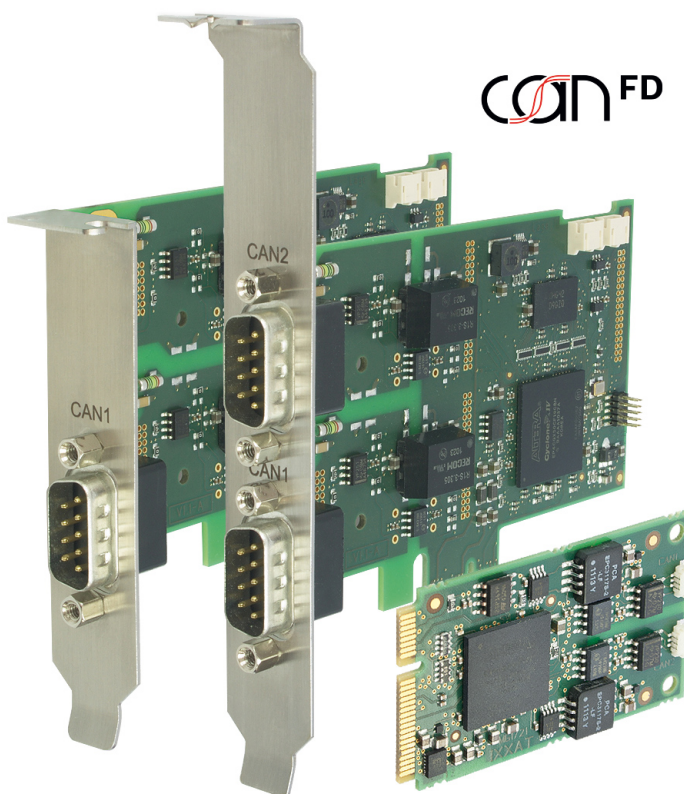


# PC CAN Interface

## CAN-IB Series for PCI/PCIexpress

### USER MANUAL

4.01.0230.20000 3.2 en-US ENGLISH



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# Important User Information

## Liability

Every care has been taken in the preparation of this document. Please inform HMS Industrial Networks of any inaccuracies or omissions. The data and illustrations found in this document are not binding. We, HMS Industrial Networks, reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be considered as a commitment by HMS Industrial Networks. HMS Industrial Networks assumes no responsibility for any errors that may appear in this document.

There are many applications of this product. Those responsible for the use of this device must ensure that all the necessary steps have been taken to verify that the applications meet all performance and safety requirements including any applicable laws, regulations, codes, and standards.

HMS Industrial Networks will under no circumstances assume liability or responsibility for any problems that may arise as a result from the use of undocumented features, timing, or functional side effects found outside the documented scope of this product. The effects caused by any direct or indirect use of such aspects of the product are undefined, and may include e.g. compatibility issues and stability issues.

The examples and illustrations in this document are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular implementation, HMS Industrial Networks cannot assume responsibility for actual use based on these examples and illustrations.

## Intellectual Property Rights

HMS Industrial Networks has intellectual property rights relating to technology embodied in the product described in this document. These intellectual property rights may include patents and pending patent applications in the USA and other countries.

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# Table of Contents

Page

<b>1</b>	<b>User Guide .....</b>	<b>3</b>
1.1	Target Group.....	3
1.2	Related Documents .....	3
1.3	Document History .....	3
1.4	Trademark Information .....	3
1.5	Conventions.....	4
<b>2</b>	<b>Safety Instructions .....</b>	<b>5</b>
2.1	Information on EMC .....	5
2.2	General Safety Instructions .....	5
2.3	Intended Use.....	5
<b>3</b>	<b>Scope of Delivery .....</b>	<b>5</b>
<b>4</b>	<b>Product Description .....</b>	<b>6</b>
4.1	CAN-IB100/200/PCIe and CAN-IB300/400/PCI .....	6
4.2	CAN-IB500/600/PCIe .....	7
4.3	CAN-IB120/PCIe Mini and CAN-IB520/PCIe Mini .....	8
<b>5</b>	<b>Installation.....</b>	<b>9</b>
5.1	Installing the Software .....	9
5.2	Installing the Hardware.....	9
<b>6</b>	<b>Connections .....</b>	<b>10</b>
6.1	Overview .....	10
6.2	CAN Bus .....	10
6.3	Expansions.....	11
6.4	PCIe Mini.....	12
<b>7</b>	<b>Expansions .....</b>	<b>13</b>
7.1	Fieldbus Expansion .....	13
7.2	CAN Expansion Board .....	15
7.3	MultiCAN Expansion .....	16
<b>8</b>	<b>Technical Data .....</b>	<b>20</b>
8.1	PCI/PCIe .....	20
8.2	Mini PCIe.....	20

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**9 Support/Return Hardware..... 21**

- 9.1 Support ..... 21
- 9.2 Return Hardware ..... 21

**10 Disposal..... 21**

**A Regulatory Compliance ..... 23**

- A.1 EMC Compliance (CE) ..... 23
- A.2 FCC Compliance Statement ..... 23
- A.3 Disposal and recycling..... 24

# 1 User Guide

Please read the manual carefully. Make sure you fully understand the manual before using the product.

## 1.1 Target Group

This manual addresses trained personnel who are familiar with CAN, CAN FD and the applicable standards. Only ESD trained staff is authorized to install the interface. The contents of the manual must be made available to any person authorized to use or operate the product.

## 1.2 Related Documents

Document	Author
User Manual <i>Expansions for CAN-IB Series for PCI/PCl express</i>	HMS
Installation Guide <i>VCI Driver</i>	HMS

## 1.3 Document History

Version	Date	Description
3.0	April 2016	Revised and edited in new design
3.1	September 2017	Removed obsolete variants, added CAN-FD variants, related documents, target group and intended use
3.2	March 2019	Layout changes

## 1.4 Trademark Information

Ixxat<sup>®</sup> is a registered trademark of HMS Industrial Networks. All other trademarks mentioned in this document are the property of their respective holders.

## 1.5 Conventions

Instructions and results are structured as follows:

- ▶ instruction 1
- ▶ instruction 2
  - result 1
  - result 2

Lists are structured as follows:

- item 1
- item 2


**Bold typeface** indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
This font is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: [Conventions, p. 4](#)


This is an external link (URL): [www.hms-networks.com](http://www.hms-networks.com)

Safety advice is structured as follows:


	<p>Cause of the hazard!</p> <p>Consequences of not taking remediate action.</p> <p>How to avoid the hazard.</p>
---	---


Safety signs and signalwords are used dependent on the level of the hazard.


---

 *This is additional information which may facilitate installation and/or operation.*

---

	<p>This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.</p>
---	--

	<p><b>Caution</b></p> <p>This instruction must be followed to avoid a risk of personal injury.</p>
---	--

	<p><b>WARNING</b></p> <p>This instruction must be followed to avoid a risk of death or serious injury.</p>
---	--

## 2 Safety Instructions

### 2.1 Information on EMC



Risk of interference to radio and television if used in office or home environment!

Use exclusively included accessories.

Make sure that the shield of the interface is connected with the device plug and the plug on the other side.

Use exclusively shielded cables.

### 2.2 General Safety Instructions

- ▶ Protect product from moisture and humidity.
- ▶ Protect product from too high or too low temperature (see [Technical Data, p. 20](#)).
- ▶ Protect product from fire.
- ▶ Do not paint the product.
- ▶ Do not modify or disassemble the product. Service must be carried out by HMS Industrial Networks.
- ▶ Store products in dry and dust-free place.

### 2.3 Intended Use

The interfaces are used to connect computer systems to CAN and LIN networks. They are intended for the installation in computer systems with closed housings.

## 3 Scope of Delivery

Included in the scope of delivery of standard variant:

- PC CAN interface
- CD with VCI driver and example application
- Installation Guide *VCI Driver*
- User Manual *PC CAN Interface*

## 4 Product Description

PCIe interfaces (apart from PCIe Mini) are available as standard and low-profile version. PCI interfaces are available as standard version. The low-profile version is expandable with a D-Sub 9 connector on a second slot bracket.



Fig. 1 Standard and low-profile version

### 4.1 CAN-IB100/200/PCIe and CAN-IB300/400/PCI

#### Common Features

- available with 1 or 2 CAN channels
- expandable up to 4 CAN channels
- ISO 11898-2 CAN bus coupling (high-speed)
- expandable with ISO 11898-3 low-speed CAN
- expandable with LIN (CAN-IB200/PCIe, CAN-IB400/PCI)

#### CAN-IB100/200/PCIe

- single Lane (x1) PCI Express CAN Interface
- CAN-IB100/PCIe, passive interface
- CAN-IB200/PCIe, active interface
- PCI Express connector compliant with the specification *PCI Express Card Electromechanical Specification version 1.1*, operation in any PCI Express slot (x1, x4, x8, x16) possible
- standard version: optionally galvanically isolated  
low-profile version: galvanically isolated



**CAN-IB300/400/PCI**

- PCI CAN Interface
- 5 V and 3.3 V compatible
- CAN-IB300/PCI, passive interface
- CAN-IB400/PCI, active interface
- PCI interface compliant with *PCI local bus specification Rev. 2.2*
- galvanically isolated

**4.2 CAN-IB500/600/PCIe****Common Features**

- supports CAN-FD (ISO and non-ISO) and CAN 2.0A/B
- ISO 11898-2 CAN bus coupling (high-speed)
- expandable with ISO 11898-3 low-speed CAN
- galvanically isolated

**CAN-IB500/PCIe**

- available with 1 CAN channel
- Single Lane (x1) PCI Express CAN Interface
- passive interface
- PCI express connector compliant with the specification *PCI Express Card Electromechanical Specification version 1.1* , operation in any PCI Express slot (x1, x4, x8, x16) possible

**CAN-IB600/PCIe**

- available with 1 or 2 CAN channels
- Single Lane (x1) PCI Express CAN Interface
- active interface
- PCI express connector compliant with the specification *PCI Express Card Electromechanical Specification version 1.1* , operation in any PCI Express slot (x1, x4, x8, x16) possible
- expandable with LIN

## 4.3 CAN-IB120/PCIe Mini and CAN-IB520/PCIe Mini

### Common features

- Single lane (x1) PCI express card
- PC interface compliant with *PCI express base specification, revision 1.1*
- form factor F2: Full-mini with bottom-side keep outs
- dimensions according to *PCI express Mini Card electromechanical specification, revision 1.2*
- ISO 11898-2 CAN bus coupling (high-speed)

### CAN-IB120/PCIe Mini

- available with 1 or 2 CAN channels
- optionally galvanic isolated

### CAN-IB520/PCIe Mini

- 1 CAN-FD channel, switchable ISO CAN-FD, non-ISO CAN-FD, CAN 2.0A/B
- galvanically isolated

## 5 Installation

### 5.1 Installing the Software

For the operation of the interface a driver is needed.

#### Windows

- ▶ Install the VCI driver (see Installation Guide *VCI Driver*).

#### Linux and Real-Time Operating Systems

- ▶ Observe information about supported operating systems and interfaces on [www.ixxat.com](http://www.ixxat.com).

### 5.2 Installing the Hardware



Risk of ESD damages caused by improper handling!

Use ESD protective measures to avoid equipment damage.

- ▶ Make sure that the VCI driver is installed.
- ▶ Turn off the computer.
- ▶ Pull the power cord.
- ▶ Open the computer case according to the instructions of the computer manufacturer.
- ▶ Determine the corresponding slot.
- ▶ Plug PCI/PCIe connector in the corresponding slot, without using force.
- ▶ Make sure that the interface is securely held in the computer.
- ▶ Close the computer case.
- Hardware installation is complete.

## 6 Connections

### 6.1 Overview

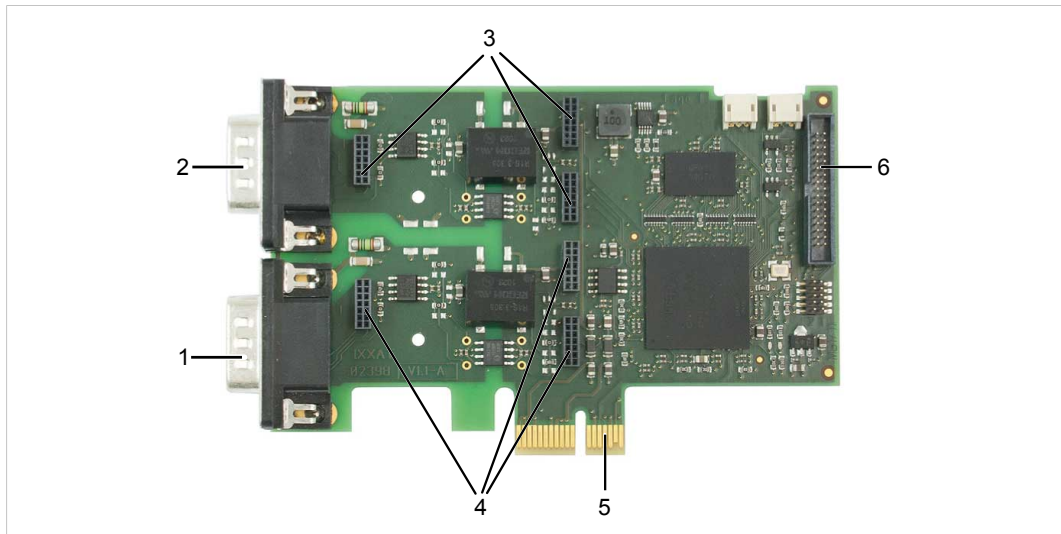


Fig. 2 Connections

1	CAN 1
2	CAN 2 (exclusively in standard version)
3	Fieldbus expansion connector channel 2 (option)
4	Fieldbus expansion connector channel 1 (option)
5	PCI/PCIe connector
6	Expansion board connector (option)

### 6.2 CAN Bus

The bus coupling can optionally be galvanically isolated. With galvanic isolation the shield of the CAN connector is connected to CAN ground through a 1 M $\Omega$  resistor and a 10 nF capacitor. The shields of the CAN connectors are connected directly together.

For a not galvanically isolated interface, the CAN ground and PC ground are at the same potential.



*For best noise immunity use shielded CAN cables.*

Pin Allocation D-Sub 9 Connector		
Pin no.	Signal	Via fieldbus expansion
1	—	CAN-Low (low-speed)
2	CAN-Low (high-speed)	—
3	CAN GND	—
4	—	CAN-High (low-speed)
5	—	—
6	—	—
7	CAN-High (high-speed)	—
8	—	LIN
9	—	VBAT <sub>LIN</sub> (8-18 V DC)

### Low-Profile Version

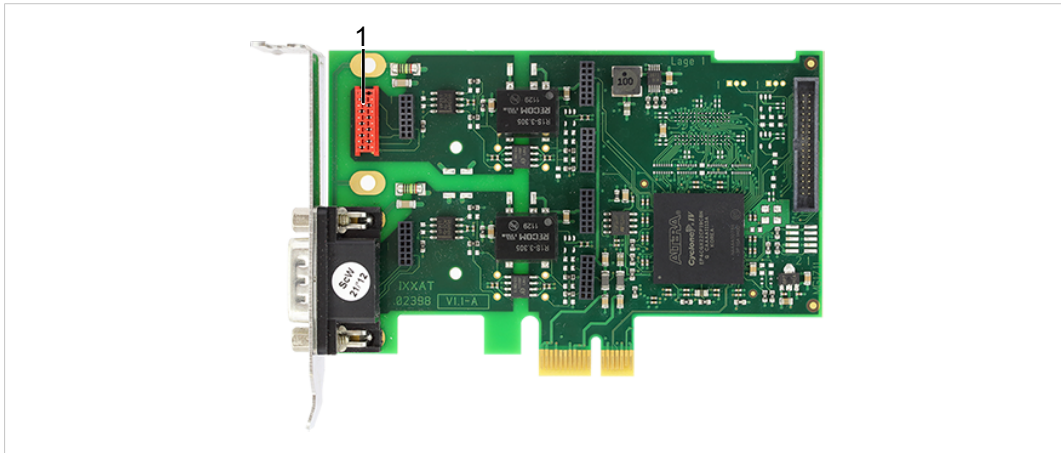


Fig. 3 Low-profile version

In the low-profile version, only the D-Sub 9 connector of CAN 1 is implemented. It is possible to output the signals of CAN 2 to a second slot bracket.

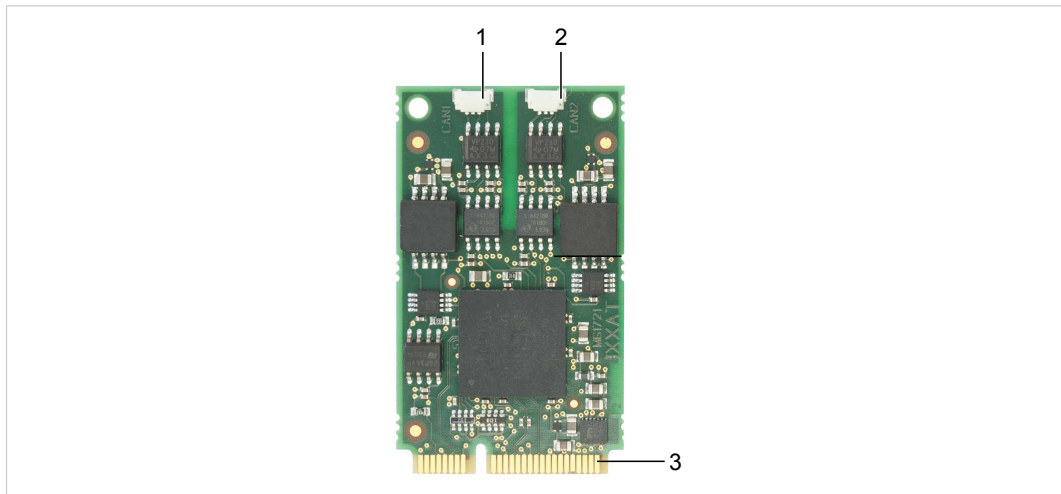
- ▶ To connect the second slot bracket to the interface, plug the ribbon cable in connector (1) on the interface and in the connector on the second slot bracket.

## 6.3 Expansions

The fieldbus expansion connectors can be used to extend each CAN circuit with fieldbus expansions for additional fieldbuses (exclusively galvanically isolated interfaces). The signals of the additional fieldbuses are applied to the corresponding CAN connector.

The CAN expansion board connector can be used to connect a CAN expansion board that can provide up to two additional CAN interfaces and fieldbus expansions.

## 6.4 PCIe Mini



**Fig. 4 Connections PCIe Mini**

1	CAN 1, Pin 1
2	CAN 2, Pin 1
3	PCIe Mini card connector

Pin Allocation CAN Connector		
Pin no.	Signal	Color
1	CAN-High	Red
2	CAN-Low	Yellow
3	CAN GND	Black

The CAN connector type is SM03B-SURS-TF by JST. The counterpart is O3SUR-32S by JST. A pre-assembled open-style cable for each CAN connector is included.

## 7 Expansions

### 7.1 Fieldbus Expansion

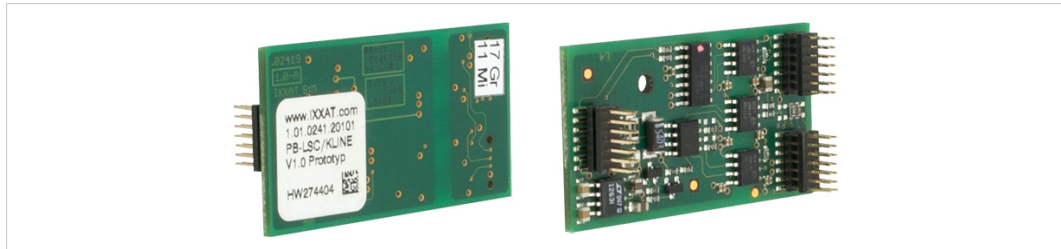


Fig. 5 Fieldbus expansion

If there is a low-speed CAN transceiver on the fieldbus expansion, it is possible to switch via software between the high-speed CAN transceiver on the interface and the low-speed CAN transceiver on the fieldbus expansion. The signals of the fieldbus modules are connected to the appropriate D-Sub 9 connector.

Simultaneous operation of low-speed CAN and LIN is also possible.



Use fieldbus expansions exclusively in conjunction with galvanically isolated CAN channels.

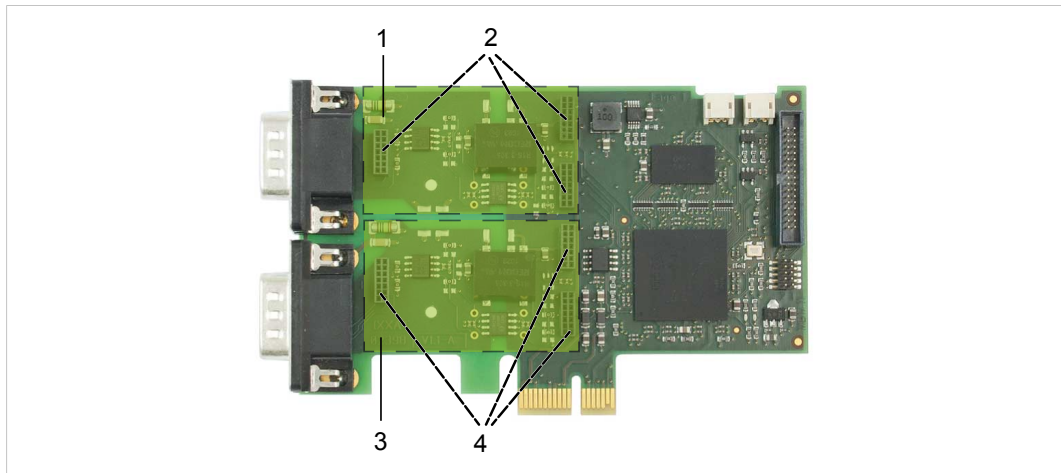


If fieldbus expansions are used, CAN 1 high-speed and LIN 1 have the same GND.

#### 7.1.1 Compatibility

Supported fieldbuses	Compatible CAN interface (galvanically isolated)
CAN low-speed	CAN-IB100/200/PCle CAN-IB300/400/PCI CAN-IB500/600/PCle CAN expansion board
LIN	CAN-IB200/600/PCle CAN-IB400/PCI
CAN low-speed and LIN	CAN-IB200/600/PCle CAN-IB400/PCI

## 7.1.2 Installation



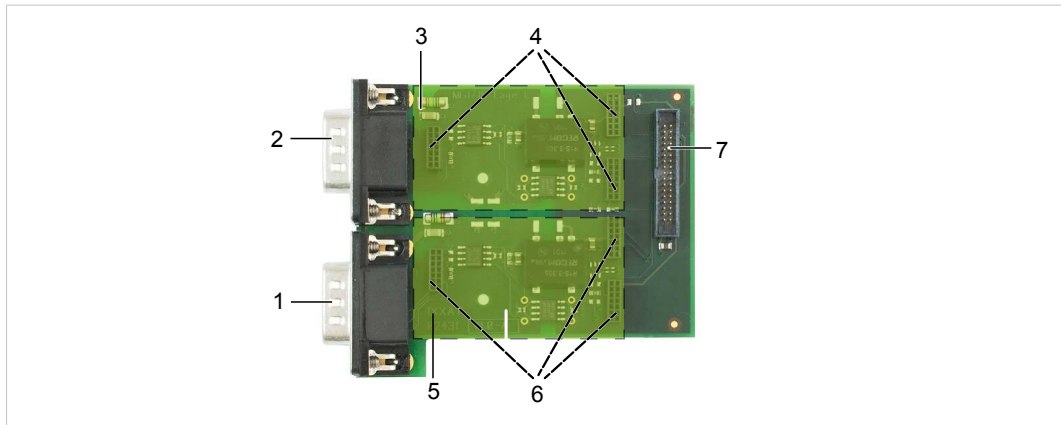
**Fig. 6** CAN interface with fieldbus expansions

1	Fieldbus expansion channel 2
2	Fieldbus expansion connector channel 2
3	Fieldbus expansion channel 1
4	Fieldbus expansion connector channel 1

- ▶ Plug the expansion in the corresponding expansion connector.
- ▶ Make sure that the expansion is properly inserted in the socket.
  - Interface detects the installed expansions automatically.
- ▶ If the expansion is not detected automatically, check if the expansion is properly inserted.
- ▶ Observe product description and further information on [www.ixxat.com](http://www.ixxat.com).



## 7.2 CAN Expansion Board



**Fig. 7** Expansion board with fieldbus expansions

1	CAN 3
2	CAN 4
3	Fieldbus expansion channel 4
4	Fieldbus expansion connector channel 4
5	Fieldbus expansion channel 3
6	Fieldbus expansion connector channel 3
7	Expansion board connector

The CAN expansion board provides the following options:

- increase the number of available CAN channels up to four
- increase with additional fieldbus expansions

As an option the bus coupling can be galvanically isolated.

The CAN expansion board is available as standard or low-profile version.

### 7.2.1 Compatibility

The CAN expansion board is compatible with the following, galvanically isolated two channel CAN interface:

- CAN-IB100/PCle
- CAN-IB200/PCle
- CAN-IB300/PCI
- CAN-IB400/PCI

### 7.2.2 Installation

- ▶ Connect the CAN expansion board to the CAN interface with the provided ribbon cable.
- ▶ Make sure that the ribbon cable is in right orientation.
- ▶ For pin allocation of D-Sub 9 connector see [CAN Bus, p. 10](#).

### 7.2.3 Fieldbus Expansions

The fieldbus expansion connectors can be used to extend each CAN circuit with fieldbus expansions for additional fieldbuses. The signals of the additional fieldbuses are applied to the corresponding CAN connector.

- ▶ Observe information about available fieldbus expansions and the compatibility with CAN interfaces on [www.ixxat.com](http://www.ixxat.com).
- ▶ Install the expansion (see *Installation*, p. 14).

## 7.3 MultiCAN Expansion

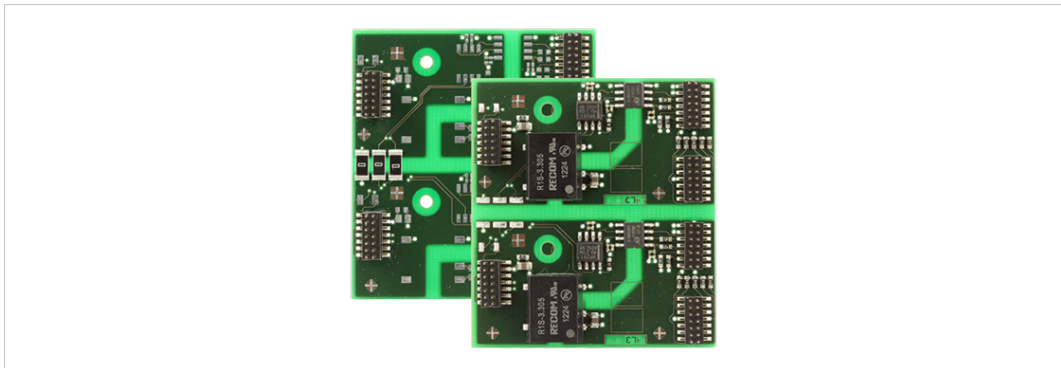


Fig. 8 MultiCAN expansion

With using a MultiCAN expansion the number of available CAN high-speed channels on a D-Sub 9 connector of a specific CAN interface is doubled and the number of required computer slots is halved.

MultiCAN-PB is used in conjunction with the standard version.

MultiCAN-PB/LP is used in conjunction with the low-profile version.

### 7.3.1 MultiCAN-PB

The expansion redirects the channel CAN 3 to the D-Sub 9 connector of CAN 1 and channel CAN 4 to D-Sub 9 connector of CAN 2. The galvanic isolation of CAN channels remains.

The use of the following expansions is not possible:

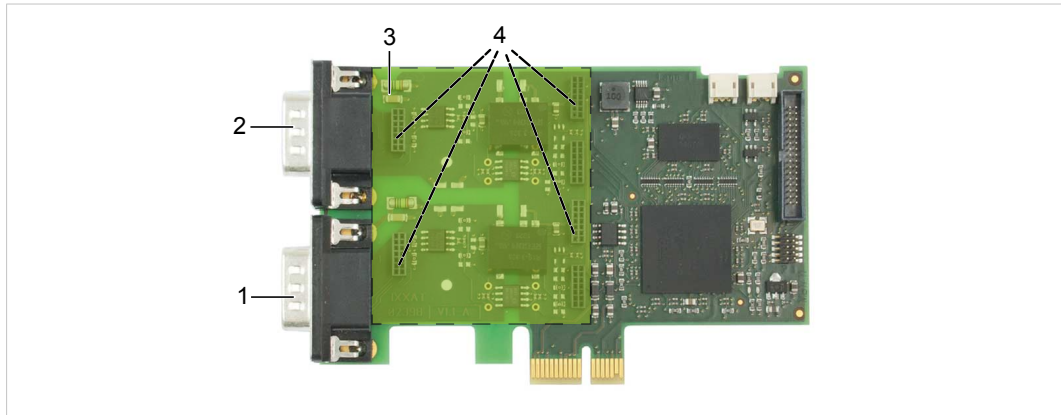
- CAN expansion board
- fieldbus expansions

#### Compatibility

The MultiCAN-PB expansion is compatible with the following, galvanically isolated two channel CAN interfaces (standard version):

- CAN-IB100/PCle
- CAN-IB200/PCle
- CAN-IB300/PCI
- CAN-IB400/PCI

## Installation



**Fig. 9** CAN interface with MultiCAN-PB expansion

1	CAN 1/3
2	CAN 2/4
3	MultiCAN-PB
4	Fieldbus expansion connectors

- ▶ Install the expansion (see [Installation, p. 14](#)).
- ▶ Observe different pin allocation of D-Sub 9 connector.

### Pin Allocation Using MultiCAN-PB

Pin No.	Signal CAN 1/3	Signal CAN 2/4
1	CAN <sub>3</sub> -Low (high-speed)	CAN <sub>4</sub> -Low (high-speed)
2	CAN <sub>1</sub> -Low (high-speed)	CAN <sub>2</sub> -Low (high-speed)
3	GND <sub>1</sub>	GND <sub>2</sub>
4	CAN <sub>3</sub> -High (high-speed)	CAN <sub>4</sub> -High (high-speed)
5	GND <sub>3</sub>	GND <sub>4</sub>
6	—	—
7	CAN <sub>1</sub> -High (high-speed)	CAN <sub>2</sub> -High (high-speed)
8	—	—
9	—	—

### 7.3.2 MultiCAN-PB/LP

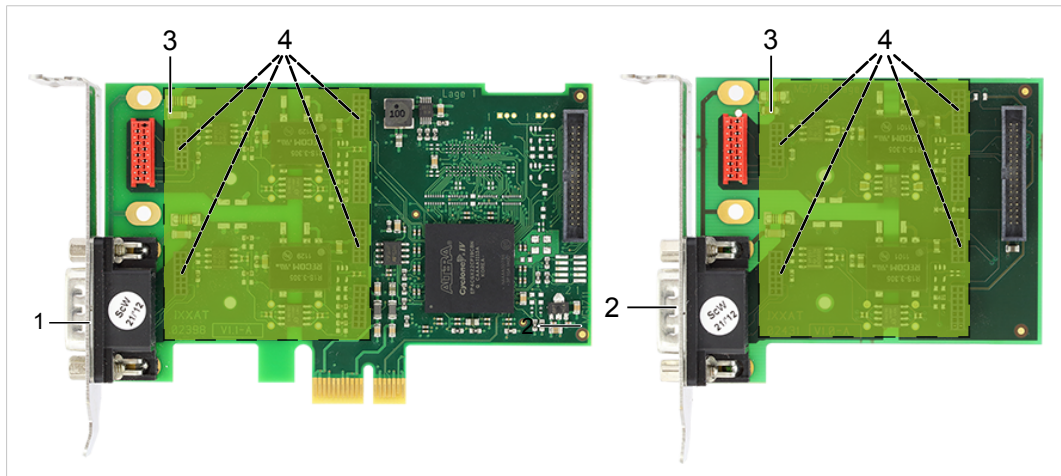


Fig. 10 CAN interface and CAN expansion board with MultiCAN-PB/LP expansion

1	CAN 1/2
2	CAN 3/4
3	MultiCAN-PB/LP
4	Fieldbus expansion connectors

If used in conjunction with low profile CAN interfaces the expansion redirects channel CAN 2 to the CAN 1 connector.

If used in conjunction with the CAN expansion board the expansion redirects channel CAN 4 to the CAN 3 connector.

The galvanic isolation of CAN channels remains.

The use of fieldbus expansions is not possible.

#### Compatibility

The MultiCAN-PB/LB expansion is compatible with the following, galvanically isolated CAN interfaces (low-profile version):

- CAN-IB100/PCIe LP
- CAN-IB200/PCIe LP
- CAN-IB600/PCIe LP
- CAN expansion board LP

**Installation**

- ▶ Install the expansion (see [Installation, p. 14](#)).
- ▶ Observe different pin allocation of D-Sub 9 connector.

**Pin Allocation Using MultiCAN-PB/LP**

Pin No.	Signal CAN 1/2	Signal CAN 3/4
1	CAN <sub>2</sub> -Low (high-speed)	CAN <sub>4</sub> -Low (high-speed)
2	CAN <sub>1</sub> -Low (high-speed)	CAN <sub>3</sub> -Low (high-speed)
3	GND <sub>1</sub>	GND <sub>3</sub>
4	CAN <sub>2</sub> -High (high-speed)	CAN <sub>4</sub> -High (high-speed)
5	GND <sub>2</sub>	GND <sub>4</sub>
6	—	—
7	CAN <sub>1</sub> -High (high-speed)	CAN <sub>3</sub> -High (high-speed)
8	—	—
9	—	—

## 8 Technical Data

### 8.1 PCI/PCle

CAN transceiver (low-speed):	TJA1054, via optional fieldbus expansion
LIN transceiver	TJA1020T, via optional fieldbus expansion
Operating temperature range	0 °C to +70 °C
Storage temperature range	-40 °C to +85 °C
Galvanic isolation	1 kV for 1 second
Relative humidity	10 % to 95 %, no condensation
CAN propagation delay	With galvanic isolation typical 6 ns, max. 10 ns
CAN bit rates	10 kbit/s to 1 Mbit/s (high-speed) 10 kbit/s to 125 kbit/s (low-speed)

#### CAN-IB100/200/500/600/PCle

PC interface	PCI Express Base Specification, Rev 1.1, single lane port (x1)
CAN transceiver	SN65HVD251
Dimension	64 x 105 mm
Weight	Approx. 55 g
Power supply	Via PCle socket (3.3 V DC)
Current consumption	CAN-IB100/PCle typ. 3.3 V/400 mA CAN-IB200/PCle typ. 3.3 V/550 mA

#### CAN-IB300/400

PC interface	PCI Specification 2.2, 32 Bit, 33 MHz
CAN transceiver	TLE6250GV33
Dimension	64 x 120 mm
Weight	Approx. 60 g
Power supply	Via PCI socket (3.3 V/5 V DC)
Current consumption	CAN-IB300/PCI typ. 3.3 V/100 mA, 5 V/100 mA CAN-IB400/PCI typ. 3.3 V/500 mA, 5 V/100 mA

### 8.2 Mini PCle

PC interface	PCI Express Base Specification, Rev 1.1, single lane port (x1)
Form factor	F2: Full Mini with bottom-side keep outs According to PCI Express Mini Card Electromechanical Specification, Revision 1.2
CAN transceiver	Texas Instruments SN65HVD230
CAN signal delay	With galvanic isolation typically 6 ns, max. 10 ns
CAN bitrates	CAN-IB120/PCle Mini: 10 kbit/s to 1 Mbit/s (high-speed) CAN-IB520/PCle Mini: 10 kbit/s to 8 Mbit/s (CAN FD)
Dimensions	30 x 51 mm
Weight	Approx. 6 g
Power supply	Via PCle Mini Card connector (3.3 V DC)
Power consumption	Max. 230 mA (3.3 V DC)
Operating temperature range	-40 °C to +85 °C
Storage temperature range	-40 °C to +85 °C
Galvanic isolation	500 V AC for 1 minute between CAN bus and internal logic
Relative humidity	10 to 95 %, no condensation

## 9 Support/Return Hardware

Observe the following information in the support area on [www.ixxat.com](http://www.ixxat.com):

- information about products
- FAQ lists
- installation notes
- updated product versions
- updates

### 9.1 Support

- ▶ For problems or support with the product request support at [www.ixxat.com/support](http://www.ixxat.com/support).
- ▶ If required use support phone contacts on [www.ixxat.com](http://www.ixxat.com).

### 9.2 Return Hardware

- ▶ Fill in the form for warranty claims and repair on [www.ixxat.com](http://www.ixxat.com).
- ▶ Print out the Product Return Number (PRN resp. RMA).
- ▶ Pack product in a physically- and ESD-safe way, use original packaging if possible.
- ▶ Enclose PRN number.
- ▶ Observe further notes on [www.ixxat.com](http://www.ixxat.com).
- ▶ Return hardware.

## 10 Disposal

- ▶ Dispose of product according to national laws and regulations.
- ▶ Observe further notes about disposal of products on [www.ixxat.com](http://www.ixxat.com).

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## A Regulatory Compliance

### A.1 EMC Compliance (CE)



The product is in compliance with the Electromagnetic Compatibility Directive. More information and the Declaration of Conformity is found at [www.ixxat.com](http://www.ixxat.com).

### A.2 FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- ▶ This device may not cause harmful interference.
- ▶ This device must accept any interference received, including interference that may cause undesired operation.

<b>Product name</b>	CAN-IB100/PCIe, CAN-IB200/PCIe CAN-IB300/PCI, CAN-IB400/PCI CAN-IB500/PCIe, CAN-IB600/PCIe CAN-IB120/PCIe Mini, CAN-IB520/PCIe Mini
<b>Responsible party</b>	HMS Industrial Networks Inc
<b>Address</b>	35 E. Wacker Dr, Suite 1700 Chicago, IL 60601
<b>Phone</b>	+1 312 829 0601



Any changes or modifications not expressly approved by HMS Industrial Networks could void the user's authority to operate the equipment.



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

### A.3 Disposal and recycling



You must dispose of this product properly according to local laws and regulations. Because this product contains electronic components, it must be disposed of separately from household waste. When this product reaches its end of life, contact local authorities to learn about disposal and recycling options, or simply drop it off at your local HMS office or return it to HMS.

For more information, see [www.hms-networks.com](http://www.hms-networks.com).

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## [HMS Networks:](#)

<u><a href="#">1.01.0231.11000</a></u>	<u><a href="#">1.01.0231.12001</a></u>	<u><a href="#">1.01.0231.21000</a></u>	<u><a href="#">1.01.0231.22001</a></u>	<u><a href="#">1.01.0233.11000</a></u>	<u><a href="#">1.01.0233.12001</a></u>
<u><a href="#">1.01.0233.12010</a></u>	<u><a href="#">1.01.0233.21000</a></u>	<u><a href="#">1.01.0233.22001</a></u>	<u><a href="#">1.01.0233.22010</a></u>	<u><a href="#">1.01.0237.12010</a></u>	<u><a href="#">1.01.0237.21000</a></u>
<u><a href="#">1.01.0237.22000</a></u>	<u><a href="#">1.01.0237.90001</a></u>	<u><a href="#">1.01.0239.22000</a></u>	<u><a href="#">1.01.0239.22010</a></u>	<u><a href="#">1.01.0239.42001</a></u>	<u><a href="#">1.01.0245.42012</a></u>
<u><a href="#">1.01.0291.12001</a></u>	<u><a href="#">1.01.0291.22001</a></u>	<u><a href="#">1.01.0293.12001</a></u>	<u><a href="#">1.01.0293.22001</a></u>	<u><a href="#">1.01.0314.22001</a></u>	<u><a href="#">1.01.0314.22011</a></u>