BERGHOF

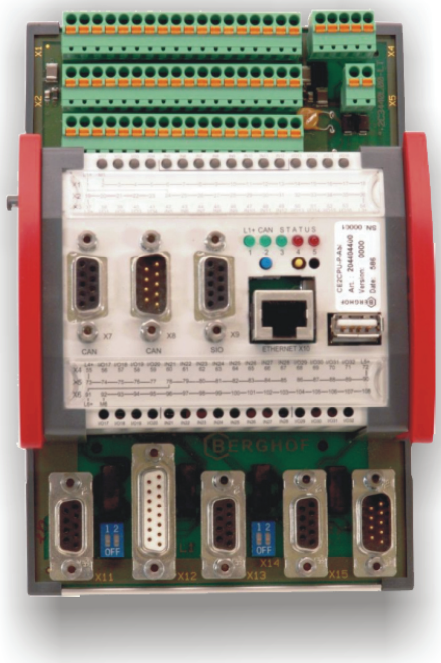
AUTOMATION

ZUNDEL Holding Enterprise

CE2CPU-P

Cell-Controller

V.2.0



User Handbook

CANtrol®

Your Automation Solution

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

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General Information on this Manual

Content:
This manual describes the CANtrol moduleCE2CPU-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.: 2810120

You can reach us at:

BERGHOF Automationstechnik GmbH
Harretstr. 1
72800 Eningen / Germany
Phone: +49 7121 / 894-0
Telefax: +49 7121 / 894-100
e-mail: info@berghof-automation.de
www.berghof-automation.de

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Update

Version	Date	Subject
2.0	12.01.07	First version

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Contents

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:

DANGER	**Immediate danger** Failure to observe the information indicated by this warning will result in death, serious injury or extensive property damage.
WARNING	**Potential danger** Failure to observe the information indicated by this warning may result in death, serious injury or extensive property damage.
CAUTION	**Danger** Failure to observe the information indicated by this warning may result in injury or property damage.
NOTICE	**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.

⚠ WARNING

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. CE2CPU-P module

2.1. Overview

Order number

The order/item no. required for acquiring a replacement is to be found on the nameplate of the module.

Function

The Cell Controller is a real-time-capable control module having a broad spectrum of I/O and data interfaces. The module is programmable in 'C' or in IEC 61131-3 standard (CoDeSys 2.3).

Ethernet

A 10/100 MBit/s Ethernet interface is available. The TCP/IP and UDP/IP protocols provide very flexible accessibility to visualisation software, to higher order control units or to the IT infrastructure.

USB

The USB Host Interface makes a widely distributed peripheral interface available. It can be used, for example, to carry out an application update or a data migration simply via a USB stick. Please contact our technical support if no driver support is available for a specific USB device.

CAN interfaces

The cell controller possesses 2 standard CAN interfaces, which can both be used at up to 1 MBit/s.

AS-i interface

In addition to the two standard CAN interfaces, the cell controller can be equipped with AS-i master activation. The AS-I master is configured via a serial interface of its own.

Serial interfaces

In all 4 serial interfaces can be used on the cell controller. The (RS232) programming interface is supplemented by the RS485 for distance measuring systems. Two more RS232 interfaces can also be configured as an RS422 and/or RS285 interface.

Fast I/O

The cell controller possesses 4 fast inputs (for 2 RS422 encoders) and 2 fast outputs (RS422).The fast outputs can be configured so that they can be used on 4 digital (24V) outputs.

The 8 digital inputs can be reconfigured as fast counter inputs via the software interface. This permits another 4 + 24V encoders to be connected to the 24 V inputs. An additional capture function can be implemented on 4 digital inputs/outputs.

NOTICE	If +24 V I/O are configured as fast counter inputs, correspondingly fewer digital +24 V I/Os are available.

E-bus expansion

A maximum of six digital E-bus expansion modules can be added to extend the Cell Controller's I/O level.

An overview of the features

- Motorola PowerPC 5200 CPU / 400 MHz
- Program and data memory (RAM) 64 MB on board / 32 MB for application
- Program memory (flash) 16 MB on board / 8 MB for application
- 16 KB Retain Memory
- Ethernet 10/100 interface
- 1 USB Host Interface
- 2 CAN interfaces
- 1 RS232 serial interface for programming tools and application
- 2 RS232 serial data interfaces, can also be used as RS422/RS485
- 1 RS 485 interface for motion trackers
- 8 digital inputs
- 8 digital, individually configurable inputs/outputs
- 4 (RS422) counter inputs for 2 quadrature encoders at maximum
- 8 (+24 V) counter inputs for 4 quadrature encoders at maximum
- 2 RS422 timer outputs or 4 +24 V timer outputs, configurable via software
- I/O level locally expandable by internal E-bus with up to 6 expansion modules (digital/analog)
- Maintenance-free, having no buffer battery
- Optional: AS-i master activation can be configured via its own (RS232) serial interface.

Material supplied

The material supplied with the control module comprises:

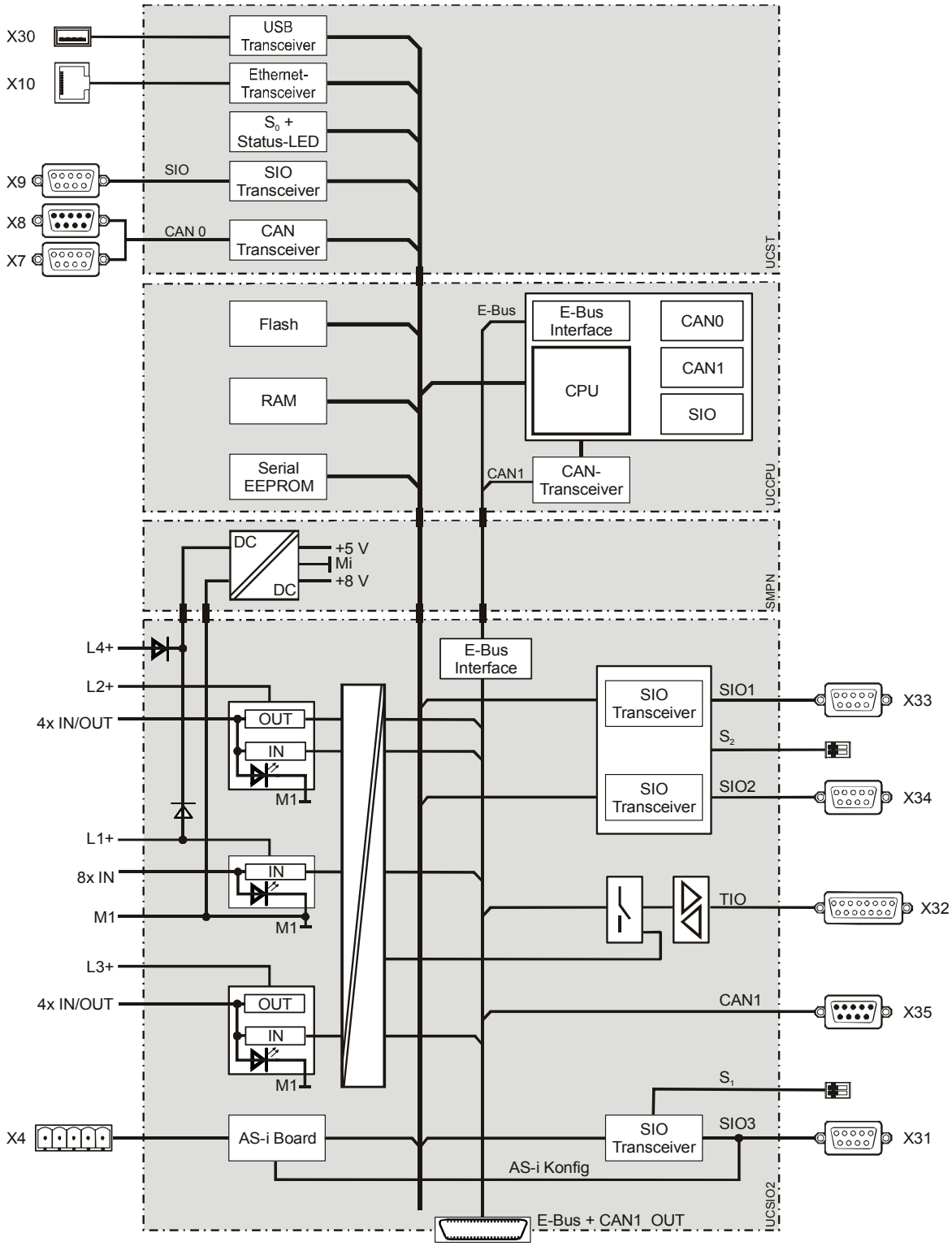
- CE2CPU-P control module

2.2. Technical Data

Module data		
Version	**CE2CPU-P-1131**	**CE2CPU-P-ASI**
Item-No.	204405400	204404400
Development environment	CP1131 (V2.3 and higher) or CPC++	
Dimensions WxHxD [mm]	124 x 170 x 85,5 (modular size W = 113/118,5)	
Weight	ca. 700 g	
Mounting	mounting rail NS 35/7,5 EN 50022	
Expansion	with up to 6 E-bus expansion modules	
Operating temperature range	5° C to 50° C (no moisture condensation) convection-type cooling assured	
CPU	PPC 5200 / 400 MHz	
Programming software	IEC 61131-3 or 'C' high level language with realtime operating system	
User memories		
Program and data memory (RAM)	64 MB on board / 32 MB for application	
Program memory (flash)	16 MB on board / 8 MB for application	
Retain memory	16 KB	
EMC, safety class, insulation test, degree of protection		
Noise immunity	EN 50081-2, industrial sector	
Emitted interference	EN 50082-2, industrial sector	
Safety class	III	
Insulation resistance	EN 61131-2; DC 500 V test voltage	
Degree of protection	IP 20	
Supply voltage, power consumption		
Power supply module electronics (supply voltage)	SELV DC +24 V < 0,4 A (EN 61131-2)	
Power supply - digital I/Os	DC +24 V (EN 61131-2) distributed into 3 groups	
Power consumption	at U_e= DC +24 V running at no load max. 500 mA, fuse protection according to load on I/Os, max. 6 A	
Power-supply reverse voltage protection	yes	
Electrical isolation	yes	
Digital inputs/outputs (DIO)		
Number of inputs	8, of which up to 4 are usable as +24 V counter inputs via TPU, another 4 inputs are capture inputs	
Number of inputs/outputs	8, of which up to 4 are usable as +24 V timer outputs via TPU and up to 4 can be used via the TPU as +24 V counter inputs TPU	
Output current	0.5 A	
Short-circuit protection	yes	

Module data		
Version	**CE2CPU-P-1131**	**CE2CPU-P-ASI**
Electrical isolation	yes	
Connection method	vertical three-wire front wiring with push-on terminal strips for screw, spring or crimp connection	
Timer inputs/outputs (TIO)		
Number of counter inputs	12 for a maximum of 6 quadrature encoders with different counting functions. 4 RS422 counter inputs , 8 counter inputs by reconfiguring the +24 V digital inputs. Counting frequency in the case of quadruple evaluation: RS422 < 4 MHz, +24 V < 80 kHz	
Number of timer outputs	At maximum 4 with different output functions. 2 with RS422 interface and 2 that can be switched over to +24 V, 4 in the case of +24 V interface. If +24 V timer outputs are configured, the number of digital outputs available is correspondingly lower. Pulse frequency with RS422 <10 kHz, with +24 V < 500 Hz	
Short-circuit protection	yes	
Connection system	For +24 V interface (DIO) vertical three-wire front wiring with push-on terminal strips for screw or spring connection For RS422 interface (TIO), 15-pin Sub D socket.	
Ethernet Interface		
Number and type of interfaces	1 Ethernet interface 10/100	
Protocol	TCP/IP and UDP/IP	
Connection system	RJ45 (ETH, X10)	
USB Interface		
Number and type of interfaces	1 USB Host interface, V1.1 (X30)	
AS-i Interface (optional)		
Number and type of interfaces	1 AS-i Master interface (X4), configurable via RS232 (X31)	
Connection system	vertical front wiring with push-on terminal strips for screw, spring or crimp connection	
Serial Data Interface		
Number and type of interfaces	1 RS232 (X9) for programming/application 1 RS 485 (X31) specifically for motion trackers 2 RS232 (X33/X34) for applications with RTS/CTS, both interfaces can be switched over and used as RS422 or RS485.	
CAN interfaces		
Number and type of interfaces	2 CAN ISO11898; CAN Channel 0 (X7/X8) on the cover CAN Channel 1 (X35) on the base board and parallel on E-bus plug	
Controls and display facilities		
LED’s	5 status LEDs; 1 status LED per input/output (not for the specialised timer inputs/outputs)	
Operating mode selection switch	Yes, on the cover (S0)	
Programming	via CAN bus or RS232 interface (X9)	

2.3. Block Diagram



NOTICE

The module electronics and inputs IN5-IN12 (Group 2) are all supplied with voltage via L1+ (X11).
The module electronics can be supplied with voltage separately via L4+ (X5).
This guarantees the voltage supply to the module electronics even if L1+ (X11) is switched off.

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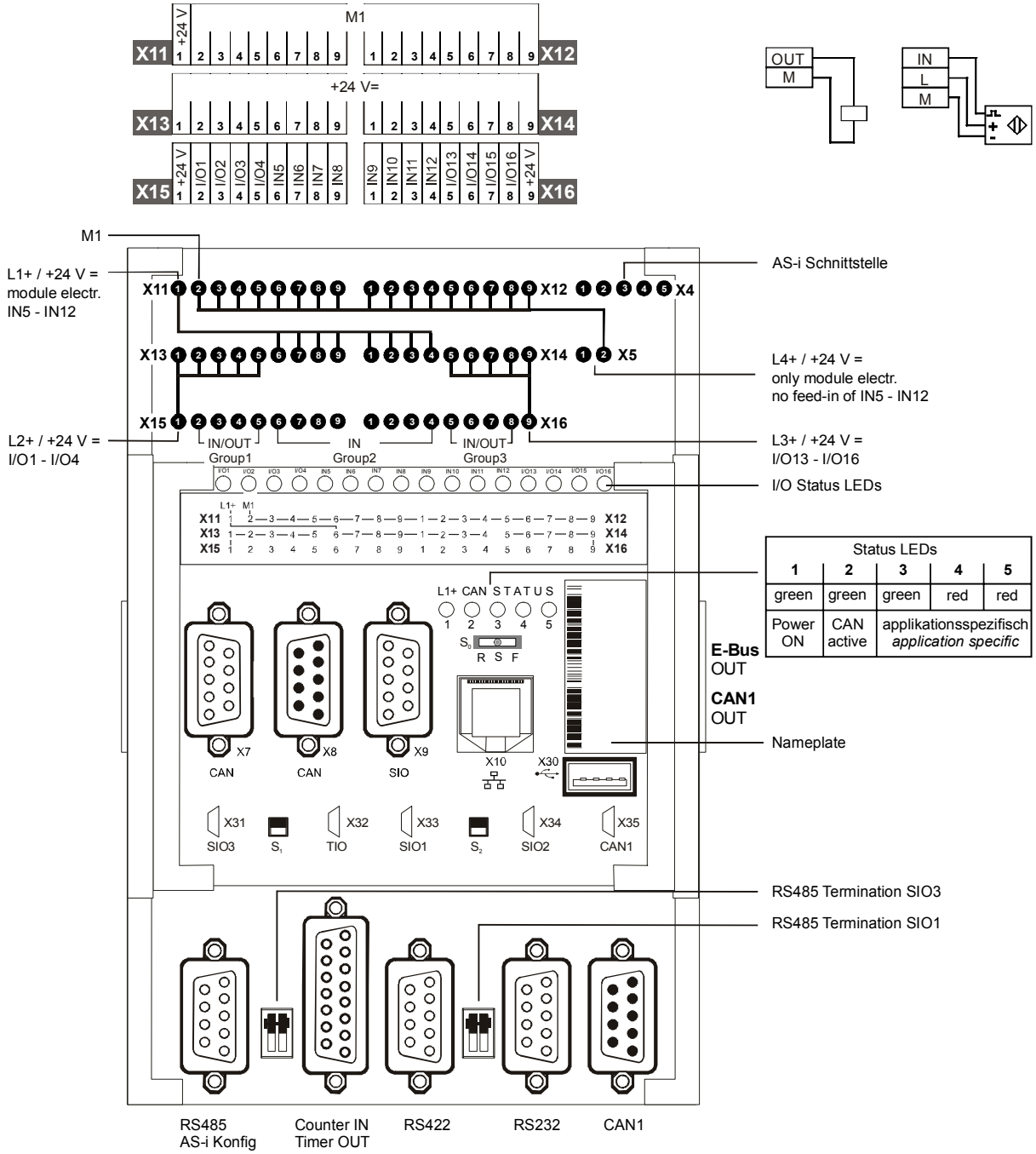
2.4. Module Diagram and Connection Assignment



NOTICE

The module electronics and inputs IN5-IN12 (Group 2) are all supplied with voltage via L1+ (X11).
The module electronics can be supplied with voltage separately via L4+ (X5).
This guarantees the voltage supply to the module electronics even if L1+ (X11) is switched off.

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2.4.1. Component Operation

WARNING

Do not insert, apply, detach or touch connections when in operation!
Destruction or malfunctioning may otherwise occur. Disconnect all incoming supplies before working on modules; including those of connected peripherals such as externally supplied sensors, programming devices, etc.

2.4.2. Commissioning

Re-examine all connections for correct wiring and polarity before applying the supply voltage. Switch on supply voltage.

NOTICE

See associated software documentation for further information.

2.4.3. Functions Selection, Displays, Diagnostics

I/O status

Each input and output has its own yellow I/O-status LED which indicates the logic state of the input or output in question.

I/O status

LED- status	Logical status
input LED yellow ON	1 (HIGH, activated)
input LED yellow OFF	0 (LOW)
output LED yellow ON	1 (HIGH, activated)
output LED yellow OFF	0 (LOW)

Operating mode selection switch S_0

serves to switch from one operating mode to another and to restart the module The function is software-related.

Switch position	CP1131	CPC++
RUN (R)	CP1131 program in RUN. Can be changed according to programming device.	freely programmable
STOP (S)	CP1131 program in STOP	freely programmable
RESET (F)	CP1131 Retain variables are deleted.	freely programmable

Operating status

The current state of power supply, module mode and other functions are indicated by 5 operating-status LEDs. Error messages are also displayed by these status LEDs.

Operating status

LED	Logical status
1 L1+ (green)	ON = correct supply voltage for module electronics
2 CAN status 2 (green)	ON = CAN 0 send, active

Operating status CPC++ LEDs 3 to 5 can be controlled by means of the user software.

Operating status CP1131

Status 3 (green)	Status 4 (red)	Status 5 (red)	Description
Random	Random	On	at least one variable is controlled by force (FORCE)
On	Off	Random	The user program is in RUN.
Off	On	Random	The user program is in STOP.
Off	Flashing	Random	The user program is in ERROR STOP.
Flashing	On	Random	The user program is in breakpoint STOP.

2.4.4. TPU I/O Interface (TIO)

The TIO interface provides input and output channels for specialised functions.

The signal is processed in a special block on the CPU printed circuit board. By incorporating program libraries, it is possible for example for rotary transducers with quadrature encoders to be connected or for PWM signals to be generated.

4 inputs and 2 outputs with a differential RS422 interface are provided for this purpose.

Another 8 inputs and 4 outputs with +24 V interface are available via an X11 to X16 terminal strip (see table: *"terminal assignment for digital X11-X16 I/Os"*).

The interface of the outputs can be switched over from RS422 (TIO) to +24 V (dig. I/O) by means of software.
The I/Os cannot be used as process I/Os when operating the TIO interface via the +24V interface (digital I/O).

NOTICE

The TIO interface is <u>not</u> electrically isolated from the internal component potential.

To prevent GND loops from forming, sensors and actuators must be connected via X11-X16 connectors or X32 (TIO) only!

Capture inputs

(IN9-12) capture inputs can be used to control the 6 counter units. However, only 4 inputs are available with this functionality. In view of the fact that these are standard +24V inputs, the switching delays are summarised in the table below.

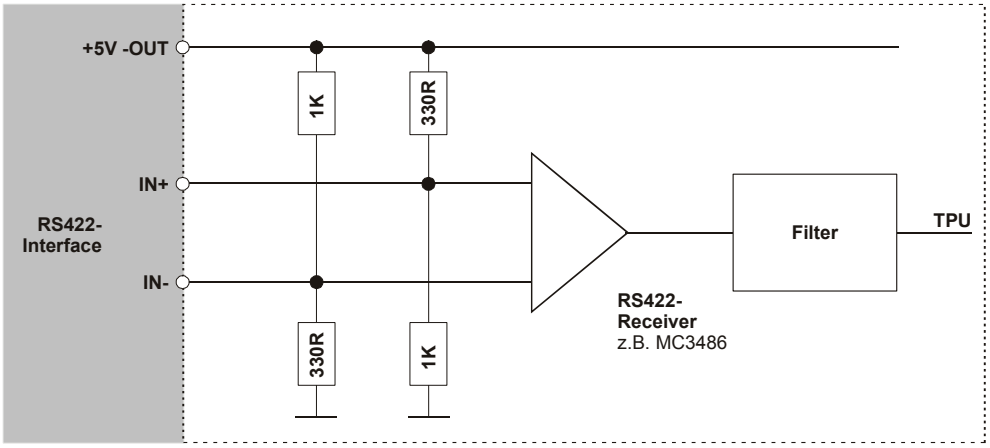
Edge	Switching delays
Rising	3 µs
Falling	15 µs

2.4.5. Counter Input Circuit

The RS422 inputs can also be used "single ended" as indicated.
Remember to allow for the reduced signal-to-noise ratio in this case.

NOTICE

Contact our Technical Support service for more detailed information.



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2.4.6. TPU I/O Connector Assignment

X32 (female) **TIO**

Terminal	Signal name	Description	Note
1	OUT1+	timer-output, differential	direct RS422 driver output (e.g. MC3487)
2	OUT2+	timer-output, differential	direct RS422 driver output (e.g. MC3487)
3	IN4+	counter input, differential	
4	+ 5V Out	+5 V, 100 mA - output	e.g. to supply power to encoder; common potential with CPU, short-circuit proof
5	GND		
6	IN1+	counter input, differential	
7	IN2+	counter input, differential	
8	IN3+	counter input, differential	
9	OUT1-	timer-output, differential	direct RS422 driver output (e.g. MC3487)
10	OUT2-	timer-output, differential	direct RS422 driver output (e.g. MC3487)
11	IN4-	counter input, differential	
12	GND		
13	IN1-	counter input, differential	
14	IN2-	counter input, differential	
15	IN3-	counter input, differential	

Connection Assignment - Digital Inputs/Outputs (X11 to X16)

Terminal		Signal name	Configured as Digital- I/O		TPU- I/O	Note
X11	1	L1+	supply for IN5 to IN12and module electronics			
X11 X12	2..9 1..9	M1	GND for module supply and I/O supply			
X13 X14	1..9 1..9	+24 V=	I/O supply			over L1+ to L3+
X15	1	L2+	supply for I/O1 to I/O4			
	2	I/O1	digital I/O +24 V	IN1 (TPU)	counter input +24 V	going as TPU I/O to form Encoder 1
	3	I/O2	digital I/O +24 V	IN2 (TPU)	counter input +24 V	
	4	I/O3	digital I/O +24 V	IN3 (TPU)	counter input +24 V	going as TPU I/O to form Encoder 2
	5	I/O4	digital I/O +24 V	IN4 (TPU)	counter input +24 V	
	6	IN5	digital IN +24 V	IN5 (TPU)	counter input +24 V	going as TPU I/O to form Encoder 3
	7	IN6	digital IN +24 V	IN6 (TPU)	counter input +24 V	
	8	IN7	digital IN +24 V	IN7 (TPU)	counter input +24 V	going as TPU I/O to form Encoder 4
	9	IN8	digital IN +24 V	IN8 (TPU)	counter input +24 V	
X16	1	IN9	digital IN +24 V		capture input	can be assigned to counters by way of the software
	2	IN10	digital IN +24 V		capture input	
	3	IN11	digital IN +24 V		capture input	can be assigned to counters by way of the software
	4	IN12	digital IN +24 V		capture input	
	5	I/O13	digital I/O +24 V	OUT1 (TPU)	timer output +24 V	
	6	I/O14	digital I/O +24 V	OUT2 (TPU)	timer output +24 V	
	7	I/O15	digital I/O +24 V	OUT3 (TPU)	timer output +24 V	
	8	I/O16	digital I/O +24 V	OUT4 (TPU)	timer output +24 V	
	9	L3+	supply for I/O13 to I/O16			

2.4.7. Serial Interfaces

The module has a total of up to 5 serial communications interfaces on 4 plug connectors The X31 plug connector contains 2 interfaces.

Terminal	Interface	(Positioning)
X9	SIO: RS232 (programming interface)	Module cover
X31	RS485 for motion trackers RS232 configuration of AS-i master	Base PCB below
X33	SIO1: RS422 (can be used with external wiring as RS485 or by means of software as RS232).	Base PCB below
X34	SIO2: RS232	Base PCB below

X9: **RS232 programming interface**

b)	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
9	Reserved	Do not connect

X31: **RS485 and RS232**

The RS485 interface is designed for connecting motion trackers. The RS232 is directly connected to the AS-I master activation and serves to configure the AS-i master.

Pin	Signal	Description
1	RTXD-	RS485 received / transmitted data low
2	TXD	RS232 / transmitted data
3	RXD	RS232 / received data
3	TXD	RS232 / transmitted data
4	RTXD+	RS485 received / transmitted data high
5	GND	Signal ground
6	Reserved	Do not connect
7	Reserved	Do not connect
8	Reserved	Do not connect
9	Reserved	Do not connect

An RS485 terminating resistor can be activated via the S_1 slide switch.

X33 / X34:

RS232 or RS422 / RS485

RS232 the standard assignment of the two serial interfaces on X33 and X34.

Standard RS232 assignment

Pin	Signal	Description
1	Reserved	Do not connect
2	RXD	RS232 / received data
3	TXD	RS232 / transmitted data
4	Reserved	Do not connect
5	GND	Signal ground
6	Reserved	Do not connect
7	RTS	Ready to send
8	CTS	Clear to send
9	Reserved	Do not connect

The two serial interfaces can also be configured individually as RS422 by means of the software.

Pin assignment as RS422

Pin	Signal	Description
1	Reserved	Do not connect
2	RxD-	Received data low
3	TXD-	Transmitted data low
4	Reserved	Do not connect
5	GND	Signal ground
6	Reserved	Do not connect
7	TxD+	Transmitted data high
8	RxD+	Received data high
9	Reserved	Do not connect

Pin assignment as RS485

The interfaces can be reconfigured individually to form an RS485 interface by means of external connections. The prerequisite for this is the configuration of the interface as RS422. In addition the following connections must be made by means of external wiring:

- Pin 2 and 3 => RxTxD– (A)
- Pin 7 and 8 => RxTxD+ (B)

The bus physics of the RS485 interface requires terminating resistance. With the S_2 slide switch the RS485 interface can be scheduled on connector X33 If X34 is also used as RS485, in this case equipment with terminating resistors must take place externally.

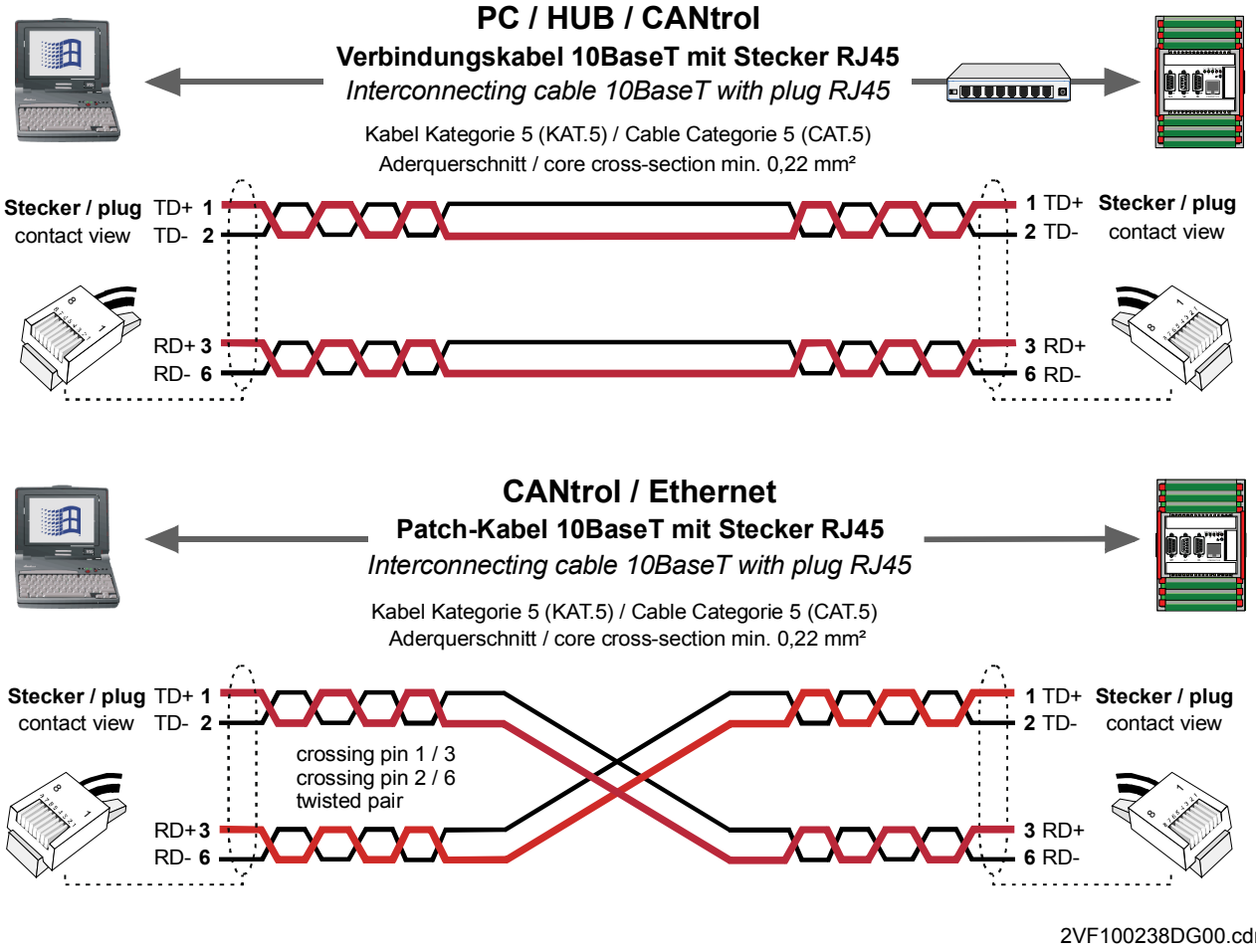
⚠ CAUTION

Terminating resistance may only be activated if the interface is used as RS485!

For all other configurations (RS422 / RS232) a communications error arises or the communication fails.

2.4.8. Ethernet Interface

A 10/100 MBit/s Ethernet interface is available. The TCP/IP and UDP/IP protocols provide very flexible accessibility to visualisation software, to higher order control units or to the IT infrastructure.



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

2.4.9. AS-i interface (optional)

The AS-i master activation is connected via pin X4.
Configuration takes place via the X31 serial interface (see section *'Serial interfaces'*.

X4: **AS-i interface**

Pin	Signal	Description
1	AS-i+	Communication / supply (brown conductor)
2	AS-i-	Communication / supply (blue conductor)
3	PE	Protective earthing conductor
4	AS-i+	Communication / supply (brown conductor)
5	AS-i-	Communication / supply (blue conductor)

Connections 1 and 4; 2 and 5 are connected with one another internally.

2.4.10. USB interface

Devices can be connected to the (X30) USB interface on the USB port (Rev. 1.1).
It is a USB Host interface that supplies up to 500 mA power at 5V.

⚠ CAUTION

In addition, the power supply of the module also supplies the electronics of the e-bus extension module.

If more than 100 mA are required on the USB interface, this reduces the maximum number of E-bus stations.

X30 **USB-Interface**

B1	VCC
B2	D-
B3	D+
B4	GND

2.4.11. CAN Interfaces (standard version)

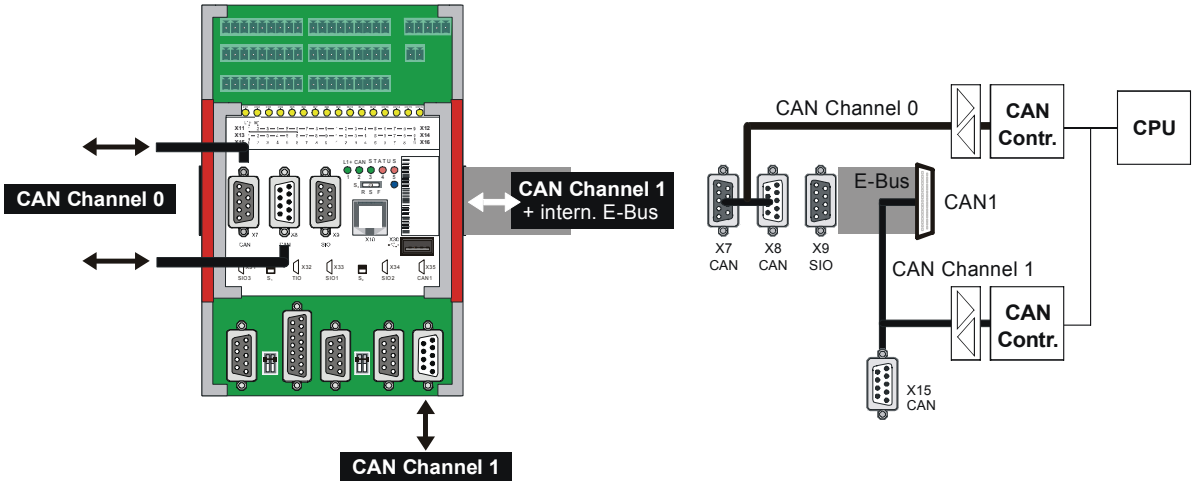
The CPU module is supplied with 2 CAN interfaces compliant to ISO 11898.
The standard CAN interfaces correspond to the description in the manual:
'*Introduction to the CANtrol automation system'*.

CAN Channel 0

X7/X8 on front panel.
As well as being an application-specific communication interface, channel 0 also serves as a programming interface.
The maximum baud rate is 1 MBit/s and can be adjusted by software.

CAN Channel 1

X35 on the base board and parallel on the internal E-bus (with integral matching resistor). The maximum baud rate is 1 MBit/s and can be adjusted by software.



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X7 / X8 / X35: **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

More about connecting the CAN interface is to be found in the '*Introduction'* manual.

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3. Digital Inputs/Outputs 8/8-0,5 (3,81)

3.1. Grouping of Inputs/Outputs

The grouping facility permits formation of groups, separate power circuits, emergency off circuits, etc. as and when required.

Inputs/outputs can be supplied in groups as

- 1 input groups and
- 2 output / input groups.

The **modular electronic circuit** for C modules is supplied together with input group 2 (Group 2) over connection terminals 1 (L1+) and 2 (M1).
The modular electronic circuit must be supplied with power in **any** cases, otherwise the modules will be inoperable.
Supply must be provided directly (unswitched) from the supply unit.

Inputs

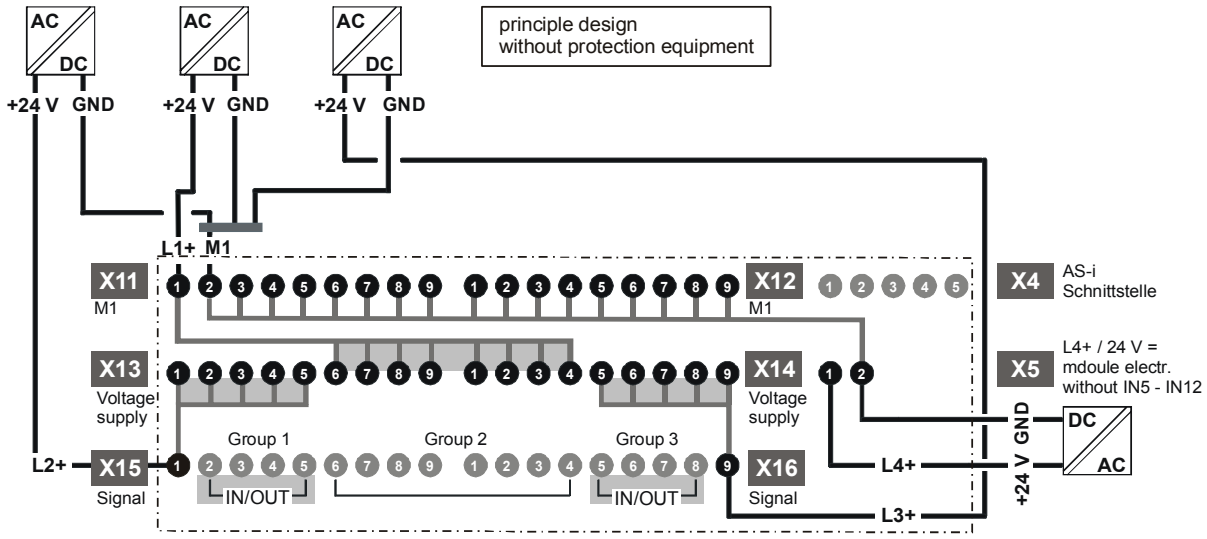
Inputs (sensors) must be supplied directly from the supply unit.
Do not conduct the sensor supply through switched circuits.

Outputs

Output groups may be supplied through upstream switch elements (emergency off, manual switches, etc.).

⚠ WARNING	**Feedback could destroy the module and/or the sensors!** Otherwise, when group power supply is disconnected, connected sensors could produce a feedback over the output transistors. Always make sure the sensors are each supplied from the same power source as the module's associated I/O group.

3.1.1. Schematic Diagram of Input/Output Grouping



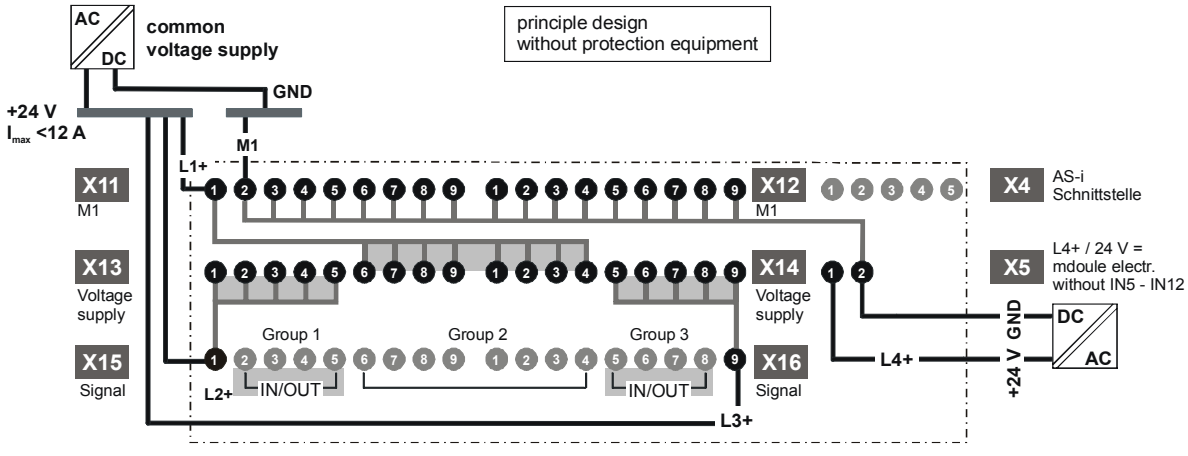
Group 1	IN / OUT 1-4	*Bemessungsspannung für erhöhte Isolation nach Rated voltage for increased isolation defined by* *EN 61131-2* *0...50 V*
Group 2	IN 5-12	
Group 3	IN / OUT 13-16	

2VF100245DG00.cdr

3.1.2. Without Grouping

Wird auf die Gruppenbildung bei der Spannungsversorgung verzichtet, sind vom Anwender die im folgenden Bild dargestellten Verbindungen herzustellen.

Without grouping of the voltage supply, the user has to build the following connection.



2VF100274DG00.cdr

3.2. Digital Inputs, high side switching

The digital inputs are high side switching type 1 inputs for 3-conductor sensors. They are designed for input voltages of 24 V nominal. The inputs are transmitted cyclically to the CPU. An open input is interpreted as static 0 (LOW).

Pulse recognition and interference suppression

Inputs are read cyclically. Pulses < 100 µs are hardware suppressed. The sampling interval can be parameterised by software. The shortest possible sampling interval is 250 µs.

If pulses are to be detected reliably they must be longer than the sampling interval stipulated by software.
Multiple sampling can be programmed in order to suppress spurious pulses.
Sampling interval and multiple sampling (filtering) can be activated in groups of 32 inputs each.

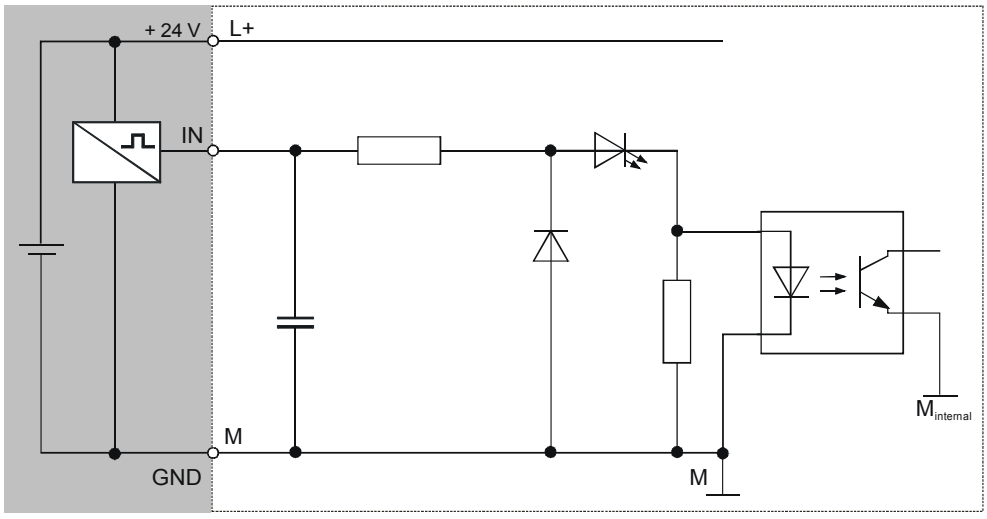
NOTICE

This function is available only for C applications at present. Using IEC 61131-3 the filter is permanently set to 250 µs.

Operating status

The status of each input is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals.
An LED lights when its associated input is activated (logical 1 / HIGH).

3.2.1. Block diagram of input



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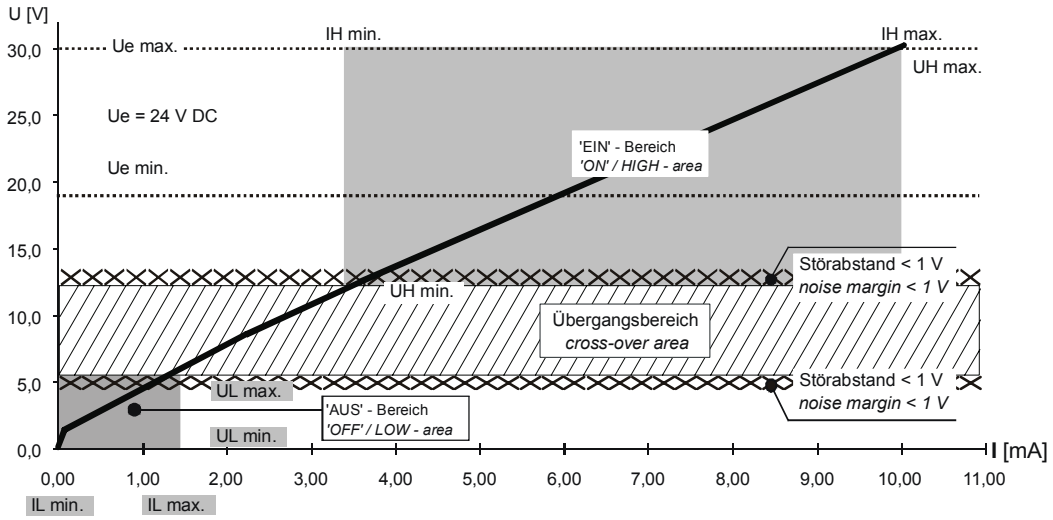
3.2.2. Digital Inputs Data

Module data	
Number of inputs	8 (max. 16)
Line lengths: in switchgear cabinet dedicated l.v. wiring	 Allow for voltage drop when choosing conductor cross-section, otherwise no restrictions in practice. Observe all relevant local regulations and the requirements of EN 61131-3. Please consult manufacturer regarding lightning hazard.
Rated load voltage L+ Reverse voltage protection	DC 24 V (SELV) yes
Electrical isolation	yes (optical isolator) in groups
Status display	yes, yellow LED for each input
Alarms	definable according to software
Input delay	parameterisable by software
Input capacitance	< 10 nF

Digital-input operating areas



Eingangsspannung (DC) der externen Stromversorgung
Input voltage (DC) of extern power supply

Ue	24 V	Bemessungsspannung / *rated voltage*
Ue max.	30 V	oberer Grenzwert / upper *limit*
Ue min.	19,2 V	unterer Grenzwert / *lower limit*

Grenzwerte für '1' Signal für die 'EIN'-Bedingung
Limit for '1' signal for the 'ON'-condition

$UH_{max.}$	30,0 V	obere Spannungsgrenze / upper *voltage limit*
$IH_{max.}$	10,0 mA	obere Stromgrenze / upper *current limit*
$UH_{min.}$	13,5 V	untere Spannungsgrenze / *lower voltage limit*
$IH_{min.}$	3,5 mA	untere Stromgrenze / *lower current limit*

Grenzwerte für '0' Signal für die 'AUS'-Bedingung
Limit for '0' signal of the 'OUT'-condition

$UL_{max.}$	5,5 V	obere Spannungsgrenze / upper *voltage limit*
$IL_{max.}$	1,5 mA	obere Stromgrenze / upper *current limit*
$UL_{min.}$	0 V	untere Spannungsgrenze / *lower voltage limit*
$IL_{min.}$	0 mA	untere Stromgrenze / *lower current limit*

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3.3. Digital Outputs, high side switching

WARNING	The module can be destroyed by overvoltages > 32 V and / or feedback. Risk of **fire!**

Each digital output is also usable as an input. See description under ‘Digital Inputs’ if using as input.

Outputs

The outputs are of high side switching 24 volt type (two-conductor). Maximum output current per output is 500 mA. The outputs have a common earth (GND) when operating in groups. Power is supplied separately from the supply for the modular electronic circuit (see ‘Connection Assignment’).
The outputs switch automatically to ‘0’ (LOW) if there is no available data link to the CPU or if the module’s internal supply is insufficient.

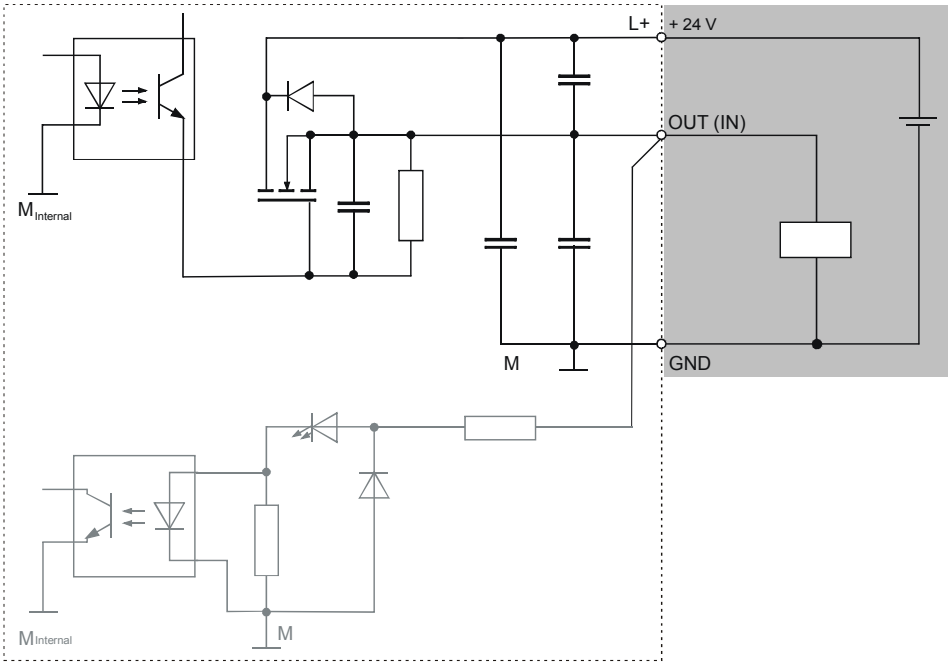
Protected output

All outputs are protected by an incorporated current-limiting circuit and a thermal overload protection circuit. If overloaded, the affected output switches off.
The output can be re-activated by program on elimination of the overload and thermal cooling. A high-speed de-excitation feature having a terminal voltage of 50 V, related to L+, protects all outputs against induced voltage peaks under inductive loads.
The overload protection of non-involved outputs may also respond prematurely if feedback or high-speed de-excitation give rise to thermal loads.

Operating status

The status of each output is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals. A LED lights when its associated output is activated, logical ‘1’ (HIGH).

3.3.1. Block diagram of output



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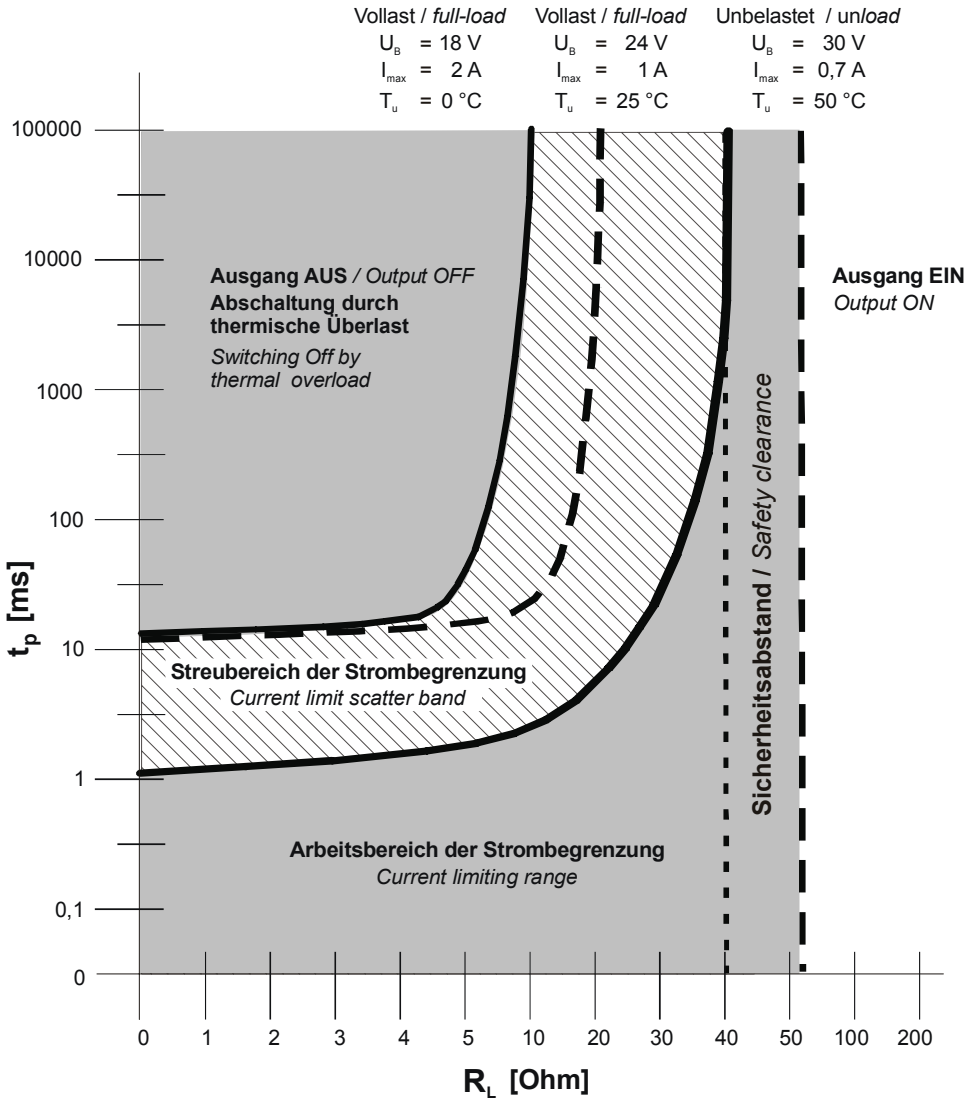
3.3.2. Digital Outputs Data

Module data		
Number of outputs		8 semiconductor outputs in 2 groups
Type of outputs		semiconductor, non-holding
Suppressor circuit for inductive loads		high-speed de-excitation 50 V terminal voltage (typical) to + 24 V
Power loss due to de-excitation		max. 0.5 watts per output max. 4 watts per module
Status display		yes, yellow LED for each output
Diagnostic function		yes, switching state can be read back at pin
Load connection		
Total loading (100%)		4 A (8 x 0.5 A)
Overload protection		yes, in event of thermal overload Responding of thermal overload protection may influence adjoining outputs.
Short-circuit protection [1)] response threshold		yes, electronic current-limiting feature, min. 0.5 A, typically 0.9 A
[1)] Current is limited electronically. Responding of the short-circuit protection feature produces thermal overload and trips the thermal overload protection circuit.		
Output delay	for ‘0’ to ‘1’ for ‘1’ to ‘0’	max. 0.5 ms max. 0.5 ms
Output capacitance		< 20 nF
Rated voltage Voltage drop (at rated current)v		DC +24 V < 0.5 V
Rated current Leakage current	for ‘1’ signal for ‘0’ signal	0.5 A max. 0.1 mA
Total current (horizontal mounting on vertical mounting plate)	of all outputs per group	max. 4 A (8 x 0.5) max. 2 A (4 x 0.5)
Lamp load (DC +24 V)		max. 6 watts
Connection of two outputs in parallel to provide logic operation to increase performance		 allowed not allowed
Insulation resistance		
Rated voltage		0 V <Ue <50 V
Test voltage up to 2,000 m altitude		500 VDC

Overload Reaction of Digital Outputs

Überlast-Verhalten der digitalen Ausgänge
Overload-reaction of digital output



Innerhalb des Streubereichs der Strombegrenzung ist das Verhalten der Strombegrenzung undefiniert.
Within the current-limit scatter band the reaction of current limiting is undefined.

2VF100021DG00.cdr

NOTICE

It is not possible to know for certain within the current limit scatter band whether the response will be to disconnect or to return to the working range.

As a result, this state should be avoided! The output is ready for operation by elimination of the overload and thermal cooling.

4. Annex

4.1. Environmental Protection

4.1.1. Emission

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

4.1.2. 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.

4.2. Maintenance/Upkeep

⚠ WARNING	**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.

4.3. Repairs/Service

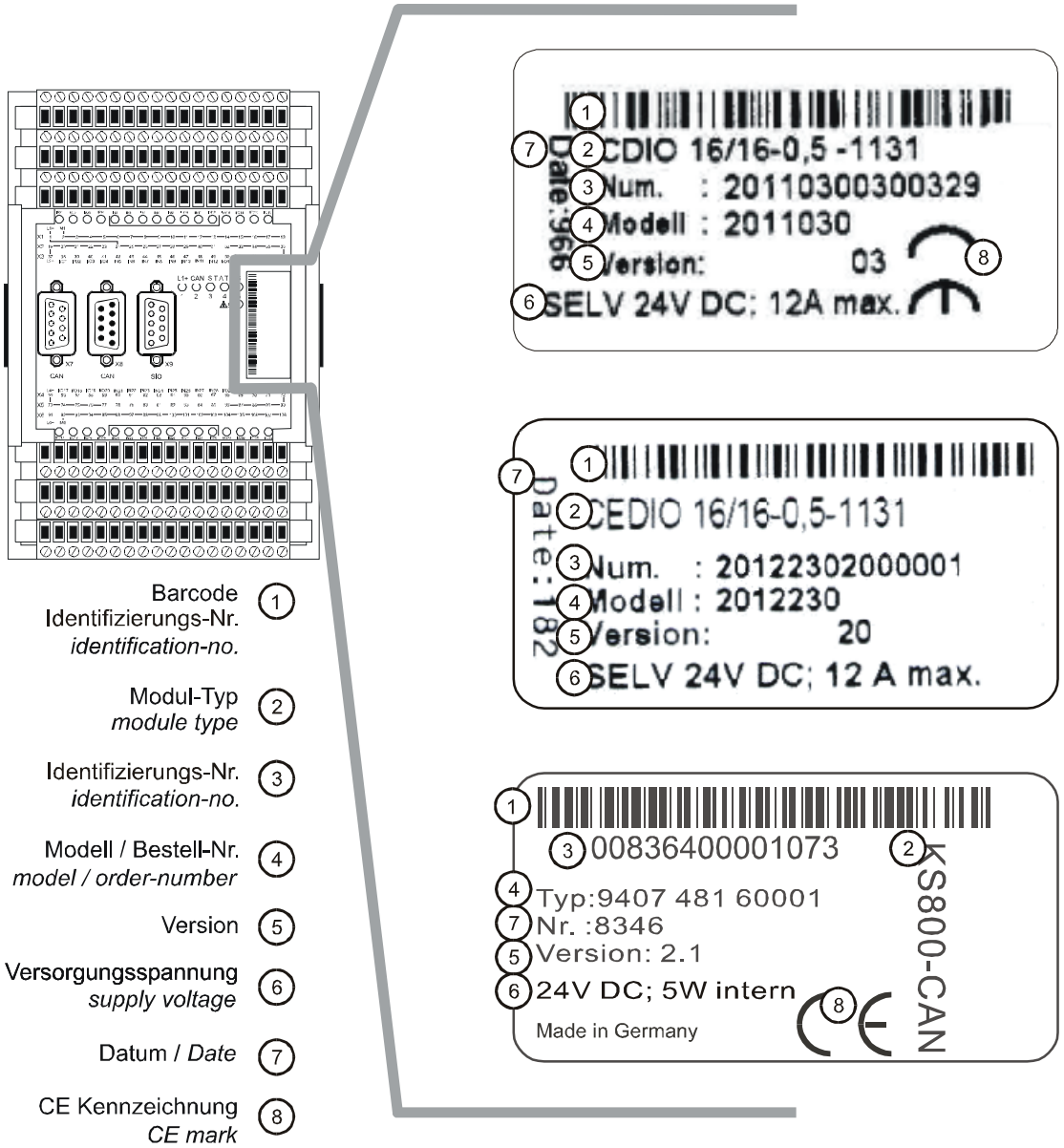
⚠ WARNING	Repair work may only be carried out by the manufacturer or its authorised service engineers.

4.3.1. 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.

4.4. Nameplate

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



1 Barcode Identifizierungs-Nr. *identification-no.*
2 Modul-Typ *module type*
3 Identifizierungs-Nr. *identification-no.*
4 Modell / Bestell-Nr. *model / order-number*
5 Version
6 Versorgungsspannung *supply voltage*
7 Datum / *Date*
8 CE Kennzeichnung *CE mark*

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**

NOTICE	**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 reload 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.).

4.5. Addresses and Bibliography

4.5.1. 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 10772 Berlin	or	VDE-Verlag GmbH 10625 Berlin
IEC Standards	VDE Verlag GmbH 10625 Berlin	or	Internet search http://www.iec.ch/

4.5.2. 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/EN61131Bl1	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 - **C**ontroller **A**rea **N**etwork (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.