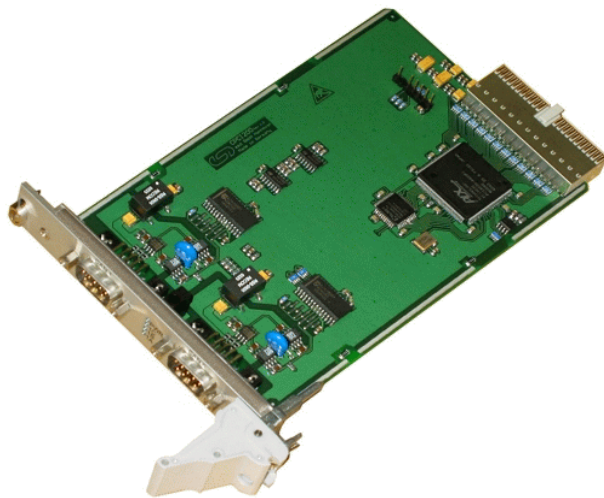


CPCI-CAN/200

CompactPCI-CAN-Interface



Hardware-Installation and Technical Data

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Changes in the chapters

The changes in the user's manual listed below affect changes in the **hardware**, as well as changes in the **description** of the facts only.

Chapter	Changes versus previous version
-	DeviceNet chapter removed
-	

Further technical changes are subject to change without notice.

NOTE

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1. Overview

1.1 Description of the Module

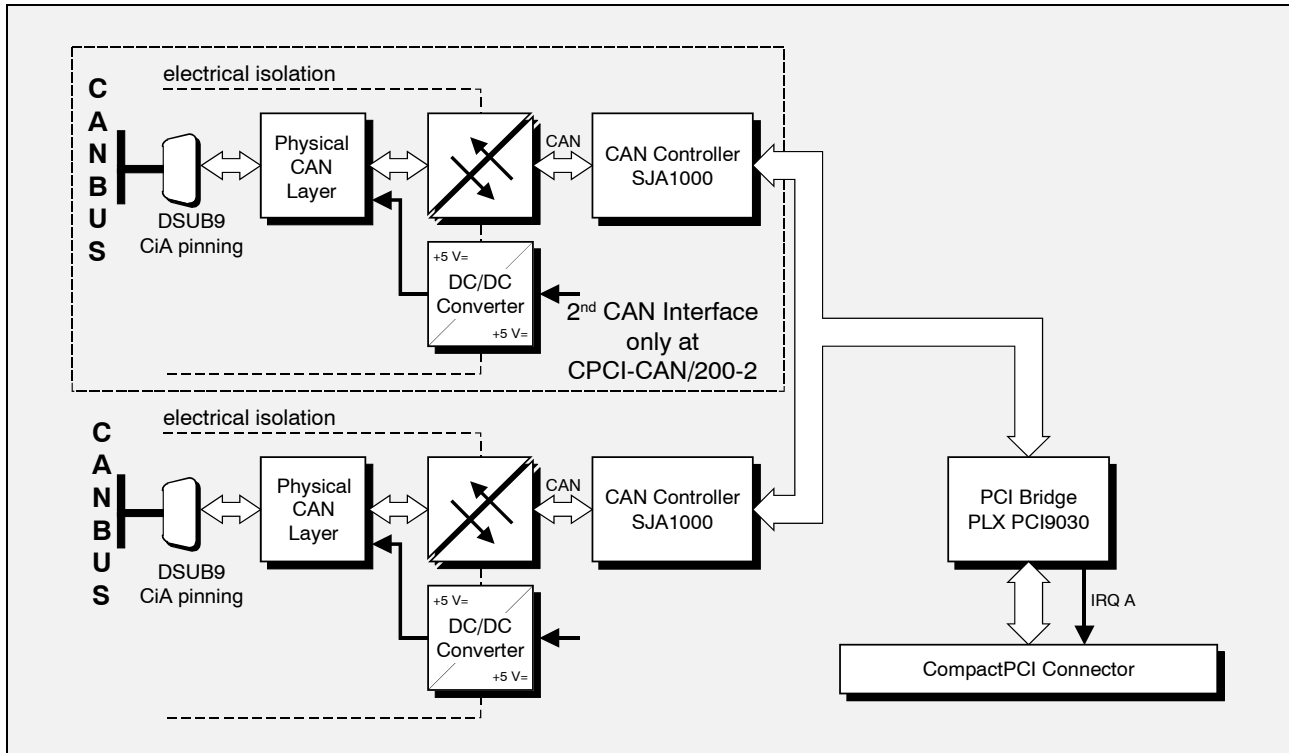
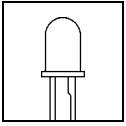


Fig. 1.1.1: Block-circuit diagram of the CPCI-CAN/200 module

The CPCI-CAN/200 is a passive CompactPCI board with one or optional two CAN interfaces. Data security and consistency are guaranteed up to 1 Mbit/s.

The ISO 11898-compliant CAN interface allows a maximum data-transfer rate of 1 Mbit/s. Among many other features of CAN interfaces, the bit rate can be set by software.

The CAN interface is electrically isolated from the other potentials by means of optocouplers and DC/DC-converters.



2. PCB View and LEDs

2.1 PCB View with Connectors

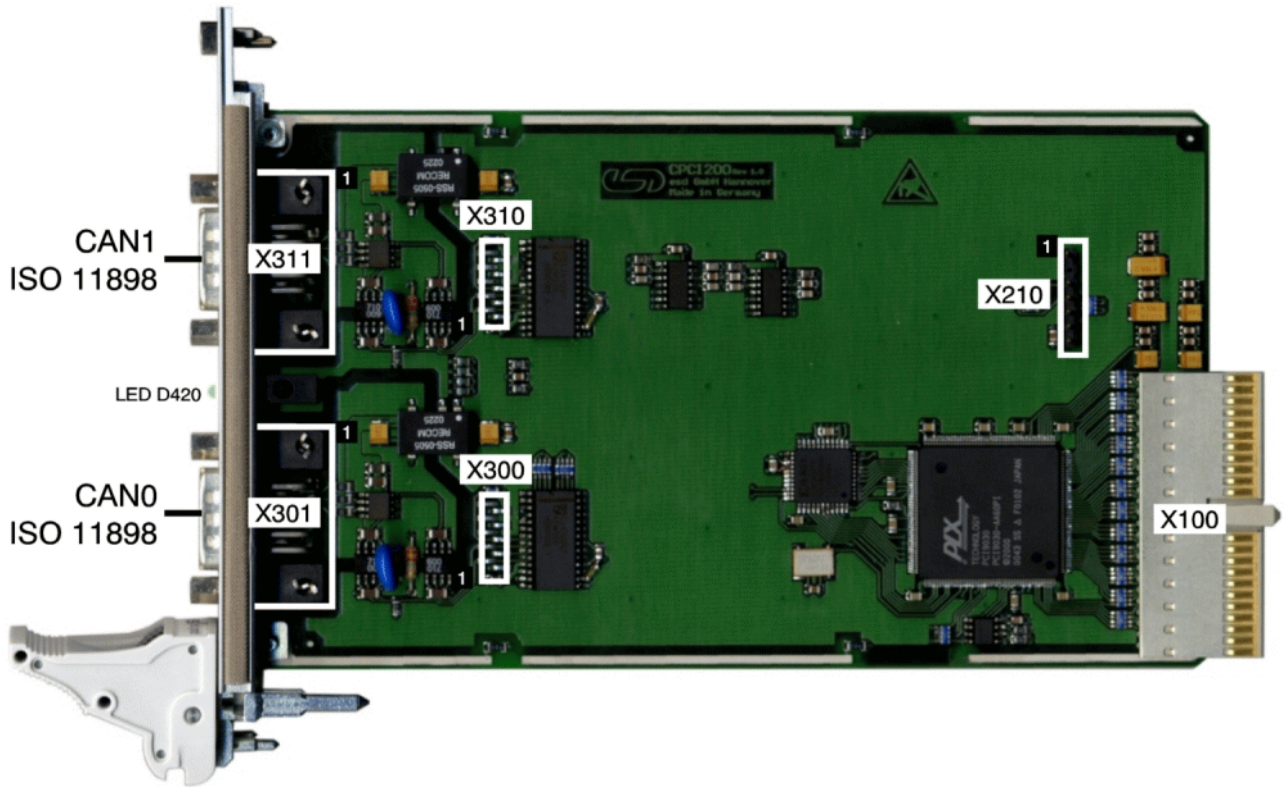
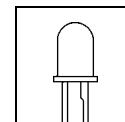


Fig. 2.1.1: Representation of the module



2.2 LED Display

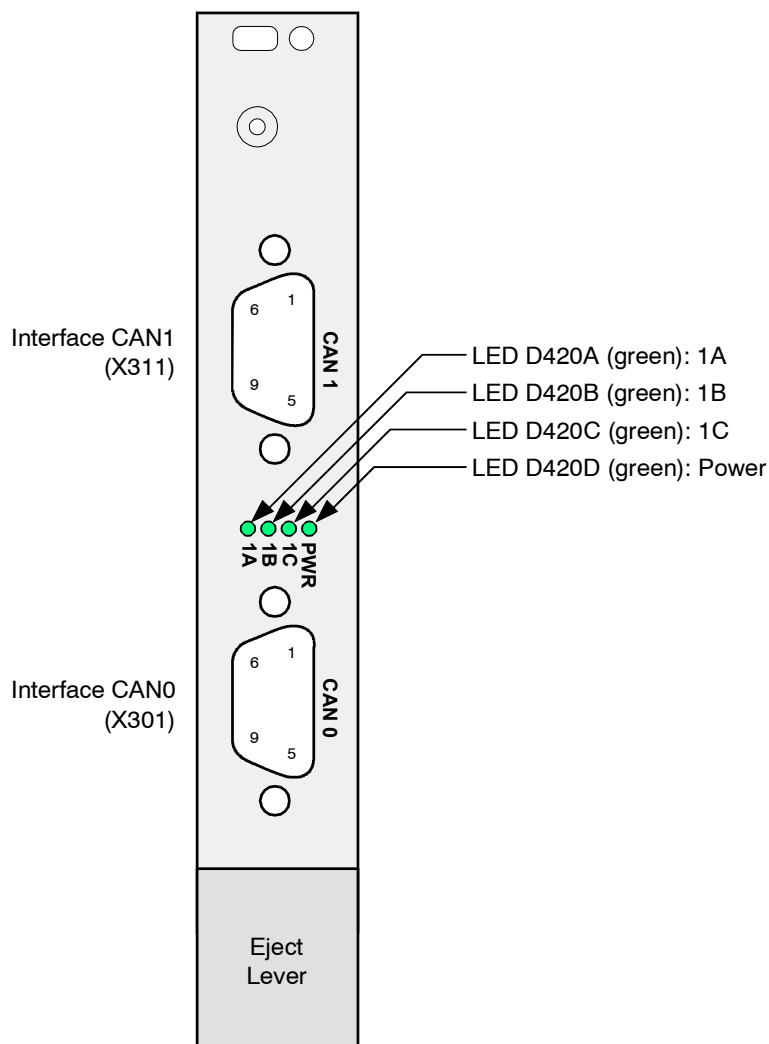
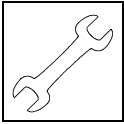


Fig. 2.2.1: Position and colour of the LEDs

LED	Colour	Name	Display function (LED on)
LED D420A	green	1A	not implemented
LED D420B	green	1B	Interrupt of CAN controller of CAN1 active
LED D420C	green	1C	Interrupt of CAN controller of CAN0 active
LED D420D	green	PWR	Power supply on

Table 2.2.1: Display functions of LEDs



3. Hardware Installation

Attention!

Electro-static discharges may cause damage to electronic components. In order to avoid this please make sure to follow the steps below *before* touching the CAN module:

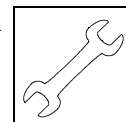
- ▶▶ Switch off the power supply of your CompactPCI system, but leave it connected to mains.
- ▶▶ Now touch the metal case of the computer to discharge yourself.
- ▶▶ Even your clothes must not touch the CAN module.

Installation:

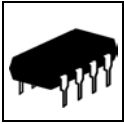
1. Switch off your CompactPCI system and all connected peripheral devices (monitor, printers, etc.). Switch off the CAN devices of the network the CAN module is to be connected to.
2. Discharge yourself as described above.
3. Disconnect the CompactPCI system from mains.
4. Select an open 3U-CompactPCI bus position and insert the module into the slot selected. The CAN module can be inserted into any 3U-slot.
5. Attach the module by means of the front panel screws.
6. Connect the CAN bus.
Please note that the CAN bus must be terminated at both ends. **esd** offers special T-connectors and terminator connectors. Additionally, the CAN-GND signal must be connected to earth at *exactly one* point in the CAN network. Therefore, the CAN terminator connectors have additionally an earth connection. A CAN device whose CAN interface is not electrically isolated acts as an earth connection like the CAN-GND.

The first CAN interface (CAN network 0) is connected via the DSUB-connector (X301) and the second CAN interface (CAN network 1) is connected via the DSUB-connector (X311).





7. Connect the CompactPCI system to mains again.
8. Switch on the CompactPCI system, the peripheral devices and the other CAN devices again.
12. End of hardware installation.
Continue with the software installation as described in the manual 'CAN-API with Software Tools and Installation Notes'.

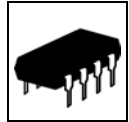


4. Summary of Technical Data

4.1 General Technical Data

Ambient temperature	0...50 °C, also available for -40 °C...+85 °C
Humidity	max. 90 %, non-condensing
Power supply	via CompactPCI bus, nominal voltage: 5 V \pm 5%, 3.3 V \pm 5% current (typ.): for 3.3 V (1x CAN): tbd. for 3.3 V (2x CAN): tbd. for 5 V (1x CAN): tbd. for 5 V (2x CAN): tbd.
Connectors	X100 (132-pin post connector) - CompactPCI board connector X301 (DSUB9/male) - CAN net 0 X311 (DSUB9/male) - optional CAN net 1 X300 (8-pole pin strip) - opt. interface adapter net 0 X310 (8-pole pin strip) - opt. interface adapter net 1 X210 (7-pole pin strip) - ISP-programming (only for programming- and test purposes)
Dimensions	100 mm x 160 mm
Weight	170 g

Table 4.1.1: General Data of the module



4.2 CompactPCI Bus

Host bus	PCI-bus according to PCI-Local Bus Specification 2.1
PCI-data/address bus	32 bit
Controller	PLX 9030
Interrupt	interrupt signal A
Board dimension	according to CompactPCI Specification, Rev. 1.0
Connectors	
Connector coding	Universal Board, not keyed (3.3 V or 5 V signalling voltage)

Table 4.2.1: CompactPCI bus data



4.3 CAN Interface

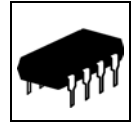
Number	1, optional 2 CAN interfaces
CAN controller	SJA1000
CAN protocol	Basic CAN 2.0A/B
Physical interface	Physical Layer in accordance with ISO 11898, transfer rate programmable from 10 kbit/s to 1 Mbit/s
Bus termination	has to be set externally
Electrical isolation of the CAN interfaces from other units	the two possible CAN interfaces are electrically isolated from each other and from the CompactPCI bus potentials via optocouplers and DC/DC-converters
Optional interface adapter	Single-Wire CAN: - one adapter board for each CAN channel with Phoenix Combicon connectors (or equivalent) - SAE J2411-compatible driver IC

Table 4.3.1: Data of CAN interface

4.4 Software Support

Software drivers for various operating systems (Windows, Linux, real-time operating systems) are available. An extensive list of all operating systems is listed in the software manual.

A Software package for CANopen is available.

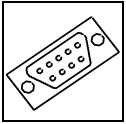


4.5 Order Information

Type	Description	Order No.
CAN-CPCI/200-1B	CPCI-CAN/200 with 1x CAN 2.0A/B, ISO 11898	C.2035.02
CAN-CPCI/200-2B	CPCI-CAN/200 with 2x CAN 2.0A/B, ISO 11898	C.2035.04
CAN-CPCI/200-2-T	CPCI-CAN/200 with 2x CAN 2.0A/B, ISO 11898, extended temperature range (-40 °C...+85 °C)	C.2035.06
Options:		
CAN-CPCI/200-FP6	6 U front panel	C.2035.30
Software:		
CAN-DRV-LCD	Object licence for Windows and Linux incl. CD-ROM	C.1101.02
CAN-CPCI/200-Co	CANopen master/slave object licence	C.2035.12
Manuals:		
CAN-CPCI/200-ME *)	English hardware manual for C.2035.02 to C.2035.08 (this manual)	C.2035.21
CAN-API-ME *)	Software manual in english	C.2001.21
CANopen-ME *)	Additional software documentation for CANopen in english	C.2002.21

*) If module and manual are ordered together, the manual will be delivered free of charge.

Table 4.5.1: Order information



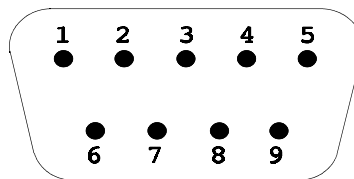
Connector Assignment

5. Connector Assignment

5.1 CAN Bus Interface (X301, X311)

The signals are identically assigned to the connector of interface CAN0 (X301) and to the optional interface CAN1 (X311). The connectors are 9-pole male DSUB-connectors.

Pin Position:



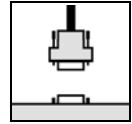
Pin Assignment:

Signal	Pin		Signal
CAN_GND	6	1	reserved
		2	CAN_L
CAN_H	7	3	CAN_GND
reserved	8	4	reserved
reserved	9	5	Shield

9-pole DSUB-connector

Signal Description:

CAN_L, CAN_H...	CAN signal lines
CAN_GND ...	reference potential of local CAN physical layers
shield ...	potential of the connector case
reserved ...	reserved for future applications



6. Correctly Wiring Electrically Isolated CAN Networks

Generally all instructions applying for wiring regarding an electromagnetic compatible installation, wiring, cross sections of wires, material to be used, minimum distances, lightning protection, etc. have to be followed.

The following **general rules** for the CAN wiring must be followed:

1.	A CAN net must not branch (exception: short dead-end feeders) and has to be terminated by the wave impedance of the wire (generally $120 \Omega \pm 10\%$) at both ends (between the signals CAN_L and CAN_H and not at GND)!
2.	A CAN data wire requires two twisted wires and a wire to conduct the reference potential (CAN_GND)! For this the shield of the wire should be used!
3.	The reference potential CAN_GND has to be connected to the earth potential (PE) at one point. Exactly one connection to earth has to be established!
4.	The bit rate has to be adapted to the wire length.
5.	Dead-end feeders have to be kept as short as possible ($l < 0.3 \text{ m}$)!
6.	When using double shielded wires the external shield has to be connected to the earth potential (PE) at one point. There must be not more than one connection to earth.
7.	A suitable type of wire (wave impedance ca. $120 \Omega \pm 10\%$) has to be used and the voltage loss in the wire has to be considered!
8.	CAN wires should not be laid directly next to disturbing sources. If this cannot be avoided, double shielded wires are preferable.

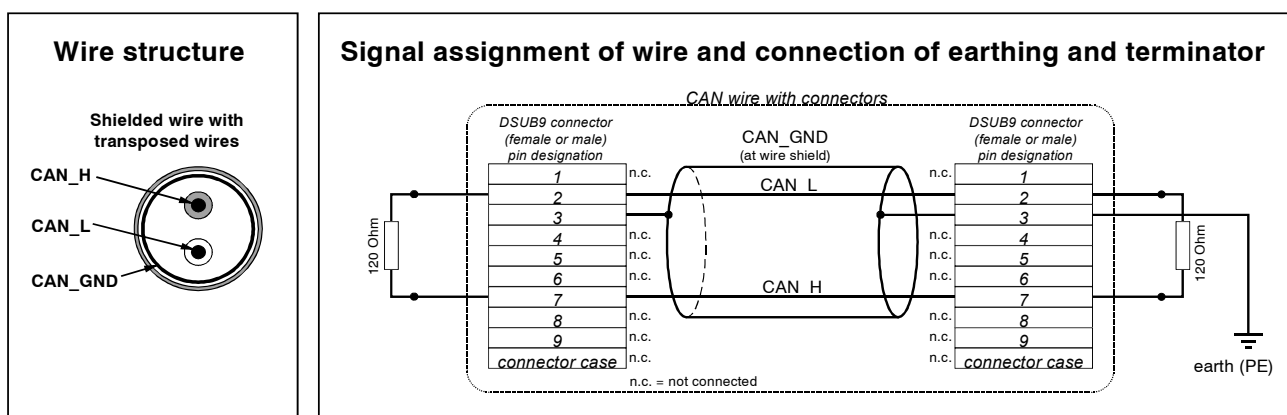
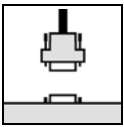


Figure: Structure and connection of wire



Wiring

Cabling

- for devices which have only one CAN connector per net use T-connector and dead-end feeder (shorter than 0.3 m) (available as accessory)

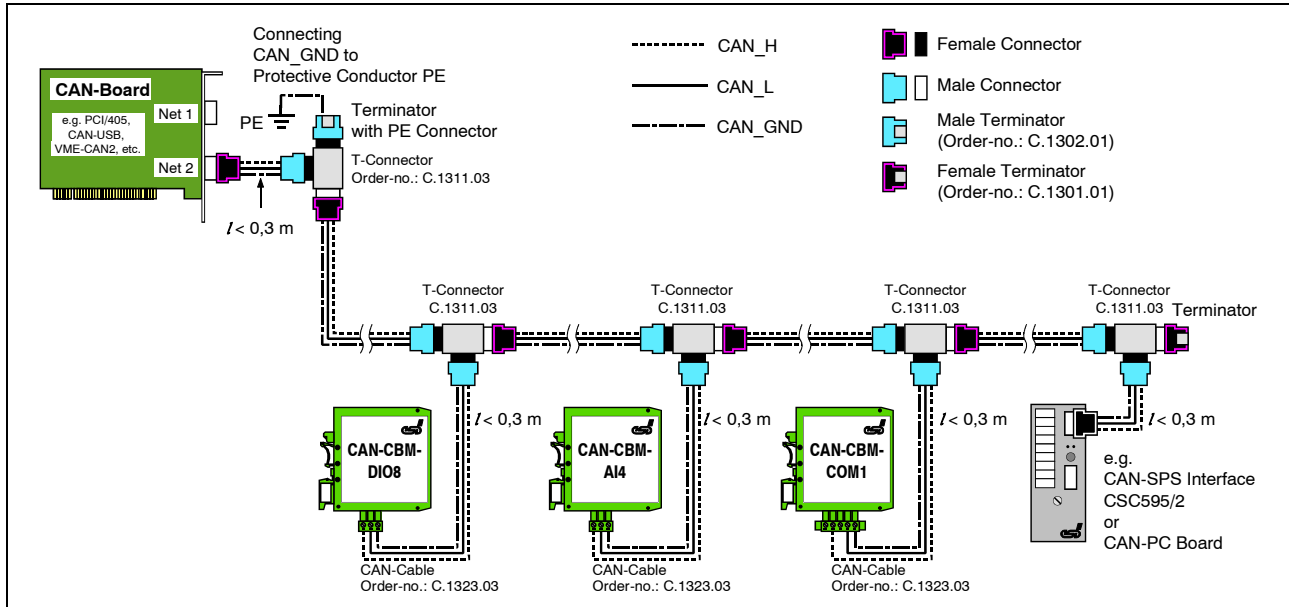


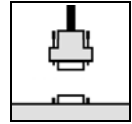
Figure: Example for correct wiring (when using single shielded wires)

Terminal Resistance

- use **external** terminator, because this CAN later be found again more easily!
- 9-pin DSUB-terminator with male and female contacts and earth terminal are available as accessories

Earthing

- CAN_GND has to be conducted in the CAN wire, because the individual esd modules are electrically isolated from each other!
- CAN_GND has to be connected to the earth potential (PE) at **exactly one** point in the net!
- each CAN user without electrically isolated interface works as an earthing, therefore: do not connect more than one user without potential separation!
- Earthing CAN e.g. be made at a connector

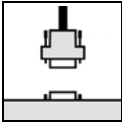


Wire Length

- Optical couplers are delaying the CAN signals. By using fast optical couplers and testing each board at 1 Mbit/s, however, esd CAN guarantee a reachable length of 37 m at 1 Mbit/s for most esd CAN modules within a closed net without impedance disturbances like e.g. longer dead-end feeders. (Exception: CAN-CBM-DIO8, -AI4 and AO4 (these modules work only up to 10 m with 1 Mbit/s))

Bit rate [Kbit/s]	Typical values of reachable wire length with esd interface l_{\max} [m]	CiA recommendations (07/95) for reachable wire lengths l_{\min} [m]
1000	37	25
800	59	50
666.6	80	-
500	130	100
333.3	180	-
250	270	250
166	420	-
125	570	500
100	710	650
66.6	1000	-
50	1400	1000
33.3	2000	-
20	3600	2500
12.5	5400	-
10	7300	5000

Table: Reachable wire lengths depending on the bit rate when using esd-CAN interfaces



Wiring

Examples for CAN Wires

Manufacturer	Type of wire
U.I. LAPP GmbH Schulze-Delitzsch-Straße 25 70565 Stuttgart Germany www.lappkabel.de	e.g. UNITRONIC ®-BUS CAN UL/CSA (UL/CSA approved) UNITRONIC ®-BUS-FD P CAN UL/CSA (UL/CSA approved)
ConCab GmbH Äußerer Eichwald 74535 Mainhardt Germany www.concab.de	e.g. BUS-PVC-C (1 x 2 x 0,22 mm ²) Order No.: 93 022 016 (UL appr.) BUS-Schleppflex-PUR-C (1 x 2 x 0,25 mm ²) Order No.: 94 025 016 (UL appr.)
SAB Bröckskes GmbH&Co. KG Grefrather Straße 204-212b 41749 Viersen Germany www.sab-brockskes.de	e.g. SABIX® CB 620 (1 x 2 x 0,25 mm ²) Order No.: 56202251 CB 627 (1 x 2 x 0,25 mm ²) Order No.: 06272251 (UL appr.)

Note: Completely configured CAN wires can be ordered from **esd**.