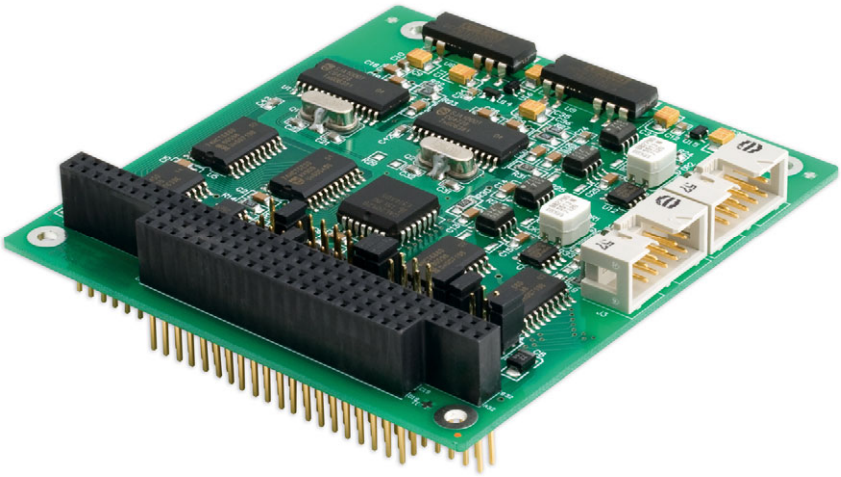
PCAN-PC/104

PC/104 to CAN Interface

User Manual



PEAK System

Products taken into account

Product Name	Model	Item Number
PCAN-PC/104 Single Channel	One CAN channel	IPEH-002054
PCAN-PC/104 Dual Channel	Two CAN channels	IPEH-002055
PCAN-PC/104 Single Channel opto-decoupled	One CAN channel, galvanic isolation for CAN connection	IPEH-002056
PCAN-PC/104 Dual Channel opto-decoupled	Two CAN channels, galvanic isolation for CAN connections	IPEH-002057

The cover picture shows the product PCAN-PC/104 Dual Channel opto-decoupled. Other product versions have an identical form factor but vary in equipment.

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1 Introduction

Tip: At the end of this manual (Appendix C) you can find a **Quick Reference** with brief information about the installation and operation of the PCAN-PC/104 card.

With the PCAN-PC/104 card you can connect a PC/104 or compatible computer directly to a CAN bus and therefore simply integrate the computer into a High-speed CAN network (HS-CAN).

With the opto-decoupled versions of the PCAN-PC/104 card an isolation of up to 500 V between the computer and the CAN parts of the card is achieved by use of a DC/DC converter and an optocoupler.

Note: This manual refers to different versions of the PCAN-PC/104 card (see also *Products taken into account* on page 2). Differences at use and at the technical specifications are mentioned accordingly in this manual.

1.1 Properties at a Glance

- PC/104 card (“stackthrough”) for the 16-bit ISA bus
- Support of interrupts IRQ3 – IRQ5, IRQ7, IRQ10 – IRQ12, IRQ15 (manual setup with jumpers)
- Shared interrupt possible for use with several cards or the Dual Channel version in a computer
- Connection of a High-speed CAN bus (two with the Dual Channel version), CAN specifications 2.0A and 2.0B
- Equipped with one or two CAN controllers SJA100T by Philips/NXP (independently configurable)

- CAN connection 9-pin D-Sub male, pin assignment according to CiA recommendation DS 102
- CAN transfer rate up to 1 MBit/s
- Galvanic isolation up to 500 V for the CAN interface (only opto-decoupled versions)
- Support for operating systems Windows (starting with 2000) and Linux

Note: This manual describes the use of the PCAN-PC/104 card with Windows. You can find device drivers for Linux and the corresponding information on PEAK-System's website under www.peak-system.com/linux.

1.2 System Requirements

The following prerequisites must be given, so that the PCAN-PC/104 card can be used properly:

- PC/104-ISA port (16 Bit) in the computer
- Operating system Windows (Vista, XP SP2, 2000 SP4) or Linux

1.3 Scope of Supply

The scope of supply normally consists of the following parts:

- PCAN-PC/104 card
- Slot bracket with one or two CAN D-Sub connectors including cables to the PCAN-PC/104 card
- CD-ROM with software (drivers, utilities), programming examples, and documentation

2 Hardware Installation

2.1 Configuring the PCAN-PC/104 Card

Before you install the PCAN-PC/104 card into the computer you may need to configure it. For each CAN channel an interrupt (IRQ) and an I/O address range is set for operation in the computer.

At delivery the PCAN-PC/104 card has the following default settings:

CAN Channel	IRQ	I/O Address Range	Remark
1	10	300h – 31Fh	
2	5	320h – 33Fh	Only at the Dual Channel version

Tip: If the given resources are not firmly occupied by other devices, you can skip the configuration and directly continue with the following manual section 2.2.

For a configuration differing from the default settings you need to set jumpers on the PCAN-PC/104 PCB according to the following explanations.

Interrupt

An interrupt (IRQ) must be assigned to each CAN channel. This is done with a single jumper on jumper field JP1 for CAN channel 1 and jumper field JP2 for CAN channel 2 (latter only with the Dual Channel version). The PCAN-PC/104 card supports the interrupts 3, 4, 5, 7, 10, 11, 12, and 15. The default setting at delivery for CAN channel 1 is interrupt 10, for CAN channel 2 interrupt 5.

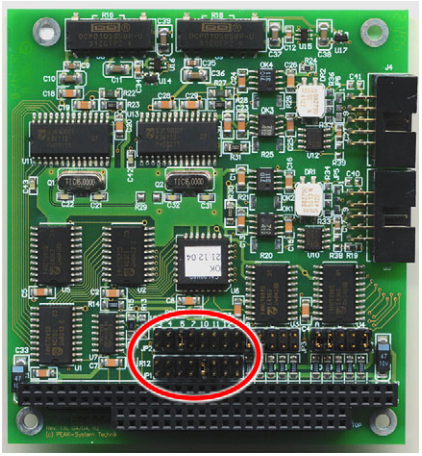


Figure 1: Position of the jumper fields for setting the interrupts,
JP1 for CAN channel 1 (lower jumper field),
JP2 for CAN channel 2 (upper jumper field,
Dual Channel version only)

It is possible to share the same interrupt between two existing CAN channels. Therefore you can configure the same interrupt, when using two PCAN-PC/104 cards in the same computer.

Tip: We suggest to configure different interrupts as long as resources allow it and use interrupt sharing only, if this is not the case.

I/O Address Range

Each CAN channel must be assigned to an unique I/O address range in the computer. An address space from 200h up to 39Fh and 3E0h to 3FFh (h = hexadecimal) is available. PCAN-PC/104 uses 32 addresses beginning from the configured base address. The configuration is done on jumper field JP3 for CAN channel 1 and jumper field JP4 for CAN channel 2 (latter only with the Dual Channel version). One or several jumpers are needed for each jumper field.

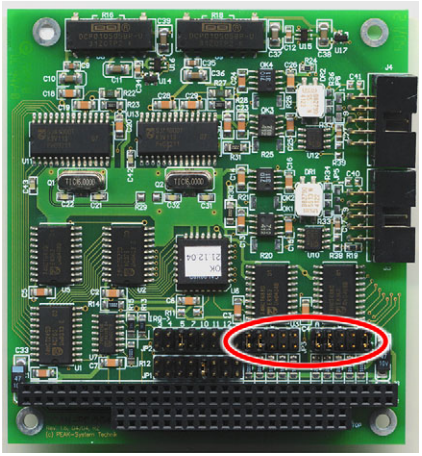


Figure 2: Position of the jumper fields for setting the I/O base addresses,
JP3 for CAN channel 1 (left jumper field),
JP4 for CAN channel 2 (right jumper field, Dual Channel version only)

The following table shows the possible settings. The X stands for a set jumper. The default settings at delivery for CAN channels 1 and 2 are highlighted.

Jumper field JP3/JP4					I/O address range
A	B	C	D	E	
X					200h – 21Fh
X				X	220h – 23Fh
X			X		240h – 25Fh
X			X	X	260h – 27Fh
X		X			280h – 29Fh
X		X		X	2A0h – 2BFh
X		X	X		2C0h – 2DFh
X		X	X	X	2E0h – 2FFh
X	X				300h – 31Fh
X	X			X	320h – 33Fh
X	X		X		340h – 35Fh

Continued on the next page

Jumper field JP3/JP4					I/O address range
A	B	C	D	E	
X	X		X	X	360h – 37Fh
X	X	X			380h – 39Fh
X	X	X	X	X	3E0h – 3FFh

2.2 Installation into the Computer

Do the following to install the PCAN-PC/104 card into the computer:

1. Make sure that the computer is turned off (power switch at the computer's supply unit).
2. Plug the PCAN-PC/104 card onto a PC/104 connector. For details please refer to the documentation of the computer.
3. Interconnect the connector for each CAN channel on the PCAN-PC/104 card (see Figure 3) with the CAN connector of the slot bracket using the attached flat cable.

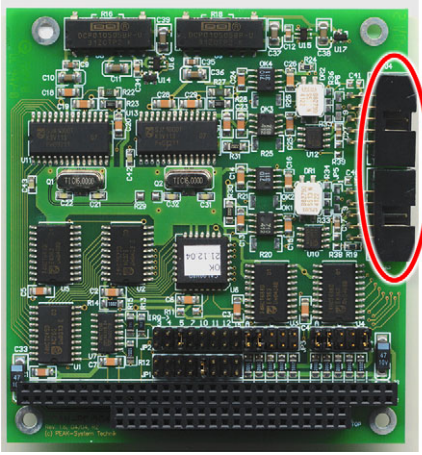


Figure 3: Connectors for the flat cables to the CAN connectors,
J3 for CAN channel one (lower position),
J4 for CAN channel 2 (upper position, Dual Channel version only)

4. Close the computer's casing.

Note: Before switching on the computer, please follow the procedure for modifying the computer's BIOS settings described in the following section.

2.3 Modifying the Computer's BIOS Settings

To ensure a flawless operation of the PCAN-PC/104 card it is necessary that you indicate the used interrupt(s) in the BIOS setup of the computer. You avoid that the corresponding resources are automatically assigned to other devices and resulting conflicts.

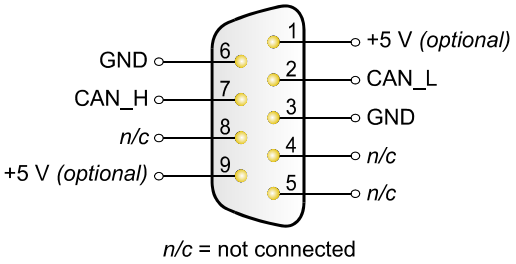
Note: Due to a diversity of existing BIOS setup versions for computers we cannot give detailed instructions here. Instead we indicate common setting names.

In order to know how to start the computer's BIOS setup please consult the corresponding documentation. Usually you can enter the BIOS setup by pressing the key [Del] or [F2] shortly after switching on the computer.

In the BIOS setup itself you can often find the settings for the interrupts under a menu item containing the text “PnP”. For the interrupt(s) used by PCAN-PC/104 change the setting to “Reserved” or “Legacy ISA”.

2.4 Connecting a CAN Bus

A High-speed CAN bus (ISO 11898-2) is connected to one of the 9-pin D-Sub ports of the slot bracket. The pin assignment corresponds to the CiA recommendation DS 102-1.



n/c = not connected

Figure 4: Pin assignment HS-CAN
(view onto connector of the slot bracket)

The pin assignment between the D-Sub port and the 10-pin connector on the PCAN-PC/104 card is as follows:

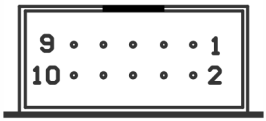


Figure 5: Numbering at the 10-pin connector

Pin	Assignment	Assignment D-Sub
1	+5 V (optional)	1
2	GND	6
3	CAN_L	2
4	CAN_H	7
5	GND	3
6	not connected	8
7	not connected	4
8	+5 V (optional)	9
9	not connected	5
10	not connected	

2.5 5-Volt Supply at the CAN Connector

You can route a 5-Volt supply to pin 1 and/or pin 9 of the CAN connector (independently for each CAN connector on the Dual Channel version) by setting solder bridges on the PCAN-PC/104 card. Thus devices with low power consumption (external transceivers or optocouplers, for example) can be directly supplied via the CAN connector.

When using this option the 5-Volt supply is connected to the power supply of the computer and is not fused separately. The opto-

decoupled versions of the card contain an interconnected DC/DC converter. Therefore the current output is limited to about 50 mA.

Attention! At this procedure special care is indispensable, since there is a short circuit danger. The PCAN-PC/104 card could be destroyed and/or the power supply or electronics of the computer 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-PC/104 card while the computer is de-energized.

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

Set the solder bridges on the PCAN-PC/104 card according to the desired settings. Figure 6 shows the positions on the card; the table below contains the possible settings.

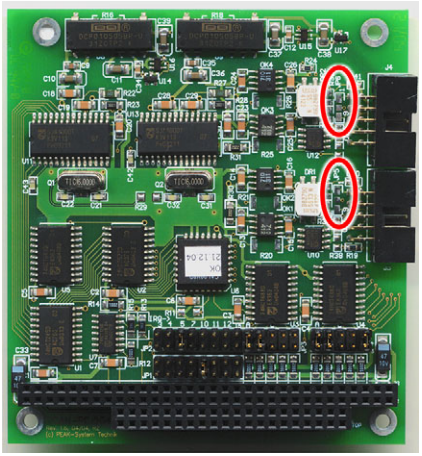


Figure 6: Position of the solder bridge fields for the 5-Volt supply
(JP5 lower position, JP6 upper position)

5-Volt supply →	**None**	**Pin 1**	**Pin 9**	**Pin 1 + Pin 9**
JP5 (CAN channel 1) / JP6 (CAN channel 2)				

3 Software Setup

Under Windows a driver is needed that can access the PCAN-PC/104 card and that provides the interface for Windows applications. Beside the mentioned device driver the CAN monitor PCAN-View for Windows can also set up.

Do the following to setup the driver and, if applicable, additional software:

1. Please make sure that you are logged in as user with administrator privileges (not needed for normal use of the PCAN-PC/104 card later on).
2. Insert the supplied CD-ROM into a drive of the computer. Usually a navigation program appears a few moments later. If not, start the file `Intro.exe` from the root directory of the CD-ROM.
3. Navigate through the menus to the driver installation for the PCAN-PC/104 card (**English** > **Drivers** > **PCAN-PC/104**). Click on **Install now** afterwards. The setup program for the driver is executed. Under Windows Vista you may need to confirm the note about the execution with elevated rights.
4. Follow the instructions of the setup program.

4 Software

This chapter deals with the provided software and the software interface to the PCAN-PC/104 card.

4.1 PCAN-View for Windows

PCAN-View for Windows is a simple CAN monitor for viewing and transmitting CAN messages.

Installation

You can install the application optionally during the driver setup procedure (see also chapter 3 *Software Setup* on page 15).

Program Start

In the Start menu of the Windows desktop you can find the entry "PCAN Hardware". From there you can execute the program PCAN-View.

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

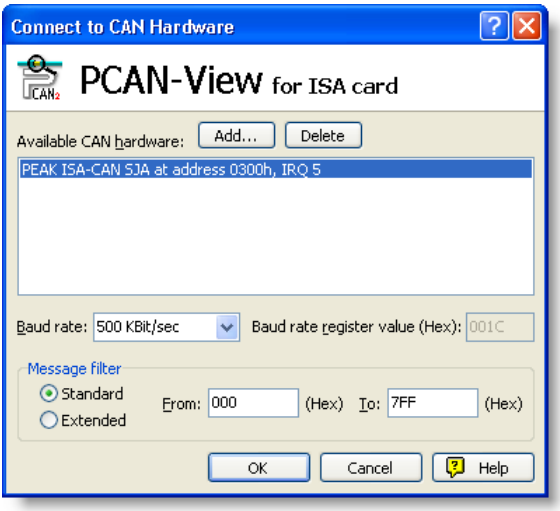


Figure 7: Selection of the CAN specific parameters

If **no entry** is in the list "Available CAN hardware" (for example at the first program start), you need to add one:

1. Press the button **Add**. The dialog box "Add CAN hardware" appears.
2. Select the connected hardware and the operating mode from the list "Type of CAN hardware".

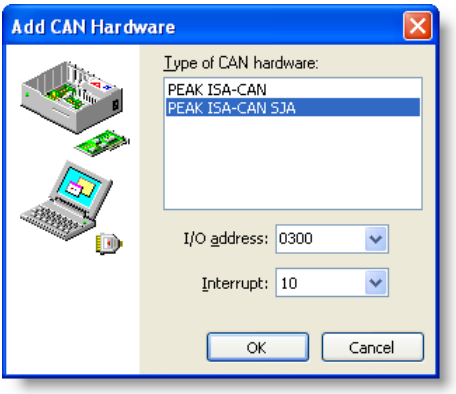


Figure 8: Selection of hardware resources

3. Enter the I/O base address and the interrupt set on the PCAN-PC/104 card (see section 2.1 *Configuring the PCAN-PC/104 Card* on page 6).
4. Confirm your input with **OK**.

In the dialog box “Connect to CAN hardware” you may make **further settings** (baud rate and CAN message filter) for the created hardware entry.

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 supplied CD-ROM you can find files that are provided for software development. You can access them with the navigation program (button **Programming**). The files exclusively serve the linking of own programs to hardware by PEAK-System with the help of the installed device driver under Windows.

Further more the CD-ROM contains header files and examples for creating own applications in conjunction with the PCAN-Light drivers. Please read the detailed documentation of the interface (API) in each header file.

Tip: You can find further information in the file `PCANLight_enu.chm` (Windows Help file) on the CD-ROM.

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
Can I use **several PCAN-PC/104 cards** in the same computer?	Yes. When there's a lack of resources it is possible to share the same interrupt between CAN channels. However, consider that an unique I/O address range is assigned to each CAN channel.

6 Technical Specifications

Connectors	
PC/104	ISA bus with 8 MHz clock rate, 16 bit bus width
CAN	D-Sub (m), 9 pins Pin assignment according to CiA recommendation DS 102-1 Opto-decoupled versions: galvanic isolation up to 500 V (separate for each CAN channel)

CAN	
Specification	ISO 11898-2 High-speed CAN (up to 1 MBit/s) 2.0A (standard format) and 2.0B (extended format)
Controller	max. 2 Philips SJA1000T
Transceiver	max. 2 Philips PCA82C251

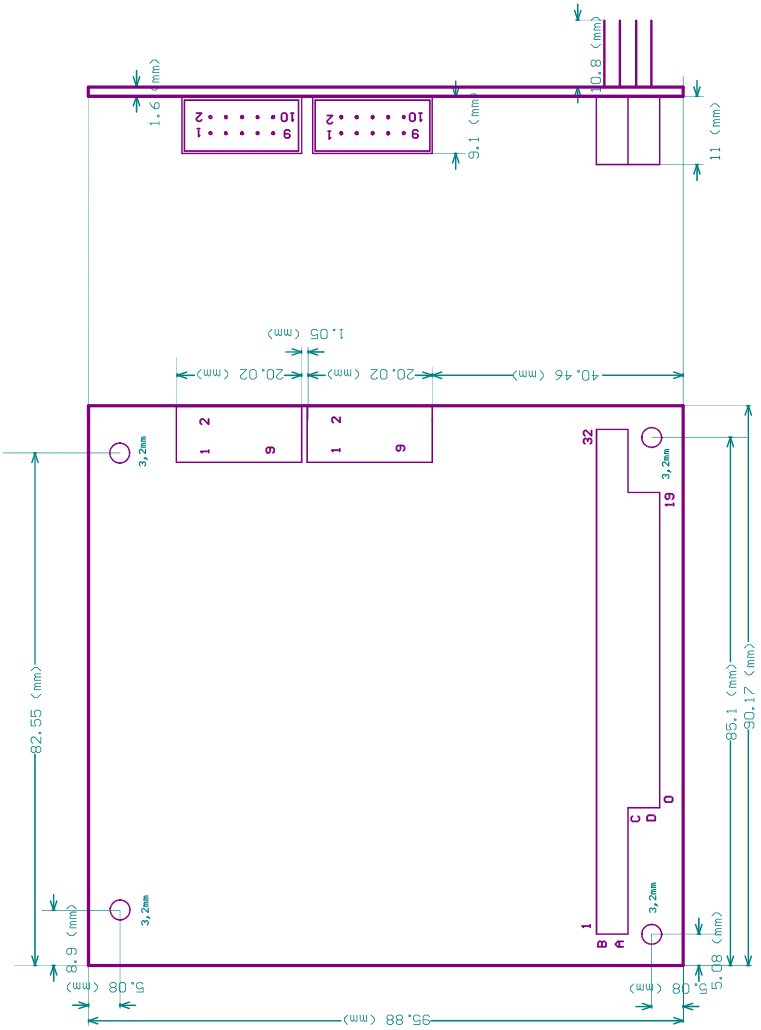
Supply		
Current consumption	PCAN-PC/104 Single Channel: PCAN-PC/104 Dual Channel: PCAN-PC/104 Single Channel opto-dec.: PCAN-PC/104 Dual Channel opto-dec.:	max. 150 mA max. 170 mA max. 210 mA max. 270 mA

Environment	
Operating temperature	-40 – +85 °C (-40 – +185 °F)
Temperature for storage and transport	-40 – +125 °C (-40 – +257 °F)
Relative humidity	15 – 90 %, not condensing
EMC	EN 50081-1:1992 EN 50082-1:1997 EN 50081-2:1993 EN 61000-6-2:1999 EC directive 89/336/EEC

Continued on the next page

Measures	
Size	96 x 91 x 24 mm (3 3/4 x 3 9/16 x 15/16 inches) (see also dimension drawing Appendix A on page 23)
Weight	PCAN-PC/104 Single Channel: 57 g (2.01 oz.) PCAN-PC/104 Dual Channel: 63 g (2.22 oz.) PCAN-PC/104 Single Channel opto-dec.: 59 g (2.08 oz.) PCAN-PC/104 Dual Channel opto-dec.: 65 g (2.29 oz.)

Appendix A Dimension Drawing



The figure's size doesn't correspond to the original size of the PCAN-PC/104 card.

Appendix B Certificates

B.1 CE

PCAN-PC/104 IPEH-002054/55/56/57 EC declaration of conformity
PEAK-System Technik GmbH

Notes on the CE Symbol CE

The following applies to the PCAN-PC/104 products IPEH-002054/55/56/57

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 61000-6-3: 2001	EN 61000-6-1: 2001
Industrial	EN 61000-6-4: 2001	EN 61000-6-2: 2001

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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Mr. Wilhelm
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D-64293 Darmstadt
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phone: +49 6151 81 73-20
fax.: +49 6151 81 73-29
info@peak-system.com

Signed this 10th day of June 2004

Appendix C Quick Reference

Default setting at delivery

CAN Channel	IRQ	I/O Address Range	Remark
1	10	300h – 31Fh	
2	5	320h – 33Fh	Only at the Dual Channel version

Hardware Installation / Configuring the Computer

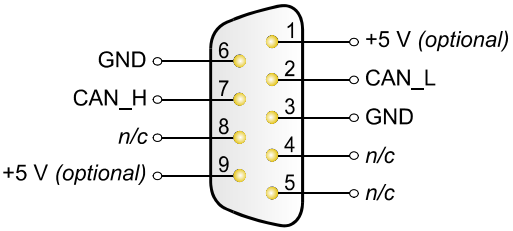
Plug the PCAN-PC/104 card onto the PC/104 stack of the switched off computer. After switching on the computer enter the BIOS setup. In the PnP table mark the interrupts used by the PCAN-PC/104 card as reserved.

Software setup and startup under Windows

Execute the driver installation program from the supplied CD-ROM.

Run the CAN monitor PCAN-View from the Windows Start menu as a sample application for accessing the PCAN-PC/104 card. Indicate the needed parameters for initialization of the card (I/O base address, interrupt) and select the desired CAN channel, when using the Dual Channel version.

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



n/c = not connected