CAN-DP/2

CAN to PROFIBUS-DP® Slave Gateway

CANopen-DP/2

CANopen® to PROFIBUS-DP Slave Gateway

Hardware Manual

to Product C.2907.02 and C.2909.02

esd electronic system design gmbh
Vahrenwalder Str. 207 • 30165 Hannover • Germany
http://www.esd.eu
Phone: +49 (0) 511 3 72 98-0 • Fax: +49 (0) 511 3 72 98-68

N O T E

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esd electronic system design gmbh
Vahrenwalder Str. 207
30165 Hannover
Germany

Phone: +49-511-372 98-0
Fax: +49-511-372 98-68
E-Mail: info@esd.eu
Internet: www.esd.eu

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Document History

The changes in the document listed below affect changes in the hardware as well as changes in the description of the facts, only.

Revision	Chapter	Changes versus previous version	Date
1.1	9	Added new chapter 'Appendix InRailBus (Option)'	2013-02-14
	11	Updated chapter 'Order Information'	

Technical details are subject to change without further notice.

Safety Instructions

- When working with CAN-DP/2, CANopen-DP/2 follow the instructions below and read the manual carefully to protect yourself from injury and the CAN-DP/2, CANopen-DP/2 from damage.
- Do not open the housing of the CAN-DP/2, CANopen-DP/2.
- Never let liquids get inside the CAN-DP/2, CANopen-DP/2. Otherwise, electric shocks or short circuits may result.
- Protect the CAN-DP/2, CANopen-DP/2 from dust, moisture and steam.
- Protect the CAN-DP/2, CANopen-DP/2 from shocks and vibrations.
- The CAN-DP/2, CANopen-DP/2 may become warm during normal use. Always allow adequate ventilation around the CAN-DP/2, CANopen-DP/2 and use care when handling.
- Do not operate the CAN-DP/2, CANopen-DP/2 adjacent to heat sources and do not expose it to unnecessary thermal radiation. Ensure an ambient temperature as specified in the technical data.
- Do not use damaged or defective cables to connect the CAN-DP/2, CANopen-DP/2 and follow the CAN wiring hints in chapter: "Correctly Wiring Electrically Isolated CAN Networks".
- In case of damages to the device, which might affect safety, appropriate and immediate measures must be taken, that exclude an endangerment of persons and objects.
- Current circuits which are connected to the device have to be sufficiently protected against hazardous voltage (SELV according to EN 60950-1).
- The CAN-DP/2, CANopen-DP/2 may only be driven by power supply current circuits, that are contact protected. A power supply, that provides a safety extra-low voltage (SELV or PELV) according to EN 60950-1, complies with this conditions.

Qualified Personal
This documentation is directed exclusively towards personal qualified in control and automation engineering. The installation and commissioning of the product may only be carried out by qualified personal, which is authorized to put devices, systems and electric circuits into operation according to the applicable national standards of safety engineering.

Conformity
The CAN-DP/2, CANopen-DP/2 is an industrial product and meets the demands of the EU regulations and EMC standards printed in the conformity declaration at the end of this manual.

Warning: In a residential, commercial or light industrial environment the CAN-DP/2, CANopen-DP/2 may cause radio interferences in which case the user may be required to take adequate measures.

Intended Use
The intended use of the CAN-DP/2, CANopen-DP/2 is the operation as PROFIBUS-DP-CAN/CANopen-Gateway.
The guarantee given by esd does not cover damages which result from improper use, usage not in accordance with regulations or disregard of safety instructions and warnings.

- The CAN-DP/2, CANopen-DP/2 is intended for indoor installation.
- The operation of the CAN-DP/2, CANopen-DP/2 in hazardous areas, or areas exposed to potentially explosive materials is not permitted.
- The operation of the CAN-DP/2, CANopen-DP/2 for medical purposes is prohibited.

Service Note
The CAN-DP/2, CANopen-DP/2 does not contain any parts that require maintenance by the user. Unauthorized intervention in the device voids warranty claims.

Disposal
Devices which have become defective in the long run have to be disposed in an appropriate way or have to be returned to the manufacturer for proper disposal. Please, make a contribution to environmental protection.

Table of contents

1. Overview

1.1 Module Description CAN-DP, CANopen-DP

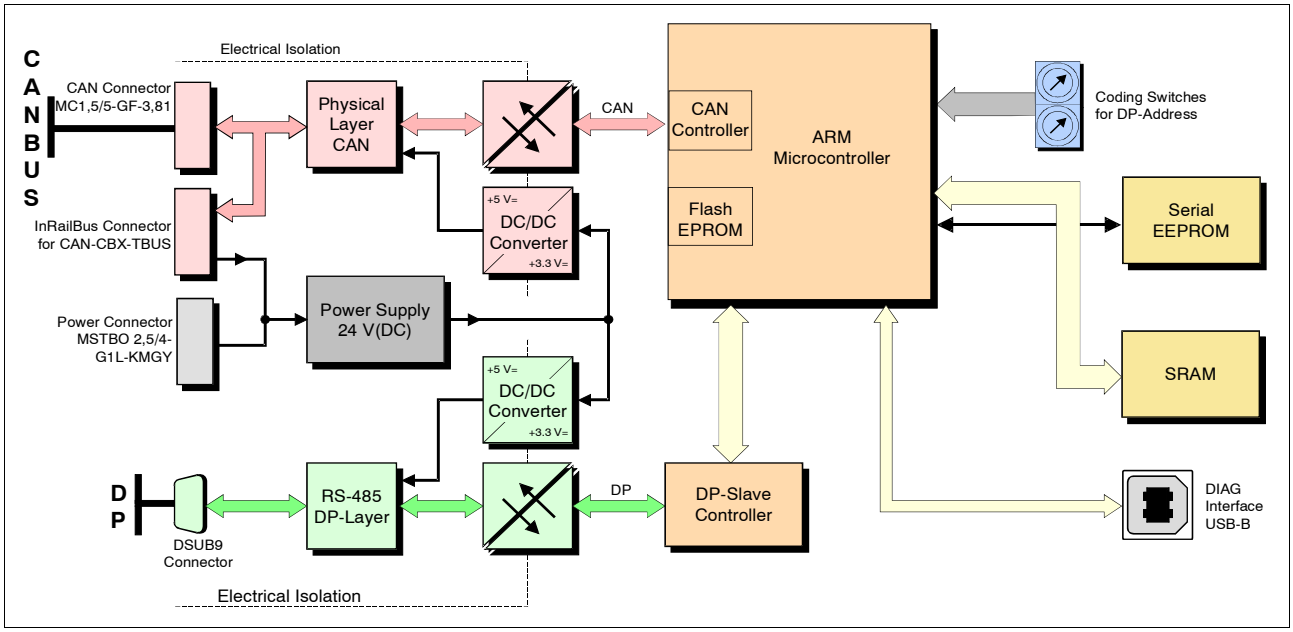


Fig. 1: Block-circuit diagram of the CAN-DP/2 module

By means of the CAN-DP/2 and CANopen-DP/2 modules, any PROFIBUS DP master can be connected to a CAN network.

The CAN-DP/2 module (order no.: C.2907.02) is equipped with a VPC3+ DP-Slave controller and acts like a slave I/O component on the DP-bus, with a total of up to 300 bytes input and output data. Maximum 244 bytes of the total of 300 bytes can be used as input data (with 56 byte output data) or maximum 244 bytes can be used as output data (with 56 bytes input data).

The CANopen-DP/2 module (order no.: C.2909.02) is equipped with a VPC3+ DP-Slave controller and acts like a slave I/O component on the DP-bus with a maximum of 240 bytes input data and maximum 240 bytes output data.

The CAN-DP/2 and CANopen-DP/2 modules operate internally with an ARM Cortex™-M3 processor, which buffers the CAN and PROFIBUS DP data into the local SRAM. The firmware and configuration data are kept in the Flash. Parameters are stored by means of a serial EEPROM.

The ISO 11898-2-compliant CAN interface allows a maximum data-transfer rate of 1 Mbit/s. The PROFIBUS DP slave interface automatically recognizes all usual bit rates up to 12 Mbit/s. The DP interface as well as the CAN interface are electronically insulated by optocouplers and DC/DC converters.

The CAN is connected by means of a 5-pin spring-cage connector in MINI COMBICON design. According to standard, the DP interface is equipped with a 9-pin female DSUB connector.

The configuration of the CAN-DP/2 and CANopen-DP/2 is done via PROFIBUS® tool, e.g. SIMATIC Manager.

2. Connectors and Basic Wiring

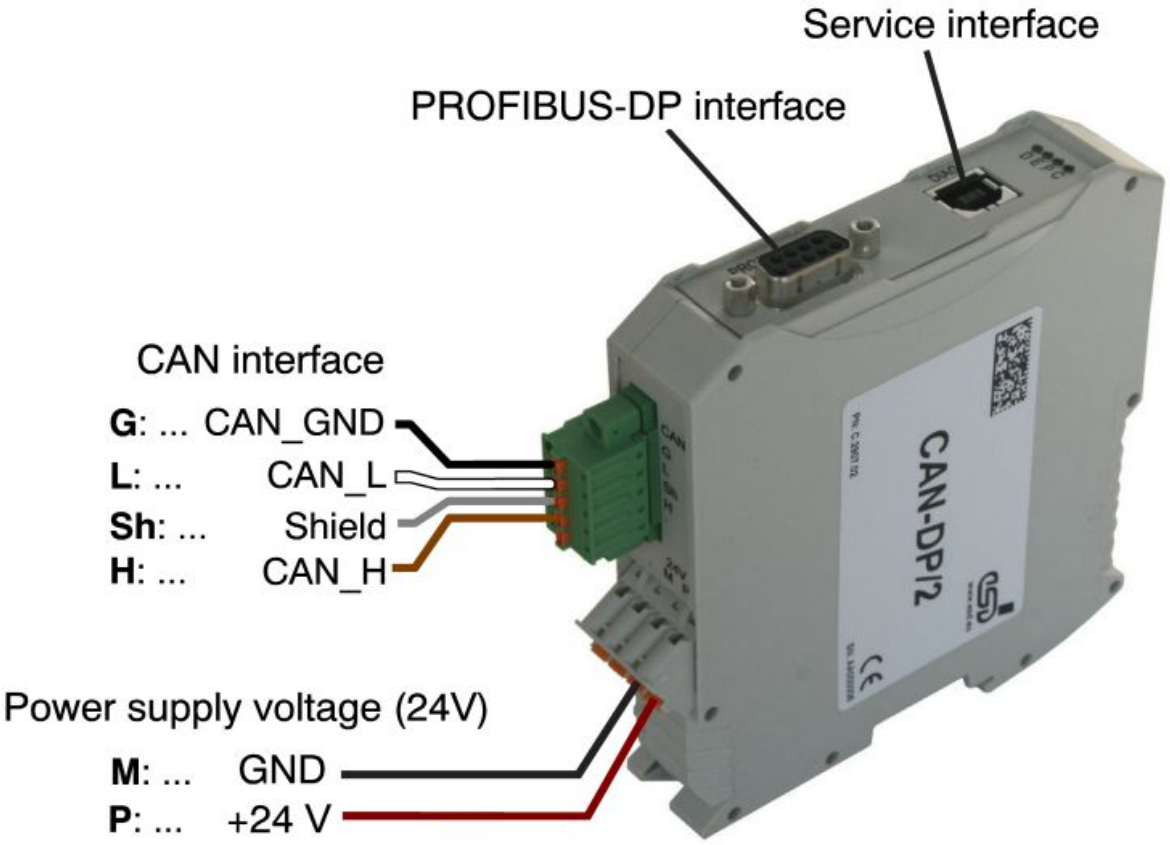


Fig. 2: Connections in operable state

3. Hardware Installation

To put the CAN-DP/2, CANopen-DP/2 into operation, please follow the installation notes.

Step	Procedure
	**Read the safety instructions at the beginning of this document carefully, before you start with the hardware installation!**
1.	Check the position of the coding switches.
2.	Mount the CAN-DP/2, CANopen-DP/2 module and connect the interfaces (CAN, PROFIBUS-DP, power supply voltage).
3.	Please note that the CAN bus has to be terminated at both ends! **esd** offers special T-connectors and termination connectors. Additionally the CAN_GND signal has to be connected to earth at **exactly one** point in the CAN network. Therefore the CAN termination connectors offered by esd have got a grounding contact. A CAN participant with a CAN interface which is not electrically isolated corresponds to the grounding of the CAN-GND.
4.	Switch on the 24 V-power supply voltage of the CAN-DP/CANopen-DP.

4. LEDs and Coding Switches

4.1 LED Assignment

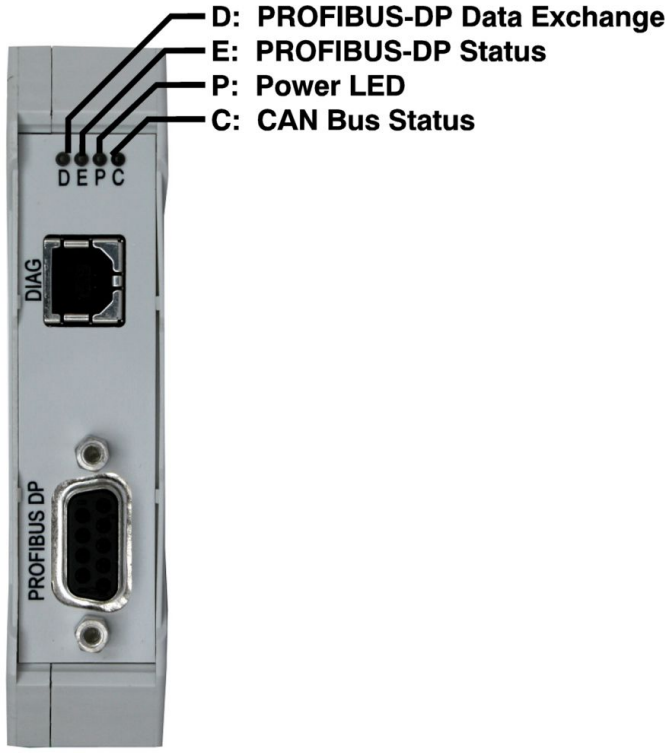


Fig. 3: Position of LEDs in the front panel

4.1.1 LED Indication

LED	Color	Name	Display Function LED on
D	green	PROFIBUS-data exchange	The complex display function of these LEDs is specified by the firmware. Refer to the chapter 'Diagnosis via LED Display' of the respective software manual for further information.
E	red	PROFIBUS-DP status	
P	green	Power LED	
C	green	CAN bus status	

4.2 Setting PROFIBUS-DP Address via Coding Switches

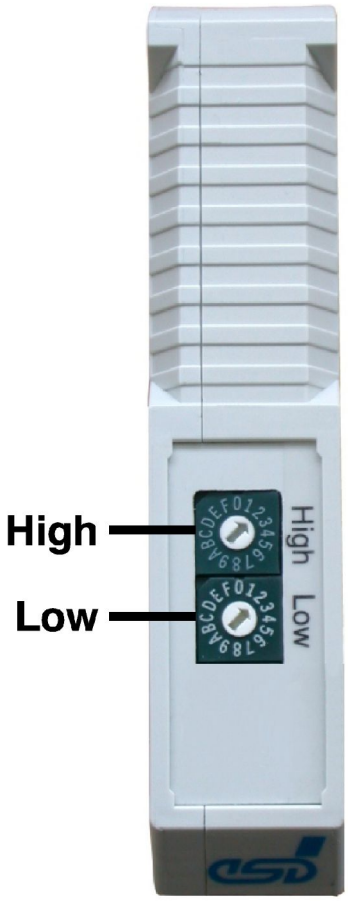


Fig. 4: Position of the Coding Switches

The PROFIBUS-DP address can be set with the coding switches. When switching on the module, the coding switches are evaluated via the firmware. Changes of the settings have to be made before switching on the module because changes during operation have no effect.

The CAN-DP/2 and CANopen-DP/2 are operated as slave stations with a configurable decimal address range from 3 to 124 or hexadecimal from 03h to 7Ch. Configuring an address lower than 3, the address 3 is valid. Configuring an address higher than 124 (decimal), respectively higher than 7Ch, the address 124 is valid.

The coding switch HIGH configures the more significant bits, the coding switch LOW configures the low significant bits (refer to figure above).

The CAN identifier of the CAN-DP/2 can be configured via the PROFIBUS-DP configuration tool (e.g. SIMATIC Manager). Please, refer to the 'CAN-DP/2 Software Manual' and 'CANopen-DP/2 Software Manual' respectively for further information.

5. Technical Data

5.1 General Technical Data

Power supply voltage	nominal voltage:	24 V/DC ± 20%
	Current consumption (24 V, 20 °C)	typical: 40 mA
Connectors	CAN interface:	5-pin MINI COMBICON or InRail Bus
	PROFIBUS-DP inteface:	9-pin DSUB, female
	Power supply:	4-pin COMBICON with spring-cage connection or InRailBus
	Service Interface:	USB type B connector
Temperature range	0...55 °C ambient temperature	
Humidity	max. 90%, non-condensing	
Dimensions	22.5 mm x 99 mm x 114.5 mm	
Weight	ca. 125 g	

5.2 Microprocessor and Memory

CPU	ARM®Cortex™-M3, STM2F205, 32-bit	
Memory	SRAM:	512 KB x 16 bit (1MB)
	Flash-EPROM:	256 KB, integrated in microcontroller
	Serial EEPROM	4 KB

5.3 CAN Interface

Number of CAN interfaces	1 x CAN
CAN controller	ISO11898-1 (CAN 2.0)
Physical Layer	Physical Layer according to ISO 11898-2, transmission rate programmable from 10 Kbit/s to 1 Mbit/s
Electrical isolation	via magnetic couplers and DC/DC converters
Bus termination	terminating resistor has to be set externally, if required
Connector	5-pin MINI COMBICON with spring-cage connection

5.4 PROFIBUS-DP Interface

Number of PROFIBUS-DP interfaces	1x PROFIBUS-DP
DP controller	VPC3, PROFIBUS-DP Slave
DP interface	RS-485, electrically isolated, max.12 Mbit/s
Connector	9-pin DSUB female

5.5 Service Interface (DIAG)

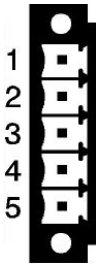
Type	USB, for manufacturing purposes only
USB specification	USB 2.0 Full Speed (12 Mbit/s)
Connector	DIAG, USB-connector type-B

6. Connector Assignments

6.1 CAN Bus (5-pin MINI COMBICON Style)

Device connector: COMBICON MC 1,5/5-GF-3,81
Line connector: COMBICON FK-MCP 1,5/5-STF-3,81, spring-cage connection (included in the scope of delivery)
For conductor connection and conductor cross section see page 18.

Pin Position:



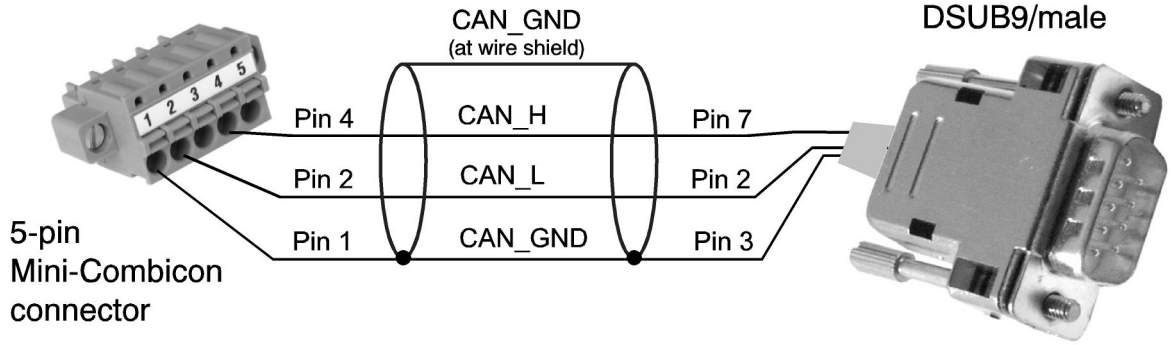
Pin Assignment:

Pin	Signal
1	CAN_GND
2	CAN_L
3	Shield
4	CAN_H
5	-

Signal Description:

CAN_L, CAN_H ...	CAN signals
CAN_GND...	reference potential of the CAN physical layers
Shield...	Shielding (Connected with the shielding contact of the case which has a conductive connection to the hat rail)
-...	not connected

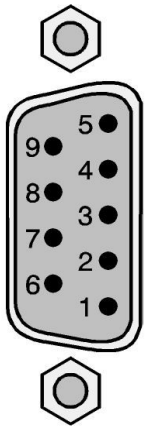
Recommendation of an adapter cable from 5-pin Combicon (here line connector FK-MCP1,5/5-STF-3,81 with spring-cage-connection) to 9-pin DSUB:



6.2 PROFIBUS-DP Interface (9-pin DSUB)

Device connector: 9-pin DSUB female

Pin Position:



Pin Assignment:

Signal	Pin		Signal
-	9	5	DGND
		4	CNTR-P (Output)
(In-/Output) RxD/TxD-N	8	3	RxD/TxD-P (In-/Output)
-	7	2	reserved
(Output) P5V	6	1	Shield

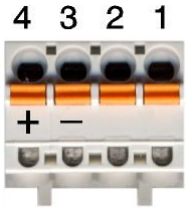
Signal Description:

RxD/TxD-P...	receive and transmission data
RxD/TxD-N	
CNTR-P...	control signal for repeater (‘Request To Send’)
P5V...	voltage supply for external terminating resistor networks (+5V, max. 50 mA)
DGND...	reference potential
-...	not connected

6.3 Power Supply Voltage

Device connector: Phoenix Contact Combicon MSTBO 2,5/4-G1L-KMGY
Line connector: Phoenix Contact Combicon FKCT 2,5/4-ST, 5.0 mm grid,
(spring-cage connections) (contained in the scope of supply)
For conductor connection and conductor cross section see page 18.

Pin-Position:



Pin-Assignment:

Pin	4	2	2	1
Signal	+24 V	GND	-	-

Signal Description:

+24 V... Supply voltage
GND ... Reference potential
- ... not connected

6.4 Conductor Connection/Conductor Cross Sections

The following table contains an extract of the technical data of the line connectors.

Interface	Power Supply Voltage 24 V	CAN-Connector
Connector type plug component (Range of articles)	FKCT 2,5/..-ST KMGY	FK-MCP 1,5/5-STF-3,81
Connection method	spring-cage connection	spring-cage connection
Stripping length	10 mm	9 mm
Conductor cross section solid min.	0,2 mm²	0.14 mm²
Conductor cross section solid max.	2,5 mm²	1.5 mm²
Conductor cross section stranded min.	0,2 mm²	0,14 mm²
Conductor cross section stranded max.	2,5 mm²	1,5 mm²
Conductor cross section stranded, with ferrule without plastic sleeve min.	0,25 mm²	0,25 mm²
Conductor cross section stranded, with ferrule without plastic sleeve max.	2,5 mm²	1,5 mm²
Conductor cross section stranded, with ferrule with plastic sleeve min.	0,25 mm²	0,25 mm²
Conductor cross section stranded, with ferrule with plastic sleeve max.	2, 5 mm²	0,5 mm²
Conductor cross section AWG/kcmil min.	24	26
Conductor cross section AWG/kcmil max	12	16
2 conductors, solid	not allowed	not allowed
2 conductors, stranded	not allowed	not allowed
2 conductors, stranded, ferrules without plastic sleeve	not allowed	not allowed
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0,5 mm²	not allowed
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	1,5 mm²	not allowed
Minimum AWG according to UL/cUL	26	28
Maximum AWG according to UL/cUL	12	16

7. Correctly Wiring Electrically Isolated CAN Networks

For the CAN wiring all applicable rules and regulations (EC, DIN), e.g. regarding electromagnetic compatibility, security distances, cable cross-section or material, have to be met.

7.1 Light Industrial Environment (*Single* Twisted Pair Cable)

7.1.1 General Rules

Note:
esd grants the EC Conformity of the product, if the CAN wiring is carried out with at least single shielded **single** twisted pair cables that match the requirements of ISO 118982-2. Single shielded *double* twisted pair cable wiring as described in chapter 7.2. ensures the EC Conformity as well.

The following **general rules** for CAN wiring with single shielded *single* twisted pair cable must be followed:

1	A cable type with a wave impedance of about 120 Ω ±10% with an adequate wire cross-section (0.22 mm²) has to be used. The voltage drop over the wire has to be considered!
2	For light industrial environment use at least a two-wire CAN cable. Connect • the two twisted wires to the data signals (CAN_H, CAN_L) and • the cable shield to the reference potential (CAN_GND)!
3	The reference potential CAN_GND has to be connected to the functional earth (FE) at exactly **one** point.
4	A CAN net must not branch (exception: short cable stubs) and has to be terminated with the characteristic impedance of the line (generally 120 Ω ±10%) at both ends (between the signals CAN_L and CAN_H and **not** at GND)!
5	Keep cable stubs as short as possible (l < 0.3 m)!
6	Select a working combination of bit rate and cable length.
7	Keep away cables from disturbing sources. If this cannot be avoided, double shielded wires are recommended.

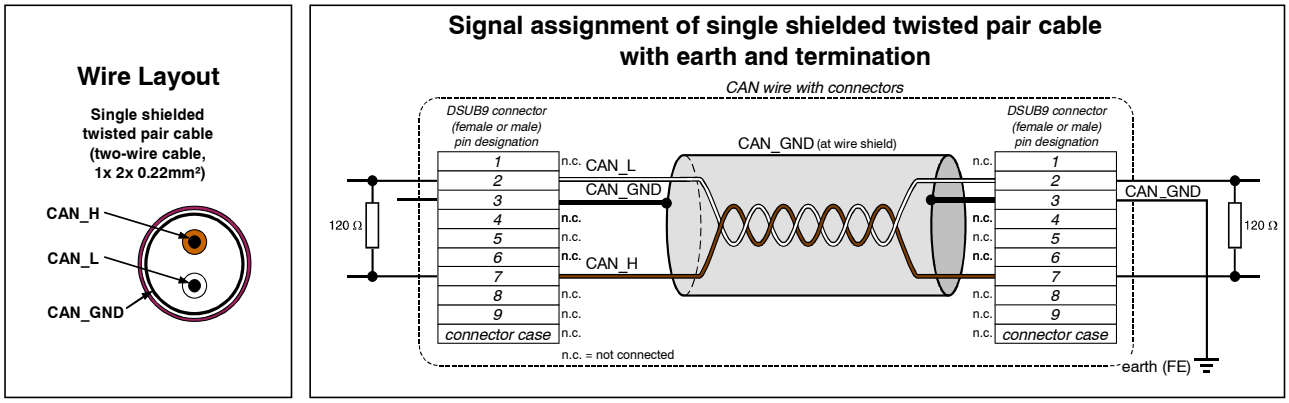


Figure. 5: CAN wiring for light industrial environment

7.1.2 Cabling

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

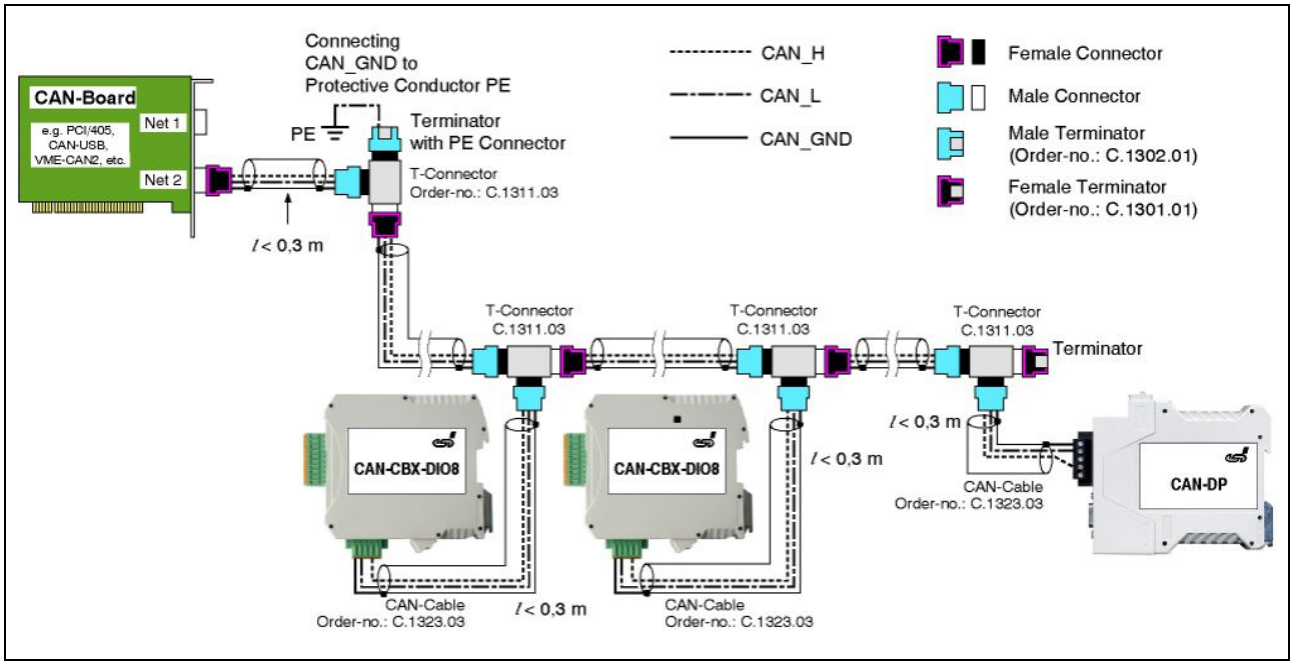


Figure. 6: Example for proper wiring with single shielded single twisted pair wires

7.1.3 Termination

- Use external termination plugs, because they can be rediscovered more easily than internal terminations within the CAN devices!
- 9-pin DSUB-termination connectors with male and female contacts and earth terminal are available as accessories

7.2 Heavy Industrial Environment (*Double* Twisted Pair Cable)

7.2.1 General Rules

The following **general rules** for the CAN wiring with single shielded *double* twisted pair cable must be followed:

1	A cable type with a wave impedance of about 120 Ω ±10% with an adequate wire cross-section (0.22 mm²) has to be used. The voltage drop over the wire has to be considered!
2	For heavy industrial environment use a four-wire CAN cable. Connect • two twisted wires to the data signals (CAN_H, CAN_L) and • the other two twisted wires to the reference potential (CAN_GND) and • the cable shield to functional earth (FE) at least at one point!
3	The reference potential CAN_GND has to be connected to the functional earth (FE) at exactly **one** point.
4	A CAN bus line must not branch (exception: short cable stubs) and has to be terminated with the characteristic impedance of the line (generally 120 Ω ±10%) at both ends (between the signals CAN_L and CAN_H and **not** at GND)!
5	Keep cable stubs as short as possible (l < 0.3 m)!
6	Select a working combination of bit rate and cable length.
7	Keep away CAN cables from disturbing sources. If this can not be avoided, double shielded cables are recommended.

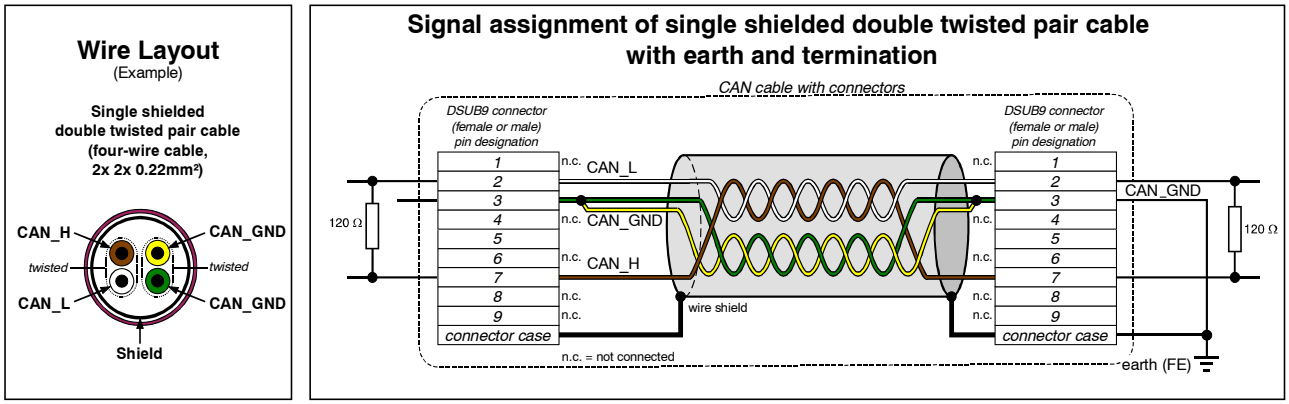


Figure. 7: CAN wiring for heavy industrial environment

7.2.2 Device Cabling

- To connect CAN devices which are equipped with one CAN connector per net, use T-connectors and cable stubs (shorter than 0.3 m).

Attention:
If single shielded *double* twisted pair cables are used, realize the T-connections by means of connectors that support connection of two CAN cables at one connector where the cable's shield is looped through e.g. DSUB9 connector from ERNI (ERBIC CAN BUS MAX, order no.:154039).

The usage of esd's T-connector type C.1311.03 is not recommended for single shielded *double* twisted pair cables because the shield potential of the conductive DSUB housing is not looped through this T-connector type.

Furthermore, mixed use of single twisted and double twisted cables should be avoided!

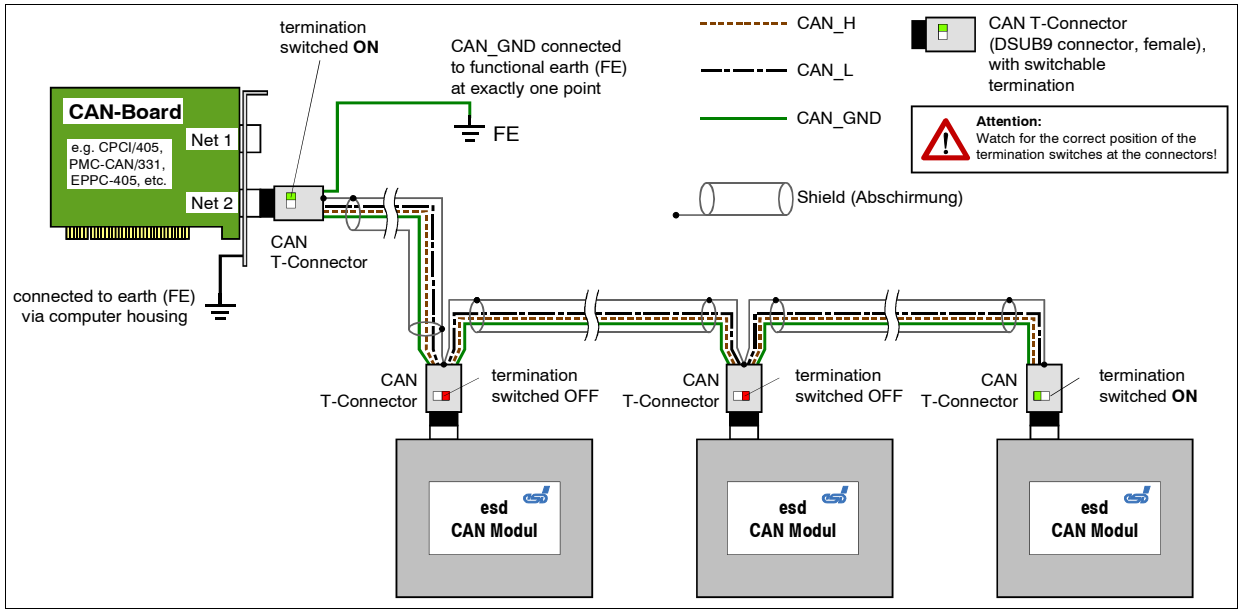


Figure. 8: Example for proper wiring with single shielded double twisted pair cables

7.2.3 Termination

- Use external termination plugs, because they can later be rediscovered more easily than internal terminations within the CAN devices!

- A 9-pin DSUB-connector with integrated switchable termination resistor can be ordered e.g. from ERNI (ERBIC CAN BUS MAX, female contacts, order no.:154039).

7.3 Electrical Grounding

- CAN_GND has to be connected between the CAN devices, because esd CAN devices are electrically isolated from each other!
- CAN_GND has to be connected to the earth potential (FE) at **exactly one** point of the network!
- Each CAN interface without electrically isolated interface acts as an earthing point. For this reason do not connect more than one CAN device without electrically isolated CAN interface!
- Earthing can e.g. be made at a connector/T-connector.

7.4 Bus Length

- Optical couplers are delaying the CAN signals. esd modules typically reach a wire length of 37 m at 1 Mbit/s within a closed net without impedance disturbances like e.g. cable stubs >> 0.3 m.

Bit rate [Kbits/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 1: Recommended cable lengths at typical bit rates (with esd-CAN interfaces)

Note:
Please note the recommendations according to ISO 11898 for the selection of the cross section of the wire depending of the wire length.

7.5 Examples for CAN Cables

7.5.1 Cable for Light Industrial Environment Applications (Two-Wire)

Manufacturer	Cable Type
U.I. LAPP GmbH Schulze-Delitzsch-Straße 25 70565 Stuttgart Germany www.lappkabel.com	e.g. UNITRONIC ®-BUS CAN UL/CSA (1x 2x 0.22) (UL/CSA approved) Part No.: 2170260 UNITRONIC ®-BUS-FD P CAN UL/CSA (1x 2x 0.25) (UL/CSA approved) Part No.: 2170272
ConCab GmbH Äußerer Eichwald 74535 Mainhardt Germany www.concab.de	e. g. BUS-PVC-C (1x 2x 0.22 mm²) Order No.: 93 022 016 (UL appr.) BUS-Schleppflex-PUR-C (1x 2x 0.25 mm²) Order No.: 94 025 016 (UL appr.)

7.5.2 Cable for Heavy Industrial Environment Applications (Four-Wire)

Manufacturer	Cable Type
U.I. LAPP GmbH Schulze-Delitzsch-Straße 25 70565 Stuttgart Germany www.lappkabel.com	e.g. UNITRONIC ®-BUS CAN UL/CSA (2x 2x 0.22) (UL/CSA approved) Part No.: 2170261 UNITRONIC ®-BUS-FD P CAN UL/CSA (2x 2x 0.25) (UL/CSA approved) Part No.: 2170273
ConCab GmbH Äußerer Eichwald 74535 Mainhardt Germany www.concab.de	e. g. BUS-PVC-C (2x 2x 0.22 mm²) Order No.: 93 022 026 (UL appr.) BUS-Schleppflex-PUR-C (2x 2x 0.25 mm²) Order No.: 94 025 026 (UL appr.)

Note:
Configured CAN cables can be ordered from **esd**.

8. CAN Troubleshooting Guide

The CAN Troubleshooting Guide is a guide to find and eliminate the most frequent hardware-error causes in the wiring of CAN-networks.

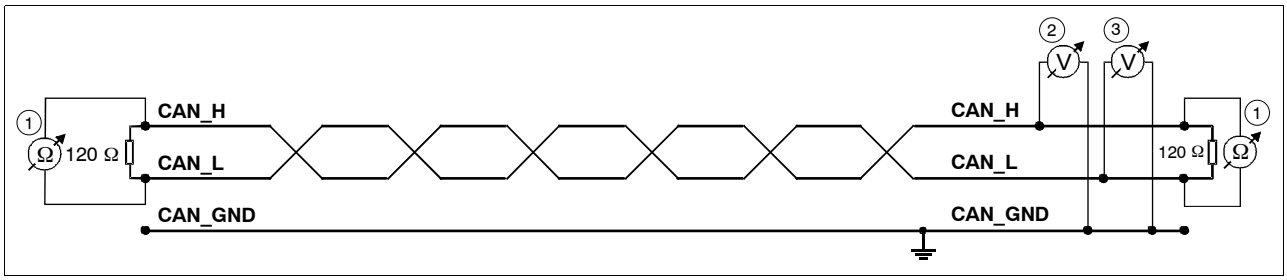


Figure. 9: Simplified diagram of a CAN network

8.1 Termination

The termination is used to match impedance of a node to the impedance of the transmission line being used. When impedance is mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line. If the source, transmission line and load impedance are equal these reflections are eliminated. This test measures the series resistance of the CAN data pair conductors and the attached terminating resistors.

To test it, please

1. Turn off all power supplies of the attached CAN nodes.
2. Measure the DC resistance between CAN_H and CAN_L at the ends of the network ① (see figure above) and at the centre of the network (if the network cable consists of more than one line section).

The measured value should be between 50 Ω and 70 Ω. The measured value should be nearly the same at each point of the network.

If the value is below 50 Ω, please make sure that:
- there is no short circuit between CAN_H and CAN_L wiring
- there are not more than two terminating resistors
- the nodes do not have faulty transceivers.

If the value is higher than 70 Ω, please make sure that:
- there are no open circuits in CAN_H or CAN_L wiring
- your bus system has two terminating resistors (one at each end) and that they are 120 Ω each.

8.2 Electrical Grounding

The CAN_GND of the CAN network has to be connected to the functional earth potential (FE) at only **one** point. This test will indicate if the CAN_GND is grounded in several places.
To test it, please

1. Disconnect the CAN_GND from the earth potential (FE).
2. Measure the DC resistance between CAN_GND and earth potential (see figure on the right).
3. Connect CAN_GND to earth potential.

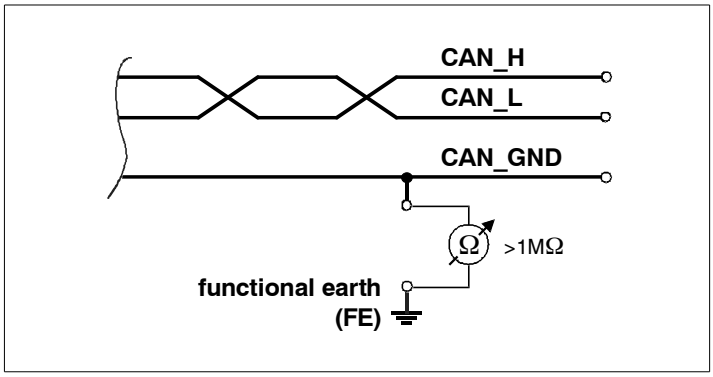


Figure. 10: Simplified schematic diagram of ground test measurement

The resistance should be higher than 1 MΩ. If it is lower, please search for additional grounding of the CAN_GND wires.

8.3 Short Circuit in CAN Wiring

A CAN bus might possibly still be able to transmit data if there is a short circuit between CAN_GND and CAN_L, but the error rate will increase strongly. Make sure that there is no short circuit between CAN_GND and CAN_L!

8.4 CAN_H/CAN_L-Voltage

Each node contains a CAN transceiver that outputs differential signals. When the network communication is idle the CAN_H and CAN_L voltages are approximately 2.5 volts. Faulty transceivers can cause the idle voltages to vary and disrupt network communication.

To test for faulty transceivers, please

1. Turn on all supplies.
2. Stop all network communication.
3. Measure the DC voltage between CAN_H and GND ② (see figure above).
4. Measure the DC voltage between CAN_L and GND ③ (see figure above).

Normally the voltage should be between 2.0 V and 4.0 V.

If it is lower than 2.0 V or higher than 4.0 V, it is possible that one or more nodes have faulty transceivers. For a voltage lower than 2.0 V please check CAN_H and CAN_L conductors for continuity. For a voltage higher than 4.0 V, please check for excessive voltage.

To find the node with a faulty transceiver please test the CAN transceiver resistance (see below).

8.5 CAN Transceiver Resistance Test

CAN transceivers have one circuit that controls CAN_H and another circuit that controls CAN_L. Experience has shown that electrical damage to one or both of the circuits may increase the leakage current in these circuits.

To measure the current leakage through the CAN circuits, please use an resistance measuring device and:

1. Switch off the node and disconnect it from the network ④
   (see figure below).

2. Measure the DC resistance between CAN_H and CAN_GND ⑤
   (see figure below).

3. Measure the DC resistance between CAN_L and CAN_GND ⑥
   (see figure below).

The measured resistance has to be about 500 kΩ for each signal. If it is much lower, the CAN transceiver it is probably faulty.
Another sign for a faulty transceiver is a very high deviation between the two measured input resistance (>> 200%).

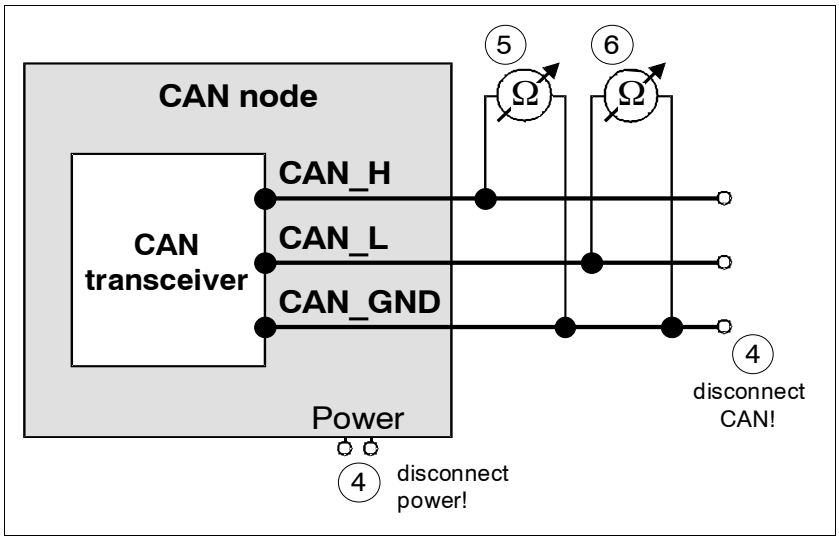


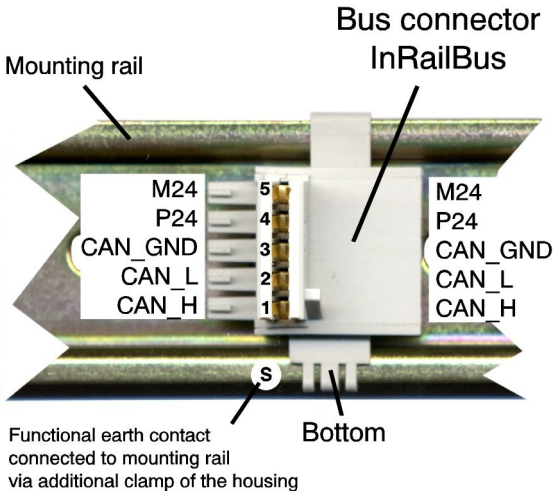
Figure. 11: Measuring the internal resistance of CAN transceivers

9. Appendix InRailBus (Option)

9.1 Connector Assignment 24V and CAN via InRailBus

Connector type: Mounting-rail bus connector of the CBX-InRailBus
Phoenix Contact ME 22,5 TBUS 1,5/5-ST-3,81 KMGY

Connector View:



Pin Assignment:

Pin	Signal
5	M24 (GND)
4	P24 (+24 V)
3	CAN_GND
2	CAN_L
1	CAN_H

S	FE (PE_GND)

Signal Description:

CAN_L, CAN_H ... CAN signals

CAN_GND ... reference potential of the local CAN-Physical layers

P24... power supply voltage +24 V ±10 %

M24... reference potential

FE... functional earth contact (EMC) (connected to mounting rail potential)

9.2 Using InRailBus

Note:
This chapter describes the installation of the module using InRailBus for CAN-CBX-modules. For the CAN-DP/2 and CANopen-DP/2 modules the following points apply accordingly.

9.2.1 Installation of the Module Using InRailBus Connector

If the CAN bus signals and the power supply voltage shall be fed via the InRailBus, please proceed as follows:

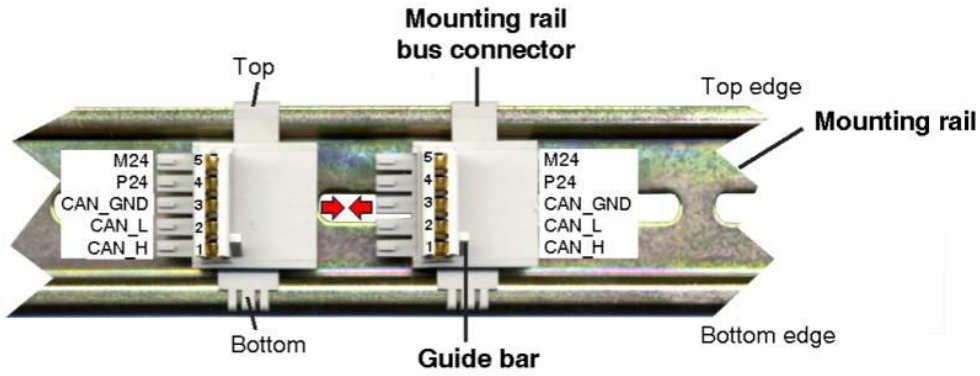


Figure. 12: Mounting rail with bus connector

1. Position the InRailBus connector on the mounting rail and snap it onto the mounting rail using slight pressure. Plug the bus connectors together to contact the communication and power signals (in parallel with one). The bus connectors can be plugged together before or after mounting the CAN-CBX modules. **The mounting rail bus connector is not included in the amount of delivery and has to be ordered separately.**

2. Place the CAN-CBX module with the DIN rail guideway on the top edge of the mounting rail.

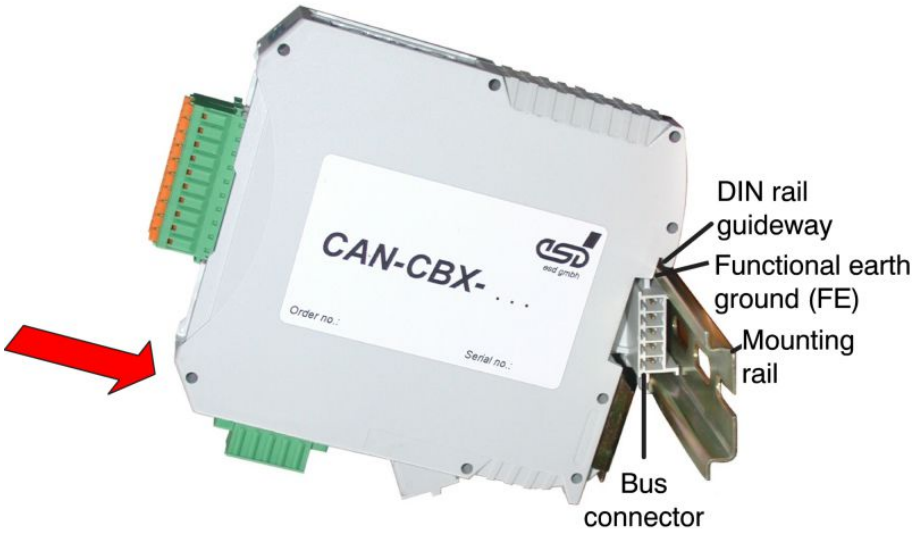


Figure. 13: Mounting CAN-CBX modules

3. Swivel the CAN-CBX module onto the mounting rail in pressing the module downwards according to the arrow as shown in figure 13. The housing is mechanically guided by the DIN rail bus connector.

4. When mounting the CAN-CBX module the metal foot catch snaps on the bottom edge of the mounting rail. Now the module is mounted on the mounting rail and connected to the InRailBus via the bus connector. Connect the bus connectors and the InRailBus, if not already done.

Figure. 14: Mounted CAN-CBX module

9.2.2 Connecting Power Supply and CAN Signals to CBX-InRailBus

To connect the power supply and the CAN-signals via the InRailBus, a terminal plug is needed. The terminal plug is not included in delivery and must be ordered separately (order no.: C.3000.02, see order information for InRailBus Accessories, page 34).

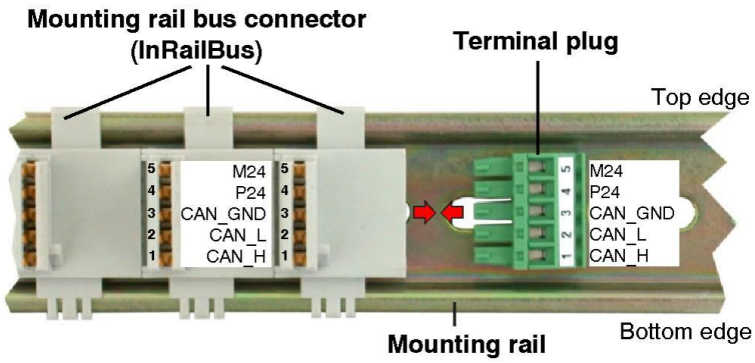


Figure. 15: Mounting rail with InRailBus and terminal plug

Plug the terminal plug into the socket on the right of the mounting-rail bus connector of the InRailBus, as described in Figure 15. Then connect the CAN interface and the power supply voltage via the terminal plug.

9.2.3 Connection of the Power Supply Voltage

The power supply voltage can be connected via the +24V connector for the power supply voltage or via InRailBus connector.

Attention:
Please note the safety instructions to requirements on the supply current circuit (see page 4).

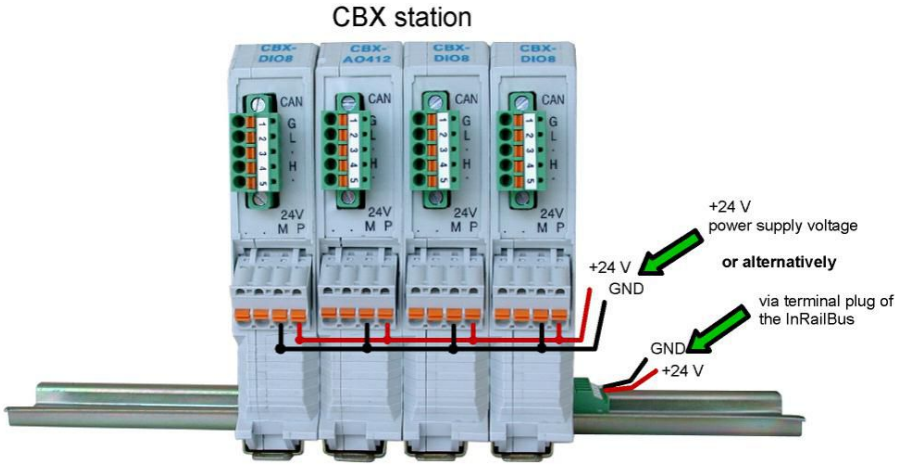


Figure. 16: Connecting the power supply voltage to the CAN-CBX station

Earthing the mounting rail

Note:
Connect the mounting rail to functional earth potential. Please note that the impedance of the connecting cable has to be kept low.

Functional earth is a current path of low impedance between current circuits and earth, which is used to increase the interference immunity. It is not intended as protective measure and does not protect against accidental contact.

9.2.4 Connection of CAN

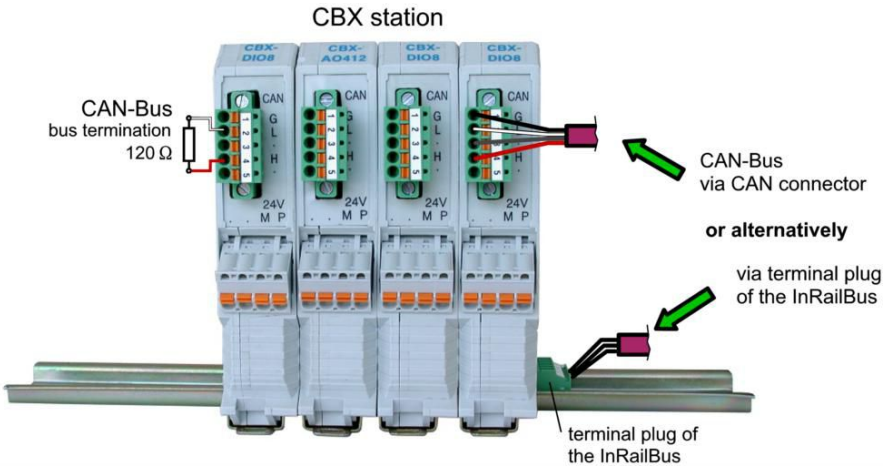


Figure. 17: Connecting the CAN signals to the CAN-CBX station

Generally the CAN signals can be fed via the CAN connector of the first CAN-CBX module of the CBX station. The signals are then connected through the CAN-CBX station via the InRailBus. To lead through the CAN signals the CAN bus connector of the last CAN-CBX module of the CAN-CBX station has to be used. The CAN connectors of the CAN-CBX modules which are not at the ends of the CAN-CBX station must not be connected to the CAN bus, because this would cause incorrect branching.
A bus termination must be connected to the CAN connector of the CAN-CBX module at the end of the CBX-InRailBus (see Fig. 17), if the CAN bus ends there.

9.3 Remove the CAN-CBX Module from InRailBus

If the CAN-CBX module is connected to the InRailBus please proceed as follows:

Release the module from the mounting rail in moving the foot catch (see Fig. 13) downwards (e.g. with a screwdriver). Now the module is detached from the bottom edge of the mounting rail and can be removed.

Note:
It is possible to remove individual devices from the whole without interrupting the InRailBus connection, because the contact chain will not be interrupted.

10. Declaration of Conformity

EG-KONFORMITÄTSERKLÄRUNG
EC DECLARATION OF CONFORMITY

Adresse / *Address*
esd electronic system design gmbh
Vahrenwalder Str. 207
30165 Hannover
Germany

esd erklärt, dass das Produkt *esd declares, that the product*	Typ, Modell, Artikel-Nr. *Type, Model, Article No.*
CAN-DP/2 **CANopen-DP/2**	**C.2907.02** **C.2909.02**
die Anforderungen der Normen *fulfills the requirements of the standards*	**EN 61000-6-2:2005,** **EN 61000-6-4:2007+A1:2011**
gemäß folgendem Prüfbericht erfüllt. *according to test certificate.*	**H-K00-490-12**
Das Produkt entspricht damit der EG-Richtlinie „EMV" *Therefore the product corresponds to the EC-Directive 'EMC'*	**2004/108/EG**
Das Produkt entspricht der EG-Richtlinie „RoHS" *The product corresponds to the EC-Directive 'RoHS'*	**2011/65/EU**

Diese Erklärung verliert ihre Gültigkeit, wenn das Produkt nicht den Herstellerunterlagen entsprechend eingesetzt und betrieben wird, oder das Produkt abweichend modifiziert wird.
This declaration loses its validity if the product is not used or run according to the manufacturer's documentation or if non-compliant modifications are made.

Name / *Name* T. Ramm
Funktion / *Title* CE-Koordinator / *CE Coordinator*
Datum / *Date* Hannover, 2013-01-04

Rechtsgültige Unterschrift / *authorized signature*

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11. Order Information

Type	Properties	Order No.
CAN-DP/2	Gateway CAN to PROFIBUS-DP slave, physical layer ISO 11898-2, firmware with gateway function, GSD-file included	C.2907.02
CANopen-DP/2	Gateway CANopen to PROFIBUS-DP slave, physical layer ISO 11898-2, firmware with gateway function, GSD-file included	C.2909.02
Accessories		
 CAN-CBX-TBUS	Mounting-rail bus connector of the CBX-InRailBus for CAN-CBX modules	C.3000.01
 CAN-CBX-TBUS-Connector	Terminal plug of the CBX-InRailBus for the connection of the +24V power supply voltage and the CAN interface, female type	C.3000.02
 CAN-CBX-TBUS-Connection adapter	Terminal plug of the CBX-InRailBus for the connection of the +24V power supply voltage and the CAN-Interface Male type	C.3000.03

Table 2: Order information

PDF Manuals
Manuals are available in English and usually in German as well. Available manuals are listed in the following table.
Please download the manuals as PDF documents from our esd website www.esd.eu for free.

Manuals		Order No.
CAN-DP/2-MD	CAN-DP/2 manual in German	C.2907.20
CAN-DP/2-ME	CAN-DP/2 manual in English	C.2907.21
CANopen-DP/2-MD	CANopen-DP/2 manual in German	C.2909.20
CANopen-DP/2-ME	CANopen-DP/2 manual in English	C.2909.21

Table 3: Available manuals

Printed Manuals
If you need a printout of the manual additionally, please contact our sales team: sales@esd.eu for a quotation. Printed manuals may be ordered for a fee.