was successful, Korlan USB2CAN Info LED shoud be off, Error LED should be on. Run USB2CAN test application (can be downloaded from 8devices WEB page). Test application should find all USB to CAN devices connectd to PC and their serial numbers. Insert the device's serial number you would like to use and press **"Open"**:
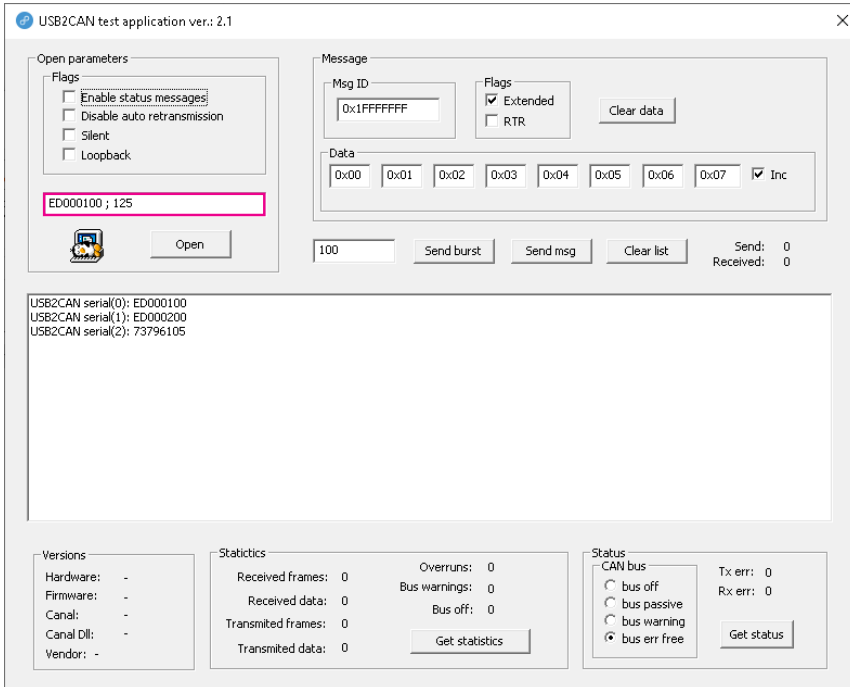
4.3 Windows 8 driver installation

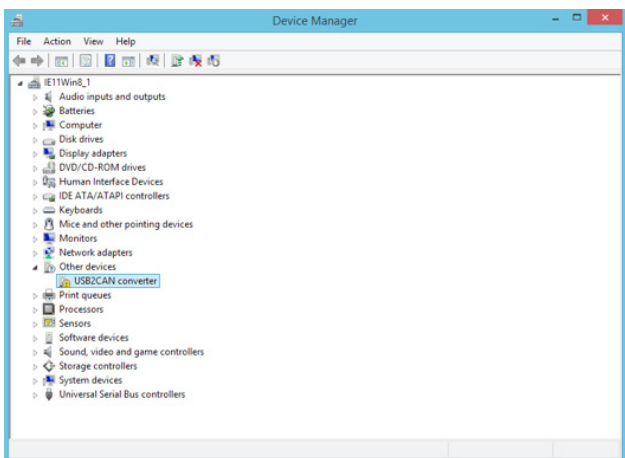**Download drivers files from 8devices WEB page:**

- 32-bit - USB2CAN Windows 32-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1
- 64-bit - USB2CAN Windows 64-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

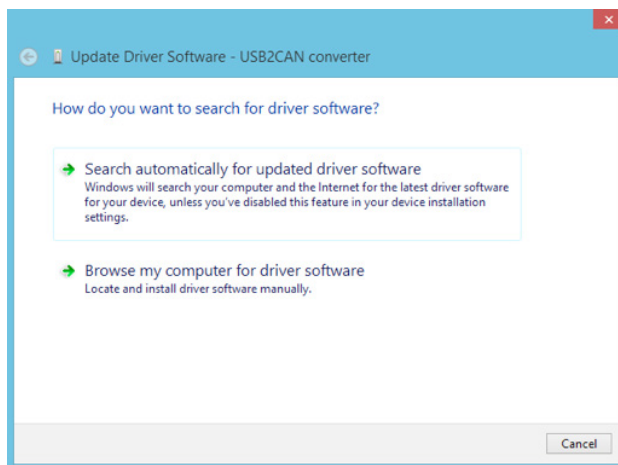Plug USB2CAN device to computer USB connection. Info LED should be on, Error LED should be off.
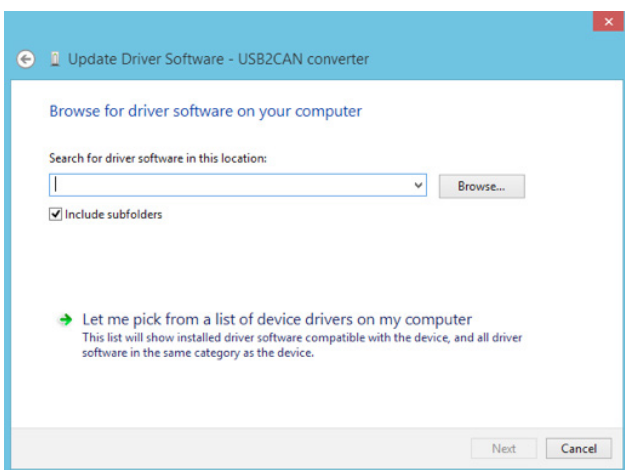
Run device manager.

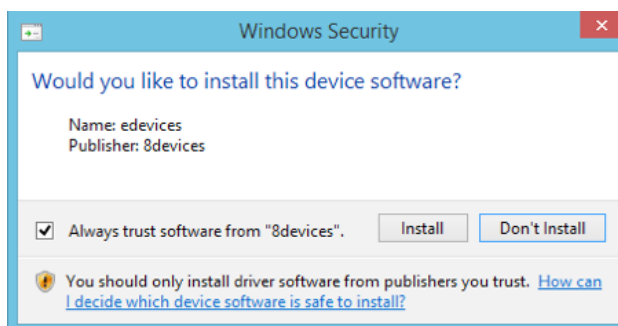**1** Then mark USB2CAN device and chose "Update driver software" from top menu:

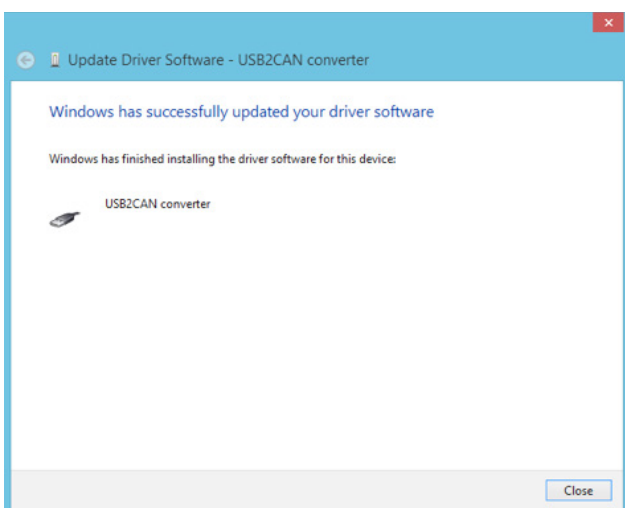**2** Choose "Browse my computer for driver software":


3 Browse for drivers and click next:

4 Will pup-up Windows Security message. Choose "Install":

5 And press "Close":

If the driver installation was successful, USB2CAN Info LED should be off, Error LED should be on. Run USB2CAN test application (can be downloaded from 8devices WEB page). Test application should find all USB to CAN devices connectd to PC and their serial numbers. Insert the device's serial number you would like to use and press **"Open"**:
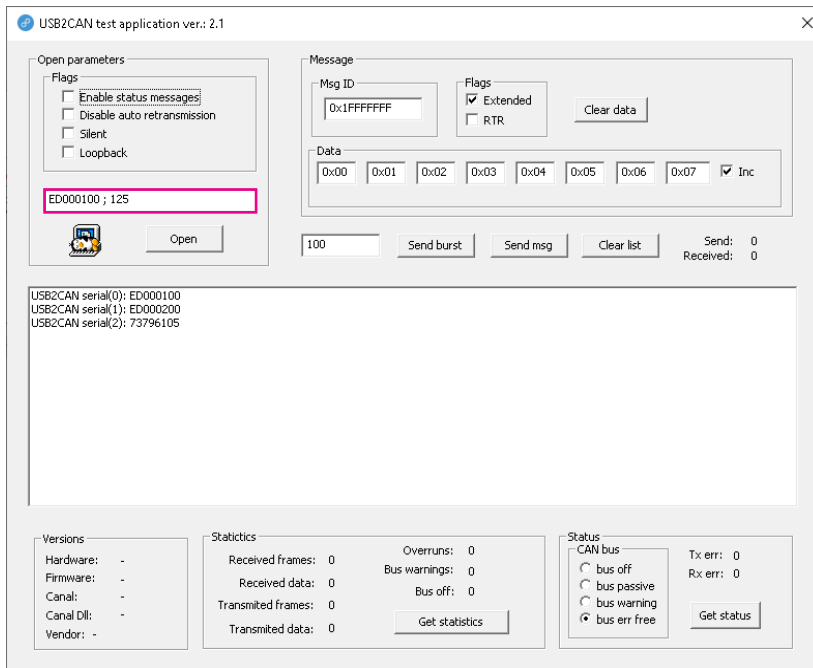

4.3 Windows 10 driver installation

Download drivers files from 8devices WEB page:

• 32-bit - USB2CAN Windows 32-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1
• 64-bit - USB2CAN Windows 64-bit (XP, Vista, Win7, Win8, Win10) USB driver v1.0.2.1

Plug USB2CAN device to computer USB connection. Info LED should be on, Error LED should be off. Use Hardware wizard, which will start after You plug device to PC.
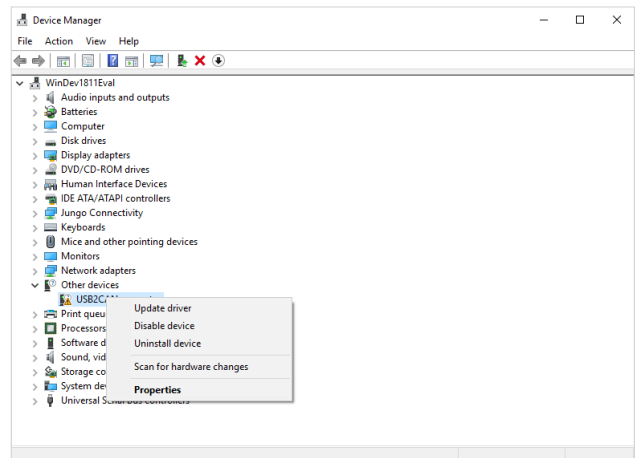
It can be started manually by pressing **"Start"** button and then run Device manager by writing **"Device manager"** in search field.
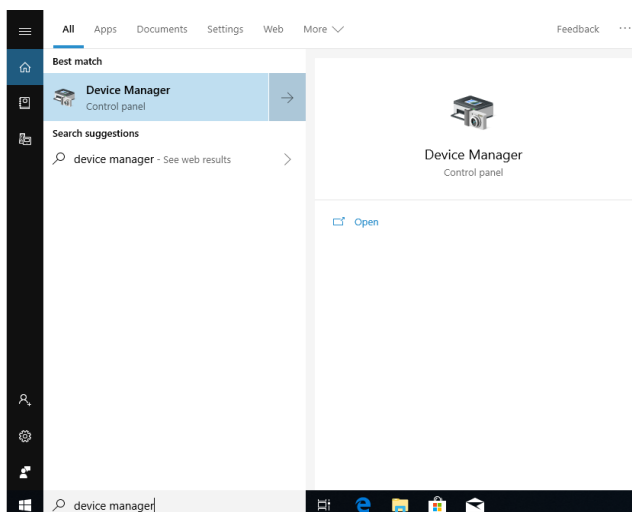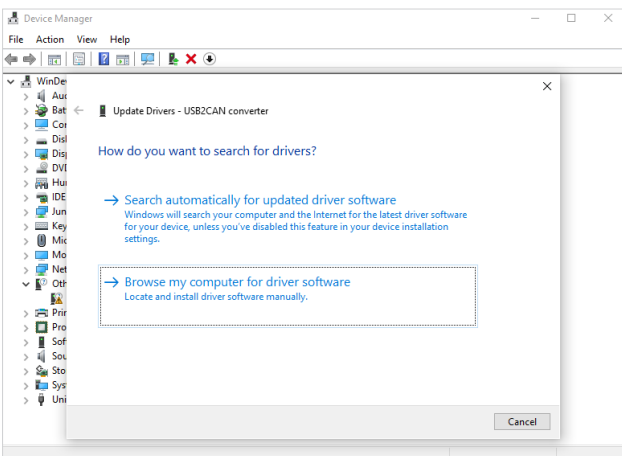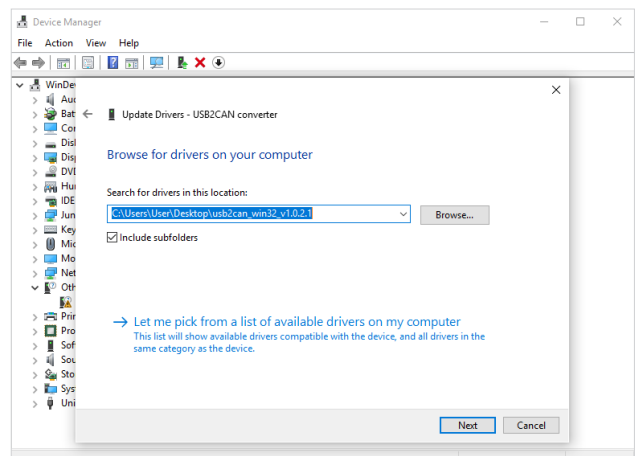
1　　Choose USB2CAN device:
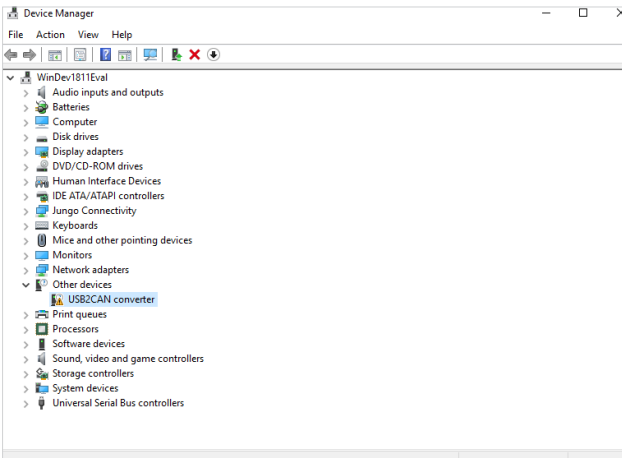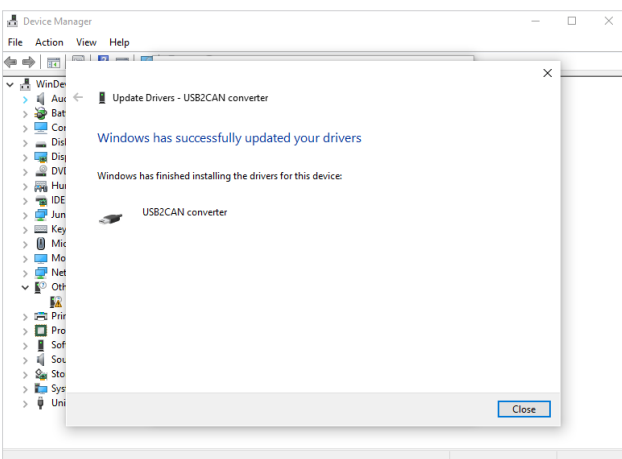

2　　Press "Update Driver":

3　　Choose "Browse my computer for driver software:

4　　Browse for driver's location on Your computer:

5　　Finish installation:

If the driver installation was successful, USB2CAN Info LED should be off, Error LED should be on. Run USB2CAN test application (can be downloaded from 8devices WEB page). Test application should find all USB to CAN devices connectd to PC and their serial numbers. Insert the device's serial number you would like to use and press **"Open"**:

4.4 USB2CAN test application bus speed configuration

For a proper operation a correct serial number and bus speed must be entered. Serial number is located on USB2CAN label.

Standard CAN bus speed configuration
Input format is: "serial number;can bus speed", speed options 20, 50, 100, 125, 250, 500, 800,1000
Example: 664E01CF;125

Customized CAN bus speed configuration
For a customized speed, the bus speed setting must be set to "0" with additional configuration parameters. The additional parameters are written directly to internal microcontroller timing register.

Input format is: "serial number;0;tseg1;tseg2;sjw;brp"
Example: 664E01CF;0;12;34;22;11

More details how to configure customized speed can be found at http://www.bittiming.can-wiki.info

Note: on the WEB page drop down menu select "ST Microelectronics bxCAN" and "Clock Rate" = 32MHz