CAN-USB/Micro

Small CAN USB Interface in DSUB9 Enclosure

Hardware Manual

For Product C.2068.02,
C.2068.03

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This manual contains important information and instructions on safe and efficient handling of the CAN-USB/Micro. Carefully read this manual before commencing any work and follow the instructions.
The manual is a product component, please retain it for future use.

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Hardware version.:	Rev. 1.1 and higher

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
1.3	all	Manual converted to Word, all chapters revised	2025-10-22
	-	Safety instructions and notes from page 5 revised	
	all	CAN-USB/Micro-TI added	
		Chapters on correct wiring has been deleted	
1.2	5.4	Software support per default via NTCAN driver.	2014-01-17
	9.	EC declaration of conformity updated.	
	10.	Order information updated.	
1.1	5.4, 12.	Notes on software driver support inserted.	2011-06-01
	7.	Documentation corrected: CAN interface is not electrically isolated. Editorial revision of the chapter.	
	8.	CAN transceiver test revised. Editorial revision of the chapter.	
	12.	Order information moved to chapter 12.	
1.0	-	First version	2011-01-28

Technical details are subject to change without further notice.

Classification of Warning Messages and Safety Instructions

This manual contains noticeable descriptions, warning messages and safety instructions, which you must follow to avoid personal injuries or death and property damage.

This is the safety alert symbol.
It is used to alert you to potential personal injury hazards. Obey all safety messages and instructions that follow this symbol to avoid possible injury or death.

DANGER, WARNING, CAUTION

Depending on the hazard level the signal words DANGER, WARNING or CAUTION are used to highlight safety instructions and warning messages. These messages may also include a warning relating to property damage.

DANGER
Danger statements indicate a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING.
Warning statements indicate a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION
Caution statements indicate a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

Notice statements are used to notify people on hazards that could result in things other than personal injury, like property damage.

NOTICE
This NOTICE statement indicates that the device contains components sensitive to electrostatic discharge.

NOTICE
This NOTICE statement contains the general mandatory sign and gives information that must be heeded and complied with for a safe use.

INFORMATION

INFORMATION
Notes to point out something important or useful.

Safety Instructions

- When working with the CAN-USB/Micro follow the instructions below and read the manual carefully to protect yourself from injury and the CAN-USB/Micro from damage.
- Do not use damaged or defective cables to connect the CAN-USB/Micro.
- 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 domestic animals and property.
- The CAN-USB/Micro may only be operated on supply circuits that offer sufficient protection against dangerous voltages. The CAN-USB/Micro must be powered via USB and not from an external power supply.
- External circuits connected to the interfaces of the CAN-USB/Micro must be sufficiently protected against dangerous voltage.
- The user is responsible for compliance with the applicable national safety regulations.
- Do not open the housing of the CAN-USB/Micro .
- The CAN-USB/Micro must be securely installed before commissioning.
- Never let liquids get inside CAN-USB/Micro. Otherwise, electric shocks or short circuits may result.
- Protect the CAN-USB/Micro from dust, moisture, and steam.
- Protect the CAN-USB/Micro from shocks and vibrations.
- The CAN-USB/Micro may become warm during normal use. Always allow adequate ventilation around the CAN-USB/Micro and use care when handling
- Do not operate the CAN-USB/Micro adjacent to heat sources and do not expose it to unnecessary thermal radiation. Ensure an ambient temperature as specified in the technical data.

DANGER
Hazardous Voltage - Risk of electric shock due to unintentional contact with uninsulated live parts with high voltages inside of the system into which the CAN-USB/Micro is to be integrated.

→ Disconnect all hazardous voltages (mains voltage) before opening the system.
→ Ensure the absence of voltage before starting any electrical work

NOTICE
Electrostatic discharges may cause damage to electronic components.

→ Take the appropriate precautions for handling electrostatic discharge sensitive devices.
→ Discharge the static electricity from your body before touching the CAN-USB/Micro.
→ Transport and store the CAN-USB/Micro only in an electrostatically safe bag, as when delivered.

Qualified Personnel

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

Conformity

The CAN-USB/Micro 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 an industrial environment the CAN-USB/Micro may be affected by radio interferences. In this case the user may be required to take adequate measures.

Data Safety

This device is equipped with a USB or other interface which is suitable to establish a connection to data networks. Depending on the software used on the device, these interfaces may allow attackers to compromise normal function, get illegal access or cause damage.
esd does not take responsibility for any damage caused by the device if operated at any networks. It is the responsibility of the device's user to take care that necessary safety precautions for the device's network interface are in place.

Intended Use

The intended use of the CAN-USB/Micro is the operation as converter for easily connecting a CAN interface to a PC via USB. Power is supplied via the USB interface with 5 VDC.
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 operation of the CAN-USB/Micro in hazardous areas, or areas exposed to potentially explosive materials is not permitted.
- The operation of the CAN-USB/Micro for medical purposes is prohibited.

Service Note

The CAN-USB/Micro does not contain any parts that require maintenance by the user. The CAN-USB/Micro does not require any manual configuration of the hardware. Unauthorized intervention in the device voids warranty claims

Disposal

Products marked with a crossed-out dustbin must not be disposed of with household waste. Devices which have become defective in the long run must be disposed in an appropriate way or must be returned to the manufacturer for proper disposal. Please, contribute to environmental protection.

Table of Contents

List of Tables

List of Figures

1 Overview

1.1 About this Manual

This manual describes the hardware variants of CAN-USB/Micro. The product is available in the variants CAN-USB/Micro and CAN-USB/Micro-TI. In this manual both variants are collectively referred to as CAN-USB/Micro. Functional features, available options and included components may differ depending on the selected variant.
Differences of the CAN-USB/Micro variants are noted accordingly where relevant.

1.2 Description of CAN-USB/Micro

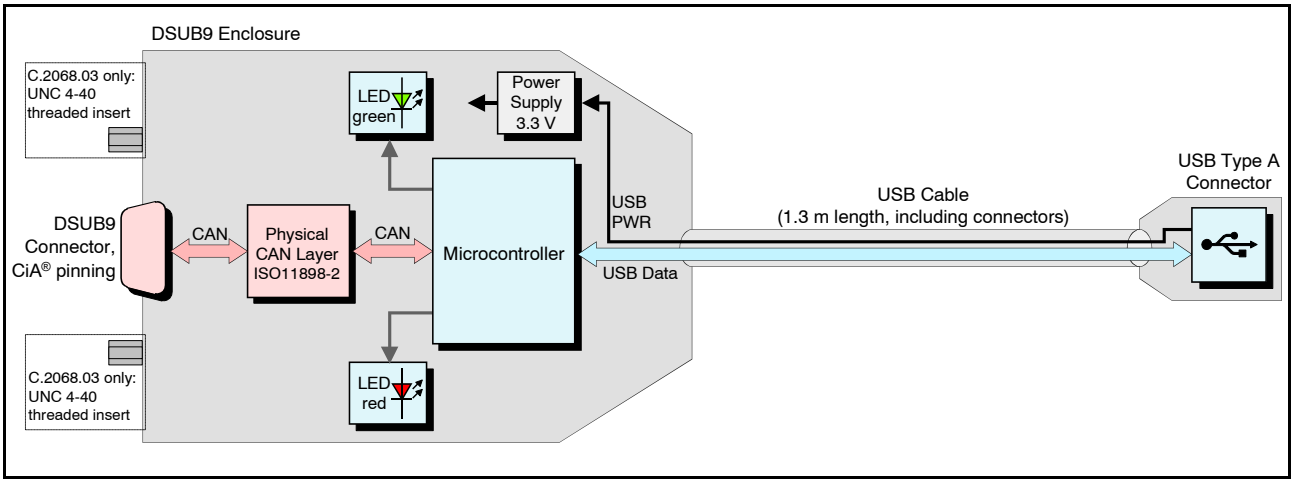


Figure 1: Block circuit diagram of CAN-USB/Micro

The CAN-USB/Micro is a very small CAN-USB interface that fits into a DSUB9 enclosure.
The ARM® Cortex-M3® micro controller handles the CAN data. The non-isolated CAN interface is supplied directly via USB. The CAN-USB/Micro module supports the USB 2.0 full-speed interface with data rates of up to 12 Mbit/s.
Both variants of the CAN-USB/Micro have the same hardware, except for the fastening option in the CAN-USB/Micro-TI variant. The DSUB9 connector of the TI-variant comes with two bolts with threaded inserts UNC 4-40, for fastening of the DSUB9 connector.

esd offers the sophisticated NTCAN-API for accessing the CAN bus via the CAN-USB/Micro, which provides extensive functions for optimum use of the CAN bus.
Device drivers and the NTCAN-API for Windows® are included.
Linux® (kernel ≥ 5.19) is supported via Linux CAN (SocketCAN) and NTCAN wrapper library.

For Windows there are additional free esd CAN tools (e.g. the interactive CAN bus analysis tool CANreal), that can be downloaded from our website. The tools enable efficient configuration and analysis of CAN applications and networks.

In addition, esd offers protocol stacks based on the NTCAN API for easy integration of CANopen, and J1939. For more information, please ask our sales team.

1.3 Glossary

Abbreviations

Abbreviation	Term	Description
API	Application Programming Interface	
CAN	Controller Area Network	In this manual the term CAN only includes CAN CC. CAN FD and CAN XL are not supported
CAN CC	CAN classic	
CAN FD	CAN flexible data rate	
CPU	Central Processing Unit	
CiA	CAN in Automation	
SDK	Software Development Kit	

2 CAN-USB/Micro Views

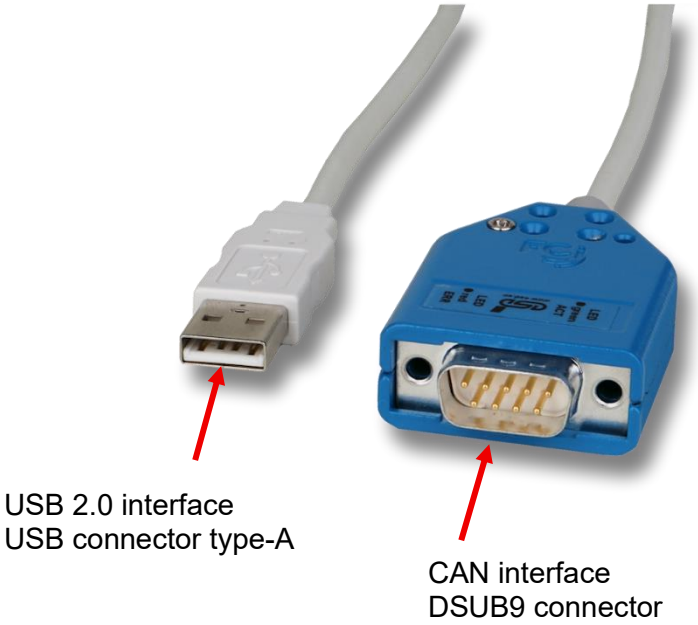


Figure 2: CAN-USB-Micro View

Figure 3: CAN-USB/Micro DSUB9

Figure 4: CAN-USB/Micro-TI with two additional bolts with threaded inserts UNC 4-40

See also page 17 for signal assignment of the CAN connectors.

NOTICE
Read chapter “Installing and Uninstalling Hardware” from page 12, before you start with the installation of the hardware!

3 LED Description

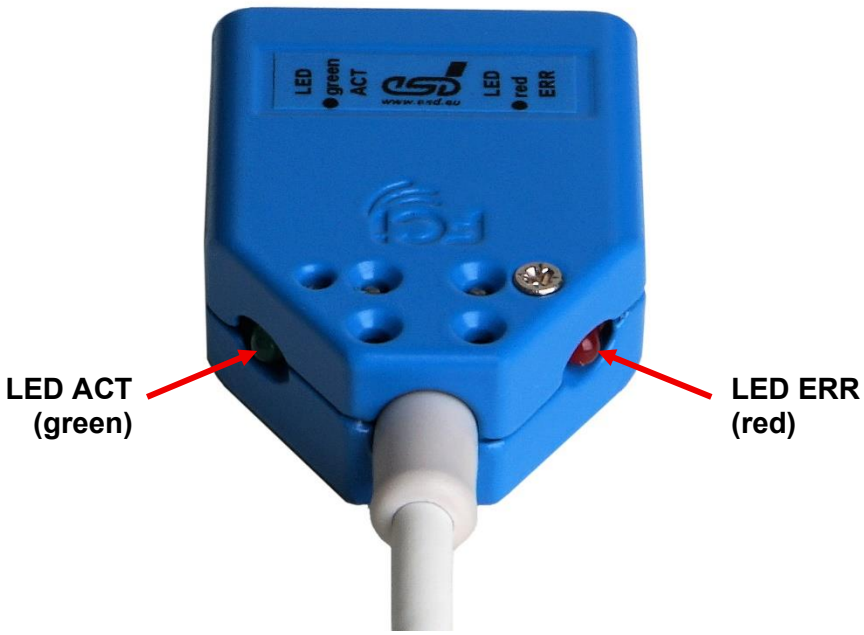


Figure 5: LEDs

LED name	Colour	Function	Indicator State	Description
ACT	green	Activity	on	USB module is enumerated (a node address is assigned to the USB module)
			flash off	receives CAN telegrams or USB commands
			off	not working
ERR	red	Error	on	*CAN-Bus-off* or *CAN-Error-passive* or *CAN-Controller-Warn*
			off	CAN bus OK, (CAN-Error-active)

Table 1: Description of LEDs

4 Installing and Uninstalling Hardware

To install or uninstall the CAN-USB/Micro, please follow the installation notes.

Step	Procedure	See Page
	**NOTICE** **Read and follow the safety instructions at the beginning of this document carefully before you start with the hardware installation/!**	5
	**DANGER** Hazardous voltage - Risk of electric shock due to unintentional contact with uninsulated live parts with high voltages inside of the system into which the CAN-USB/Micro is to be integrated. → The CAN-USB/Micro may only be operated on supply circuits that offer sufficient protection against dangerous voltages. → External circuits connected to the CAN-USB/Micro must be sufficiently protected against dangerous voltages. → Compliance with the applicable national safety regulations is the responsibility of the user. → Ensure the absence of voltage before starting any electrical work.	
To install, continue as described in chapter 4.1 ‘Installing the Hardware’. To uninstall, continue as described in chapter 4.2 ‘Uninstalling the Hardware’		

4.1 Installing the Hardware

Step	Procedure	See Page
1.	Follow the safety instructions at the beginning of chapter 4	12
2.	Connect the USB connector of the CAN-USB/Micro to a USB bus of the PC.	
3.	Connect the 9-pin DSUB connector to the CAN bus. See also chapter Connector Assignments If applicable, attach the CAN-USB/Micro-TI via the bolts (UNC 4-40 threaded inserts)	17
	Please note that the CAN bus must be terminated at both ends! esd offers special T-connectors and termination connectors for external termination. Additionally, the CAN_GND signal must be connected to earth at exactly one point in the CAN network. A CAN device whose CAN interface is not galvanically isolated (such as CAN-USB/Micro) corresponds to the grounding of the CAN-GND. Further general information on CAN wiring can be found on our website: https://esd.eu/en/support/can-bus-wiring-notes	
4.	End of hardware installation.	
5.	The software installation is described in the manual “Installation Guide, NTCAN Part 2: Installation, Configuration and Firmware Update”	

4.2 Uninstalling the Hardware

Step	Procedure	See Page
1.	Follow the safety instructions at the beginning of chapter 4	12
2.	Make sure that the connected CAN interface and power supply are switched off.	
3.	Disconnect the CAN-USB/Micro from the CAN and USB interfaces.	
4.	If applicable loosen the fastening of the CAN-USB/Micro-TI.	
5.	Carefully remove the CAN-USB/Micro.	

5 Technical Data

5.1 General Technical Data

Power supply	Via USB, Nominal voltage range: 4.4 V … 5.25 V
Current consumption	Typical: $I_{5V\_TYPICAL}$ = 50 mA
Temperature range	0° C ... 50°C ambient temperature
Humidity	Max. 90%, non-condensing
Protection class	IP20
Dimensions	Cable length: 1.3 m including connectors DSUB9 connector housing: 35 mm x 15 mm x 45 mm
Weight	110 g

Table 2: General technical data of the module

5.2 USB Device Interface

Number	1
Controller	Integrated in ARM-Cortex-M3, 32-bit, 72 MHz
Standard	USB Specification Rev. 2.0, Full speed
Bit rate	Max. 12 Mbit/s
Connector	USB plug type A

Table 3: Data of the USB interface

5.3 CAN Interfaces

Number of CAN ports	1x integrated in DSUB9 connector housing
CAN controller	Integrated in ARM-Cortex-M3, 32 bit, 72 MHz
CAN protocol	According to ISO 11898-1
Physical CAN Layer	High-speed CAN interface according to ISO 11898-2, bit rate up to 1 Mbit/s
Galvanic isolation	None
Bus termination	None, A terminating resistor must be set externally if required
Connector	DSUB9, according to CiA® 303-1

Table 4: Data of the CAN interface

5.4 Software Support

esd offers the sophisticated NTCAN-API, which provides extensive functions for optimal use when accessing the CAN bus via the CAN-USB/Micro.

Device drivers and the NTCAN-API for Windows® are included. Linux® (kernel ≥5.19) is supported via Linux CAN (SocketCAN) and NTCAN wrapper library.

In addition, esd offers protocol stacks based on the NTCAN API for easy integration of CANopen, and J1939. For more information, please ask our sales team.

Device drivers for other operating systems are available on request. For detailed information about the driver availability for your operating system, please contact our sales team: sales@esd.eu

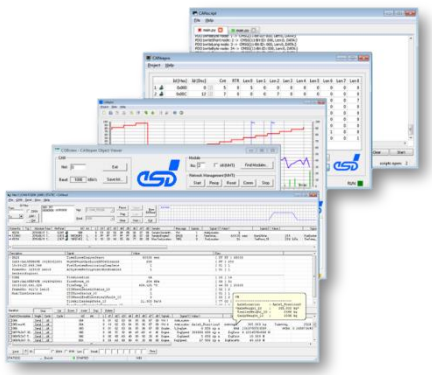
The CAN software installation and the software drivers are described in the manuals:

"NTCAN-API Part 1: C/C++ Software Design Guide" Application Developers Manual and
"NTCAN-API Part 2: Installation, Configuration and Firmware Update" Installation Guide

The manuals can be downloaded free of charge from our website via the product page of the CAN-USB/Micro or the CAN-SDK page: https://esd.eu/produkte/can-sdk.

CAN Tools

For Windows there are additional free esd CAN tools (e.g. the interactive CAN bus analysis tool CANreal), that can be downloaded from our website. The tools enable efficient configuration and analysis of CAN applications and networks.



The following CAN Tools are available:

CANreal	Display and record of CAN message frames
CANplot	Graphical display of CAN data
CANrepro	Replay of pre-recorded CAN messages
CANscript	Python based scripting tool
COBview	Analysis and diagnostics of CANopen® nodes

System Requirements:
- Windows 32-bit or 64-bit system
- esd CAN driver installed

As part of the esd software development kit (CAN SDK) of the NTCAN-API the CAN Tools are included in delivery of the CAN-CD.
The CAN SDK can also be downloaded free-of-charge from the esd website.

5.5 Firmware Licenses

NOTICE
The software from esd and from third parties used in the CAN-USB/Micro is subject to the license terms of the respective authors or rights holders. CAN-USB/Micro may only be used in accordance with these license terms!
By using the CAN-USB/Micro you agree to the terms of these software licenses.

You can download the licenses from our website, see the following chapters.

5.6 3rd Party Software License Terms

- The CAN-USB/Micro is an esd product with firmware based on FreeRTOS™ V1.x to V9.x that uses the FreeRTOS operating system which was developed under the terms of the GNU Public License (GPL v.2.0).
  Please refer to chapter 3.4 of the document esd's “3rd party licensor notice” that is part of the product's documentation on the enclosed CD. The document also includes the full text of the license.

  You can also download the full license text of the GNU GPL v.2.0 from our homepage, see Table 5.

License Name	**Identifier** (from SPDX License List)
GNU General Public License v2.0 only	GPL-2.0-only

Table 5: Download license text

5.6.1 Open-Source Software Copy

You may obtain a copy of the source code, if and as required under the license by sending a mail to oss-compliance@esd.eu

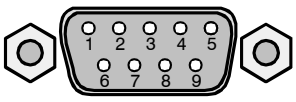
You may also obtain a copy of the source code, if and as required under the license, by sending a check or money of EUR 25.00 to:
esd electronics gmbh
Vahrenwalder Str. 207
30165 Hannover, Germany

6 Connector Assignments

6.1 CAN

Device connector: DSUB9 connector with pin contacts

Pin Position:



Pin Assignment:

Signal	Pin		Signal
Reserved	6	1	Reserved
CAN_H	7	2	CAN_L
Reserved	8	3	CAN_GND
Reserved	9	4	Reserved
		5	CAN-GND (CAN_Shield)

Signal Description:

CAN_L, CAN_H …	CAN signal lines
CAN_GND …	Reference potential of the local CAN physical layer
CAN_GND (CAN_Shield) …	CAN_Shield is connected to shield of the USB wire and to GND
Reserved :::	Reserved for future applications, do not connect!

6.2 USB

Device connector: USB connector standard type A

Pin Position:

Pin Assignment:

Pin	Signal
1	V_{BUS}
2	D-
3	D+
4	GND

Signal Description:

VBUS ...	+5 V power supply voltage
D+, D-...	USB signal lines Data+, Data-
GND...	Reference potential

7 Declaration of Conformity

EU-KONFORMITÄTSERKLÄRUNG
EU DECLARATION OF CONFORMITY

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30165 Hannover
Germany

esd erklärt, dass das Produkt *esd declares, that the product*	Typ, Modell, Artikel-Nr. *Type, Model, Article No.*
CAN-USB/Micro	**C.2068.02**
CAN-USB/Micro-TI	**C.2068.03**
die Anforderungen der Normen *fulfills the requirements of the standards*	**EN 61000-6-1:2007,** **EN 61000-6-3:2007/A1:2011**
gemäß folgendem Prüfbericht erfüllt. *according to test certificate.*	**H-K00-0397-10**
Das Produkt entspricht damit der EU-Richtlinie „EMV" *Therefore the product conforms to the EU Directive 'EMC'*	**2014/30/EU**
Das Produkt entspricht den EU-Richtlinien „RoHS" *The product conforms to the EU Directives 'RoHS'*	**2011/65/EU, 2015/863/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. Bielert
Funktion / *Title*	QM-Beauftragter / *QM Representative*
Datum / *Date*	Hannover, 2025-04-14

Rechtsgültige Unterschrift / *authorized signature*

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8 Order Information

Hardware Type	Properties	Order No.
CAN-USB/Micro	Intelligent CAN interface inside DSUB9 connector for USB, CAN according to ISO 11898-1, High Speed, ISO 11898-2, DSUB 9 according to CiA 303-1 USB 2.0 device, Full-Speed (12 Mbit/s), USB-Cable 1.3 m, Drivers for Windows and Linux	C.2068.02
CAN-USB/Micro-TI	Intelligent CAN interface inside DSUB9 connector for USB, DSUB9 with threaded insert UNC 4-40, CAN according to ISO 11898-1, High Speed, ISO 11898-2, DSUB 9 according to CiA 303-1 USB 2.0 device, Full-Speed (12 Mbit/s), USB-Cable 1.3 m, Drivers for Windows and Linux	C.2068.03
Device drivers for Windows and Linux are included in delivery of the CAN-USB/Micro variants free of charge and can be downloaded from our website.		

Table 6: Order information hardware

Software Type	Properties	Order No.
CANopen object licences including CD-ROM:		
CANopen Software Stack Windows/Linux	Single user runtime license for CANopen Software Stack for Windows and Linux in connection with esd CAN hardware and NTCAN API. Includes CANopen Manager and Slave as dll's/lib's in one package. Delivery as license sticker and CD (LCD) with documentation.	C.1101.06
J1939 Stack object licenses including CD-ROM:		
J1939 Stack for Windows (Object)	Single-user runtime license for J1939 Software Stack and J1939 Device Simulator & Monitor for use with esd CAN hardware and NTCAN API. Including protocol interpreter plugin for CANreal for decoding and displaying PGNs. Delivered as Windows object code for easy integration into a system.	C.1130.10
J1939 Stack for Linux	via Linux CAN (SocketCAN) and NTCAN wrapper library Single-user runtime license for J1939 Software Stack for use with esd CAN hardware and NTCAN API.	C.1130.11
For detailed information about availability of the driver for your special operating system, please contact our sales team.		

Table 7: Order information software for CAN-USB/Micro

PDF Manuals
Please download the manuals as PDF documents from our esd website https://www.esd.eu for free.

Manuals		Order No.
CAN-USB/Micro-ME	Hardware manual in English	C.2068.21
CAN-API-ME	NTCAN Part 1: Application Developers Manual NTCAN Part 2: Installation Guide	C.2001.21
CANopen-ME	CANopen manual in English	C.2002.21
J1939 Stack ME	J1939 stack manual in English	C.1130.21

Table 8: 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.