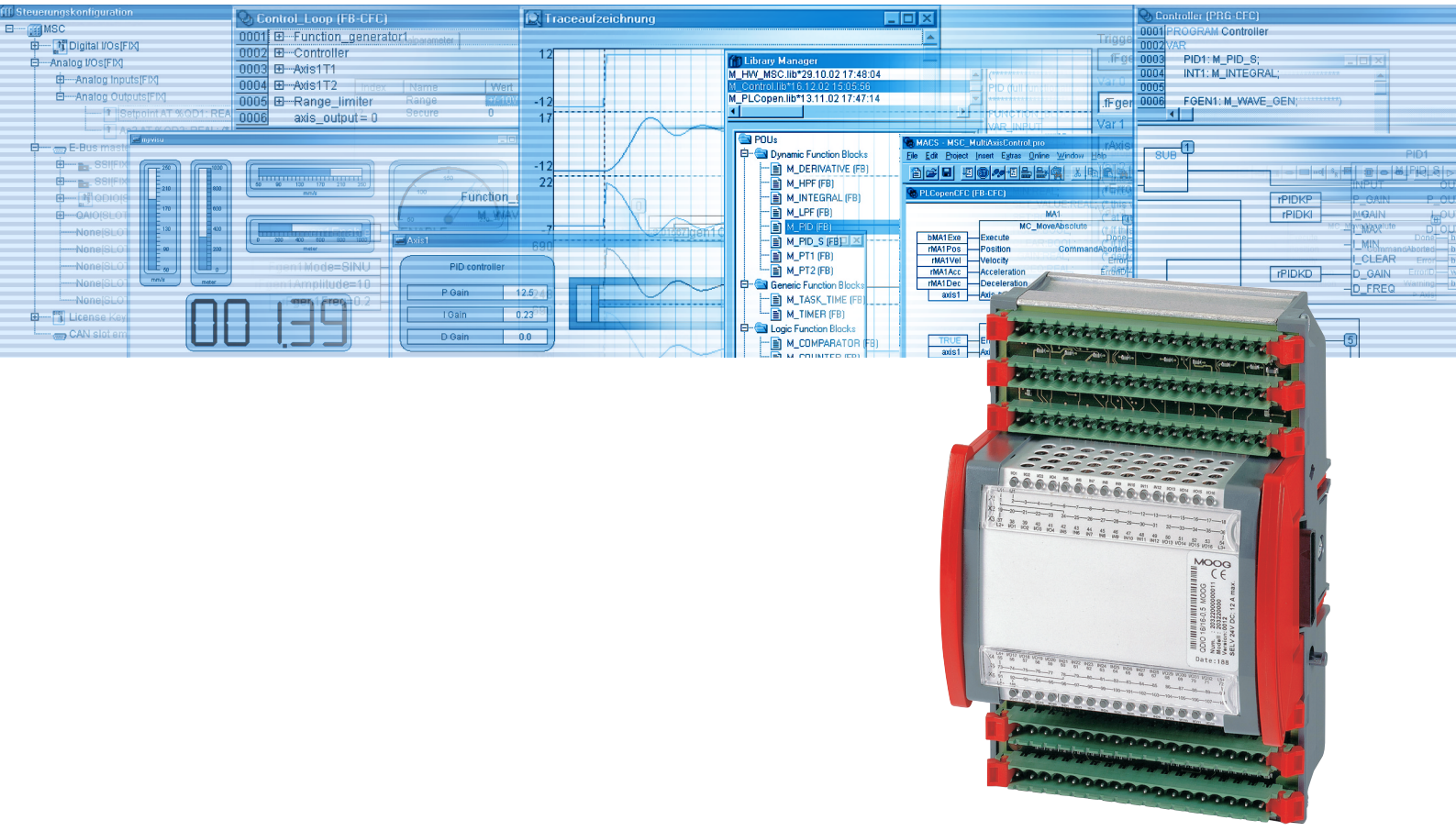
User Manual

M3000® Control System

QDIO 16/16-0,5
Digital I/O Extension Module



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DIN EN ISO 9001

Our quality standard is according to DIN EN ISO 9001.

Introduction

to CANtrol Automation System

Includes description of the modules

CDIO 16/16-0,5

QDIO 16/16-0,5

QCAN-adaptor

V.1.21

User Handbook

A u t o m a t i o n S y s t e m

CANtrol®

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General Information on this Manual

Content:
This manual describes the CANtrol automation system, the modules CDIO 16/16-0,5, QDIO 16/16-0,5 and its modifications and the QCAN-adaptor. 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 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.

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Update

Version	Date	Subject
1.11	12-99	First English Version / Translation of german version 1.11
1.20	22.06.01	IEC 1131-x replaced with IEC 61131-x. Extensions and updates: General instructions, arrangement of modules, block diagram of input/output, dig.I/O low side switching, block circuit diagram of modules, technical data QDIO 16/16-0,5, QCAN: termination by E-bus. Annex: Update 'module type'. connection building, product overview.
1.21	01.03.02	Updates: figures CAN channels, arrangement of modules, installation and dismantling, digital I/O, CDIO 16/16-0,5, connection building (C2CPU-2S..), annex, connection plugs and product overview. New format types.

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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:

DANGER ! means that death, severe physical injury or substantial damage to property will occur on failure to take the appropriate precautions.

Warning ! means that death, severe physical injury or substantial damage to property may occur on failure to take the appropriate precautions.

Caution means that minor physical injury or damage to property may occur on failure to take the appropriate precautions.

Note:
provides important information on the product or refers to a section of the documentation which is to be particularly noted.

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. General Information

2.1. Remarks Concerning This Manual

Contents

This manual describes the general foundations of the CANtrol automation system and contains the following topics:

- System overview and network structure
- CAN Bus
- Mechanical layout
- Electrical system
- A description of a basic system consisting of:
  CPU-module: CDIO 16/16-0,5
  I/O-expansion module (digital): QDIO 16/16-0,5
  E-bus/CAN Adaptor: QCAN

Scope of Application

This manual contains general information which applies to CANtrol at the time of this manual's publication. The manual is complete only in conjunction with the module-related user manuals required for each instance of use.

Norms

The CANtrol automation system and its components fulfill the behavioral specifications of European Norm EN 61131, Part 2.

Note:
Departures from statements in this text may be necessary in individual cases due to technical developments. These are specifically noted and explained in each user manual.

CE-Designations

CE designations for the CANtrol automation system's components are based on a user-oriented control system design with proven EMC (electromagnetic compatibility). These components meet the requirements and protective target values of EC-guideline No. 89/336/EC, "Electromagnetic Compatibility" (an EMC guideline) and correspond to the coordinated European Norms (EN) for programmable logic control systems (PLC), as published in the European Community's official bulletins. Please give special attention to the rules for correct wiring of EMCs in cabinets and buildings (cf. IEC No 61131-4 / Supplement 1 to EN 61131). Installation in grounded metal cabinets is recommended. EMC compliance cannot be claimed if protection is inadequate.
The low voltage guideline (73/23/EWG) does not apply to the CANtrol system, since its permissible voltage levels are below the limit values.

Order Numbers

See the product overview for a list of deliverable articles and their order numbers.

2.2. Shipment and Storage

Shipment and storage requirements for the CANtrol module correspond to the requirements of EN 61131, Part 2.

Note:
All statements here apply only to modules which are shipped and stored in their original containers.

Conditions	Permissible Range
Temperature	-25° C to +70° C
Relative Humidity	5% to 95%, no condensation
Air Pressure	> 70 kPa (Corresponds to 3000 m above sea level)
Free Fall	1 m

2.3. Operating Conditions

Conditions for Use

CANtrol is constructed for permanent installation in switchgear cabinets under normal operating conditions, corresponding to EN No. 61131, Part 2.
The modules correspond to Safety Class IP 20.
The user has the duty of ensuring that the following operating conditions are adhered to.

Condition	Permissible Range	Remarks
Climatic Conditions		
Temperature (horizontal installation)	+0° C to +50° C	
Mean Temperature for 24 hours	Max. 45° C	
Relative humidity	5% to 95 % No condensation	
Pollution level	2	IEC 664
Corrodibility	No protection	
Height above sea level	Max. 2000 m	
Mechanical conditions		
Sinusoidal oscillations Permanent Occasional	$10 \leq f \leq 57$ Hz 0,0357 mm Amplitude 0,075 mm Amplitude	IEC 68, Parts 2-6
Sinusoidal oscillations Permanent Occasional	$58 \leq f \leq 150$ Hz 0,5 g const.acceleration 1 g const.acceleration	IEC 68, Parts 2-6
Pulse	Peak value 15 g 11 ms Duration	IEC 68, Parts 2-27
Electric conditions		
Rated voltage Note	DC 24 V Tolerance range 18 V to 32 V	Safety Extra-Low Voltage (SELV) corresponding to EN 61131-2 (See also previous Note)

Current consumption
The table contains approximate values, i.e. a rough estimate of power requirements.

Module Type	Current Consumption from DC 24 V (No-load)	Current Consumption from DC 24 V (Full load)	Stray power U_e = 28 V
C... / R... modules with digital I/O	Max. 300 mA	Max. 10 A	0.35 W per active channel
Q... modules with digital I/O	-	Max. 10 A	0.35 W per active channel

Exact values for the current consumption of each module are found in that module's user manual.

Note:
CANtrol modules function properly in the range between 18 V and 32 V.
To ensure compatibility with other components, we recommend staying within the power supply tolerance band from 19.2 V to 30 V, as specified by EN 61131-2.

Limitations

CANtrol may **not** be used without additional precautions in:

- Locations with a corrosive atmosphere
- Locations with aggravated operating conditions, e.g. due to
  - dust collection
  - aggressive vapors / gases
- Facilities requiring special supervision, e.g.
  - elevator systems
  - electrical facilities in highly dangerous room areas
- Inhabited areas
  (residences, commercial and industrial areas, small production plants)

Additional precautions can be taken by installation e.g. in specially designed cabinets.

2.4. Electromagnetic Compatibility

EMC

CANtrol modules are designed for use under normal industrial operating conditions and fulfil the following requirements:
Emitted interference EN 50081-2
Immunity to interference EN 50082-2.

CE designations for the CANtrol automation system's components are based on a user-oriented control system design with proven EMC (electromagnetic compatibility).

CANtrol can also be used in conjunction with appropriate additional precautions in inhabited areas (residences, commercial and industrial areas, small production plants) (EN 50081-1). CANtrol may not be used in inhabited areas whose respective facilities fail to meet these requirements.

Appropriate additional precautions might be the following, for example:
- installation in grounded metal cabinets
- installation of filters in the supply mains
- use of shielded cables outside the cabinets

ESD

CANtrol modules are not ESD-sensitive with respect to handling (shipment, installation, and removal).

2.4.1. Immunity to Interference

CANtrol meets the requirements of EN 61131-2 and EN 50082-2. All EMC specifications apply for the installation of CANtrol modules on an electrically conductive, grounded mounting plate.

The following table shows the EMC of the CANtrol automation system in the presence of sinusoidal interferences.

HF-Waves Electromagnetic HF field		**HF interference**
Amplitude-modulated	Pulse-modulated	
80 to 1000 MHz	900 MHz ± 5 MHz	0.15 to 80 MHz
10 V/m		10 V_{eff} unmodulated
80 % AM (1 kHz)	50% CD (Continuous Duty)	80 % AM (1 kHz)
	200 Hz Repetition rate	150 Ohm Source impedance

2.4.2. Emitted Interference

Emitted interference of electromagnetic fields (measured at a distance of 30 m).

Frequency	**Emitted Interference**
from 20 to 230 MHz	< 30 dB (µV/m)Q
from 230 to 1000 MHz	< 37 dB (µV/m)Q

2.5. Grounding

CANtrol modules lack a protective ground connection (operational ground). They are **functionally grounded** by the mounting rail.

All supply voltages should be grounded for reasons of operating safety. Provide a detachable connection for the ground lead on the load power supply unit or the isolating transformer; this makes it easier to locate ground faults in case of malfunction.

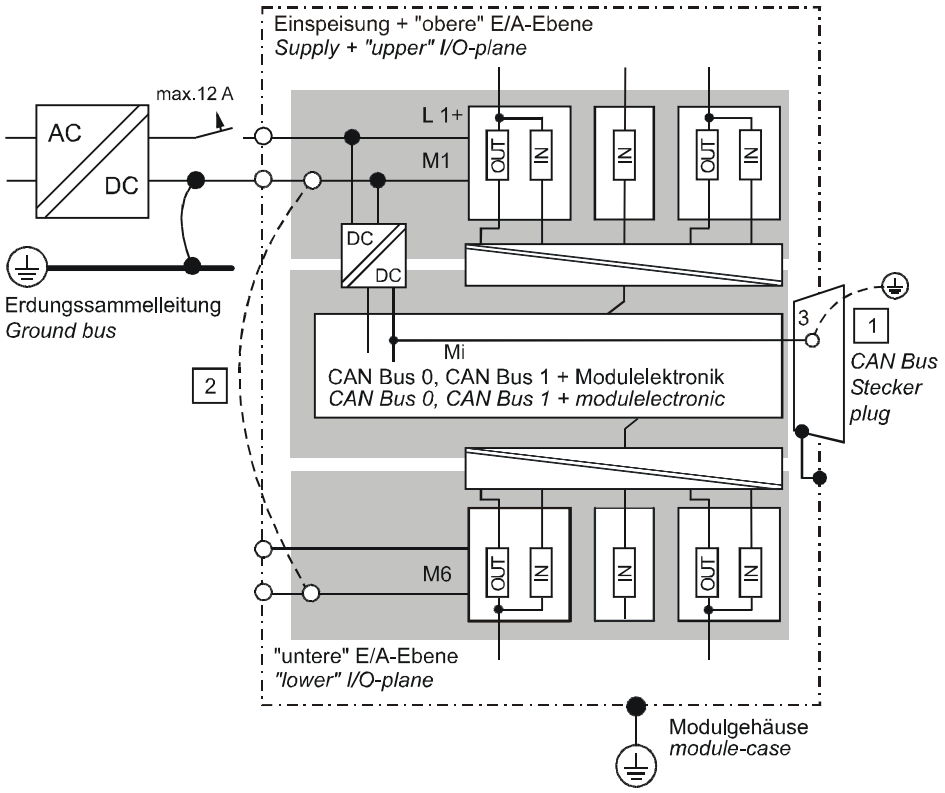
2.6. Insulation Resistance and Electrical Isolation

Isolationsfestigkeit / *insulation resistance*

Die Isolationsfestigkeit von CANtrol Modulen erfüllt die Anforderungen nach EN 6 1131 Teil 2.
The insulation resistance of the CANtrol module fulfil the requirement to EN 6 1131, part 2.

Bemessungsspannung / *rated voltage*	0 V < Ue < 50 V
Prüfspannung für 2000 m Höhe *test voltage for 2000 m height*	DC 500 V

Vereinfachte Darstellung der Potentialtrennung bei CPU-Modulen
Simplified diagram of the galvanic isolation by the CPU-modules



Hinweis / Note:

1 Zum Potentialausgleich ist die CAN-GND Leitung einseitig zu erden.
For the equipotential bonding earth the CAN-GND line on one side.

2 Die 'obere' und 'untere' E/A-Ebene bei digitalen CANtrol Modulen kann mittels Drahtbrücke auf gemeinsames Potential gelegt werden.
The "upper" and "lower" I/O-plane of digital CANtrol modules can be layed with wire jumpers on a common potential.

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3. Information Concerning the System

3.1. General Remarks on Power Supply

The control system's power supply requires **Safety Extra-Low Voltage (SELV) according to EN 61131-2.** The rated voltage is DC 24 V.

Power for the module's electronic system is usually input over the supply terminals of the I/O connection level. The exact current input locations are given in the specifications for each module.
The electronic system of the module itself (without sensors/actuators) requires a maximum power supply of 2 A (usually < 1 A).

3.1.1. Power Supply of the Module's Electronic System

Power for the module's electronic system and the I/O modules of the input channels should be supplied by a non-switched power supply (no intermediate devices like EMERGENCY OFF, manual operation, etc.).

Note:
Due to internal module capacities, brief current spikes as high as 50 A (< 0.5 ms) may occur when the module's supply voltage is switched on.

Power can be supplied to the output channels over a switched power supply. The module itself requires a maximum of 0.1 A from this power supply. The internal capacitive load is 0.1 µF.

3.1.2. Current-Carrying Capacity

All power supply terminals and their respective internal connections are designed for a current-carrying capacity of max. 12 A.
Use the following with currents higher than this maximum current:
- several separately protected circuits or
- several separate power supply units with individual circuits.

3.1.3. Current Supply Output Channels

Current-supplying output channels of modules with digital I/O have a built-in current limitation and a thermally-activated overload protection.
The output channels usually deliver a current of 0.5 A; the current limitation is usually around 0.9 A. Exact values are given in the individual module specifications.

3.1.4. Power Supply Characteristics

The user must supply **Safety Extra-Low Voltage (SELV)** which is reliably isolated electrically from the supply networks as defined in EN 61131-2.
The control current and load current for CANtrol modules can be supplied from a power supply unit, with due regard for the power limits.

Requirements

Power supply units for the CANtrol automation system must fulfill the following technical requirements:

Output voltage	
- Rated voltage*(U_e)*	DC 24 V (SELV)
- Permissible tolerance range*(min/max)*	-15 % / +20 %, stable at no load
- Residual ripple *(Ripple)*	+5 %
- Ramp-up time (10 % - 90 %)	Max. 0.2s
Output current	
- Rated value	<10 A, current-limiting
Energy reserve	
- Under full load *(Severity PS2)*	>10 ms (> 19.2 V), 1s interval between drops
Power-**F**ail Signal *(PF)*	Potential-free contact

Note:
Safety Extra-Low Voltage / SELV is defined by EN 61131-2 (IEC Norm 61131-2) as voltage which does not exceed 42.4 V peak voltage or DC voltage, measured between conductors or between a conductor and ground, under any operating conditions. The circuit in which it flows must be isolated from the line current supply by a safety isolating transformer or an equivalent device. National regulations are to be observed in selecting the correct rated and insulation voltage.

3.1.5. Power Supply Problems

As in any other control system, the CANtrol system's first reaction to irregularities in the power supply system depends directly on the presumed state of the input/output channels. This state is usually unforeseeable.
When brief drops in supply voltage occur, the following points should be taken into account in order to determine whether the system is in proper working order:

CANtrol is a control system in which response times as brief as 1 ms are possible. The dynamic I/O characteristics are adjusted for this. The minimum pulse duration which can be generated and/or registered in most cases is about 0.5 ms.

CANtrol modules with their own power supply units (C-/R-modules) have a built-in undervoltage recognition. Its response time in most cases is 1.5 ms; the reaction threshold is < 18 V (usually 16 V).

Undervoltage recognition ensures that the module's internal control processes are always in one of the following states:

RUN	Normal program status, corresponding to the user program of the moment.
FAIL SAFE	All output channels 'OFF' Backup of internal data in FLASH memory; the energy required for this is kept in reserve by the system. Wait for restart, depending on the user program of the moment.

Warning ! Due to the brief I/O response times, it cannot be guaranteed that undervoltage recognition will react before erroneous control instructions are issued from the I/O level.
Danger of: Uncontrolled movement sequences, malfunction, destruction.
Always observe the following recommendations!

We recommend the following precautions, either singly or in combination, in order to avoid danger in case of undervoltage:

- Program long filter times for the input channels
- Use a power supply source with an adequate energy reserve for the control system and the I/O level.
- Prepare a signal which announces the imminent loss of power supply (Power-Fail Signal), and also program a corresponding reaction into the application program.

It is the user's responsibility to implement these steps.

3.2. Self-Test and Diagnosis

3.2.1. Initial Self-Test

After being turned on, the system automatically checks the availability of RAM and the integrity of data in the operating system's FLASH memory.
The module's configuration and the communication links can then be checked under the user's supervision.

3.2.2. The Watchdog

CANtrol has built-in safety features which are capable of putting all I/O functions into a pre-defined condition in case of hardware and/or software malfunction. This permits the user to set up control systems which greatly reduce the risk of fatal malfunctions.

Each I/O module is equipped with a timer element (Watchdog) of its own which must be periodically triggered in order for the output channels to remain active.

This triggering is carried out automatically by the operating system after successful completion of the initial self-test and after an application program has been loaded and is ready for operation.

The user program can also be incorporated into the watchdog triggering process by means of appropriate programming.

Warning ! The watchdog function may be deactivated by the programming and diagnostic unit (PADT).
Danger of: Uncontrolled movement sequences, malfunction, destruction

It is also possible to keep the Watchdog "awake" during the programming/initial startup phase; in that case, however, the options of diagnosis and "online" observation are considerably reduced.

Please contact the manufacturer if your safety requirements are stricter.

3.2.3. FAIL SAFE

All digital and analog output channels of the modules go into a pre-defined state in case of hardware malfunctions and whenever the Watchdog reacts.
This condition is always de-energized.

3.2.4. Error Messages

Since all output channels have a FAIL SAFE feature, each digital output channel can be defined for error messages if so required.

The operating system ensures that the output channels remain in FAIL SAFE condition until the initial self-test has been carried out successfully.

Cyclical checks and reactions to communication problems must be programmed by the user.

3.2.5. Optical Status Display

Primary operating modes and fatal malfunctions are signaled optically by LEDs located on the front cover of C-/R modules.

3.2.6. The Communication Monitor

Functions which report available capacity and system malfunctions to the user program have been integrated into the operating system for all communication channels.

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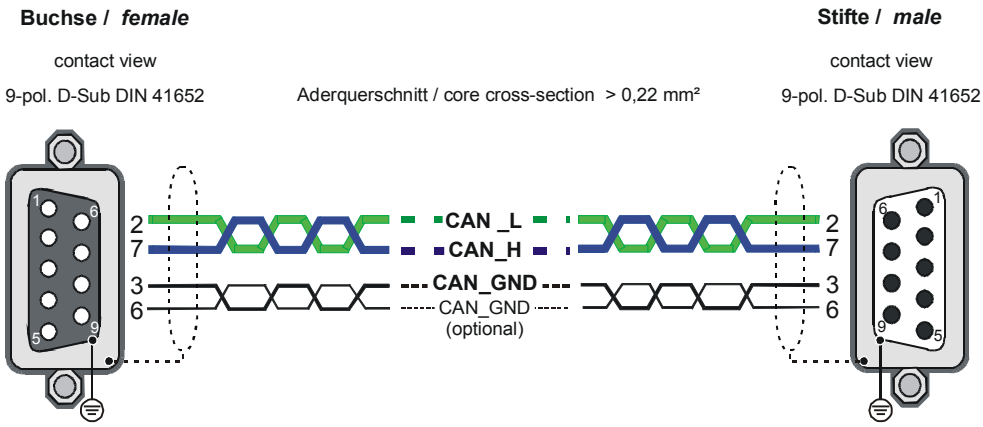
4. Connecting Cables for Communication Interfaces

4.1. The CAN Interface

CAN interface(s) X7/X8 on the front panel.

Empfohlene Belegung des CANtrol Buskabels
Recommended aquisitions of the CANtrol bus cable



Pin	Signal	Description	
1	NC	reserved	
2	**CAN_L**	**CAN_L bus line** (dominant low)	CANtrol
3	**CAN_GND**	**CAN ground** (twisted pair)	CANtrol
4	NC	reserved	
5	(CAN_SHLD)	optional CAN shield	
6	(GND)	optional CAN ground	CANtrol
7	**CAN_H**	**CAN_H bus line** (dominant high)	CANtrol
8	NC	reserved	
9	(CAN_V+)	optional CAN external positive supply (dedicated for supply of transceiver and optocouplers, if galvanic isolation of the bus nodes applies)	

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Trouble-free operation requires that the CAN_GND wire always be present and allocated in the cable.
Use only shielded cables with twisted pairs of wires.

Note:
Pin 3 is connected to Pin 6 in all CAN Bus plugs on the CANtrol modules.

4.1.1. CiA Recommendations for Connector Pin Assignments

Complete specifications for allocating the CAN Bus connector's pins are to be found in the recommendations of the CAN in Automation (CiA) the international users and manufacturers group.

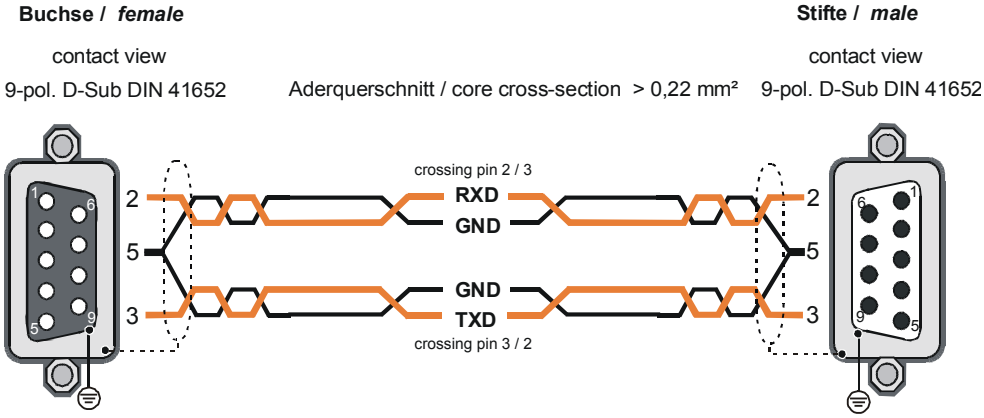
Complete allocation is not required for use of an exclusively CANtrol network. However, this cable allocation is recommended whenever CAN products of other systems are to be integrated into the CANtrol network, since such components may use the signals defined here. Here too, the CAN_L / CAN_H leads must be used as a separate twisted pair.

Note:
The pins of CANtrol module plugs are allocated according to CiA specifications. The metal housings of the plugs have an internal, conductive connection with SL/PE. The modules therefore correspond to the CiA recommendation.

4.2. Serial Interface

SIO interface (X9) according to RS 232 specifications on the front panel of the C-modules.

Empfohlene Belegung des RS 232 Programmierkabels
Recommend aquisitions of the RS 232 programming cable



Pin	Signal	Description	
1	shield	case	not used with CANtrol
2	**RXD**	**received data**	**CANtrol Modules**
3	**TXD**	**transmitted data**	**CANtrol Modules**
4	NC	reserved	
5	**GND**	**signal ground**	**CANtrol Modules**
6	NC	reserved	
7	RTS	request to send	not used with CANtrol
8	CTS	clear to send	not used with CANtrol
9	NC	reserved	

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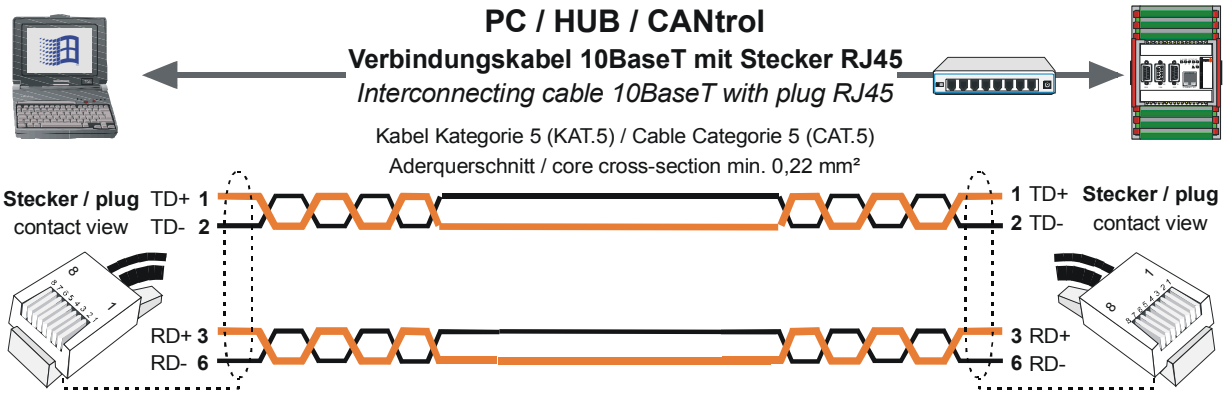
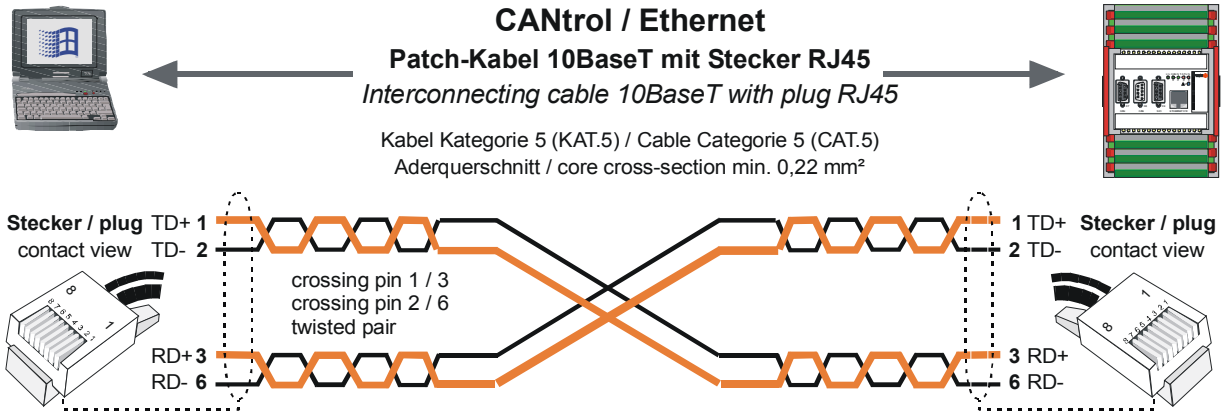
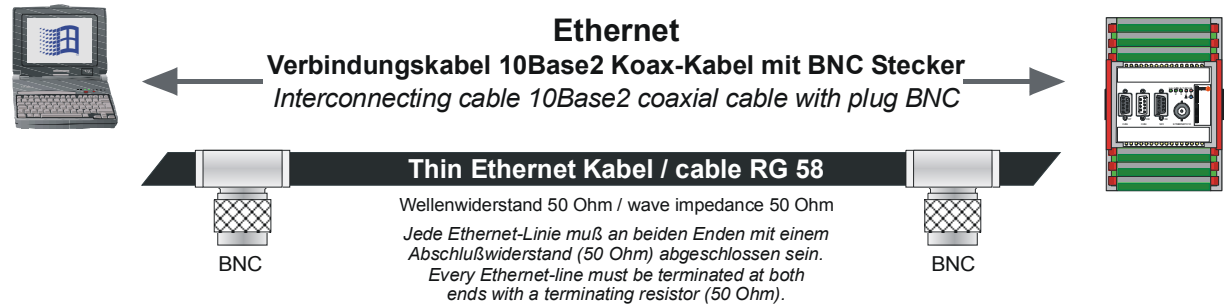
4.3. The Ethernet Interface





Pin	Signal	Description
1	**TD+**	
2	**TD-**	
3	**RD+**	
4	NC	reserved
5	NC	reserved
6	**RD-**	
7	NC	reserved
8	NC	reserved



Um den Anforderungen in industrieller Umgebung gerecht zu werden, sollten nur gesicherte Protokolle gefahren werden.
For correct data transfer in industrial atmosphere only safty protocolls should be used.

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5. Design of the CANtrol Automation System

5.1. The Mechanical Layout

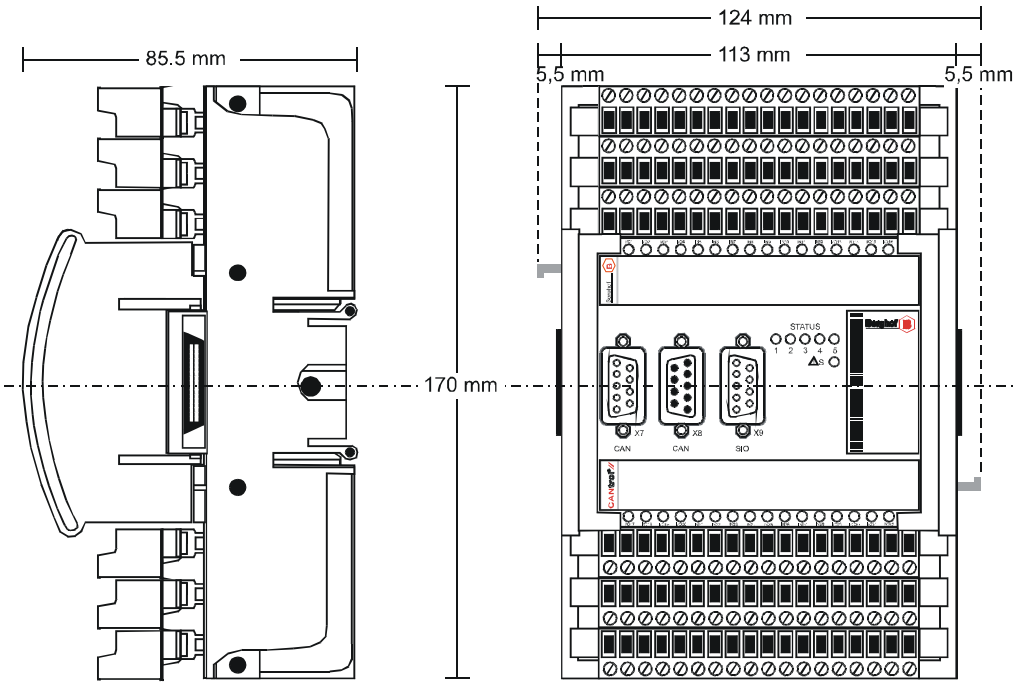
5.1.1. Space Required for Installation

Mounting Rails CANtrol modules are mounted on standard NS 35/7,5 mounting rails according to DIN EN 50022.

Modules Horizontal space requirements are determined by the coupling pins at the sides, which in turn depend on the module's internal arrangement.

Safety Class IP 20

Abmessungen/*Dimensions*



Montage	als Einzelmodul *single module* □	als Reihenmodul*) *module block* ■□■	als Endmodul *end module* □■ oder ■□
Breite / *wide* (Hinweis) [mm]	124,0	113,0	118,5
Höhe / *high* [mm]	170,0		
Tiefe / *depth* [mm]	85,5		

*) Reihenmaß/ *block dimension* = n x 113 mm + 11 mm

Hinweis:
Im Einzelfall kann es Module mit abweichender Baubreite geben (z.B. QCAN).
Prüfen Sie die gültigen Maße anhand des modulbezogenen Anwenderhandbuchs.

In exceptional cases modules will have different wide dimensions (e.g. QCAN).
Prove the valid dimensions using the matching module manual.

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5.1.2. Arrangement of Modules

CANtrol modules are usually designed for unassisted convection cooling.
Any variations from this are described in the user manual for each module.

Horizontal Design

The modules must be arranged horizontally. The mounting rail must be horizontally positioned on a vertical metal mounting plate.

Distances

When tiers of wiring ducts are used, the tier spacing must correspond to the height of the wiring ducts. At least 30 mm must be present between the module and the wiring duct itself. No more than 8 modules may be mounted end-to-end without interruption.

Note:
The general conditions described in the section on "Grouping Input/Output Channels" are to be complied with.

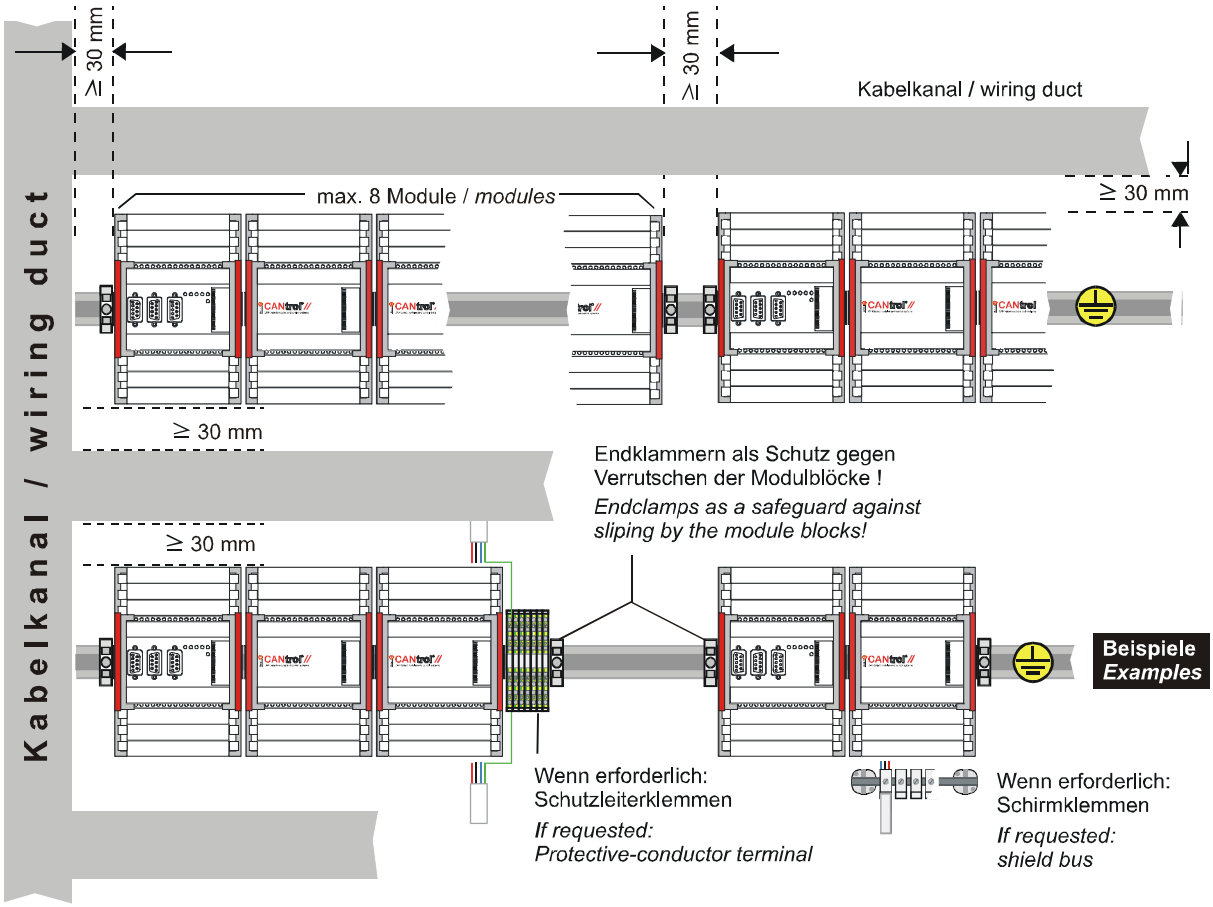
Safeguarding against slippage

Place a terminal clamp at the start and end of each module block to prevent the modules from slipping.

Warning !

All openings in module housings must remain free for ventilation.
Do not allow them to be covered.
Otherwise there is danger of overheating and fire.

Anordnung der Module
Arrangement of the modules



Hinweis:
Legen Sie bitte die, der Modul-Verpackung beigelegten Informationen: '*Hinweise zur Montage/Demontage'*, in einer geeigneten Ablage im Schaltschrank ab. Diese Informationen helfen dem Servicepersonal beim Austausch der CANtrol Module.
Note:
Please, put the Information paper you find enclosed in the packing of the modules: 'Notes of the Installation and Dismantling' in the right place of the cabinet.' This information will help the service personnel to exchanged the CANtrol modules.

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By maintaining the minimum distances, you will ensure that:
- You have enough room to connect the cables.
- You have enough room to mount / remove the modules.
- Convection cooling is adequate.

In most cases, the I/O level of the modules is designed for a 3-conductor connection plan. If for urgent reasons an SL/PE-conductor (e.g. from sensor housings) or a cable shield must be connected, we recommend that the extended connection level be positioned directly at the control cells.

Caution Should technical requirements make it necessary to select other arrangements, this will lower the performance specifications of the modules unless corresponding steps are taken to ensure forced ventilation. Data based on experience are available on request.

5.1.3. Installation and Dismantling

No tools are required to install or dismantle the CANtrol modules.

Warning! Always disconnect modules from the power supply before installing or dismantling them.

Caution Read the instructions to ensure contact stability and safeguard against slippage. Improper installation can lead to malfunctions. There is no guarantee that the modules will work as specified in such cases.

Installation

Install CANtrol modules as follows:

❶ Open the **two** sliding catches (red) at the sides by pulling them out.

❷ Place the module on the mounting rail and apply pressure to lock into place.

Extension

Extension modules (Q.../R..modules) are only added on the right hand side. Proceed as described in *Installation* (steps ❶+❷)

Caution Before pushing the modules together, make absolute sure that **all sliding catches** of the modules to be contacted are **open**, as this is the only way to ensure that the modules are reliably connected.

❸ Shift the module to the left and contact via the bus connector.

Arresting

Once the modules are installed (steps ❶ to ❸), they must be arrested with the lateral sliding catches.

❹ Press **both** lateral sliding catches in the direction of the mounting rail until the modules are locked into place.

Note:
When the modules are correctly arrested on the mounting rail they are also automatically arrested with **high contact stability**.

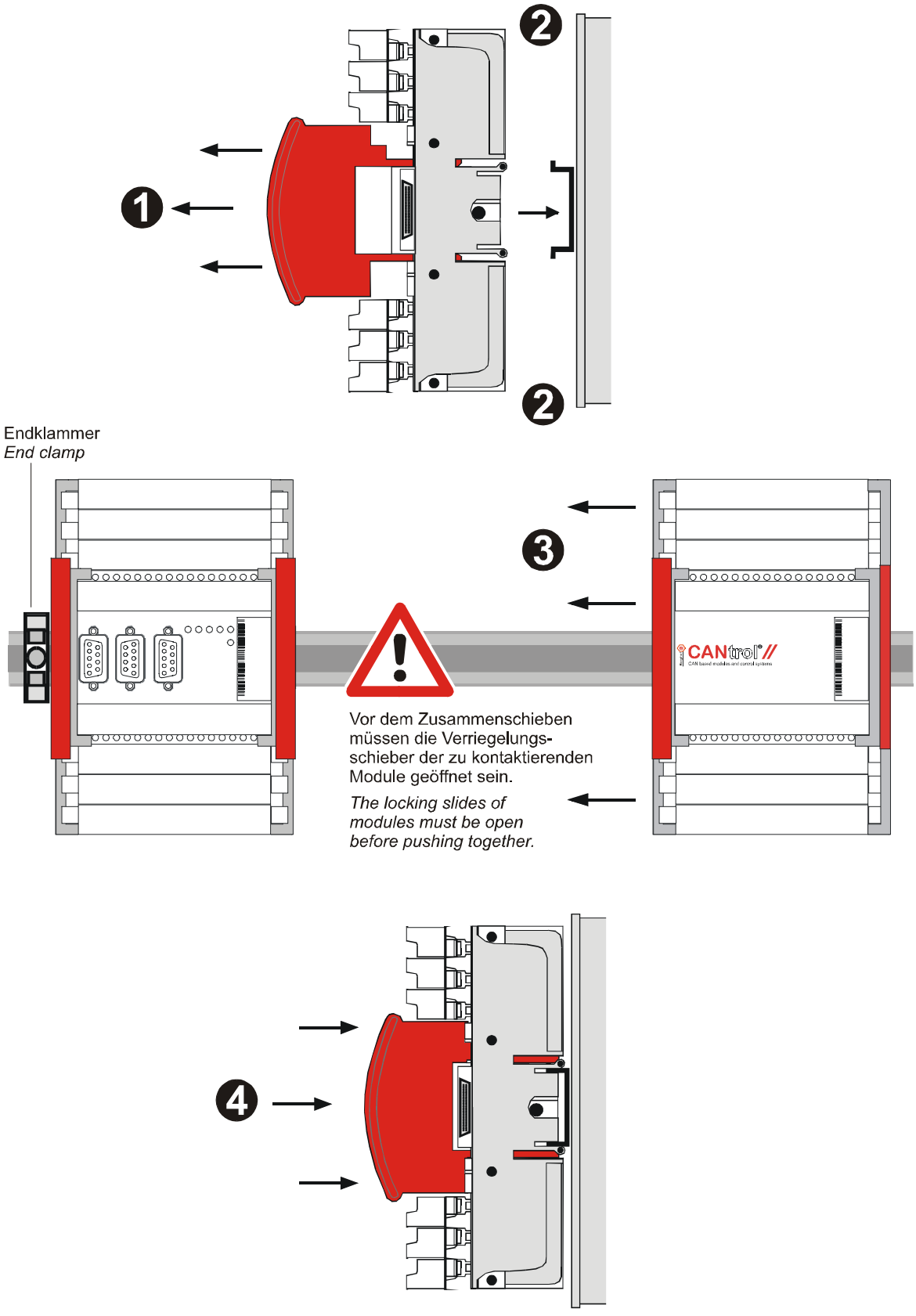
Safeguarding against slippage

Place a terminal clamp at the start and end of each module block to prevent the modules from slipping.

Dismantling

To dismantle, unscrew the terminal clamps and open the module interlocks by pulling out the lateral sliding catches.

Remove the modules in reverse order, as described in *Extension/Installation*.



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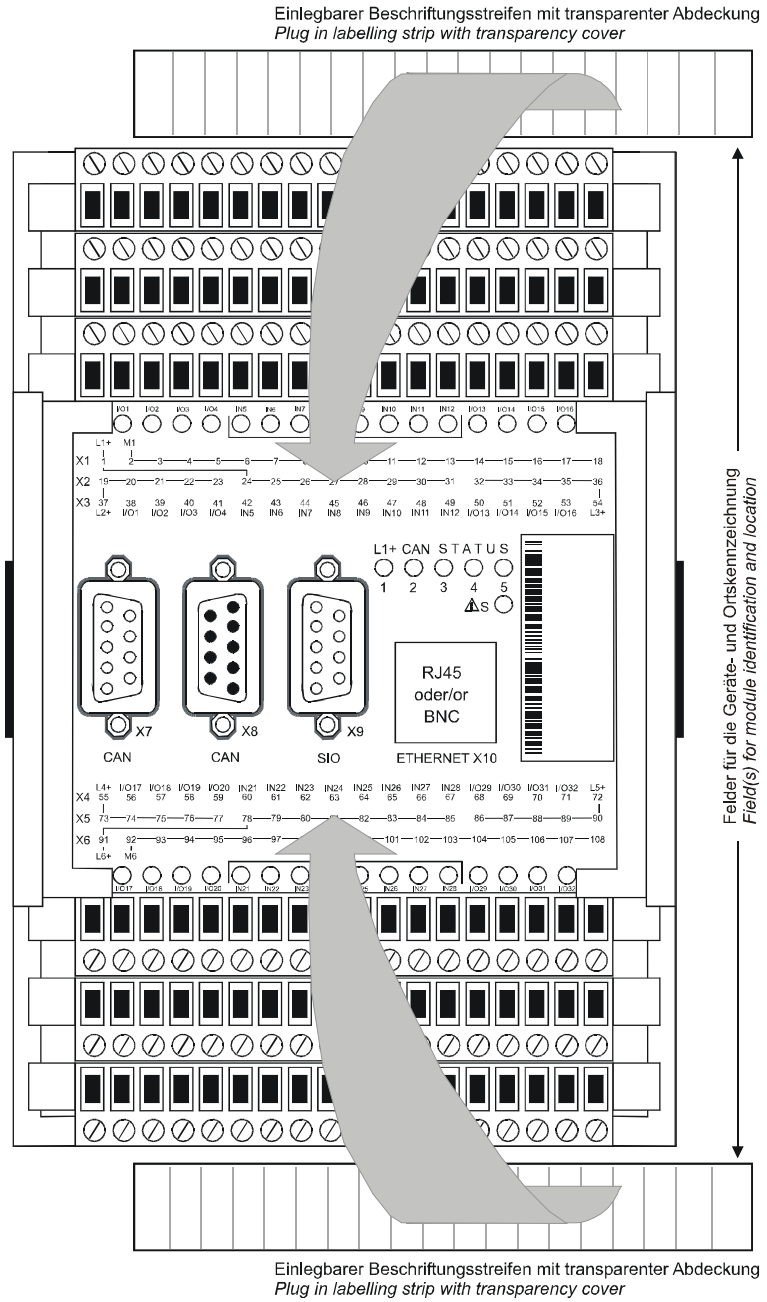
5.1.4. Designations

The modules are identified by their rating plates.
The name and Order No. of each module is printed on its rating plate (cf. also "Rating Plate" in the Annex).
Write the designations of the location and the device in the two empty spaces on the insertable label.
The I/O designation is printed on the cover of the housing and can be used by the user as plain text information on the insertable labels.



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5.1.5. Project Planning and Installation

Be sure to observe the following information in order to ensure reliable integration of the CANtrol automation system into the respective application environment:

IEC 61131 Observe the information in IEC 61131-4 / Supplement 1 to EN 61131 "Programmable Logic Control Systems - Guidelines for the User".

Safety Abide by safety and accident prevention regulations (e.g. machine instructions) for each specific application situation.

EMERGENCY OFF EMERGENCY OFF features (IEC 204 / VDE 113) must remain activated in all operating modes of the equipment or system.

Restart Do not deactivate the EMERGENCY OFF feature if this could result in an uncontrolled or undefined restart.
Make sure that no dangerous operating conditions occur after a voltage dip or power failure.

Voltages Do not allow differences or variations in the power supply and load voltages to drop below or exceed specified tolerances. Differences which are contrary to specifications can lead to dangerous situations or malfunction of the automation system.

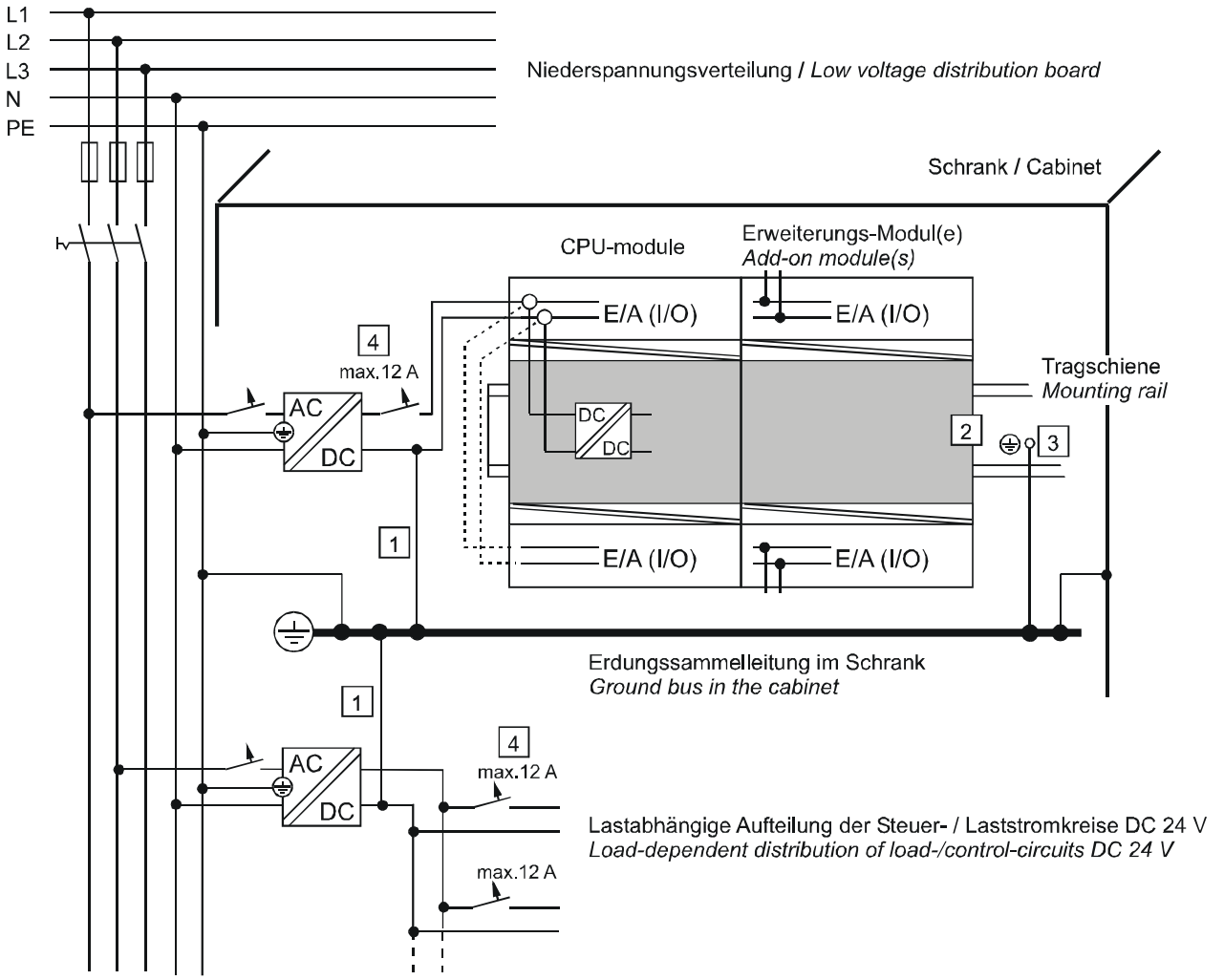
Power Supply DC 24 V Supply CANtrol systems only with Safety Extra-Low Voltage (SELV) according to EN 61131-2.

Strand Breakage Cable or strand breakage on the signal level must be prevented from causing undefined situations in the automation system. Implement all necessary hardware and software safety precautions.

Connections Make sure that all connections and signal lines are installed in such a way that inductive and capacitive interspersions cannot have a negative effect on the automation system.

5.1.6. Load Current Supply and Grounding Layout

Übersicht Stromversorgung und Erdungskonzept
Overview power supply and earthing-concept



Hinweis / *Note:*

1 Sehen Sie eine lösbare Verbindung zum Schutzleiter vor; dies erleichtert die Lokalisierung von Erdanschlüssen.
Provide for a removable connection of the protective earth, for simple locating of ground connections.

2 CANtrol Module sind nach dem Aufrasten auf die Tragschiene leitend mit dieser verbunden.
After placing CANtrol modules on the mounting rail they are connected conductively.

3 Tragschiene elektrisch leitend mit dem Schutzleiter (PE) verbinden.
Connect the mounting rail conductively with the protective earth (PE).

4 Ein Stromkreis darf mit max. 12 A abgesichert sein.
Circuit protection is max. 12 A

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5.1.7. Connections of CANtrol Modules

Warning ! Always shut down the whole system and switch it offline before working on the CANtrol control system.
Otherwise danger of: - uncontrolled movement sequences,
- destruction,
- malfunction.

5.1.8. Power Supply

Power must be supplied by **Safety Extra-Low Voltage (SELV)** which is reliably isolated electrically according to EN 61131-2.

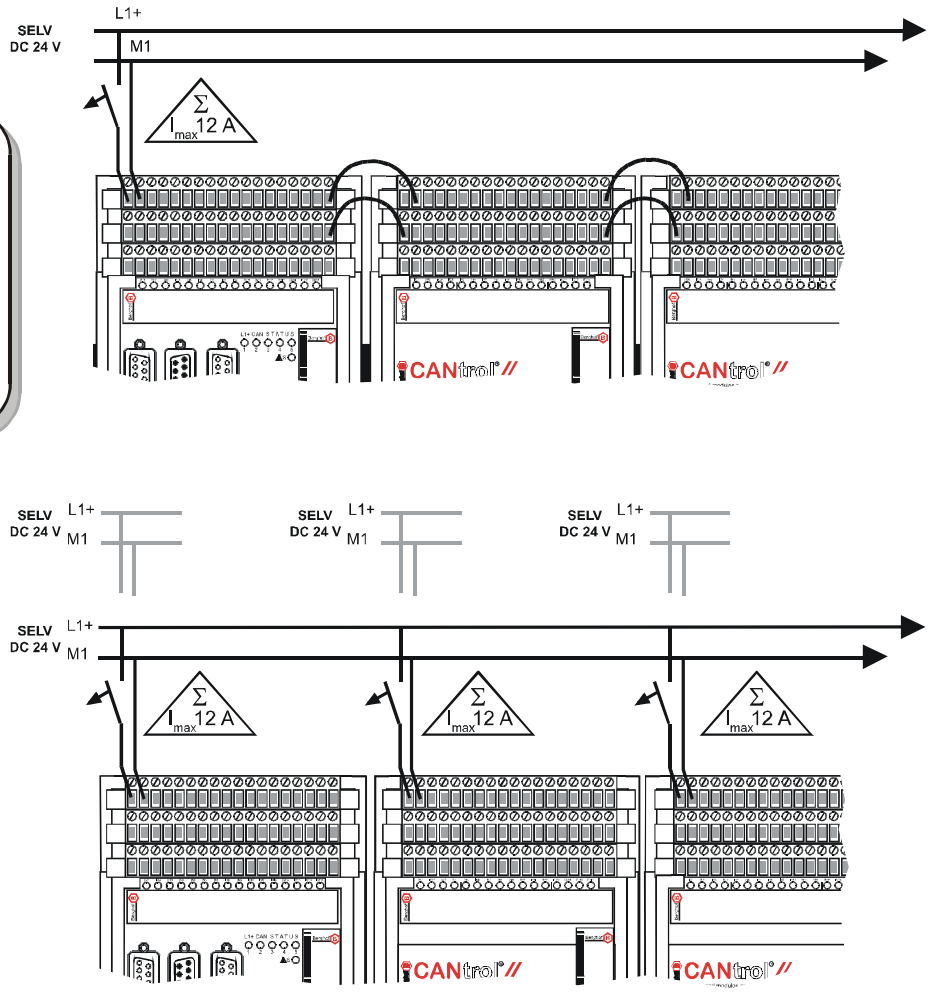
5.1.9. Fuse Protection

No more than 12 A may be used to protect the supply current.
Take the following steps in case of currents above this maximum supply current:
- use several separately protected circuits,
- or use several separate power supply units with separate circuits.

Richtiges Anschließen
Correct connection!

Achtung!
Einzelne CANtrol Komponenten oder Produkte anderer Hersteller können die genannten Werte unterschreiten.

Attention!
Separate CANtrol modules or products of other manufacturers can have lower limits.



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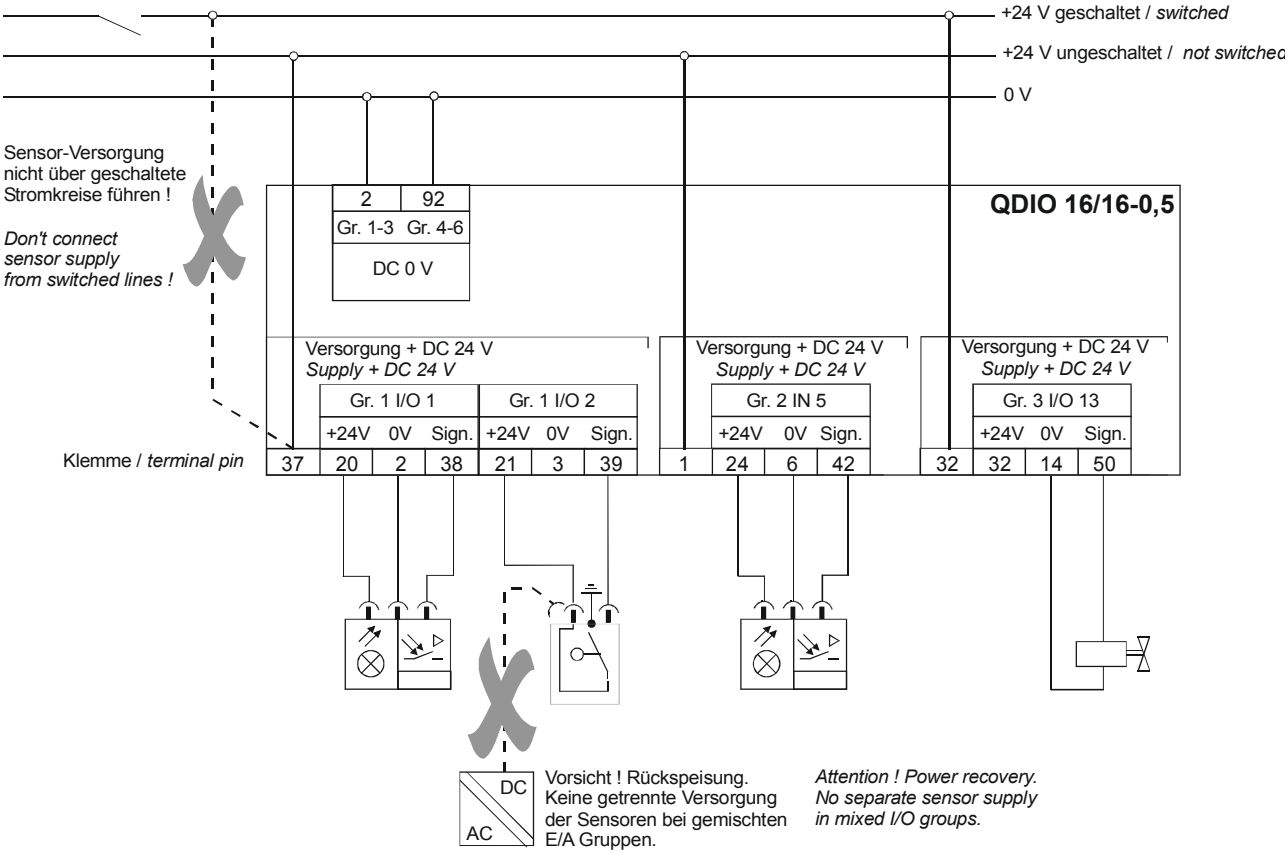
5.1.10. Wiring

Beispiel: Verdrahtung von CANtrol Modulen
Example: Wiring of CANtrol modules



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Input Channels Power must be supplied to the input channels (sensors) directly from the power supply unit. Do not wire the power supply of the sensors over switched circuits.

Output Channels Power may be supplied to output groups over circuit-breakers which are already present (EMERGENCY OFF, hand switches etc.).

Power Recovery Always make sure that the sensors are supplied from the same current source as that of the module's corresponding I/O group.
Otherwise power may return over the output transistors through connected sensors even when the module current supply is turned off.
This can lead to malfunctions in the control processes and may destroy the modules!

Warning ! Power recovery when the module power supply is turned off can lead to unwanted control sequences.
If manual control is used, it may be destroyed or rendered useless by this.

Remarks on Wiring Errors

Make sure that voltage, polarity and terminal assignments are correct when making connections.

Warning ! Overvoltage > 32 V and/or power recovery can ruin the module.
Wiring errors can lead to destruction of the modules and/or serious malfunctions.
Fire hazard!

Overvoltage Input voltages above the permissible tolerance range (> 32 V) can lead to destruction of the module.

Polarity The power supply of the control circuits is protected against polarity reversal.
The modules cannot function properly if polarity is wrong.

Signals Crossed signal connections can cause serious malfunctions.

5.1.11. Connection Techniques

You may choose among three types of connections for the dedicated low-voltage wiring of CANtrol modules:

- Screw-type terminal
- Crimp connection
- Spring-latch terminal

All the above connections are appropriate for wires with cross sections up to 2.5 mm^2.
You will find a list of possible connectors in the chapter "Product overview".

Note:
Activate the multipole connectors only when they are off-load.

Crimping method

The female contacts are available either loose or in the form of strip contacts.

A 0.4 x 2.5 x 80 mm screwdriver is required to **dismantle** receptacle contacts.

Spring-latch Terminals

Spring-latch terminals make it possible for you to connect the power supply and signal lines quickly and easily.

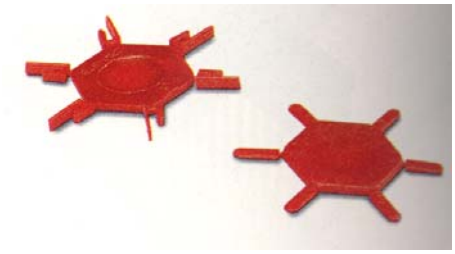
Warning ! Inserting the screwdriver forcibly into the cable opening will ruin the spring-latch terminal. Press the screwdriver only into the square opening of the plug-in block.

Proceed as follows when making connections:

1. Insert the screwdriver into the square opening and press downwards.
2. Insert the lead into the proper round hole.
3. Withdraw the screwdriver from the hole.
   The lead remains held firmly by the clamp-type contact.

Connector Coding

The multipole connectors of the field level can be coded in order to eliminate errors when connections are made or broken. The coding is carried out without loss of polarity by means of coded riders (CR) or tabs in the socket and coding profiles (CP) in the plug connector itself.



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How To Attach the Coding

The coding profiles (CP) are inserted into the groove on the plug connector.
The coded riders (CR) or tabs are inserted into the recess of the socket.

Warning !	Crossed signal connections may lead to destruction of the modules and/or to malfunctions. Encode all multipole connectors. Never remove the coding.

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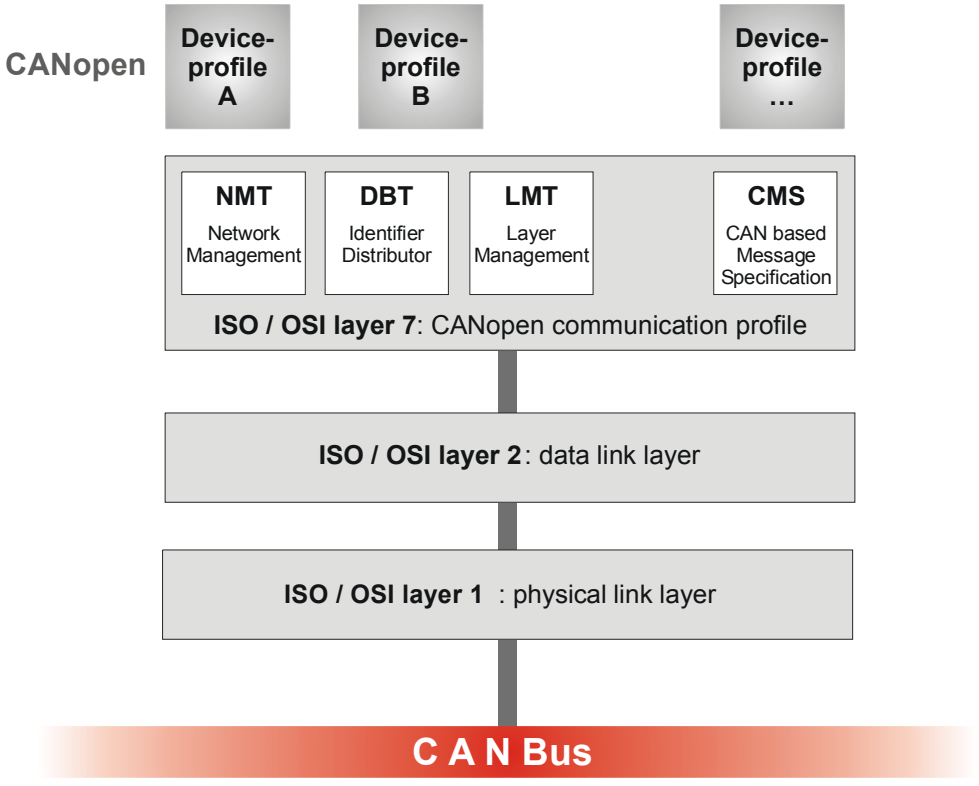
6. CAN Bus and CANtrol

6.1. Protocols

CAN (*Controller Area Network*) as a fast fieldbus system is used as internal communication systems for machines and equipment in the field of industrial automation.

CAN systems meet the requirements of an open system using the specification of the **CANopen Communication Profile** Layer-7 Protocol (CiA Draft Standard 301) as specified by the International Users and Manufacturers Group "CAN-in-Automation" (CiA).
The protocol architecture recommended by CiA includes layers 1, 2 and 7 of the ISO/OSI international layer model.
Layer 1 in this case corresponds to CiA Norm CiA-102-1, which represents a supplement to ISO/DIS Norm 11898.
Layer 2 corresponds to ISO/DIS Norm 11898.
Layer 7 corresponds to Draft Standard No. 301 as recommended by CiA.



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6.1.1. CANopen

CANopen offers a standardized level of abstraction which can be used to manage message identifiers, to structure the transmission of data, and to perform other useful functions.

The functions of CANopen are used in configuring and programming the cell-controller and for communication with remote modules. The user can employ these functions in the form of function blocks or libraries.

The **CANopen** specification defines so-called "CANopen Device Profiles". These in turn make it possible to create an uniform control system which is independent of types and manufacturers but has the same level of efficiency for various devices.

Note:
The CANopen specifications are standardized and maintained by the consumer organization CiA. See the corresponding CiA publications for further information *(www.can-cia.de)*.

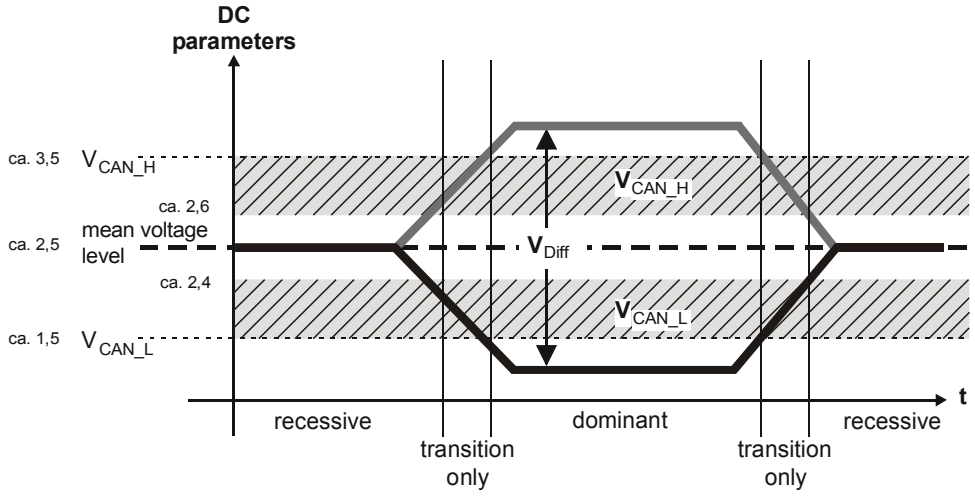
6.1.2. CAN

CAN is based on a linear topology which can be structured hierarchically. Messages in the CAN protocol are designated by an "Identifier" and can be taken over simultaneously by all nodes; this is very important for the consistency of data in the network and the synchronization of applications. At the same time, the Identifier assigns bus-access priority to each message.

CAN is a "Multi-Master" system: Every user of the bus can send a message when the bus is free. Should several bus users try to send messages simultaneously, the message with highest priority receives the right of access. The technique used in the CAN protocol ensures correct allocation of bus time without the destruction of message contents.

6.1.3. CAN Bus Voltage Level

CAN Bus-Spannungspegel nach ISO/DIS 11898 (schematisch)
CAN bus voltage-level by ISO/DIS 11898 (schematic)



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6.1.4. CAN Characteristics

- Message-oriented protocol
- Message priority assignment
- Multi-Master system
- Bit-wise arbitration without loss of contents
- Simplicity of communication services
- Short block lengths
- High level of data security
- Consistency of data in the network
- Short latency intervals
- International standardization
- Open communication by means of standard protocols (CANopen)

6.2. System Overview of CANtrol

CANtrol's hardware and software structure permits modular automation solutions with distributed intelligence.
The system's layout follows the linear structure of the CAN Bus while also permitting a hierarchical subdivision of the CAN Bus via WideCAN / LocalCAN.

CANtrol can be programmed using a personal computer (PC) under Windows (for details refer to the software manuals).

CANtrol modules are mechanically compact units which are installed by snapping them onto DIN mounting rails.

A CANtrol system consists of components from the following module groups:

- **CPU modules (C-modules)**
- **Remote modules (R-modules)**
- **Expansion modules (Q-modules)**
- **Display and user terminals (RDISP)**

6.2.1. CAN-Channels

CANtrol modules which run with CAN Buses are equipped with up to 3 CAN interfaces:

CAN Channel 0 On the front of C-modules.
In addition to its uses as a communication interface for specific applications, channel 0 is also used as a programmable interface.

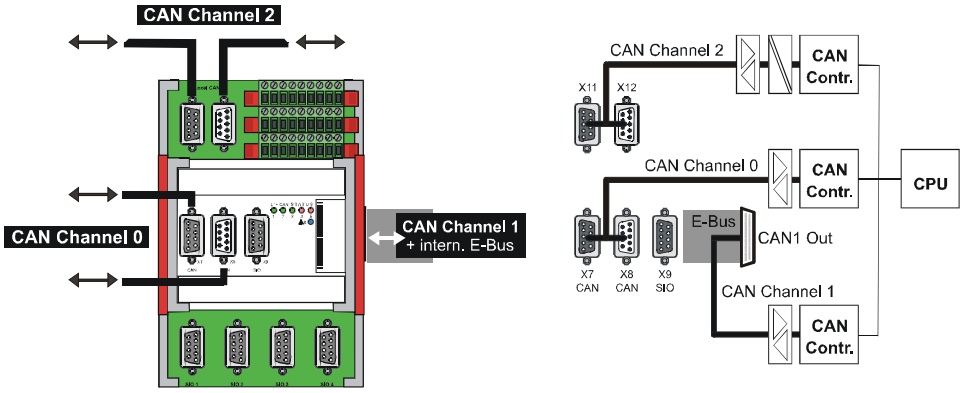
CAN Channel 1 On the internal E-bus (in C-modules with an integrated terminating resistor).

CAN Channel 2 On Type C1CPU-4S... cell controllers.

An individual CAN controller is provided for each CAN channel.
In addition, CAN channel 2 is galvanically decoupled from channel 0 and channel 1 via an optocoupler.

Channels 1 and 2 are presently limited to 125 kBit/s. This limit will cease to exist as soon as the Pelican mode of the Philips SJA 1000 has been integrated into the CANtrol modules.

CAN Channels C-Modules



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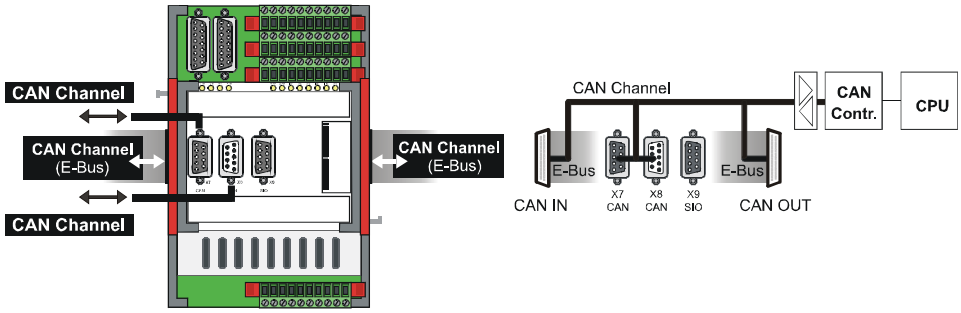
CAN-Channel R-Modules



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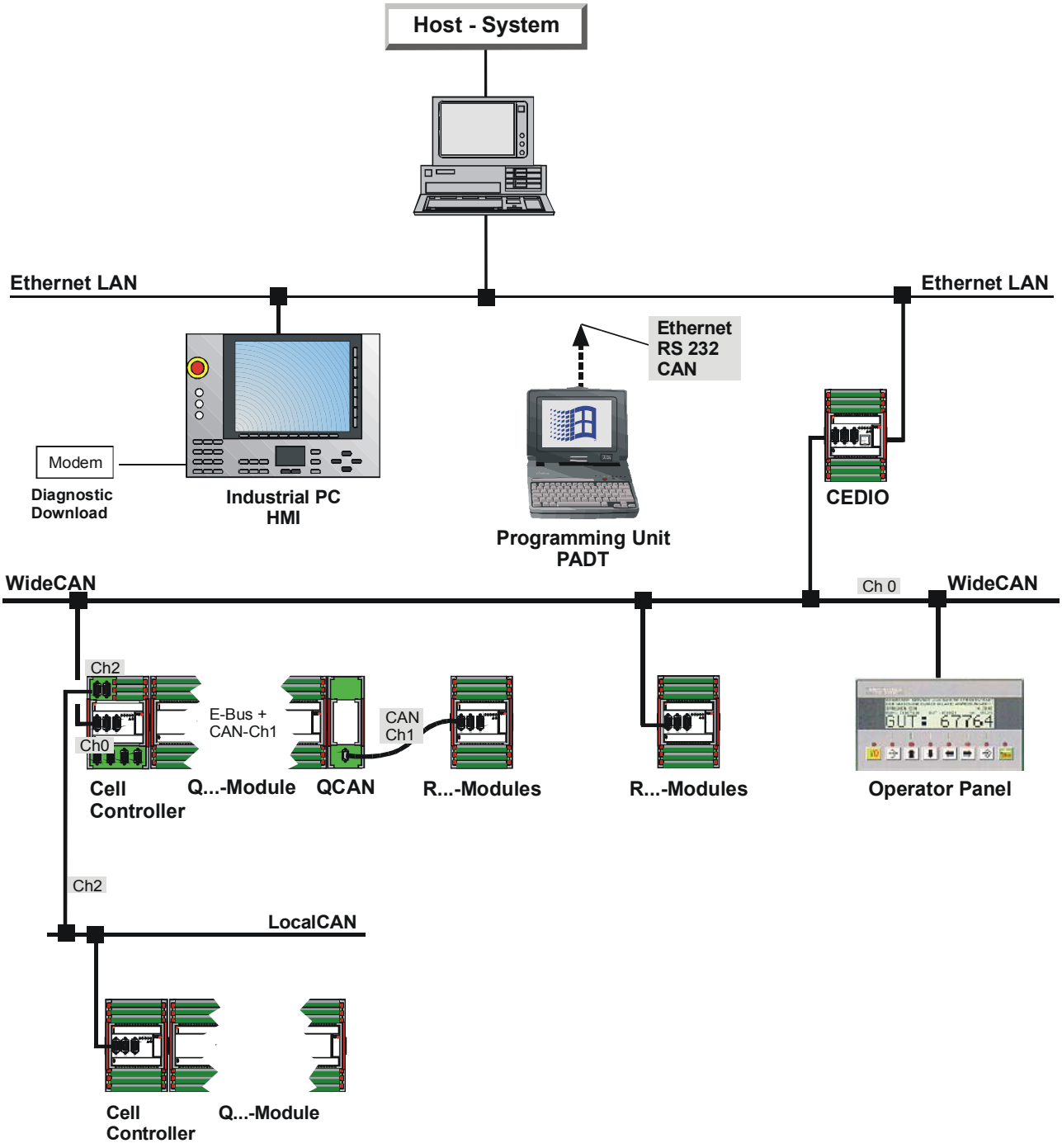
6.2.2. CANtrol System Architecture



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CANtrol Module Categories

C-Modules

CPU modules function as freely programmable cell controllers and CAN nodes of the system; they form autonomous control groups and can be expanded locally via the internal E-bus. The number of expansion modules for a C-module is limited. The permissible number is found in the user manual of each cell controller.
The master E-bus cell controller is always located at the left end of the control group. C-modules cannot be mounted end-to-end via the E-bus.
CAN channel 1 on the E-bus of C-modules is already equipped with an internal terminating resistor. No second terminating resistor is required on CAN channel 1 if the Remote modules are directly coupled to a cell controller.

Q-Modules

Expansion modules are used for local I/O expansion of C-modules via the module's internal E-bus. These modules possess no intelligence of their own, but are directly actuated by a C-module during I/O activities.
Q-modules can be used only with a C-module.
The number of expansion modules for any C-module is limited. The permissible number is given in the user manual of each cell controller.

R-Modules

Remote modules are intelligently functioning modules with fixed CANopen based control functions and a CAN connection.
R-modules are "stand-alone controllers" and cannot be expanded by Q-modules. However, they can be directly coupled to one another by means of the CAN Bus which is provided on the E-bus connector; this reduces the amount of cabelling work required by the CAN Bus.
In this case, however, the R-modules must always be positioned at the far right of a control group, since only the CAN Bus is created at their E-bus connection.
For further information see the particular module manual.

RDISP

Display and user terminals are versatile, user-operated observation and input devices with graphic LCD displays, freely assignable function keys, and a CAN Bus connection.
These devices can be integrated into any CAN protocol (e.g. CANopen).

CANtrol Network Topology

CANtrol's network topology can be hierarchically distributed over several CAN Buses in order to implement real-time uses even in systems which are spatially far apart while improving the structural organization of the application.

This structural organization is carried out as a WideCAN or LocalCAN, whereby the hierarchical allocation and the definition of each bus master is independent of hardware and is implemented via the design of the network and the system initialization.

WideCAN

The hierarchical level designated as "WideCAN" has the task of ensuring spatial networking of the individual control groups. In the rule, the synchronization and exchange of data between the control groups and the user stations of a machine or facility take place here.

LocalCAN

This subordinate hierarchical level connects the local units of a control group over short distances. This "real-time" bus is controlled by the cell controller (CAN node) of each respective control group.

6.2.3. Bus Structure

Linear Structure

The structure of the CAN Bus is a line structure. Branch lines and branch circuits should be avoided.

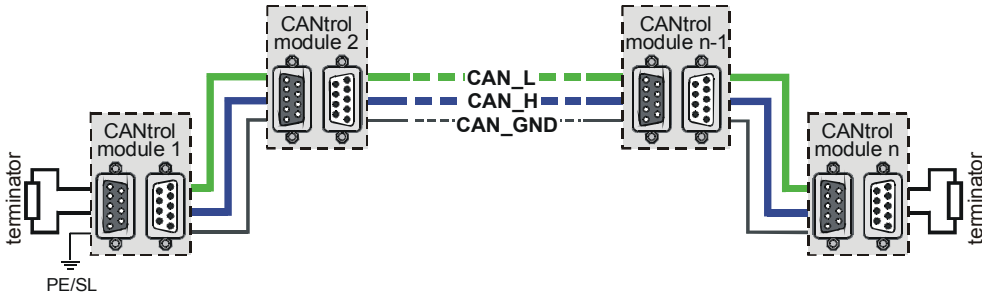
All CANtrol modules which are provided with a CAN Bus (C.../R... modules) connection possess two connectors (Bu/St) for each CAN Bus connection. T-branch adapters are therefore unnecessary (but may also be used).

CANtrol makes it possible to implement the required line structure without difficulty.

Even when line lengths are short, a CAN line must have a terminating resistor on both sides. In addition, equipotential bonding must be created by grounding the CAN_GND cable of the line on one side.

Note:
We offer the required terminating resistors in our line of accessories.

CAN Bus Linienstruktur */ CAN bus line structure*



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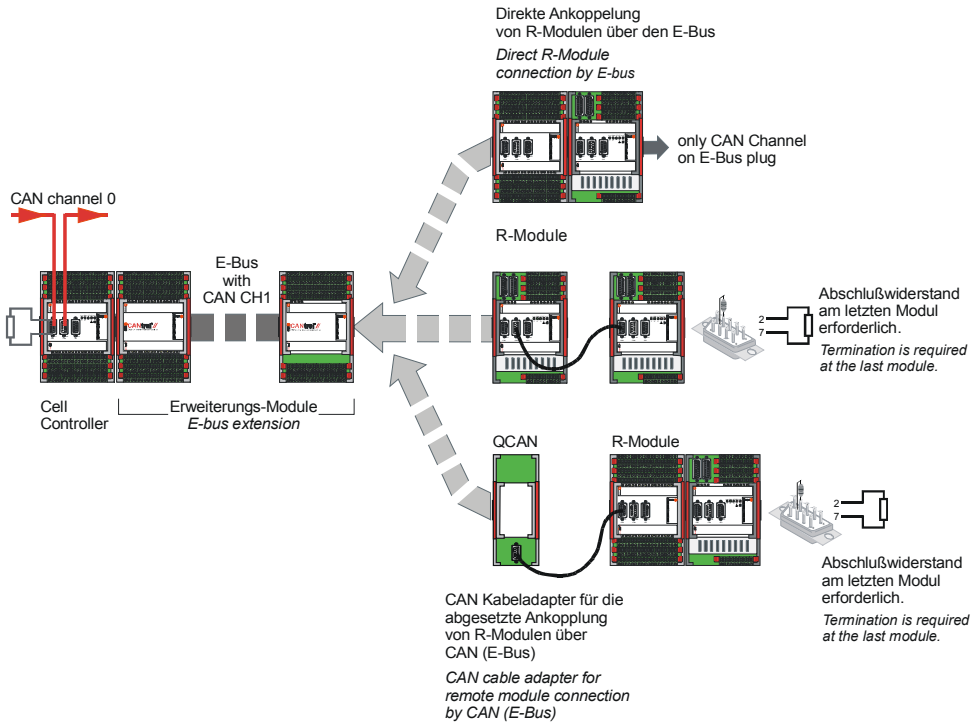
Local Control Groups

Bildung lokaler Steuerungsgruppen über den E-Bus und Anbindung von R-Modulen
Formation of local control-groupes by the E-bus and linking of R-Modules



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The E-bus can be used to create local control groups with different functions by mounting different modules end-to-end on the mounting rail. The following rules should be observed in this case:

- Use only one cell controller per control group.
- Do not attempt to connect cell controllers with one another over the E-bus.
- Do not exceed the maximum permissible number of E-bus expansion modules (Q...).
- Place remote modules or a QCAN module at the right of the last expansion module.

Tip! You can reduce the number of cables (CAN connecting cables) by coupling several remote modules to one another over the E-bus, even without a cell controller.

The CAN Channel on the E-bus is already provided by the C-modules with an internal terminating resistor.
No second terminating resistor is required on this CAN channel in case of direct E-bus coupling within a control cell.

6.3. Project Planning Instructions for CANtrol CAN Networks

6.3.1. Network Area

A number of factors in each CAN network - e.g. the line length, the baud rate, the specific resistance of the line etc. play a role in determining the maximum extent of the network. This limit is one feature of the arbitration technique which is characteristic of CAN.

Recommended Sample Values

Baud Rate	Longest Line Length between CAN Nodes	Core cross-section
1 Mbit / s	< 40 m	Cu ≥ 0.22 mm²
0.5 Mbit / s	< 95 m	
0.125 Mbit / s	< 400 m	
50 kbit / s	< 1000 m	

The values in this table presume the use of an appropriate cable, i.e. one specified for use as data transfer cable.

Note:
Please contact our Technical Support department if you have special requirements which require a more detailed allocation.

6.3.2. Number of Network Nodes

CANtrol networks permit a maximum of 64 bus intersections over and above ISO/DIS Specification No. 11898.
When integrating products from other systems, please remember that ISO/DIS Norm No. 11898 specifies only networks with a max. of 30 nodes. Such products sometimes have older CAN Bus drivers which may reduce the permissible number of nodes in the CANtrol network.

6.3.3. Selecting Lines for the CAN Bus Cable

Parameter	CANtrol Recommended	Remarks
Number of wires	Min. 4-wire, twisted pairs	At least 6 wires in case of full allocation according to the CiA Standard.
Core cross-section	Cu 0.22 - 0.34 mm²	In large-area networks, a higher core cross-section improves the signal-to-noise ratio.
Wiring	2 twisted wire pairs with shielding	Connect the shielding conductively to the connector housing and the protective collar of the plug connector assembly.
Impedance Z_0 (1 MHz)	80 ... 130 Ohm	Make sure that impedance remains the same if different types of cable are used.

Selection of the correct cable also depends on conditions at the place of use (towing, environmental requirements, ...).

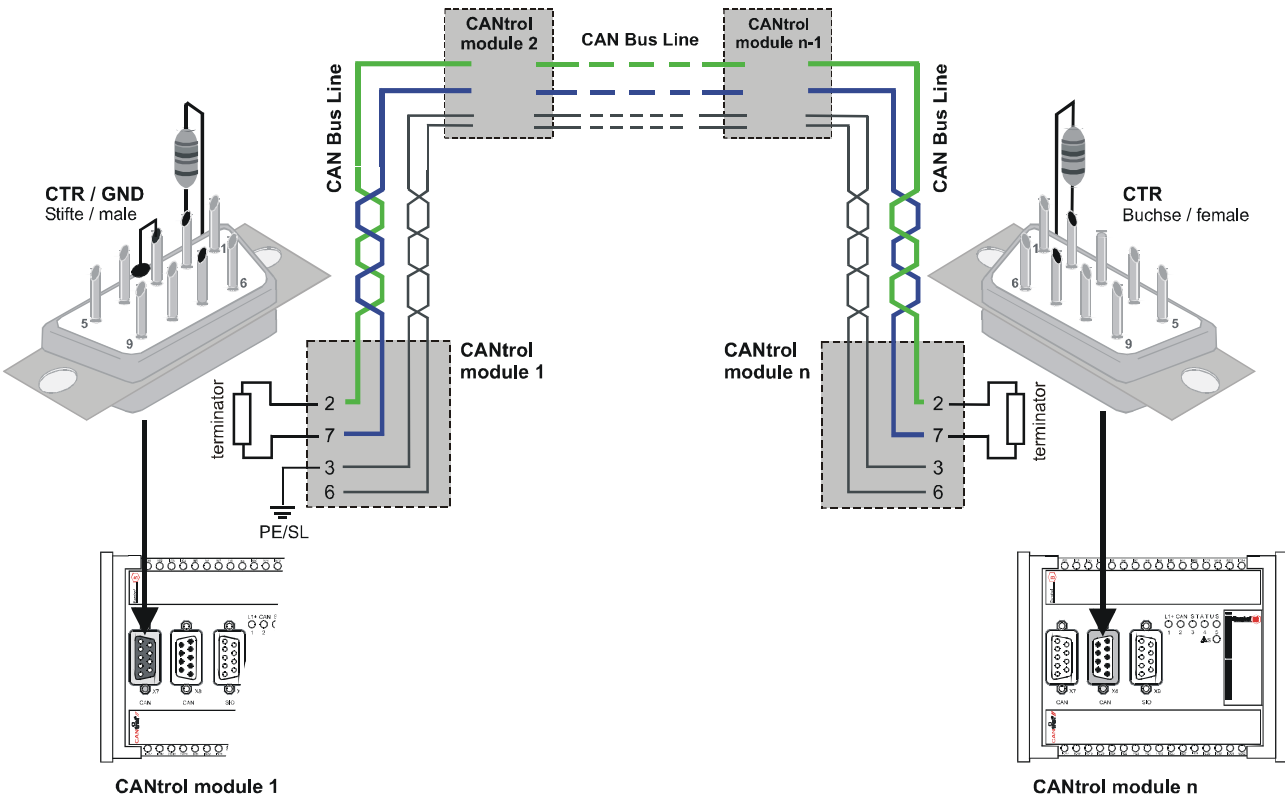
Note:
For normal use we recommend the "Unitronic BUS LD" CAN Bus data transfer cable of the LAPP-KABEL Company.

6.3.4. Terminating Resistors and Equipotential Bonding

Every CAN Bus (CAN Channels 0 to 2) must be terminated at both ends with a terminating resistor.
In addition, the CAN_GND cable must be grounded on one side in order to create equipotential bonding. A practical way to do this is to use each free CAN Bus connector plug of the "first" and "last" CANtrol module on a single line.

Note:
You can find the appropriate terminating resistor in our line of accessories under "CTR" or "CTR/GND".

Abschlußstecker / *terminating resistor connector*



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7. Configuration and Programming Tool

7.1. Programming Tool

The most commonly-used **p**rogramming **a**nd **d**iagnostic **t**ool (**PADT**) for CANtrol systems is a personal computer provided by the user.

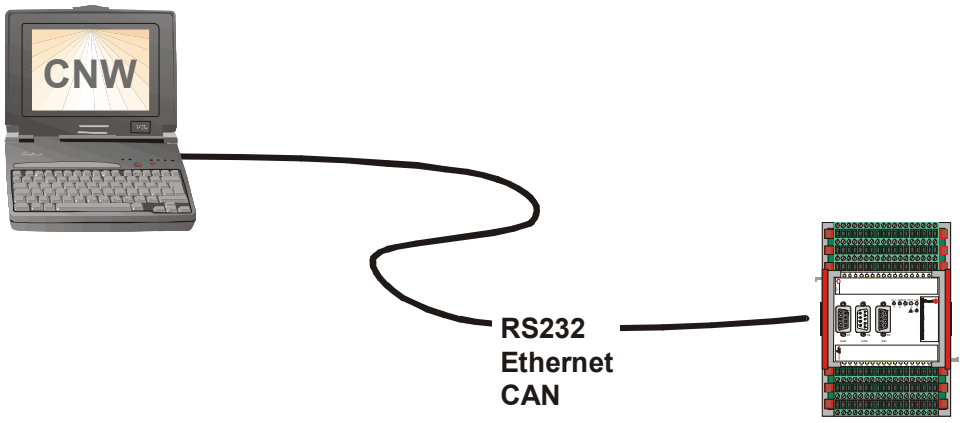
The features of this peripheral strongly determine how safe and reliable the operation of the CANtrol system with a connected PADT will be.
Commercially available PCs are in general not suitable for use under the operating conditions defined for CANtrol (industrial environment).

Caution The user should specially ensure that the conditions necessary for safe operation as a PADT are fulfilled by the user's chosen PC.

The PADT can be connected to the CANtrol system via

- the CANbus
- the serial module interface
- the Ethernet interface (CEDIO…)

Konfiguration von Node ID und Baudrate mit Peer-to-Peer Verbindung
Configuration of the node-ID and baudrate with peer-to-peer connection



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7.2. Configuration of Cell Controller with the CNW Tool

New or replaced cell controllers have to be configured before they are used in an application. This procedure can be compared with setting selector switches in other systems. Such switches were deliberately omitted when the CANtrol system was being designed, since these do not allow the array of configuration data currently needed to be represented conveniently and neatly.
In place of this, the CANtrol system uses the user-friendly CNW tool (**C**ANtrol **N**ode **W**izard), which guides you through the configuration process. The familiarisation and documentation requirements usually involved with setting configurations are thus reduced to a minimum.

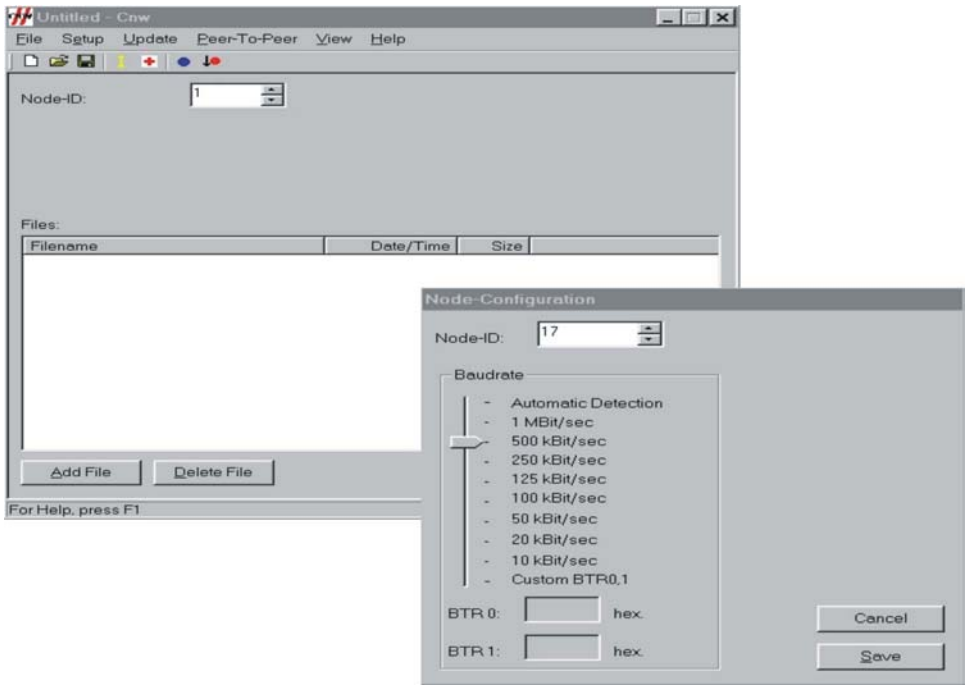
A single module is connected to the PADT (PC) for configuration.

The module has to be put into configuration mode after the supply voltage has been applied, or, depending on previous use, it may already be ready for configuration.

Configuration mode is indicated by the alternate flashing of the status indicators (LED 4 and 5). If another status is signalled, press the ‘S’ button.

The elementary parameters ‘node ID’ (identification number) and ‘CAN baud rate’ are then configured using the menu item ‘peer-to-peer’. The data are validated in the module by pressing the ‘S’ button located on the module and operation is then possible on a correspondingly set-up CANbus.

Example:



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Other functions of the CNW tool:

- Query firmware information:
  Enter the node ID of the required cell controller and the CAN baud rate in the main window.
  Then select *Firmware Information* in the ‘Update’ menu.

  This allows the firmware information for all cell controllers connected to CAN channel 0 to be queried. This function also allows communication via the CANbus to be tested at the same time.
- Update firmware.
- Switch between application and configuration (also bootloader) mode: Select *Operation Mode* in the ‘Update’ menu; this is the same function as manual switching with the ‘S’ button on the module.

Configuration (bootloader) mode is only required for configuration and reloading of the firmware.

Note:
Further programming procedure is determined by the programming environment used (IEC 61131/C). For more information, see the relevant programming manuals.

7.3. Setting the Node ID

The individual CANbus users are identified within the CANtrol system communications by an unambiguous node ID.
The node ID numbers from 1 to 127 are permitted.
These numbers can be allocated at will, however, they do affect individual CAN user priorities *(do not confuse with CAN message identifiers)*.

Note:
Users of **the same** physical CAN line **must always** be allocated an unambiguous node ID.

7.4. CAN Baud Rate

In order to ensure successful CAN communication, there should be a uniform baud rate setting for all bus users. The values chosen should be selected in accordance with the maximum line length, but should not be unnecessarily high (extra safety factor).

Note:
Cell controller communication occurs during programming and maintenance in CAN exclusively by means of CAN channel 0 on the front panel of the module.
Channels 1 and 2 are reserved for the application programs.
There is always a uniform baud rate for a physical CAN line.
For this reason, baud rate settings **have to be** identical for all users located in the same line, both during configuration (with the CNW) and in the application programs.
Different lines may have different baud rates.

7.5. Gateways – Exceptional Cases

A gateway provides the means for a cell controller to receive certain CAN messages over a given channel and to transmit these unchanged, i.e. with the same CAN identifier, over another channel, perhaps with a different baud rate.

In order to keep the system load to a minimum, it is possible and indeed advisable to let only a certain number of CAN messages pass through the gateway. The cell controller gateway functionality must explicitly be activated by the application program (function block or library function).

Note:
If you want to programme and maintain cell controllers behind a gateway, then the entire CAN identifier range (1409 to 1663) has to be transmitted in both directions. When this is happening, the node IDs of these cell controllers should not collide with other node IDs in the higher-level system.

In this case, the system cannot be programmed via the gateway node serial interface.

The application program must already be started on this node for the gateway to be activated; only in this way can the function blocks be called.

Individual configuration means that the user has a considerable degree of flexibility when it comes to arranging the gateway functionality.
It might be necessary for the user to have more in-depth knowledge of the communication protocols (CAN, CANopen) in order to implement the required functionality successfully. (Keywords: high system load or number of users, time-critical applications, etc.)

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8. Digital Inputs/Outputs (high side-/low side switching)

Outputs may also be connected to inputs without additional external load.

8.1. 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
• 2 input groups and
• 4 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.

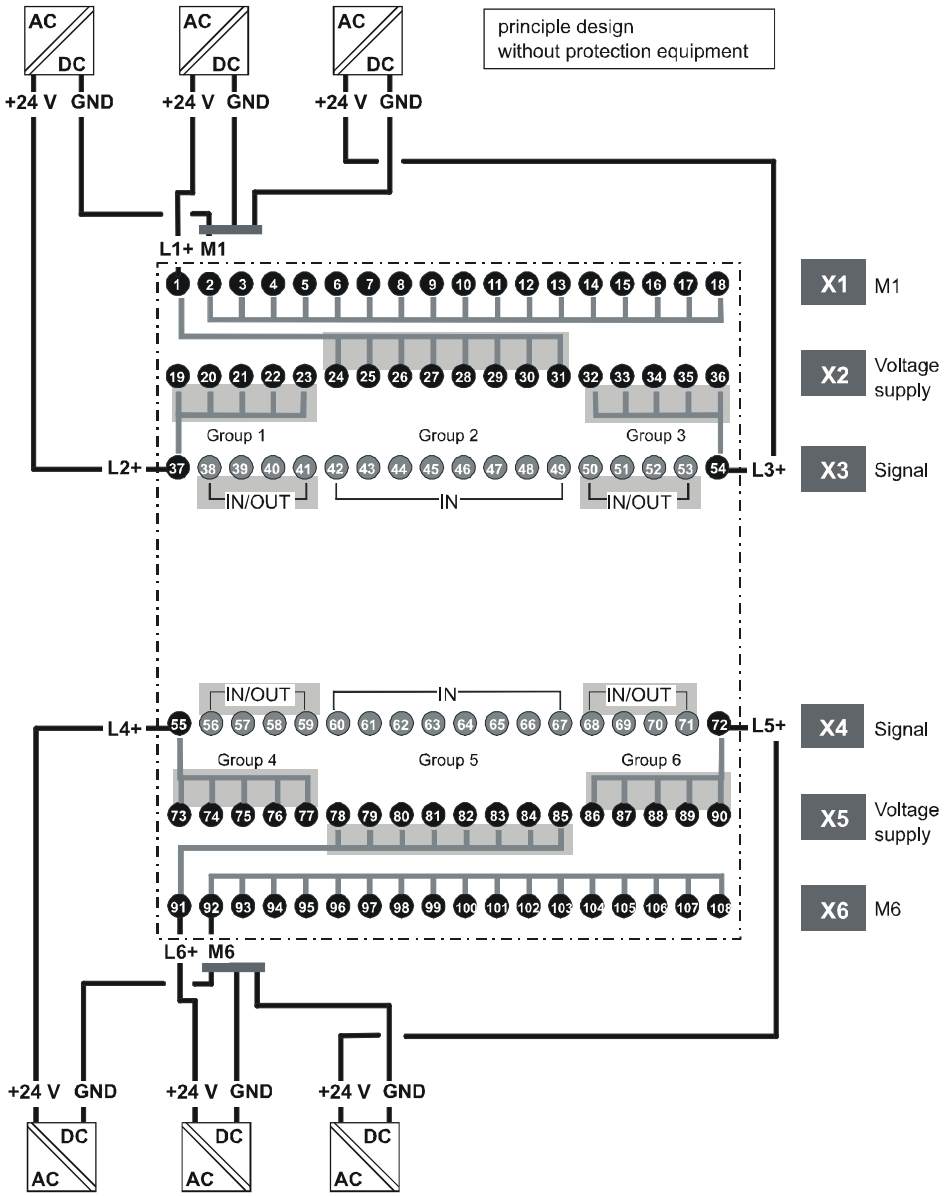
Outputs

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

Feedback

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

8.1.1. Schematic Diagram of Input/Output Grouping (high side-/low side switching)



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	
Group 4	IN / OUT 17-20	
Group 5	IN 21-28	
Group 6	IN / OUT 29 -32	

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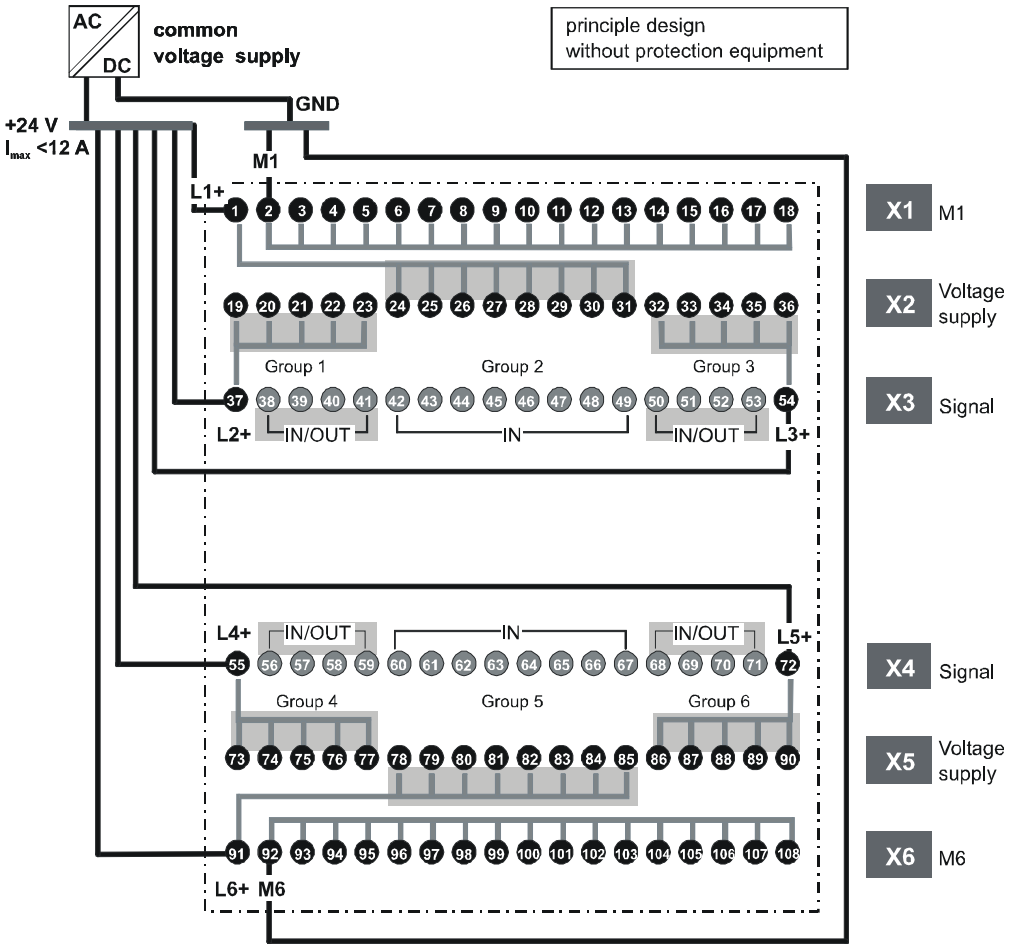
8.1.2. Without Grouping (high side-/low side switching)

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.



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8.2. 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.

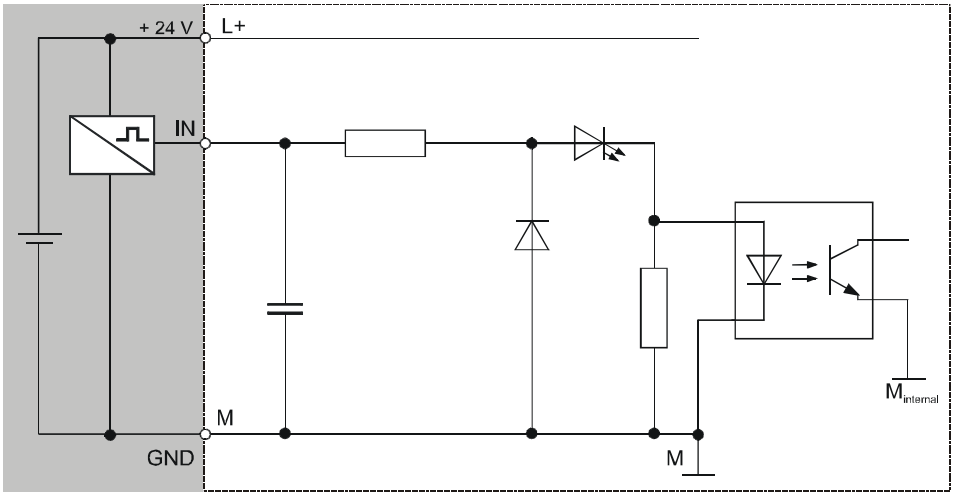
If pulses are to be detected reliably they must be longer than the sampling interval stipulated by software.
Multiple sampling can be programmed in order to suppress spurious pulses.
Sampling interval and multiple sampling (filtering) can be activated in groups of 32 inputs each.

Note:
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).

8.2.1. Block diagram of input, high side switching



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8.3. Digital Inputs, low side switching

The digital inputs are low 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.

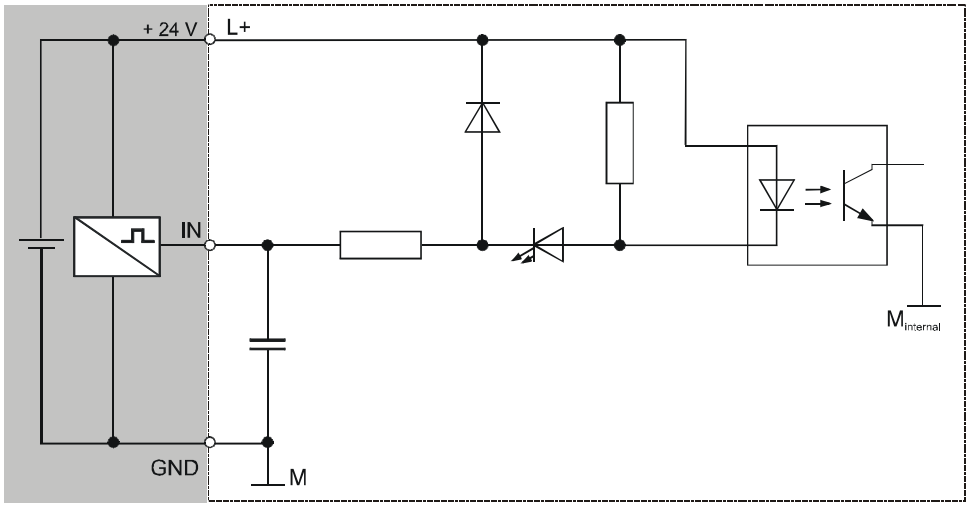
If pulses are to be detected reliably they must be longer than the sampling interval stipulated by software.
Multiple sampling can be programmed in order to suppress spurious pulses.
Sampling interval and multiple sampling (filtering) can be activated in groups of 32 inputs each.

Note:
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 0 / LOW).

8.3.1. Block diagram of input, low side switching



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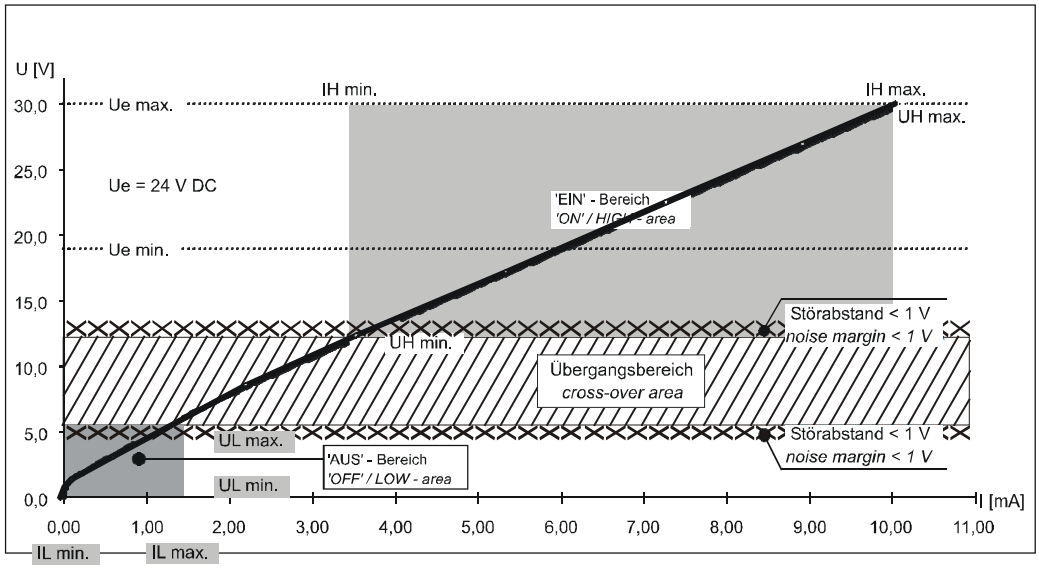
8.3.2. Digital Inputs Data (high side-/low side switching)

Module data	
Number of inputs	16 (max. 32)
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	24 VDC (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 (high side-/low side switching)



Eingangsspannung (DC) der externen Stromversorgung *Input voltage (DC) of extern power supply*		
U_e	24 V	Bemessungsspannung / *rated voltage*
$U_{e\ max.}$	30 V	oberer Grenzwert / upper *limit*
$U_{e\ min.}$	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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8.4. 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.

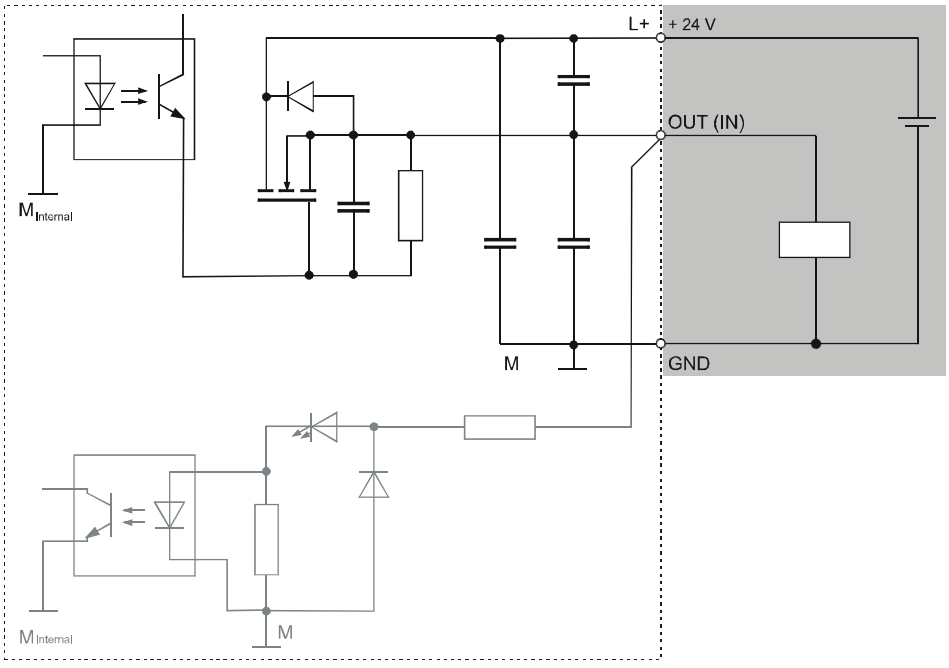
Protected output

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).

8.4.1. Block diagram of output high side switching



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8.5. Digital Outputs, low 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 low 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 ‘1’ (HIGH) if there is no available data link to the CPU or if the module’s internal supply is insufficient.

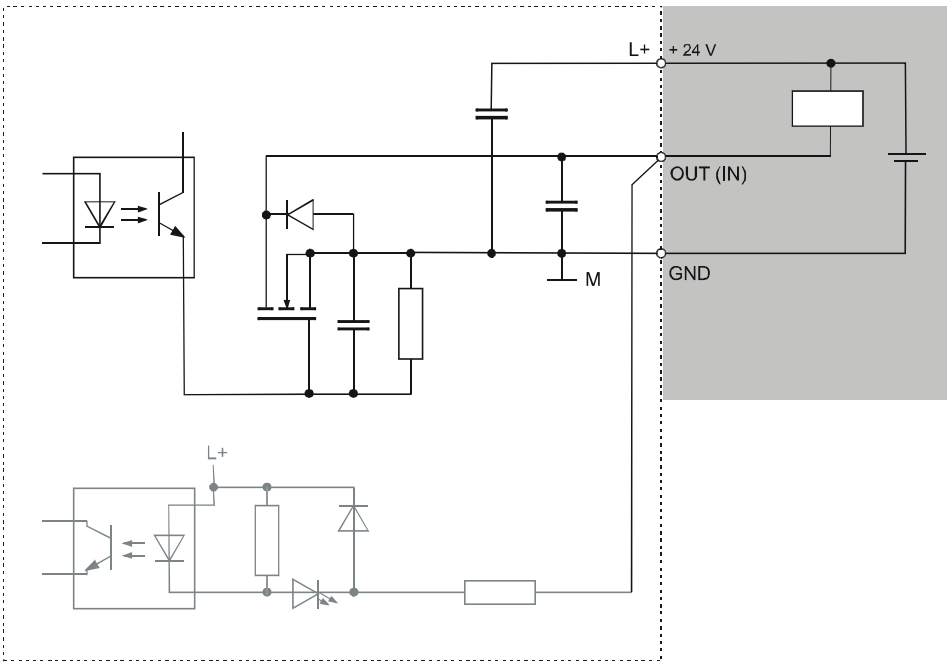
Protected output

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.
The overload protection of non-involved outputs may also respond prematurely if feedback 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 ‘0’ (LOW).

8.5.1. Block diagram of output low side switching



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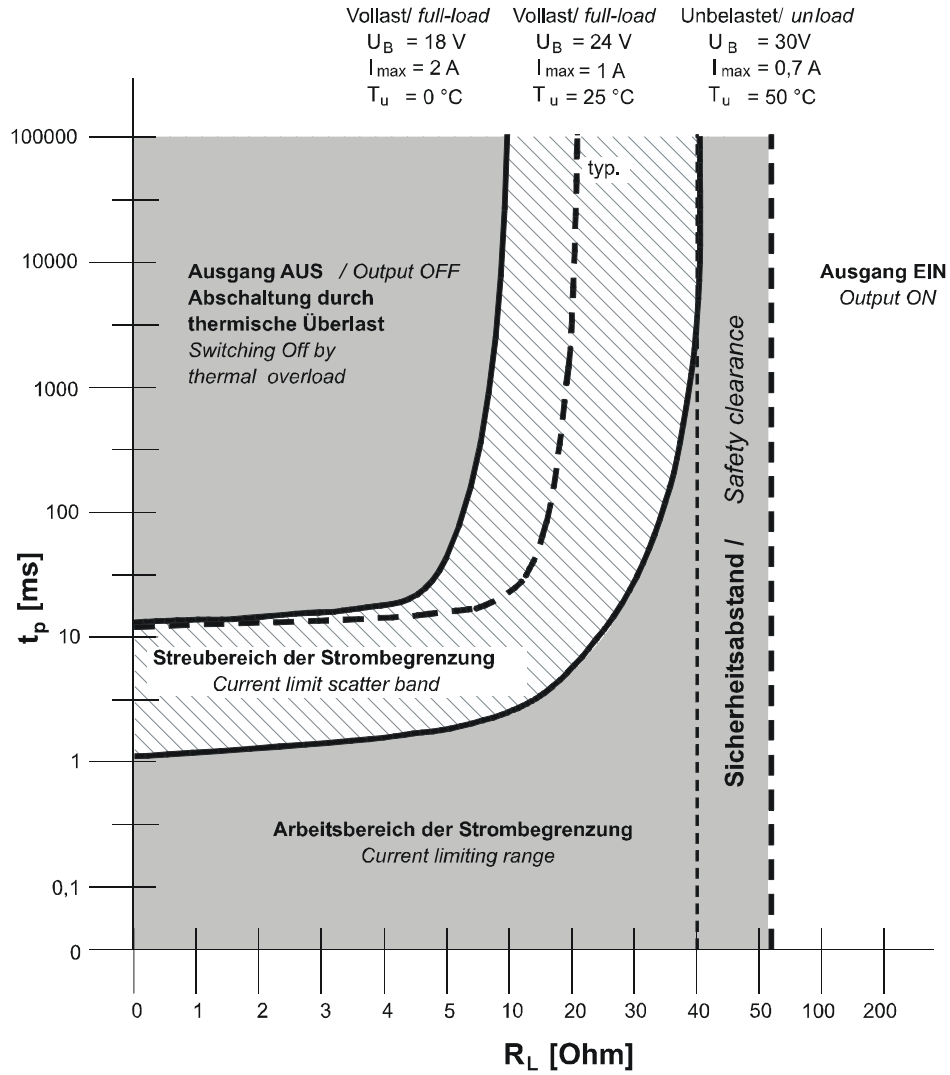
8.5.2. Digital Outputs Data (high side-/low side switching)

Module data	
Number of outputs	16 semiconductor outputs in 4 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%)	8 A (16 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	+24 VDC
Voltage drop (at rated current)	< 0,5 V
Rated current for ‘1’ signal	 0,5 A
Leakage current for ‘0’ signal	 max. 0,1 mA
Total current of all outputs	max. 8 A (16 x 0,5)
Total current per group (horizontal mounting on vertical mounting plate)	max. 2 A (4 x 0,5)
Lamp load (+24 VDC)	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 (high side-/low side switching)

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.

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Note:
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.

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9. CDIO 16/16-0,5 Cell Controller

9.1. Overview

Order number

The order/item No. required for acquiring a replacement is to be found on the nameplate of the module.
The available modifications of the CDIO modules (programming IEC 61131-3/C, switching level of the I/O) and their order numbers can be found in the "Technical Data" section or in the latest price list.

Function

The CDIO 16/16-0,5 is a real-time control CPU with digital I/O.
Programmable in "C" or according to IEC 61131-3.

E bus extension

The I/O level of the CDIO 16/16-0,5 Cell Controller can be extended by adding a maximum of 6 E-bus expansion modules.
Use of 6 QDIO 16/16-0,5 expansion modules, for example, would correspond to 224 digital I/Os.

Features

- MC 68332 CPU / 25 MHz
- 2 MByte Flash Memory 1.25 MByte CMOS RAM
- 16 digital inputs and
  16 digital, individually configurable inputs/outputs;
  outputs may be supplied with power in groups.
- I/O level locally extendible over internal E-bus with up to 6 Q... modules (digital/analog)
- Minimal space requirement and mounting depth.
- Maintenance-free, having no buffer battery

Material supplied

The material supplied with the CDIO 16/16-0,5 comprises:

- CDIO 16/16-0,5 I/O control module

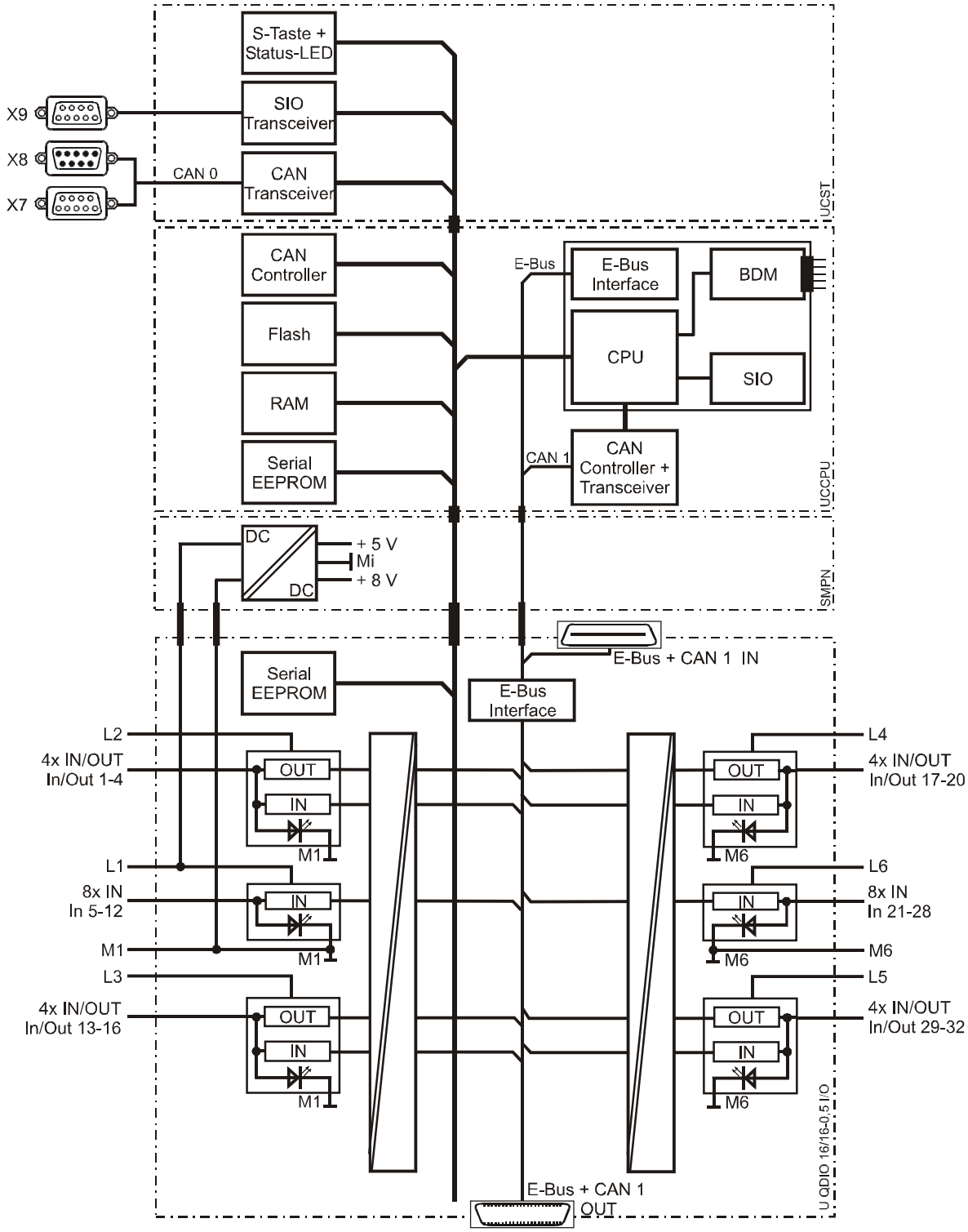
Note:
See section on 16/16-0,5 digital I/Os for information on digital I/Os and the formation of I/O groups.

9.2. Technical Data

Module data				
Development environment	CPC++		CP1131	
	high side switching	low side switching	high side switching	low side switching
Name	**CDIO 16/16-0,5**	**CDIO 16/16-0,5N**	**CDIO 16/16-0,5-1131**	**CDIO 16/16-0,5-1131N**
Item No.	2011020	20110201	2011030	2011031
Dimensions wxhxd [mm]	124 x 170 x 85.5 (modular dimension W = 113/118.5)			
Weight	approx. 700 g			
Mounting	NS 35/7.5 EN 50022 mounting rail			
Expansion	with up to 6 E-bus expansion modules (e.g. QDIO, QAIO)			
Working temperature range	5°C to 50°C (no moisture condensation) convection cooling provided			
CPU	MC 68332 / 25 MHz			
Flash EPROM / SRAM	2 MB / 1.25 MB			
Programmable software	IEC 61131-3 or ‘C’ standard language with real-time operating system			
EMC, class of protection, insulation testing, degree of protection				
Emitted interference	EN 50081-2, industrial sector			
Noise immunity	EN 50082-2, industrial sector			
Class of protection	III			
Insulation resistance	EN 61131-2; 500 VDC (test voltage)			
Degree of protection	IP20			
Supply voltage, power consumption				
Modular electronics power supply (supply voltage)	SELV +24 VDC max. 0.15 A (EN 61131-2)			
Power supply, digital I/Os	+24 VDC (EN 61131-2) subdivided into 6 groups			
Power consumption	at U_e = 24 VDC idling max. 300 mA; all I/Os active approx. 10 A			
Electrical isolation	yes, between CAN bus and digital I/Os and Ethernet			

Digital inputs/outputs	
Number of inputs	16
Number of inputs/outputs	16, individually configurable as inputs or outputs
Short circuit or polarity reversal protection	yes in both cases, all digital outputs
Connection method	vertical three-wire front wiring with push-on terminal strips for screw, spring or crimp connection
Operation and display	
LED's	5 status LEDs; 1 status LED per input/output
'S' button	yes, at the front (including module reset)
Interfaces	
Type of interfaces	CANbus, SIO, E bus
Programming	via CANbus or RS 232

9.3. Block Circuit Diagram



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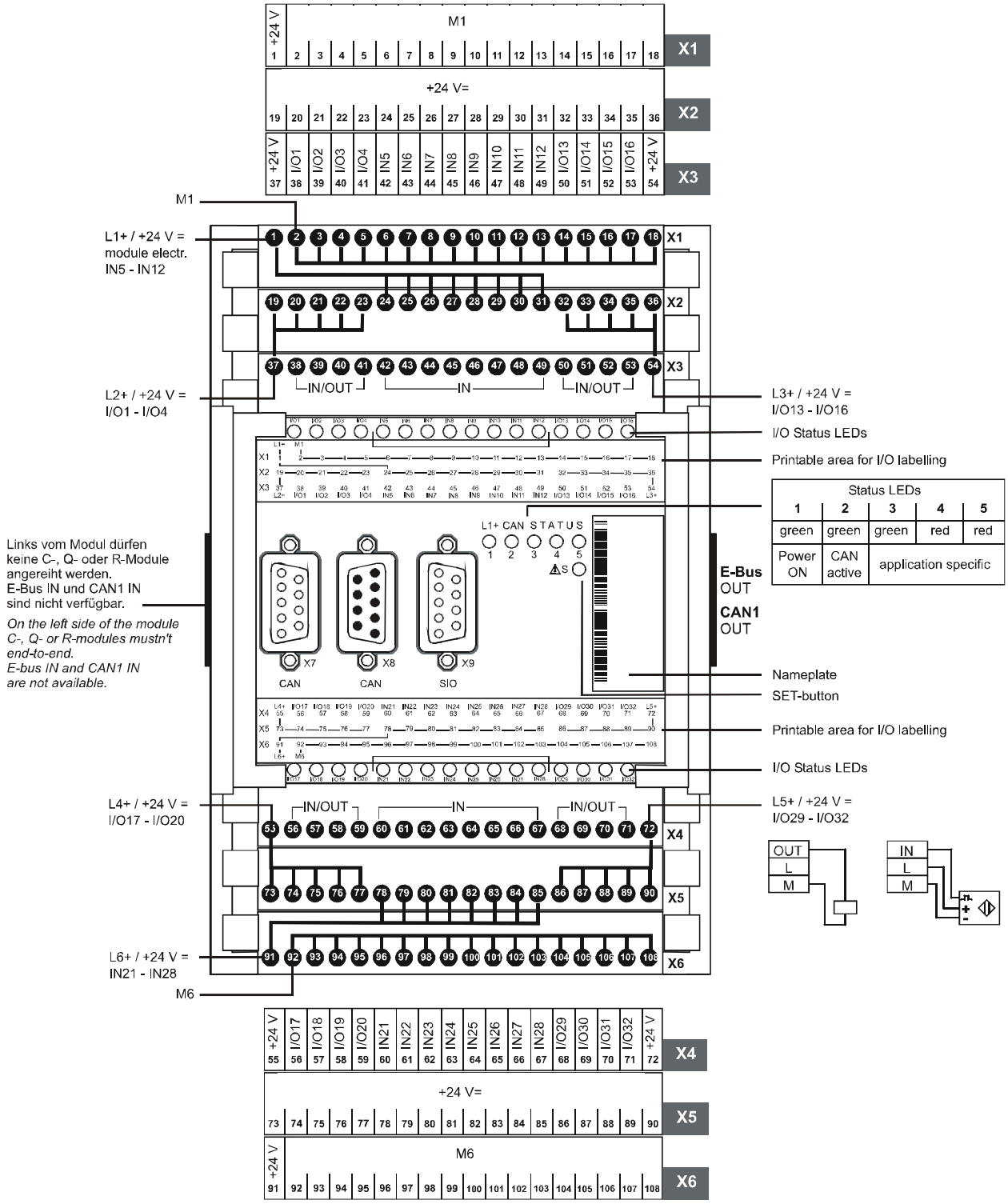
9.4. Module Diagram and Connection Assignment



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9.5. Function Selection, Displays, Diagnostics

Warning ! Do not touch ‘S’ button during normal operation.
Program sequence could otherwise be put into an undefined state.
! Risk of uncontrolled system and machine states !
Put system/machine into a safe initial state (‘maintenance’ mode for example) before actuating the ‘S’ button.

‘S’ button Used to switch between modes and to re-start the module. The function of the ‘S’ button is software-dependent.

I/O status Each input and output has a yellow I/O status LED assigned to it to indicate the logical status of the input or output in question.

Operating status 5 operating status LEDs indicate the current state of the power supply, module mode and other functions. Error messages are also displayed by these status LEDs.

I/O status

Status LED	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 status

Status-LED	Logical status
1 L1+ (green)	ON = correct supply voltage for modular electronics
2 CAN status 2 (green)	ON = CAN 0 send, active
3 CAN status 3 (green)	CDIO active (see software manual)
4 CAN status 4 (red)	alternating flashing indicates configuration mode on (see software manual)
5 CAN status 5 (red)	alternating flashing indicates configuration mode on (see software manual)

9.6. 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 CANtrol modules; including those of connected peripherals such as externally supplied sensors, programming devices, etc.

9.6.1. Commissioning

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

The I/O status LEDs of the digital outputs will not light up. The outputs are set to 0 (low) when switching on and off the modular electronics and remain in that state until the next switching command.
No occurrence of brief switching peaks.

See associated software documentation for further information.

Note:
See section on 16/16-0,5 digital I/Os for information on digital I/Os and the formation of I/O groups.

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10. QDIO 16/16-0,5 Expansion Module

10.1. Overview

Order number

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

Function

The QDIO 16/16-0,5 is used to expand the digital I/O level of cell controllers.
The modules are connected by means of direct E-bus coupling.
The module has the following features:

Features

- 16 digital inputs and
  16 digital, individually configurable inputs/outputs;
  outputs may be supplied with power in groups.
- Minimal space requirement and mounting depth.

Material supplied

The material supplied with the QDIO 16/16-0,5 comprises:

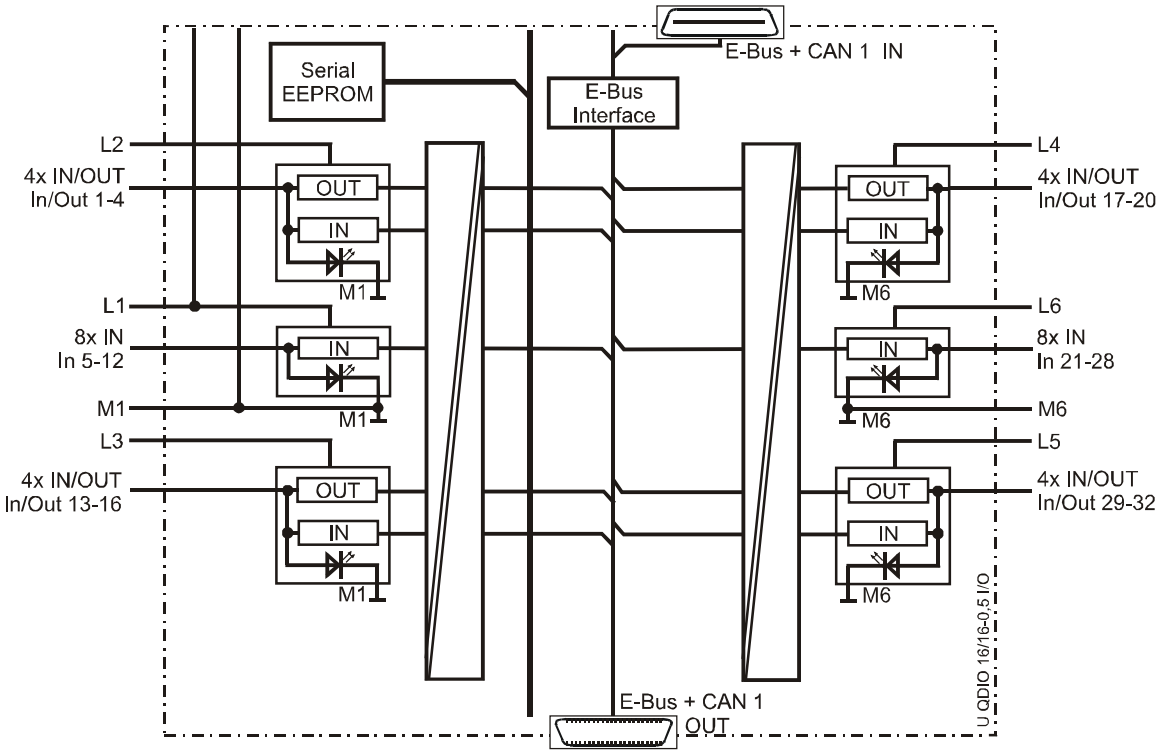
- QDIO 16/16-0,5 expansion module

Note:
See section on 16/16-0,5 digital I/Os for information on digital I/Os and the formation of I/O groups.

10.2. Technical Data

Module data		
Digital expansion module	high side switching	low side switching
Name	**QDIO 16/16-0,5**	**QDIO 16/16-0,5N**
Item No	213351	13520
Dimensions WxHxD [mm]	124 x 170 x 85.5 (modular dimension W = 113/118.5)	
Weight	approx. 700 g	
Mounting	NS 35/7.5 EN 50022 mounting rail	
Working temperature range	5°C to 50°C (no moisture condensation) convection cooling provided	
EMC, class of protection, insulation testing, degree of protection		
Emitted interference	EN 50081-2, industrial sector	
Noise immunity	EN 50082-2, industrial sector	
Class of protection	III	
Insulation resistance	EN 61131-2; 500 VDC (test voltage)	
Degree of protection	IP20	
Supply voltage, power consumption		
Modular electronics power supply (supply voltage)	SELV +24 VDC (EN61131-2)	
Power supply, digital I/Os	+24 VDC (EN61131-2) subdivided into 6 groups	
Power consumption	at U_e = 24 VDC idling max. 300 mA; all I/Os active approx. 10 A	
Electrical isolation	yes, between CAN bus and digital I/Os and Ethernet	
Digital inputs/outputs		
Number of inputs	16	
Number of inputs/outputs	16, individually configurable as inputs or outputs	
Short circuit or polarity reversal protection	yes in both cases, all digital outputs	
Connection method	vertical three-wire front wiring with push-on terminal strips for screw, spring or crimp connection	
Operation and display		
LED’s	1 status LED per input/output	
Interfaces		
Type of interfaces	E bus	

10.3. Block Circuit Diagram



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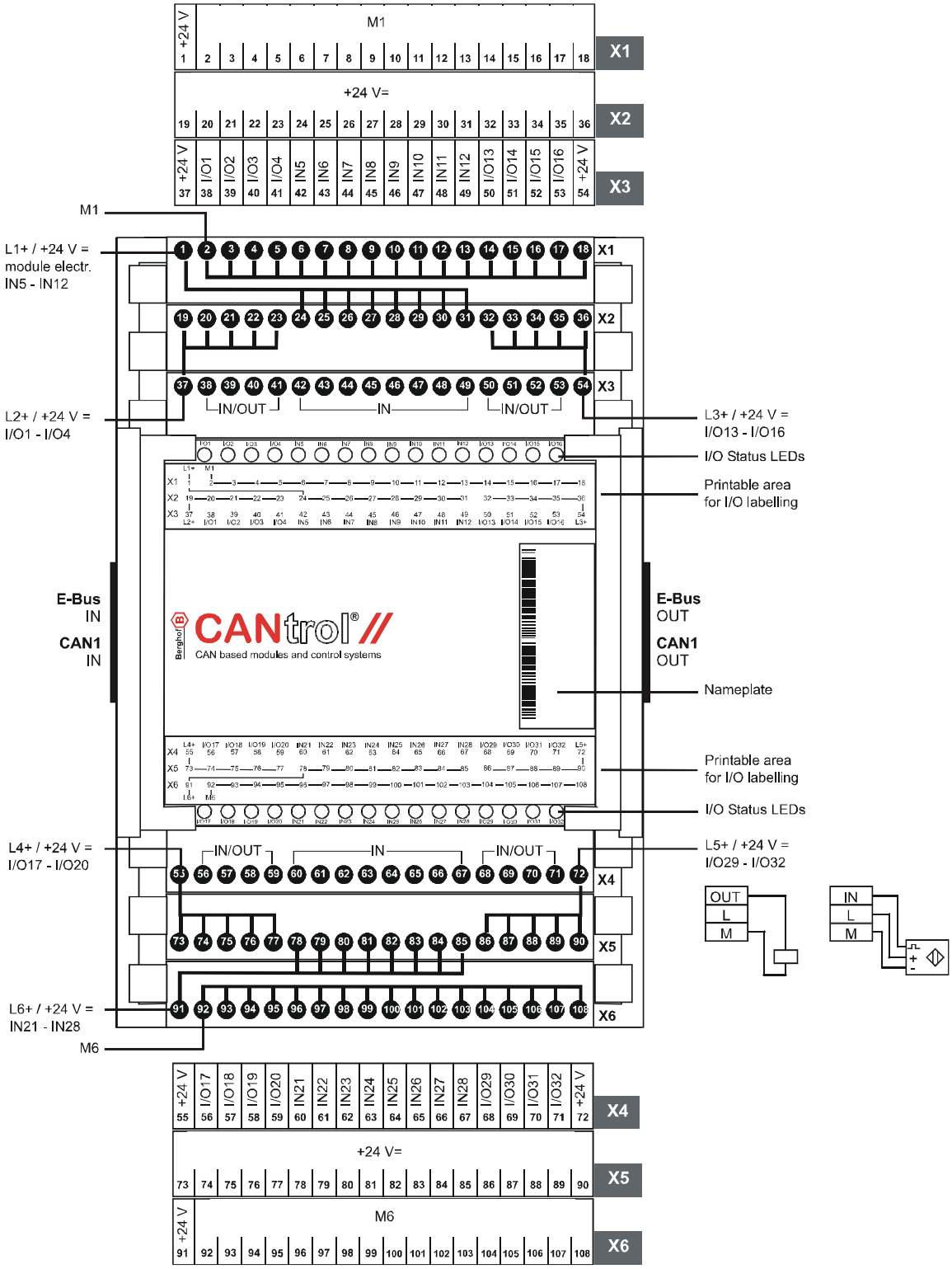
10.4. Module Diagram and Connection Assignment



2VF100025DG01.cdr

10.5. 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 CANtrol modules; including those of connected peripherals such as externally supplied sensors, programming devices, etc.

10.5.1. Commissioning

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

The I/O status LEDs of the digital outputs will not light up. The outputs are set to 0 (low) when switching on and off the modular electronics and remain in that state until the next switching command.
No occurrence of brief switching peaks.

See associated software documentation for further information.

Note:
See section on 16/16-0,5 digital I/Os for information on digital I/Os and the formation of I/O groups.

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11. QCAN E-Bus / CAN Adaptor

11.1. Overview

Order number

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

Function

The QCAN module is used to couple R-modules which are stepped down via the CAN Bus channel on the E-bus.

The QCAN module must always be installed at the right of the last module of a control cell. Here is the CAN Bus terminated. The E-bus is not continued in this module. The QCAN module can only used at the beginning and/or at the end of a CAN-line.

Material supplied

The material supplied with the E-bus/CAN Adaptors QCAN comprises:

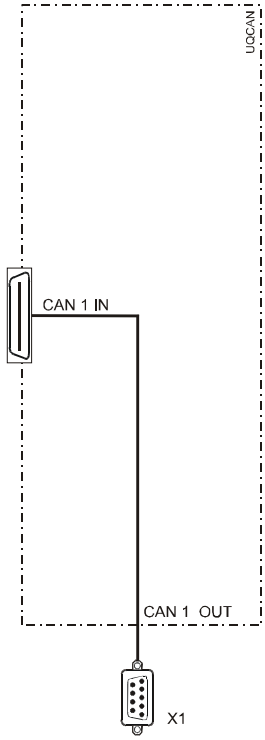
- QCAN module

Note:
This module has less overall width than the standard modules.

11.2. Technical Data

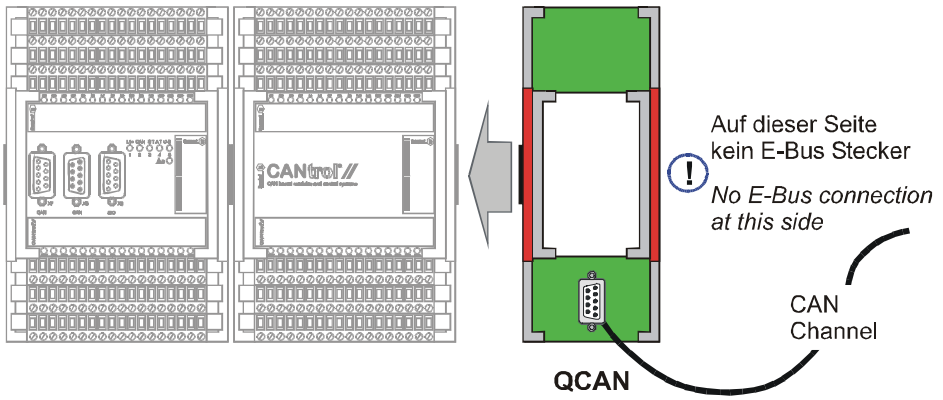
Module data	
Designation	QCAN
Item No	13483
Dimensions WxHxD [mm]	65 x 170 x 85,5 mm (modular dimension W = 59,5)
No. of modules per row	max. 1 module
Weight	ca. 230 g
Mounting	Mounting rail NS 35/7,5 EN 50022
EMC, class of protection, insulation testing, degree of protection	
Emitted interference	EN 50081-2, industrial sector
Noise immunity	EN 50082-2, industrial sector
Class of protection	III
Insulation resistance	EN 61131-2; 500 VDC (test voltage)
Degree of protection	IP20
Supply voltage, power consumption	
Supply voltage	None (passive module)
Interfaces	
Type of interface	CAN bus

11.3. Block Circuit Diagram



2VF100054DG01.cdr

11.4. Structure and connection building



CAN Kabeladapter für die abgesetzte Ankopplung von R-Modulen über den E-Bus CAN Channel

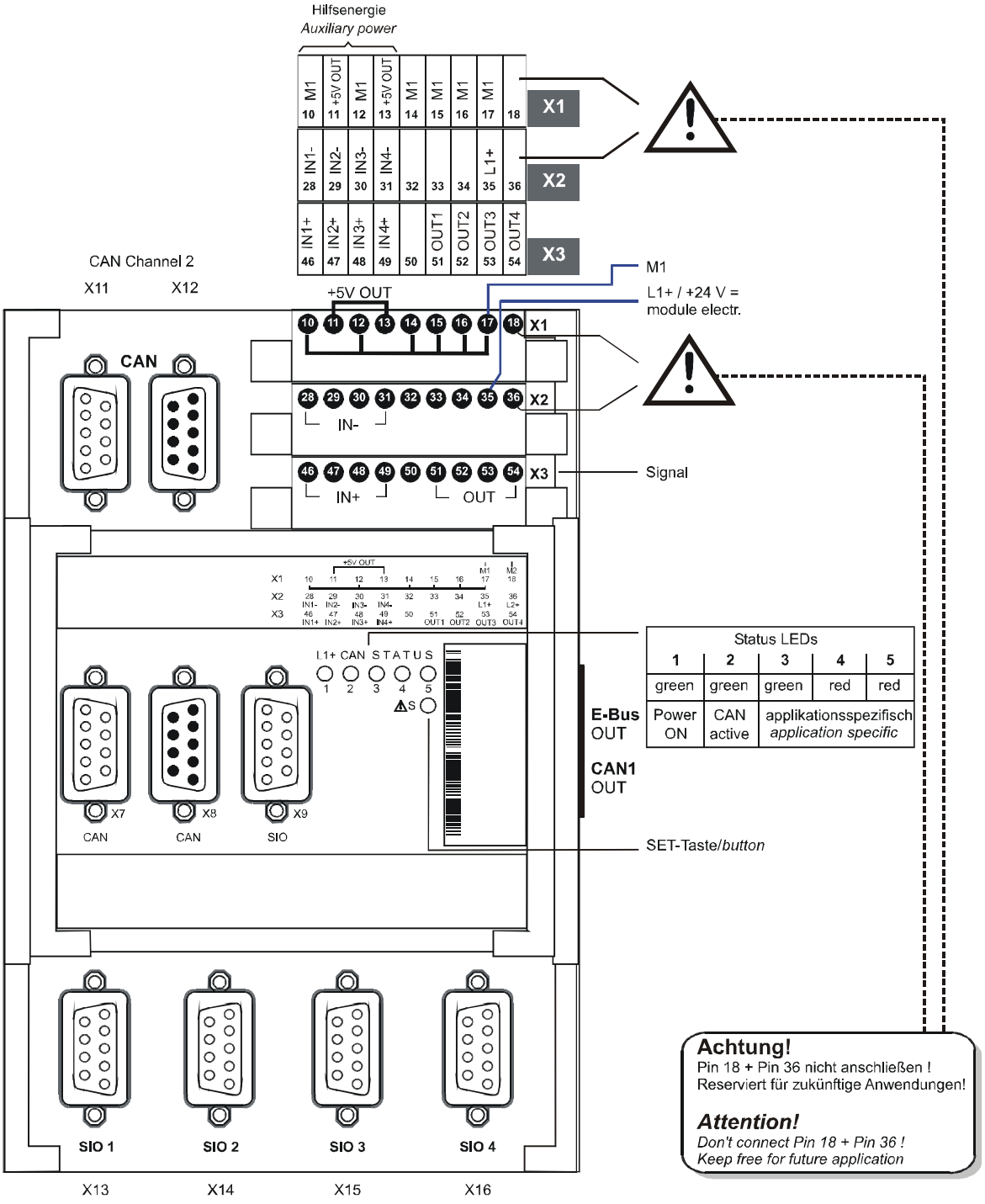
CAN cable adaptor for remote module connection by E-Bus CAN channel

2VF100055DG01.cdr

12. Connection Building

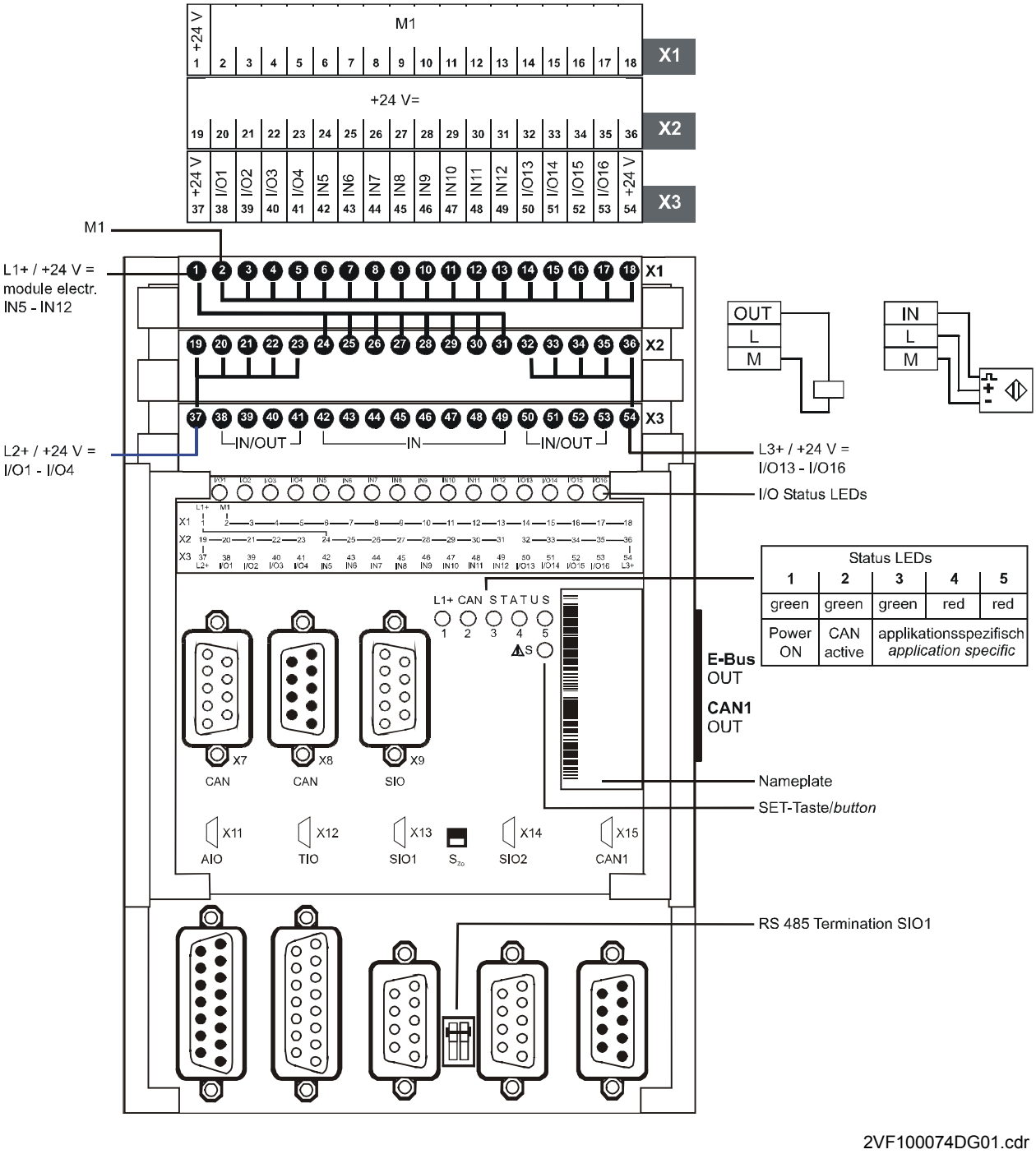
12.1. CPU-Modules

12.1.1. C1CPU-4S...

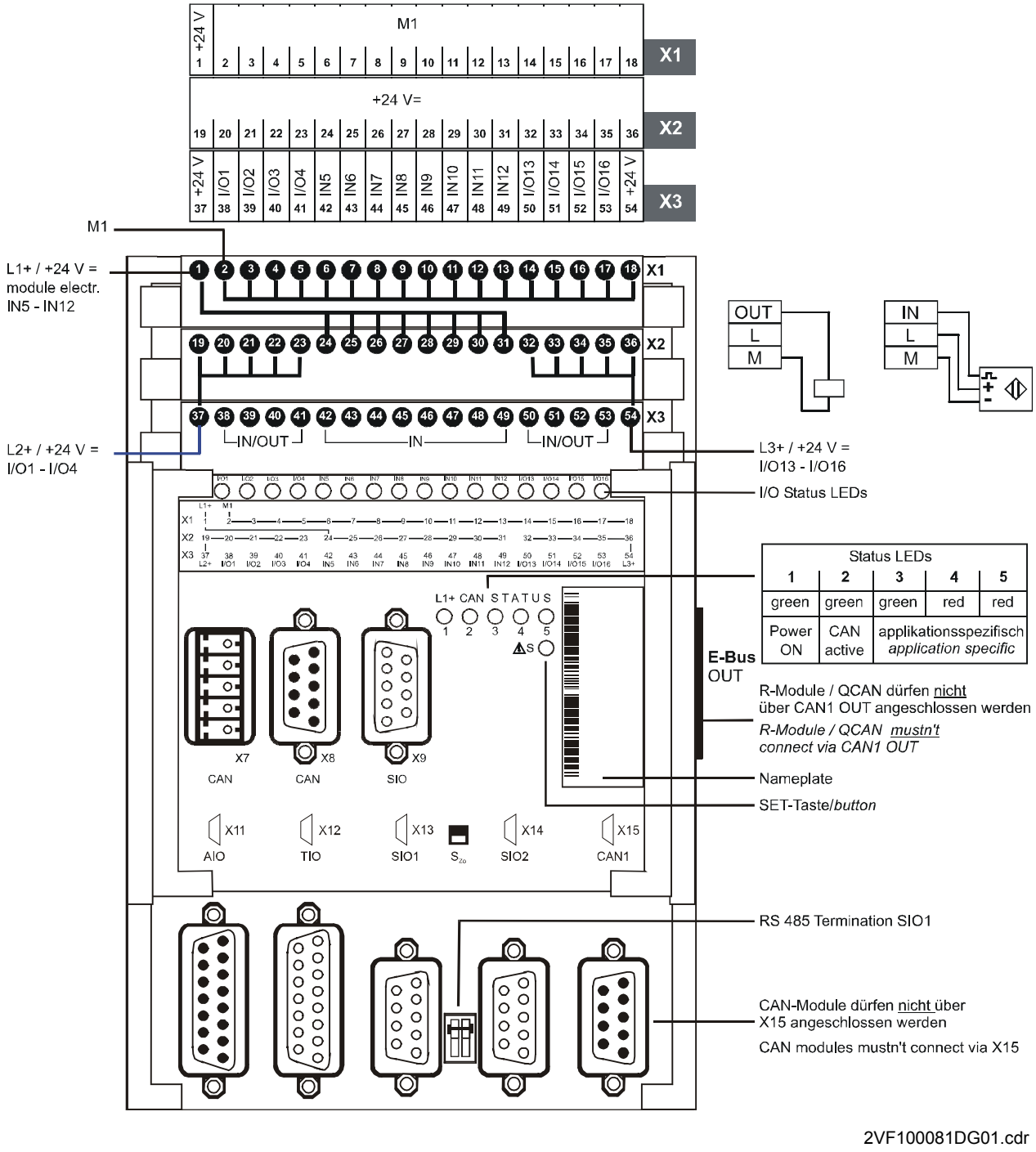


2VF100031DG02.cdr

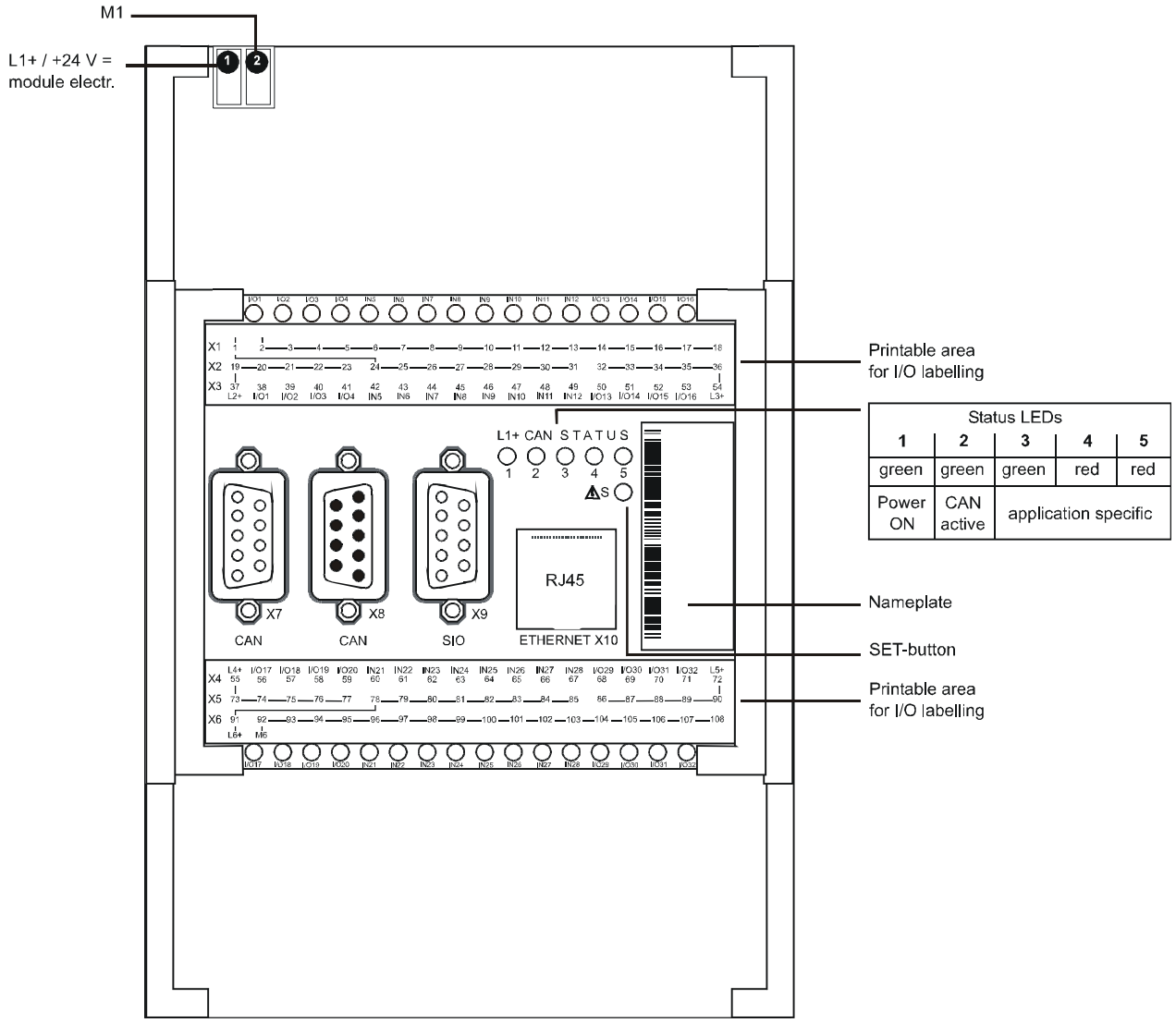
12.1.2. C2CPU-2S...



12.1.3. C2CPU-2S...SC

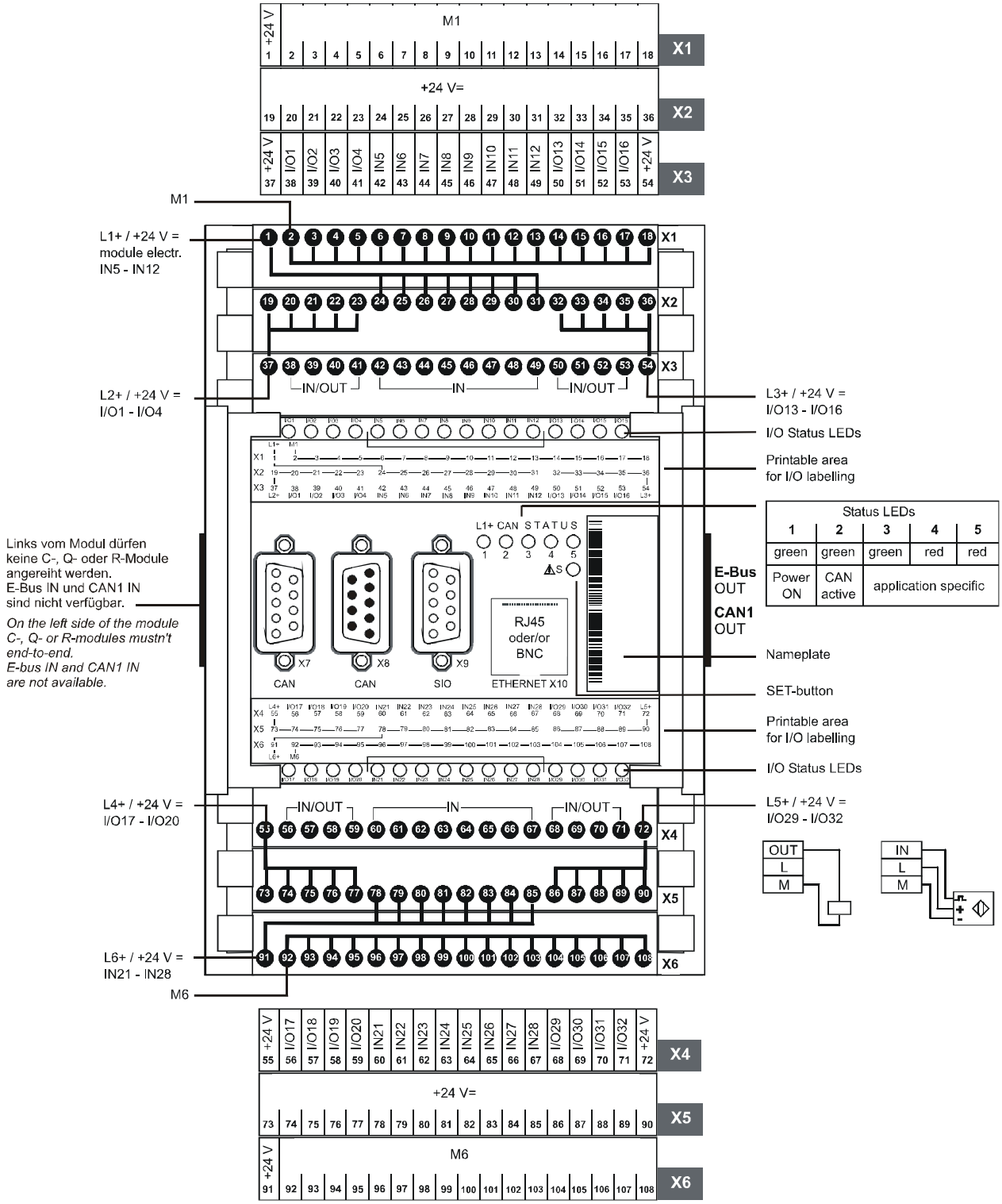


12.1.4. CE3CPU



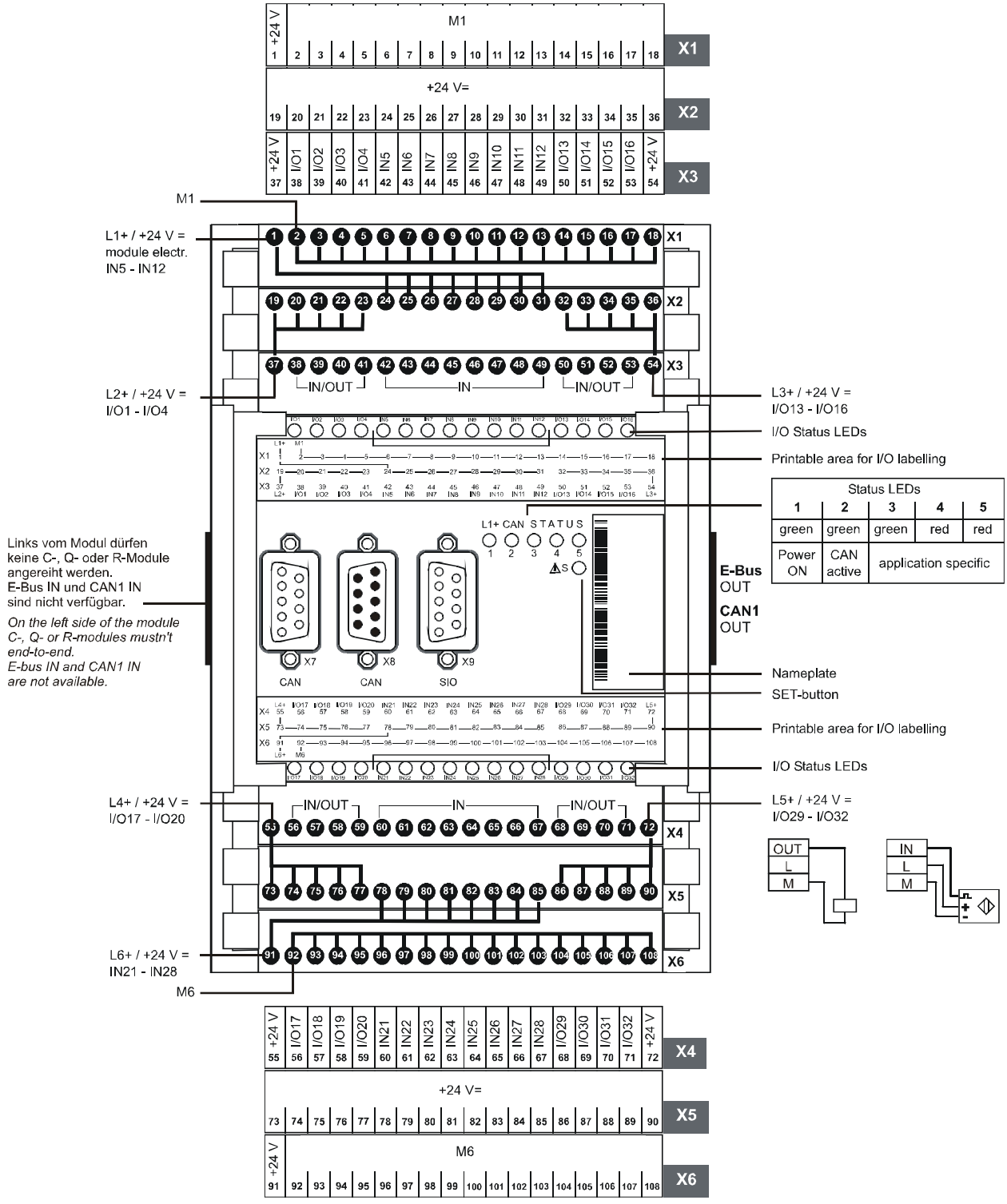
2VF100084DG00.cdr

12.1.5. CEDIO 16/16-0,5...



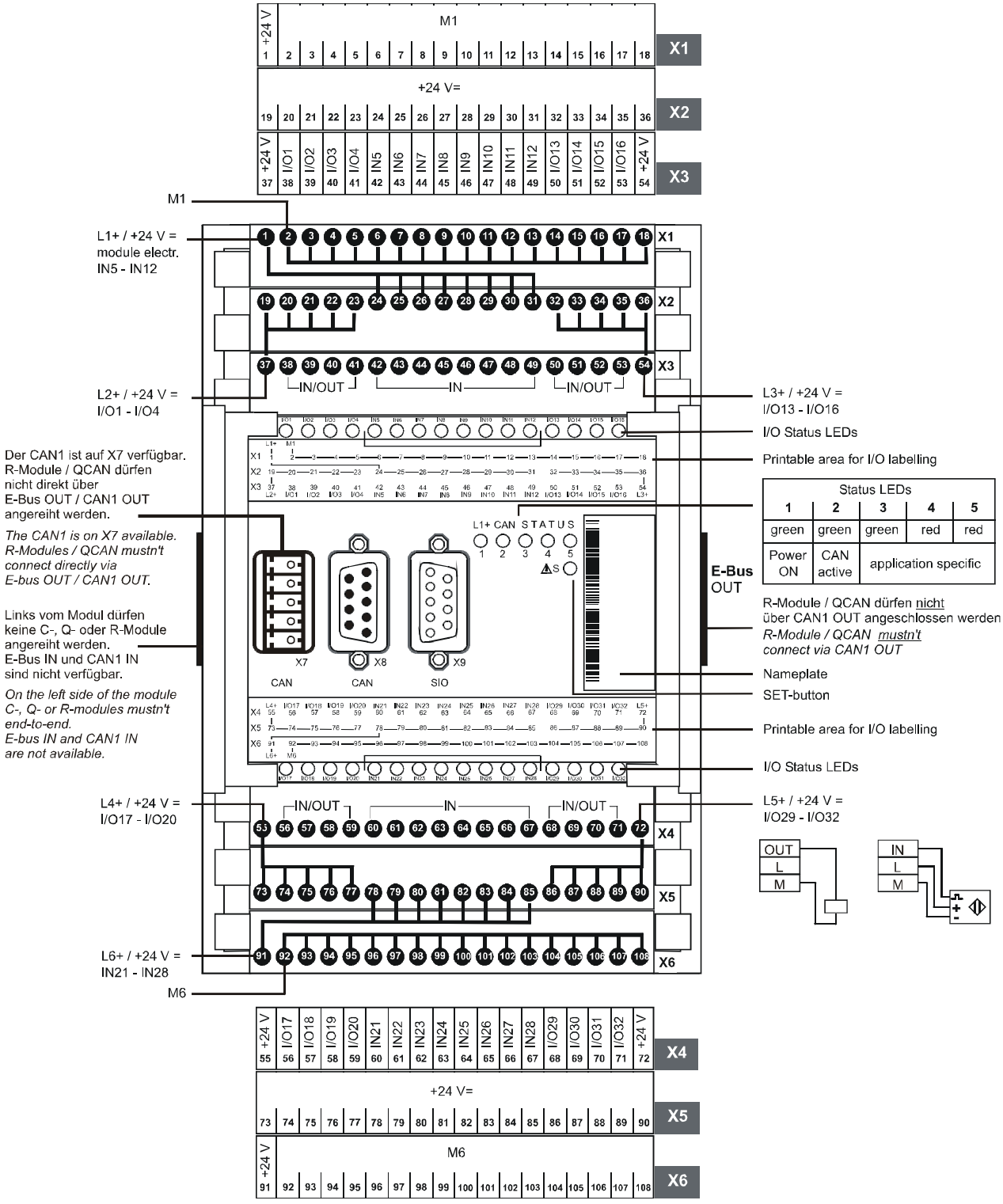
2VF100005DG01.cdr

12.1.6. CDIO 16/16-0,5



2VF100004DG01.cdr

12.1.7. CDIO 16/16-0,5-SC



2VF100082DG00.cdr

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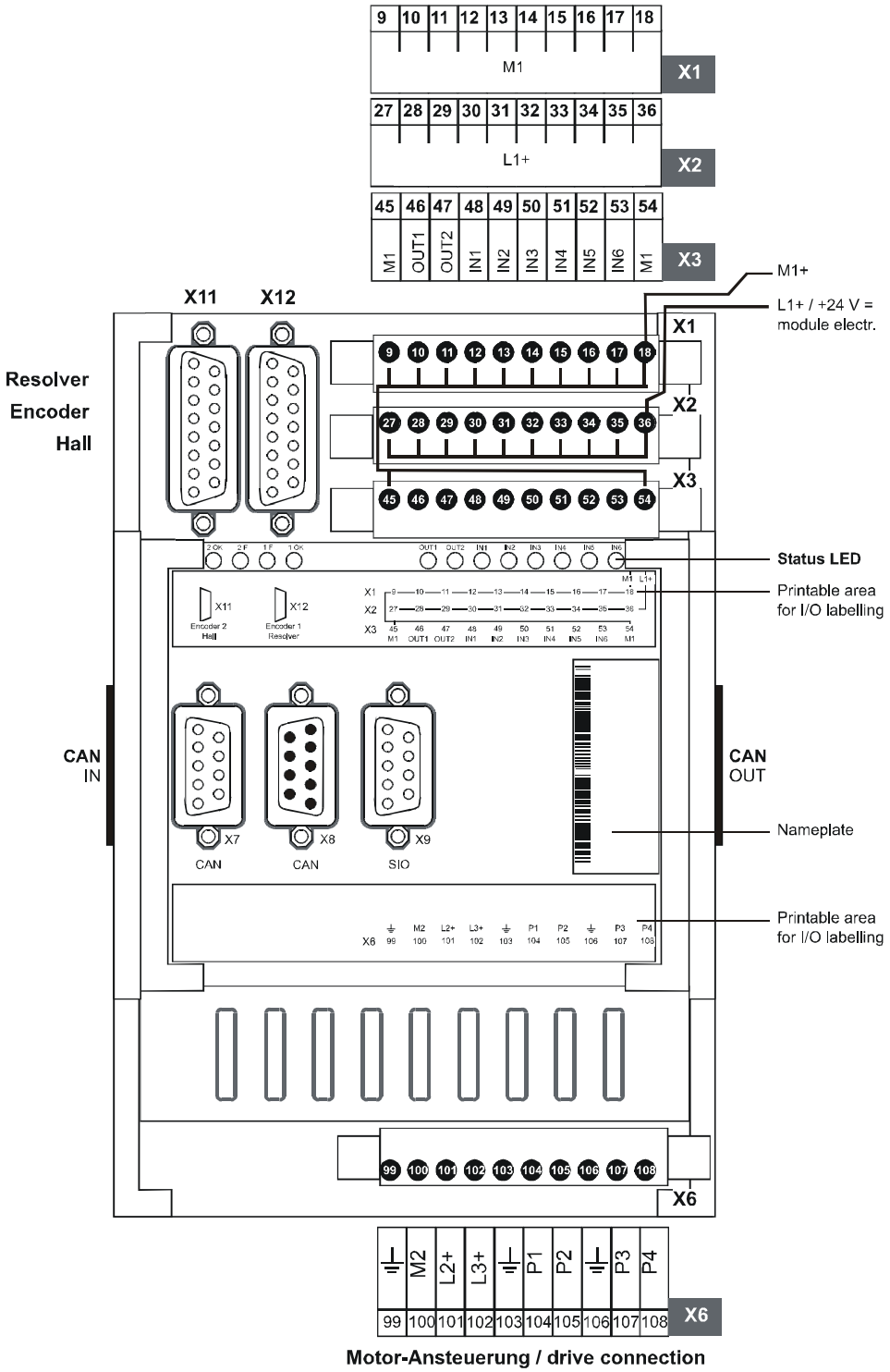
12.2. Remote functions- modules

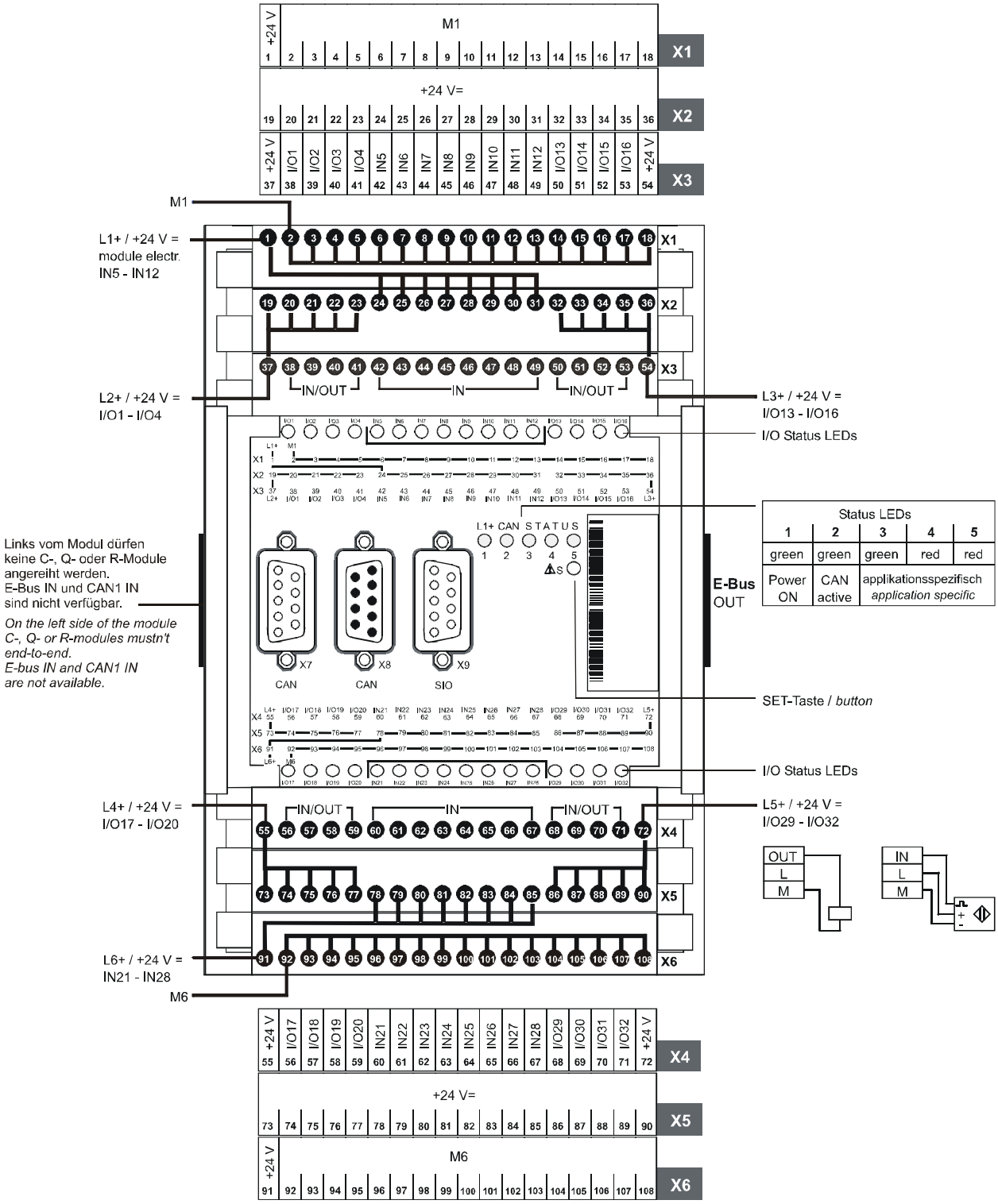
12.2.1. RDC1... / RDC2...



Motor-Ansteuerung / drive connection

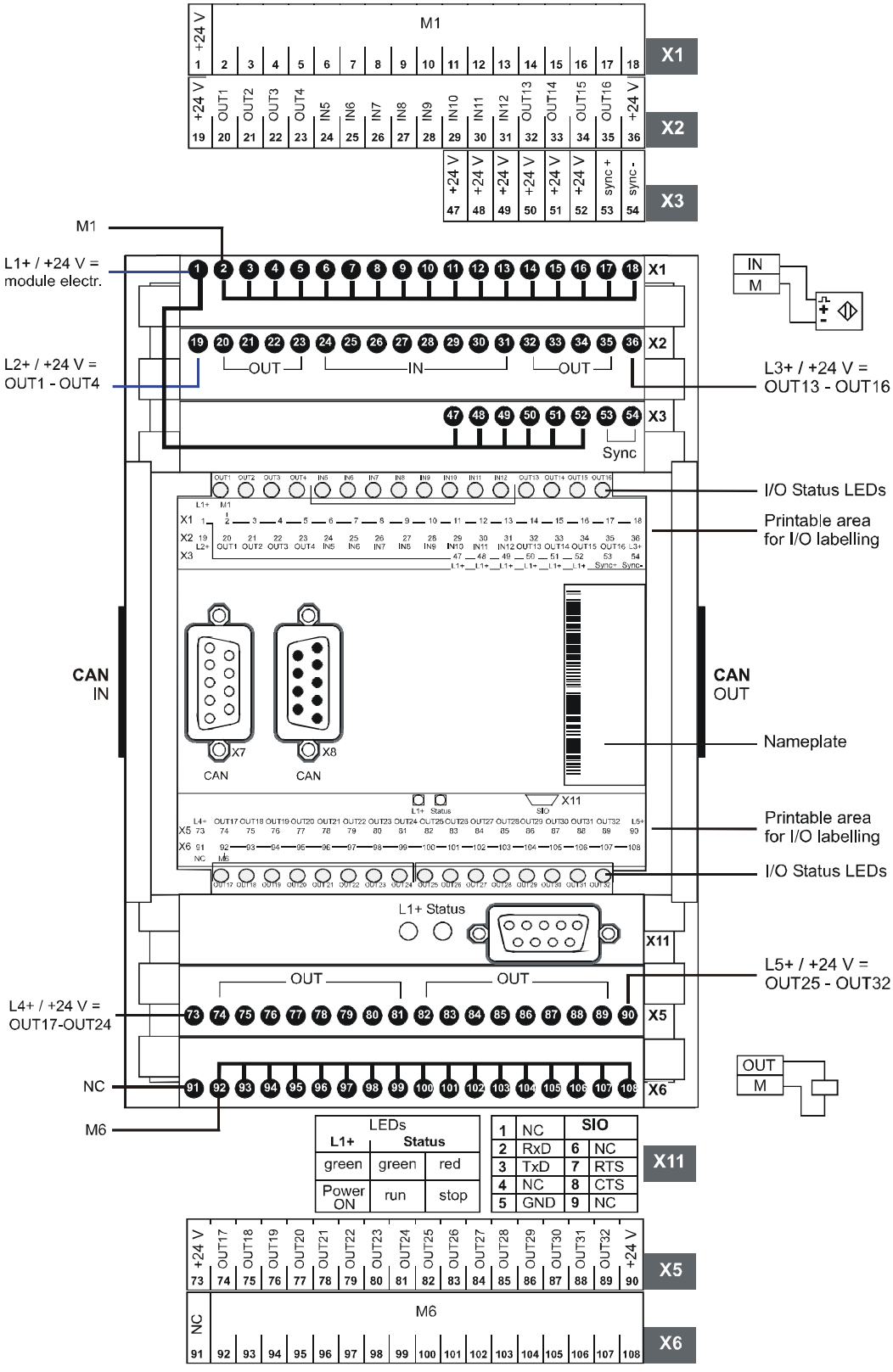
2VF100030DG02.cdr

12.2.2. RDIO 16/16-0,5



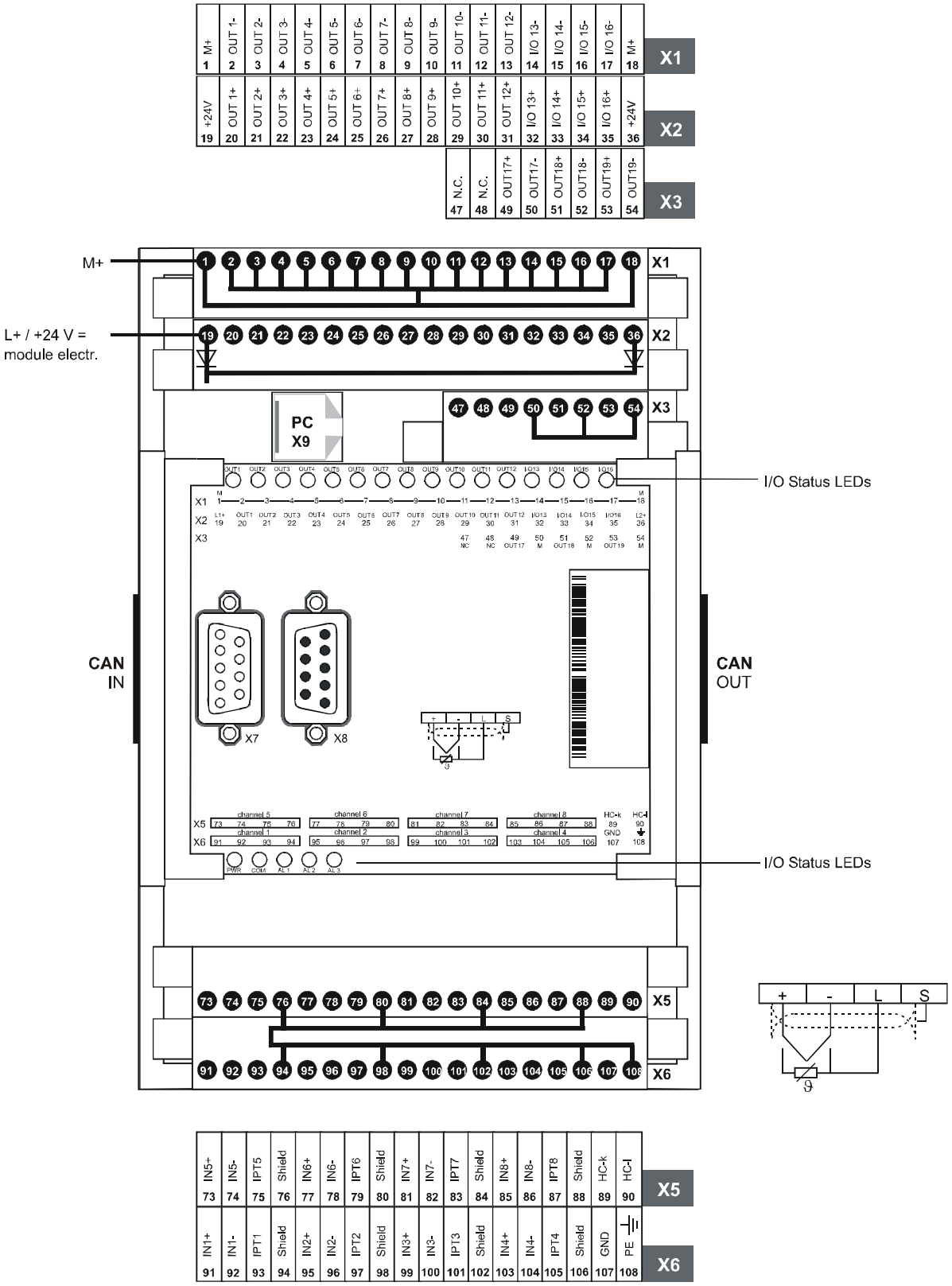
2VF100029DG01.cdr

12.2.3. RDIO 8/24-0,5



2VF100083DG00.cdr

12.2.4. RTEMP8

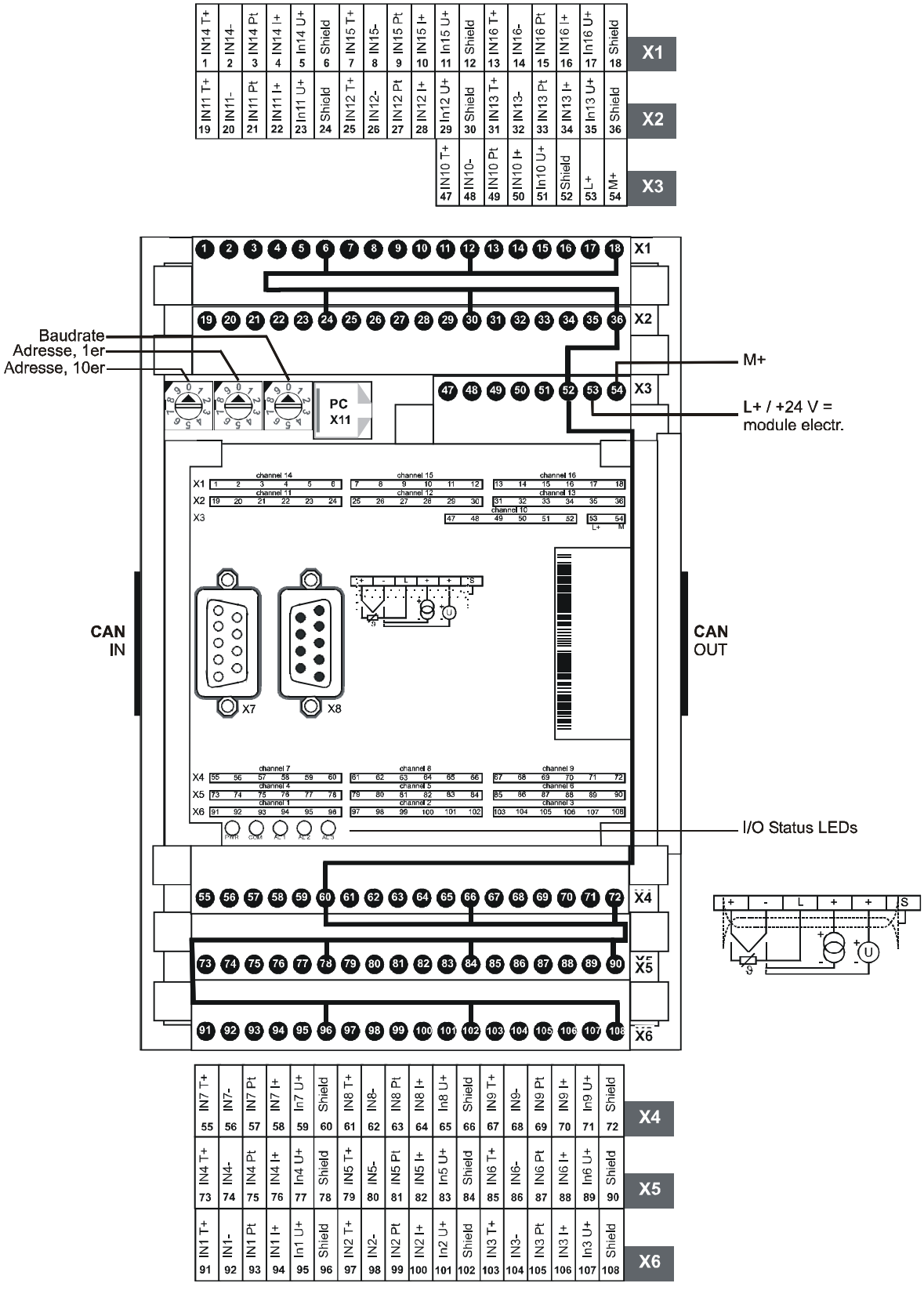


M+	OUT 1-	OUT 2-	OUT 3-	OUT 4-	OUT 5-	OUT 6-	OUT 7-	OUT 8-	OUT 9-	OUT 10-	OUT 11-	OUT 12-	I/O 13-	I/O 14-	I/O 15-	I/O 16-	M+	X1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
+24V	OUT 1+	OUT 2+	OUT 3+	OUT 4+	OUT 5+	OUT 6+	OUT 7+	OUT 8+	OUT 9+	OUT 10+	OUT 11+	OUT 12+	I/O 13+	I/O 14+	I/O 15+	I/O 16+	+24V	X2
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
										N.C.	N.C.	OUT17+	OUT17-	OUT18+	OUT18-	OUT19+	OUT19-	X3
										47	48	49	50	51	52	53	54	

IN5+	IN5-	IPT5	Shield	IN6+	IN6-	IPT6	Shield	IN7+	IN7-	IPT7	Shield	IN8+	IN8-	IPT8	Shield	HC-k	HC-I	X5
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	
IN1+	IN1-	IPT1	Shield	IN2+	IN2-	IPT2	Shield	IN3+	IN3-	IPT3	Shield	IN4+	IN4-	IPT4	Shield	GND	PE	X6
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	

2VF100032DG01.cdr

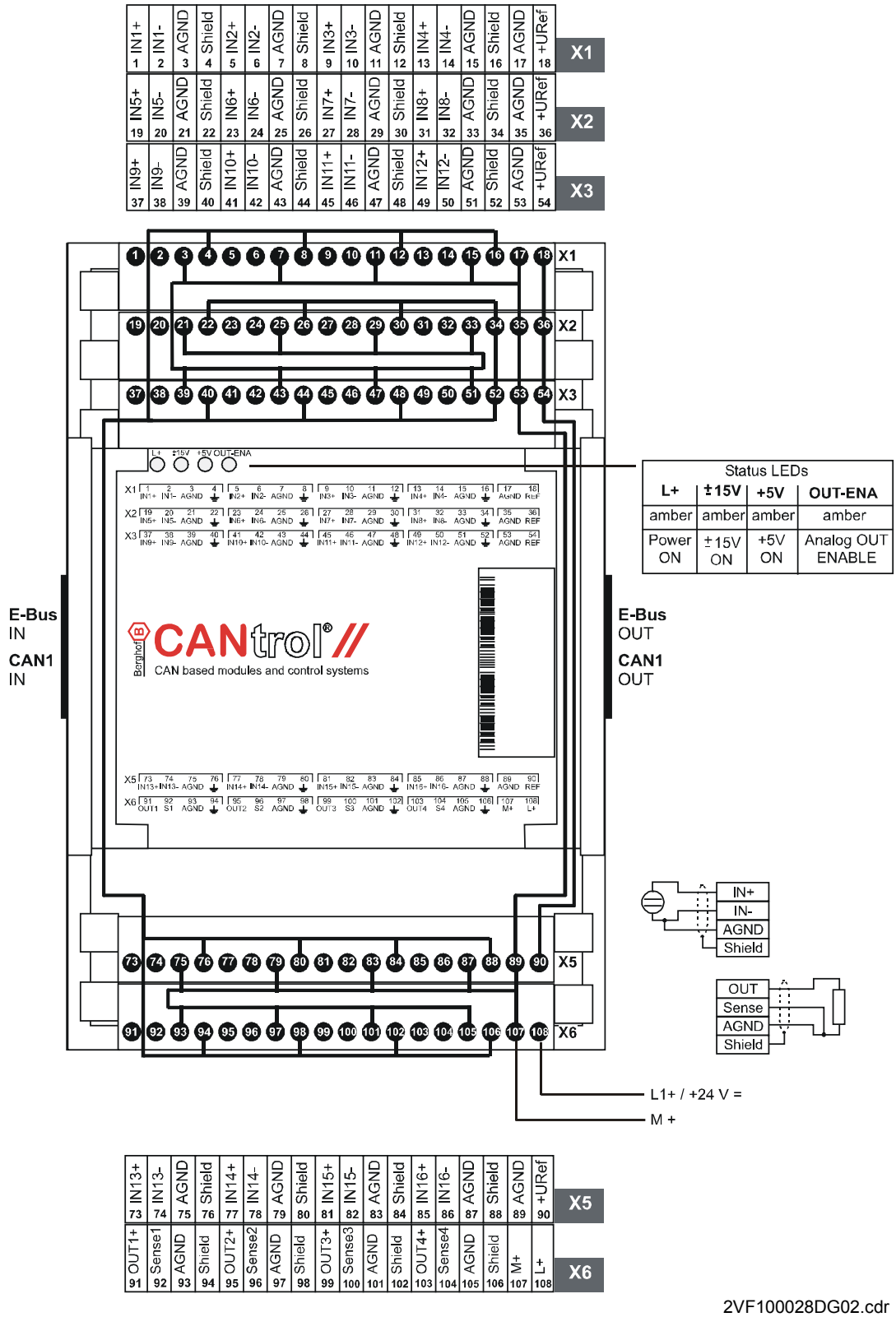
12.2.5. RTI16



2VF100033DG00.cdr

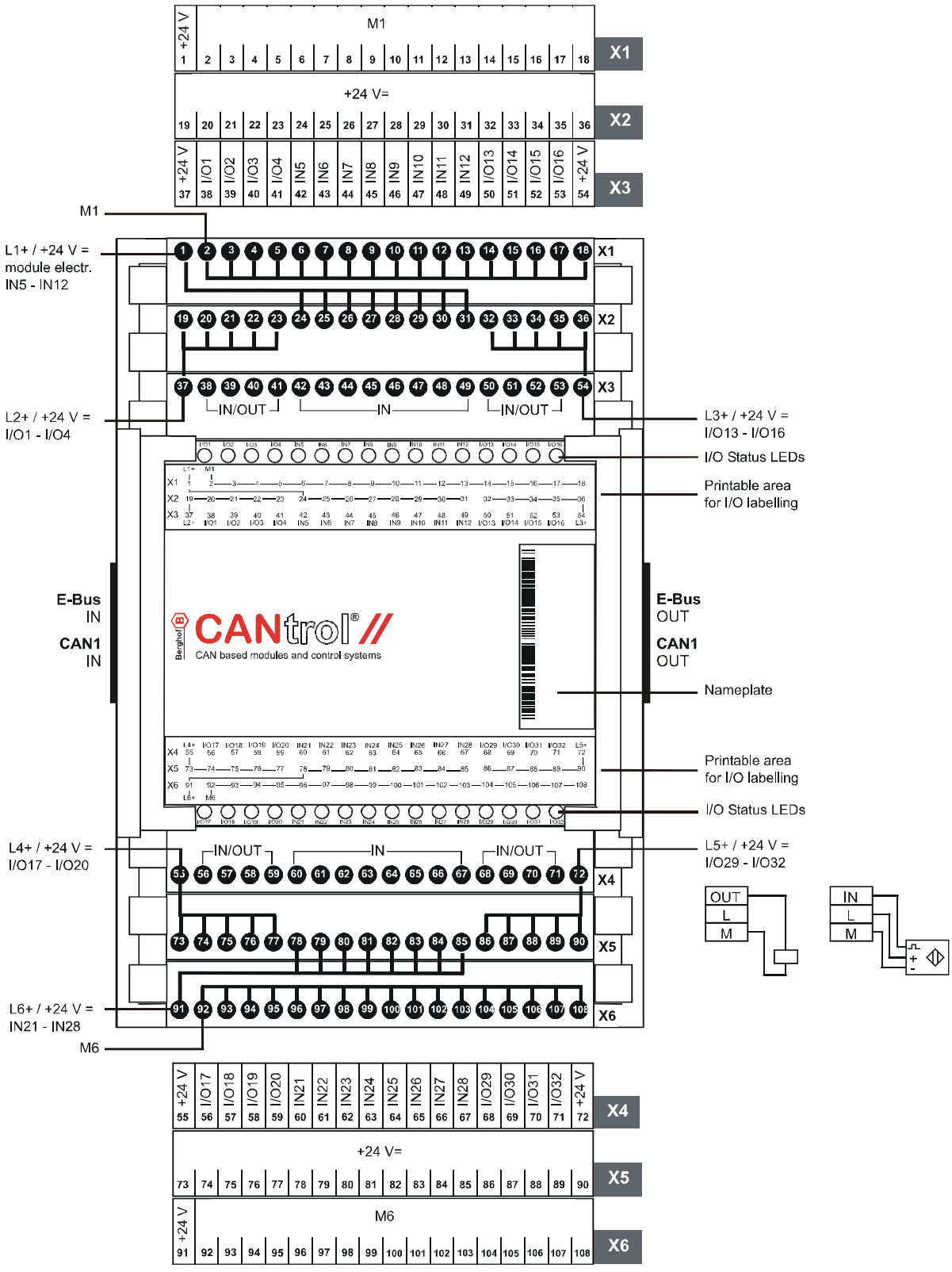
12.3. E-bus expansion- modules

12.3.1. QAIO 16/4-V



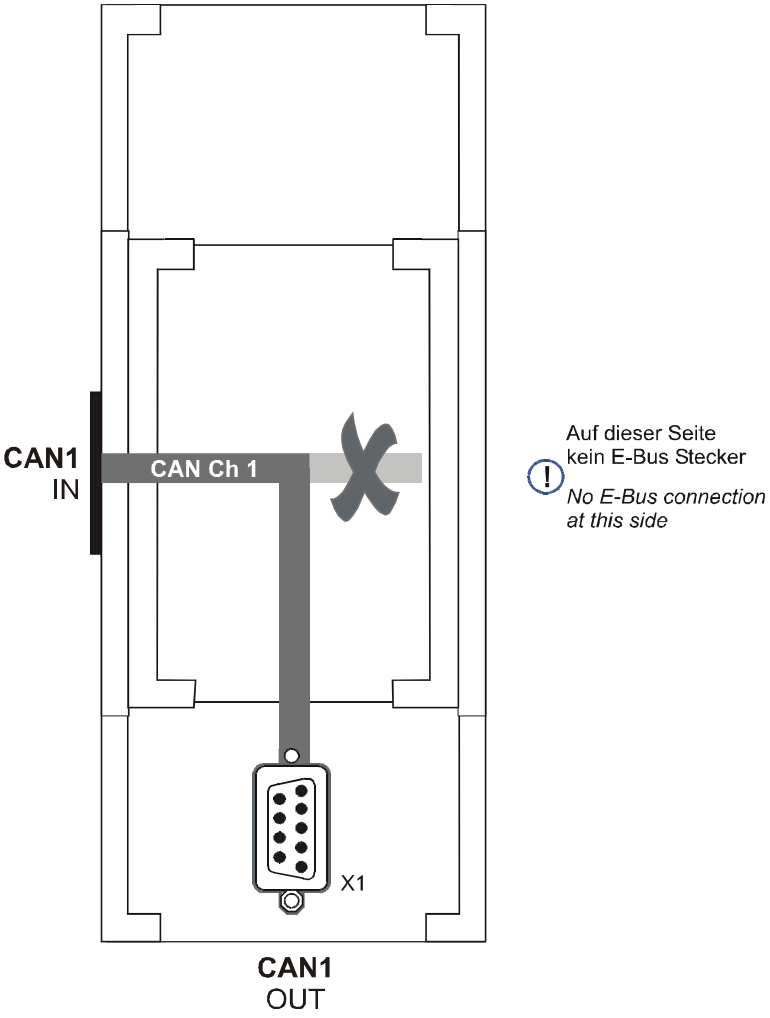
2VF100028DG02.cdr

12.3.2. QDIO 16/16-0,5



2VF100025DG01.cdr

12.3.3. QCAN


CAN1
IN
CAN Ch 1
X1
CAN1
OUT
Auf dieser Seite
kein E-Bus Stecker
No E-Bus connection
at this side
2VF100087DG01.cdr

13. Annex

13.1. Environmental Protection

13.1.1. Emission

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

13.1.2. 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.

13.2. 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.

13.3. Repairs/Service

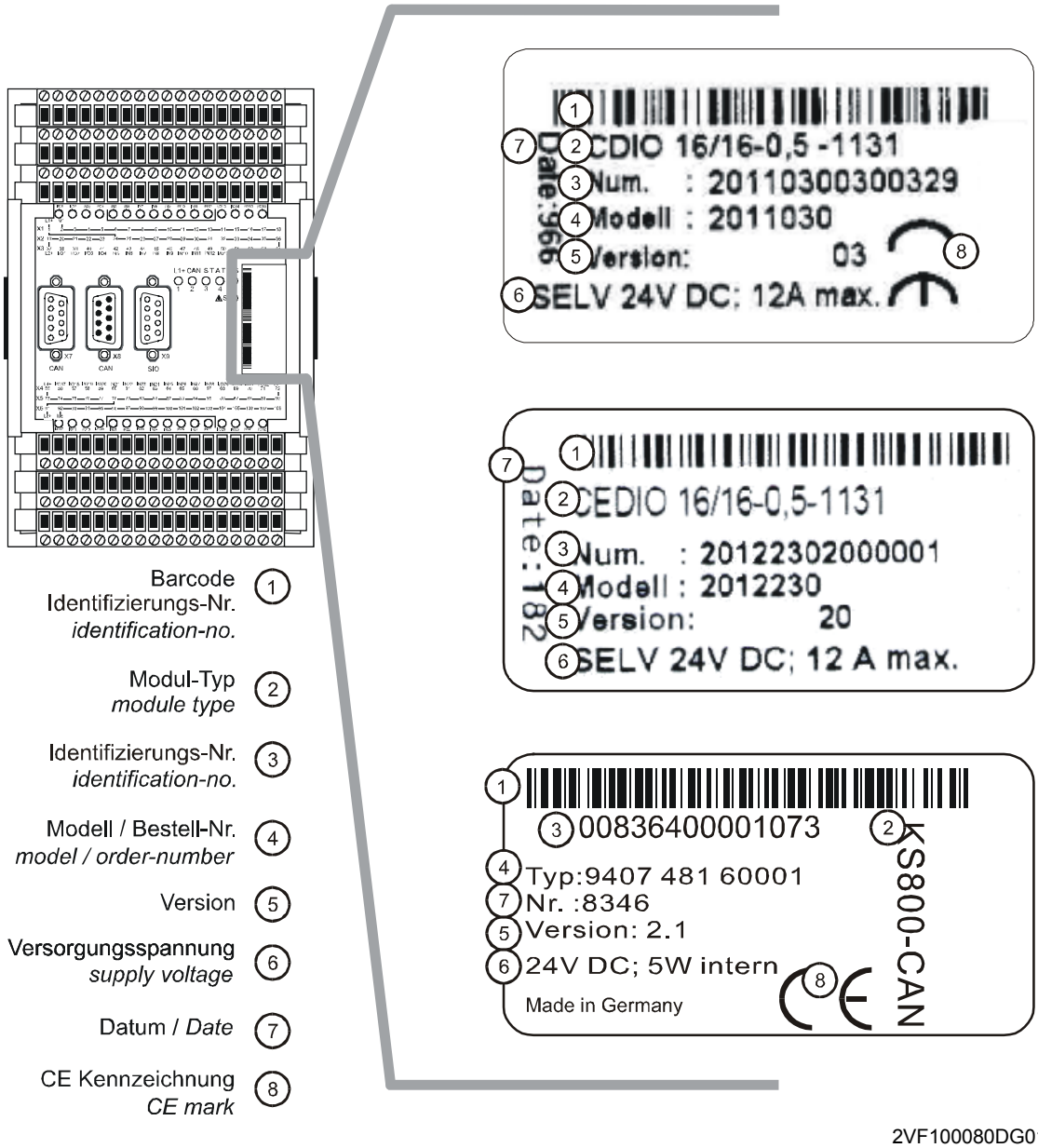
Warning ! Repair work may only be carried out by the manufacturer or its authorised service engineers.

13.3.1. 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.

13.4. Nameplate

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



Barcode
Identifizierungs-Nr. *identification-no.* 1

Modul-Typ *module type* 2

Identifizierungs-Nr. *identification-no.* 3

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

Version 5

Versorgungsspannung *supply voltage* 6

Datum / *Date* 7

CE Kennzeichnung *CE mark* 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**

Note:
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.)

13.5. Addresses and Bibliography

13.5.1. Addresses

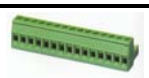
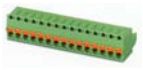
CiA	'CAN in Automation', international manufacturers and users organisation for CAN users in the field of automation: CiA - CAN in Automation e.V. Am Weichselgarten 26 D-91058 Erlangen /Germany e-mail: headquarters@can-cia.de http://www.can-cia.de		
DIN-EN Standards	Beuth Verlag GmbH 10772 Berlin	or	VDE-Verlag GmbH 10625 Berlin
IEC Standards	VDE Verlag GmbH 10625 Berlin	or	Internet search http://www.iec.ch/

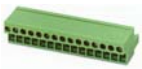
13.5.2. Standards/Bibliography

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.

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

14. Selection List for Connection Plugs

Auswahlliste für CANtrol® Anschluß-Stecker / *Selection List For CANtrol® Connection Plugs*									
	Polzahl/ *Number of poles*		**2**	**5**	**8**	**9**	**10**	**12**	**18**
	**Schraubanschluß oben** *Screw-type terminal, top* *max.* 1,5 mm²	*Artikel Nr.* *Article No.*		14050					
	**Schraubanschluß oben** *Screw-type terminal, top* *max.* 2,5 mm²	*Artikel Nr.* *Article No.*	2841		13466	13026	13562		13027
	**Schraubanschluß seitlich** *Screw-type terminal, side* max. 2,5 mm²	*Artikel Nr.* *Article No.*	6054		6496	13440	3579		13360
	**Crimp-Anschluß, Abg. oben** *Crimped connection, top side* 0,5 - 1,0 mm² / 1,5 - 2,5 mm²	*Artikel Nr.* *Article No.*			12660	13560	13561		13362
	**Federkraftklemme, Abg. oben** *Spring-type terminal, top side* max. 2,5 mm²	*Artikel Nr.* *Article No.*			13799	13800	13801		13363
Baugruppe / *Module*	**Polzahl/ *Number of poles***		**2** Einzelstecker pro Baugruppe / *Single plugs per module*	**5**	**8**	**9**	**10**	**12**	**18**
Application & Network									
C1CPU...									
	C1CPU-4S-00	2010020				3x			
	C1CPU-4S-00-1131	2010030				3x			
	C1CPU-4S-01	2010021				3x			
	C1CPU-4S-01-1131	2010031				3x			
	C1CPU-4S-02	2010022				3x			
	C1CPU-4S-02-1131	2010032				3x			
	C1CPU-4S-03	2010023				3x			
	C1CPU-4S-03-1131	2010033				3x			
	C1CPU-4S-04	2010024				3x			
	C1CPU-4S-04-1131	2010034				3x			
	C1CPU-4S-05	2010025				3x			
	C1CPU-4S-05-1131	2010035				3x			
	C1CPU-4S-06	2010026				3x			
	C1CPU-4S-06-1131	2010036				3x			
	C1CPU-4S-07	2010027				3x			
	C1CPU-4S-07-1131	2010037				3x			
C2CPU...									
	C2CPU-2S-00-8/8	2021020							3x
	C2CPU-2S-00-8/8-1131	2021030							3x
	C2CPU-2S-01-8/8	2021021							3x
	C2CPU-2S-01-8/8-1131	2021031							3x
	C2CPU-2S-02-8/8	2021022							3x
	C2CPU-2S-02-8/8-1131	2021032							3x
C3CPU...									
	C3CPU-00-1131	2022112					2x		4x
	C3CPU-01-1131	2022212					2x		4x
	C3CPU-02-1131	2022232					2x		4x
CDIO...									
	CDIO-16/16-0,5	2011020							6x
	CDIO 16/16-0,5-1131	2011030							6x
	CDIO 16/16-0,5N	2011021							6x
	CDIO 16/16-0,5N-1131	2011031							6x
CEDIO...									
	CEDIO 16/16-0,5	2012020							6x
	CEDIO 16/16-0,5B	2012022							6x
	CEDIO 16/16-0,5-1131	2012030							6x
	CEDIO 16/16-0,5B-1131	2012032							6x
	CEDIO 16/16-0,5N-1131	2012031							6x
CE3CPU									
	CE3CPU	2031001	1x						
	CE3CPU-1131	2031000	1x						

Auswahlliste für CANtrol® Anschluß-Stecker / *Selection List For CANtrol® Connection Plugs*									
	Polzahl/ *Number of poles*		**2**	**5**	**8**	**9**	**10**	**12**	**18**
	**Schraubanschluß oben** *Screw-type terminal, top* *max.* 1,5 mm²	*Artikel Nr.* *Article No.*		14050					
	**Schraubanschluß oben** *Screw-type terminal, top* *max.* 2,5 mm²	*Artikel Nr.* *Article No.*	2841		13466	13026	13562		13027
	**Schraubanschluß seitlich** *Screw-type terminal, side* max. 2,5 mm²	*Artikel Nr.* *Article No.*	6054		6496	13440	3579		13360
	**Crimp-Anschluß, Abg. oben** *Crimped connection, top side* 0,5 - 1,0 mm² / 1,5 - 2,5 mm²	*Artikel Nr.* *Article No.*			12660	13560	13561		13362
	**Federkraftklemme, Abg. oben** *Spring-type terminal, top side* max. 2,5 mm²	*Artikel Nr.* *Article No.*			13799	13800	13801		13363
	Polzahl/ *Number of poles*		**2**	**5**	**8**	**9**	**10**	**12**	**18**
Baugruppe / *Module*			Einzelstecker pro Baugruppe */ Single plugs per module*						
CANtrol®// *power track*									
C2CPU...SC									
	C2CPU-2S-01-8/8-SC-1131	2029031		1x					3x
	C2CPU-2S-03-8/8-SC-1131	2029033		1x					3x
CDIO...SC									
	CDIO 16/16-0,5-SC-1131	2027030		1x					6x
Distributed I/O									
QAIO									
	QAIO 16/4-A	13740							5x
	QAIO 16/4-V	13352							5x
QDIO									
	QDIO 16/16-0,5	213351							6x
	QDIO 16/16-0,5N	13520							6x
RDIO									
	RDIO 16/16-0,5	2020020							6x
	RDIO 8/24-0,5	2030000							3x
Motion Control									
RDC									
	RDC1-EC	13745					4x		
	RDC1-EC-R	13746					4x		
	RDC1-EC-R-150	2013001					4x		
	RDC2	13353					4x		
	RDC2-S	2023001					1x	2x	
Temperature Control									
RTEMP									
	RTEMP8	13354			1x				4x
	RTEMP8/16	2014001			1x				4x
RTI									
	RTI 16	13833			1x				5x

**) Die Crimp-Kontakte sind getrennt zu bestellen (siehe Preisliste).
Crimp contacts must be ordered separately (Cf.price list)

15. Product Overview

Application & Network		
2010020	**C1CPU-4S-00** for C application	Cell controller, programmable, CPU 68332/25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 2 CAN interfaces Min-D (wide/local CAN), 1 E-bus and 1 E-bus CAN interface, 1 x RS 232 (for programming or application), 4 diff. In ± 7V (RS 422) for 2 encoders 500 kHz stepping frequency in 4x counting, dig. I/O optodecoupled against 24V, 4 rapid outputs 5...24V/max. 25mA/max. 150kHz, open collector, short-circuit proof, connection with 3 x 9-pin plugs (not supplied), CPC++ runtime, real time operating system CAN/CANopen software.
2010030	**C1CPU-4S-00-1131** for CP1131	as C1CPU-4S-00, with additional: CP1131 runtime system
2010021	**C1CPU-4S-01** for C application	as C1CPU-4S-00, with additional: 2 x RS 232C and 2 x RS 485
2010031	**C1CPU-4S-01-1131** for CP1131	as C1CPU-4S-00, with additional: 2 x RS 232C and 2 x RS 485 and CP1131 runtime system
2010022	**C1CPU-4S-02** for C application	as C1CPU-4S-00, with additional: 2 x RS 232C and 2 x RS 422
2010032	**C1CPU-4S-02-1131** for CP1131	as C1CPU-4S-00, with additional: 2 x RS 232C and 2 x RS 422 and CP1131 runtime system
2010023	**C1CPU-4S-03** for C application	as C1CPU-4S-00, with additional: 4 x RS 422
2010033	**C1CPU-4S-03-1131** for CP1131	as C1CPU-4S-00, with additional: 4 x RS 422 and CP1131 runtime system
2010024	**C1CPU-4S-04** for C application	as C1CPU-4S-00, with additional: 1 x RS 485, 1 x RS 232C and 2 x RS 422
2010034	**C1CPU-4S-04-1131** for CP1131	as C1CPU-4S-00, with additional: 1 x RS 485, 1 x RS 232C, 2 x RS 422 and CP1131 runtime system
2010025	**C1CPU-4S-05** for C application	as C1CPU-4S-00, with additional: 2 x RS 485, 2 x RS 422
2010035	**C1CPU-4S-05-1131** for CP1131	as C1CPU-4S-00, with additional: 2 x RS 485, 2 x RS 422 and CP1131 runtime system
2010026	**C1CPU-4S-06** for C application	as C1CPU-4S-00, with additional: 1 x RS 485, 1 x RS 422
2010036	**C1CPU-4S-06-1131** for CP1131	as C1CPU-4S-00, with additional: 1 x RS 485, 1 x RS 422 and CP1131 runtime system
2010027	**C1CPU-4S-07** for C application	as C1CPU-4S-00, with additional: 4 x RS 232
2010037	**C1CPU-4S-07-1131** for CP1131	as C1CPU-4S-00, with additional: 4 x RS 232, and CP1131 runtime system
2021020	**C2CPU-2S-00-8/8** for C application	Cell controller, programmable, CPU 68332/25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 1 Min-D CAN interface (wide CAN), 1 E-bus and 1 E-bus CAN interface in addition to Min-D, 1 x RS 232 (for programming or application), 8 x dig. IN 24V, 8 x dig. IN/OUT bidirectional 24V/0.5A, IN/OUT high side switching, connection with 3 x 18-pin plugs (not supplied), DI/DO optodecoupled, 2 power supply groups, status LED per I/O channel, 2 rapid up/down counters or 1 incremental encoder, 2 PWM outputs or 1 pulse/directional output, CPC++ runtime, real time operating system, CAN/CANopen software.

2021030	**C2CPU-2S-00-8/8-1131** for CP1131	as C2CPU-2S-00-8/8, with additional: CP1131 runtime system.
2021021	**C2CPU-2S-01-8/8** for C application	as C2CPU-2S-00-8/8, with additional: 1 x RS 232C and 1 x RS 485.
2021031	**C2CPU-2S-01-8/8-1131** for CP1131	as C2CPU-2S-00-8/8, with additional: 1 x RS 232C and 1 x RS 485 and CP1131 runtime system.
2021022	**C2CPU-2S-02-8/8** for C application	as C2CPU-2S-00-8/8, with additional: 1 x RS 232C and 1 x RS 422.
2021032	**C2CPU-2S-02-8/8-1131** for CP1131	as C2CPU-2S-00-8/8, with additional: 1 x RS 232C and 1 x RS 422 and CP1131 runtime system.
2021023	**C2CPU-2S-03-8/8** for C application	as C2CPU-2S-00-8/8, with additional: 2 x RS 232C.
2021033	**C2CPU-2S-03-8/8-1131** for CP1131	as C2CPU-2S-00-8/8, with additional: 2 x RS 232C and CP1131 runtime system.
2022112	**C3CPU-00-1131** for CP1131	CPU 68332, 1 MB SRAM, 3 MB flash for archive memory, real time clock, 1 CAN bus on terminal strip, 1 RS 232 modem connection, 1 RS 232, 1 RS 485, 8 x dig. IN 24V, 8 x dig. IN/OUT bidirectional 24V/0.08A, Inputs may also be used as frequency inputs 8 analog IN 0..10mA, convertible to 0..20mA in 2nd group, 12 bit resolution, connection with 4 x 18-pin and 2 x 10-pin plugs (not supplied), programming to IEC 61131-3; delivery period available on request.
2022212	**C3CPU-01-1131** for CP1131	as C3CPU-00-1131, but 3 MB flash replaced by: 5 MB flash; delivery period available on request
2022232	**C3CPU-02-1131** for CP1131	as C3CPU-00-1131, but 3 MB flash replaced by: 5 MB flash and 8 analog OUT ±10V, 11 bit + sign, 4 of 8 analog OUT can be individually converted to 0..20mA; delivery period available on request.
2011020	**CDIO 16/16-0,5** for C application	Cell controller, programmable, CPU 68332/25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 1 Min-D CAN interface, 1 E-bus and 1 E-bus CAN interface, 1 x RS 232 (for programming or application), 16 x dig. IN 24V, 16 x dig. IN/OUT bidirectional 24V/0.5A, IN/OUT high side switching, connection with 6 x 18-pin plugs (not supplied), DI/DO optodecoupled, 6 power supply assemblies, status LED per I/O channel, CPC++ runtime, real time operating system, CAN/CANopen software.
2011030	**CDIO 16/16-0,5-1131** for CP1131	as CDIO 16/16-0,5, with additional: CP1131 runtime system
2011021	**CDIO 16/16-0,5N** for C application	Cell controller, programmable, CPU 68332/25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 1 Min-D CAN interface, 1 E-bus and 1 E-bus CAN interface, 1 x RS 232 (for programming or application), 16 x dig. IN 24V, 16 x dig. IN/OUT bidirectional 24V/0.5A, IN/OUT low side switching, connection with 6 x 18-pin plugs (not supplied), DI/DO optodecoupled, 6 power supply groups, status LED per I/O channel, CPC++ runtime, real time operating system, CAN/CANopen software.
2011031	**CDIO 16/16-0,5N-1131** for CP1131	as CDIO 16/16-0,5N, with additional: CP1131 runtime system
2012020	**CEDIO 16/16-0,5** with RJ45 connection for C application	Cell controller, programmable, CPU 68360/33 MHz, 2 MB CMOS RAM, 2 MB flash memory, 1 RJ45 Ethernet interface, 1 Min-D CAN interface, 1 E-bus and 1 E-bus CAN interface, 1 x RS 232 (for programming or application), 16 x dig. IN 24V, 16 x dig. IN/OUT bidirectional 24V/0.5A, IN/OUT high side switching, connection with 6 x 18-pin plugs (not supplied), DI/DO optodecoupled, 6 power supply groups, status LED per I/O channel, CPC++ runtime, real time operating system, CAN/CANopen software.

2012030	**CEDIO 16/16-0,5-1131** with RJ45 connection for CP1131	as CEDIO 16/16-0,5 with additional: CP1131 runtime system
2012022	**CEDIO 16/16-0,5B** with BNC connector for C application	as CEDIO 16/16-0,5 with: BNC connector instead of RJ45
2012032	**CEDIO 16/16-0,5B-1131** with BNC connector for C application	as CEDIO 16/16-0,5 with additional: BNC connector instead of RJ45 and CP1131 runtime system
2012031	**CEDIO 16/16-0,5N-1131** with RJ45 connection for CP1131	as CEDIO 16/16-0,5 with additional: CP1131 runtime system, all IN/OUT low side switching
2031001	**CE3CPU** for C application	Cell Controller, programmable, CPU 68360 / 33 MHz, 2 MB CMOS RAM, 2 MB flash memory, 1 Ethernet interface RJ45, 1 Min-D CAN interface, 1 x RS232 (for programming or for application), connection with 1 x 2-pin plug (not supplied), CPC++ runtime, real time operating system, CAN/CANopen software.
2031000	**CE3CPU-1131** with RJ45 connection for CP1131	as CE3CPU with additional: CP1131 runtime system
13483	**QCAN**	E-bus/CAN adaptor, converts E-bus CAN of a CPU module to Min-D.
CANtrol® // *power track*		
2029031	**C2CPU-2S-01-8/8-SC-1131** for CP1131/sliding contact	Cell Controller, programmable in IEC 61131-3, CPU 68332 / 25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 1 CAN interface 5-pin. connection for sliding contact, 1 Min-D CAN interface (wide-CAN), 1 E-Bus, 1 x RS232, 1 x RS232 (for programming or application), 8 x dig. IN 24V, 8 x dig. IN/OUT bidirektional 24V/0.5A, IN/OUT high side switching, DI/DO optodecoupled, 2 power supply groups, status LED per I/O channel, 2 rapid up/down counters or 1 incremental encoder 2 PWM outputs or 1 pulse/directional output, connection with 3 x 18-pin and 1 x 5-pin plugs (not supplied), CAN / CANopen software and CP1131 runtime system.
2029033	**C2CPU-2S-03-8/8-SC-1131** for CP1131/sliding contact	as C2CPU-2S-01-8/8-SC-1131, but instead of 1x RS232 and 1x RS485 with: 2x RS232C
2027030	**CDIO 16/16-0,5-SC-1131** for CP1131/sliding contact	Cell Controller, programmable in IEC 61131-3, CPU 68332 / 25 MHz, 1.25 MB CMOS RAM, 2 MB flash memory, 1 CAN interface 5-pin connection for sliding contact, 1 Min-D CAN interface, 1 E-Bus, 1 x RS232 (for programming or for application), 16 x dig. IN 24V, 16 x dig. IN/OUT bidirectional 24V / 0.5A, IN/OUT high side switching, DI/DO optodecoupled, 6 power supply groups, status LED per I/O channel, connection with 6x18-pin and 1x5 pin plugs (not supplied) CAN / CANopen software and CP1131 runtime system
D i s t r i b u t e d I / O		
13352	**QAIO 16/4-V**	Local extension module with E-bus interface, 16 analog IN ±10V differential, 12 bit, 4 AO ±10V floating, 12 bit (with Floating Sense connection to equalize ground potential), reference voltage source +10V/5mA for sensor supply, all I/O optodecoupled together against E-bus, 4-pin signal connection with 5 x 18-pin plugs (not supplied).
13740	**QAIO 16/4-A**	as QAIO 16/4-V, but instead of 16 analog IN ±10V with: 16 analog IN, 0...20mA.
213351	**QDIO 16/16-0,5**	Local extension module with E-bus interface, 16 x DI 24V, 16 x DI/DO bidirectional 24V/0.5A high side switching, all DI/DO optodecoupled, 6 power supply groups, status LED per channel, 3-pin connection with 6 x 18-pin plugs (not supplied).

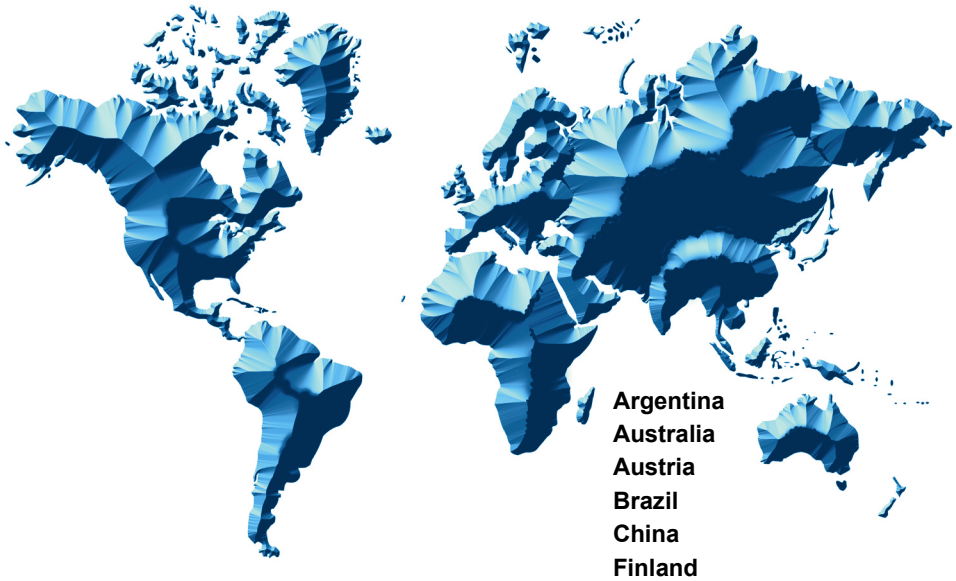
13520	**QDIO 16/16-0,5N**	Local extension module with E-bus interface, 16 x DI 24V, 16 x DI/DO bidirectional 24V/0.5A low side switching, all DI/DO optodecoupled, 6 power supply groups, status LED per channel, 3-pin connection with 6 x 18-pin plugs (not supplied).
2020020	**RDIO 16/16-0,5**	Remote I/O module, parameterizable with CANopen profile DS401, 1 Min-D CAN interface, 1 x RS 232 (for configuration), 16 x dig. IN 24V, 16 x dig. IN/OUT bidirectional 24V/0.5A, IN/OUT high side switching, connection with 6 x 18-pin plugs (not supplied), DI/DO optodecoupled, 6 power supply groups, status LED per I/O channel.
2030000	**RDIO 8/24-0,5**	Remote I/O module, parameterizable with CANopen profile DS401, 1 Min-D CAN interface, 1 x RS 232 (for configuration), 8 x dig. IN 24V, 24 x dig. OUT 24V / 0.5A, 1 potential free input, I/O‘s optodecoupled, PWM modus for outputs adjustable, 3 power supply groups, status LED per I/O channel, connection with 4 x 18-pin and 1 x 8-pin plugs (not supplied), delivery period available on request.
Motion Control		
13745	**RDC1-EC**	Intelligent servo-controller, CANopen profile 1 Min-D CAN interface, 1 x RS 232, interface for 1 brushless DC synchronous motor, Hall/encoder commutation, continuous output per module max. 300W, max. 75VDC, 6 x DI 24V, 2 x DO 24V/0.5A, 3 x AI + 10 V, motor connection and I/O connection with 4 x 10-pin plugs (not supplied), speed control and positioning control, point-to-point commands, interpolating path/time profiles,.. control optimization with CPRDC software (not supplied).
13746	**RDC1-EC-R**	as RDC1-EC, but instead of Hall/encoder commutation with: resolver commutation
2013001	**RDC1-EC-R-150**	as RDC1-EC, but instead of Hall/encoder commutation, 75V DC, with: resolver commutation, max. 150VDC, delivery period available on request.
13353	**RDC2**	Intelligent 2x servo controller, CANopen profile 1 Min-D CAN interface, 1 x RS 232 interface for max. 2 DC motors with brushgear, max. 2 x 300W, max. 75VDC, 6 x DI 24V, 2 x DO 24V/0.5A, 3 x AI + 10 V, motor connection and I/O con- nection with 4 x 10-pin plugs (not supplied), speed control and positioning control, point-to-point commands, interpolating path/time profile, ... control optimization with CPRDC software (not supplied).
2016000	**RDC Mounting set**	2 cooling and mounting plates with fixing accessories and thermo lubricant. The RDC modules may be operated with an increased load. Not suitable for RDC2-S.
2023001	**RDC2-S**	2x motor controller, CANopen profile 1 Min-D CAN interface, 1 x RS 232 interface for max. 2 DC motors with brushgear, max. 10A motor current rating, 5A continuous current rating, 14-30mADC, 6 x DI 24V, 2 x DO, 2 xAI 0-10 V, signal connection with 1 x 10-pin and 2 x 12-pin plugs (not supplied), polarityreversal relay controls anti- clockwise/clockwise rotation and stop; ramps, currents, etc. are pro- grammed using CPRDC-S software; delivery period available on request.
Temperature Control		
13354	**RTEMP 8**	Intelligent 8x multi-temperature controller, CANopen profile, 1 Min-D CAN interface, 1 x RS 232 for parameterization with CPRTEMP software (not supplied), measurement inputs for Pt 100, thermocouple or 0-100mV, 4 DI/DO 24V/70mA bidirectional, 12 DO 24V/70mA, 3 interrupt outputs, all DI/DO optodecoupled, signal connection with 4 x 18-pin and 1 x 8-pin plug (not supplied), self-optimization, multi-zone control, measuring-circuit check and heating current monitoring....
2014001	**RTEMP 8/16**	as RTEMP8, with additional: 8 further software controllers for controller cascading.

13833	**RTI 16**	Intelligent 16x multi-temperature controller, and/or remote analog module, CANopen profile, 1 Min-D CAN interface, 1 x RS 232 for parameterization with CPRTEMP software, measuring-circuits for Pt 100, thermocouple, +/- 10V, 0..20mA, 4-pin signal connection with 5 x 18-pin and 1 x 8-pin plug (not supplied), self-optimization, multi-zone control, measuring-circuit monitoring and heating current monitoring, ...
Human Interface		
13697	**RDISP8 / 240x64**	LCD graphics terminal, supertwist LCD 240x64 dots, LED backlit 8 x 40, 4 x 20, 2 x 10 character scalable 8 function keys, status LEDs, 224KB flash for text, display and PLC-function, 96KB system memory, interfaces: CANbus, RS-232/TTY, dimensions 187 x 120 x 56 mm, degree of protection IP65 on face-side, interactive mode set up using PC-based programming tool CPRDISP (not supplied).
13698	**RDISP22 / 240x64**	as RDISP8 / 240 x 64, with additional: numerical block, dimensions 187 x 120 x 56 mm.
2202000	**RDISP22/240x64 RTC**	as RDISP8 / 240 x 64, with additional: numerical block, real time clock, dimensions 187 x 120 x 56 mm.
2206000	**RDISP27 / 240x128 RTC**	LCD graphics terminal, supertwist LCD 240x128 dots, LED backlit 16 x 40, 8 x 20, 4 x 10 character scalable 8 function keys, status LEDs, numerical block, real time clock, 224KB flash for text, display and PLC-function, 96KB system memory, interfaces: CANbus, RS-232/TTY, dimensions 252 x 130 x 56 mm, degree of protection IP65 on face-side, interactive mode set up using PC-based programming tool CPRDISP (not supplied).
Developer's Frame		
2900000 2900010	**CP1131 Demo / ger** **CP1131 Demo / engl**	Development environment for programming and de-bugging IEC 61131-3 projects. Covers the 5 programming languages SFC, LD, IL, ST, FBD. Contact from CP1131 to the runtime system on the CPU modules can be established via 3 different interfaces (CAN, Ethernet, RS 232). Runs in WIN 95/98 / WIN NT 4.0. Demo version.
2900002 2900012	**CP1131 / ger** **CP1131 / engl**	Development environment for programming and de-bugging IEC 61131-3 projects. Covers the 5 programming languages SFC, LD, IL, ST, FBD. Contact from CP1131 to the runtime system on the CPU modules can be established via 3 different interfaces (CAN, Ethernet, RS 232). Runs in WIN 95/98 / WIN NT 4.0.
2911002	**CPC++**	C++ cross compiler package with ANSI-C compiler and C++, class library, assembler, linking loader and librarian for the 68xxx microprocessor family. Licence type: single user; MS-DOS; medium: diskette prepared for integration in MS Visual C++ V 5.0 environment, (not supplied).
13802	**BDM cable**	Service adaptor from PC parallel port to CANtrol BDM port.
Basic software and hardware for the Lauterbach Debugger		
13782	**LA-7701**	Debug module
13783	**LA-7710**	BDM C source code debugger for 68K
Hardware for Lauterbach ISA interface		
13779	**LA-7800**	PODBUS interface CARD for ISA
13781	**LA-7804**	Interface cable for PODBUS, 1.5m
Hardware for Lauterbach printer port interface		
13780	**LA-7801**	PODBUS interface printer port; precondition: EPP port
Hardware and software for Lauterbach Ethernet interface		
13847	**LA-7811**	PODBUS Ethernet controller 64 MB
13848	**LA-8602**	Ethernet driver package for LA-7810

Configuration		
13689	**CNWI**	CANtrol® Node Wizard, configuration software for individual CANtrol® modules, parameterization, software download, ..., Runs in WIN 95/98 / WIN NT. Comprises a company licence. Full and/or batch licences for resale available on request.
13700	**CPRDC / engl**	Engineering tool for CANtrol® RDC-xx axis controller (not for RDC2-S) via CAN or RS 232, for setting or optimization of control and communication parameters. Runs in WIN 95/98 / WIN NT.
2902101	**CPRDC-S / ger**	PC tool for RDC2-S axis controller, based on IEC 61131; the motor parameters may be handled via RS 232. Runs in WIN95/98/WIN NT; delivery period available on request.
13699	**CPRDISP / ger / engl**	Engineering tool for CANtrol® RDISP operator displays, for drawing up texts, images and variables, with installation dongle.
2906011	**CPRDISP-D / ger**	Engineering tool for CANtrol® RDISP operator displays, for drawing up texts, images and variables, with installation dongle, incl. ladder diagram programming.
2907031	**CPRTEMP**	Engineering tool for CANtrol® RTEMP8, RTEMP8/16, RTI16 temperature controllers for setting control and communication parameters, optimization and setting tool, Runs in WIN 95/98 / WIN NT
13694	**PC adaptor**	PC adaptor to connect CPRTEMP and RTEMP8, RTEMP8/16, RTI16.
298	**RDISP adaptor**	Adaptor for serial interfaces, link RDISP - CPRDISP
Software		
13803	**3964R-1131**	IEC 61131 function library for computer link with procedure 3964R, for use on CDIO 16/16-0,5-1131, CEDIO 16/16-0,5-1131, C2CPU-2S-xx-8/8-1131 and C1CPU-4S-xx-1131, company licence.
13804	**3964R-CCPU**	C' function library for computer link with procedure 3964R, for use with CDIO 16/16-0,5, C2CPU-2S-xx-8/8 and C1CPU-4S-xx-, company licence.
13805	**3964R-CECPU**	C' function library for computer link with procedure 3964R, for use with CEDIO 16/16-0,5, company licence.
13693	**CPC++ Runtime CCPU**	CANtrol® runtime system for C environment includes VRTXsa, I/O handler, CAL, CANopen.
13687	**CPC++ Runtime CECPU**	CANtrol® runtime system for C-environment includes VRTXsa, I/O-handler, CAL, CANopen.
13845	**Win CAL**	CAL-DLL for PC connection via CEDIO 16/16-0,5 Ethernet for Win95, WinNT - company licence.
Fittings		
Cables + matching resistors		
4711	**CANtrol cable 0.75m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling
13721	**CANtrol cable 1.5m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling
13722	**CANtrol cable 3m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling
13723	**CANtrol cable 5m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling
13724	**CANtrol cable 10m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling; delivery period available on request.
13725	**CANtrol cable 20m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling; delivery period available on request.
13726	**CANtrol cable 40m**	CAN bus cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends for CANtrol® network cabling; delivery period available on request.
13727	**RS 232 cable 0.75m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends

13728	**RS 232 cable 1.5m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends
13729	**RS 232 cable 3m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends
13730	**RS 232 cable 5m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends
13731	**RS 232 cable 10m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends; delivery period available on request.
13732	**RS 232 cable 20m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends; delivery period available on request.
13733	**RS 232 cable 40m**	RS 232 cable, flexible 0.22mm² shielded with Min-D connection (9-pin) at both ends; delivery period available on request.
2016011	**Y-cable RS232/CAN-Debug 3m**	Cable for the X9 Min-D plug (socket) of power track standard cell controller. It consists of 3 plugs afiliated with each other. One 9-pin Min-D plug (pins) for the connection to the cell controller, one 9-pin Min-D plug (socket) with RS232 assignment for the programming and configuration tools as well as a 9-pin Min-D plug (pins) for the sliding contact CAN bus, providing an opportunity to listen on CAN high speed level.
13558	**CTR**	9-pin Min-D plug casing (socket) with integral matching resistor (120 Ohm) for the termination of a CAN cable.
13559	**CTR/GND**	9-pin Min-D plug casing (pins) with integral matching resistor (120 Ohm) and equipotential connection (CAN_GND -> SL/PE) for the termination of a CAN cable.
2016012	**CTR-SC-T2**	RC-circuit with connecting cable for termination of sliding contact based CAN-Bus.
Plugs		
14158	**FKC 2,5/2-ST-5,08**	2-pin plug with spring-latch terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13799	**FKC 2,5/8-ST-5,08**	9-pin plug with spring-latch terminal, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13800	**FKC 2,5/9-ST-5,08**	9-pin plug with spring-latch terminal, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13801	**FKC 2,5/10-ST-5,08**	10-pin plug with spring-latch terminal, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13363	**FKC 2,5/18-ST-5,08**	18-pin plug with spring-latch terminal, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
2841	**FRONT-MSTB 2,5/2-ST-5,08**	2-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13466	**FRONT-MSTB 2,5/8-ST-5,08**	8-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13026	**FRONT-MSTB 2,5/9-ST-5,08**	9-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13562	**FRONT-MSTB 2,5/10-ST-5,08**	10-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13027	**FRONT-MSTB 2,5/18-ST-5,08**	18-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
6496	**MSTB 2,5/8-ST-5,08**	8-pin plug with screw terminal at side, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13440	**MSTB 2,5/9-ST-5,08**	9-pin plug with screw terminal at side, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
3579	**MSTB 2,5/10-ST-5,08**	10-pin plug with screw terminal at side, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
13360	**MSTB 2,5/18-ST-5,08**	18-pin plug with screw terminal at side, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)

12660	**MSTBC 2,5/8-ST-5,08**	8-pin plug for crimp connection (grid 5,08)
13560	**MSTBC 2,5/9-ST-5,08**	9-pin plug for crimp connection (grid 5,08)
13561	**MSTBC 2,5/10-ST-5,08**	10-pin plug for crimp connection (grid 5,08)
13362	**MSTBC 2,5/18-ST-5,08**	18-pin plug for crimp connection (grid 5,08)
13364	**MSTBC-MT 0,5-1,0**	Crimp contacts, loose (100 pieces) cross-sectional area of connecting cable 0,5 to 1.0mm²
13365	**MSTBC-MT 0,5-1,0 BA**	Crimp contacts, strip (4000 pieces) cross-sectional area of connecting cable 0.5 to 1.0mm²
13366	**MSTBC-MT 1,5-2,5**	Crimp contacts, loose (100 pieces) cross-sectional area of connecting cable 1.5 to 2.5mm²
6054	**MVSTBR 2,5/2-ST-5,08**	2-pin plug with screw terminal at side, cross-sectional area of connecting cable up to 2.5mm² (grid 5,08)
14050	**MCVR 1,5/5-ST-3,5**	5-pin plug with screw terminal at top, cross-sectional area of connecting cable up to 1,5 mm² (grid 3,5)
13367	**MSTBC-MT 1,5 BA**	Crimp contacts, strip (4000 pieces) cross-sectional area of connecting cable 1.5 to 2.5mm²
13830	**Coding tab**	Coding tabs for terminals
13831	**Label**	Labelling strips for terminals No. 1-108
C A N t r o l D o c u m e n t a t i o n		
2801211 2801221	**Introduction CANtrol /ger** **Introduction CANtrol /engl**	Introduction to CANtrol automation system, includes description of cell-controller CDIO 16/16-0,5, expansion module QDIO 16/16-0,5 and CAN adaptor QCAN
Application & Network		
2801411 2801421	**C1CPU-4S.. / ger** **C1CPU-4S.. / engl**	manual for the cell-controller C1CPU-4S..
2803811	**CE3CPU / ger**	manual for the CAN/Ethernet Gateway
2800711 2800721	**CEDIO 16/16-0,5 / ger** **CEDIO 16/16-0,5 / engl**	manual for the cell-controller CEDIO16/16-0,5
Distributed I/O		
2801711 2801721	**QAIO 16/4-V / -A / ger** **QAIO 16/4-V / -A / engl**	manual for the analog expansion modules
2800811 2800821	**RDIO 16/16-0,5 / ger** **RDIO 16/16-0,5 / engl**	manual for the remote I/O module RDIO16/16-0,5
Temperature Control		
2802121	**RTEMP 8 / engl**	manual for the multi-temperature controller RTEMP 8
2801611 2801621	**RTEMP 8/16 / ger** **RTEMP 8/16 / engl**	manual for the multi-temperature controller RTEMP 8/16
Developer's Frame		
2801011 2801021	**Introduction CP1131 /ger** **Introduction CP1131 /engl**	Introduction to development enviroment CP1131
2800611 2800621	**CP1131 / ger** **CP1131 / engl**	manual for the development enviroment CP1131
2801811 2801821	**FB CP1131 /ger** **FB CP1131 /engl**	manual for the CP1131 function blocks



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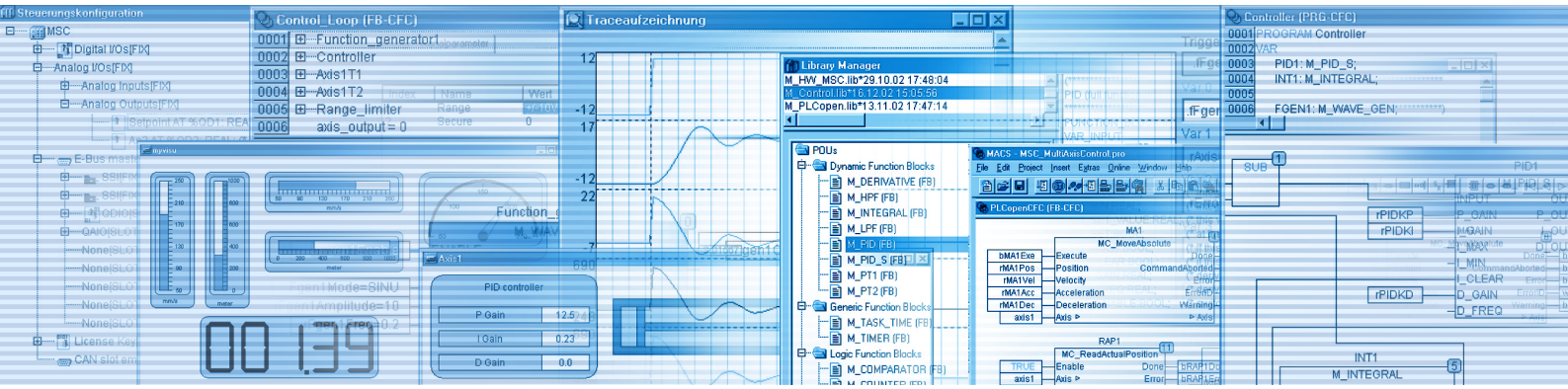

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