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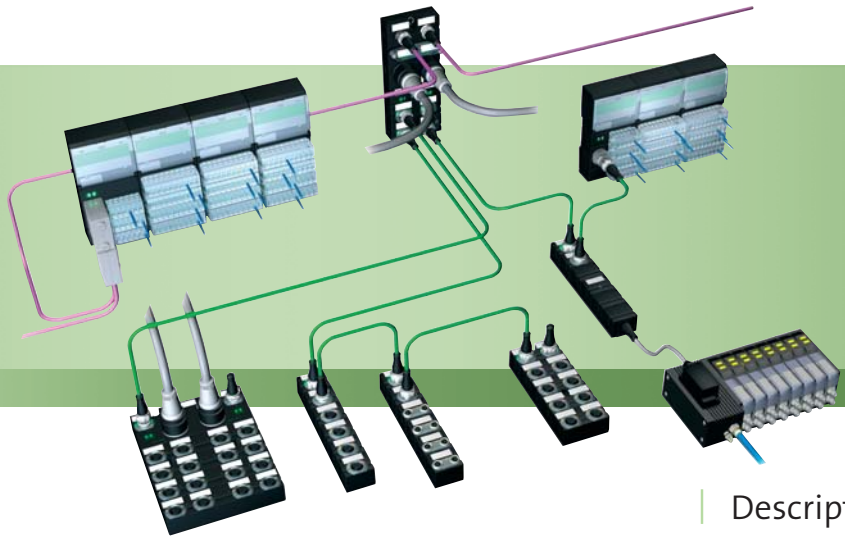
Manual
Cube67+ System



- Description of Cube67+ System
- Installation
- Configuration Notes

Publisher's Note

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Service and Support

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In addition, our Customer Service Center (CSC) will be glad to assist you:

Our Customer Service Center can support you throughout your project in the planning and conception of customer applications, configuration, installation, and startup. We also offer competent consulting or - in more complex cases - we even provide direct onsite support.

The Customer Service Center provides support tools. It performs measurements for fieldbus systems, such as PROFIBUS DP, DeviceNet, CANopen, and AS interface, as well as energy, heat, and EMC measurements.

Our coworkers at the Customer Service Center provide their competence, know-how, and years of experience. They are knowledgeable about hardware and software, and compatibility with products made by various manufacturers.

You can contact the Customer Service Center at

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About the User Manual and its Structure

Bus Manual:

General explanations and functions for each bus.

On this subject, please click on the links to the next page.

System Manuals:

Describe the system in general and give an overview about the products, accessories and documentation.

Art. No.	Designation
56030	Cube 20 System
56970	Cube 67 System
56974	Cube 67+ System

www.murrelektronik.com

Bus Node Manuals:

Describe product-specific features and settings to the Bus Node and to the modules which are connected to it.

Art. No.	Designation
56521	Cube67+ BN-PROFIBUS
56526	Cube67+ BN-PNIO
56980	Cube67 BN-PROFIBUS
56981	Cube67 BN-DeviceNet
56982	Cube67 BN-CANopen
56983	Cube67 BN-Ethernet / IP
56984	Cube67 BN-DeviceNet V2

Technical Data Manual:

Contains of product-specific overviews to installation and exact technical data, values.

Art. No.	Designation
56971	Technical Data of devices of range Cube67 and Cube67+

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Instruction to Safetycategory 3:

Art. No.	Designation
56972	Instruction to Safetycategory 3

www.murrelektronik.com

Here are links to the bus unser manuals:

>>> PROFIBUS (www.profibus.com)

Table of Contents

Important Information

Symbols and Icons

This manual contains information and instructions you must comply with in order to maintain safety and avoid personal injury or damage to property. They are identified as follows:

Notes indicate important information.

Warnings contain information that, if you ignore this information, may cause damage to equipment or other assets or, if you fail to comply with safety precautions, may constitute a danger to the user's health and life.

These instructions are recommendations issued by Murrelektronik.

Intended Purpose

Read this manual carefully before startup of the equipment. Keep it in a location that is accessible to all users at all times.

The products that are described in this manual were developed, manufactured, tested, and documented in compliance with the relevant safety standards. In normal cases, these products do not constitute any danger to persons or objects, provided the handling specifications and safety instructions described in this manual are observed. They meet the following requirements:

- EMC directive (2004/108/EEC)

The products are designed for industrial use. An industrial environment is defined as one in which loads are not connected directly to the public low-voltage power grid. Additional measures must be taken if the products are used in private, business, or trade environments.

The safe, troublefree functioning of the products requires proper transportation, storage, mounting, and installation, and careful operation. Operation of the devices for their intended purposes is only guaranteed when the enclosures are fully mounted. If aggressive media are used, check their material resistance depending on the application.

Current safety and accident prevention laws valid for a specific application must be observed for the configuration, installation, setup, maintenance, and testing of the devices. The power supply must

correspond to SELV or PELV standards. Power sources in accordance with EN 61558-2-6 (transformer) or EN 60950-1 (switched-mode power supply) meet these requirements.

Only use cables that meet the requirements and regulations for safety, electromagnetic compatibility, and, if necessary, telecommunications terminal equipment specifications.

Information on the cables and accessories that are suitable for use with this product are contained in the Appendix to this manual.

Qualified Personnel

Only qualified, trained electricians knowledgeable in the safety standards of automation systems may configure, install, set up, maintain, and test the devices. The requirements concerning qualified personnel are dependent on the requirements profiles described in ZVEI and VDMA. For this reason, electricians must know the contents of the manual "Weiterbildung in der Automatisierung" (Further Training in Automation Systems) published by ZVEI and VDMA published by Maschinenbau-Verlag, Post Box 710864, 60498 Frankfurt, Germany) before installing and maintaining the devices. These are specialists who are capable of assessing the work to be done and the possible dangers on account of their technical training, knowledge, experience, and knowledge of the relevant standards; or who have an identical level of knowledge equivalent to technical training since they have worked in the same area for many years.

Only Murrelektronik technical personnel are allowed to execute work on the hardware and software of our devices, if they are devices not described in this manual.

Unqualified tampering with the hardware or software, or failure to observe the warnings cited in this manual may result in severe personal injury or damage to property.

1. Description of the Cube67+ System

The Cube67+ system is based on Cube67 and features a more comprehensive functional range.

The purpose of the Cube67+ system is to decentrally combine the signals of the I/O level and provide this information via the field bus network (e.g. Profibus). The central unit is the Cube67+ bus node that connects the Cube67+ I/O modules to the fieldbus.

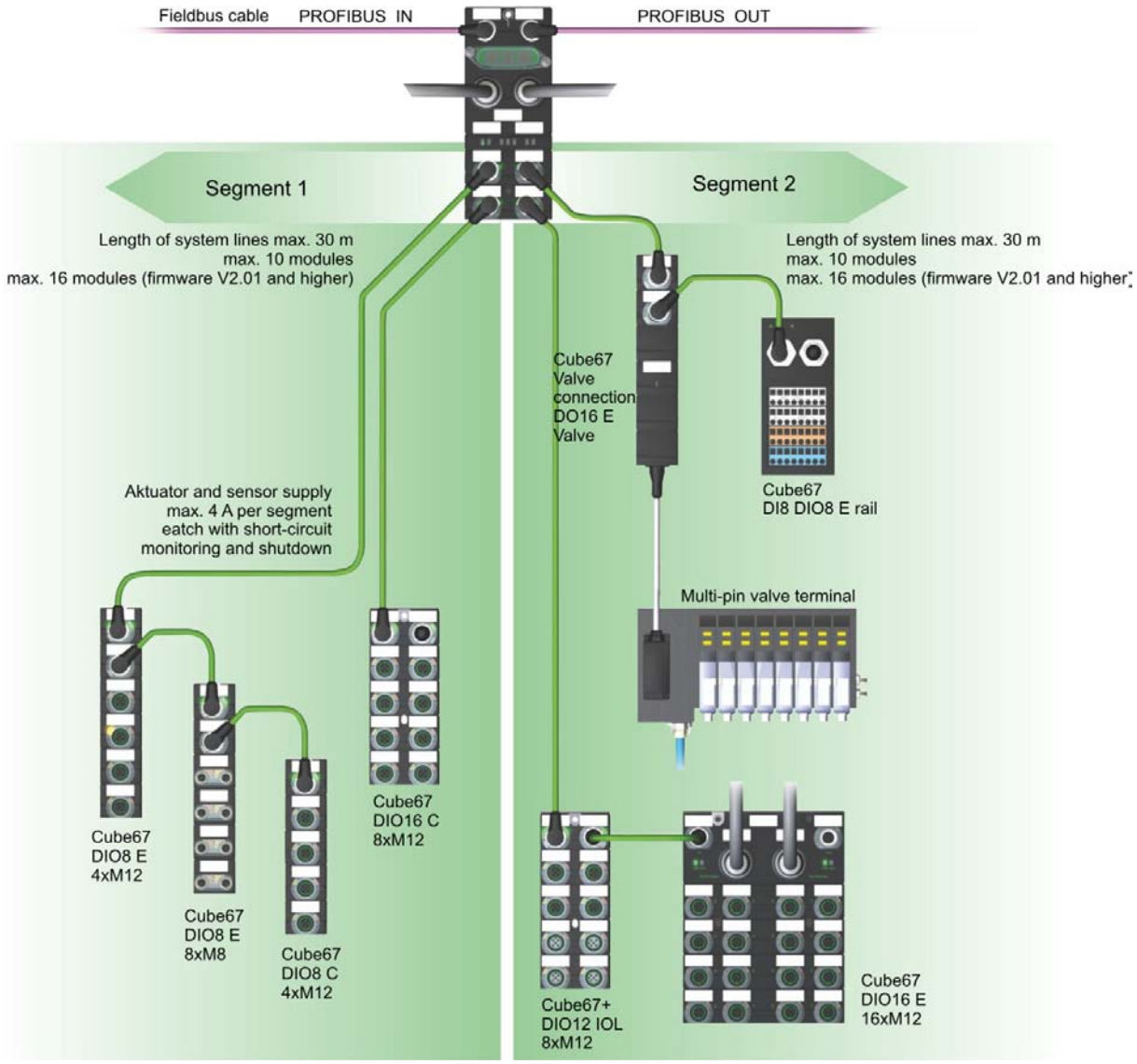

Fig. 1: The Cube67+ System

Cube67+: the plus is for...

- Cube67+ bus nodes can control more modules, thus process more I/O signals.
- It allows to use longer cables.
- New IO link functionality with Cube67+ IOL (IO - link) modules.
- An even better protection by intelligent load monitoring.

The proven benefits of Cube67

- the I/O level is directly implemented in the machine, in the immediate proximity of sensors and actuators, thus eliminating bulky and awkward wiring,
- reduced dimensions ensure a compact and space-saving design of the machine.
- Multifunctional I/Os enable free configuration of the two signals per slot, whether input, diagnostic input or output.
- Comprehensive diagnostics with detailed information on type and location of the fault or error

1.1 Explanation of the bus systems

For the descriptions of the different bus types please refer to the bus manuals.

You will find an overview in the section "Manual Overview and Layout" in this manual.

2. Installation

2.1 Mounting

Please refer to the Technical Data Manual for the mounting rules.

You will find an overview in the section "Manual Overview and Layout" in this manual.

2.2 Connection Diagram

For the exact connection diagram and settings please refer to the corresponding product manuals.

You will find an overview in the section "Manual Overview and Layout" in this manual.

3. Configuration Notes

This chapter contains a short description of the Cube67+ system components and information that is important during the electromechanical planning phase.

3.1 System Components

3.1.1 Product Designation Code

The components of the Cube67+ system are described in two diagrams that help to understand their functions

Example for bus nodes:

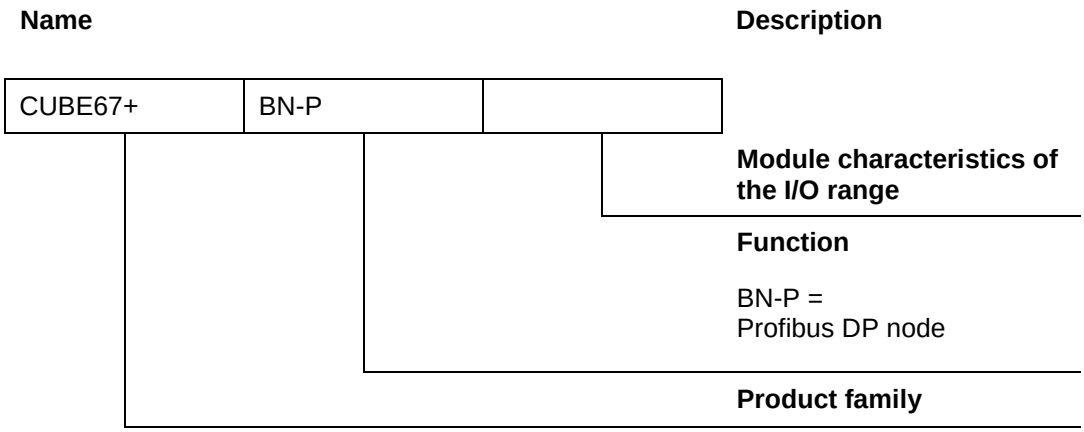

Fig. 2: Example Designation Code

Example for modules:

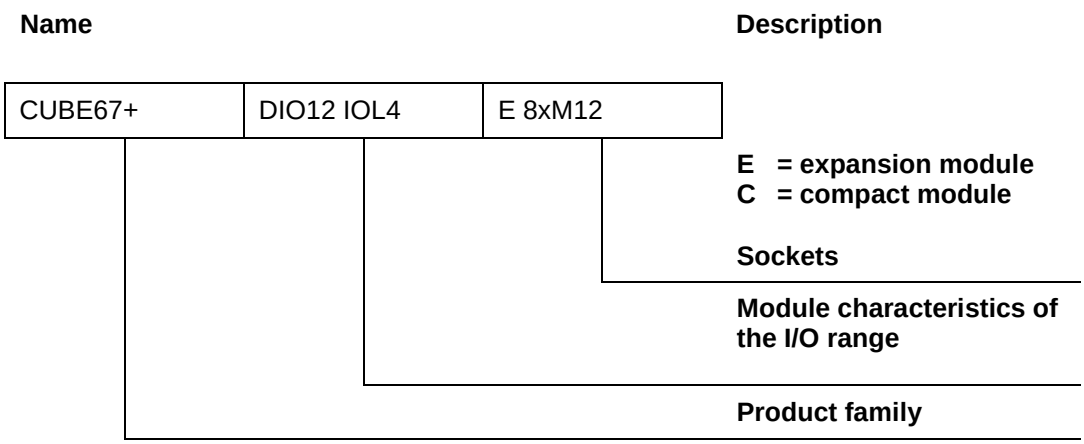

Fig. 3: Example Designation Code

3.1.2 Cube67+ Bus Node

The bus node connects the I/O modules to the fieldbus. It is supplied via a 7/8" power cable and features four connections for the internal system connection. A maximum of 10 I/O modules per segment can be connected. This is a total of up to 20 I/O modules for one bus node. The I/O modules are supplied via the internal system connection.

Article number	Description	
56521	Cube67+ BN-P	

Tab. 1: Cube67+ Bus Node

For the exact connection diagram and settings please refer to the corresponding product manuals.

You will find an overview on the manuals in the section "Manual Overview and Layout" in this manual.

3.1.3 Cube67 modules

All Cube67 modules can be operated at the Cube67+ bus node,

You will find an overview on the different Cube67 modules in the Cube67 System Manual.

You will find an overview on the manuals in the section "Manual Overview and Lay-out" in this manual.

3.1.4 Cube67+modules

The "+" of the Cube67+ stands for the additional functions of these modules.

Cube67+ modules can only be operated on Cube67+ bus nodes.

The Cube67+ expansion modules feature an expansion interface for the internal system connection, i.e. the latter can be routed to the following I/O modules. An expansion module can also be the sole or the last module of a segment. In this case, a terminating resistor must be installed on the expansion interface of the internal system connection (cf. chapter 4.2.6 "Terminal resistance of the internal system connection").

Article number	Description
56 752	Cube67+ DIO12 IOL4 E 8xM12
56 761	Cube67+ DIO4 RS232/485 E 4xM12
56 765	Cube67+ DIO12 IOL4 E 8xM12

Tab. 2: Cube67+ Expansion Modules

3.1.5 Internal system connection – hybrid line

The green system cable is a shielded hybrid cable for the

- communication between bus node and I/O modules.

- Transfer of sensor supply.[1],

- Transfer of actuator supply.

Use only our pre-wired connectors for the internal system connection.

Length	straight - straight	90° – 90°
0,3 m		
0,6 m		
1,0 m … 10,0 m Steps: 0,5 m		

Tab. 3: Internal system connection – hybrid line

Information on hybrid lines is available in our catalog and our online shop at:

onlineshop.murrelektronik.com

[1] The supply voltage of the Cube67 I/O modules is taken from the sensor supply.

3.1.6 7/8“ Power cables Pre-wired

The Cube67+ system is supplied via a 7/8" connector. Sensors and actuators can be supplied from various voltage sources. The ground of both supply voltages is internally connected. The operating voltage of the Cube67+ components is taken from the sensor supply.

Length	straight - straight	90° - 90°
0,3 m		
0,6 m		
1,0 m … 10,0 m Steps: 0,5 m		

Tab. 4: 7/8“ Power cables

Information on hybrid lines is available in our catalog and our online shop at:

onlineshop.murrelektronik.com

3.1.7 Accessories

3.1.7.1 Cube67 T-coupler M12 6 pole

Article number	Description	
7000-46101-0000000	T-coupler M12 6 pole additional actuator power supply	

Tab. 5: Cube67 T-coupler M12 6 pole

3.1.7.2 Blind plugs

Article number	Description	Packaging unit
58627	Blind plugs M12	10 pieces
3858627	Blind plugs M8	10 pieces
7000-13481-0000000	Blind plug diagnostic M12 (bridge PIN 1 to PIN 2)	10 pieces
56951	Blank plug M12	4 pieces
55385	Blind plug 7/8' - plastic	1 piece
55390	Blind plug 7/8' - metall	1 piece

Tab. 6: Accessories Blind plugs

3.1.7.3 Terminating resistors

Article number	Description	
7000-14041-0000000	Terminating resistor M12 Profibus (connector)	
7000-15041-0000000	Terminating resistor M12 for the internal system connection (male)	

Tab. 7: Accessories Terminating resistors

3.1.7.4 Labeling accessories

Article number	Description	Packaging unit
55318	Label plate	20 pieces

Tab. 8: Accessories Labeling accessories

3.1.7.5 Ground strap

Article number	Description	Packaging unit
4000-71001-0410004	Ground strap 4mm² 100mm hole for M4	20 pieces

Tab. 9: Accessories ground strap

3.1.7.6 Types of intelligent current monitoring

- – Fire protection (EN 60950-1)
- – Operating voltage protection (EN 61131-2)
- – Operating state memory device (EN 61131-1)

For installation in the range of IP20.

Article number	Description of the intelligent current monitoring	Nominal operating branch-circuit current (full load)	
9000-41034-0100400	4.4 (4 channels)	4 A each	
9000-41034-0100600	4.6 (4 channels)	6 A each	
9000-41034-0401000	4.10 (4 channels)	10 A each	
9000-41042-0100400	2.4 (2 channels)	4 A each	
9000-41042-0100600	2.6 (2 channels)	6 A each	
9000-41042-0401000	2.10 (2 channels)	10 A each	

Tab. 10: Overview of types of intelligent current monitoring

Information on products and accessories is available in our catalog and our online shop at:

onlineshop.murrelektronik.com

3.2 Internal system connection

Use only our pre-wired connectors for the internal system connection.

ATTENTION:

Inverting Cube67+ I/O modules in a system can result in injury or serious damage to man and/or material.

When comparing planned and actual configuration, the Cube67+ system is basically not able to distinguish between identical or replaceable modules. Therefore it is important, that Cube67+ system cables and Cube67+ I/O modules are clearly labeled.

3.2.1 Topology

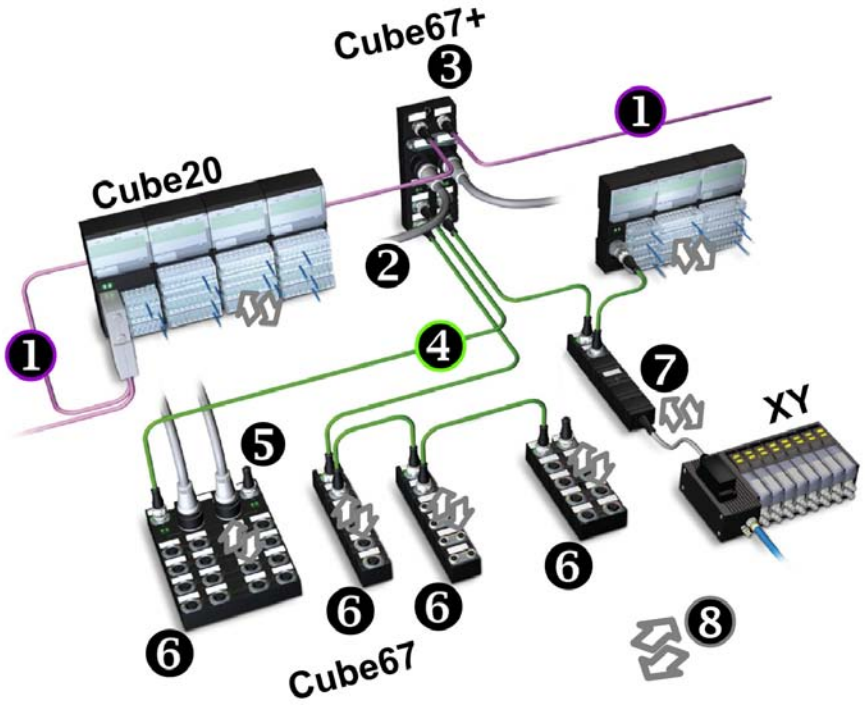

Fig. 4: Topology

❶ **Fieldbus cable**

❷ **7/8" Power cable**

❸ **Bus node**

❹ **Internal system connection (integrated)**

❺ **Terminating resistor of the Internal system connection**

❻ **Expansion module**

❼ **Customer-specific modules**

❽ **input / output**

The bus node has four connections for 2 x 10 I/O modules. It is not necessary to set the addresses of the modules. The modules are actuated automatically in the order of connection. Unused connections are ignored.

3.2.2 Internal System Connection Terminations

A terminal resistance must be installed on each cord of the internal system connection.

Compact modules have an integrated terminal resistance. If the last I/O module in a cord is a compact module, it is not necessary to install a supplementary terminal resistance. If the last I/O module is an expansion module, the expansion interface of the internal system connection must always be fitted with a terminating resistor. Unused connections of the bus node must always be fitted with a terminating resistor. Unused slots of the modules have to be fitted with blind plugs, in order to reach IP67 protection. The following illustration shows by means of a configuration example where the terminating resistors must be installed.

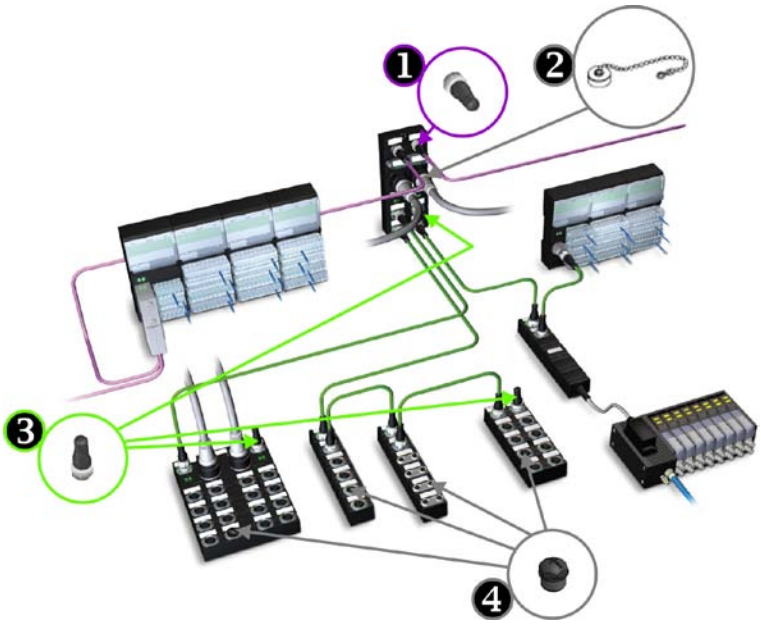

Fig. 5: IP67 plugs

If a slot is not used:

1. Terminating resistor from the fieldbus at the bus node
2. Locking cap of the 7/8" Power cable
3. Terminating Resistor of the Internal system connection
4. Locking cap in the I/O area

For the relevant locking caps see Chapter System Components > Accessories

3.2.3 Segments and lines

The internal system connection is divided in 2 segments and, due to this division, is operable with longer line lengths and a larger number of modules.

Sockets 0 and 2 belong to the left segment of the internal system connection; sockets 1 and 3 belong to the right segment.

If modules are connected to an associated socket x, this is referred to as a connection to line x, whereby x corresponds to the related socket number. For example, Line 0 for Socket 0, Line 1 for Socket 1, etc.

3.2.4 Maximum expansion

The maximum expansion per segment is 30 m. The lengths within the line are freely selectable, however, the sum per segment must not exceed 30 m!

The following illustrations shows an expansion example:

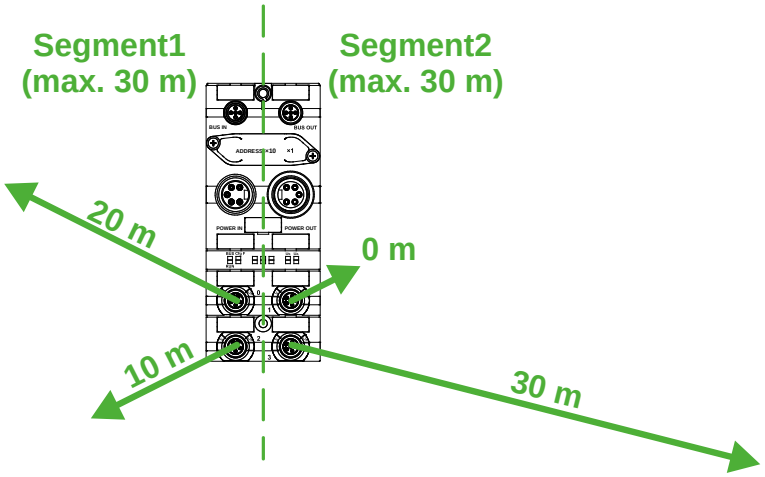

Fig. 6: Maximum expansion

3.2.5 Number of components

Max. 32 expansion modules per Cube67+ bus node are possible (16 per segment). The modules can be connected to the segments in any arrangement, however, not more than 16 modules per segment.

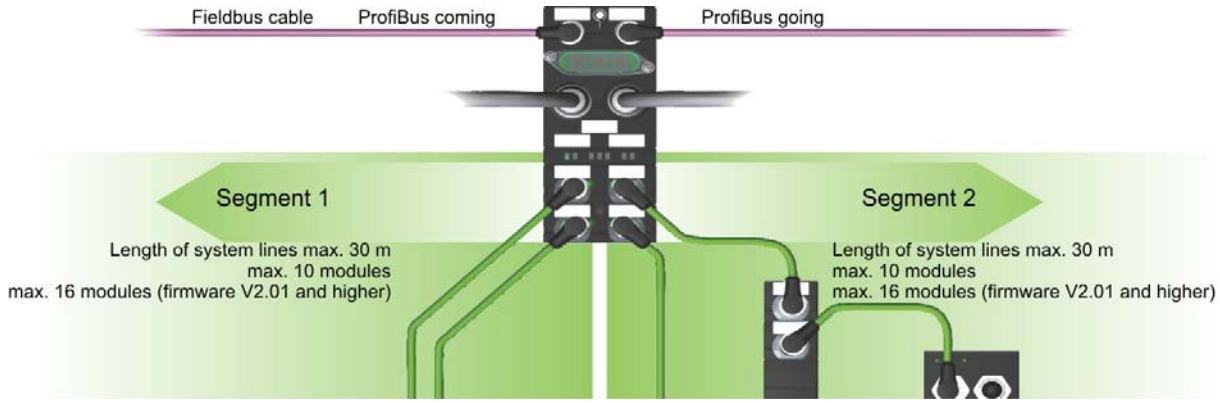

Fig. 7: Internal System Connection Features

Fig. 8: Firmware version

Up to firmware 2.0, 20 modules can be connected, 10 per segment. From firmware V2.1, 32 modules can be connected, 16 per segment. The firmware version is printed on the side of the bus module.

The sockets 0,1,2,3 are used according to their order.

Unused sockets have to be fitted with a terminating resistor!

3.2.6 Load rating

The modules connected to the bus node are supplied with two voltages via the internal system connection.

	Load rating	Supply of the
sensor supply	4 A	Module electronics and sensors
Internal actuator supply	4 A	Actuators

Tab. 11: Supply by the internal system connection

ATTENTION:

Make sure to avoid back discharge of the sensor supply voltage caused by external supply of the Cube67+ system.

Protection

An intelligent current monitoring integrated into the bus node recognizes overload and short circuits. If one of these states is recognized, the voltage at the affected line is shut down. When the failure is resolved, the system is re-started by a Power ON reset.

Overload is activated, when the permissible current is exceeded by over 10%, that is I≥ 4,4 A.

Between 4 A and 4.4 A, an overload diagnostic is generated on the fieldbus, however, the affected voltage is not shut down.

Current on the channel	LED Display	State
0 – 100%		Load current OK.
100 – 110%		Overload - Diagnostic
> 110%		Overload - Diagnostic, voltage at the affected line is shut down.

Tab. 12: Overload or short circuits of the intelligent current monitoring

3.2.7 External supply of the actuator supply

The power distributor Cube67 PD 7/8“ is used for the actuator supply of the compact modules. The power distributor assures an active energy circuit. It is fitted out with a short-circuit detection on outputs. The LED indicators on the M12 sockets display the status of the output voltage.

ATTENTION:

The power distributor must not be used to supply the bus node via the internal system connection. Supply of the green system line is also prohibited.

3.3 Power Supply

3.3.1 Configuration Notes

Bus modules require a direct-voltage power supply of typically 24 VDC (SELV/PELV) which must comply with the regulations of conventional industrial power-utility companies.

In order to optimize interference immunity, we advise you to power sensors, bus, and actuators from different sources. The power supply should be primary switched-mode or regulated power supplies.

The output of the power supply units depends on the number of connected load and their output.

In any case, it must be ensured that the system voltage does not drop below 18 V DC viewed from the system power supplies and measured at the remotest slave. System response becomes unspecific if sensor and bus power supply drop below 18 V DC.

Primary switched-mode power supply units normally permit an increase in output voltage to the amount of the rated voltage in order to compensate for any power losses.

Modules with digital inputs support the direct connection of commercially available sensors. A separate power supply may be necessary for the sensors if the total power required is high due to the number of slaves or a high power draw of the sensors.

The sensor supply may only be provided via the bus node into the Cube67+ system. Back discharge by sensors or by an external supply in order to increase the maximum current is not allowed.

Protecting cables between power supply and bus node:

Cable protection in the form of an intelligent current monitoring or a fuse has to be provided in order to detect damages of the supply cable and to shut down in case of failures.

3.3.2 Recommended power supply units

Primary switched-mode power supply units from Murrelektronik are specially designed to power automation systems. For this reason, we recommend them to power the modules.

Note for DeviceNet users:

We recommend so-called Class 2 power supplies for the supply of the DeviceNet bus.

Please contact our sales support regarding information about "ODVA" certified power supplies.

Phases	Output rating	Input voltage 95...132 V AC	Input voltage 185...265 V AC
1	240 W / 10 A	85086	85085
1	480 W / 20 A	85088	85087

Tab. 13: Recommended power supply units MCS Power+ single phase

Phases	Output rating	Input voltage 3 x 340...460 V AC
3	240 W / 10 A	85095
3	480 W / 20 A	85097
3	960 W / 40 A	85099

Tab. 14: Recommended power supply units MCS Power+ three phase

Murrelektronik offers an extensive range of pimary switched power supply units.

Please refer to our catalogs or: www.murrelektronik.com

3.4 Connecting Sensors and Actuators

3.4.1 Sensor supply

Sensors can be supplied by[2] the I/O module. A re-settable PTC per M12 socket protects the sensor supply. The maximum current draw for the sensor power supply is 200 mA and for I/O - slots 700 mA. Please note the following derating diagram.

3.4.1.1 Derating of the sensor modules normal

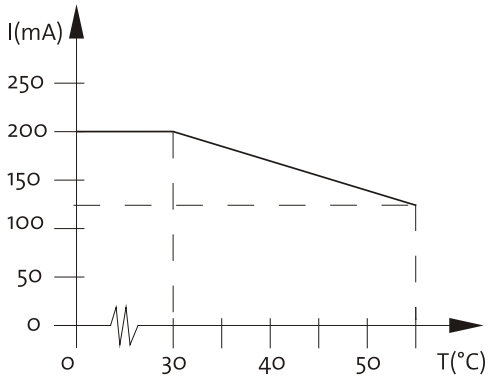

Fig. 9: Derating of the sensor module normal

3.4.1.2 Derating of the I/O link modules

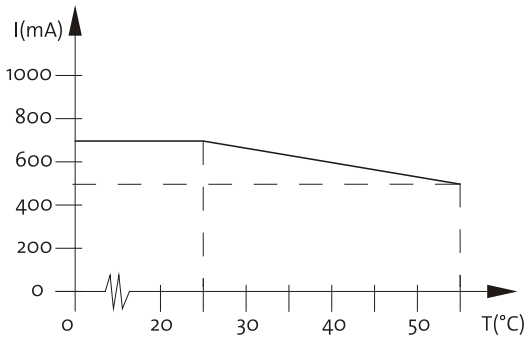

Fig. 10: Derating of the I/O link modules

[2]This does not apply for art. nos. 56 710 / 56 720 / 56 740

D The total current of all sensors and modules that are supplied via the bus node in a Cube67+ installation, has to be smaller than 8 A.

The sensor supply may only be provided via the bus node into the Cube67+ system. Back discharge by sensors or by an external supply in order to increase the maximum current is not allowed.

The capacity per digital input is 10 nF.

The maximum permissible capacity must not exceed 220 µF.

3.4.2 Supply of external components (art. no. 56 710 / 56 720)

For the analog output modules art. no. 56 710 and 56 720, the actuator supply (not switchable) is[3] provided via Pin 1 of the M12 slot. When observing the total current of 4 A for the whole line, the maximum current draw per slot is 1,6 A.

3.4.3 Analog setting modules

Setting modules can be connected to analog output modules Cube67 AO4 C 4xM12 (U)/(I).

The supply of analogue output variables of Cube67 modules Art.- Nr. 56 710 / 56 720 is drawn from the sensor supply. The output value is not dependent on the actuator supply status.

The output value of Cube67 AO4 C 4xM12 (U)/(I) modules is not dependent on the actuator supply status.

[3] For the configuration of the M12 slot for Cube67 AO4 C 4xM12 (U)/(I) see the manual Technical Data art. no. 56 971.

3.4.4 Actuators

For the maximum current drawable from the outputs see the Technical data (User's manual Art.- No. 56 971).

Please observe the max. current-carrying capacity of the power supply on the bus node or other power supplies into the Cube67+ system. With a 7/8“ power connector, the max. total current for the actuator supply is 8 A.

The module may be damaged if the actuator power supply polarity is reversed!

When extending the actuator supply via the internal system connection, care must be taken to ensure that the total current of all modules in the segment does not exceed 4 A.

The total current of all actuators that are supplied via the bus node or a power distributor art. no. 56955 in a Cube67+ installation, has to be smaller than 8 A.

When using modules with an output current of 1.6 A that are supplied via the system cable, we recommend an additional actuator power supply art. no. 7000-46101-0000000.

To increase power, outputs may be connected in parallel.

If an overload or short-circuit occurs at an output, that output is shut down. This output will remain disabled even when the error has been corrected. In order to reset the short-circuit memory, the output must be reset or the actuator supply switched off.

3.4.5 Diagnostic input DESINA

Pin 2 of the M12 slot can be configured as a diagnostic input on all digital modules. If a 0 volt signal is present at a diagnosis input, it will be displayed inverted in the process map. At the same time, a channel-specific diagnostic message will be issued via the channel-related diagnostic.

3.4.5.1 Examples for the application of the DESINA diagnostic function Pin 2

Pin 2 basically behaves like an inverting input when it is parameterized as a diagnostic input.

A special feature is that the assigned LED lights up red when a voltage of 0 V →logical "1" is present. It is therefore possible to indicate faults of external devices at Cube67+. Several suggestions are given in the following.

3.4.5.2 Connection of Sensors/Actuators with Diagnostic Output

Imagine you are using a sensor or an actuator with diagnostic output. You can also evaluate this diagnosis signal, and process and represent it in the controller or visualization unit using a conventional I/O system.

However, you have no visual fault display in the proximity of the defects sensor, which is probably also fitted in a concealed location. Visual indication at the M12 slot of the Cube67+ also facilitates accurate on-site fault localization.

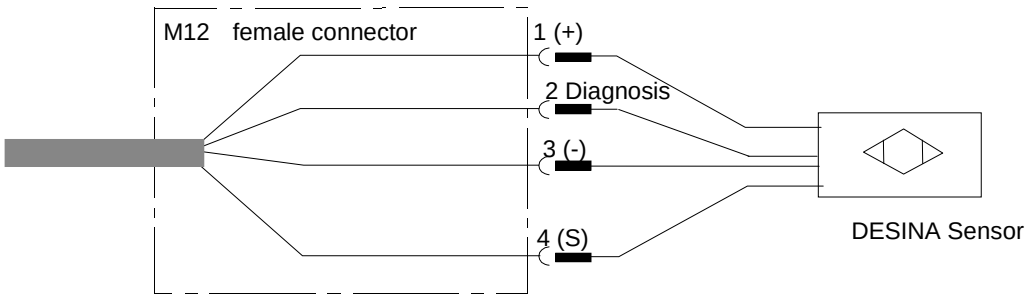

Fig. 11: Connection of Sensors/Actuators with Diagnostic Output

Recognizing:

- Front surface damage
- defective electronics
- wire-break

3.4.5.3 Cable Break Monitoring

Murrelektronik GmbH supplies the M12 diagnosis adapter with a simple accessory which helps you to monitor M12 lines to the sensors or actuators of your system for **wire break**.

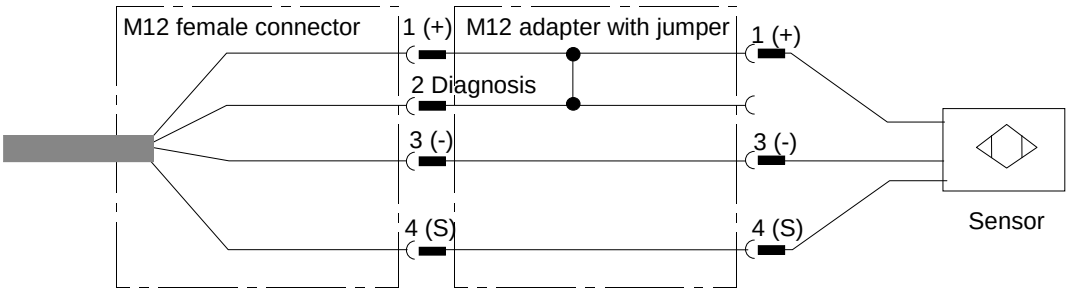

Fig. 12: Cable Break Monitoring

When using a Desina sensor, no connector with LED in the plug must be connected, otherwise wire break will not be recognized.

3.5 Electromagnetic Compatibility (EMC)

This device meets the requirements of EC Directive 2004/108/EEC "Electromagnetic Compatibility".

This device is Class A equipment and may cause radio-frequency interference in residential areas. In this case, the operator may be required to implement adequate countermeasures.

The devices described in this manual each meet the relevant standards for electromagnetic compatibility. However, this does not mean that their electromagnetic compatibility is still guaranteed when installed in a plant or machine.

For this reason, we urgently advise you to comply with the instructions on installation in accordance with EMC requirements below. Only then can you assume that the overall system complies with EMC requirements, provided CE-marked components are used exclusively.

Protection against Electrostatic Discharge

The products described in this manual contain complex semiconductor components which may be destroyed or damaged by electrostatic discharge (ESD).

Damage does not necessarily lead to immediate, detectable failure, or malfunction. These states may be even delayed, or occur sporadically.

The generally accepted safety precautions for ESD sensitive devices must be observed when handling the devices. The following precautions must be taken:

Never plug or unplug connectors while the equipment is under power.

If you are an operator, discharge any static charge you may be carrying just before you touch the equipment. For example, you can touch a grounded part of the machine, or wear an ESD discharge strap that is permanently connected to ground.

Grounding

A short (as short as possible), low-impedance connection between the grounding point and the reference ground is essential to divert interference voltages running between the device and reference ground.

The inductivity of standard FE conductors is a high impedance for high-frequency interference voltages. For this reason, the use of grounding straps is advisable. If this is not possible, a fine-wire FE conductor should be selected with the largest possible cross section, and the connection to ground should be kept as short as possible.

Cable Routing

You can avoid EMC problems by observing elementary basic rules of cable routing:

- Route data lines as far as possible away from power lines.
- Route data lines and power lines at least 10 cm apart.
- Intersect data and power lines at right angles only.
- Route data and power lines in separate, shielded compartments.
- Remember the interference potential of other devices or lines when routing the cables.
- Place frequency converters, motor lines, and other devices and lines that emit high-frequency intereference at the greatest possible distance.

Voltage Drops

Short-term voltage drops (<3 ms) normally pose no operational problems as the electronics are protected by capacitors integrated in the power circuits. This does not apply to the power supply of the sensors and actuators connected to the module. Their high power requirement cannot be covered by the capacitors integrated in the device. For this reason, even transient interruptions of the actuator supply can result in undesirable switching operations.

Due to the integrated input filter, a change in the input signal of less than 1 ms does not cause a change of the input state signaled to the Master. Longer interruptions of the sensor supply may cause changes of the input signal.

Separate Power Supplies

Sensors or actuators can be powered by a common power supply unit. However, it is preferable to use separate power supplies in order to maximize the electromagnetic compatibility of the overall system.

Interference Suppression of Inductive Loads

The outputs of the devices described in this manual have an integrated protective circuit that provides safety against high-energy interference voltages, such as those that occur when inductive consumers are switched.

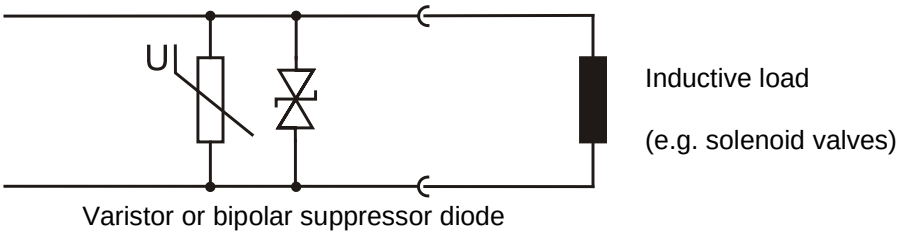

Fig. 13: Interference Suppression of Inductive Loads

A suppressor diode helps to quickly reduce the energy stored in the inductive load of a magnetic field. However, it is recommended to use commercially available protection circuits for inductive loads, especially loads in the range of the maximum current-carrying capacity of a channel at switching frequencies of > 1 Hz. These protection circuits can reduce the energy stored in the connected inductances.

The high voltages that occur when inductive loads are shut down result in strong fields in the cables with consequential faults in adjacent circuits or devices.

Murrelektronik offers a wide selection of interference suppression products for this purpose.

Please refer to our catalogs or: www.murrelektronik.com

Other Measures and Limits

In some system configurations, the requirements for interference emission and immunity from interference can only be met with additional measures, or even not at all. In these cases, the EMC within the system is also dependent on the signle components of other manufacturers.

Mains filters are a suitable means of reducing line-conducted interference. Various manufacturers offer optical-fiber converters. This data transmission technology is basically immune to EMC interferences. However, this does not apply to the electronic conversion circuits. For this reason, the use of optical fibers does not solve all EMC problems.

Our certified test center will answer your questions regarding EMC. They will give advice on guaranteeing compliance with the EMC directive for the system you produce.

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Glossary

Actuator shutdown	Short-circuit or overload at an output leads to the shutdown of the output.
AI	Analog input
AO	Analog output
BN-P	Bus Node - Profibus, bus node - Profibus
Bus-Run-LED	LED that signals the bus status
Bussegment	"Due to the electrical specification of the RS-485 interface, the number of users on an RS485 network is limited to 32 users. If there are more than 32 Profibus users, the network must be divided into segments by means of repeaters.
1 byte	corresponds to 8 bits
Cfg F-LED	LED to signal a correct/incorrect configuration
DI	Digital input
DIN TH35	DIN standard mounting rail (35x15mm, 35x7.5mm).
DO	Digital output.
DP	Decentral Periphery. Profibus protocol for rapid cyclical data exchange.
E/A(I/O)	Input/output
EC Directive 2004/108/EC	EMC Directive.
EMC	Electromagnetic Compatibility
ESD	Electrostatic discharge
FE	Function ground
Freeze Command	The input data of the slave are "frozen".
GSD	The Device Master Data describes the technical features of a Profibus product. This file is required to configure a Profibus system and is provided by the device

	manufacturer.
I	Current
I/O-	Input/ Output
ID number	A 16-bit number that identifies a Profibus product uniquely. It represents a reference for the GSD file. Several devices have the same ID number, provided they are described in a common GSD file. This number is allocated by the Profibus User Organization.
IEC 61158	Worldwide standard for Profibus DP and FMS. Successor of international standard EN 50170, Volume 2
IP20	Ingress Protection, 20 = Device protection according to EN 605291.
IP20	Ingress Protection, 67 = Device protection according to EN 605291.
LSB	Least significant bit
LWL	Optical fiber
MSB	Most significant bit.
Ni	Nickel
PAA	Process map of outputs
PAE	Process map of inputs
PELV	Protective Extra Low Voltage
PNO	Profibus User Organization.
Power-LED	LED to signal the operating status
Pt 100	Temperature sensor on platinum base (0°C is equivalent to 100Ω)
+R	High potential sensor connection.
-R	Low potential sensor connection.
Repeater	Coupling element to process signals between Profibus segments.
RL	Sensor power supply in three-wire mode.
RTD	Resistance Temperature Device.
S	Reference potential

Segment	The internal system connection supports a left and a right segment. Slot 0 and 2 belong to the left segment, slot 1 and 3 to the right segment.
SELV	Safety Extra Low Voltage.
Simatic Manager	Programming software for program-logic controllers made by Siemens.
PLC	Program-logic controller
Line	If modules are connected to slot 0, it is called "connected to line 0".
TH	Thermoelement / thermocouple.
TH+	High potential sensor connection
TH-	Low potential sensor connection.
Type E, Type J, Type K,	
Type N, Type R	Thermoelements as per DIN EN 60584 standard.
U	Voltage
U/I	Voltage / current
UA (brown terminal)	Actuator supply
UA (red terminal)	Module supply
UB	Operating voltage
UI (red terminal)	Module and sensor supply
US (brown terminal)	Sensor supply
VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machinery and Industrial Equipment Manufacturers)
VZ	Sign.
ZVEI	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers' Association).

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