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# **CAN-USB adapter**

link between CAN and USB

(User's Manual)

Version 1.0

**CB-USB-01001/01002**

refers to product revision no.  
V 1.0

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## Conventions

If numbers are specified in this manual, they will be either decimal or hexadecimal. We use C-notation to identify hexadecimal numbers (the 0x prefix).

Some parts of the text are really important. These are visually marked with the following signs:



Indicates information that, when not fully understood or followed, might cause permanent damage to the system. You should not start using the product before you have read this information.



Indicates information that we think you should have read to save your time by avoiding problems. Important suggestions that should be followed will also be marked with this sign.

## Acronyms and Abbreviations

EMC	Electromagnetic capability.
ESD	Electrostatic discharge.
FLASH	Electrically erasable PROM. Capable of in-circuit re-programming with the capability of erasing considerably large blocks (in contrast to EEPROM).
USB	Universal Serial Bus
OS	Operating System (e.g. Windows 2000/XP, Linux, QNX, VxWorks,...)
API	Application Programming Interface
SDK	Software development kit

## Product Options

The CAN-USB is available in different versions:

Ordering-no.	Type
CB-USB-01001	CAN-USB interface with isolated CAN
CB-USB-01002	CAN-USB interface without isolated CAN

table 1: CAN-USB versions

# 1 Introduction



With the CAN-USB adapter it is an easy way to connect a CAN network to a Personal computer or Notebook computer with USB port. Due to the Plug 'n Play feature of the USB port, the CAN-USB adapter can be connected and disconnected to the computer system without leaving running applications and restarting the system (except of the very first installation of the software drivers). The software driver supplies an API to the user, which is mostly identical to other CAN APIs from JANZ.

## 1.1 Features

### 1.1.1 Hardware

- embedded design using a powerful 16MHz RISC processor
- 64kB SRAM (used for message buffering and extended message filtering)
- USB 1.1 interface (also compatible to USB 2.0)
- four LEDs for status indication
- industrial standard SJA1000 CAN controller
- optical decoupled CAN interface (non decoupled CAN interface optional on request)
- software switchable CAN bus termination
- CAN bitrates up to 1MBit/s supported
- USB- and CAN-message buffers
- 9pol DSUB male connector for CAN
- Type B connector for standard USB cable
- in field firmware updates possible
- very small housing (53 x 55 x 20 mm)

### 1.1.2 Firmware

The firmware is that piece of software which runs on the device's RISC microcontroller (not on the user PC) and has the following main features:

- 11 bit and 29 bit identifiers are supported

- user configurable extended acceptance filtering
- configurable synchronisation message generation (a message which will be send periodically within a user configurable time interval)
- queue buffer with different priorities for outgoing CAN messages
- queue buffer for incoming messages
- integrated bootloader for in field firmware updates
- error and status reporting, busload counters
- sniffing mode
- Self test mode

### 1.1.3 Software

- Driver support for Windows 2000/XP™ (and Linux)
- free CANlook2 lite for Windows™ on the Software driver CD-ROM
- a SDK is also available on request. Please contact JANZ for more information.

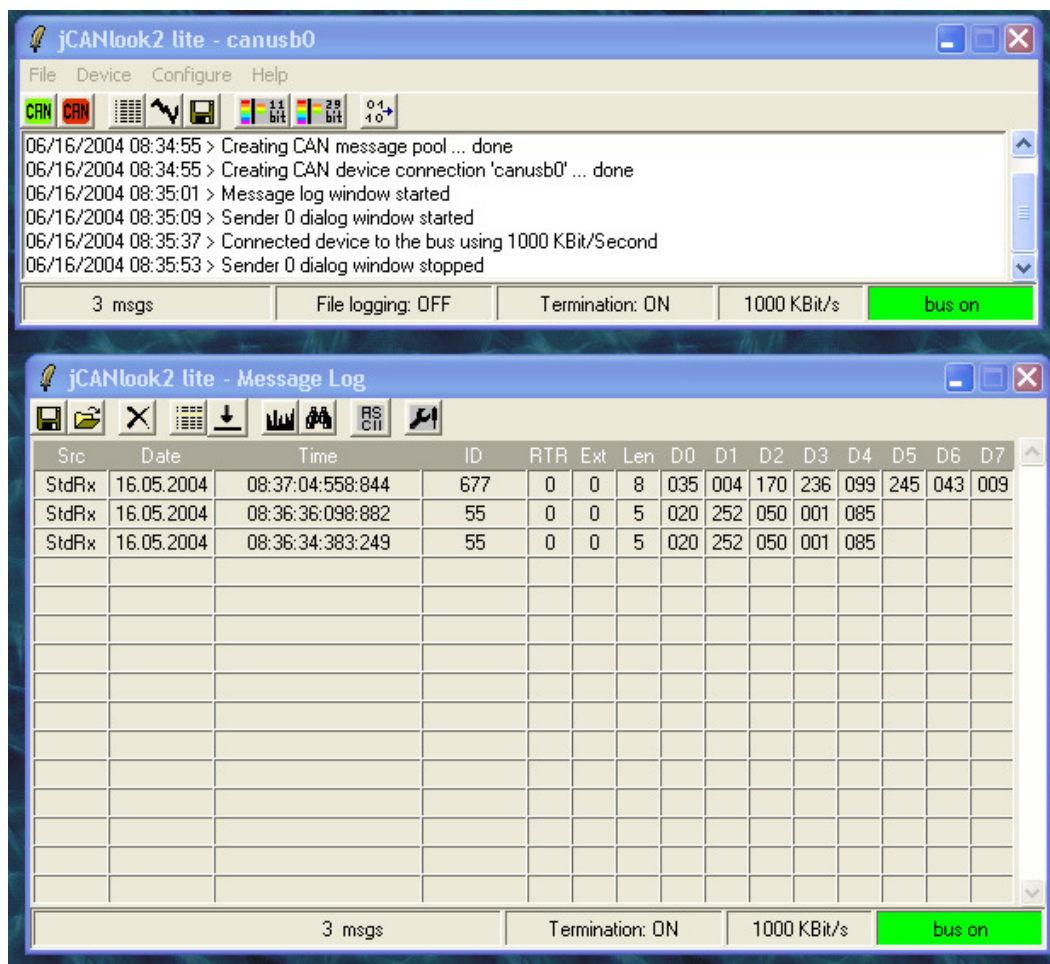


figure 1: CANlook2 sample session

## 1.2 Functional Overview

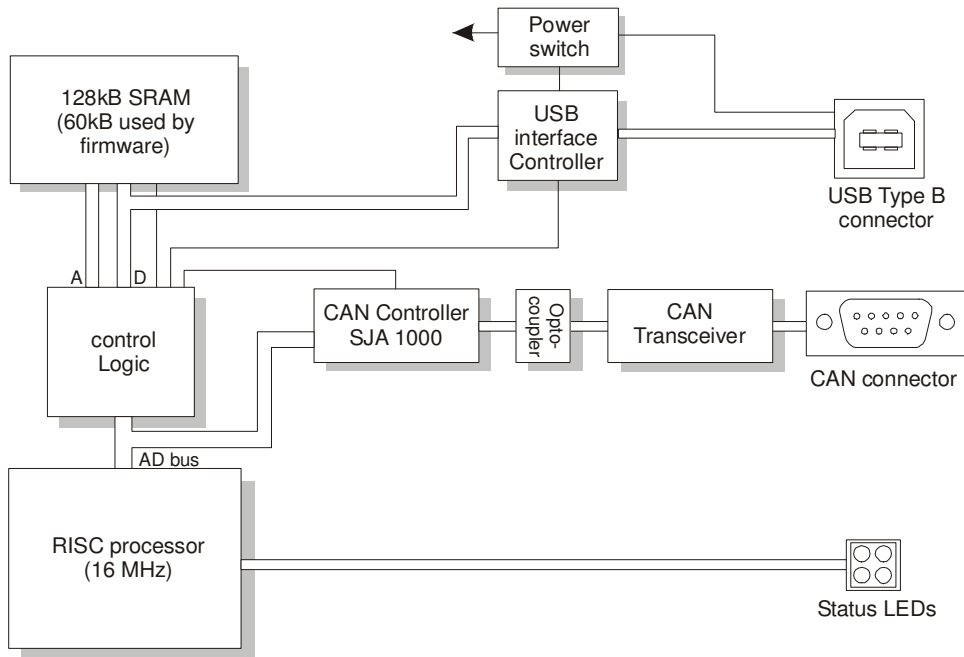


figure 2: CAN-USB block diagram (opt. decoupled version)

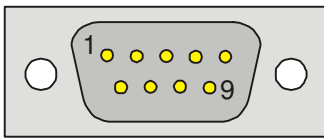
## 2 hardware description

When opening the shipping package of the CAN-USB device, you should immediately check the contents of the package:

- 1) CAN-USB interface
- 2) USB Cable (Type A --> Type B)
- 3) Software Driver CD-ROM

### 2.1 Front Panel

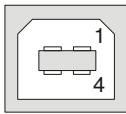
#### 2.1.1 CAN connector



1	n.c.	6	ext. GND
2	CAN_L	7	CAN_H
3	ext. GND	8	n.c.
4	n.c.	9	n.c.
5	n.c.		

table 2: CAN connector

#### 2.1.2 USB connector



1	V <sub>BUS</sub>
2	D-
3	D+
4	GND

table 3: USB connector

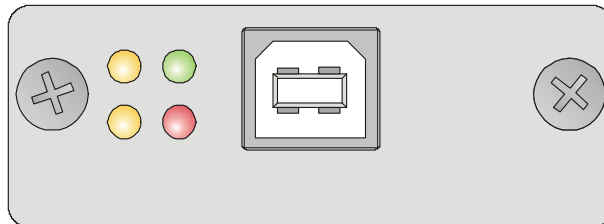
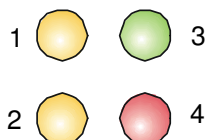


figure 3: front panel with USB connector and status LEDs

#### 2.1.3 Status LEDs



1	Bus On
2	CAN bus activity
3	Power On / Bootloader
4	Error, buffer overrun

table 4: frontpanel status LEDs

- 1) Bus On LED  
This LED shows the status of the SJA1000 CAN controller.  
LED off: controller is in RESET-mode

- LED on: Bus on state
- 2) CAN bus activity  
This LED flashes on incoming and outgoing CAN messages. It flashes even then, if incoming CAN messages are rejected by the enhanced message filter. The LED does not flash, if messages are rejected by the SJA's hardware message filter.  
This LED is also used by the bootloader during a firmware update.
  - 3) Power On LED  
If the green LED is lit, the CAN-USB interface is working. That includes also a successful enumeration of the host computer. If the host computer does not recognise the CAN-USB device or the software drivers are not installed, this LED will stay off.  
To indicate that the CAN-USB device has entered the bootloader mode for firmware update, this LED is pulsating.
  - 4) Error LED  
If the red LED is lit, either the USB-to-CAN tx-queue or the CAN-to USB rx-queue is full. That means that messages could get lost. This can happen for example, if the host computer is not able to handle more incoming messages or the CAN recipient is in bus off state.  
If is LED is lit immediately after plugging in the device, the power on self test has detected an internal hardware error. The device may not be fully functional and should be returned to the manufacturer.

### 3 Installation



The use of bus powered USB hubs is not recommended. Connect the CAN-USB device directly to your host PC or to a self powered USB hub (with an AC power supply).  
Note that USB extension cables can also cause unstable behaviour.

When connecting the CAN-USB device to your PC, a new hardware device will be recognised by the OS. The following steps for getting started with the CAN-USB device depend on the kind of OS your are using.

#### 3.1 Windows 2000/XP

The device driver installation for Microsoft Windows 2000/XP operating systems will be initiated automatically by the system after the device was connected with the USB port. The operating system will request you for an appropriate device driver. Please let the system search for this driver on the CD-ROM delivered with the device.

A device driver and a corresponding library will be installed as well as also a small background application which enables the Janz CANlook2 analyser tool to get access to the device. This background process is the reason, why the operating system needs to be rebooted after installation! During reboot the driver is loaded and the background process is started.

The CD-ROM delivered with the device also contains documents which describe the Janz CANlook2 analyser tool installation in more detail.

#### 3.2 Linux

Will be available soon...

## 4 Appendices

### 4.1 Technical Data

<b>CPU</b>	Atmel ATmega 64/128 RISC microcontroller	
<b>Memory</b>	SRAM 4kB (MCU internal) + 60kB (external, latched) FLASH: 64kB (ATmega64), 128kB (ATmega128)	
<b>Clock</b>	16MHz (MCU and SJA1000)	
<b>Status indication</b>	4 frontpanel LEDs	
<b>CAN</b>	front panel D-SUB male connector (according to CiA DS-102) Controller: SJA 1000 ISO/DIS 11898, opto-isolated (500V) software switchable bus line termination (120 Ohms)	
<b>USB</b>	front panel USB type B receptable Controller: FTDI FT245BM	
<b>USB-IDs</b>	Vendor ID: 0x0403, Device ID: 0xEBD0	
<b>power requirements</b>	USB bus powered device, USB high power device is reported to the host PC (500mA)	
	<b><i>DC power supply voltage (USB)</i></b>	<b><i>power supply current</i></b>
	4.75V – 5.25V	operating: max. 170mA
		USB stand-by: 200uA

## 4.2 References

SJA1000 Stand-alone CAN controller data sheet

Philips Semiconductor, 2000 Jan 04

### WWW-References

Janz Automationssysteme AG:

[www.janz.de](http://www.janz.de)

Atmel Corporation:

[www.atmel.com](http://www.atmel.com)

Future Technology Devices International Ltd

[www.ftdichip.com](http://www.ftdichip.com)

Tcl/Tk environment (needed for Janz CANlook2 analyser tool)

[www.tcl.tk](http://www.tcl.tk)

## 4.3 Product History

Note that changes in the major version number are related to a PCB redesign. Though, PCB redesign need not be related to functional changes, but might have been done for manufacturing purposes only.

Version	Release Date	Name	Changes
V0.9	09.02.2004	hr	<ul style="list-style-type: none"> <li>released for internal software development</li> </ul>
V1.0	03.05.2004	hr	<ul style="list-style-type: none"> <li>initial version</li> </ul>

## 4.4 Manual History

Version	Release Date	Name	Changes
V1.0	17.05.2004	hr	<ul style="list-style-type: none"> <li>initial version</li> </ul>