

PCAN-B1001S

Bus Converter High-speed CAN
to Truck-Trailer CAN

User Manual v2.0.0



PEAK
System

Products taken into account

| Product Name | Model | Part number |
|--------------|-------|-------------|
| PCAN-B10011S | | IPEH-002041 |

CANopen® and CiA® are registered community trade marks of CAN in Automation e.V.

All other product names mentioned in this document may be the trademarks or registered trademarks of their respective companies. They are not explicitly marked by "™" and "®".

© 2011 PEAK-System Technik GmbH

PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

Phone: +49 (0)6151 8173-20
Fax: +49 (0)6151 8173-29

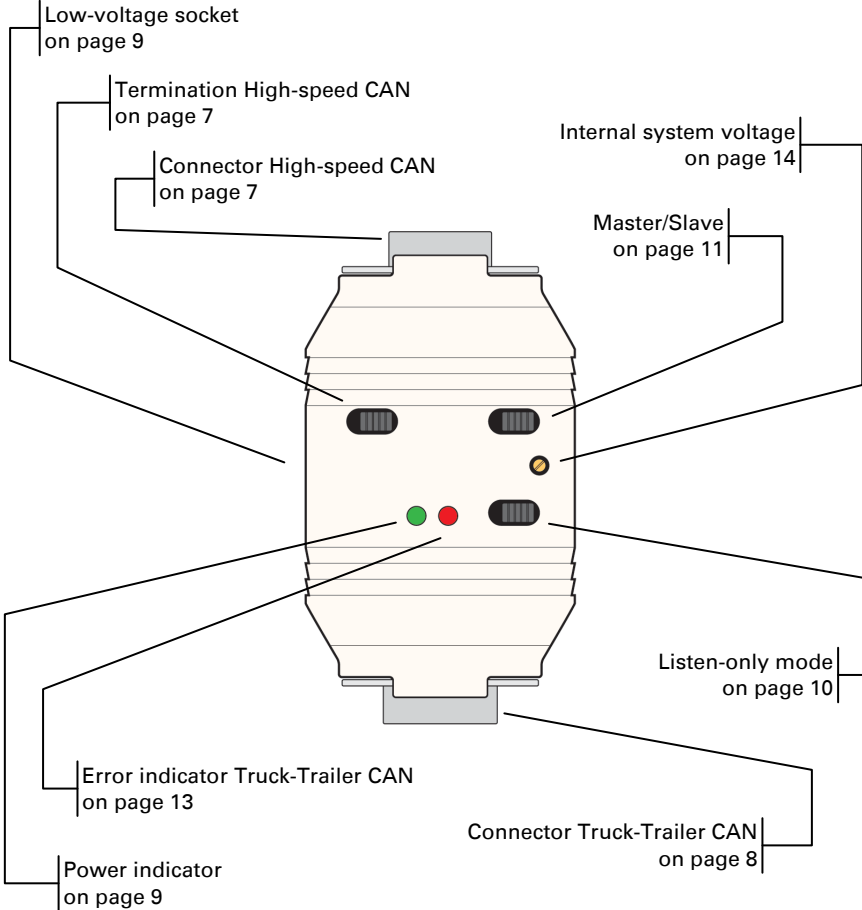
www.peak-system.com
info@peak-system.com

Document version 2.0.0 (2011-10-06)

Contents

| | | |
|-------------------|--|-----------|
| 1 | Introduction | 5 |
| 1.1 | Properties at a Glance | 5 |
| 1.2 | System Requirements | 6 |
| 1.3 | Scope of Supply | 6 |
| 2 | Installation | 7 |
| 2.1 | Connector High-speed CAN Side | 7 |
| 2.2 | Connector Truck-Trailer CAN Side | 8 |
| 2.3 | Power Supply | 9 |
| 3 | Operation | 10 |
| 3.1 | CAN Bit Rate | 10 |
| 3.2 | Listen-only Mode | 10 |
| 3.3 | Master/Slave | 11 |
| 4 | Communication Problems | 13 |
| 4.1 | Red LED "Error" | 13 |
| 4.2 | Adjusting the Internal System Voltage | 14 |
| 4.3 | Single-wire Operation Modes | 15 |
| 5 | Technical Specifications PCAN-B10011S | 17 |
| Appendix A | CE Certificate | 19 |
| Appendix B | Dimension Drawing | 20 |
| Appendix C | Quick Reference | 21 |

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 bus converter PCAN-B10011S establishes a connection between a High-speed CAN bus (ISO 11898-2) and a Truck-Trailer CAN bus (ISO 11992-1). It is designed for direct connection of a CAN interface of the PCAN series (e.g. PCAN-USB) to a Truck-Trailer CAN bus. The term B10011S refers to the transceiver of the same name.

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

- Designed for direct connection to a CAN interface of the PCAN series (e.g. PCAN-USB)
- Switchable termination for the High-speed CAN side
- Connection of the Truck-Trailer CAN bus via 9-pin D-Sub plug
- Operation mode Normal or Listen-only for the Truck-Trailer CAN side

- └ Bit rates up to 125 kbit/s (limited by input filter)
- └ Voltage supply via the Truck-Trailer CAN connector or with an AC adaptor
- └ Adjustable Truck-Trailer system voltage (11 - 26 V) at supply via AC adaptor
- └ LEDs indicate existing power supply and errors
- └ Extended operating temperature range of -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 AC adaptor

1.3 Scope of Supply

- └ Bus converter module PCAN-B10011S
- └ AC adaptor
- └ User 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® 102.

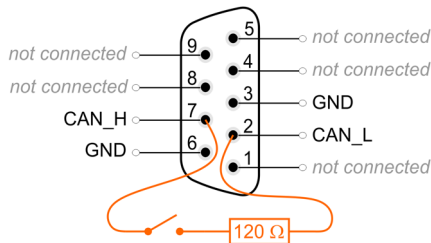


Figure 1: Pin assignment of the High-speed CAN connector

Between the lines CAN_L and CAN_H a switchable **termination** with a resistance of $120\ \Omega$ 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).



| Termination High-speed CAN | Switch position |
|-------------------------------|-----------------|
| 120 Ω | left |
| none | right |

Figure 2: Switch for High-speed CAN termination

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.

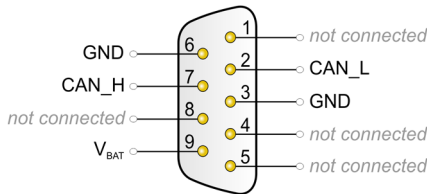


Figure 3: Pin assignment of the Truck-Trailer CAN connector

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_{BAT} , pin 9) or independently via the low-voltage socket (e.g. with the AC adaptor). The DC voltage should be 24 Volts.

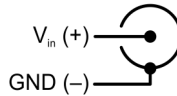


Figure 4: Contact assignment of the low-voltage socket



Note: A simultaneous connection of both supply ways isn't problematic, because the power supply with the higher voltage (usually the one of the AC adaptor) 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.

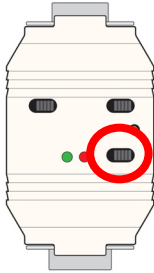
The maximum bit rate is 125 kbit/s (limited by input filter).

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

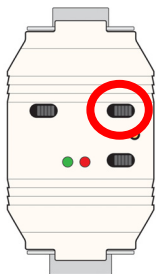
3.3 Master/Slave

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 AC adaptor. 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).

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.

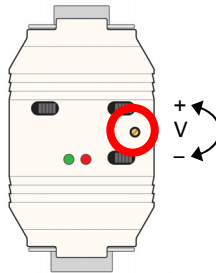



Figure 7: Trimmer for system voltage

At delivery the trimmer is pre-adjusted so that the internal system voltage is 24 V when using the provided AC adaptor. 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.

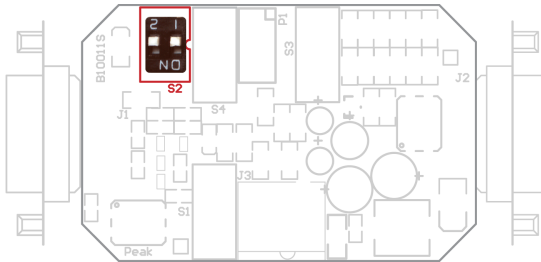


Figure 8: Position of the Dip switches on the circuit board

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

PCAN-B10011S

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® 102 |
| 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 | EN 55024:2003-10 EN 55022:2008-05 EC directive 2004/108/EG |
| 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
IPEH-002041

EC Directive

This product fulfills the requirements of EC directive
2004/108/EG on "Electromagnetic Compatibility" and is
designed for the following fields of application as per the
CE marking:

Electromagnetic Immunity

DIN EN 55024, Publication date: 2003-10
Information technology equipment, immunity characteristics – Limits and methods of
measurement (IEC/CISPR 24:1997, modified + A1:2001 + A2:2003);
German version EN 55024:1998 + A1:2001 + A2:2003

Electromagnetic Emission

DIN EN 55022, Publication date: 2008-05
Information technology equipment – Radio disturbance characteristics – Limits and methods
of measurement (IEC/CISPR 22:2005, modified + A1:2005);
German version EN 55022:2006 + A1:2007

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:

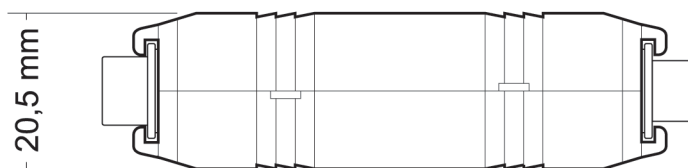
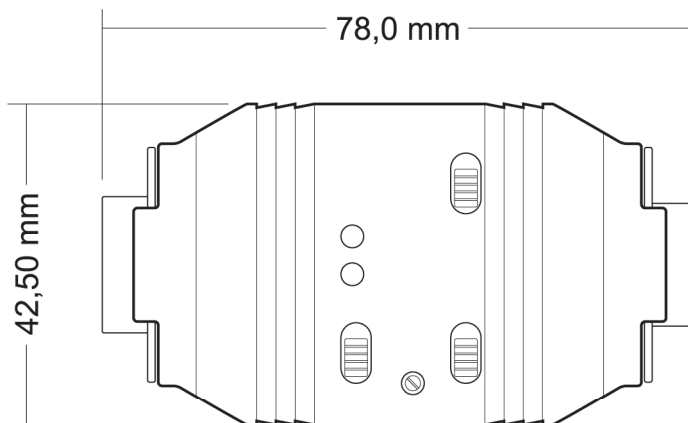
PEAK-System Technik GmbH
Mr. Wilhelm
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

Phone: +49 (0)6151 8173-20
Fax: +49 (0)6151 8173-29
E-mail: info@peak-system.com

A handwritten signature in black ink, appearing to read "Uwe W. A.", written in a cursive style.

Signed this 4th day of October 2011

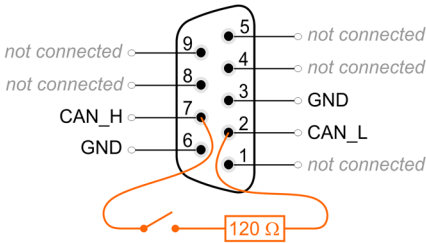
Appendix B Dimension Drawing



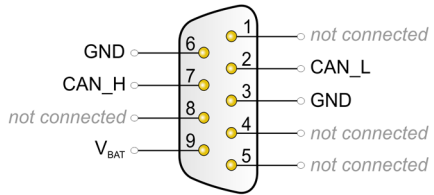
Top view and side view PCAN-B10011S.
The figure does not show the original size.

Appendix C Quick Reference

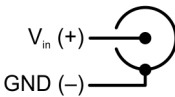
High-speed CAN socket



Truck-Trailer CAN Plug

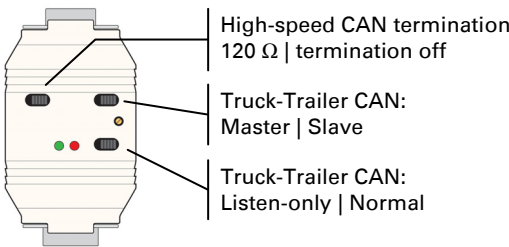


Low-voltage socket



24 V DC nominal, 8 - 30 V DC possible

Slide switches



Status LEDs

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