# PCAN-USB (ISO)

Adapter PC USB Port to High-speed CAN

# User Manual


PEAK System

## Products taken into account

| Product Name | Model | Item Number |
|---|---|---|
| PCAN-USB | | IPEH 002021 |
| PCAN-USB ISO | Galvanic isolation for CAN connection | IPEH 002022 |

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# Contents

# 1 Introduction

**Tip:** At the end of this manual (Appendix B) you can find a **Quick Reference** with brief information about the installation and operation of the PCAN-USB.

The PCAN-USB allows the connection of a CAN bus to an USB interface of an IBM compatible PC. It is especially suitable for use with notebook computers since these usually don't have an ISA or PCI slot. With the help of this adapter any PC can be linked to a high-speed CAN (HS-CAN).

At the so called ISO version of PCAN-USB an isolation of up to 500 V between the PC and the CAN parts of the adapter is achieved by use of a DC/DC converter and an optocoupler.

**Note:** This manual refers to both the **PCAN-USB** standard version and the **PCAN-USB ISO** with galvanic isolation. Differences at use and at the technical specifications are mentioned accordingly in this manual.

## 1.1 Properties at a Glance

- Connection of a high-speed CAN (CAN specifications 2.0A and 2.0B) to a PC
- Use of any USB port at the PC (USB 1.1, compatible with USB 2.0)
- Power supply via USB connection
- Equipped with the CAN controller SJA1000T by Philips
- CAN transfer rate up to 1 Mbit/s
- Hardware-reset possible by software command

- CAN connection 9-pin Sub-D male, pin assignment according to CiA recommendation DS102
- Galvanic isolation at CAN connection up to 500 V (PCAN-USB ISO only)
- LED indicating USB status and PCAN node activity
- Support for Windows 32-bit operating systems (except Windows 95, Windows 98 Gold, and Windows NT) as well as Linux

**Note**: This manual describes the use of PCAN-USB with Windows. You can find device drivers for Linux and the corresponding information on PEAK-System's website under http://www.peak-system.com/linux.

## 1.2 System Requirements

The following prerequisites must be given, so that the PCAN-USB-Adapter can be used properly:

- A free USB port (USB 1.1 or USB 2.0) at the PC or at an USB hub connected to the PC
- Windows 98 SE / ME / 2000 / XP (not Windows 95, Windows 98 Gold and Windows NT) or Linux (see website http://www.peak-system.com/linux)

## 1.3 Scope of Supply

The scope of supply normally consists of the following parts:

- Adapter PCAN-USB (plastic case with CAN connector and a cable for USB connection)
- 3½" diskette with following software:
  - This manual in PDF format
  - Device drivers for 32-bit Windows operating systems
  - PCANView: CAN monitor for Windows
  - PCAN-Light: API DLL for control of the CAN under Windows with own software
  - Sample programs with source code in Visual Basic, Borland Builder 5 and Visual C++

# 2 Hardware Installation

## 2.1 Connecting to PC / Driver Installation

Do the following to connect PCAN-USB to the PC and install the driver:

1. Turn on the PC and start Windows.
2. Make sure that you are logged in as user with Administrator rights when using Windows 2000 or Windows XP (not needed later on at normal use of PCAN-USB).
3. Insert the supplied diskette into the floppy disk drive.
   – or –
   If you downloaded the current version of the PCAN-USB software from the Website of PEAK-System (http://www.peak-system.com/), unpack the contents of the corresponding ZIP file into a folder of your choice.
4. Connect PCAN-USB to an USB port at your PC.
   Windows reports that new hardware has been detected and starts an installation wizard.
5. Follow the steps given by the installation wizard. When applicable, specify the path to the installation files (floppy disk drive or folder).

After the installation process is finished successfully the red LED on the PCAN-USB is shining.

The following screenshot series (Figure 1) demonstrates the procedure under Windows XP. It is assumed that the PCAN-USB software has been unpacked from the ZIP file coming from the PEAK-System website to the folder `C:\Temp\PCAN-USB\` before.

**Note:** Depending on the used Windows version the procedure may vary in some steps (minor differences in dialog boxes and in the sequence of dialog boxes).


Figure 1: Driver installation procedure under Windows XP (example)

### 2.1.1 Safely Removing the Adapter

When you want to unplug the PCAN-USB adapter from the PC during a Windows session, please pay attention to the following notes.

#### Windows 2000/Windows XP

- When PCAN-USB is connected and the corresponding driver is active, you will find an icon for safely removing hardware in the notification area of the taskbar (in the lower right corner of the desktop):


After clicking on the icon select the command **Remove PCAN-USB Device**. After the red LED on the PCAN-USB has gone out you can remove the adapter from the USB port of the PC.

#### Windows 98 SE/Windows ME

- Unplug PCAN-USB from the PC's USB port only, when the red LED is not blinking. Else system crashes may occur.

You can find detailed information about the red status LED in section 3.1.

## 2.2 Connecting a HS-CAN

A CAN is connected to the 9-pin Sub-D port on the PCAN-Dongle. The pin assignment corresponds to the CiA recommendation DS 102-1.

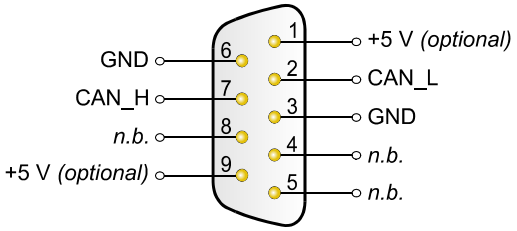


Figure 2: Pin assignment HS-CAN
(view onto male connector of the PCAN-USB)

## 2.3 5-Volt Supply on the CAN Bus

A 5-Volt supply can optionally be put onto the CAN bus (pin1 and/or pin 9 at PCAN-USB, pin 1 at PCAN-USB ISO) by making solder bridges on the PCAN-USB PCB (PCAN-USB case opened). In this way devices with a low power consumption (external transceivers or optocouplers for example) can be directly supplied over the CAN bus.

When using this option the 5-Volt supply for the CAN bus is directly connected to the power supply of the PCAN-USB (coming from the PC) and is not fused separately.

**Attention!** At this procedure a special care is indispensable since there is a short circuit danger. The PCAN-USB-Adapter could be destroyed and/or the power supply or electronics of the PC or other components connected could be damaged.

**Attention!** Risk of short circuit! If the option described in this section is activated, you may only connect or disconnect CAN cables or peripheral systems (e.g. external transceivers or optocouplers) to or from the PCAN-USB adapter while it is de-energized (PCAN-USB not connected to the PC). Consider that some PCs still supply the USB ports with power even when it is turned off.

**Important note:** PEAK-System Technik GmbH does not give guarantee on damages which have resulted from application of the option described in this section.

## Procedure:

1. In order to access the PCB, open the case of the PCAN-USB-Adapters by cautiously pushing in the latches on both sides (risk of breakage!), e.g. with a flat tip screwdriver.
2. Set the solder bridge on the PCB of PCAN-USB or PCAN-USB ISO according to the desired function. Figure 3 and Figure 4 show the corresponding positions on each PCB, the table below shows the possible configurations.

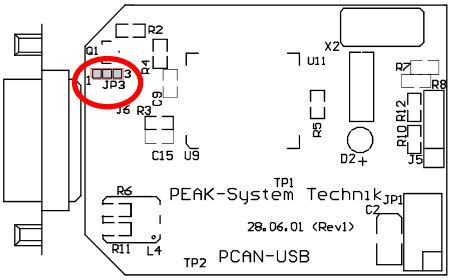


Figure 3: PCB PCAN-USB, JP3

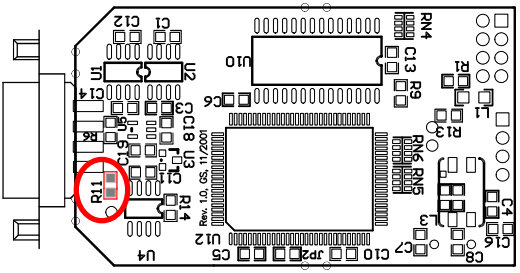


Figure 4: PCB PCAN-USB ISO, R11

| **5-Volt supply →** | **None** | **Pin 1** | **Pin 9** | **Pin 1 + Pin 9** |
|---|---|---|---|---|
| PCAN-USB, JP3 | 1 ▢▢▢ 3 | 1 ▢● 3 | 1 ●▢ 3 | 1 ●● 3 |
| PCAN-USB ISO, R11 | ▢<br>▢ | ●<br>▢ | -/- | -/- |

3. For reassembly place the PCB overhead onto the top part of the case. Make sure that the cable is lying with the strain relief in the cut-out of the case, and that the LED is placed in the corresponding hole.
4. Push the bottom part of the case onto the top part (the latches click in).

# 3 Operation

## 3.1 Status LED

PCAN-USB has a red hat status LED which may be in one of the following conditions (assumed that PCAN-USB is connected to a turned on PC):

- **Off**: There's no connection to a driver of the operating system.
- **On**: PCAN-USB is initialized. There's a connection to a driver of the operating system.
- **Slowly flashing**: A PCAN node (application in Windows) is connected to PCAN-USB.
- **Quickly flashing**: Data is transmitted via the connected CAN bus.

# 4 Software

## 4.1 Windows Software PCANView

The supplied Windows software PCANView is a simple CAN monitor.

### Installation

You can install PCANView by executing the file `PCAN_USB.exe` that you can find either on the supplied diskette or in the software package downloaded via the internet. Follow the instructions of the setup program.

### Program Start

In Windows' Start menu you can find the entry "PCAN-USB" under "Programs". From there you can execute the program PCANView.

A dialog for the selection of the CAN hardware as well as the setting of the CAN parameters appears after the program start.

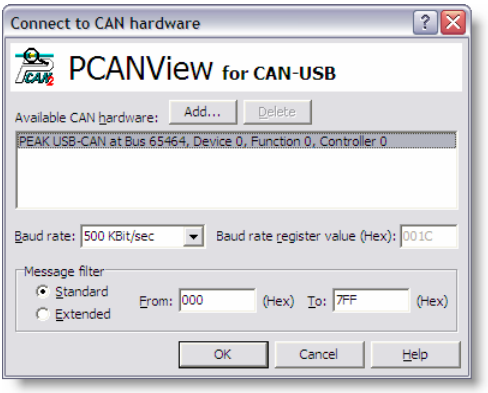


Figure 5: Selection of the CAN specific hardware and parameters

As a rule you can use the preset values and confirm the dialog box directly.

If you need further help after the program start, use the online help provided with the program (key [F1]).

## 4.2 Linking Own Programs with PCAN-Light

On the enclosed diskette you can find files in the directory `PCAN-Light`, that are provided for software development. They exclusively serve the linking of own programs to hardware by PEAK-System with the help of the installed device driver under Windows 98 SE/ME/2000/XP.

The directory `PCAN-Light` contains header files and examples to create own applications for the Light drivers. Please read the detailed documentation of the interface (API) in each header file.

**Tip:** You can find more information in the file `PCAN-USB.HLP` (Windows Help file) on diskette.

### Notes about the License

Device drivers, the interface DLL and further files needed for linking are property of the PEAK-System Technik GmbH (PEAK-System) and may be used only in connection with a hardware component purchased from PEAK-System or one of its partners. If a CAN hardware component of third party suppliers should be compatible to one of PEAK-System, then you are not allowed to use or to pass on the driver software of PEAK-System.

PEAK-System assumes no liability and no support for the PCAN-Light driver software and the necessary interface files. If third party suppliers develop software based on the PCAN Light driver and problems occur during use of this software, please, consult the software provider. To obtain development support, you need to own a PCAN Developer or PCAN Evaluation version.

# 5 Frequently Asked Questions (FAQ)

| Question | Answer |
|---|---|
| Why doesn't PCAN-USB have an integrated interface for **USB 2.0**? | The transfer rates defined by the USB 1.1 standard are sufficient for handling the upcoming data from the CAN traffic and additional management information. USB 1.1 devices also work on USB 2.0 interfaces. |
| The **data transfer** always **stops** after a short period of time, when a CAN application has been started (status LED shines continuously instead of blinking). | It may be that you use an older PCAN-USB adapter being connected to a PC with USB 2.0 interface. PEAK-System has a solution for this problem. Please contact us on this matter. |
| Does PCAN-USB also work with **DOS**? | No. DOS does not support the USB standard, and on the other hand PEAK-System doesn't provide a special driver. In order to have a CAN connection with DOS you may alternatively use PCAN-Dongle for connection to the parallel interface, for example. |

# 6 Technical Specifications

| | |
|---|---|
| **Supply** | |
| Supply voltage | +5 V DC (via USB port) |
| Current consumption | max. 200 mA |
| **Connectors** | |
| PC | USB plug type A |
| CAN | Sub-D (m), 9 pins<br>Pin assignment according to CiA recommendation DS 102-1<br>PCAN-USB ISO: galvanic isolation up to 500 V |
| **USB** | |
| Type | USB 1.1 |
| I/O address, IRQ | Automatically assigned by the PC |
| **CAN** | |
| Specification | ISO 11898<br>High-speed CAN (up to 1 MBit/s)<br>2.0A (standard format) and 2.0B (extended format) |
| Controller | Philips SJA1000T |
| Transceiver | Philips PCA82C251 |
| **Environment** | |
| Operating temperature | -40 – +85 °C<br>-40 – +185 °F |
| Storage temperature | -40 – +100 °C<br>-40 – +212 °F |
| Relative humidity | 15 – 90 %, not condensing |
| EMC | EN 50081-1:1992 (PCAN-USB only)<br>EN 50082-1:1997 (PCAN-USB only)<br>EN 50081-2:1993 (PCAN-USB only)<br>EN 61000-6-2:1999 (PCAN-USB only)<br>EN 61000-6-1:2001 (PCAN-USB ISO only)<br>EN 61000-6-2:2001 (PCAN-USB ISO only)<br>EN 61000-6-3:2001 (PCAN-USB ISO only)<br>EN 61000-6-4:2001 (PCAN-USB ISO only)<br>EC directive 89/336/EEC |

Continued on next page

| **Measures** | |
|---|---|
| Dimension (w/o cable) | PCAN-USB: about 75 x 43 x 22 mm (2 15/16 x 1 11/16 x 7/8 inches)<br>PCAN-USB ISO: about 87 x 43 x 22 mm (3 7/16 x 1 11/16 x 7/8 inches) |
| Weight | max. 70 g (2.5 oz.) |

Design and specifications are subject to change without notice.

# Appendix A Certificates

## A.1 CE

PCAN-USB IPEH-002021
PEAK-System Technik GmbH

EC declaration of conformity

**Notes on the CE Symbol** CE

The following applies to the PCAN-USB product IPEH-002021.

**EC Directive**

This product fulfills the requirements of EC directive 89/336/EEC on "Electromagnetic Compatibility," and is designed for the following fields of application as per the CE marking:

| Field of Application | Requirement for Emitted Interference | Requirement for Noise Immunity |
|---|---|---|
| Residential, commercial and small businesses | EN 50081-1: 1992 | EN 50082-1: 1997 |
| Industrial | EN 50081-2: 1993 | EN 61000-6-2: 1999 |

**Declarations of Conformity**

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

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Signed this 18th day of July 2001

PCAN-USB IPEH-002022
PEAK-System Technik GmbH

EC declaration of conformity

**Notes on the CE Symbol** CE

The following applies to the PCAN-USB-ISO product IPEH-002022.

**EC Directive**

This product fulfills the requirements of EC directive 89/336/EEC on "Electromagnetic Compatibility," and is designed for the following fields of application as per the CE marking:

| Field of Application | Requirement for Emitted Interference | Requirement for Noise Immunity |
|---|---|---|
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Signed this 18th day of July 2001

# Appendix B Quick Reference

## Hardware and Driver Installation

During a Windows session connect PCAN-USB to an USB port. The driver installation procedure is automatically initiated under Windows. Use the supplied diskette. After the installation process is finished successfully the red LED is shining.

## Software installation and startup under Windows

Execute the installation program `PCAN-USB.exe` from the enclosed diskette.
Run the CAN monitor PCANView from the Windows Start menu as a sample application for accessing PCAN-USB. The preset parameters for initialization of PCAN-USB can be used without changes.

## HS-CAN connector (Sub-D, 9 pins)