

# PCAN-B1001S

Bus Converter High-speed CAN  
to Truck Trailer CAN

## User Manual



Document version 2.1.1 (2017-02-10)

**PEAK**  
System

## Relevant products

Product Name	Model	Part number
PCAN-B10011S		IPEH-002041

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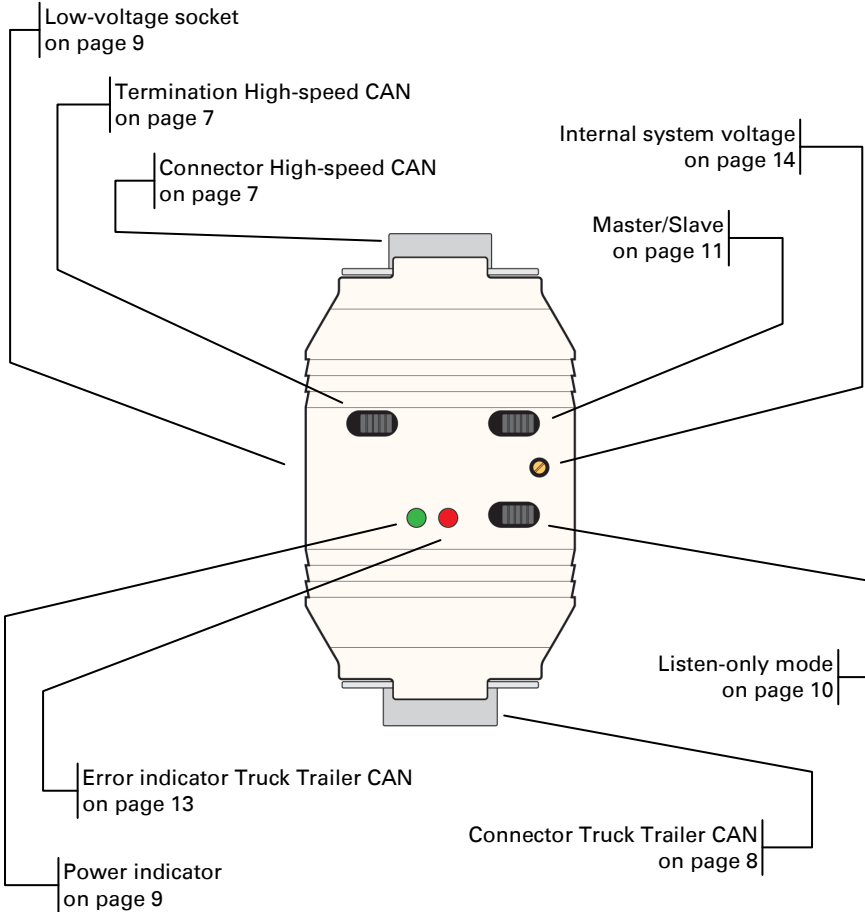
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# Module Elements



# 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-B10011S.

The PCAN-B10011S bus converter establishes a connection between a high-speed CAN bus (ISO 11898-2) and a Truck Trailer CAN bus (ISO 11992-1). One of the most important potential applications of the bus converter is a simple connection between a PEAK CAN interface (e.g. PCAN-USB) and a Truck Trailer CAN bus.

Truck-Trailer CAN is a communication connection used between a towcar and its trailers. The special conditions of this environment are taken into account, like long wires, high levels of disturbance, high voltage deviation, and a small amount of data.

A Truck Trailer CAN bus has at least two nodes. The connection is done with a two-wire line. The power supply may be done locally or via the cable from the towcar, where the reference point is the bodywork. Bodyworks from the towcar and the trailer are connected with each other. Due to this configuration there are potential differences and disturbances Truck Trailer CAN is optimized for.

## 1.1 Properties at a Glance

- Direct connection to a High-speed CAN bus through a D-Sub connector, 9-pin with switchable termination
- Direct connection of the Truck Trailer CAN bus through a D-Sub connector, 9-pin with switchable termination (master/slave mode)
- Normal or listen-only operating mode

- └ Bit rates up to 125 kbit/s (limited by input filter)
- └ Power supply via the Truck Trailer CAN bus or self-sufficient with power supply unit
- └ Adjustable Truck Trailer system voltage (11 - 26 V) for power through mains power pack
- └ Status display for power supply and error states via LEDs
- └ Extended operating temperature range from -40 to +85 °C (-40 to +185 °F)

## 1.2 System Requirements

- └ Voltage supply (usually 24 V DC) via the Truck Trailer CAN connector (see section 2 *Installation* on page 7)  
- or -  
Voltage supply with the delivered power supply unit

## 1.3 Scope of Supply

- └ Adapter in plastic casing
- └ Power supply unit
- └ Manual in PDF format

## 2 Installation

### 2.1 Connector High-speed CAN Side

The PCAN-B10011S is designed for direct connection to a CAN interface of the PCAN series (e.g. PCAN-USB). The pin assignment corresponds to the specification CiA® 303-1.

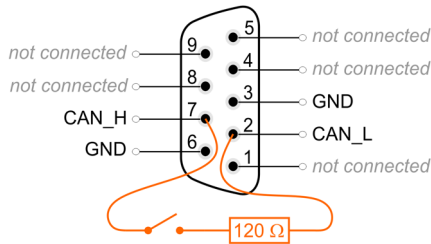


Figure 1: Pin assignment of the High-speed CAN connector

Between the lines CAN\_L and CAN\_H a switchable **termination** with a resistance of 120 Ω is installed internally. If the PCAN-B10011S shall not be connected directly to a CAN interface of the PCAN series and shall not become the endpoint of a High-speed CAN bus, the termination can be set inoperable with the corresponding slide switch (see figure and table).

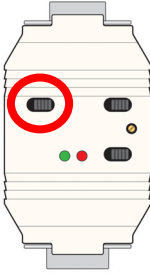


Figure 2: Switch for High-speed CAN termination

Termination High-speed CAN	Switch position
120 $\Omega$	left
none	right

## 2.2 Connector Truck Trailer CAN Side

For the connection of the Truck Trailer CAN bus a 9-pin **male** D-Sub port is used.

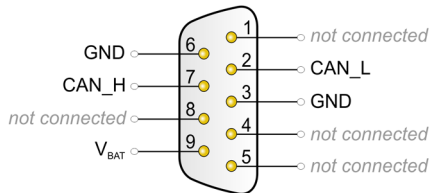


Figure 3: Pin assignment of the Truck Trailer CAN connector

Optionally the voltage supply of the PCAN-B10011S can be done via  $V_{BAT}$  (pin 9) (see following section).



## 2.3 Power Supply

The PCAN-B10011S can be supplied either via the Truck Trailer CAN connector ( $V_{\text{BAT}}$ , pin 9) or independently via the low-voltage socket (e.g. with the power supply unit). The DC voltage should be 24 Volts.

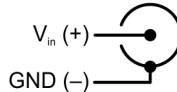


Figure 4: Contact assignment of the low-voltage socket

**Note:** A simultaneous connection of both supply ways isn't problematic, because the power supply with the higher voltage (usually the one of the power supply unit) is used automatically because of the circuit design. It is ensured that current cannot flow from one power supply to the other.

In principle higher or lower input voltages than 24 V may be applied (8 – 30 V). However, communication errors may occur at high potential differences to system voltages of other Truck Trailer CAN nodes. You can find hints for solving those problems in section 4.2 *Adjusting the Internal System Voltage* on page 14.

The **green LED** on the casing of the PCAN-B10011S indicates an existing power supply.

## 3 Operation

When putting the PCAN-B10011S into operation, please observe the following sections.

### 3.1 CAN Bit Rate

When operating the PCAN-B10011S, it must be ensured that the bit rate on the High-speed CAN bus matches the one on the Truck Trailer CAN bus. No conversion or automatic adaptation of the bit rate is done in the bus converter.

The maximum bit rate is 125 kbit/s (limited by input filter).

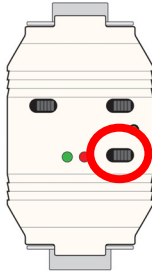
### 3.2 Listen-only Mode

During the active operation mode (normal case) the PCAN-B10011S can both receive as well as transmit on the Truck Trailer CAN side. For monitoring the CAN traffic without affecting it the setting for the passive operation is applicable (listen-only mode). In this case the transmission unit of the PCAN-B10011S is disconnected from the Truck Trailer CAN. Also the acknowledgement signal (ACK bit) typically used by CAN is not transmitted.



**Note:** For a simple point-to-point connection between two nodes both must be able to receive and transmit. Therefore only the active operation works in this case.

The listen-only mode is set with the corresponding slide switch (see figure and table).



Operation mode	Switch position
Normal	right
Listen-only	left

Figure 5: Switch for listen-only mode

### 3.3 Master/Slave

At least one node must be configured as master on a Truck Trailer CAN bus. The master determines the signal levels for communication on the bus. Further nodes on the bus being configured as slaves automatically adapt to the given signal levels and are then able to transmit, too.

In principle, several nodes may operate as master. If, however, the signal levels of the masters differ due to different battery voltages or potentials, communication errors may occur.

The system voltage of the PCAN-B10011S can be adjusted when supplied by the power supply unit. See section 4.2 *Adjusting the Internal System Voltage* on page 14.

The selection between master and slave operation is done with the corresponding slide switch (see figure and table).



Operation mode	Switch position
Master	left
Slave	right

Figure 6: Switch for Master/Slave

## 4 Communication Problems

This section is dealing with the detection of communication problems and the possibilities of adjustments and settings for the PCAN-B10011S to analyze those problems and solve them.



**Tip:** You can find additional information about the properties and the behavior of the Truck Trailer CAN transceiver B10011S in the corresponding data sheet, which you can download from the Atmel website ([www.atmel.com](http://www.atmel.com)).

### 4.1 Red LED “Error”

The red LED indicates the state of the error output of the Truck Trailer CAN transceiver. This output is active for the following error conditions on the Truck Trailer CAN side:

- └ Interrupt on CAN\_H
- └ Interrupt on CAN\_L
- └ Short circuit between CAN\_H and GND
- └ Short circuit between CAN\_H and VCC
- └ Short circuit between CAN\_L and GND
- └ Short circuit between CAN\_L and VCC
- └ Transient disturbance caused by an overvoltage pulse between CAN\_L and CAN\_H (e.g. when switching an inductive load)

## 4.2 Adjusting the Internal System Voltage

Due to differences in the potentials between parts of bodyworks or differences of system voltages of the nodes a communication may be detected as faulty or the communication may be impossible at all. When the PCAN-B10011S is supplied via the low-voltage socket, you have the possibility to adjust the internal system voltage to the conditions on the bus (usually by decreasing the voltage). This is done with the trimmer.

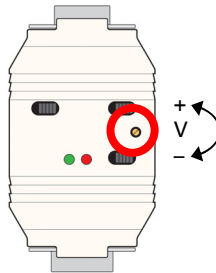




Figure 7: Trimmer for system voltage

At delivery the trimmer is pre-adjusted so that the internal system voltage is 24 V when using the provided power supply unit. The voltage can be varied in the range of about 11 to 26 V.

 **Note:** Before adjusting the internal system voltage, make sure that the occurring communication problems are not an effect of short circuits or line interruptions. Furthermore, a single-wire operation mode should not be active (see following section *Single-wire Operation Modes*).

 Do the following to adjust the internal system voltage:

For decreasing the voltage turn the trimmer clockwise until the communication errors are not occurring anymore and the red LED goes off.

### 4.3 Single-wire Operation Modes

Usually the Truck Trailer CAN transceiver works with the two data lines CAN\_L and CAN\_H. For testing or verification a single-wire operation can be set up (communication only via line CAN\_L or CAN\_H). This is done with two Dip switches on the circuit board of the PCAN-B10011S.

▶ Do the following to set up the single-wire operation:

In order to access the Dip switches you must open the casing of the PCAN-B10011S. With a flat tip screwdriver separate the upper and lower casing parts by carefully pressing into the four gaps and lever the casing open.

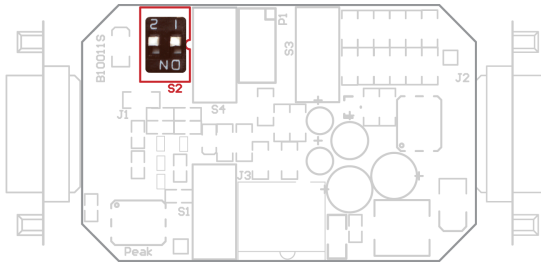


Figure 8: Position of the Dip switches on the circuit board

You can find the possible setup combinations of the Dip switches (S2-1, S2-2) in the following table. Pay attention to the labels on the Dip switch block.

Operation mode	S2-1	S2-2
Normal	off	off
Single-wire CAN_L	ON	off
Single-wire CAN_H	off	ON
Transceiver not operational	ON	ON



**Note:** If one of the operation modes beside “Normal” is set, the red LED indicates an error (see also section 4.1 *Red LED “Error”* on page 13).



## 5 Technical specifications

### Power supply

Supply voltage	24 V DC nominal, 8 - 30 V DC possible
Current consumption	about 35 mA (at 24 V) max. 110 mA

### High-speed CAN

Specification	ISO 11898-2 CAN specifications 2.0A and 2.0B
Transceiver	PCA82C251
Connector	D-Sub socket, 9-pin, pin assignment according to specification CiA® 303-1
Termination	120 Ω (switchable)

### Truck Trailer CAN

Specification	ISO 11992
Transceiver	B10011S
Connector	D-Sub plug, 9-pin
Operation modes	Master/Slave, Normal/Listen-only
Bit rate	max. 125 kbit/s (limited by input filter)

### Measures

Size	79 x 43 x 22 mm (L x W x H) See also dimension drawing in Appendix B on page 20
Weight	42 g

**Environment**

Operating temperature	-40 - +85 °C (-40 - +185 °F)
Temperature for storage and transport	-40 - +100 °C (-40 - +212 °F)
Relative humidity	15% - 90%, not condensing
EMC	Directive 2014/30/EU DIN EN 55024:2016-05 DIN EN 55022:2011-12
Ingress protection (IEC 60529)	IP20

# Appendix A CE Certificate

PCAN-B10011S IPEH-002041 – EC Declaration of Conformity  
PEAK-System Technik GmbH



## Notes on the CE Symbol

The following applies to the "PCAN-B10011S" product with the item number(s) IPEH-002041.

**EU Directive** This product fulfills the requirements of EU EMC Directive 2004/108/EG (Electromagnetic Compatibility) and is designed for the following fields of application as for the CE marking:

### Electromagnetic Immunity

DIN EN 55024, publication date 2016-05  
Information technology equipment – Immunity characteristics – Limits and methods of measurement (CISPR 24:2010 + Cor.:2011 + A1:2015);  
German version EN 55024:2010 + A1:2015

### Electromagnetic Emission

DIN EN 55022, publication date 2011-12  
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (CISPR 22:2008, modified);  
German version EN 55022:2010

**Declarations of Conformity** In accordance with the above mentioned EU Directive, the EU declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

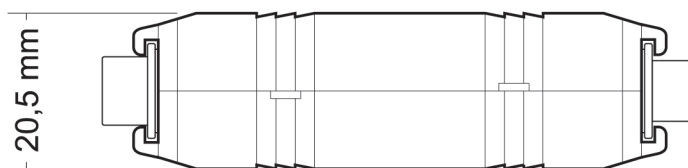
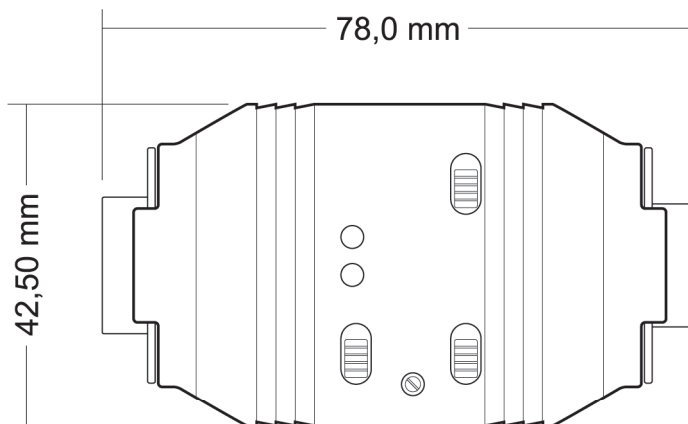
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A handwritten signature in black ink, appearing to read "Uwe W. H.", is written over a horizontal line.

Signed this 23<sup>rd</sup> day of January 2017

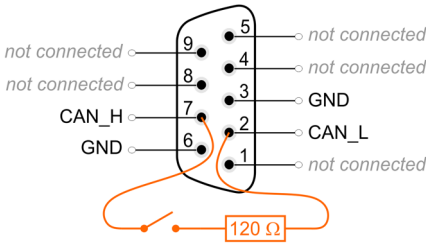
## Appendix B Dimension Drawing



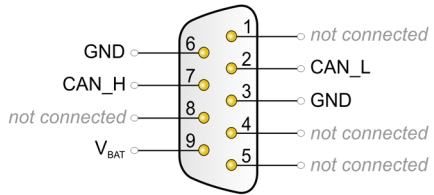
Top view and side view PCAN-B10011S.  
The figure does not show the original size.

# Appendix C Quick Reference

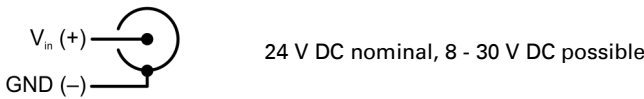
## High-speed CAN socket



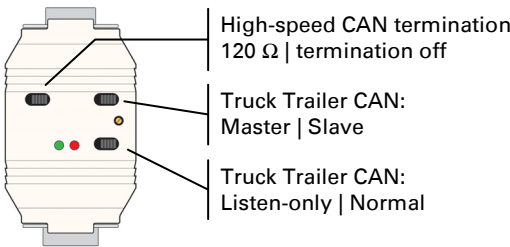
## Truck Trailer CAN Plug



## Low-voltage socket



## Slide switches



## Status LEDs

- Green "Power" Voltage supply
- Red "Error" Error condition on the Truck Trailer CAN bus