



AUTOMATION

ZUNDEL Holding Enterprise

CE3CPU-P

Cell Controller

V.1.0



User Handbook

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Disclaimer

The content of this publication was checked for compliance with the hardware and software described. However, discrepancies may arise, therefore no liability is assumed regarding complete compliance. The information in this document will be checked regularly and all necessary corrections will be included in subsequent editions. Suggestions for improvements are always welcome.

Subject to technical changes.

Trademark

CANtrol® // is a registered trademark of BERGHOF Automationstechnik GmbH

General Information on this Manual

Content:

This manual describes the CANtrol module CE3CPU-P and its modifications. The product-related information contained herein was up to date at the time of publication of this manual.

Completeness:

This manual is complete only in conjunction with the user manual entitled

‘Introduction
to CANtrol Automation System’

and the product-related hardware or software user manuals required for the particular application.

Standards:

The CANtrol automation system, its components and its use are based on International Standard IEC 61131 Parts 1 to 4 (EN 61131 Parts 1 to 3 and Supplementary Sheet 1).
Supplementary Sheet 1 of EN 61131 (IEC 61131-4) entitled ‘User Guidelines’ is of particular importance for the user.

Order numbers:

Please see the relevant product overview in the ‘Introduction to CANtrol Automation System’ manual for a list of available products and their order numbers.

Ident. No.: 2810520

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BERGHOF Automationstechnik GmbH works in accordance with DIN EN ISO 9001

Update

Version	Date	Subject
1.0	19.04.07	First version

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1. General Instructions

1.1. Hazard Categories and Indications

The indications described below are used in connection with safety instructions you will need to observe for your own personal safety and the avoidance of damage to property.

These instructions are emphasised by bordering and/or shading and a bold-printed indication, their meaning being as follows:

	Immediate danger Failure to observe the information indicated by this warning will result in death, serious injury or extensive property damage.
	Potential danger Failure to observe the information indicated by this warning may result in death, serious injury or extensive property damage.
	Danger Failure to observe the information indicated by this warning may result in injury or property damage.
	No hazard Information indicated in this manner provides additional notes concerning the product.

1.2. Qualified users

Qualified users within the meaning of the safety instructions in this documentation are trained specialists who are authorised to commission, earth and mark equipment, systems and circuits in accordance with safety engineering standards and who as project planners and designers are familiar with the safety concepts of automation engineering.

1.3. Use as Prescribed

This is a modular automation system based on the CANbus, intended for industrial control applications within the medium to high performance range.

The automation system is designed for use within Overvoltage Category I (IEC 364-4-443) for the controlling and regulating of machinery and industrial processes in low-voltage installations in which the rated supply voltage does not exceed 1,000 VAC (50/60 Hz) or 1,500 VDC.

Qualified project planning and design, proper transport, storage, installation, use and careful maintenance are essential to the flawless and safe operation of the automation system.

The automation system may only be used within the scope of the data and applications specified in the present documentation and associated user manuals.

The automation system is to be used only as follows:

- as prescribed,
- in technically flawless condition,
- without arbitrary or unauthorised changes and
- exclusively by qualified users

The regulations of the German professional and trade associations, the German technical supervisory board (TÜV), the VDE (Association of German electricians) or other corresponding national bodies are to be observed.

Safety-oriented (fail-safe) systems

Particular measures are required in connection with the use of SPC in safety-oriented systems. If an SPC is to be used in a safety-oriented system, the user ought to seek the full advice of the SPC manufacturer in addition to observing any standards or guidelines on safety installations which may be available.



As with any electronic control system, the failure of particular components may result in uncontrolled and/or unpredictable operation.

All types of failure and the associated fuse systems are to be taken into account at system level. The advice of the SPC manufacturer should be sought if necessary.

2. CE3CPU-P Module

2.1. Overview

Order number	The order/part no. is located on the nameplate of the individual modules for separate ordering.
Function	The Cell Controller is a real-time-capable control module with a broad spectrum of data interfaces. The module can be programmed in "C" or in accordance with IEC 61131-3 (CoDeSys 2.3).
Ethernet	An Ethernet interface operating at 10/100 MB/s is available. TCP/IP and UDP/IP protocols permit extremely flexible linkage to visualization software, higher-level control units or to the IT infrastructure.
USB	The USB host interface offers a widely used peripheral device interface. It can be used, for example, in conjunction with a USB stick to carry out an application update or data download. Please contact our Technical Support staff if driver support is not available for a specific USB device.
CAN interfaces	The Cell Controller is equipped with 1 standard CAN interface, which can be employed up to 1 MB/s.
Serial interfaces	The programming interface (RS232) can also be used by the application.

Overview of performance characteristics

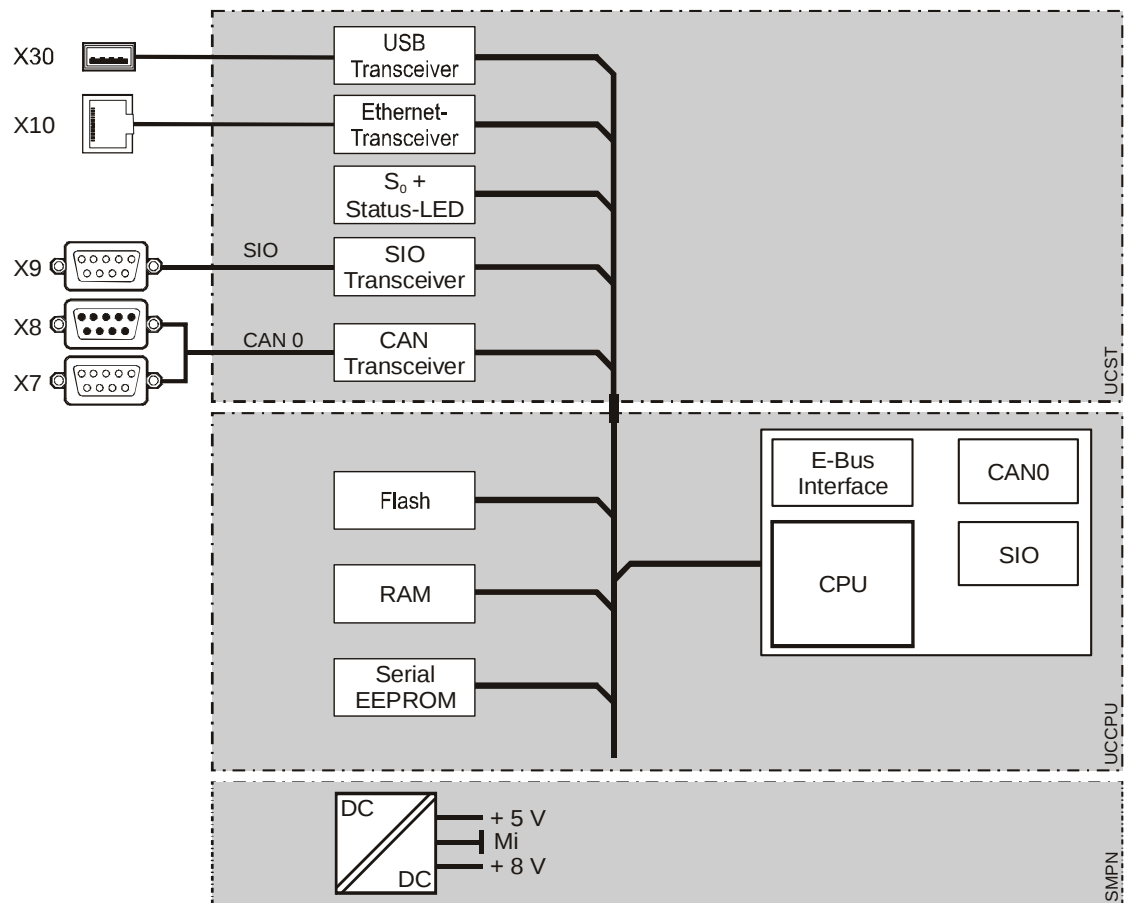
- Motorola PowerPC 5200 CPU / 400 MHz
- Application program and data memory (RAM):
64 MB on board; 32 MB for the application
- Application program memory (Flash):
16 MB on board; 8 MB for the application
- Retain memory: 16 KB
- 1 Ethernet 10/100 interface
- 1 USB Host interface
- 1 CAN interface
- 1 serial RS232 interface for programming tools and application
- Maintenance free due to lack of backup battery

Standard delivery	The standard control module delivery comprises: • CE3CPU-P control module
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2.2. Technical Specifications

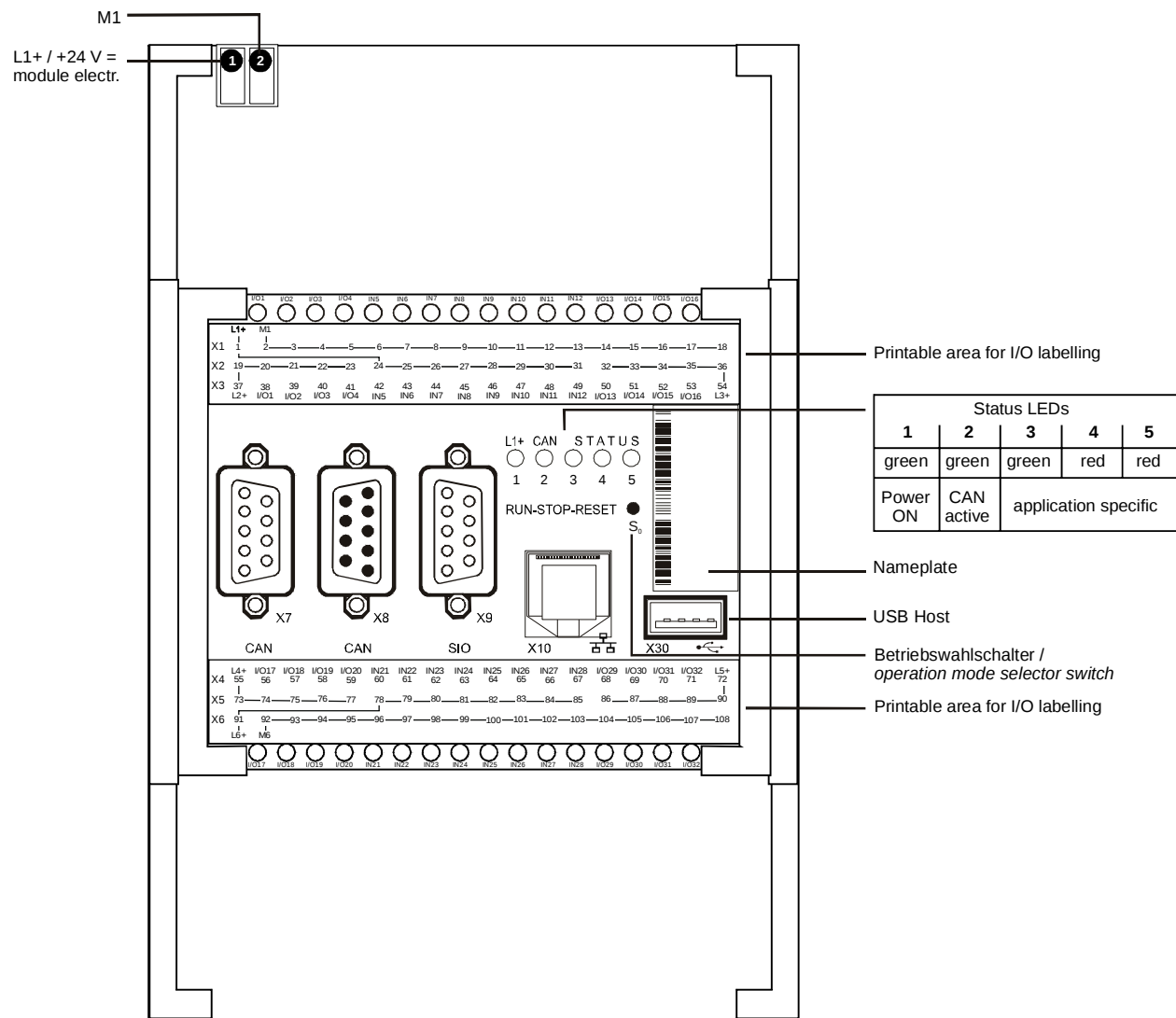
Module data	
Versions	CE3CPU-P-1131
Part no.	203105000
Development environment	CP1131 (as of V2.3) or CPC++
Dimensions, WxHxD [mm]	124 x 170 x 85.5 (in series dimensions W = 113/118.5)
Weight	approx. 700 g
Installation	Bearer rail, NS 35/7.5 EN 50022
Expansion	No
Operating temperature range	5° C to 50° C (non-condensing) convection cooling assured
CPU	PPC 5200 / 400 MHz
Programming software	IEC 61131-3 or high language "C" with real-time operating system
Application memory	
Application program and data memory (RAM)	64 MB on board / 32 MB for the application
Application program memory (Flash)	16 MB on board / 8 MB for the application
Retain memory	16 KB
EMI, protection class, insulation test, protection method	
Interference emission	EN 50081-2, industrial areas
Interference resistance	EN 50082-2, industrial areas
Protection class	III
Insulation resistance	EN 61131-2; DC 500 V test voltage
Protection method	IP 20
Supply voltage, current consumption	
Power supply, module electronics (connection voltage)	SELV DC +24 V < 0.4 A (EN 61131-2)
Power supply, digital I/Os	DC +24 V (EN 61131-2) divided into 3 groups
Power consumption	At U _e = DC +24 V in neutral, a max. of 500 mA, Fuses, depending on the I/O loads: max. 10 A
Supply voltage polarity reversal protection	Yes
Potential isolation	Yes
Ethernet interface	
Number / type of interfaces	1 Ethernet 10/100 interface
Protocols	TCP/IP and UDP/IP
Connection technique	RJ45 (ETH, X10)
USB interface	
Number / type of interfaces	1 USB Host interface, V1.1 (X30)
Serial data interfaces	
Number / type of interfaces	1 RS232 (X9) for programming / application
CAN interfaces	
Number / type of interfaces	1 CAN ISO11898 CAN channel 0 (X7/X8) on the cover
Operating / display elements	
LEDs	5 status LEDs; (not for the special timer inputs/outputs)
Operating mode selector switch	Yes, on the cover (S ₀)
Programming	Via Ethernet or RS232 port (X9)

2.3. Block Circuit Diagram



2VF100301DG00.cdr

2.4. Module View and Connection Assignment



2VF100302DG00.cdr

2.5. Subassembly Operation



Do not connect, apply, disconnect, or touch connectors during operation!

This could result in destruction or incorrect function. Prior to any work on the modules, switch all feeds off including those from connected peripheral devices, separately powered actuators, programming devices, etc.

2.5.1. Commissioning

Before applying the supply voltage perform one last check of all connections to make sure they are wired correctly and have the correct polarity. Switch the supply voltage on.



For more information, please refer to the associated software documentation.

2.5.2. Function Selection, Displays, Diagnostics

Operating mode selector switch

Used to switch between operating modes and to restart the module. This function is software dependent.

Switch position	CP1131	CPC++
RUN (R)	CP1131 program in the RUN state; can be changed with the programming device.	Freely programmable
STOP (S)	CP1131 program in the STOP state	Freely programmable
RESET (F)	CP1131 program (in RAM) and the RETAIN variables will be deleted.	Freely programmable

Operating status

Five operating status LEDs provide information concerning the current state of the power supply, the module mode and other functions. The status LEDs are also used to display error messages.

Operating status

LED state	Logical state
1 L1+ (green)	ON = Correct supply voltage to the module electronics
2 CAN status 2 (green)	ON = CAN 0 send active

Operating status, CPC++

LEDs 3 to 5 can be controlled by the application software.

Operating status, CP1131

Status3 (green)	Status4 (red)	Status5 (red)	Description
Either	Either	On	At least one variable is force controlled (FORCE).
On	Off	Either	Application program in the RUN state.
Off	On	Either	Application program in the STOP state.
Off	Flashing	Either	Application program in the ERROR STOP state.
Flashing	On	Either	Application program in the breakpoint STOP state.

2.5.3. Serial Interfaces

The module is equipped with a serial interface (RS232) which can be used for programming or for the application.

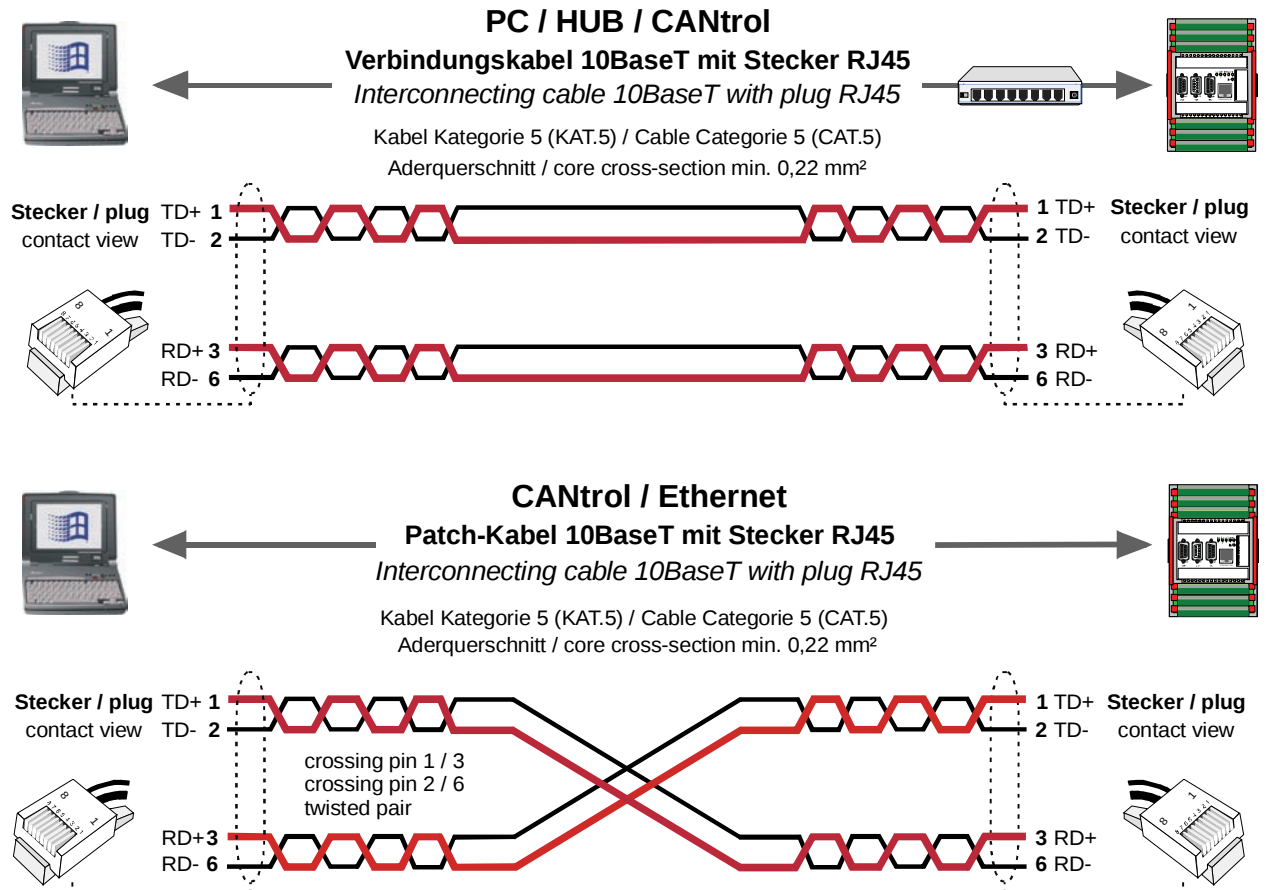
X9:

RS232 programming interface

Pin	Signal	Description
1	Reserved	Do not connect
2	RXD	Received data
3	TXD	Transmitted data
4	Reserved	Do not connect
5	GND	Signal ground
6	Reserved	Do not connect
7	Reserved	Do not connect
8	Reserved	Do not connect

2.5.4. Ethernet Interface

An Ethernet interface operating at 10/100 MB/s is available. TCP/IP and UDP/IP protocols permit extremely flexible linkage to visualization software, higher-level control units or to the IT infrastructure.



2VF100238DG00.cdr

X10:

Ethernet pin assignment

Pin	Signal	Description
1	TD+	
2	TD-	
3	RD+	
4	NC	Do not connect
5	NC	Do not connect
6	RD-	
7	NC	Do not connect
8	NC	Do not connect

2.5.5. USB Interface

Devices with USB connectors (x30) can be connected to the USB port (Rev. 1.1). This is a USB host interface which delivers up to 500 mA of current at +5V.

NOTICE

The subassembly power pack also supplies the electronics on the E-bus expansion modules. If more than 100 mA are required at the USB interface, the maximum number of E-bus subscribers is reduced.

Pin assignment

X30		
USB	B1	VCC
	B2	D-
	B3	D+
	B4	GND

The only USB devices classes which can be employed for CoDeSys users are USB sticks. A mouse can only be employed at the Linux level. The following points must be taken into consideration when USB sticks are employed:

CAUTION

A USB stick may only be pulled during operation if all file operations have been completed, otherwise the USB stick may become unusable!

If programs still have files open, the directory will no longer be able to be removed once the USB stick has been pulled. In this situation file or directory operations will result in blockages because information is to be read from a device that is no longer available in the system. Therefore, always make sure that no program still has open files in the USB stick before pulling the stick.

- USB memory sticks can be inserted and pulled during operation. The inserted device is automatically detected and mounted in the /media/usbX directory. When the USB stick is pulled, the associated /media/usbX directory automatically “disappears” provided no program is currently accessing it (see above).
- Either the first partition or, if there are no partitions, the entire memory will be mounted on the memory stick, in other words, the associated directory appears automatically.
- The first stick is mounted under /media/usb0, the second under /media/usb1, and so on. A maximum of 8 sticks may be inserted simultaneously (/media/usb[0-7]). If a new (or previously inserted, then pulled) stick is inserted it will be placed on the directory with the lowest number. Connecting a USB hub allows multiple sticks to be operated at a given USB interface. Care must be taken that no USB devices are still inserted in the hub when the hub is itself inserted or pulled.

NOTICE

The mechanical structure of the USB port is designed for a maximum insertion cycles.

2.5.6. CAN Interfaces (Standard Design)

The CPU module is equipped with 1 CAN interface with CAN bus voltage levels in accordance with ISO/DIS11898.

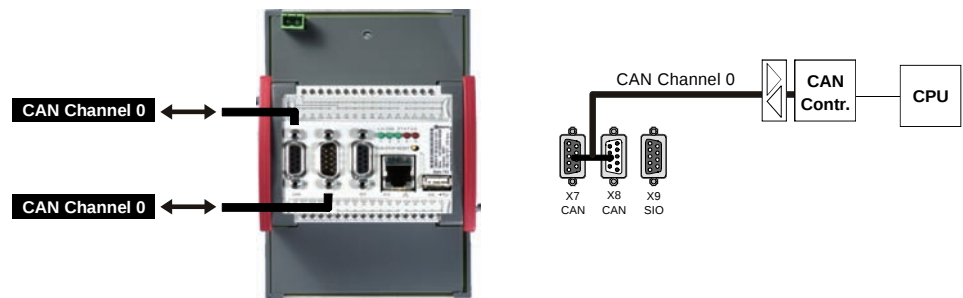
The standard CAN interfaces correspond to the description contained in the manual, *"Introduction to CANtrol Automation Systems"*.

CAN channel 0

X7/X8 on the front face

Aside from its duty as an application-specific communications interface, channel 0 also serves as the programming interface.

The max. baud rate is 1 MB/s and can be adjusted by software.



2VF100303DG00.cdr

X7 / X8:

Pin assignment

Pin	Signal	Description
1	Reserved	Do not connect
2	CAN_L	CAN Low Signal
3	CAN_GND	Signal ground
4	Reserved	Do not connect
5	(CAN_SHLD)	Optional CAN shield
6	(GND)	Optional Signal ground
7	CAN_H	CAN High Signal
8	Reserved	Do not connect
9	(CAN_V+)	Optional external driver supply

NOTICE

For more information about connecting the CAN interface, please refer to the manual, *"Introduction to CANtrol Automation Systems"*.

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3. Annex

3.1. Environmental Protection

3.1.1. Emission

When used correctly, our modules do not produce any harmful emissions.

3.1.2. Disposal

At the end of their service life, modules may be returned to the manufacturer against payment of an all-inclusive charge to cover costs. The manufacturer will then arrange for the modules to be recycled.

3.2. Maintenance/Upkeep



Do not insert, apply, detach or touch connections while in operation – risk of destruction or malfunction.

Disconnect all incoming power supplies before working on our modules; this also applies to connected peripheral equipment such as externally powered sensors, programming devices, etc. All ventilation openings must always be kept free of any obstruction.

The modules are maintenance-free when used correctly.
Clean only with a dry, non-fluffing cloth.
Do not use detergents.

3.3. Repairs/Service



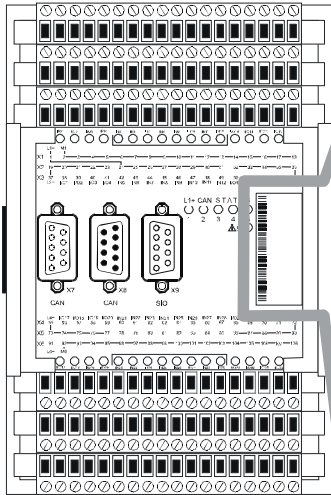
Repair work may only be carried out by the manufacturer or its authorised service engineers.

3.3.1. Warranty

Sold under statutory warranty conditions. Warranty lapses in the event of unauthorised attempts to repair the equipment and/or product, or in the event of any other form of intervention.

3.4. Nameplate

Erklärungen zu den Typenschildern (Beispiel) nameplate descriptions (example)



Barcode ①
Identifizierungs-Nr.
identification-no.

Modul-Typ ②
module type

Identifizierungs-Nr. ③
identification-no.

Modell / Bestell-Nr. ④
model / order-number

Version ⑤

Versorgungsspannung ⑥
supply voltage

Datum / Date ⑦

CE Kennzeichnung ⑧
CE mark

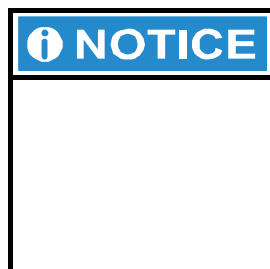
①
② CDIO 16/16-0,5 -1131
③ Num. : 20110300300329
④ Modell : 2011030
⑤ /version: 03
⑥ SELV 24V DC; 12A max. ⑧

⑦
①
② CDIO 16/16-0,5-1131
③ Num. : 20122302000001
④ Modell : 2012230
⑤ Version: 20
⑥ SELV 24V DC; 12 A max.

①
③ 00836400001073 ② KS800-CAN
④ Typ:9407 481 60001
⑦ Nr. :8346
⑤ Version: 2.1
⑥ 24V DC; 5W intern
Made in Germany ⑧

2VF100080DG01.cdr

- ① **Barcode**
same as identification number.
- ② **Module type**
plain-text name of module.
- ③ **Identification no.**
module's identification number.
- ④ **Model/order no.**
You only need to give this number when ordering a module. The module will be supplied in its current hardware and software version.
- ⑤ **Version**
defines the design-level of the module as supplied ex-works.
- ⑥ **Supply voltage**
- ⑦ **Date**
internal code.
- ⑧ **CE mark**



The 'Version' (supply version) panel specifies the design-level of the module as supplied ex-works.

When replacing a module, users, with the CNW (CANtrol Node Wizard) tool, can read off the current software version of the newly supplied module, and then re-load their 'own' software version for a particular project if necessary. With the latter in mind, before the download you should always keep a record of the existing software levels in your project documentation (software version, node IDs, baud rate, etc.).

3.5. Addresses and Bibliography

3.5.1. Addresses

CiA 'CAN in Automation', international manufacturers and users organisation for CAN users in the field of automation:

CiA - CAN in Automation e.V.
Am Weichselgarten 26
D-91058 Erlangen /Germany
e-mail: headquarters@can-cia.de
<http://www.can-cia.de>

DIN-EN Standards Beuth Verlag GmbH or VDE-Verlag GmbH
10772 Berlin 10625 Berlin

IEC Standards VDE Verlag GmbH or Internet search
10625 Berlin <http://www.iec.ch/>

3.5.2. Standards/Bibliography

IEC61131-1/EN61131-1	Programmable controllers Part 1: General information
IEC61131-2/EN61131-2	Programmable controllers Part 2: Equipment requirements and tests
IEC61131-3/EN61131-3	Programmable controllers Part 3: Programming languages
IEC61131-4/EN61131-4	Programmable logic controllers Supplementary Sheet 1: User guidelines
EN 50081 Parts 1+2	German EMC Act: Emitted interference
EN 50082 Parts 1+2	German EMC Act: Noise immunity
ISO/DIS 11898	Draft International Standard: Road vehicles - Interchange of digital information - Controller Area Network (CAN) for high-speed communication
EN 954-1	Safety of machinery: Safety-related parts of control systems (Part 1)
Bibliography	A variety of specialist publications on the CANbus is available from specialist bookshops, or can be obtained through the CiA users' organisation.

NOTICE

Our Technical Support team will be glad to provide other literature references on request.