

- Introduction
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- Diagnostics
- Acyclic Access
- Cube67 + Modules
- Technical Data

# MANUAL ENGLISH

for the Cube67 + BN-PNIO Device  
Art.-No. 56526

**Only use manual for these devices:**

<b>Name</b>	<b>Article Number</b>
Cube67 + BN-PNIO	56526

**User manual for device Cube67 + BN-PNIO**

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# 1. Introduction

## 1.1 Service & Support

<b>Sales</b>	Our sales staff in the company, field service and technicians will support you at all times.
<b>CONNECTIVITY System advisors</b>	<p>Our system advisors are your competent contact persons if you want to develop CONNECTIVITY solutions. They cooperate with you to find the best solutions for your electrical installations.</p> <p>Our CONNECTIVITY system advisors find ways that help you to permanently improve the competitiveness of your machines and plants.</p>
<b>Safety support</b>	<p>In case of questions on safety products contact:</p> <p><a href="mailto:safety_support@murrelektronik.de">safety_support@murrelektronik.de</a></p>
<b>Customer Service Center (CSC)</b>	<p>Our staff of the Customer Service Center will help you with all questions concerning installation and set-up. They support you, for example, if you have problems when combining hardware and software products of different manufacturers.</p> <p>There are numerous support tools and possibilities for measurements - both for fieldbus systems and electromagnetic interference.</p> <p>Please do not hesitate to call us on +49 (0) 7191 47-2050 or send us an E-mail to: <a href="mailto:support@murrelektronik.de">support@murrelektronik.de</a></p>
<b>Service addresses</b>	<p>Murrelektronik GmbH has a policy of customer proximity, both national and international.</p> <p>Please visit our website to find your contact person:</p> <p><a href="http://www.murrelektronik.com">www.murrelektronik.com</a></p>

## 1.2 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.

### IO-Link:

General explanations and functions for IO-Link.

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](http://www.murrelektronik.com)

### Product Manuals:

Describe product-specific features.

Art. No.	Designation
56753	Cube67 Encoder Modul

[www.murrelektronik.com](http://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
56525	Cube67+ BN-Ethernet / IP
56526	Cube67+ BN-PROFINET IO
56980	Cube67 BN-PROFIBUS
56981	Cube67 BN-DeviceNet
56982	Cube67 BN-CANopen
56983	Cube67 BN-Ethernet / IP
56984	Cube67 BN-DeviceNet V2

[www.murrelektronik.com](http://www.murrelektronik.com)

### 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+

[www.murrelektronik.com](http://www.murrelektronik.com)

### Instruction to Safetycategory 3:

Art. No.	Designation
56972	Instruction to Safetycategory 3

[www.murrelektronik.com](http://www.murrelektronik.com)

## Introduction

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The following links will provide you with more information on particular bus systems, as well as the standards and specifications on which they are based:



>>> [PROFINET \(www.profinet.com\)](http://www.profinet.com)



>>> [IO-Link \(www.io-link.com\)](http://www.io-link.com)

## 1.3 Symbols

This document includes information and notes that have to be observed for your own safety and to avoid personal and material damage. They are characterized as follows:



---

This symbol refers to important information

---



### **Warning**

Warnings contain information that, if ignored, 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.

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### **RECOMMENDATION**

Notes with this symbol are recommendations of Murrelektronik GmbH.

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### **Products and Accessories**

This symbol indicates Murrelectronics Onlineshop.

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## Introduction

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### Intended Purpose

Before starting the devices, read this manual carefully. 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 specifications of the European EMC Directive (2004/108/EC).



#### Warning



The devices are not safety devices conforming to the relevant standards. The safety functions of the system are no longer guaranteed.

Do not use the OFF state of the outputs to implement safety-related requirements of the system/machine.

---

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, trouble free functioning of the products requires proper transportation, storage, mounting, 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 comply with SELV or PELV. 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.



## Introduction

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### 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) issued by ZVEI and VDMA and published by Maschinenbau-Verlag, Post Box 710864, 60498 Frankfurt, Germany) before installing and maintaining the devices. They are therefore electricians who are capable of assessing the work executed and any possible dangers arising from this due to their professional training, knowledge, experience, and their knowledge of the pertinent standards; or who have a level of knowledge equivalent to professional training due to their many years of activity in a comparable field.

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.



#### **Warning**

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.

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## 2. Description of the Cube67+



Cube67+ stands for rational and economic solutions. The innovative fieldbus system from Murrelektronik has simplified and modernized decentralized installations from the ground up. Now there is the Cube67+ that bears a plus sign for even more flexibility. Cube67+ is a new innovative bus node. With it, Murrelektronik is expanding their field-proven Cube67 System. It allows even greater optimization for fieldbus installations, whatever the application.

### Machine Option Management

Machines and plants frequently have the same design and only differ in their expansion stages. In this case, the Cube67+ offers a solution with its integrated Machine Option Management. All you need is to create a cross-variant hardware configuration that maps the complete layout of the machine. Dependent on what Cube67 modules are contained in each variant, they can be enabled or disabled by making an entry in the controller or the control panel.

### Ring redundancy with the Media Redundancy Protocol (MRP):

Please note that the bus node does not support MRP and is therefore not ring-capable.

### ProfiNet IRT:

Please note that the bus node does not support IRT.

### Safe status:

Please note that all outputs are set to **0** in case of a CPU stop.

## 3. Installation

### 3.1 Mounting



Please refer to the Installation Instructions for the assembly regulations. You will find an overview in the section [About the User Manual and its Structure](#) in this manual.

## Installation

### 3.2 Terminal Overview of Cube67+ BN-PNIO Art.-No. 56526

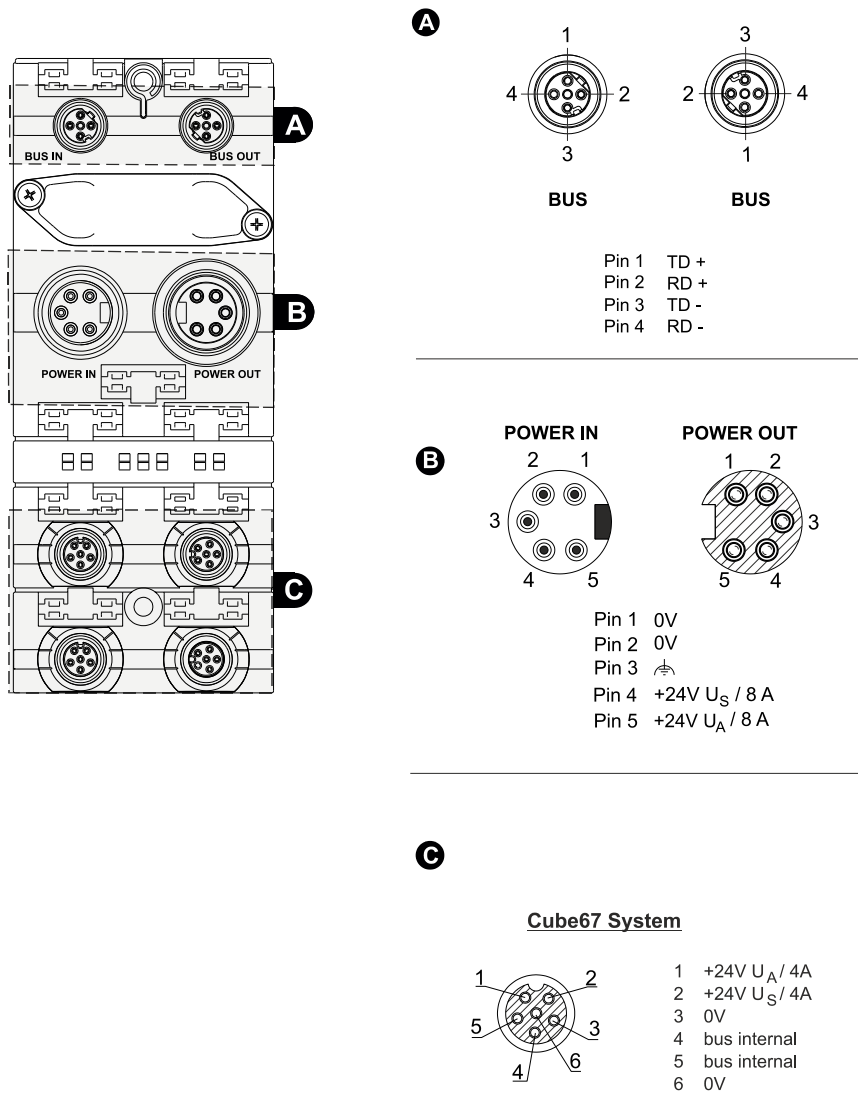


Fig. 1: Terminal overview of Cube67+ BN-PNIO Art.-No. 56526



Installation according to UL: Use power supplies or circuit controls (e.g. MICO) having NEC Class 2 approval!

## 4. Startup

### 4.1 Internal System Connection Features

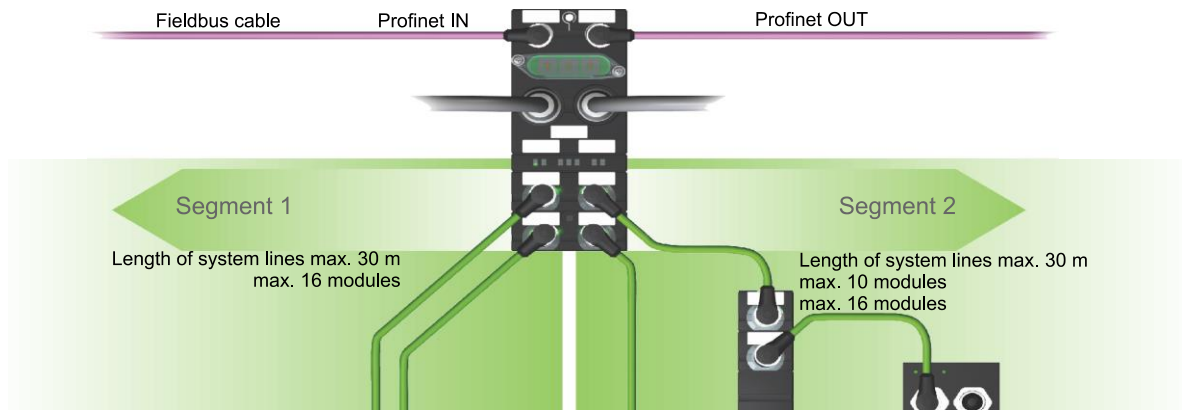


Fig. 2: Internal system connection features

The internal system connection is divided in 2 segments and, due to this division, is now operable with longer branch 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. Every segment can be operated with a maximum line length of 30 m. The segments are freely divisible, depending on the application requirements. This means that a single system line with a length of 30 m connected to socket 0 or 2 (or 1 or 3) can be divided as required among the sockets belonging to the segment, either 6 system lines each with a length of 5 m, or 10 system lines with a length of 3 m. The same applies to the number of modules: max. 16 modules are allowed per segment. They can be only connected to one segment socket, or divided as required among the two segment sockets. The layout details required to configure the hardware are contained in the associated PROFINET configuration tool.

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

### 4.2 Internal System Connection Terminations

A terminating resistor must be fitted to the start and end of each internal system connection segment in order to guarantee data transmission, irrespective of whether any modules are connected or not. This means that unused sockets on the internal system connection must be fitted with a terminating resistor, provided at least one module is operated on the segment. This regulation also applies to the output socket "Out" of the last module in the branch, provided it is an expansion module.

## 4.3 Configuration and Parameters

The Cube67+ system is usually configured with the help of a configuration tool provided by the Profinet Controller manufacturer. The controller sends the configuration telegram to the device while the system is booted, defines the number of input and output bytes and the configuration.

With the help of this information, the Cube67+ bus node checks the installation for compliance with the projected configuration. If the bus node detects a difference between the nominal configuration transferred by the PNIO Controller and the physical configuration, the bus node reports a configuration error message (parameter error message) and does not exchange data with the PNIO Controller. A configuration or parameter error is displayed at the bus node by the LED "CFg F". If an error occurs, the LED "Cf g F" lights up red.

Cube67+ System is calibrated as a modular system. If your configuration tool supports this, the bus node "56526 BN-PNIO", 2 port modules, a power supply module, and the "Branch 0" module are added automatically when you add the Cube67+ bus node. The bus node "56526 BN-PNIO" is always the first module in the configuration. It is capable of running without any expansion modules.

### 4.3.1 Maximum Data Length

When you configure the system, pay attention to the maximum length of the Profinet telegram. The maximum data length of a telegram is 1024 bytes. This restriction must be complied with when planning and configuring machines and plants, in particular when a large number of modules are used on a bus node.

### 4.3.2 Assigning Slots / Real Module

The maximum number of slots in the Profinet configuration is limited to 38 by the GSDML. A maximum of 32 real modules can be connected to the bus node. The remaining slots are required for other modules. These modules, e.g. placeholders (empty slots), branch modules, and function modules (Machine Option Management) were introduced to conduct a precise verification of the Profinet configuration and to simplify the configuration for you.

Diagnostic messages are assigned to the associated slots, i.e. if a diagnostic message is received for Slot 3, this message is related to the module at Slot 3. Module numbering may start with Slot 0 or Slot 1, depending on the configuration tool.

### 4.3.2.1 Branch Modules

The bus node has enhanced diagnostic options with the branch modules. In analogy to the 4 branches of the bus node, 4 branch modules are added to the GSDML file. The use of branch modules supplies the bus node with an exact topology that can then be compared to the actual topology of the connected modules.

All 4 branch modules must be added to the hardware configuration. Branch 0 is added automatically when the bus mode is added. The remaining branch modules must be added manually.

Modules connected to Socket 0 of the bus node must be added between branch modules Branch 0 and Branch 1 in the hardware configuration. Modules connected to Socket 1 of the BN-PNIO must be connected between Branch 1 and Branch 2, etc.



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Pay attention to the features of the internal system connection

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Slot 2 is reserved for the Machine Option Management

---

Art. No.: 56526  
Cube67+BN-PNIO

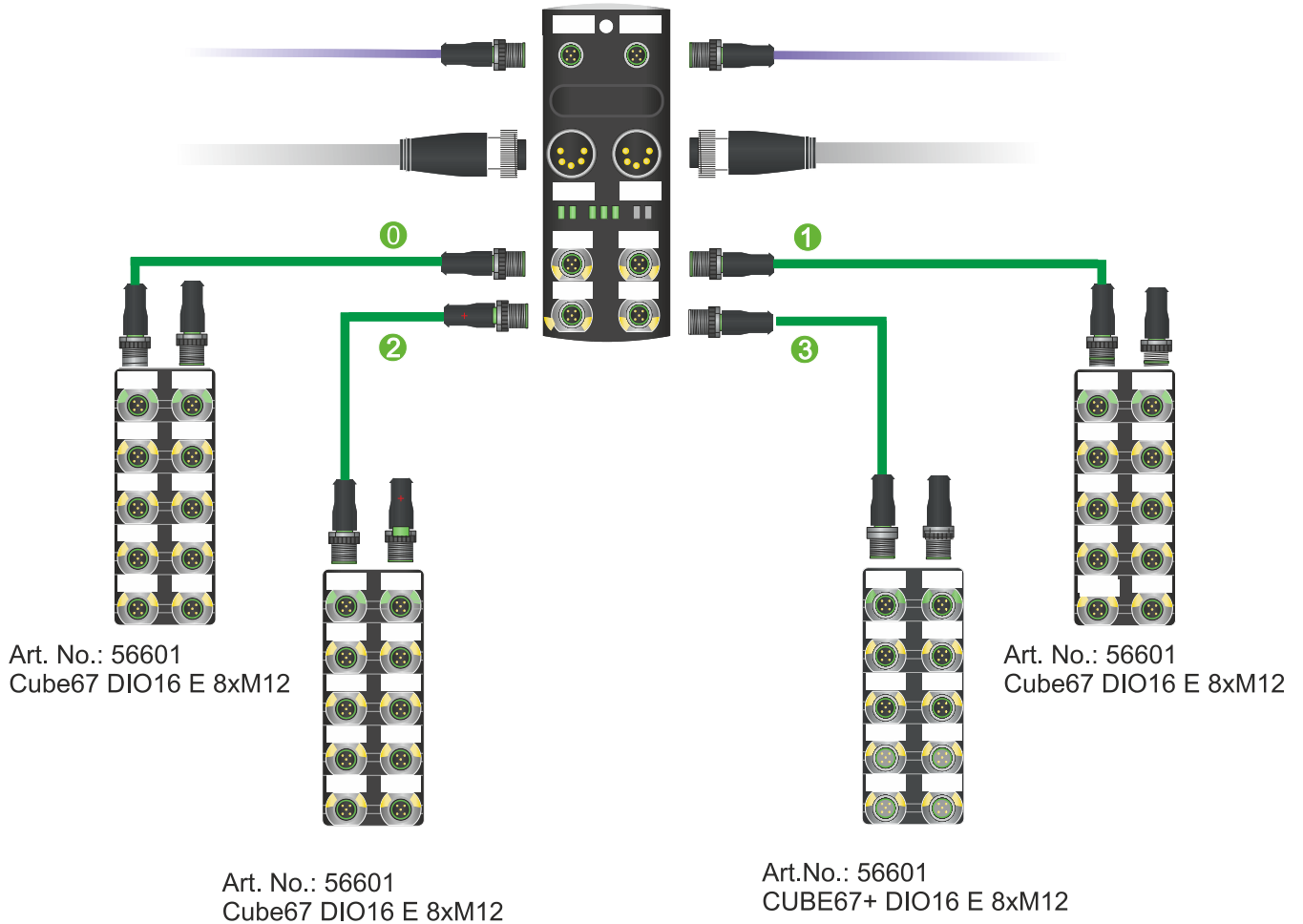


Fig. 3: Example configuration with standard modules

#### Legend

- ① - Branch 0
- ① - Branch 1
- ② - Branch 2
- ③ - Branch 3

## Startup

The example configuration should be configured in Simatic HW Config – as shown in the figure below:

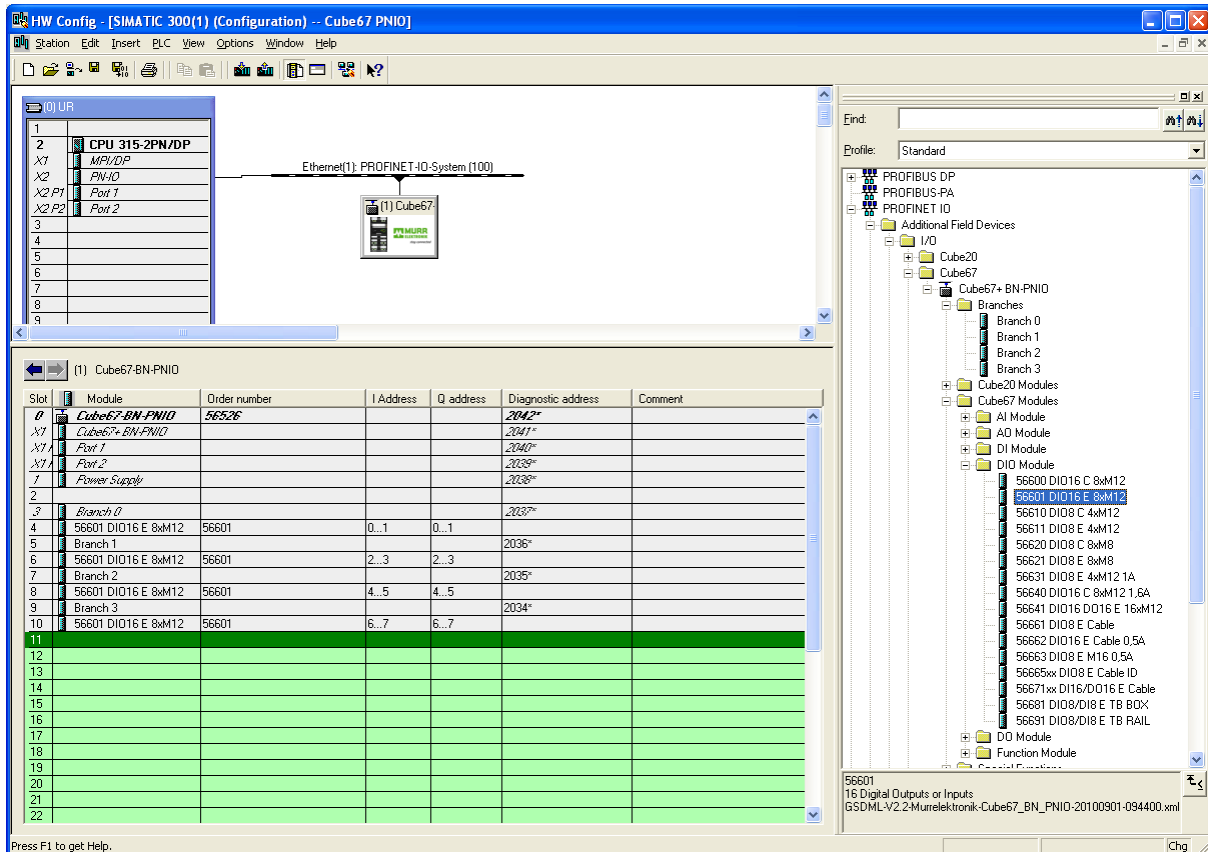


Fig. 4: Example of a branch configuration



The bus software checks for the presence of the virtual modules Branch 0 to Branch 3. If one of these modules is not present, the bus node signals a configuration error (**LED “Cf g F” red**).

### 4.3.2.2 Differences in Cube67+ Modules



Compared to the Cube 67 modules, all Cube 67+ modules can only be operated on one Cube 679 bus node, but not on the one Cube67 bus node.



### 4.3.2.3 Placeholders

In a PROFINET configuration, it is possible to leave slots unassigned. This is considered in the configuration test and offers you the possibility of expanding your machine later, without redesigning the configuration with I/O addresses. You simply add modules to the empty slots.



Due to the new branch modules added, it is no longer explicitly recommended to use placeholders. If you can already exclude an expansion of the configuration at the planning stage, the use of placeholders will not provide you with any advantages.

### 4.3.2.4 Use of Additional Subslots

Additional subslots are used to define additional functionality for a physically real Cube67+ module. The example below is the module 56752 Cube67+ DIO 12 IOL 4 E 8xM12:

<b>Basic module functionality:</b>	4 freely parameterizable M12 sockets each with 2 channels, usable as input or output
<b>Additional module functionality:</b>	4 M12 sockets with I/O link functionality at Pin 4

The basic functionality is defined in the GSDML file via the module 56752 DIO12 8xM12 IO Link. The additional functionality for the 4 I/O link ports is controlled by inserting additional subslots, e.g.:

```

IOL_DEAKTIVIERT (disabled)
IOL_I_SIO_OEFFNER (NC)
IOL_I_SIO_SCHLIESSER (NO)
IOL_I_1 Byte
IOL_I_2 Byte
...
IOL_I/O_1/1 Byte
IOL_I/O_2/2 Byte
...
IOL_O_1 Byte
IOL_O_2 Byte
...

```

This permits the selection of functionality as well as the selection of data size in the process map by drag&drop in the configuration tool. It is then possible to make an exact simulation of the real actual configuration. If one of the sockets is required, it is simply disabled by adding the module IOL\_DEAKTIVIERT. If a larger data quantity is required, select a module of the corresponding size, e.g.

## Startup

---

IOL\_I\_16 Byte. If you want to use a particular socket as a standard I/O (SIO), then enter the corresponding module, e.g. IOL\_I\_SIO\_SCHLIESSER.

You can then freely define the I and O address for each I/O link socket in the configuration tool using these modules.



---

On a Cube67+ module, the correct number of virtual modules must always be added behind the basic module in the configuration tool. Errors result in the reporting of a configuration error (**LED "Cfg F" red**).

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Diagnostic messages for additional functionality are reported to the associated subslots.

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### 4.3.3 Example: Configuration of a Cube67+ System with SIMATIC Step7®

Let's assume you want to enter the following configuration:

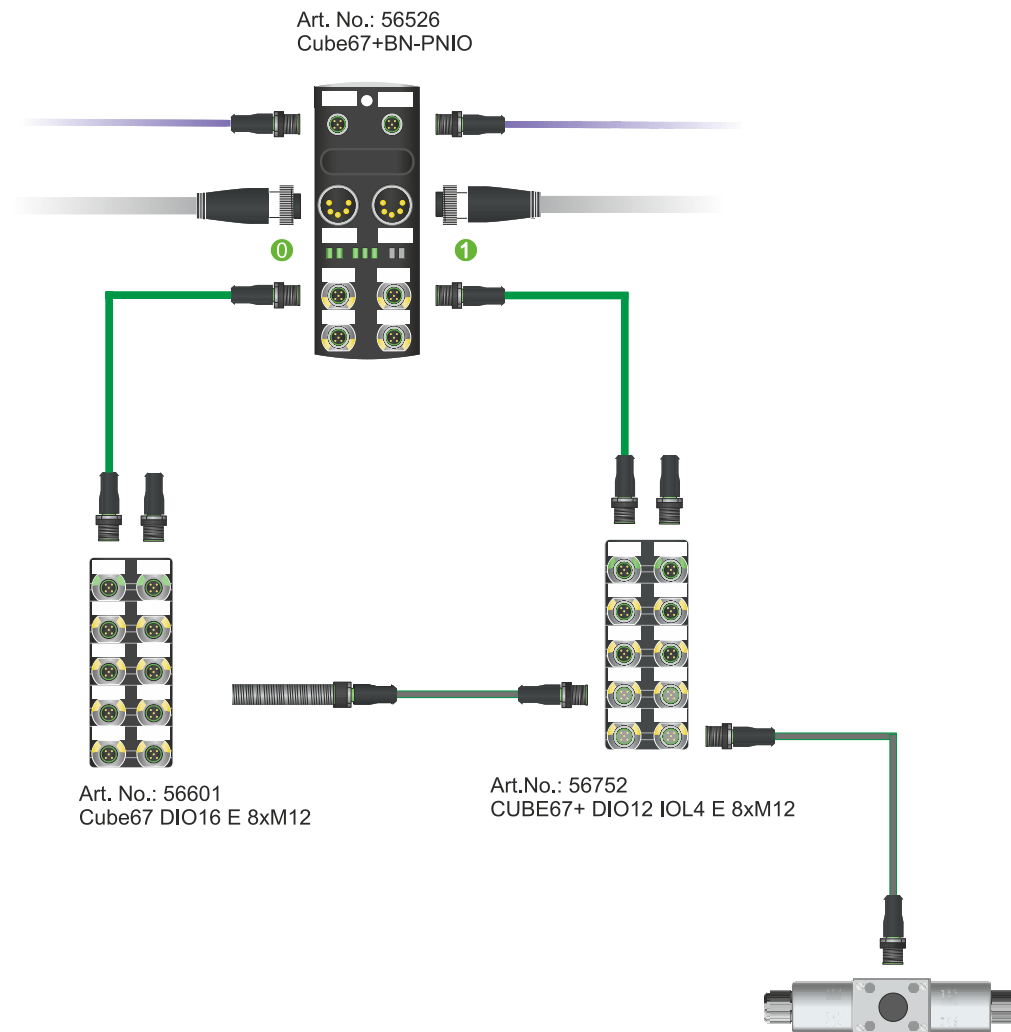


Fig. 5: Configuration of a Cube67+ project

#### Legend

- 0 - Branch 0
- 1 - Branch 1

## Startup

In the Hardware Catalog of the SIMATIC HW Config, you will find Cube67+ BN-PNIO Art.-No. 56526 under "Other Field Devices", "I/O" and "Cube67".

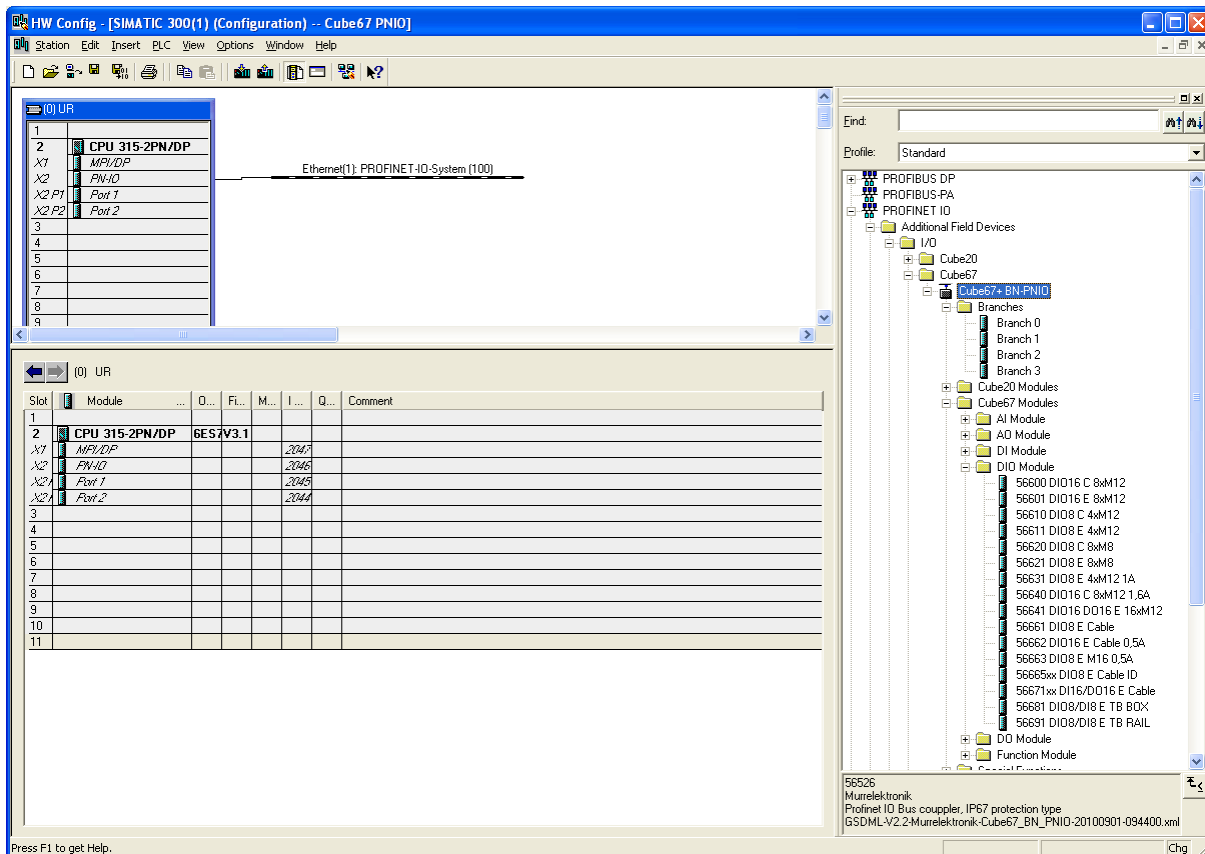


Fig. 6: Cube67+ BN-PNIO Art.-No.: 56526 SIMATIC HW Config

Mark the "Cube67+ BN-PNIO" and drag the entry by holding down the left mouse button, or double-click on the PROFINET line. The module "56526 BN-PNIO" is added. In order to add other modules (max. 35) to the configuration, simply double-click on the corresponding entry in the Hardware Catalog.

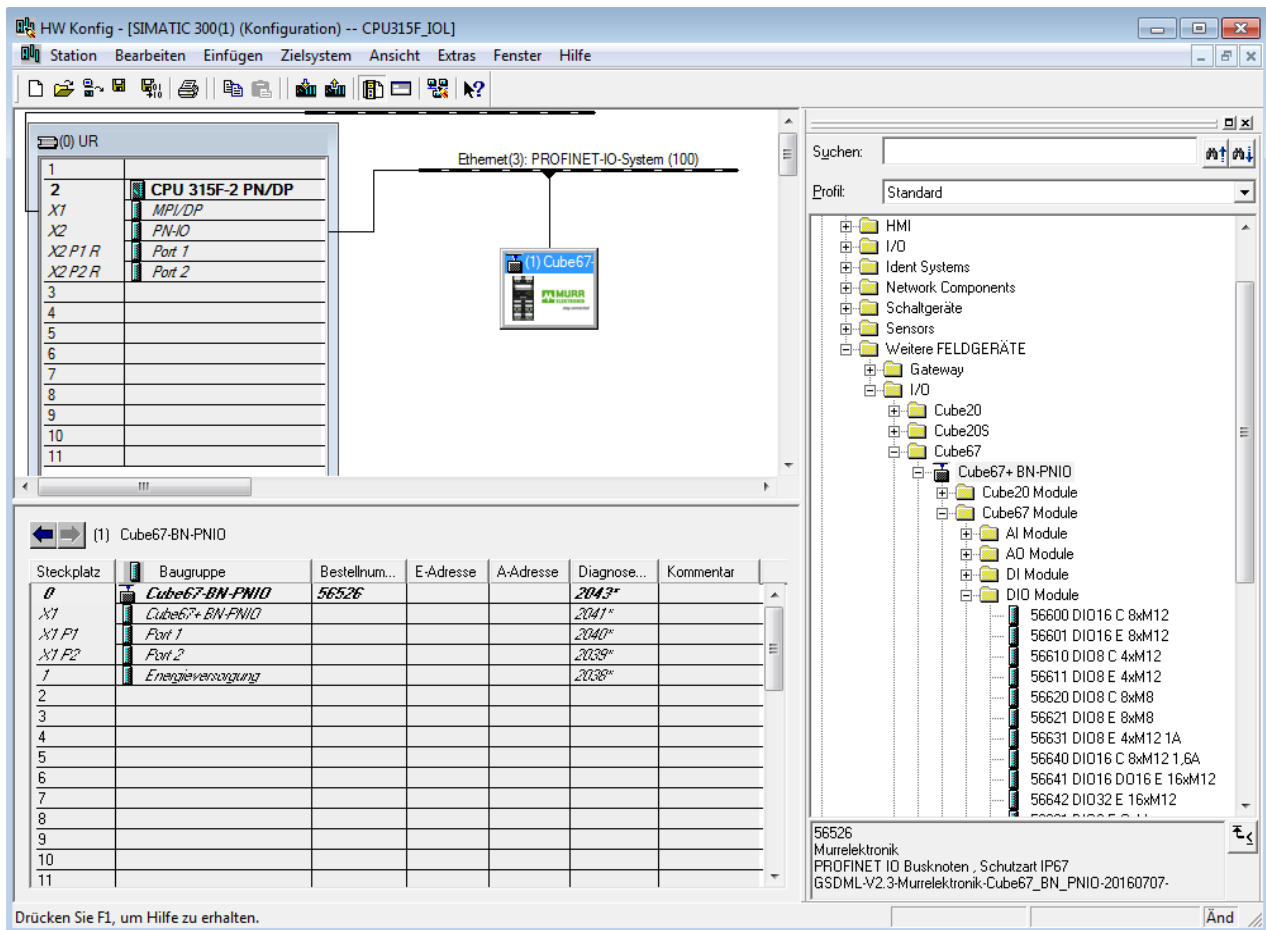


Fig. 7: Cube67+ BN-PNIO added

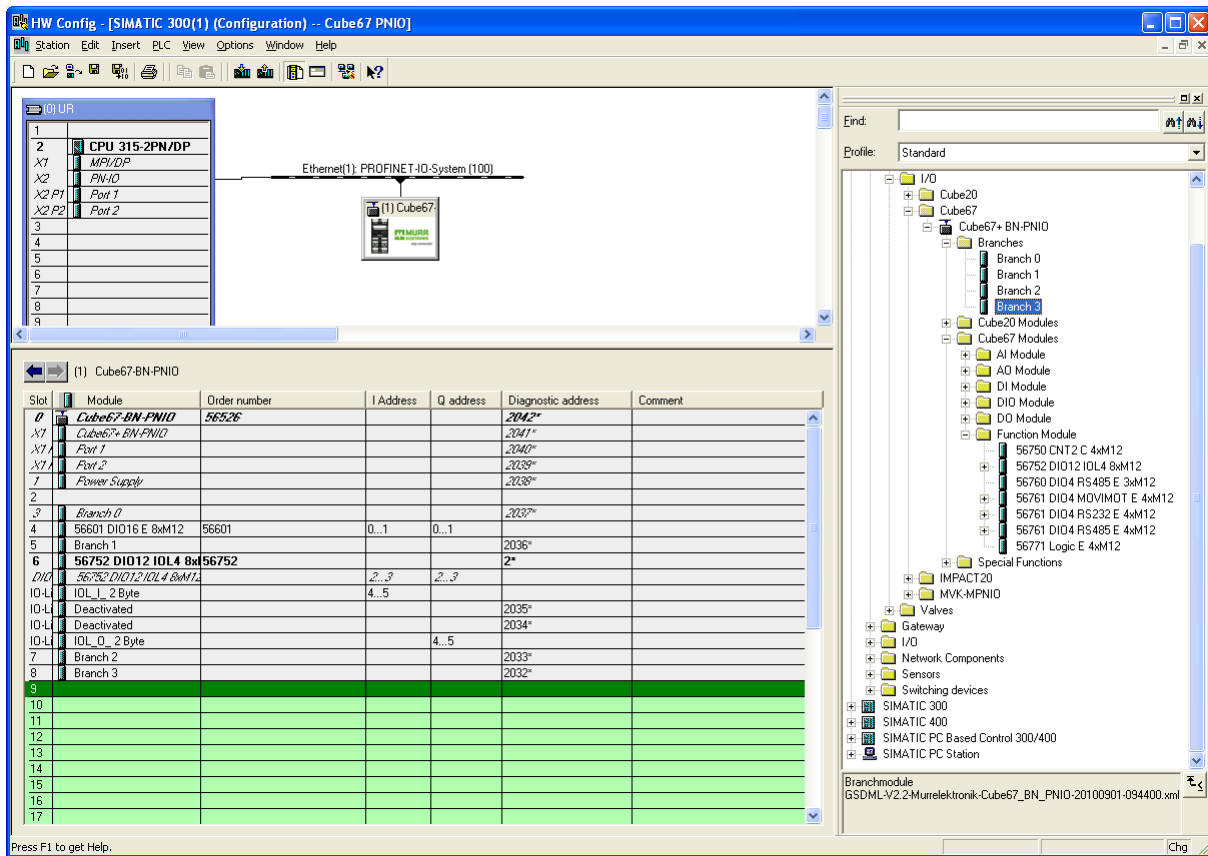


Fig. 8: Adding Cube67 modules to the SIMATIC HW Config

Double-click on any module to open a list box containing the parameter settings for this module. Select the settings you require.

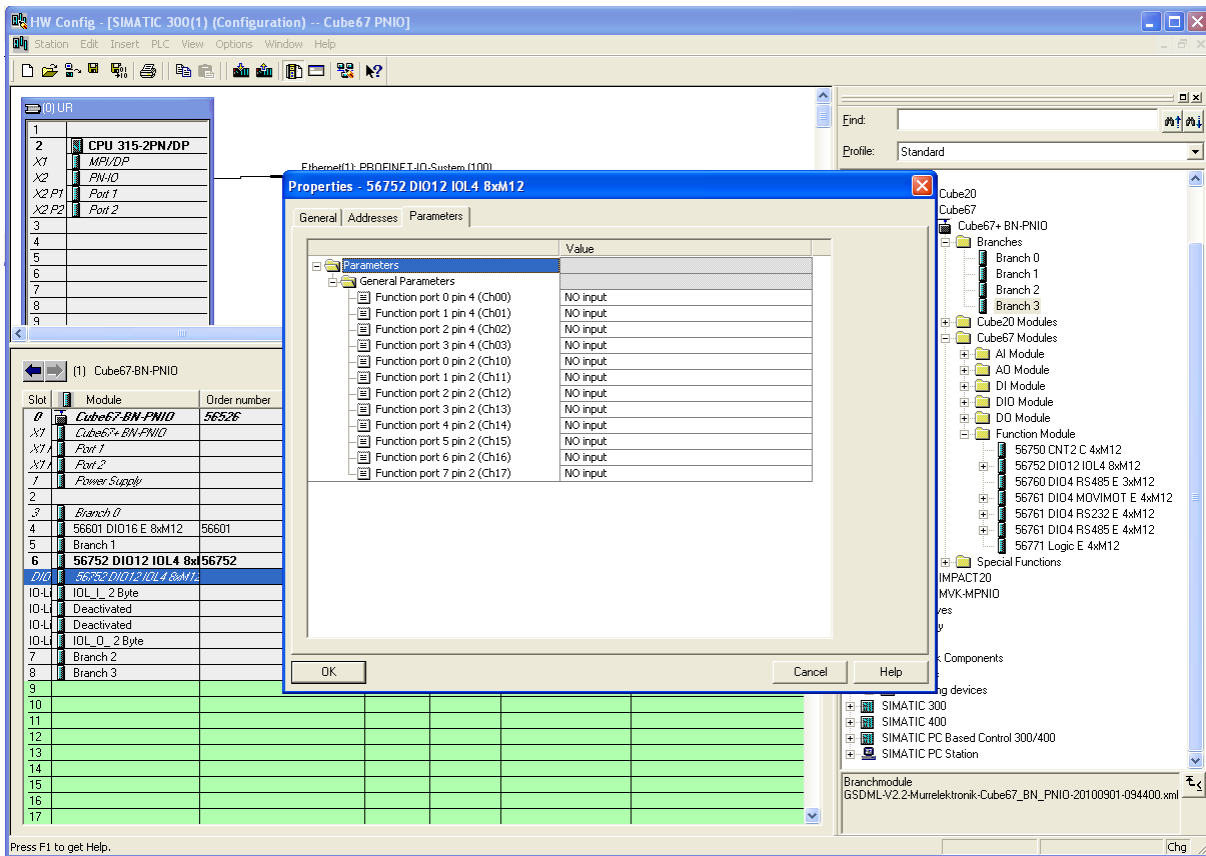


Fig. 9: Parameterizing Cube67 modules in the SIMATIC HW Config

## 4.3.4 Cube67+ BN-PNIO Art.-No. 56526

### 4.3.4.1 Parameters

Number of parameter bytes: 10

Bit assignment of parameter byte 0

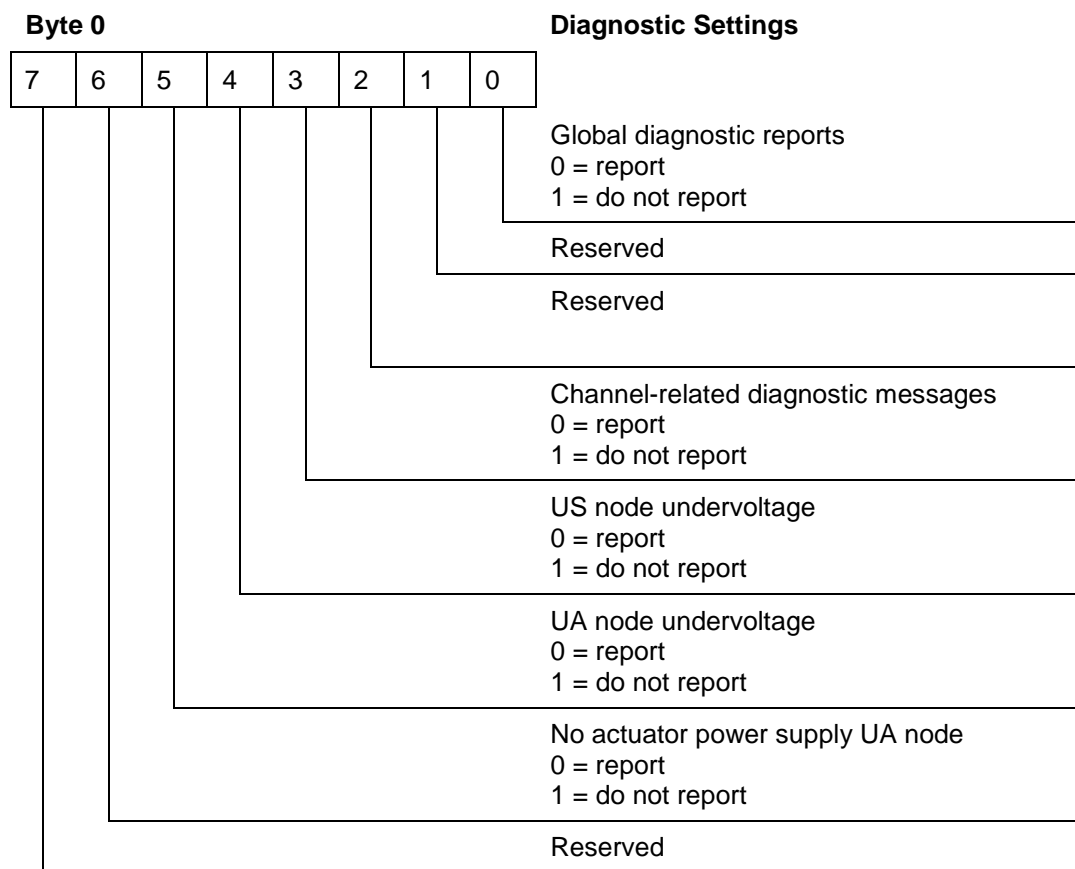


Fig. 10: Parameter byte 0 of Cube67+ BN-PNIO Art.-No. 56526



#### 4.3.4.2 Instructions on Diagnostic Settings:

##### Global diagnostic messages

This defines whether the diagnostics are reported or not. If you select "Do not report", no diagnostics are reported, even those of expansion modules.

##### Channel-related diagnostic messages

This defines whether channel-related diagnostics are reported or not. If you select "Do not report", no channel-related diagnostics are reported, even those of expansion modules.

##### US node undervoltage

This defines whether a US undervoltage is reported or not.

##### UA node undervoltage

This defines whether a UA undervoltage is reported or not.

##### No actuator power supply UA nodes

This defines whether no actuator power supply of UA is reported or not.

##### Bit assignment of parameter Byte 1

Reserved

## Startup

### Bit assignment of parameter Byte 2

This defines whether actuator power supply diagnostics, such as undervoltage, or no voltage, are reported for the associated slot or not.

0 = report

1 = do not report

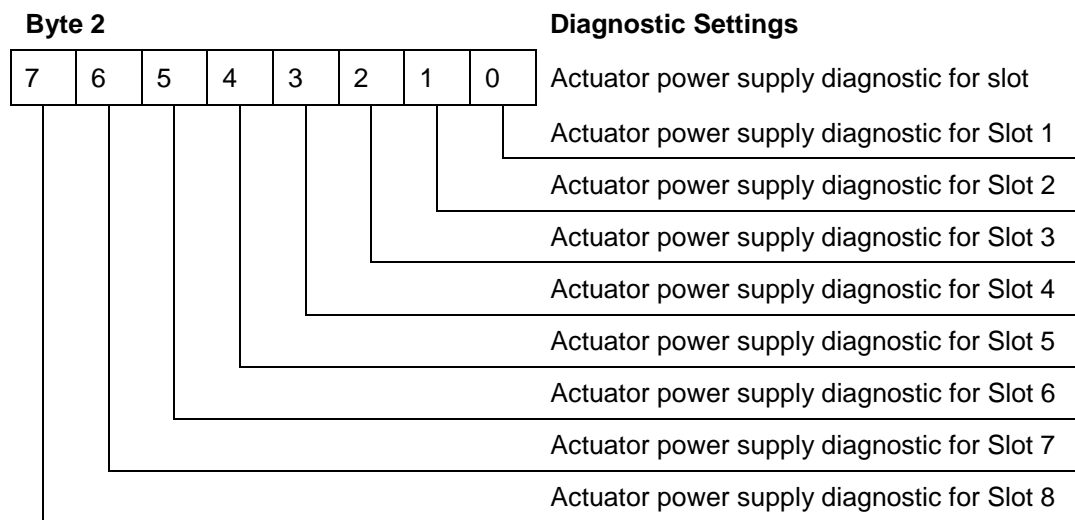


Fig. 11: Parameter byte 2 of Cube67+ BN-PNIO Art.-No. 56526

### Bit assignment of parameter bytes 3 to 6

This defines whether actuator power supply diagnostics, such as undervoltage, or no voltage, are reported for the associated slot or not.

0 = report

1 = do not report

## Startup

Byte 3: Actuator power supply diagnostic for Slots 9 to 16

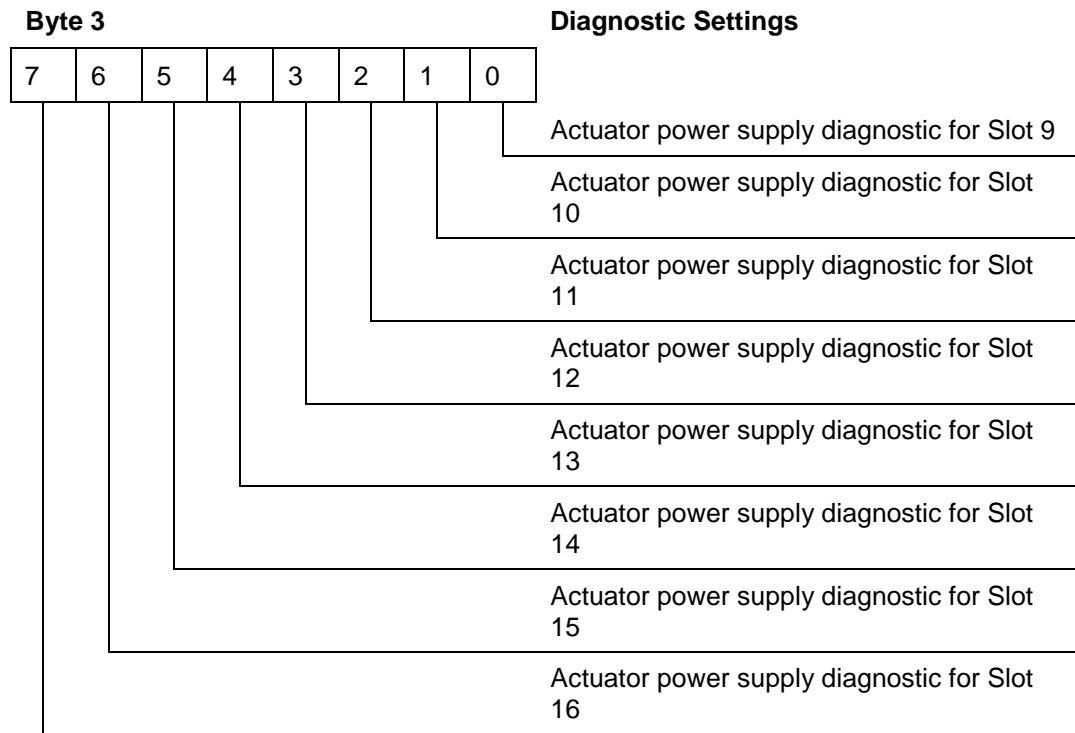


Fig. 12: Parameter byte 3 of Cube67+ BN-PNIO Art.-No. 56526

Corresponding assignment of Bytes 4 to 6:

Byte 4: Slots 17 to 24

Byte 5: Slots 25 to 32

Byte 6: Slots 33 to 40

## 4.4 Starting Up Cube67+ BN-PNIO

### 4.4.1 GSDML File

The GSDML file in XML format is required to operate the devices described in this manual.

**GSDML-Vx.x-Murrelektronik- Cube67\_BN\_PNIO –JJJJMMTT-HHMMSS.xml**

Import the GSDML file to the appropriate configuration tool before starting up the device.



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You can find the file in our online shop under the article number of the product:

<http://shop.murrelektronik.com/56526>

➔ To the product

➔ Downloads

---

#### 4.4.1.1 Setting the Topology

ProfiNet offers a number of functions, diagnostic, and maintenance options based on the existing topology or utilizing knowledge of the topology. All Cube67+ BN-PNIO devices support the topology setting and automatic topology recognition by the Engineering Tool.

This is followed by setting the topology for the Cube67+ BN-PNIO.

Setup via connected adjacent devices is performed using Slots X1 P1 and X1 P2, which represent physical interfaces.

A list of possible ports of other devices in the project is contained in the Topology tab under the "Partner Port" option.

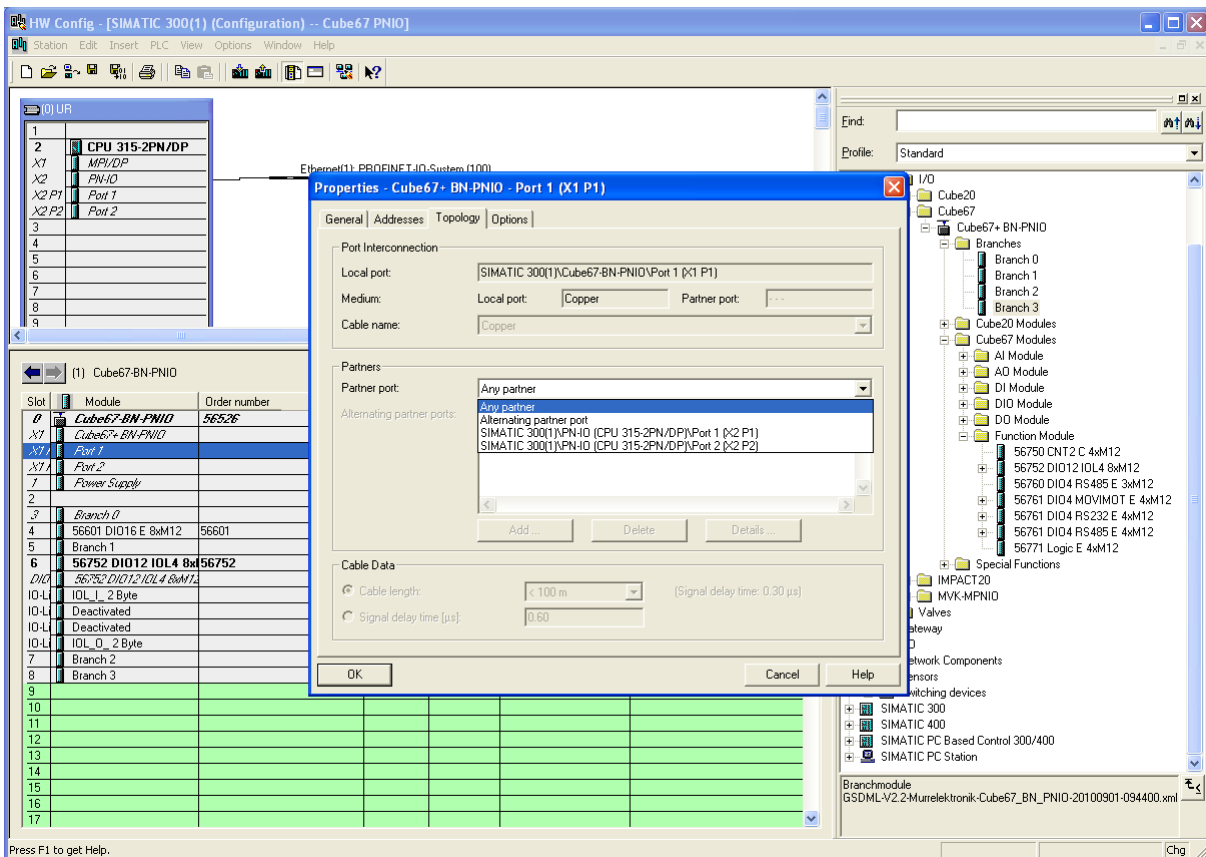
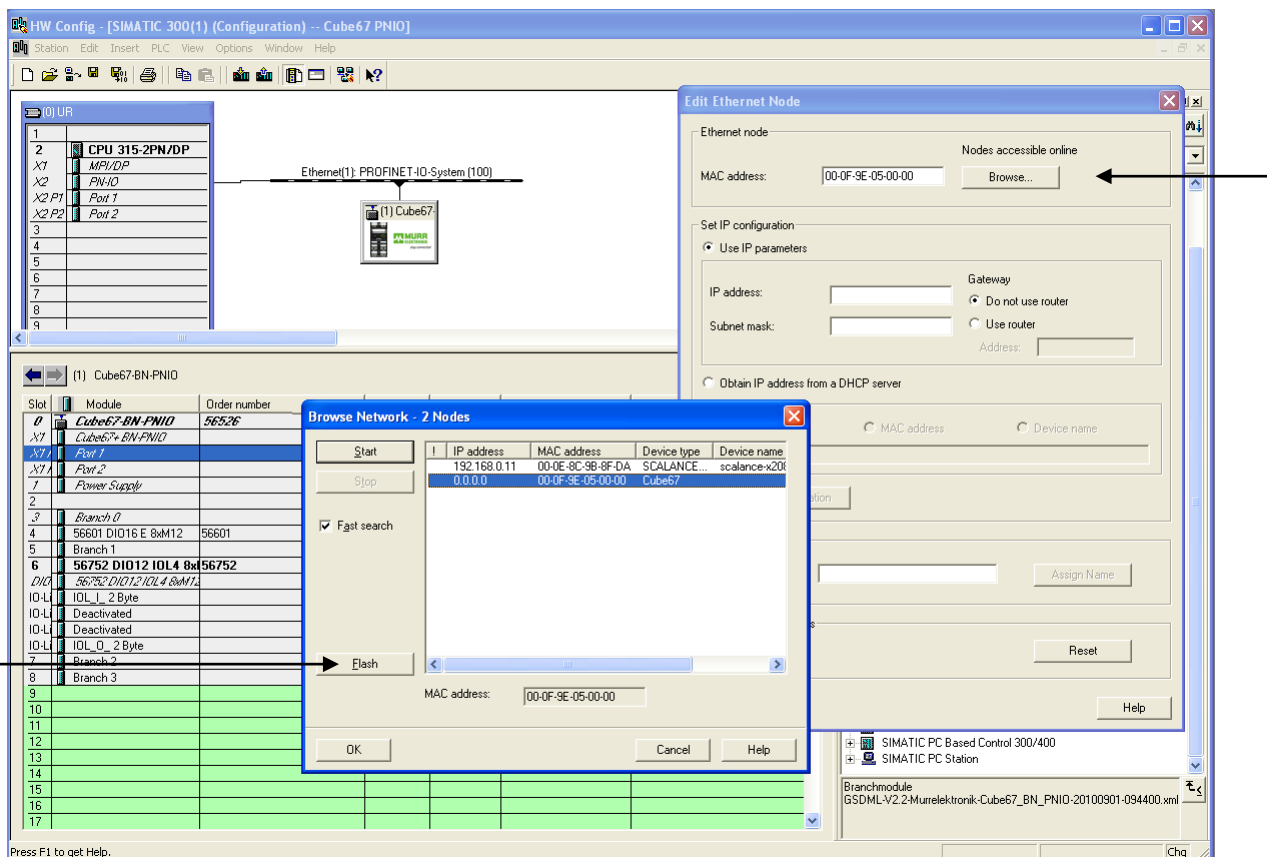


Fig. 13: List of possible partner ports

### 4.4.1.2 Identifying Devices in the Network

PNIO devices are identified by their MAC addresses and the appropriate device type. If you want to put several devices of the same type into operation, make sure you provide each with a definite unique identification.



Use your configuration tool to scan and select all the devices in the network. Use the path below to search the network for reachable users in the HW configuration:

Target system → Ethernet → Edit Ethernet Users → Search

Identification takes place using the blink test. This test makes the CfgF LED of the selected Cube67 BN-PNIO device blink at a rate of 2 Hz. Mark an available device and select the Blink option.

Fig. 14: Identifying devices in the network

## Startup

### Factory Settings of the Cube67+ BN-PNIO

- AC address                      00-0F-9E-xx-xx-xx
- IP address                      0.0.0.0
- Device type                      Cube67+ PROFINET
- Device name:

The device name is unassigned in the factory settings.

### 4.4.1.3 Issuing Device Names and IP Addresses

After you identify a device with a unique identification, assign a device name to it. The IP address is issued automatically by the PNIO controller via DCP.

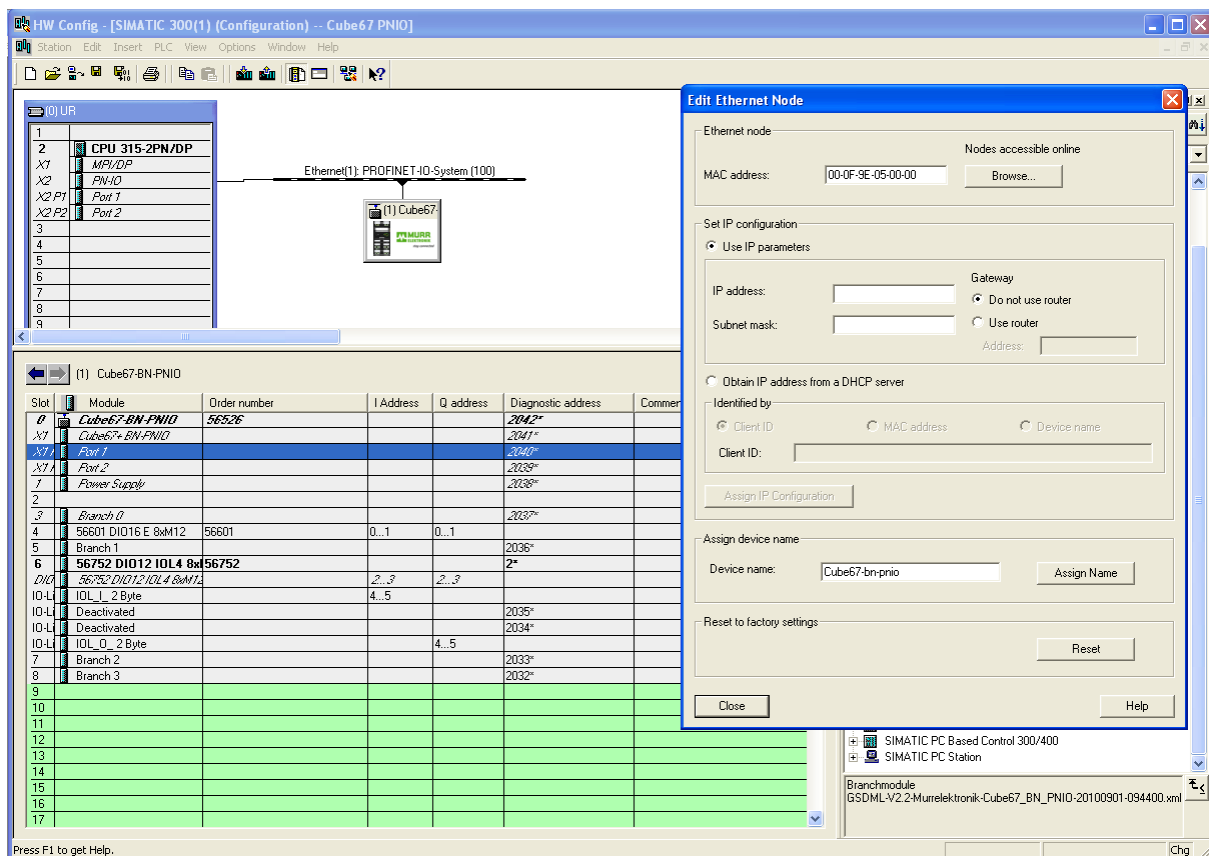


Fig. 15: Issuing device names and IP addresses

## Startup

---

The Simatic S7 Manager then shows you the data detected from the Cube67+ BN-PNIO. With PROFINET I/O, it is absolutely necessary to assign a unique symbolic name to each device. The address and name resolution is only regulated using the name that is stored in a nonvolatile memory. After entering a name, click on **"Assign Name"**.

You can issue the Cube67+ BN-PNIO with an IP address that can be saved in a nonvolatile memory in the module. Then enter the required IP address and the subnet mask to be used. Finally click on **"Assign IP Configuration"**. Alternatively, if you want to select the IP address automatically by DHCP Server, mark the suboption accordingly.

The **"Reset to Factory Settings"** function clears the previous settings and restores the defaults.

**IP address:** 0.0.0.0

**Device name:** (empty)



## 5. Diagnostics

### 5.1 LED Indicators

The Cube67+ System is capable of detecting and reporting numerous errors. Errors (diagnostics) are reported in two ways:

Diagnostic by means of LED indicator

Diagnostic for PROFINET alarms.

#### 5.1.1 Meaning of "Bus Run" LED States



The **"Bus Run"** LED represents the state of PROFINET communication on the Cube67+BN-PNIO Art.-No. 56526

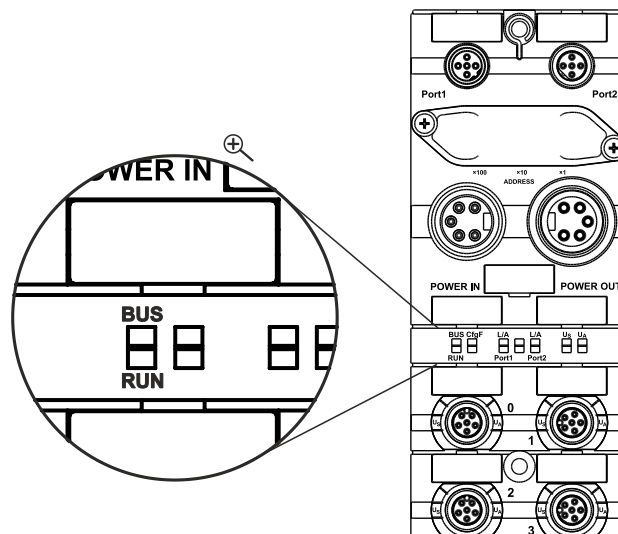


Fig. 16: LED Bus Run on the Cube67+ BN-PNIO Art.-No.: 56526

LED Display	Response	State
	Lights up continuously (green)	Profinet IO data exchange
	Flashing (green)	Not in PROFINET IO data exchange
	Off	Firmware not yet initialized

Tab. 1: LED Bus Run on the Cube67+ BN-PNIO Art.-No. 56526

## 5.1.2 Meaning of "Cfg F" LED States



The **"Cfg F"** LED represents the state of a correct/incorrect configuration on the Cube67+ BN-PNIO Art.-No. 56526.

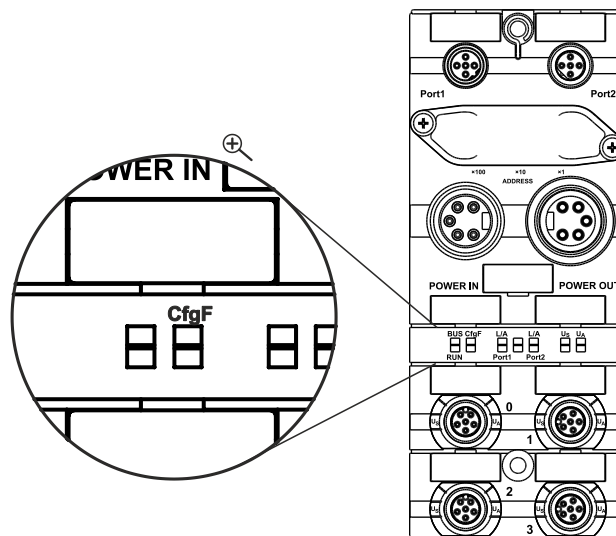






Fig. 17: Cfg F LED on the Cube67+ BN-PNIO Art.-No. 56526

LED Display	Response	State
	Lights up continuously (green)	Reale configuration matches the projected configuration match
	Flashing (green)	MOM configured, no configuration activated
	Lights up continuously (red)	Real configuration does not match the projected configuration
	Off	No configuration

Tab. 2: Cfg F LED on the Cube67+ BN-PNIO Art.-No. 56526

### 5.1.3 LAN-Port-LEDs

The two diagnosis LEDs **L/A Port 1** and **L/A Port 2** signal the current EtherNet/IP status

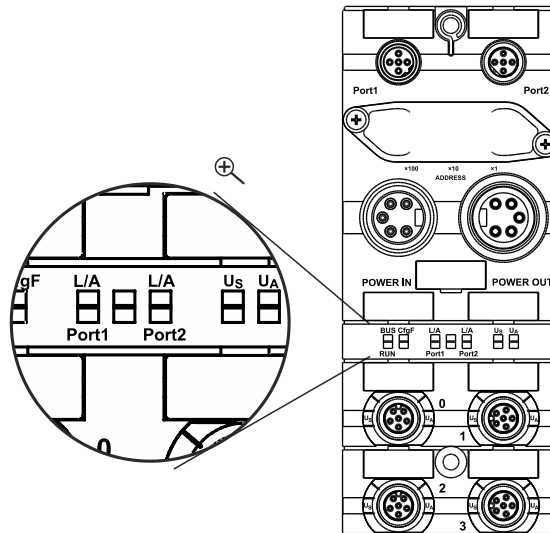





Fig. 18: LAN-Port-LEDs on the Cube67+ BN-PNIO Art.-No. 56526

LED-Anzeige	Verhalten	Zustand
	Lights up continuously (yellow)	<b>Status of line connection.</b> Line connection to Switch or other Ethernet party exists
	Flashing (green)	<b>Data traffic on lines.</b> Data are being transmitted
	Off	No line connection. No configuration.

Tab. 3: LEDs L/A Port1 and L/A Port2

## Diagnostics

### 5.1.4 Meaning of US and UA LED States

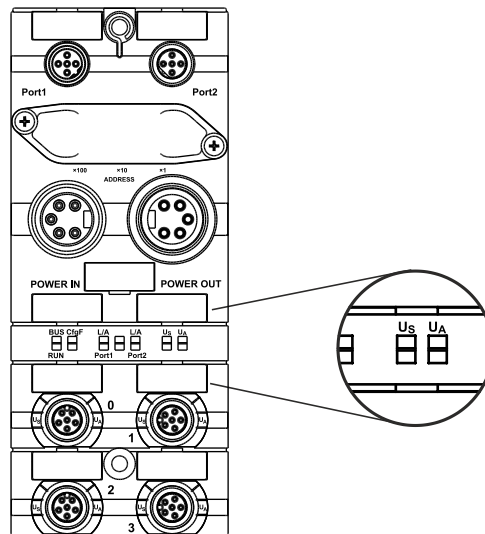










Fig. 19: US and UA LEDs on the Cube67+ BN-PNIO Art.-No. 56526

#### Sensor and System Power Supply

US LED Display	Response	State
	Lights up continuously (green)	OK (> 18 V)
	Lights up continuously (red)	Under voltage
	Off	Not available or sensor power supply < 13 V
	Flashing (red)	Internal error

Tab. 4: Status of sensor and system power supply at bus node

#### Actuator Power Supply

UA LED Display	Response	State
	Lights up continuously (green)	OK (> 18 V)
	Lights up continuously (red)	Under voltage
	Off	Not available or actuator power supply < 13 V
	Flashing (red)	Internal error

Tab. 5: Status of actuator power supply at bus node

## Diagnostics

### 5.1.5 Meaning of US / UA LED States at Internal System Connection Sockets

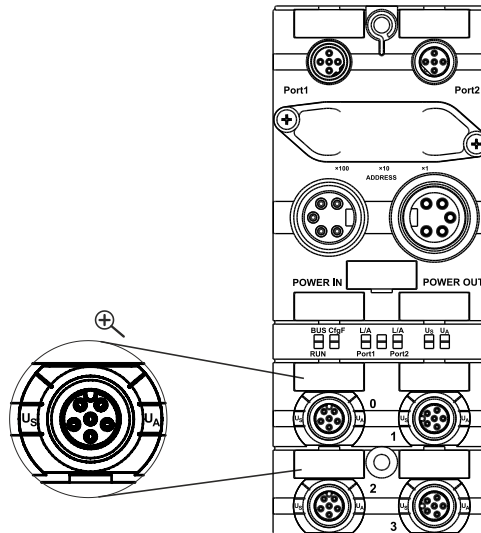
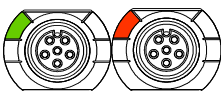
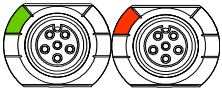
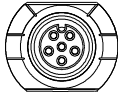


Fig. 20: US and UA LEDs on the Cube67+ BN-PNIO Art.-No. 56526

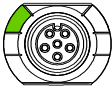
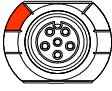

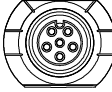
#### System Communication

LED Display US	Response	State
	green / red lights up continuously	Data transfer:
	green / red flashing	No data exchange
	off	No communication

Tab. 6: Status of system communication at bus node

## Diagnostics


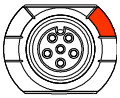
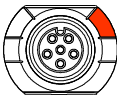
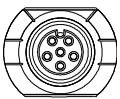
### Sensor and System Power Supply

LED Display US	Response	State
	green	OK (> 18 V)
	red	Sensor power supply undervoltage or short-circuit
	red	Overload $I > 4 \text{ A}$
	off	Not available or sensor power supply < 13 V

Tab. 7: Status of sensor and system power supply at bus node

## Diagnostics

### Actuator Power Supply

LED Display UA	Response	State
	green	OK (> 18 V)
	red	Actuator power supply undervoltage or short-circuit
	red	Overload $I > 4 \text{ A}$
	off	Not available or actuator power supply < 13 V

Tab. 8: Status of actuator power supply at bus node

## 5.2 Diagnostics via the Fieldbus



All diagnostic messages are reported slot-dependent. Note here that some configuration tools name the first slot as **Slot 0**; others name it **Slot 1**. The reported diagnostic messages refer to the numbering of the first slot with "**Slot 0**".

### Troubleshooting



If incorrect modules are reported, rectify the errors in the order of ascending slots

## 5.2.1 Configuration error

A configuration error exists if the configuration does not correspond to the actually connected structure. If a configuration error occurs, it will be output as channel-specific diagnostics in slot 1 channel 0, as can be seen in the following figure.

Kanalspezifische Diagnose:		
Steckplatz	Kanal-Nr.	Fehler
1	0	Konfigurationsfehler

Fig. 21: Configuration error

In addition, "wrong module" or "missing module" will be output for the problematic slots.



Please eliminate the errors "wrong module" and "missing module" in ascending slot order.

While evaluating the errors, it is considered that the configuration is correct; the actually connected structure, however, is not.

A few examples of such errors are depicted and explained below.



## Diagnostics

Example 1: A module is projected, but another module is connected

- Two 56601 and one 56610 are planned to be connected to branch 0.
- Actual structure: Instead of the second 56601, a 56603 has been connected.

Error message:

- "Wrong module on slot 5".

Configuration	Actually connected	Error message																																																																																				
<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dat</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>Branch 2</td></tr><tr><td>9</td><td>Branch 3</td></tr></table>	Slot	Module	0	dat	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56610 DIO8 C 4xM12	7	Branch 1	8	Branch 2	9	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dat</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>Branch 2</td></tr><tr><td>9</td><td>Branch 3</td></tr></table>	Slot	Module	0	dat	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56610 DIO8 C 4xM12	7	Branch 1	8	Branch 2	9	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dat</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>Branch 2</td></tr><tr><td>9</td><td>Branch 3</td></tr></table>	Slot	Module	0	dat	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56610 DIO8 C 4xM12	7	Branch 1	8	Branch 2	9	Branch 3
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Fig. 22: Wrong module connected

## Diagnostics

Example 2: A module is projected, yet forgotten in the actual structure

- Two 56601 and one 56610 are projected to be connected to branch 0.
- Actual structure: The second 56601 was not connected.

Error messages:

- "Wrong module on slot 5", because the second module connected to branch 0 is a 56610 and not a 56601.
- "Missing module on slot 6", because no companion piece is connected at the place of the third module projected to be connected to branch 0 (56610).

























































































































Configuration	Actually connected	Error message																																																																																		
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Fig. 23: Module not connected

## Diagnostics

### Example 3: A connected module has not been projected (1)

- Two 56601 and one 56610 are projected to be connected to branch 0.
- Actual structure: A 56711 has been connected between the second 56601 and the 56610.

#### Error messages:

- "Wrong module on slot 6", because a 56610 is expected here, but a 56711 is connected.
- "Missing module on slot 7", because a module which is not projected is connected here (56610).
















Configuration	Actually connected	Error message																																																																																						
<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-PNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>Branch 2</td></tr><tr><td>9</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-PNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56610 DIO8 C 4xM12	7	Branch 1	8	Branch 2	9	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-PNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56711 AO4 E 4xM12 (U)</td></tr><tr><td>7</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>8</td><td>Branch 1</td></tr><tr><td>9</td><td>Branch 2</td></tr><tr><td>10</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-PNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56711 AO4 E 4xM12 (U)	7	56610 DIO8 C 4xM12	8	Branch 1	9	Branch 2	10	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-PNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td> Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td> 56610 DIO8 C 4xM12</td></tr><tr><td>7</td><td> Branch 1</td></tr><tr><td>8</td><td> Branch 2</td></tr><tr><td>9</td><td> Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-PNIO	X1 P1	Port 1	X1 P2	Port 2	1	 Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	 56610 DIO8 C 4xM12	7	 Branch 1	8	 Branch 2	9	 Branch 3
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Fig. 24: Too many modules connected (1)

## Diagnostics

Example 4: A connected module was not projected (2)

- Two 56601 are projected to be connected to branch 0.
- Actual structure: A 56711 has been connected after the second 56601.

Error message:

- "Missing module on slot 6", because a module which is not projected (56711) is connected here.













Configuration	Actually connected	Error message																																																																																
<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>Branch 1</td></tr><tr><td>7</td><td>Branch 2</td></tr><tr><td>8</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	Branch 1	7	Branch 2	8	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56711 AO4 E 4xM12 (U)</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>Branch 2</td></tr><tr><td>9</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56711 AO4 E 4xM12 (U)	7	Branch 1	8	Branch 2	9	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td> Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td> Branch 1</td></tr><tr><td>7</td><td> Branch 2</td></tr><tr><td>8</td><td> Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	 Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	 Branch 1	7	 Branch 2	8	 Branch 3
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Fig. 25: Too many modules connected (2)

## Diagnostics

### Example 5: A branch has been forgotten in the project

- Branch 2 has not been taken into consideration in the configuration. Since it is imperative to project all branches, the configuration is not correct.

#### Error message:

- "Missing module on slot 8", because branch 2 has to be designed here, if no further module is connected to branch 1.







Configuration	Actually connected	Error message																																																																																
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Fig. 26: Branch has been forgotten

## Diagnostics

### Example 6: Last branch has been forgotten

- Branch 3 has not been considered during the configuration. Since it is imperative to plan all branches, the configuration is not correct.

#### Error message:

- Configuration error on slot 1, because for technical reasons, no slot error can be output for slot 9.




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5	56601 DIO16 E 8xM12																																																																																	
6	56711 AO4 E 4xM12 (U)																																																																																	
7	Branch 1																																																																																	
8	Branch 2																																																																																	

Fig. 27: Last branch has been forgotten

## Diagnostics

### Example 7: Modules are connected to the wrong branch (1)

- Two 56601 and one 56711 are designed to be connected to branch 0.
- Actual structure: These modules are connected to branch 2 instead of branch 0.

#### Error messages:

- "Missing module on slot 4", "Missing module on slot 5", "Missing module on slot 6", because modules are designed but not connected here.
- "Missing module on slot 10", because no module is projected but there is one connected here.

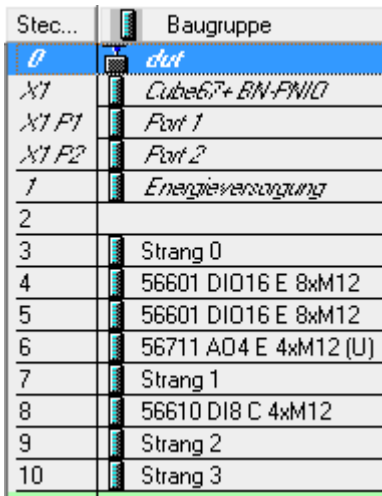
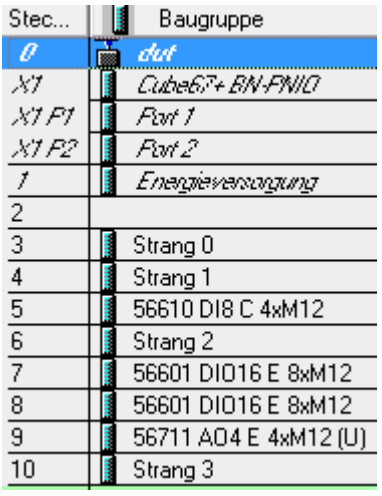

Configuration	Actually connected	Error message
		

Fig. 28: Modules connected to the wrong branch (1)

## Diagnostics

### Example 8: Modules have been connected to the wrong branch (2)

- Two 56601 and one 56711 are designed to be connected to branch 2.
- Actual structure: These modules are however connected to branch 0 instead of branch 2.

#### Error messages:

- Missing module on slot 4", because no module is projected but there is one connected here.
- "Missing module on slot 7", "Missing module on slot 8", "Missing module on slot 9", because modules are designed but not connected here.

Configuration	Actually connected	Error message																																																																																										
<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>Branch 1</td></tr><tr><td>5</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>6</td><td>Branch 2</td></tr><tr><td>7</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>8</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>9</td><td>56711 AO4 E 4xM12 (U)</td></tr><tr><td>10</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	Branch 1	5	56610 DIO8 C 4xM12	6	Branch 2	7	56601 DIO16 E 8xM12	8	56601 DIO16 E 8xM12	9	56711 AO4 E 4xM12 (U)	10	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>5</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>6</td><td>56711 AO4 E 4xM12 (U)</td></tr><tr><td>7</td><td>Branch 1</td></tr><tr><td>8</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>9</td><td>Branch 2</td></tr><tr><td>10</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	56601 DIO16 E 8xM12	5	56601 DIO16 E 8xM12	6	56711 AO4 E 4xM12 (U)	7	Branch 1	8	56610 DIO8 C 4xM12	9	Branch 2	10	Branch 3	<table><tr><th>Slot</th><th>Module</th></tr><tr><td>0</td><td>dut</td></tr><tr><td>X1</td><td>Cube67+ BN-FNIO</td></tr><tr><td>X1 P1</td><td>Port 1</td></tr><tr><td>X1 P2</td><td>Port 2</td></tr><tr><td>1</td><td>Power Supply</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>Branch 0</td></tr><tr><td>4</td><td>Branch 1</td></tr><tr><td>5</td><td>56610 DIO8 C 4xM12</td></tr><tr><td>6</td><td>Branch 2</td></tr><tr><td>7</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>8</td><td>56601 DIO16 E 8xM12</td></tr><tr><td>9</td><td>56711 AO4 E 4xM12 (U)</td></tr><tr><td>10</td><td>Branch 3</td></tr></table>	Slot	Module	0	dut	X1	Cube67+ BN-FNIO	X1 P1	Port 1	X1 P2	Port 2	1	Power Supply	2		3	Branch 0	4	Branch 1	5	56610 DIO8 C 4xM12	6	Branch 2	7	56601 DIO16 E 8xM12	8	56601 DIO16 E 8xM12	9	56711 AO4 E 4xM12 (U)	10	Branch 3
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9	56711 AO4 E 4xM12 (U)																																																																																											
10	Branch 3																																																																																											

Fig. 29: Modules connected to the wrong branch (2)



## 5.2.2 Standardized PROFINET Diagnostics

Diagnostic Message		Possible Cause	Action
Channel	01 hex Short-circuit (sensor supply)	Overload or short-circuit of sensor power supply to 0V.	Change cable to sensor or check sensor for short-circuit.
		Overload or short-circuit of internal system connection (channel type = 000)	Check cables on associated branch.
	02 hex Undervoltage I/O link	I/O link undervoltage (event 0x5100-0x5119)	Check wiring to I/O link device.
	04 hex Overload	Current load on a branch greater than 4 A and less than 4.4 A (100-110%)	Check current load and possibly distribute among other branches.
	05 hex I/O link overload	I/O link overload (event 0x5410)	Check current load.
	06 hex Line break	Defective line. Only for analog inputs and outputs.	Check connection to sensor or sensor itself.
	06 hex Line break I/O link	I/O link device not plugged in or incorrect (invalid data length, cycle time too short, etc.)	Check connection to I/O link device. Check data length. Increase cycle time in parameters.
	07 hex Upper limit overshoot	Analog input measuring range overshoot.	Check connection to sensor or sensor itself.
	07 hex Upper limit overshoot (I/O link)	I/O link event 0x8C10, 0x8C20	Check parameterization or measuring range
	08 hex Lower limit undershoot	Analog input measuring range undershoot	Check connection to sensor or sensor itself.
	08 hex Lower limit undershoot (I/O link)	I/O link event 0x8C30	Check parameterization or measuring range
	09 hex Fault	I/O link fault not assignable to another fault	Check I/O link devices or read out their event memories.
	10 hex Parameterization error	Parameterization incorrect.	Check parameterization.
	11 hex Actuator power supply undervoltage	Actuator power supply < 18 V	Check power supply unit and cable.

## Diagnostics

	13 hex Actuator power supply undervoltage	Actuator power supply overload	Check current load.
	15 hex Reference channel fault	TH module KTY not plugged in.	Install KTY correctly
	17 hex Actuator warning	External power supply to an output.	Check cable.
	18 hex Actuator disable	Overload or short-circuit of output signal to 0V.	Check wiring or actuator.
	1A hex External fault	Desina diagnostic	Check sensor or wiring.
	1B hex No actuator supply	Actuator power supply < 13 V	Check power supply unit and cable.
	1C hex No sensor voltage	Sensor power supply < 13 V	Check power supply unit and cable.
	1D hex No ext. actuator power supply	External actuator power supply < 13 V	Check power supply unit and cable.
	1E hex Ext. actuator power supply undervoltage	External actuator power supply < 18 V	Check power supply unit and cable.

*Tab. 9: Troubleshooting*

### 5.2.3 Module-specific Diagnostics

Diagnostic Message		Possible Cause	Action
Channel	609 hex (configuration error)	Incorrect configuration configured or inserted	Verify Cube67+ layout and configuration
	610 hex (Machine Option Management enabled)	Configuration not set	Use chapter on Machine Option Management and set configuration

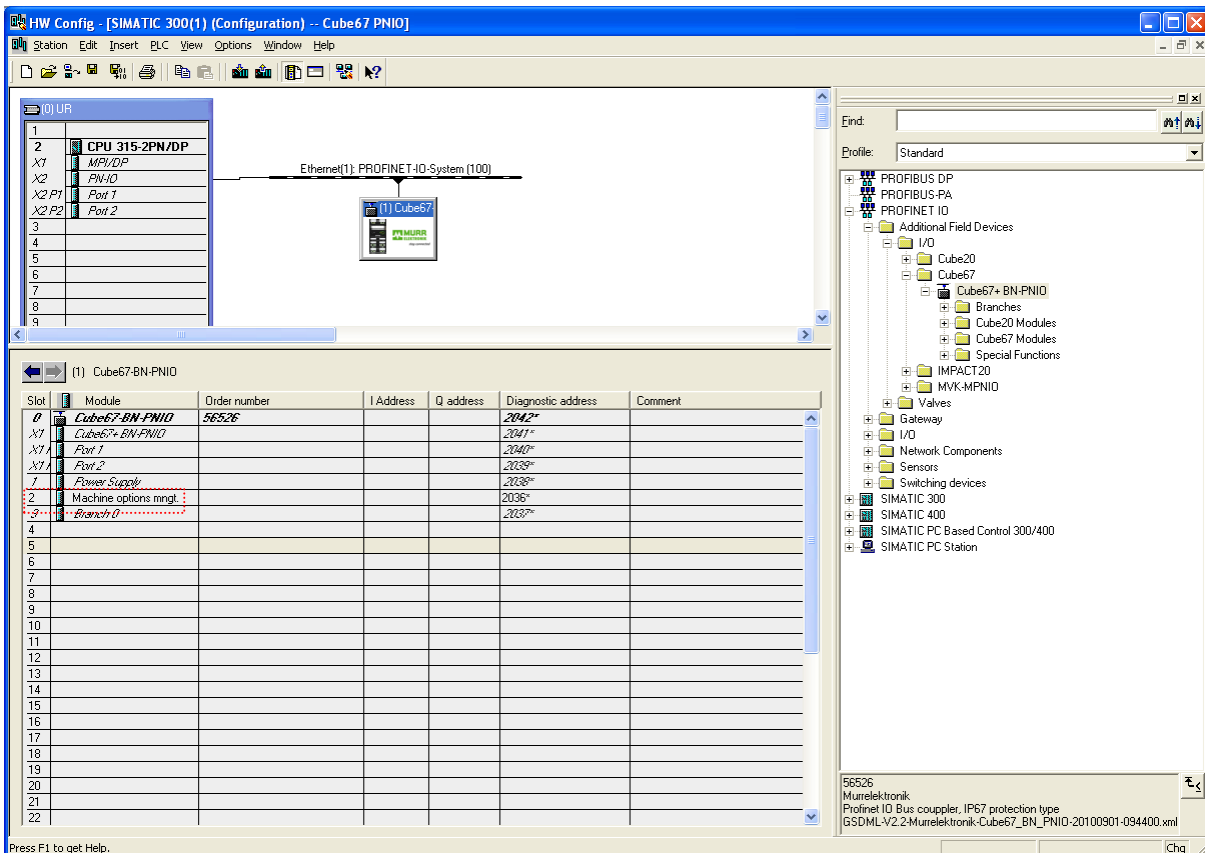
*Tab. 10: Troubleshooting, module-specific*

## 6. Acyclic Access

The Cube67+ BN-PNIO Art.-No. 56526 supports the following accesses besides IM0, IM1, and IM2.

### 6.1 Supported Indices

#### 6.1.1 Index 10 Machine Option Management



Slot	Module	Order number	I Address	Q address	Diagnostic address	Comment
0	Cube67 BN-PNIO	56526			2042	
X1	Cube67 BN-PNIO				2041	
X1A	Port 1				2040	
X1A	Port 2				2039	
1	Power Supply				2038	
2	Machine options mgmt.				2036	
3	Branch 0				2035	
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Fig. 30: Index 10 Machine Option Management

Slots 3 to 38 can be disabled in 8 bytes, provided "Machine Options Management" is parameterized.



Byte0 to Byte4 must always be written.

## Acyclic Access

Byte 0 Disable Slots 1 to 8:

Bit	State	Meaning
0	0	Slot 3 enabled
	1	Slot 3 disabled
1	0	Slot 4 enabled
	1	Slot 4 disabled
2	0	Slot 5 enabled
	1	Slot 5 disabled
3	0	Slot 6 enabled
	1	Slot 6 disabled
4	0	Slot 7 enabled
	1	Slot 7 disabled
5	0	Slot 8 enabled
	1	Slot 8 disabled
6	0	Slot 9 enabled
	1	Slot 9 disabled
7	0	Slot 10 enabled
	1	Slot 10 disabled

Tab. 11: Bit assignment of Byte 0

Corresponds to:

Byte 1: Disable Slots 11-18

Byte 2: Disable Slots 19-26

Byte 3: Disable Slots 27-34

Byte 4: Disable Slots 35-38

Write or read accesses in **"Default configuration"** receive the negative reply **"Feature not supported"**.

Read accesses with **"Machine Options Management"** receive a positive reply. The reply contains the parameters that were written previously using Index 10.

If the configuration is invalid, Index 10 write accesses always receive a positive reply. If the configuration is valid after an Index 10 write access, every following Index 10 write access receives a negative reply with **"State conflict"**.



If **"Machine Option Management"** is set, but no valid configuration is set yet, no other diagnostics are sent. Diagnostics are only sent after a valid configuration is set.



If **"Machine Option Management"** is set and individual branches are disabled using Index 10, it may occur that the diagnostic message issued for missing modules may contain incorrect slot numbers

## 6.1.2 Index 12 BusControl



Byte0 and Byte1 must always be written

### Byte 0 BusControl:

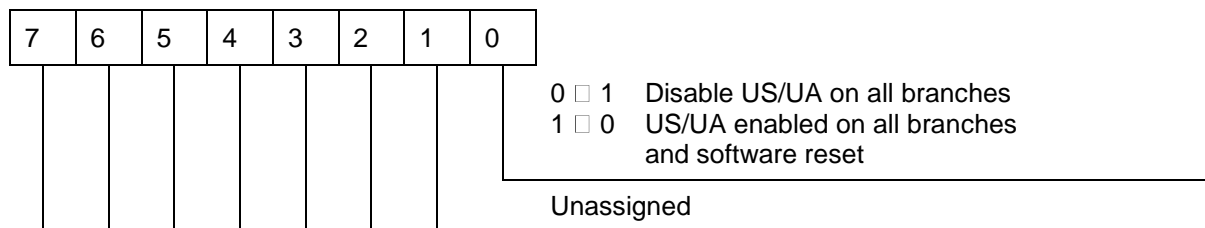


Fig. 31: Bit assignment of Byte 0

The PLC can reset the bus nodes using the BusControl request. This may reset a possibly present UA short-circuit or other fault after its rectification and without switching the power supply of the Cube67+ BN-PNIO on or off manually.

### Byte 1: UA control

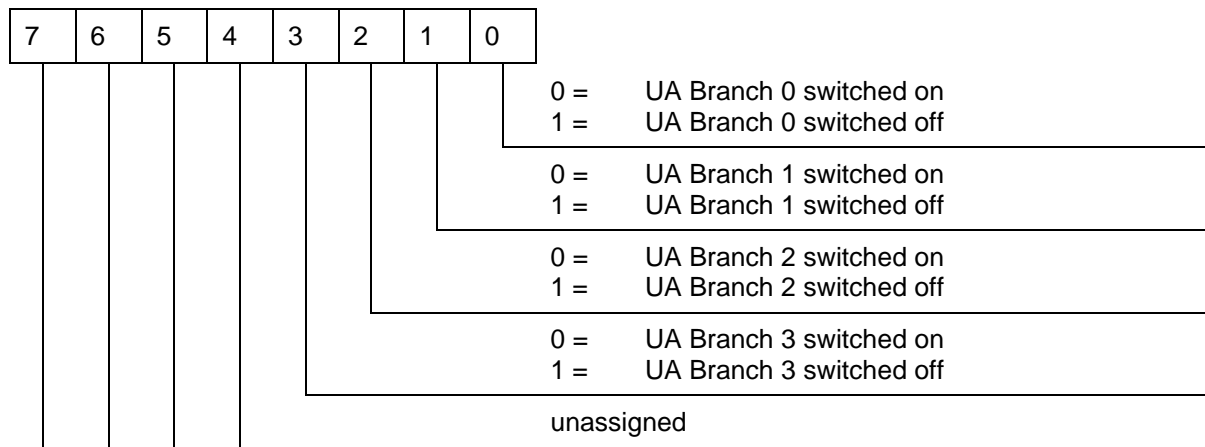


Fig. 32: Bit assignment of Byte 1

Use the BusControl access to switch off and switch back on the actuator power supplies to the individual bus node branches via the PLC. A UA short-circuit or other fault that may be present can then be reset after rectification without resetting the complete bus node.

## 6.1.3 Index 13

### Byte 0 Configuration test

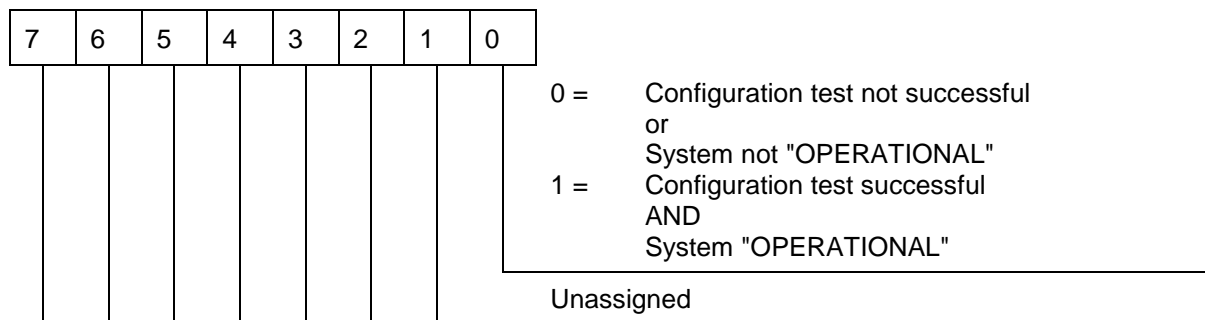


Fig. 33: Bit assignment of Byte 0

Read access must be set with Index 13 to know whether a valid configuration was set in "Machine Options Management". Here, 1 is returned if the configuration is valid and the system is OPERATIONAL, otherwise 0.

If the bus node is parameterized with "Default configuration", the reply will be negative "Feature not supported".

Write accesses receive the negative reply "Feature not supported".

### 6.1.3.1 Index 100

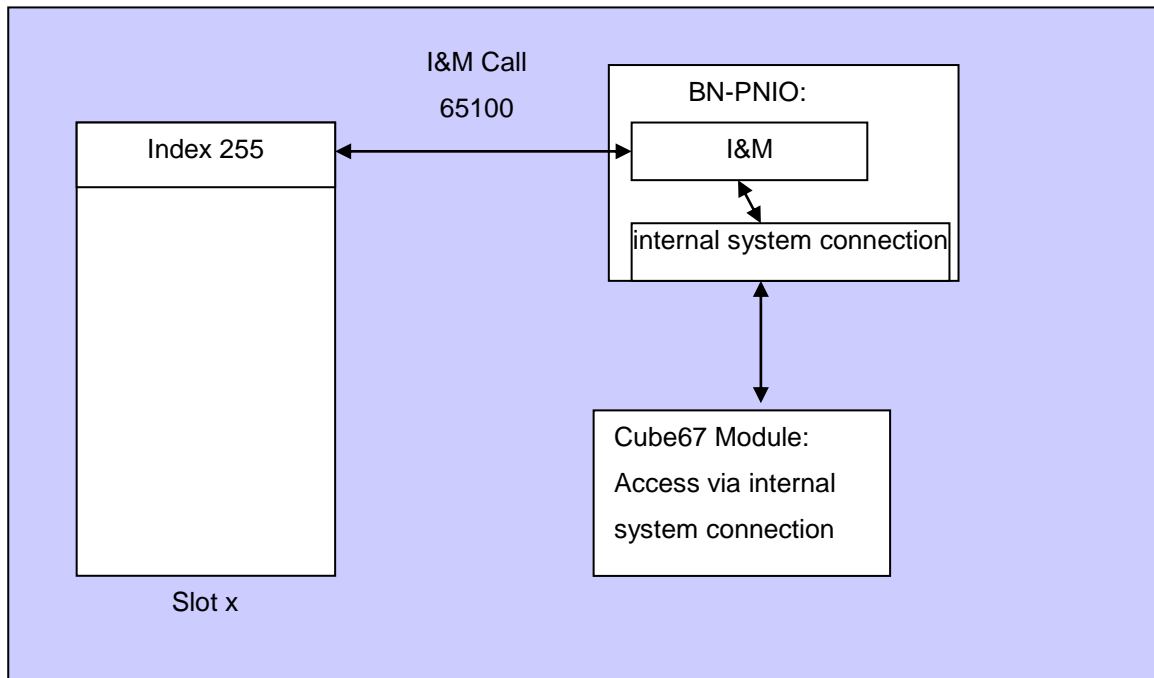


Fig. 34: Index 100 access to Cube67+ BN-PNIO or Cube67 modules

You can have write or read access to the parameter bytes of modules using the manufacturer-specific Index 100.



If the outputs of an analog module are enabled or reparameterized using DP-V1 IM100 accesses, it is necessary to reset the output data to 0 during the access. On completion of reparameterization, the output data can be re-updated

## Example:

In the simple example below, we will show you how to disable the channel of an analog output module using two Index 100 accesses and then enable another channel of the same module to switch a sensor off and switch another one on. This example was created using a Siemens controller. The requests were executed using modules that you can find in the download section of the Murrelektronik web site.

### Configuration











0	 Cube67-BN-PNIO	56526			2042*	
X1	 Cube67+BN-PNIO				2041*	
X1	 Port 1				2040*	
X1	 Port 2				2039*	
1	 Power Supply				2038*	
2						
3	 Branch 0				2037*	
4	 56710 AD4 C 4xM12 (U)	56710		256...263		
5	 Branch 1				2036*	
6	 Branch 2				2035*	
7	 Branch 3				2034*	

Fig. 35: Configuration example

Channel 0 of Module 56710 is enabled for the range 0 to 10 V.



The parameters in detail:

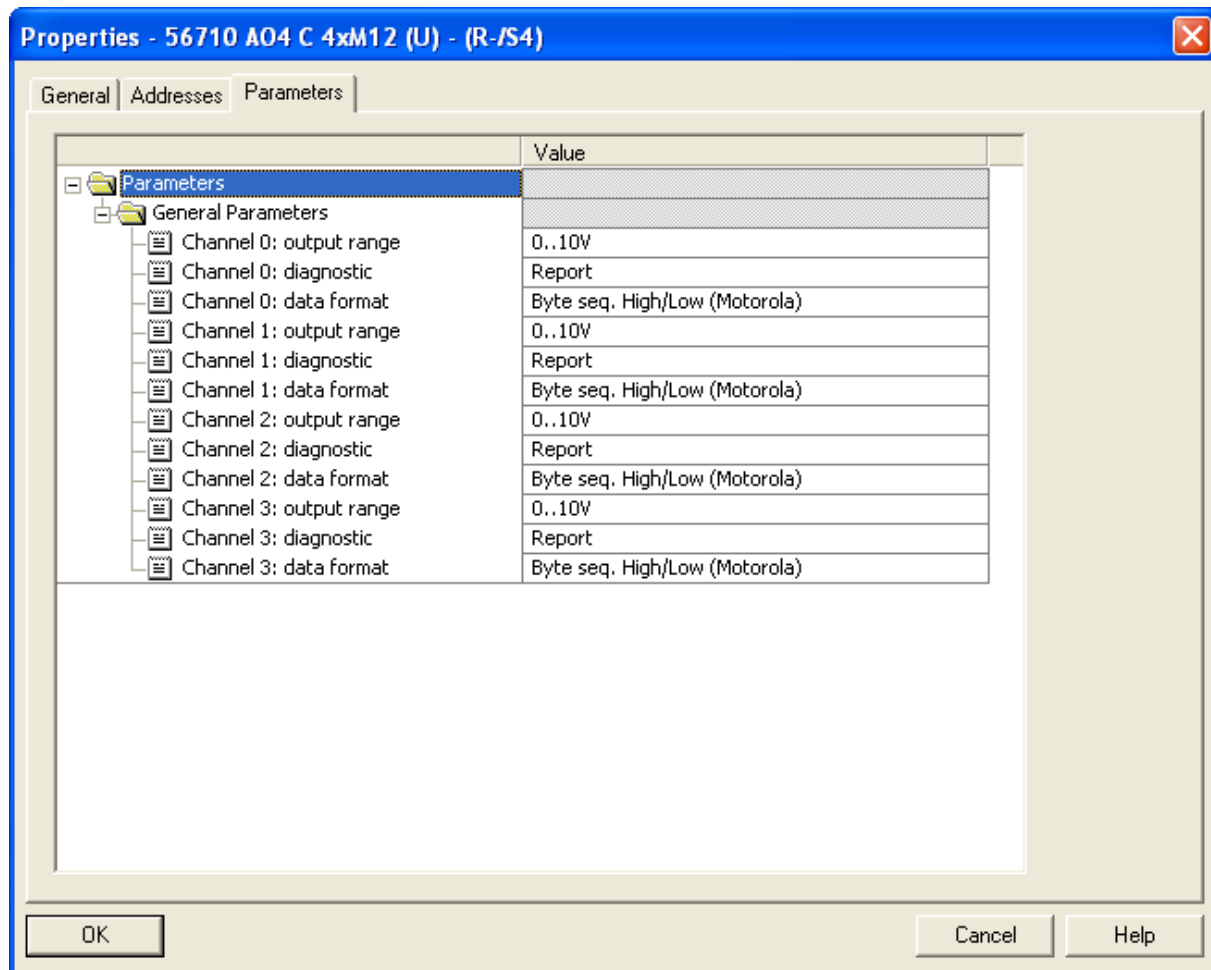


Fig. 36: Module characteristics

The current hex parameterization of the module is 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00. This is also described in the parameter assignment of Module Art.-No.56710 (excerpt from Cube67+ BN-P Manual (Art.-No. 56980):

Bit assignment of parameter byte 0 (Channel 0), 4 (Channel 1), 8 (Channel 2), 12 (Channel 3)

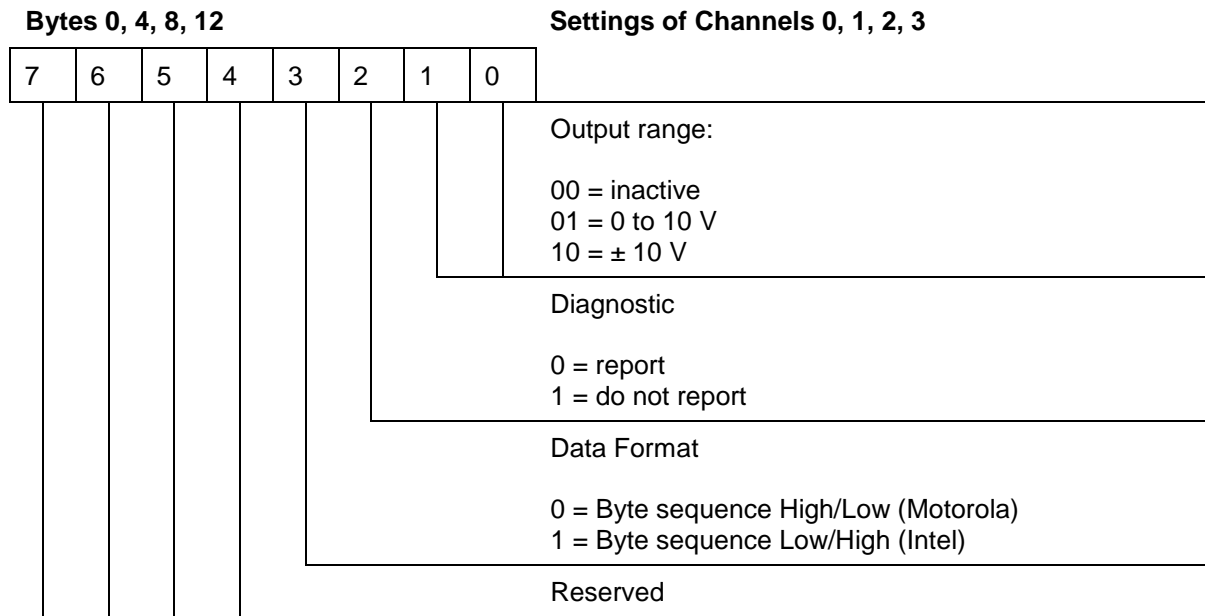


Fig. 37: Bit assignment of parameter bytes 0, 4, 8, 12

## Disabling Channel 0 of Module Art.-No. 56710

To change the module parameters using Index 100 accordingly, the following Write Request must be sent:

5F 03 FF 08 08 00 FE 4C A0 01 01 00

Meaning of the numerals in detail (all hexadecimal):

5F	Write Request
03	Slot Number
FF	Number of used index (255dec = IM)
08	Number of useful data in bytes
08	Call Function
00	Reserved
FE 4C	(65100 dec) = IM100
A0 01	Index 20 01, here, the highest bit is set (2+8 = A), this means write access.
01	The first parameter byte (parameter byte 0) is processed.
00	The parameter to be written for the selected bytes:

The Write Request is followed by a reply telegram with the written data length.

After this must come a Read Request (without parameters).

5E 03 FF 08

Meaning of the numerals in detail (all hexadecimal):

5E	Read Request
03	Slot Number
FF	Number of used index (255dec = IM)
08	Number of useful data in bytes

The parameter change was successful; Channel 0 is now set to "disabled".

**Enabling Channel 1 for the range 0 to 10 V**

---

Value 1 must be set for parameter byte 4.

---

Telegram data in detail:

5F 03 FF 08 08 00 FE 4C A0 01 05 01

Meaning of the numerals in detail (all hexadecimal):

5F	Write Request
03	Slot Number
FF	Number of used index (255dec = IM)
08	Number of useful data in bytes
08	Call Function
00	Reserved
FE 4C	(65100 dec) = IM100
A0 01	Index 20 01, here, the highest bit is set ( $2+8 = A$ ), this means write access.
05	The 5th parameter byte (parameter byte 4) is processed.
01	The parameter to be written for the selected bytes:

After this must come a Read Request (without parameters).

The parameter change was successful; Channel 1 is now enabled for the range 0 to 10 V.



---

In the download section of the Murrelektronik web site, you will find STEP7 libraries that contain the modules for IM accesses: [onlineshop.murrelektronik.com](https://onlineshop.murrelektronik.com)

---

## 7. Machine Options Management

### 7.1 Maximum Configuration

The Machine Options Management helps you to carry out the modular configuration of machines. When a machine comprises a base module A and an optional machine module B, you can use the Machine Options Management to disable modules belonging to the – non-existent – machine module B.

This is done by configuring all modules in the configuration tool, even the optional modules of machine module B. This configuration is called the "Maximum Configuration". In addition, the "Machine Options Mngt." module must be added to the slot. The system then reports an error after booting that the correct configuration was not yet set, irrespective of the received configuration or parameterization. The bus node reverts to data exchange, however, the data are not updated.

We will describe Machine Options Management by means of an example.

Here is the maximum configuration:

Slot	Module	Order number	I Address	Q address	Diagnostic address	Comment
0	Cube67-BN-PNIO	56526			2042*	
X1	Cube67+ BN-PNIO				2041*	
X1A	Port 1				2040*	
X1A	Port 2				2039*	
1	Power Supply				2038*	
2	Machine options mngt.				2036*	
3	Branch 0				2037*	
4	56601 DIO16 E 8xM12	56601	0...1	0...1		
5	56701 AI4 E 4xM12 (U)	56701	256...263			
6	56711 AO4 E 4xM12 (U)	56711		256...263		
7	Branch 1				2035*	
8	56601 DIO16 E 8xM12	56601	2...3	2...3		
9	Branch 2				2034*	
10	Branch 3				2033*	

Fig. 38: Maximum configuration

## 7.2 Selecting Modules and Setting a Configuration

When the system is in data exchange, set the configuration you want to use by disabling the slots of unused modules using Index 10 ("Machine Options Management"). Refer to Section 6.1.1 for a detailed description. A configuration test then takes place in the system, i.e. the configuration set by Machine Options Management is compared with the real topology. If this test is successful, the configuration is valid and the system continues with data exchange. If the test is not successful, the configuration is invalid and a diagnostic is output (missing or incorrect module).

The result of the test can be requested using Index 13 ("Machine Options Management configuration Test"). You will find a detailed description of this in Section 6.1.3.

If an invalid configuration is detected, you can try and set a valid configuration using Machine Options Management.

In our example, only the modules in Slots 1, 4, and 5 really exist. Slots 3, 7, 9, and 10 are occupied by branch modules that must be present. The modules in Slots 6 and 8 do not exist. They are disabled by write access to Index 10.

Slot	Module	Order number	I Address	Q address	Diagnostic address	Comment
0	Cube67-BN-PNIO	56526			2042*	
X1	Cube67+ BN-PNIO				2041*	
X1 A	Port 1				2040*	
X1 A	Port 2				2039*	
1	Power Supply				2038*	
2	Machine options mngt.				2036*	
3	Branch 0				2037*	
4	56601 DI016 E 8xM12	56601	0...1	0...1		
5	56701 AI4 E 4xM12 (U)	56701	256...263	256...263		
6	56711 AO4 E 4xM12 (U)	56711		256...263		
7	Branch 1				2035*	
8	56601 DI016 E 8xM12	56601	2...3	2...3		
9	Branch 2				2034*	
10	Branch 3				2033*	

Fig. 39: Example of an invalid configuration

In the real setup, the red bordered modules are missing (Slots 6 and 8).

## Telegram data in detail:

50 00 00 00 00

Meaning of the numerals in detail (all hexadecimal):

28	1. Parameter byte (Parameter byte 0)
00	2. Parameter byte (Parameter byte 1)
...	...
00	5. Parameter byte (Parameter byte 4)

Bit pattern of parameter bytes:

Byte 0

Bit value:	0	0	1	0	1	0	0	0	Hex: 28
Slot number:	10	9	8	7	6	5	4	3	

Byte 1:

Bit value:	0	0	0	0	0	0	0	0	Hex: 00
Slot number:	18	17	16	15	14	13	12	11	

Bytes 2 to Byte 4 are also 0, like Byte 1.




---

The Write Request receives a positive reply telegram if it was successful. This is irrespective or whether the present configuration is valid or not

---

## 7.3 Configuration Test

Check whether a valid configuration is present by checking at Index 13 using Read Request.

If "Machine Options Management" is set as the default configuration, a positive reply telegram is generated. It contains a 01 for a valid configuration and completed parameterization, and a 00 in all other cases. If the configuration is valid, the system continues with useful data exchange. If diagnostics are received, they are displayed, provided they were not disabled in the bus node parameters.

If the configuration is invalid, the system does not continue with useful data exchange. Instead, a diagnostic is sent and indicates the first slot error.

In our example, the configuration is valid. The system is now in data exchange mode.



---

If a valid configuration was set, it is not possible to set any other configurations using Machine Options Management. A negative reply telegram is sent.

---

To find out what parameters were sent using Index 10, a Read Request can also be set to Index 10 and it returns the written parameters. If nothing was written, zeros are returned.



---

If a bit is set for a slot that does not exist (example: Slots 1 to 9 are occupied and mask 00 00 02 00 00 is set (= Slot 20 is disabled), this bit is ignored.

---



## 7.4 Changing a Module

If you want to change modules, i.e. change your real set-up, please proceed as follows:

Disable all branches using Index 12 "Bus Control".

Replace the modules.

Reset the bus node using Index 12 "Bus Control".

Set a valid configuration using Index 10.

Test whether the configuration is valid.

### Example: Changing a Module

Disable the branches using Index 12.

Telegram data in detail:

01 00

Meaning of the digits in detail (all hexadecimal):

- |    |   |
|----|---|
| 01 | 1. Parameter byte: Disable US/UA on all branches. |
| 00 | 2. Parameter byte                                 |

Now UA/US are disabled. The system indicates a configuration error. When they are within the normal range, the bus node US and UA LEDs are green and the branch US and UA LEDs are disabled.

Replacing modules

Modules 56601 and 56701 on Branch 0 are removed; one Module 56601 is connected to Branch 1.

## Machine Options Management

Resetting the bus node using 12 "Bus Control"

Telegram data in detail:

00 00

Meaning of the digits in detail (all hexadecimal):

- 00            1. Parameter byte: Reset the bus node.
- 00            2. Parameter byte

The system then reports an error after run-up. The bus node then reverts to data exchange, however, the data are not updated.

Setting a valid configuration using Index 10

Since only the 56601 is connected to Branch 1, Slots 3, 4, and 5 of the non-existent modules are disabled using DP-V1 Index 10 Write Access.

Slot	Module	Order number	I Address	Q address	Diagnostic address	Comment
0	Cube67-BN-PNIO	56526			2042*	
X1	Cube67+ BN-PNIO				2041*	
X1	Port 1				2040*	
X1	Port 2				2039*	
1	Power Supply				2038*	
2	Machine options mngt.				2036*	
3	Branch 0				2037*	
4	56601 DIO16 E 8xM12	56601	0...1	0...1		
5	56701 AI4 E 4xM12 (U)	56701	256...263			
6	56711 AO4 E 4xM12 (U)	56711		256...263		
7	Branch 1				2035*	
8	56601 DIO16 E 8xM12	56601	2...3	2...3		
9	Branch 2				2034*	
10	Branch 3				2033*	
11						

Fig. 40: Example of changing modules

## Machine Options Management

---

Telegram parameters in detail:

0E 00 00 00 00

Meaning of the digits in detail (all hexadecimal):

0E	1. Parameter byte (Parameter byte 0)
00	2. Parameter byte (Parameter byte 1)
...	...
00	5. Parameter byte (Parameter byte 4)

Bit pattern of 1st parameter byte:

Byte 0

Bit value:	0	0	0	0	1	1	1	0	□ Hex: 0E
Slot number:	10	9	8	7	6	5	4	3	

Test whether the configuration is valid.

Check whether a valid configuration is present by using a Read Request at Index 13. If this is the case, the system is in data exchange mode. The module change was successful.

## 8. Cube67+ Modules

### 8.1 Cube67+ DIO12 IOL4 E 8xM12 Art.-No. 56752



The function of the IO link 1.1 module is possible with the software version 2.01 of the 56526 Cube67 ProfiNet bus node!

#### 8.1.1 Connection overview

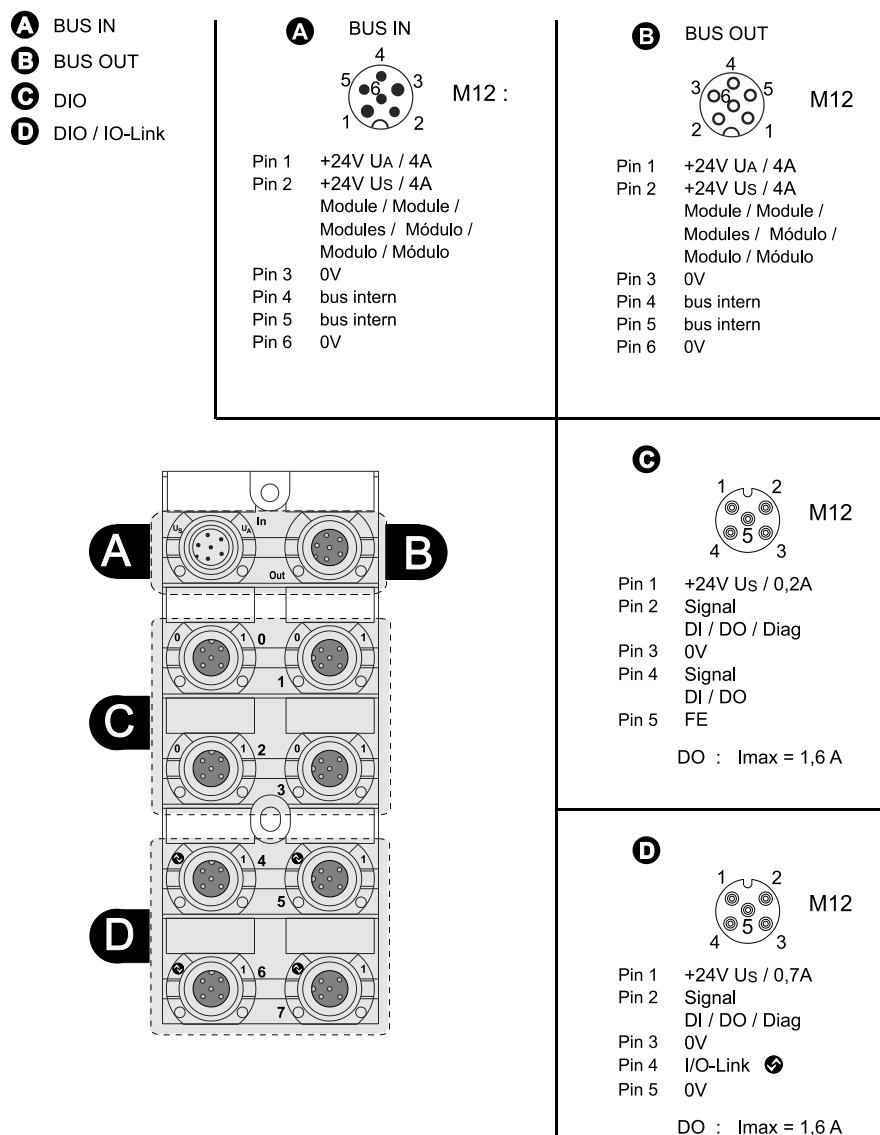


Fig. 41: Pin assignment and terminal overview

## 8.1.2 Baud Rates



The IO link masters of CUBE67+ DIO12 IOL4 E 8xM12 Art.-No. 56752 supports all three IO link baud rates COM1, COM2 and COM3 after IO-Link Communication Specification 1.0.

## 8.1.3 Parameters

Number of parameter bytes: 18

Bit assignment of parameter byte 0

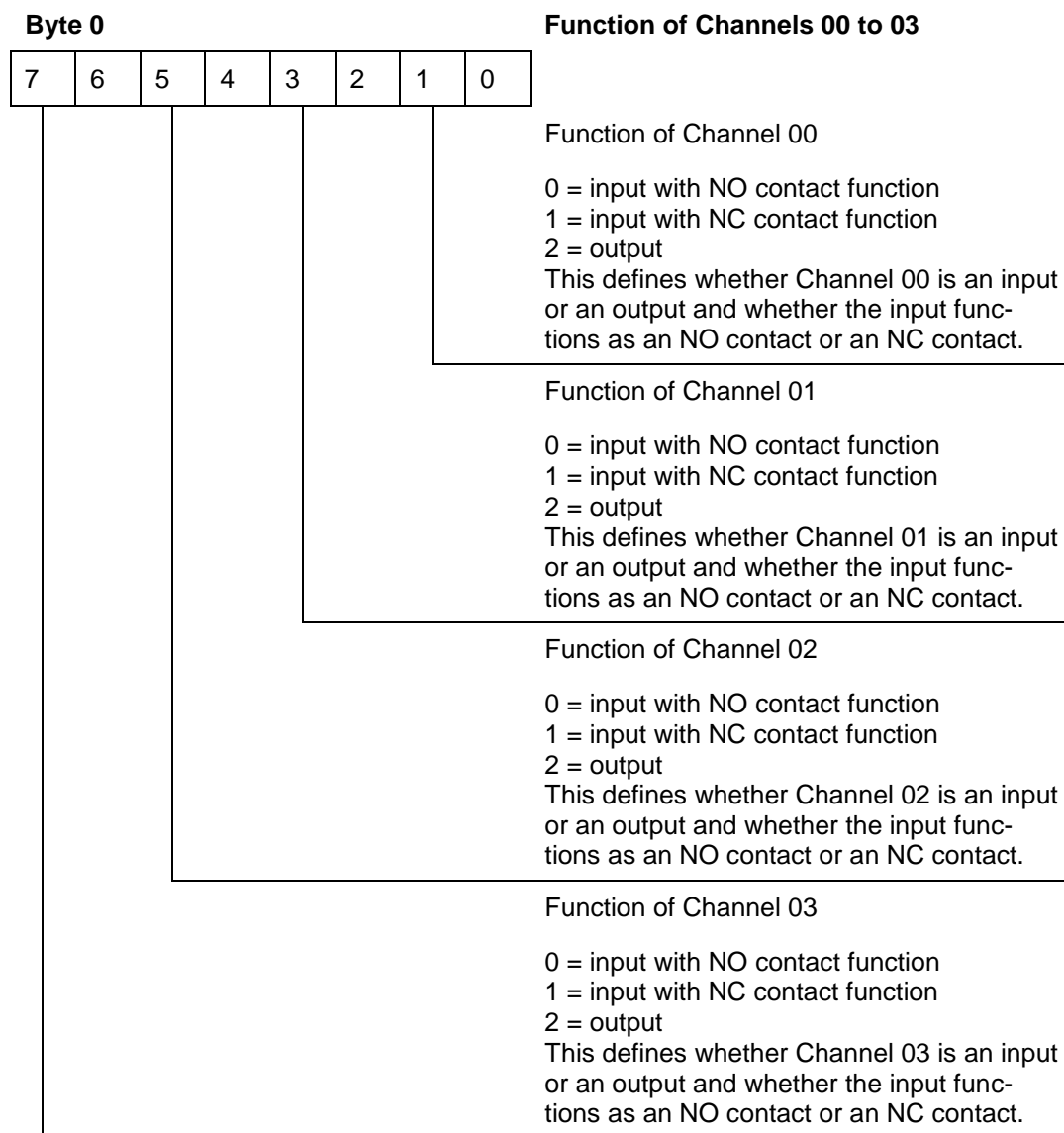


Fig. 42: Parameter byte 0 Art.-No. 56752

Bit assignment of parameter byte 1

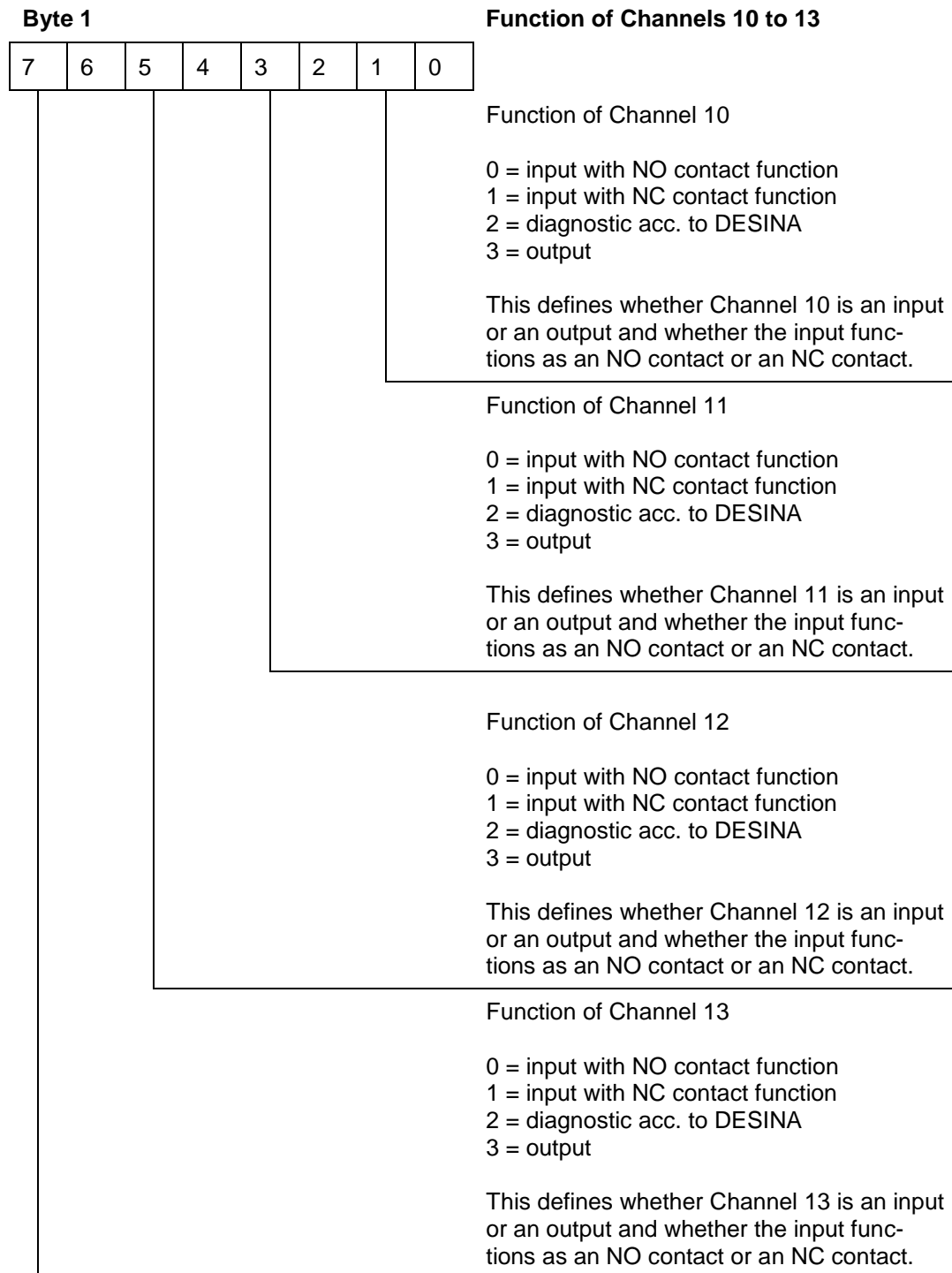


Fig. 43: Parameter byte 1 Art.-No. 56752

Bit assignment of parameter byte 2

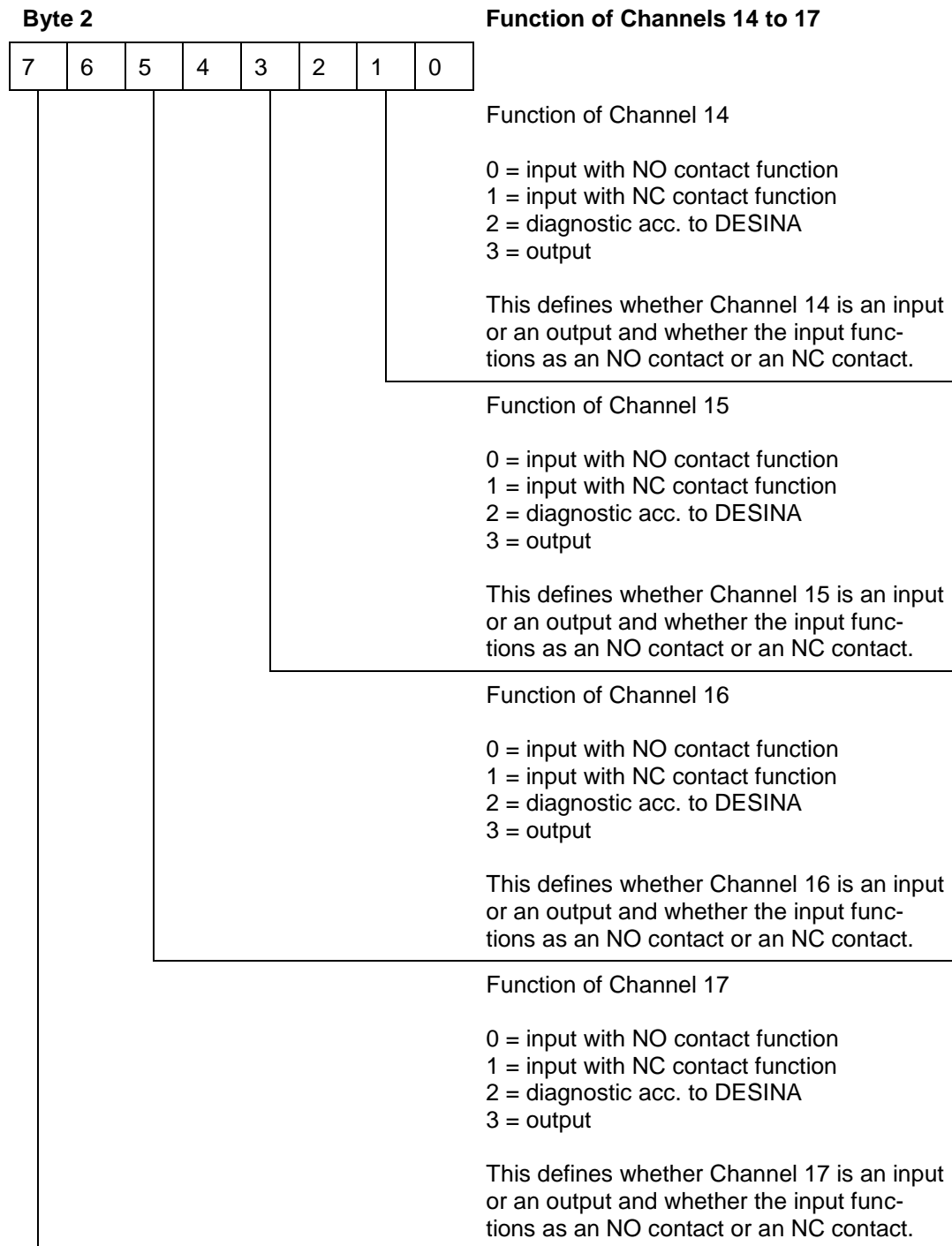


Fig. 44: Parameter byte 2 Art.-No. 56752

0 (Reserved)

Fig. 45: Parameter byte 6 Art.-No. 56752



### Bit assignment of parameter byte 7

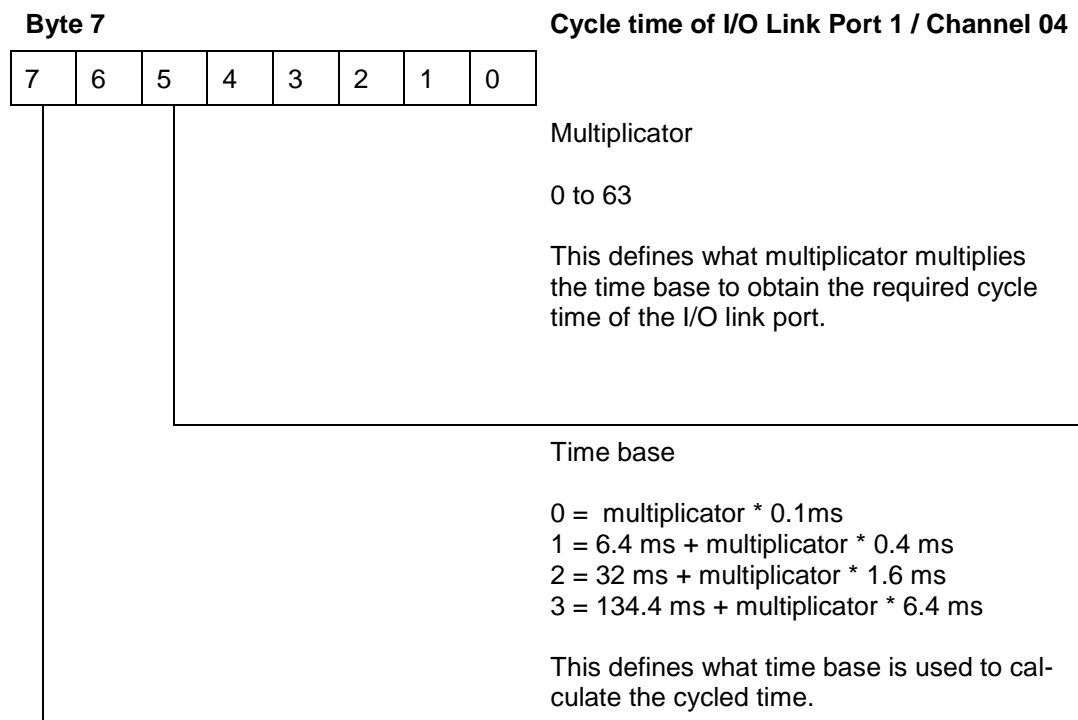


Fig. 46: Parameter byte 7 Art.-No. 56752

### Bit assignment of parameter byte 8

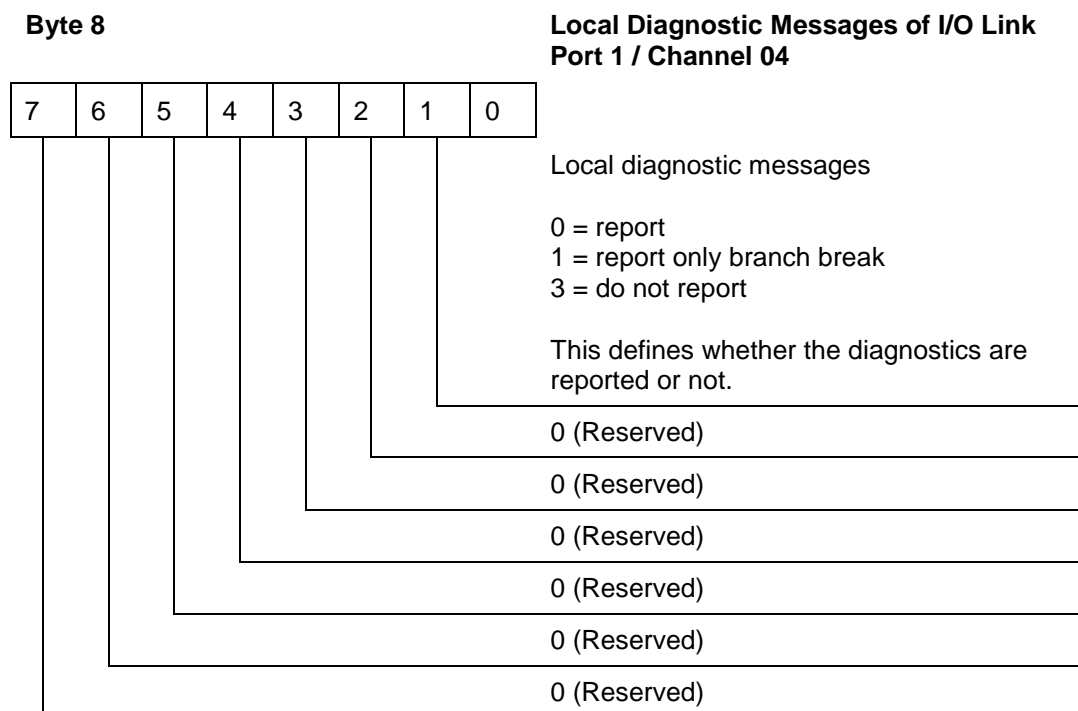


Fig. 47: Parameter byte 8 Art.-No. 56752

Bit assignment of parameter byte 9

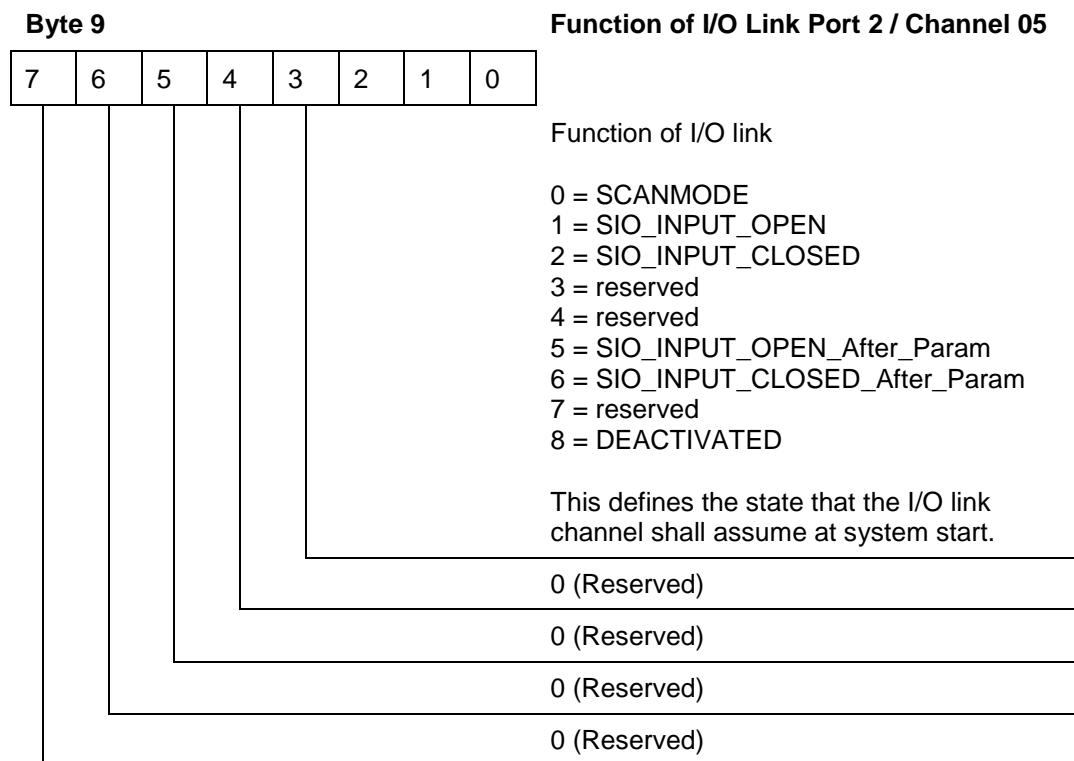


Fig. 48: Parameter byte 9 Art.-No. 56752

Bit assignment of parameter byte 10

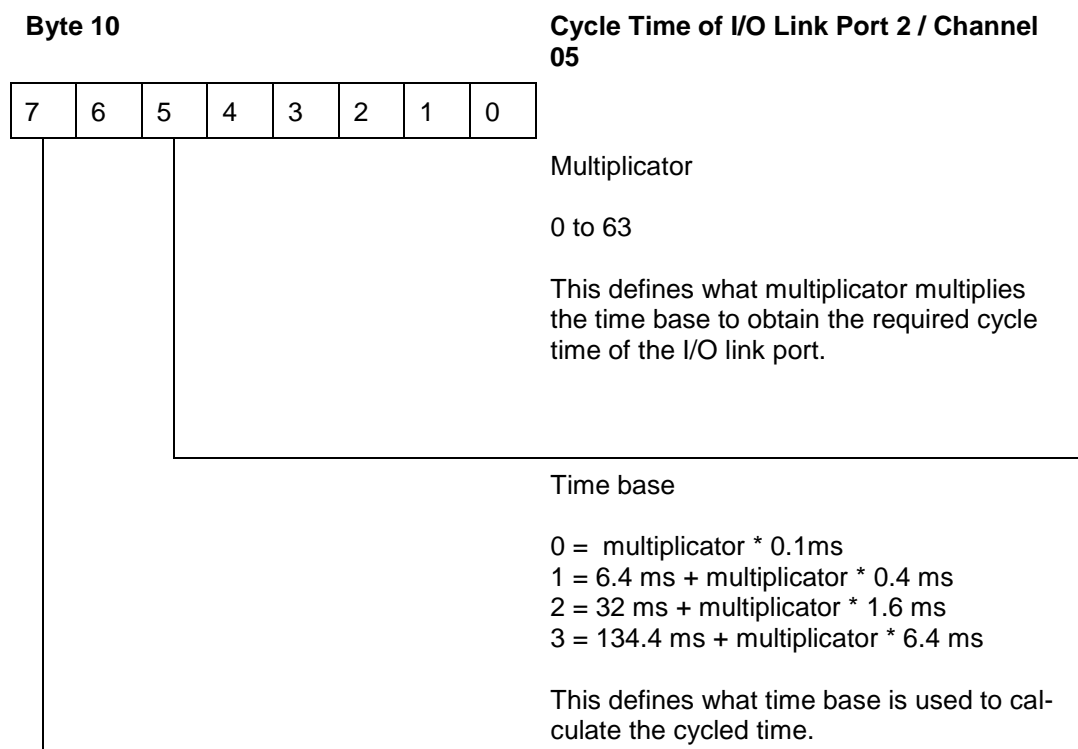


Fig. 49: Parameter byte 10 Art.-No. 56752

Bit assignment of parameter byte 11

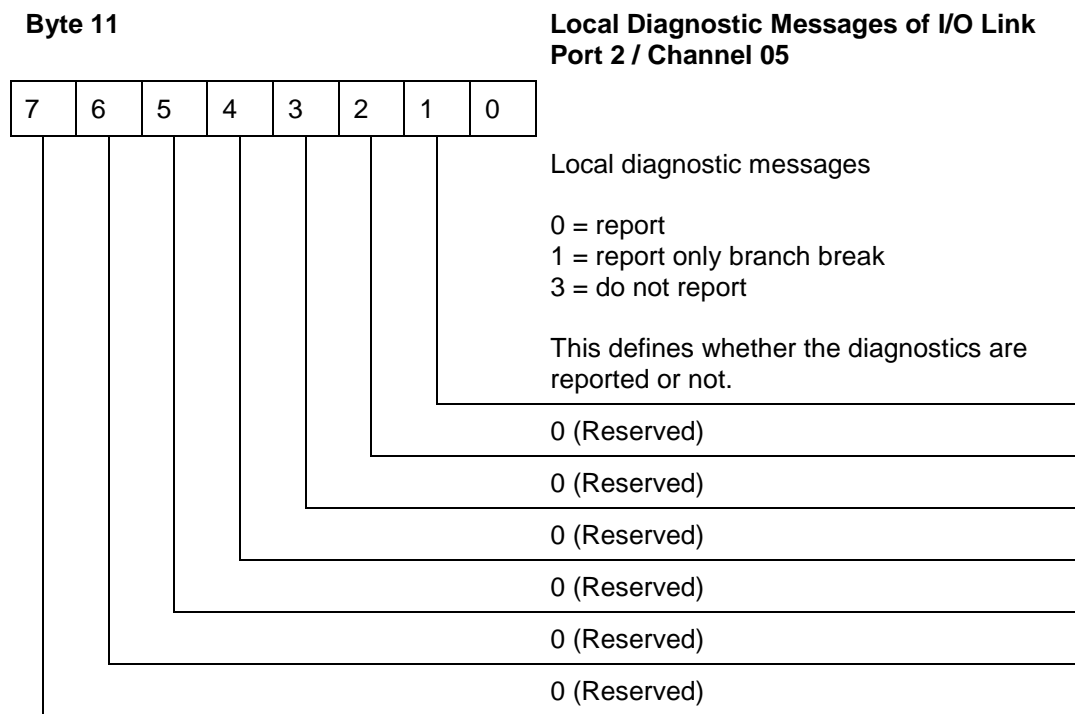


Fig. 50: Parameter byte 11 Art.-No. 56752

Bit assignment of parameter byte 12

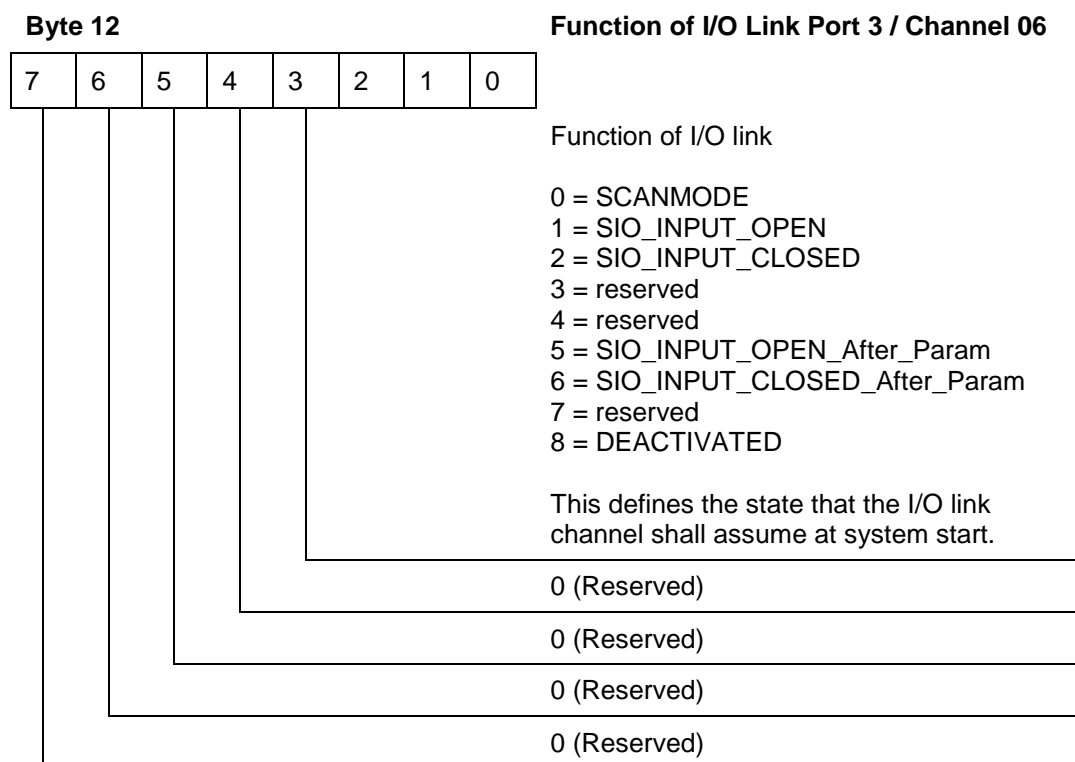


Fig. 51: Parameter byte 12 Art.-No. 56752

Bit assignment of parameter byte 13

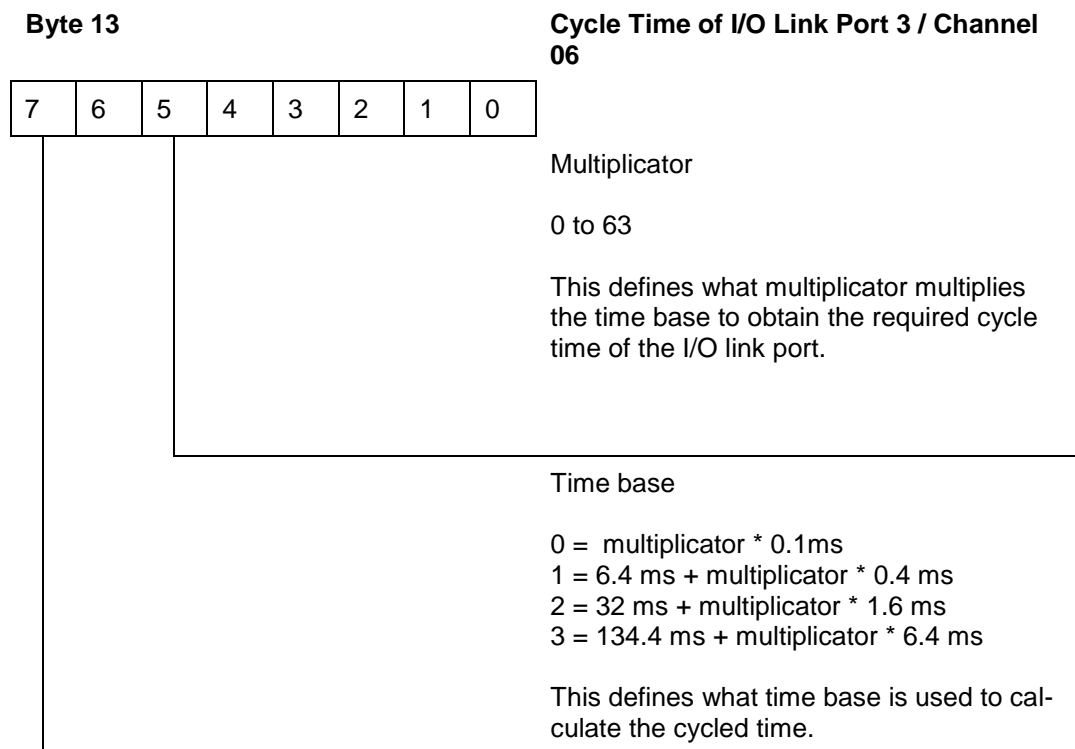


Fig. 52: Parameter byte 13 Art.-No. 56752

Bit assignment of parameter byte 14

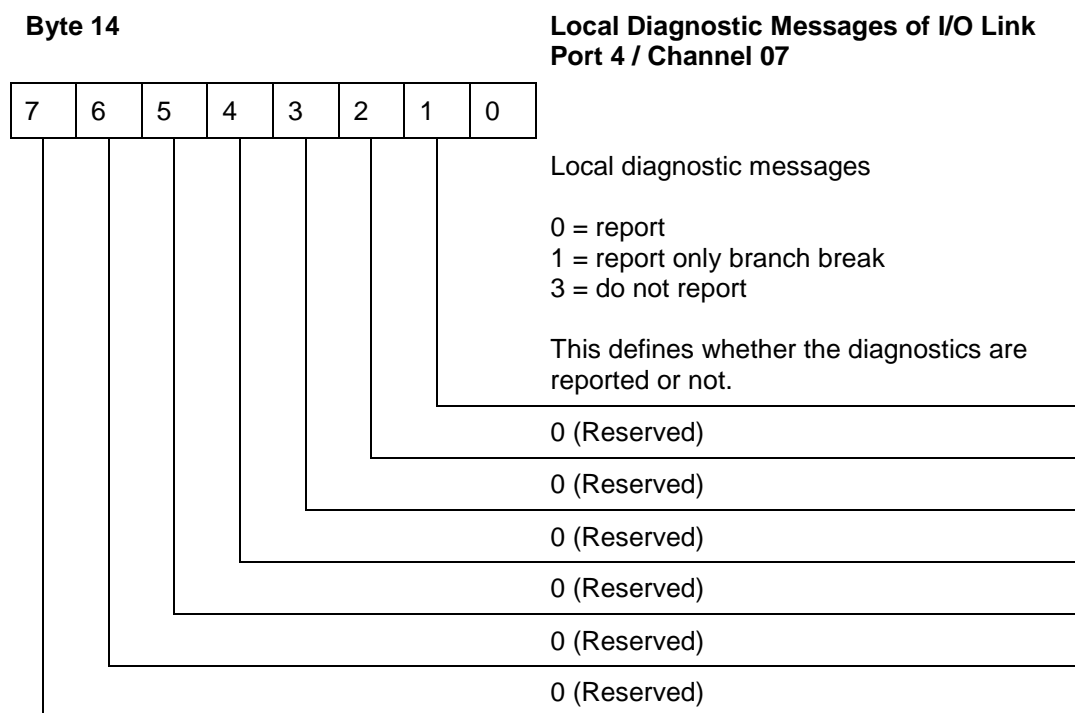


Fig. 53: Parameter byte 14 Art.-No. 56752

Bit assignment of parameter byte 15

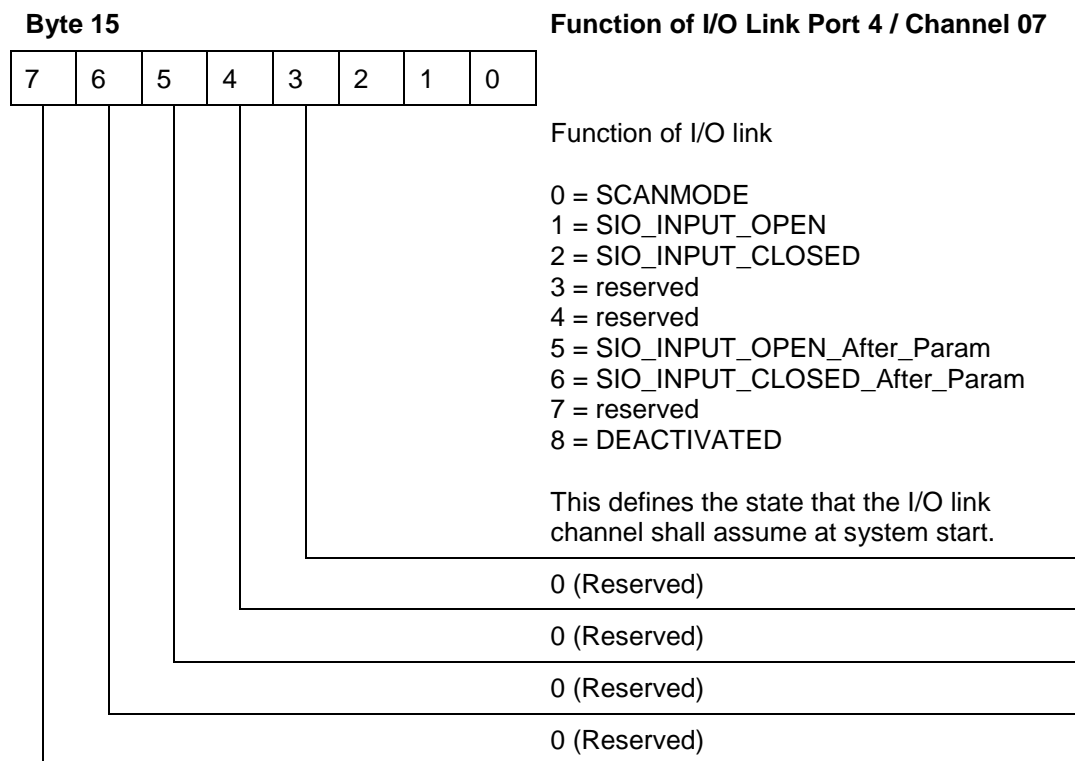


Fig. 54: Parameter byte 15 Art.-No. 56752

Bit assignment of parameter byte 16

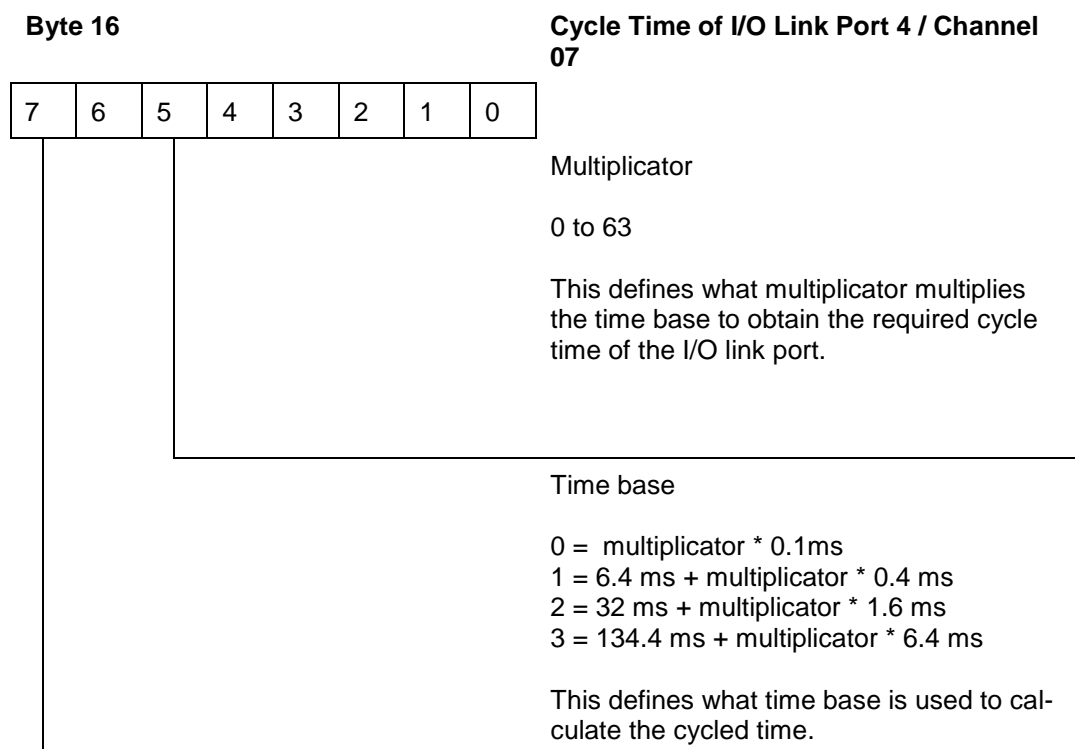


Fig. 55: Parameter byte 16 Art.-No. 56752

Bit assignment of parameter byte 17

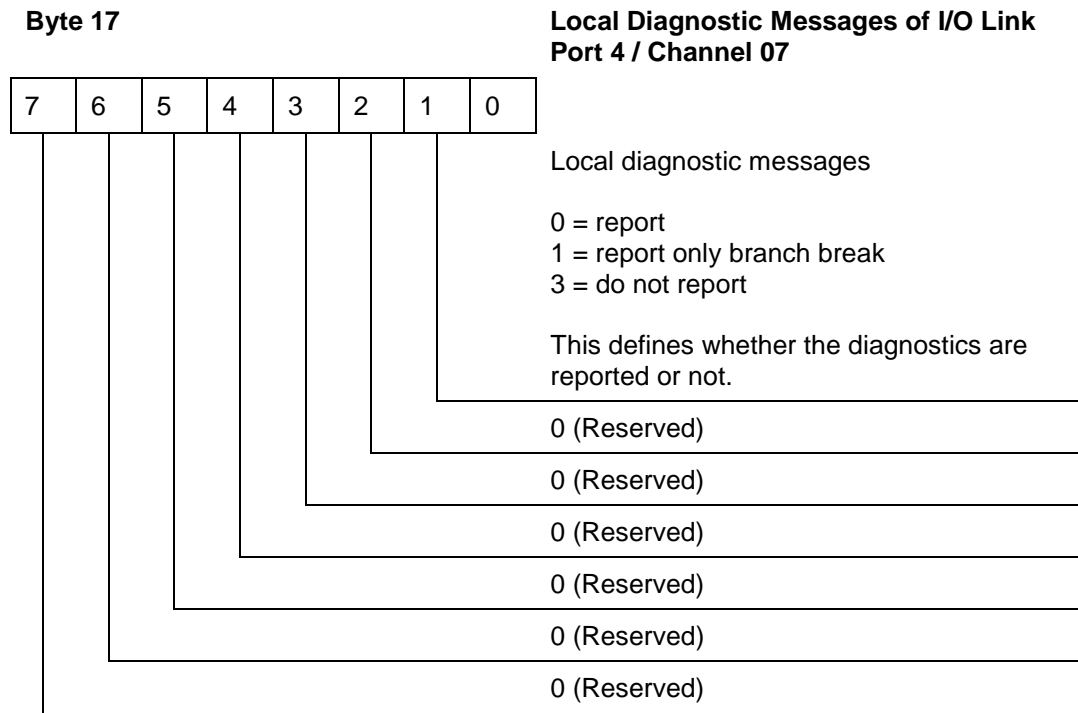


Fig. 56: Parameter byte 17 Art.-No. 56752

## 8.1.4 Data of Cube67+ DIO12 IOL4 E 8xM12

Bit assignment of I/O data – input data PAE

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	7	6	5	4	3	2	1	0

Tab. 12: PAE data byte 1 Art.-No. 56752

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	7	6	5	4	3	2	1	0

Tab. 13: PAE data byte 2 Art.-No. 56752

Bit assignment of I/O data – output data PAA

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	7	6	5	4	3	2	1	0

Tab. 14: PAA data byte 1 Art.-No. 56752

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	7	6	5	4	3	2	1	0

Tab. 15: PAA data byte 2 Art.-No. 56752

In addition to the 2 bytes for PAE and PAA each, the configured I/O Link PAE and PAA bytes are transmitted. The data length in each case depends on the virtual modules used.

### 8.1.5 I&M Functions of Cube67+ DIO12 IOL4 E 8xM12

For communication with the IO link sensors, the Cube67+ DIO12 IOL4 E 8xM12 also supports I&M functions. They are used for communication with the IO link devices as well as to represent module-specific information.

Index 65000 read = IM0 of Cube67+ DIO12 IOL4 E 8xM12

Index 65016 read = IO – Link – MM acc. to specification

Index 65017 read = IM17 information from IO – Link Port 1

Index 65018 read = IM18 information from IO – Link Port 2

Index 65019 read = IM19 information from IO – Link Port 3

Index 65020 read = IM20 information from IO – Link Port 4

Index 65098 read and write = communication channel to connected IO link devices

Index 65099 read = IO – Link Master Directory



I&M queries must always be requested at the slot of the Cube67+ DIO12 IOL4 E 8xM12. For port-related IO link queries via IM98 (65098), the requested port is contained in the I/O link protocol (Ports 1 to 4).

## 8.2 Cube67+ DIO4 RS232/485 E 4xM12 Art.-No. 56761

### 8.2.1 Connection overview

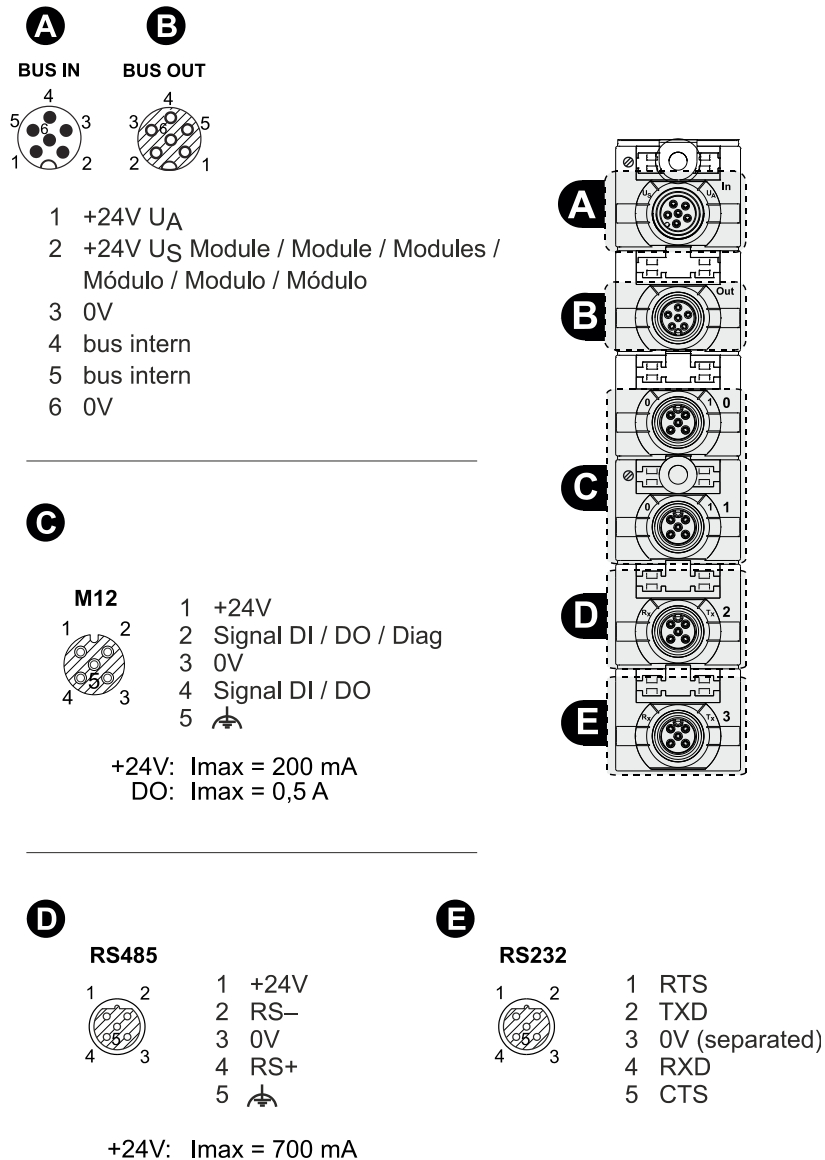


Fig. 57: Pin assignment and connection overview



## 8.2.2 SEW-MOVILINK Useful Data Protocol

The base module "Cube67+ DIO4 MOVIMOT E 4xM12" supports the SEW-MOVILINK protocol from SEW-Eurodrive GmbH & Co. KG. The following protocol data are supported:

- MOVIMOT address fixed 1
- PA useful data type 3 (2 words cyclic) for virtual module MOVIMOT\_TX\_2 Word
- PA useful data type 5 (3 words cyclic) for virtual module MOVIMOT\_TX\_3 Word
- PE useful data 2 words (status word 1, current) for virtual module MOVIMOT\_RX\_2 Word
- PE useful data 3 words (status word 1, current, and status word 2) for virtual module MOVIMOT\_RX\_3 Word
- Automatic generation of block check character (BCC) in PA useful data
- Automatic evaluation of block check character (BCC) in response telegram
- Automatic timeout watchdog

## 8.2.3 Parameters

Number of parameter bytes: 9

The detailed descriptions of the functions are in Sections 6.2.2.1 through 6.2.2.7.

Bit assignment of parameter byte 0

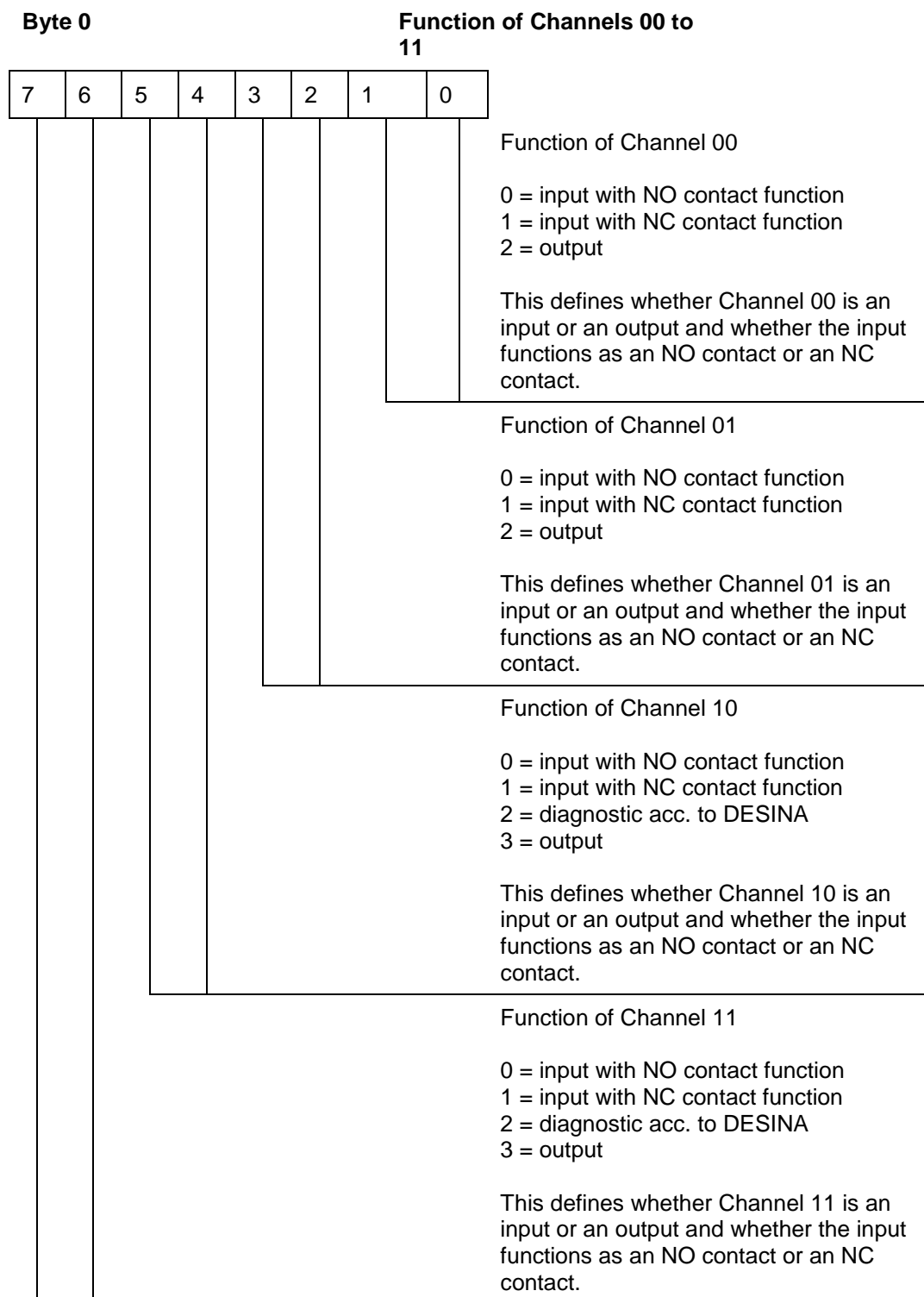
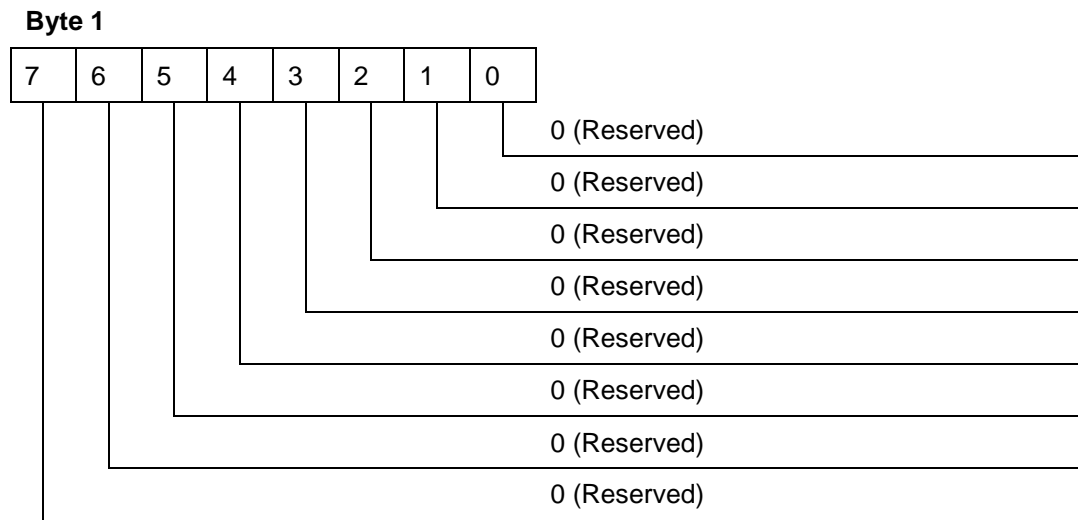


Fig. 58: Parameter byte 0 Art.-No. 56761

Bit assignment of parameter byte 1



*Fig. 59: Parameter byte 1 Art.-No. 56761*

# Bit assignment of parameter byte 2

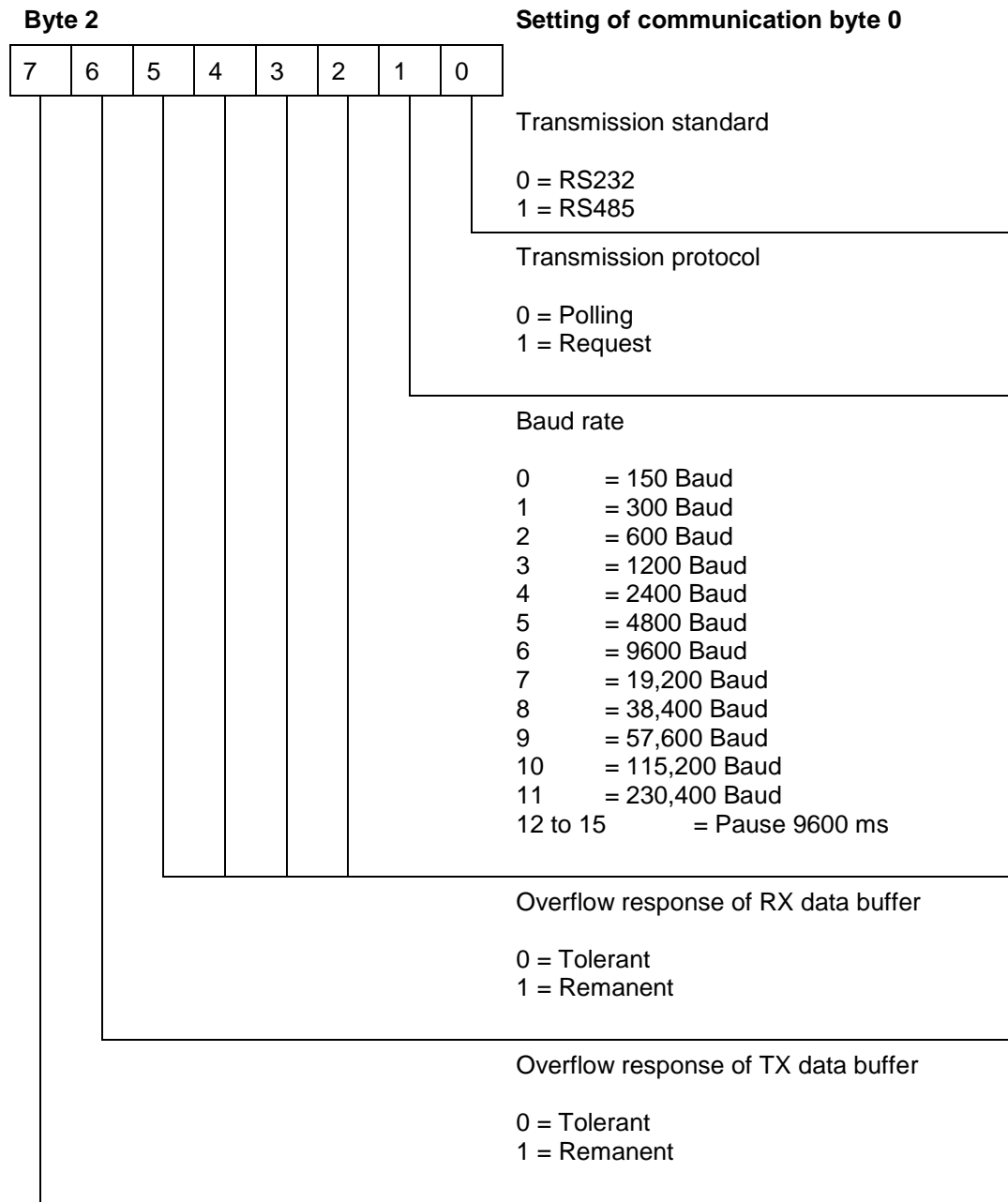


Fig. 60: Parameter byte 2 Art.-No. 56761

# Bit assignment of parameter byte 3

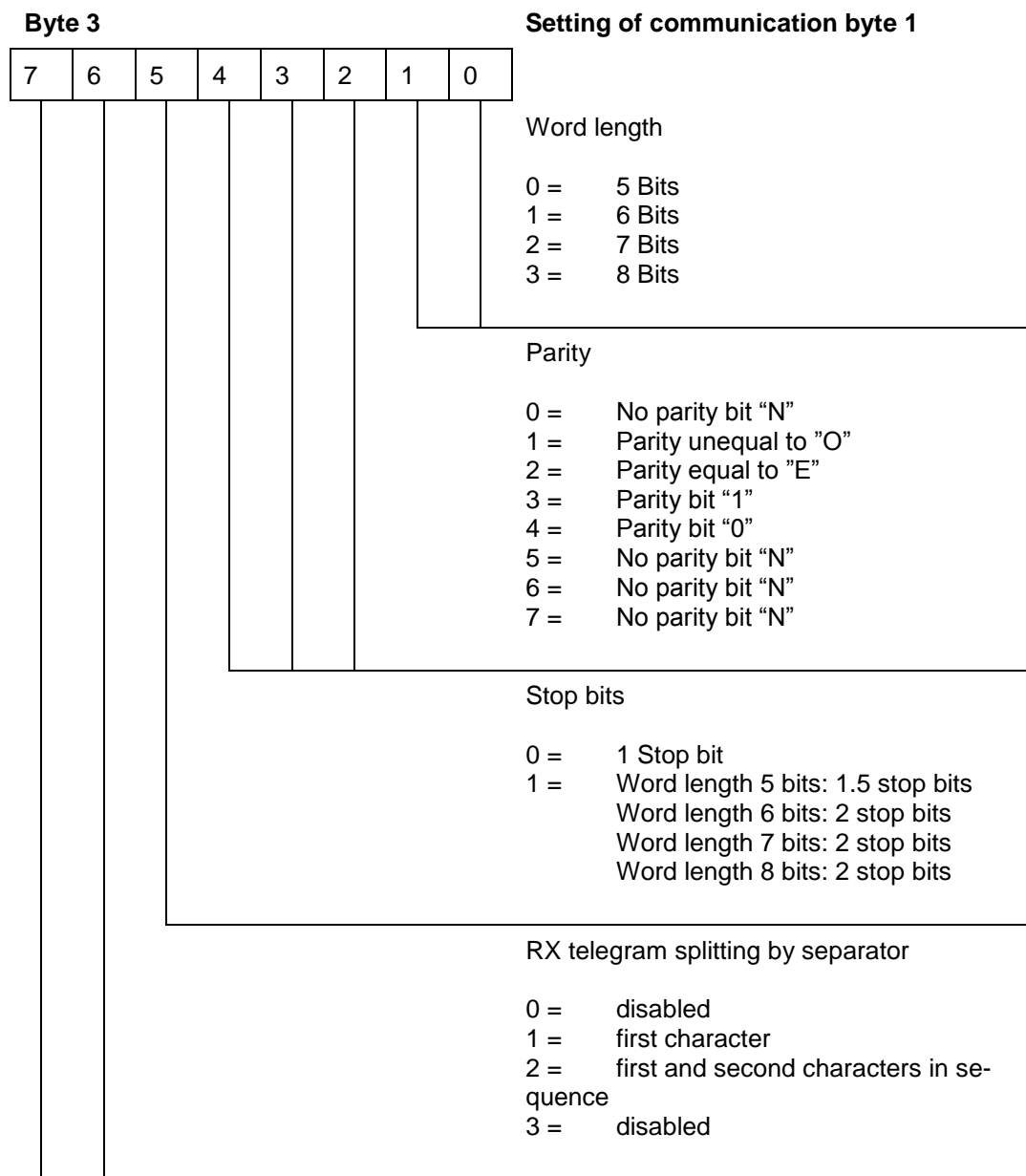


Fig. 61: Parameter byte 3 Art.-No. 56761

Bit assignment of parameter byte 4

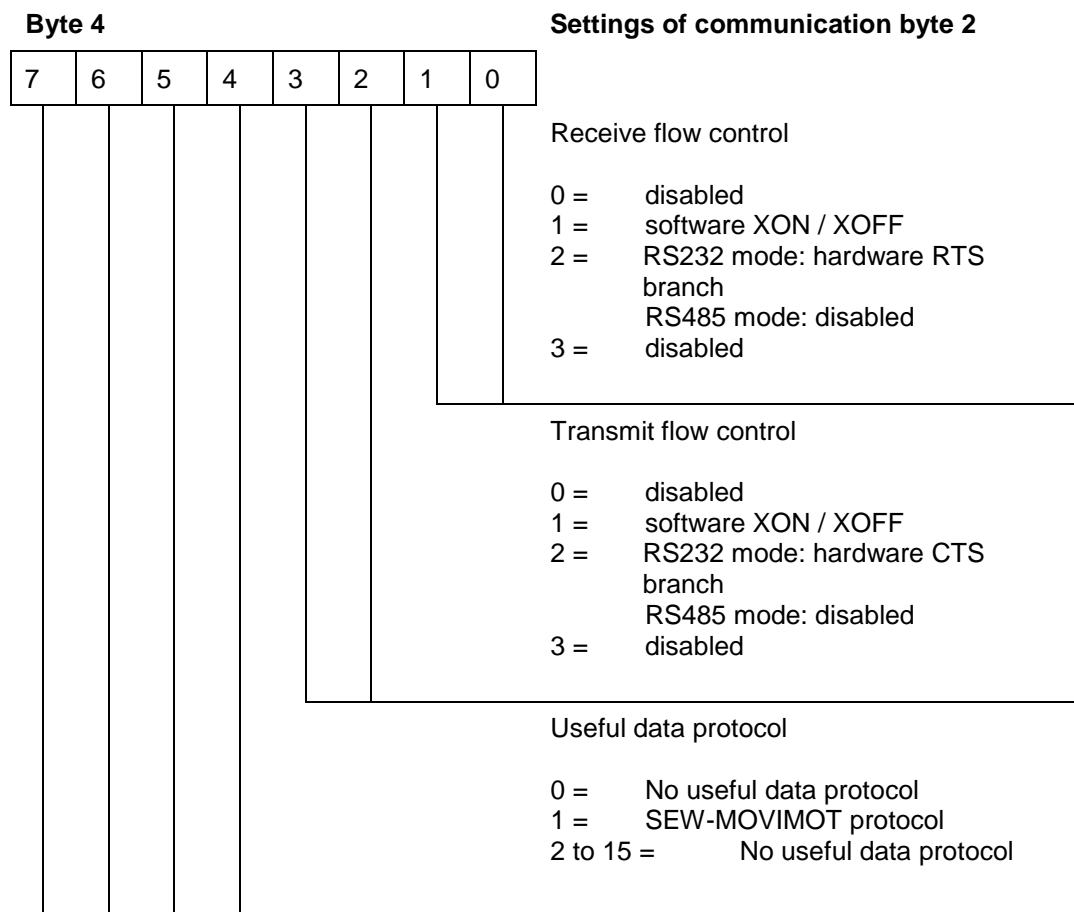


Fig. 62: Parameter byte 4 Art.-No. 56761

Bit assignment of parameter byte 5

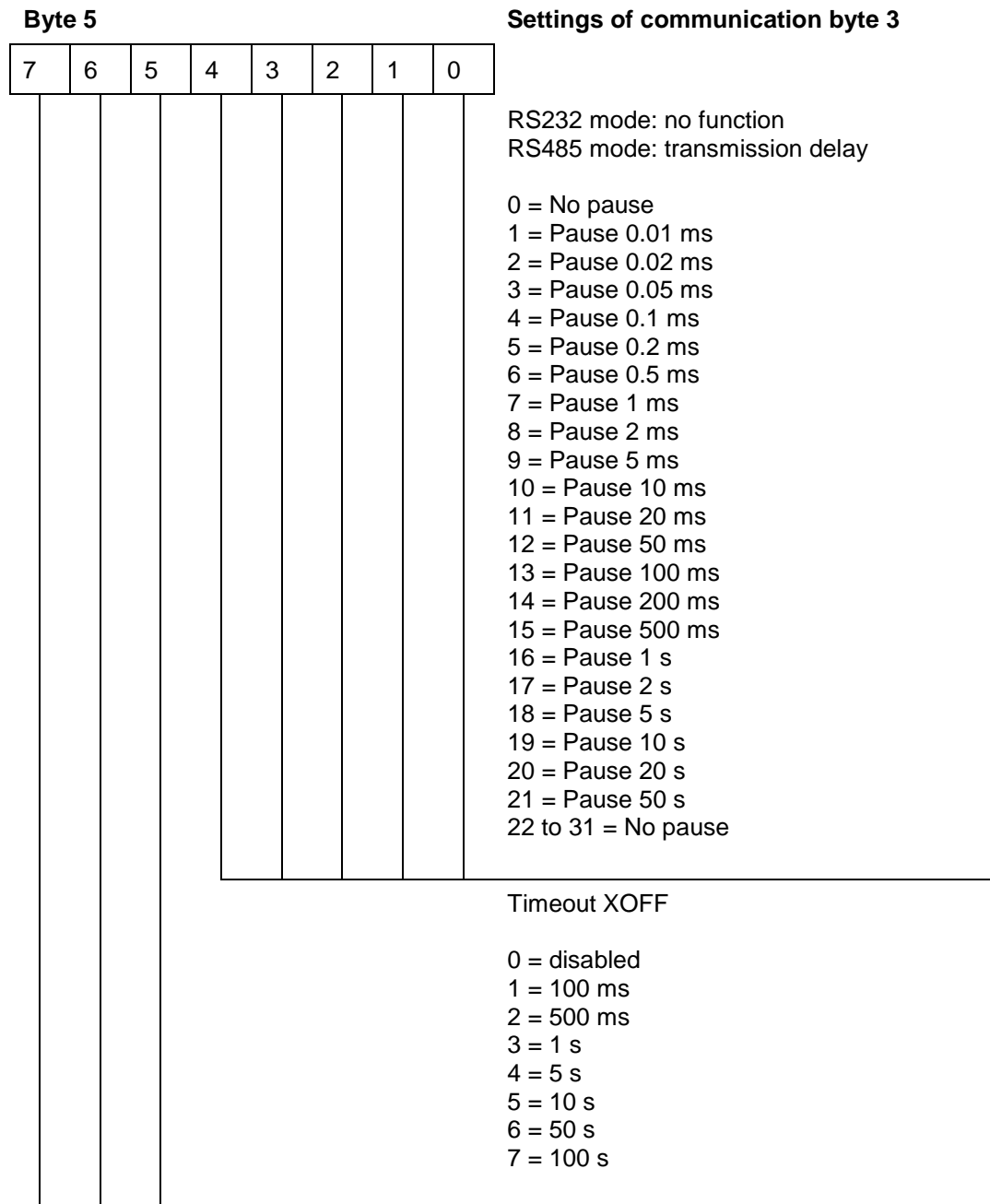


Fig. 63: Parameter byte 5 Art.-No. 56761

Bit assignment of parameter byte 6

Byte 6								Settings of communication byte 4							
7	6	5	4	3	2	1	0								
								RX telegram splitting by pause in receive data							
								0 = disabled 1 = Pause 0.01 ms 2 = Pause 0.02 ms 3 = Pause 0.05 ms 4 = Pause 0.1 ms 5 = Pause 0.2 ms 6 = Pause 0.5 ms 7 = Pause 1 ms 8 = Pause 2 ms 9 = Pause 5 ms 10 = Pause 10 ms 11 = Pause 20 ms 12 = Pause 50 ms 13 = Pause 100 ms 14 = Pause 200 ms 15 = Pause 500 ms 16 = Pause 1 s 17 = Pause 2 s 18 = Pause 5 s 19 = Pause 10 s 20 = Pause 20 s 21 = Pause 50 s 22 to 31 = Pause 1 ms							
								Splitting of RX/TX buffer							
								0 = 0.5/3.5 k (Rx: 0.5 kByte, Tx: 3.5 kByte) 1 = 1/3 k (Rx: 1 kByte, Tx: 3 kByte) 2 = 1.5/2.5 k (Rx: 1.5 kByte, Tx: 2.5 kByte) 3 = 2/2 k (Rx: 2 kByte, Tx: 2 kByte) 4 = 2.5/1.5 k (Rx: 2.5 kByte, Tx: 1.5 kByte) 5 = 3/1 k (Rx: 3 kByte, Tx: 1 kByte) 6 = 3.5/0.5 k (Rx: 3.5 kByte, Tx: 0.5 kByte) 7 = 2/2 k (Rx: 2 kByte, Tx: 2 kByte)							

Fig. 64: Parameter byte 6 Art.-No. 56761



Bit assignment of parameter byte 7

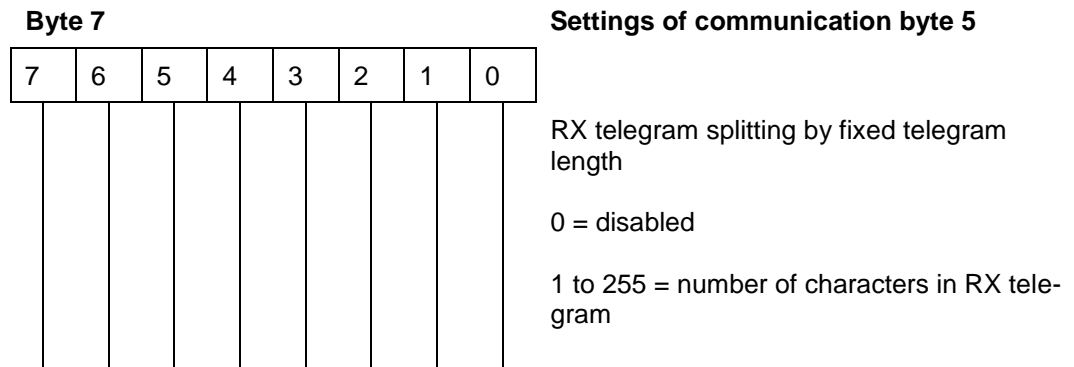


Fig. 65: Parameter byte 7 Art.-No. 56761

Bit assignment of parameter byte 8

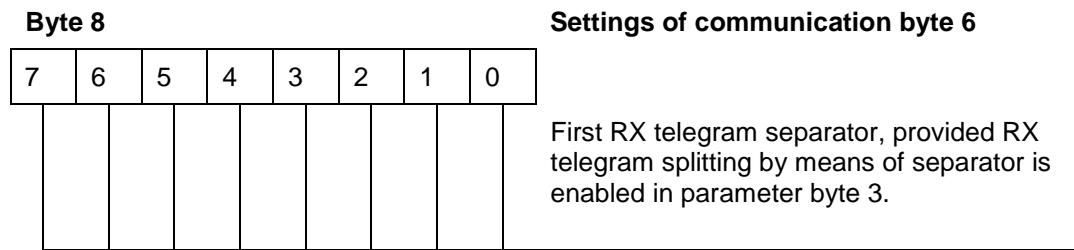


Fig. 66: Parameter byte 8 Art.-No. 56761

Bit assignment of parameter byte 9

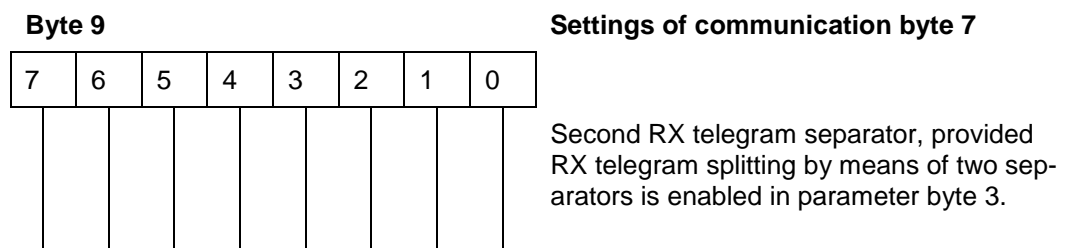


Fig. 67: Parameter byte 9 Art.-No. 56761

### 8.2.3.1 RX Telegram Segregation



RX telegram segregation is not used in the base module "Cube67+ DIO4 MOVIMOT E 4xM12" and it is therefore not parameterizable.

The characters continuously received from the communication interface are mapped on the fieldbus in the communication input data. Sequences of received characters are mapped in the form of segregated telegrams. The telegrams can be limited by various independent mechanisms:

#### Segregating by Separators



This mechanism is suitable for receive data that do not contain every character and that have no fixed length

One or two separators may be defined to segregate the telegrams.

##### Segregating Telegrams

##### Condition

1 separator	When the first separator occurs in the receive data
2 separators	When the first separator occurs in the receive data and the next character in the receive data corresponds to the second separator.

The separators are represented in the communication input data. The two separators are 0 in the presetting.



Make sure that the selected separator(s) do(es) not occur in the actual useful data when you define separators yourself

## Segregating by pause (timeout) in the receive data



This mechanism is suitable for receive data which may contain any character and that has no fixed length. It acts as protection against error states resulting from other segregations

---

If the segregation is enabled by timeout, telegram segregation takes place when the time lapse between two received characters is greater than the timeout setting. The telegram is only placed in the receive buffer when the timeout expires. The pause time only starts and ends after full characters are received, i.e. the time is measured between the end of the current character and the start of the next character.

## Segregating by fixed telegram length



This mechanism is suitable for receive data that have a fixed length. In addition, we recommend you to segregate using a sufficiently long timeout to protect against error states

---

A new telegram is formed after a fixed number of characters received.

## Segregating the communication input data



This mechanism is always available and cannot be bypassed

---

If the telegram data length is longer than the maximum data length that can be represented in the communication input data, a new telegram is generated.

The telegram is always segregated if at least one of the four conditions above is fulfilled. The segregated telegram is set in the receive buffer and entered in the communication input data, depending on the selected transmission protocol (request or polling).

If several telegrams are located in the receive buffer, they are processed using the FIFO method, i.e. the first telegram that arrived is placed first in the communication input data.

Besides a limit using a fixed telegram length, we also recommend a limit by setting a sufficiently long pause in the receive data. This then ensures that there is no sustained offset in receive data if characters are missing due to transmission errors.

### 8.2.3.2 Transmission Protocol



---

In the base module "Cube67+ DIO4 MOVIMOT E 4xM12", the transmission protocol is fixed to the **"polling"** setting and is not parameterizable

---

Telegrams received are represented in the communication in input data using the FIFO method. Telegrams are removed from the receive buffer in different ways, depending on the transmission protocol:

"Polling" Transmission Protocol	On receipt of a complete telegram, it is removed directly from the receive buffer and represented in the communication input data.
"Request" Transmission Protocol	<p>The telegrams in the receive buffer are only removed from the receive buffer on request and represented in the communication input data. The request is generated by setting Bit 0 in the command byte unequal to Bit 0 in the status byte.</p> <p>If a complete telegram is located in the receive buffer during the request, it is removed from the receive buffer on request and represented in the communication input data. In this case, the data length in Byte 2 of the communication input data is unequal to 0.</p> <p>If there is no complete telegram located in the receive buffer during the request, the communication input data and the data length from Byte 2 is set to 0.</p>

### 8.2.3.3 Data Buffer Overflow Response



---

The data buffer overflow response is not relevant in the base module "Cube67+ DIO4 MO-VIMOT E 4xM12" and it is therefore not parameterizable

---

When the module is in specific operating states, more characters may have to be set in a data buffer than there are free places. This leads to an error input in the status byte of the communication input data for this data buffer. Please refer to Section 8.2.4 for a segregation of the status bits. Each of the status bits is retained until they are reset in the communication output data using the command byte, even if the state of buffer memory is again errorfree later.

An overflow in the receive buffer results in rejection of an incomplete telegram. This does not affect complete telegrams in the receive buffer.

An overflow in the send buffer first results in the rejection of send characters. The characters in the send buffer are sent via the communication interface.

Later, after the occurrence of a buffer overflow and when there is again some free space in the buffer memory, there are two possible responses:

"Tolerant" Overflow Response

Characters are set in the related buffer memory.

"Remanent" Overflow Response

No characters are set in the related buffer memory.

### 8.2.3.4 Flow Control



---

No flow control is used in the base module "Cube67+ DIO4 MOVIMOT E 4xM12" and it is therefore not parameterizable

---

Flow control can be enabled separately for the transmit and receive parts of the communication interface. This prevents any overwriting of a data buffer for one of the users. Normally, you can select the same setting for the send and receive parts. In special cases, however, it is better to select different settings for the send and receive parts. The following protocols for flow control are supported:

#### Software XON/XOFF

In RS232 and RS485 modes, flow control is possible using the control characters XON and XOFF. Send or receive readiness is indicated by the control characters XON and XOFF. After receiving the control character XOFF in the receive data, no more characters are sent over the communication interface, even if there are still characters in the send buffer. The send process is only re-enabled after the control character XON is received.

The module sends control character XOFF, if necessary, within the actual send data, if the number of free characters in the receive buffer drops below a specific value. After the number of free characters is above this value again, control character XON is sent.

Software flow control can not be used if the control characters XON or XOFF occur in the useful data of the communication interface.

#### RTS/CTS Hardware

The module only sends data if receive standby is signaled on the communication interface via the CTS branch.

The module signals receive standby via the RTS branch. The state is dependent on the number of free characters in the receive buffer, in analogy to the software flow control.

### 8.2.3.5 RS485 Transmission Delay



---

Transmission in the base module "Cube67+ DIO4 RS232 E 4xM12" is in full-duplex mode. For this reason, RS485 transmission delay is not used and can not be parameterized

---

Transmission in RS485 mode is in half-duplex. A waiting time before sending can be defined to ensure the correct half-duplex mode, i.e. in order to exclude two users from sending simultaneously. If new data is received during the waiting time, the waiting time starts again. Transmission only starts after the waiting time expires.

### 8.2.3.6 Timeout XOFF



---

No flow control is used in the base module "Cube67+ DIO4 MOVIMOT E 4xM12". For this reason, the setting for Timeout XOFF is not parameterizable

---

If the software flow control is operated for send data by means of control character XON / XOFF, a time lapse (timeout) to receive control character XON can be fixed in the receive data on the communication interface. This timeout starts with reception of control character XOFF over the communication interface. If control character XON does not occur in the receive data of the communication interface after expiry of the timeout, another telegram is sent over the communication interface, provided send data is present in the receive buffer.

This prevents the system from "missing" a control character XON in the receive data of the communication interface due to transmission errors. It may be possible also that no data was sent.

### 8.2.3.7 Data Buffer Segregation



It is not possible to parameterize the segregation of the data buffer in the base module "Cube67+ DIO4 MOVIMOT E 4xM12".

The module contains a data buffer with a size of 4 Kbytes. The data buffer can be segregated between send and receive data in several gradations. Normally, it is practical to segregate the buffer memory into equal gradations, i.e. 2 Kbytes receive buffer and 2 Kbytes send buffer. To avoid buffer overruns, it may also be practical to vary this segregation.

### 8.2.4 DIO Data of Cube67+ DIO4 RS232/485 E 4xM12

Bit Assignment of I/O Data – DIO Input Data PAE

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	-	-	-	-	-	-	1	0

Tab. 16: PAE data byte 1 Art.-No. 56761

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	-	-	-	-	-	-	1	0

Tab. 17: PAE data byte 2 Art.-No. 56761



Bits 2 to 7 are unassigned and have the value "0".



Bit assignment of I/O data – DIO output data PAA

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	-	-	-	-	-	-	1	0

Tab. 18: PAA data byte 1 Art.-No. 56761

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	-	-	-	-	-	-	1	0

Tab. 19: PAA data byte 2 Art.-No. 56761



Bits 2 to 7 are unassigned and have the value "0".

## 8.2.5 Communication Data of Cube67+ DIO4 RS232/485 E 4xM12

### 8.2.5.1 Data without useful data protocol

#### Bit Assignment of I/O Data – Communication Input Data PAE

The length of the communication input data L is determined in bytes in the configuration by a virtual input module with prefix "RS\_RX". Length L results from the number following the prefix.

Byte assignment of communication input data

Byte	Name	Value	Meaning
0	Status	0 to 255	Status of receive data; for explanations, please refer to the table below:
1	Receive counter	0 to 255	Consecutive receive telegram number
2	Data length	0 to L-3	Number of following receive data bytes
3 to L-1	Receive data	0 to 255	Receive data from interface

Tab. 20: PAE data communication Art.-No. 56761

Bit assignment Status in Byte 0 of communication input data

Bit	Name	Value	Meaning
0	Status of receive request	0 to 1	Status Request, in conjunction with command byte
1	Reset	0 to 1	1: Communication interface is initialized
2	Status of receive buffer	0 to 3	0: No telegram present
3			1: min. one telegram present 2: Fill level > 80% 3: Overflow (remanent)
4	Status of send buffer	0 to 3	0: empty
5			1: min. one byte present 2: Fill level > 80% 3: Overflow (remanent)
6	Receive error	0 to 1	0: no error 1: error in receive data on communication interface (remanent)
7	Error in telegram	0 to 1	0: no error 1: Receive error in telegram

Tab. 21: PAE data status byte Art.-No. 56761

## Bit Assignment of I/O Data – Communication Output Data PAA

The length of the communication output data L is determined in bytes in the configuration by a virtual input module with prefix "RS\_TX". Length L results from the number following the prefix.

Byte assignment of communication output data

Byte	Name	Value	Meaning
0	Command	0 to 255	Command for parameterization; for explanations, please refer to the table follow:
1	Send counter	0 to 255	Send telegram number; if there is a change compared with the previous value, data is sent over the interface.
2	Data length	0 to L-3	Number of following send data bytes
3 to L-1	Send data	0 to 255	Send data for interface

Tab. 22: PAA data communication Art.-No. 56761

Bit assignment command in Byte 0 of communication output data

Bit	Name	Value	Meaning
0	Receive request	0 to 1	Request for receive data in request mode, if content unequal to Status bit 0.
1	Reset	0 to 1	1: Initialize communication interface, delete data buffer content, delete remanent errors.
2	Delete RX buffer	0 to 1	1: Delete content of receive buffer.
3	Reserved	0	
4	Delete TX-Buffer	0 to 1	1: Delete content of send buffer.
5	Reserved	0	
6	Delete receive errors.	0 to 1	1: Reset status of remanent receive errors.
7	Reserved	0	

Tab. 23: PAA data command byte Art.-No. 56761

## Reception of Data over the Communication Interface

If a change occurs in the status of the communication interface, the change is mapped in Byte 0 of the communication input data. This is independent on whether complete telegrams are received. Mapping the received telegrams depends on the transmission protocol selected:

**"Polling" Transmission  
Protocol**

With every telegram received over the communication interface, the receive counter is incremented by one in Byte 1 of the communication input data. After the value 255 is reached, the counter reverts to the value 0. To determine whether a complete telegram was received over the communication interface, the receive counter in Byte 1 in the communication input data must be read out cyclically (polling) and compared with the previous value. The receive data including the data length can then be read starting with Byte 2 in the communication input data. If the system detects an increment of more than one compared with the previous value in Byte 1 of the communication input, telegrams were received in the meantime and their content can no longer be determined.

**"Request" Transmission  
Protocol**

It is possible to determine whether complete telegrams are present in the receive buffer by evaluating Bits 2 and 3 of the status byte in Byte 1 of the communication input data. If a telegram is present and it is supposed to be read out, request bit 0 of the command byte in Byte 1 of the communication output data must be set to the complementary value of the request status bit 0 in Byte 1 of the communication input data. This means: The value in the communication output data must be set to 0 if the value in the communication input data was 1, and vice versa. This initiates a receive data request.

The content of the received telegram including the data length can then be read starting with Byte 2 in the communication input data. The receive counter Byte 1 of the communication input data is incremented by 1, or set to 0 (provided the previous counter status was 255), compared with the status before the receive data request.

If a request is initiated by receive data without at least one complete telegram present in the receive buffer, the receive counter is not changed in Byte 1 of the communication input data and the communication input data is set to 0 starting with Byte 2.

## Sending Data over the Communication Interface

Commands for the communication interface using Byte 0 in the communication output data can be sent independent of send data. If only a command is sent, make sure that the send counter in Byte 1 in the communication output data is not changed.

The following chronological sequence must be complied with to prevent sending any unrequired data over the communication interface:

### Write Access

### Comments

On the send data, including the length bytes starting with Byte 2 in the communication output data.

If the same data is sent a second time over the communication interface, no write access is required here.

On Command Byte No. 0 in the communication output data

Make sure that Bit 1 and Bit 0 are set to 0, otherwise no data is sent over the communication interface.

On the send counter in Byte No. 1 in the communication output data.

The send data is sent over the communication interface as soon as a change in the existing value takes place in the send counter.

The status of the send buffer can be determined by evaluate Bits 4 and 5 of the status byte and to present an overflow of further send data. The status byte is located in Byte 1 of the communication input data.

## 8.2.5.2 Data with Useful Data Protocol SEW-MOVIMOT

### Byte Assignment of I/O Data – Process Input Data PE

The length of the process input data L is determined in words in the configuration by a virtual input module with prefix "MOVIMOT\_RX". A word consists of two bytes. Length L results from the number following the prefix.

Byte assignment of process input data with input data length of 2 words ("MOVIMOT\_RX\_2 Word")

Word	Name	Value	Meaning
0	Status word 1	0 to 65535	PDU date in protocol SEW-MOVILINK
1	Output current	0 to 65535	PDU date in protocol SEW-MOVILINK

Tab. 24: PE data 2 words SEW-MOVILINK Art.-No. 56761

Byte assignment of process input data with input data length of 3 words ("MOVIMOT\_RX\_3 Word")

Word	Name	Value	Meaning
0	Status word 1	0 to 65535	PDU date in protocol SEW-MOVILINK
1	Output current	0 to 65535	PDU date in protocol SEW-MOVILINK
2	Status word 2	0 to 65535	PDU date in protocol SEW-MOVILINK or 0

Tab. 25: PE data 3 words SEW-MOVILINK Art.-No. 56761



The length of PE data in the response telegram of the SEW-MOVILINK protocol depends on the selected length of the PA data. 2 words of PA data result in 2 words of PE data. The same applies to 3 words of PA data. If there is a difference in data length in the configuration, Word 3 is either set to zero (RX 3 words, "MOVIMOT\_RX\_3 Word" module and TX 2 words, "MOVIMOT\_TX\_2 Word" module), or rejected (RX 2 words, "MOVIMOT\_RX\_2 Word" module and TX 3 words, "MOVIMOT\_TX\_3 Word" module).



If no response telegram is received within 1 second, or if the data frame in the response telegram of the SEW-MOVILINK protocol is incorrect, the process input data are completely reset to zero

## Byte Assignment of I/O Data – Process Output Data PA

The length of the process output data L is determined in words in the configuration by a virtual output module with prefix "MOVIMOT\_TX". A word consists of two bytes. Length L results from the number following the prefix.

Byte assignment of process output data with output data length of 2 words ("MOVIMOT\_TX\_2 Word")

Word	Name	Value	Meaning
0	Control word	0 to 65535	PDU date in protocol SEW-MOVILINK
1	Revolutions	0 to 65535	PDU date in protocol SEW-MOVILINK

Tab. 26: PA data 2 words SEW-MOVILINK Art.-No. 56761

Byte assignment of process output data with output data length of 3 words ("MOVIMOT\_TX\_3 Word")

Word	Name	Value	Meaning
0	Control word	0 to 65535	PDU date in protocol SEW-MOVILINK
1	Revolutions	0 to 65535	PDU date in protocol SEW-MOVILINK
2	Ramp status word	0 to 65535	PDU date in protocol SEW-MOVILINK or 0

Tab. 27: PA data 3 words SEW-MOVILINK Art.-No. 56761



PA data are sent cyclically over the communication interface, taking account of the time specifications in the SEW-MOVILINK protocol. If there is a fault on the fieldbus, the PA data are set to zero

## 8.2.6 I&M Functions

Index AFF0 read = IM0 of Cube67+ DIO4 RS232/485 E 4xM12

## 8.3 Cube67+ DIO12 IOL4 E 8xM12 Art.-No. 56765



The function of the IO link 1.1 module is possible with the software version 2.01 of the 56526 Cube67 ProfiNet bus node!

### 8.3.1 Connection overview

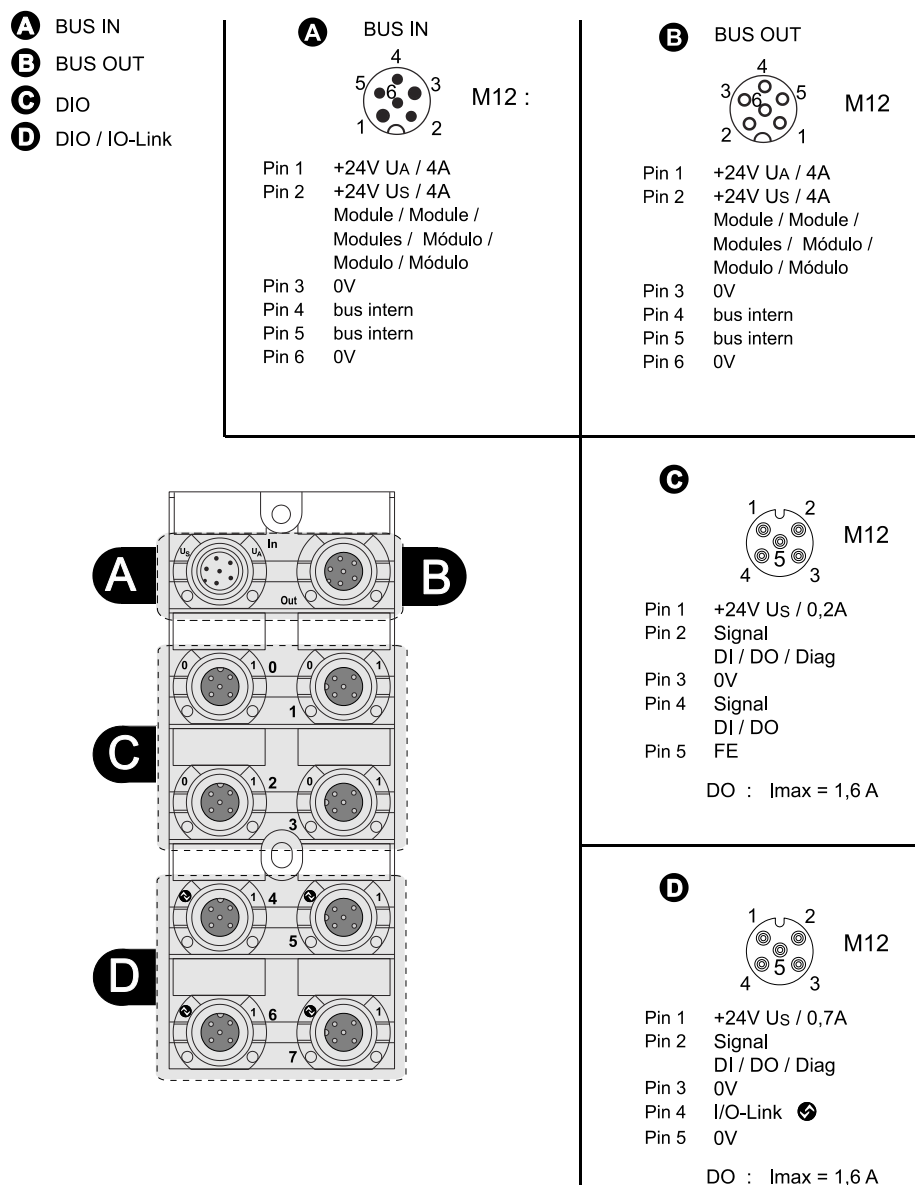


Fig. 68: Pin assignment and connection overview



## 8.3.2 Baud rates



The IO link masters of CUBE67+ DIO12 IOL4 E 8xM12 Art.-No. 56765 supports all three IO link baud rates COM1, COM2 and COM3 after IO-Link Communication Specification 1.0.

## 8.3.3 Parameters

Number of parameter bytes: 18

Bit assignment of parameter byte 0

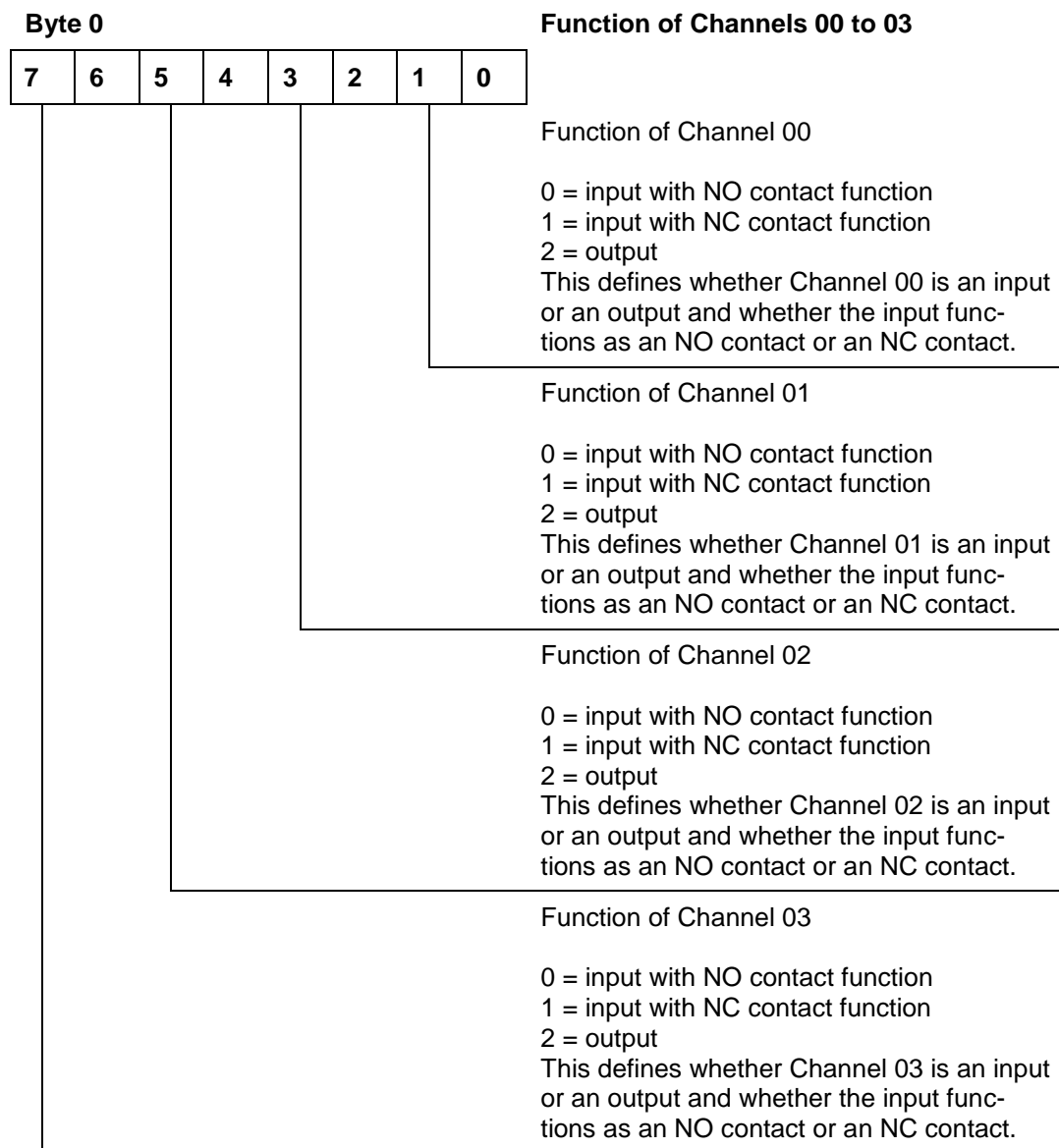


Fig. 69: Parameter byte 0 Art.-No. 56765

Bit assignment of parameter byte 1

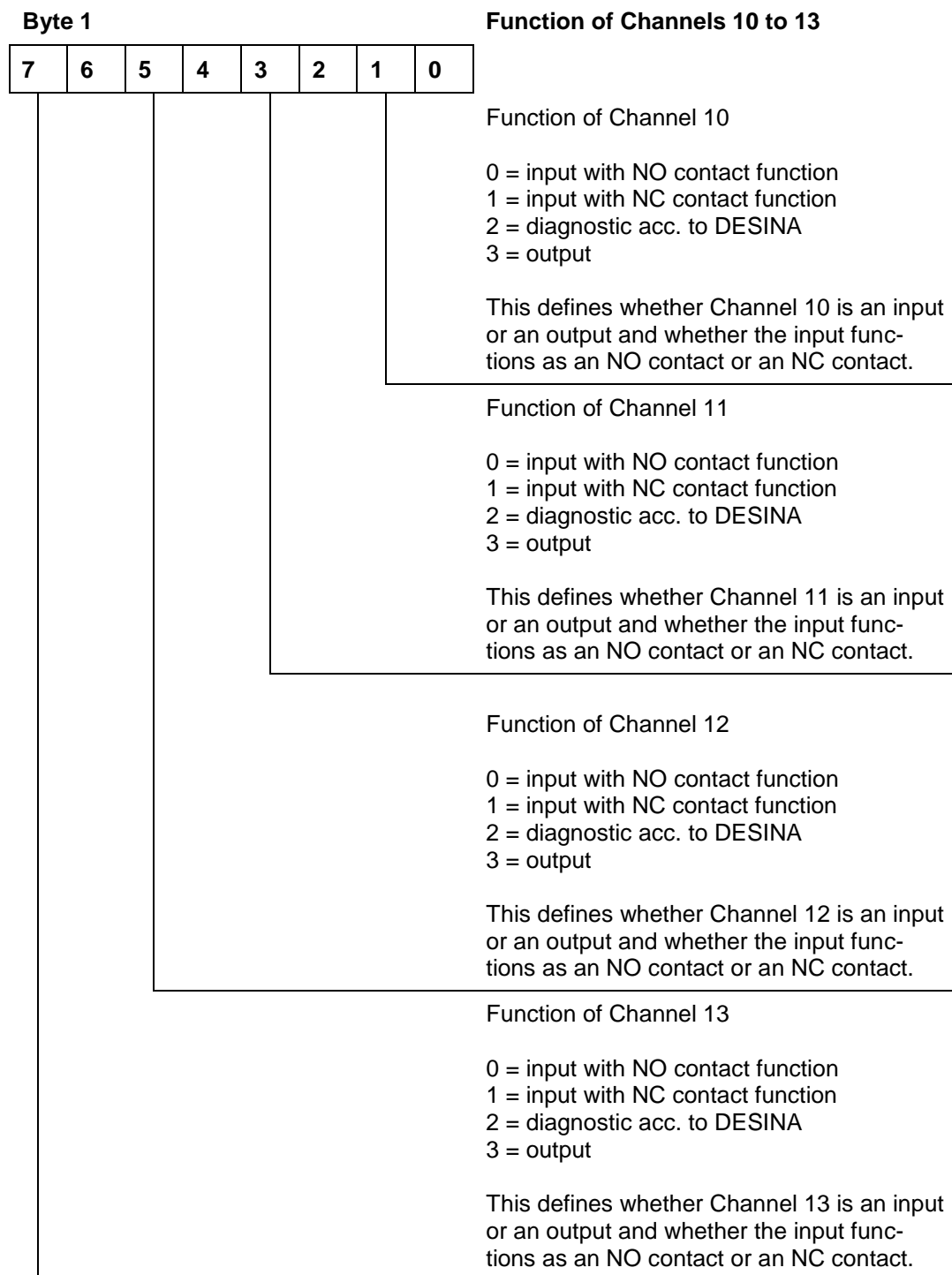


Fig. 70: Parameter byte 1 Art.-No. 56765

Bit assignment of parameter byte 2

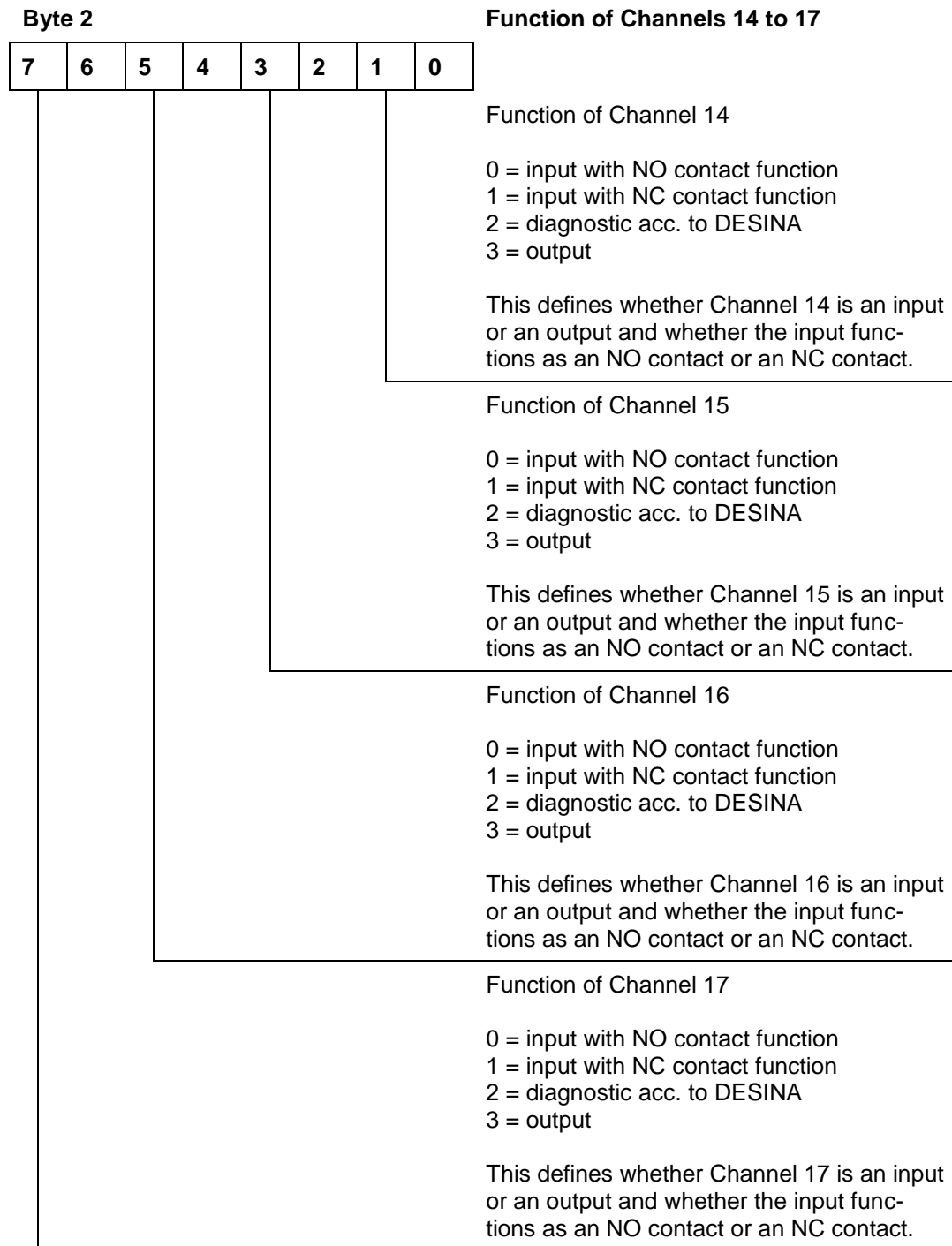


Fig. 71: Parameter byte 2 Art.-No. 56765

Bit assignment of parameter bytes 3 to 5

0 (reserved)

**Bit assignment of parameter byte 6**

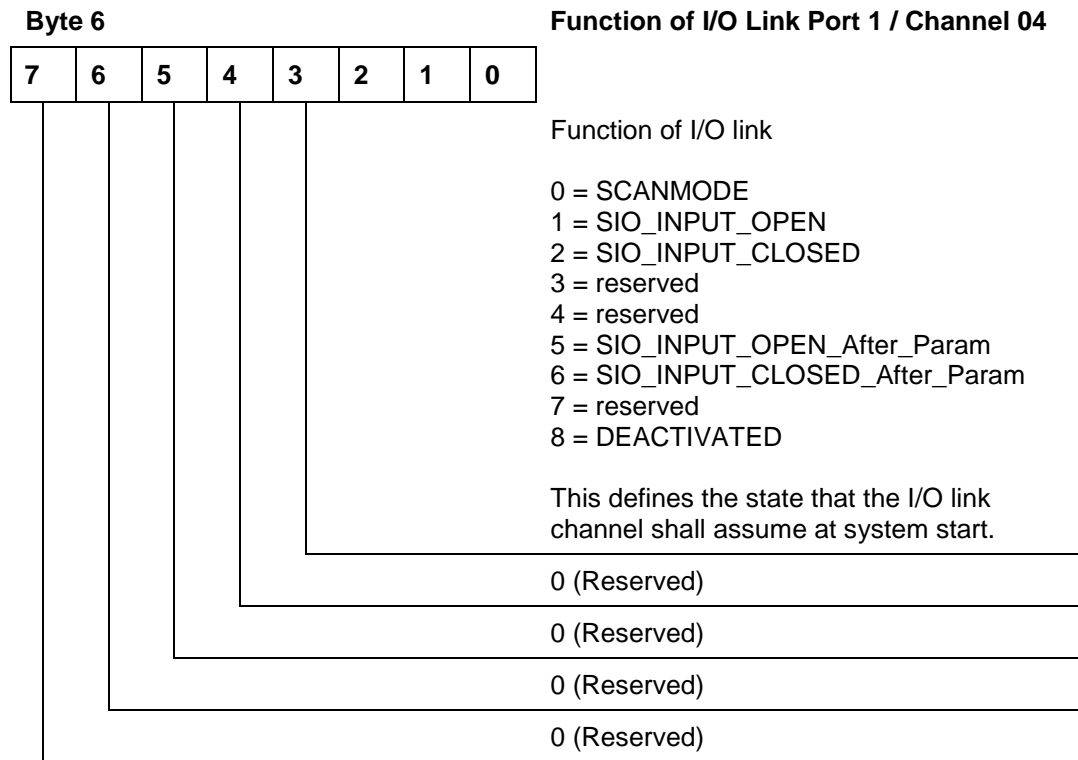


Fig. 72: Parameter byte 6 Art.-No. 56765

### Bit assignment of parameter byte 7

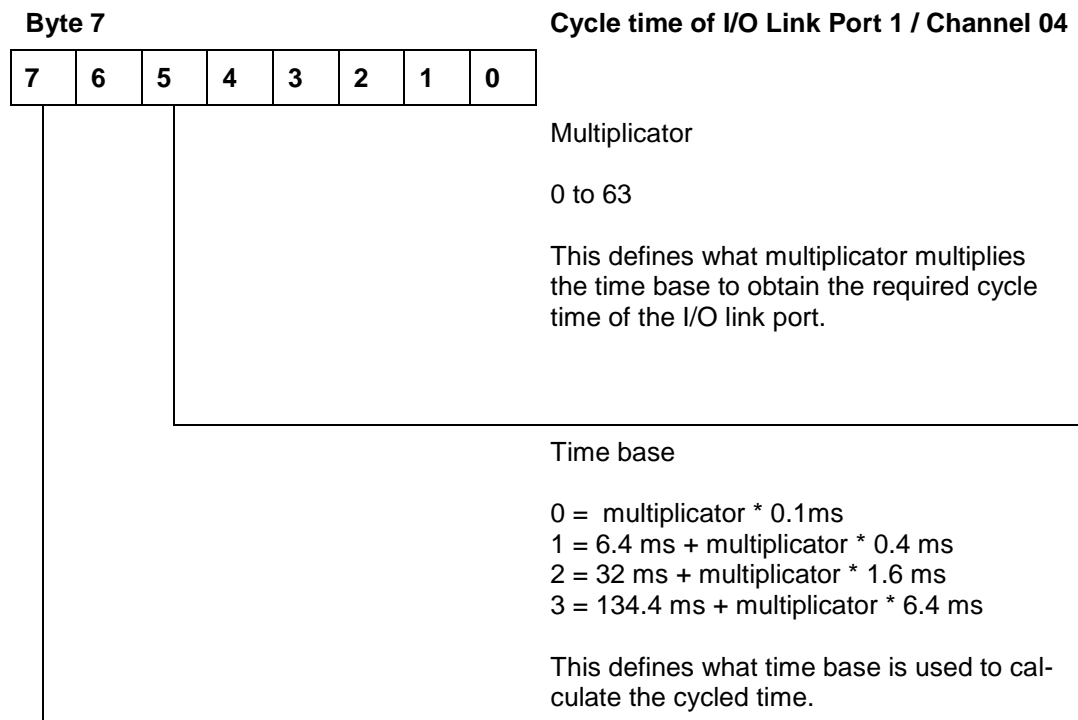


Fig. 73: Parameter byte 7 Art.-No. 56765

### Bit assignment of parameter byte 8

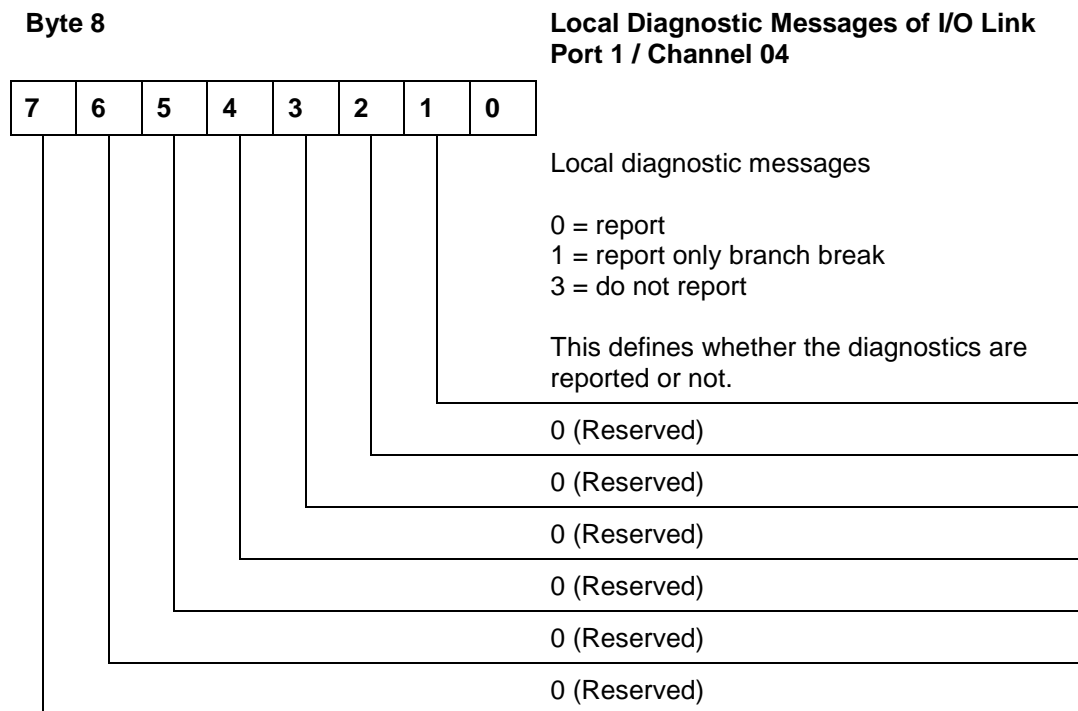


Fig. 74: Parameter byte 8 Art.-No. 56765

Bit assignment of parameter byte 9

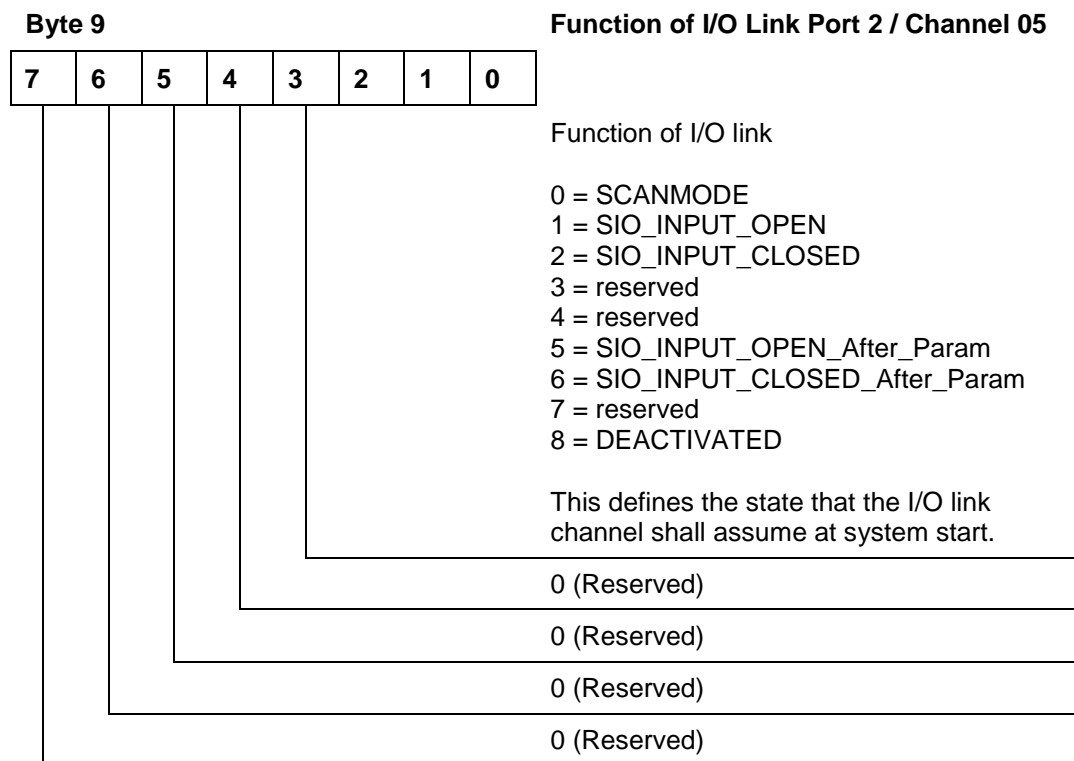


Fig. 75: Parameter byte 9 Art.-No. 56765

Bit assignment of parameter byte 10

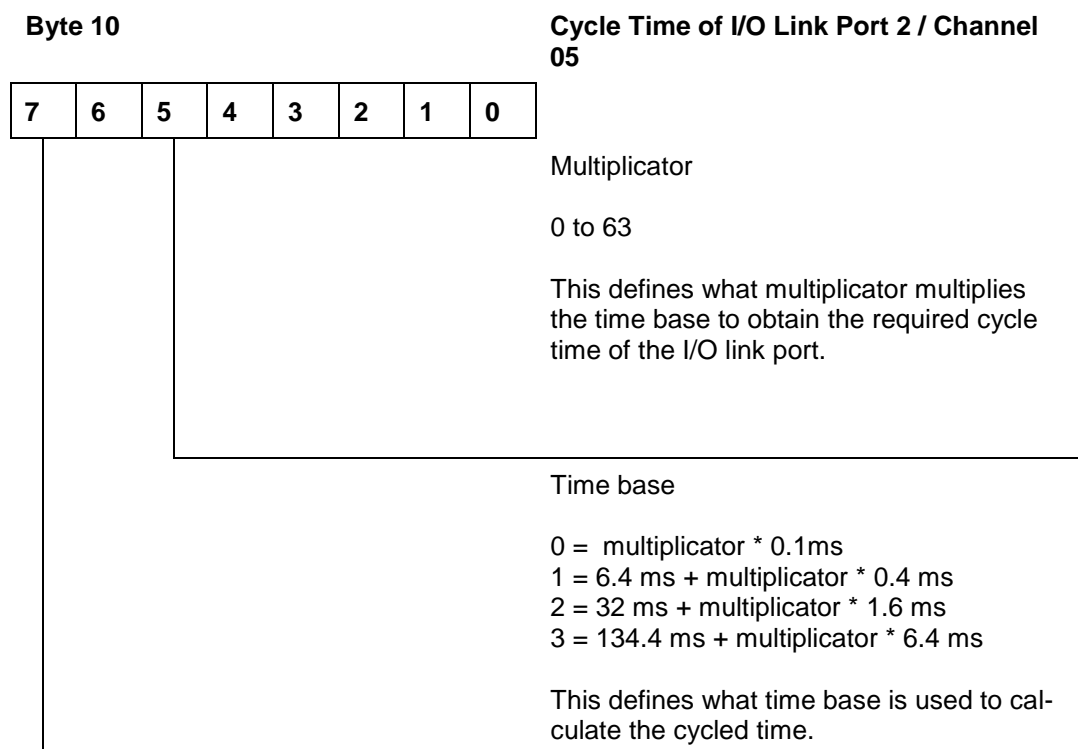


Fig. 76: Parameter byte 10 Art.-No. 56765

Bit assignment of parameter byte 11

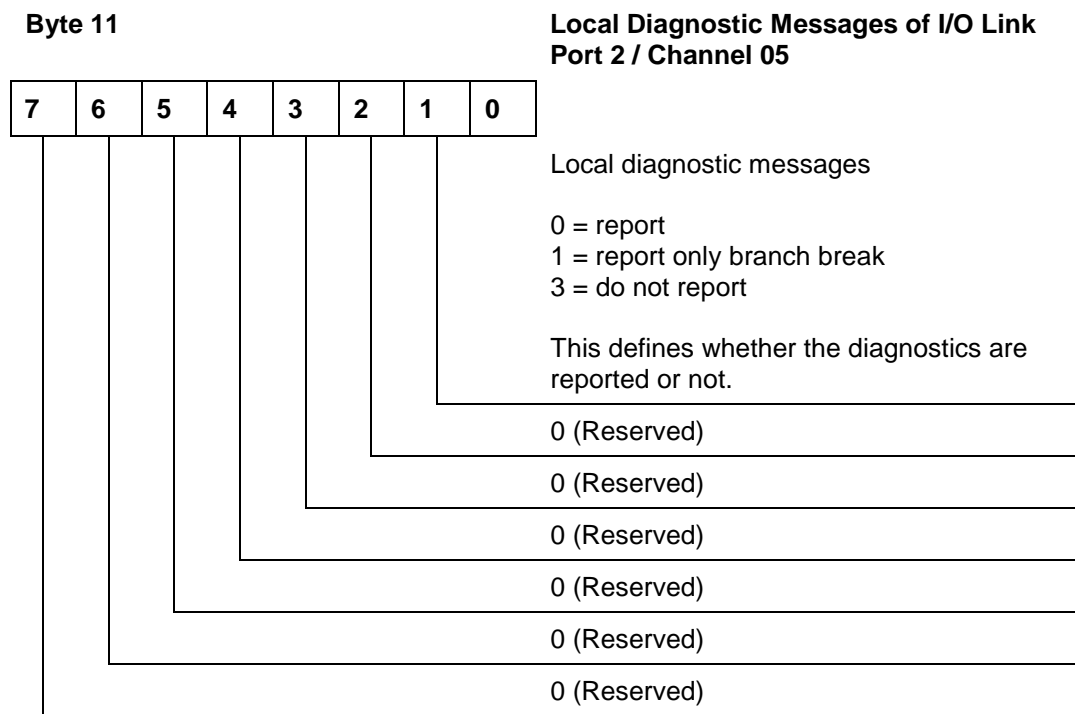


Fig. 77: Parameter byte 11 Art.-No. 56765

Bit assignment of parameter byte 12

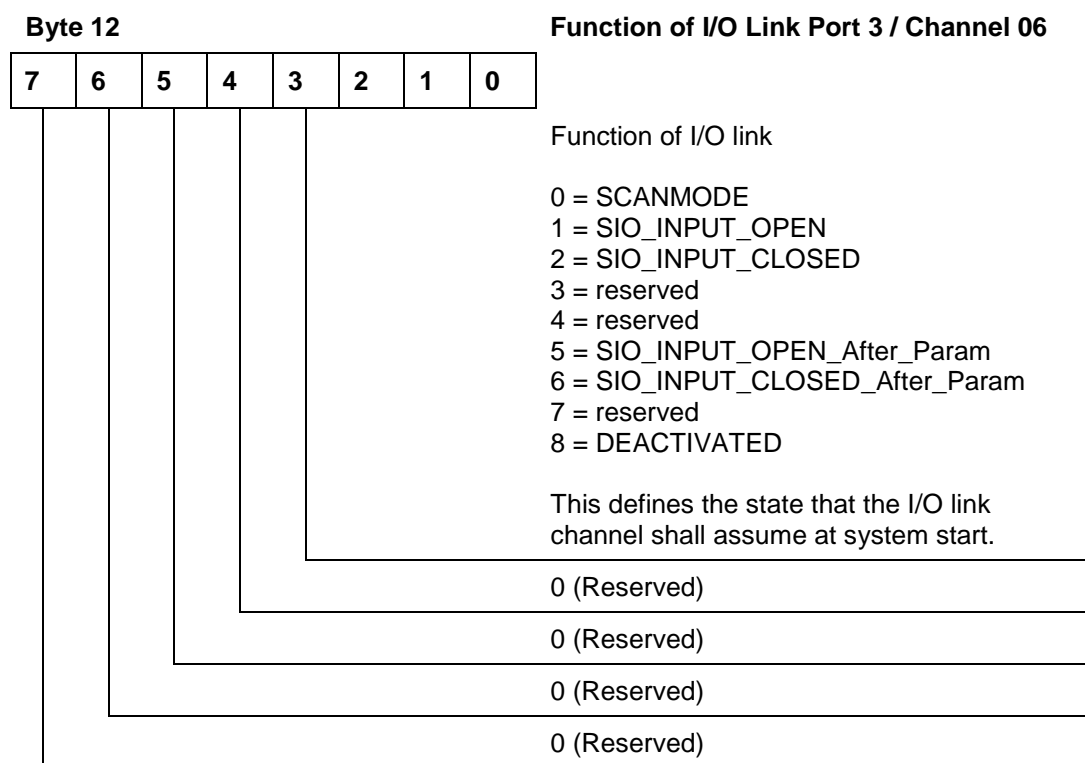


Fig. 78: Parameter byte 12 Art.-No. 56765

Bit assignment of parameter byte 13

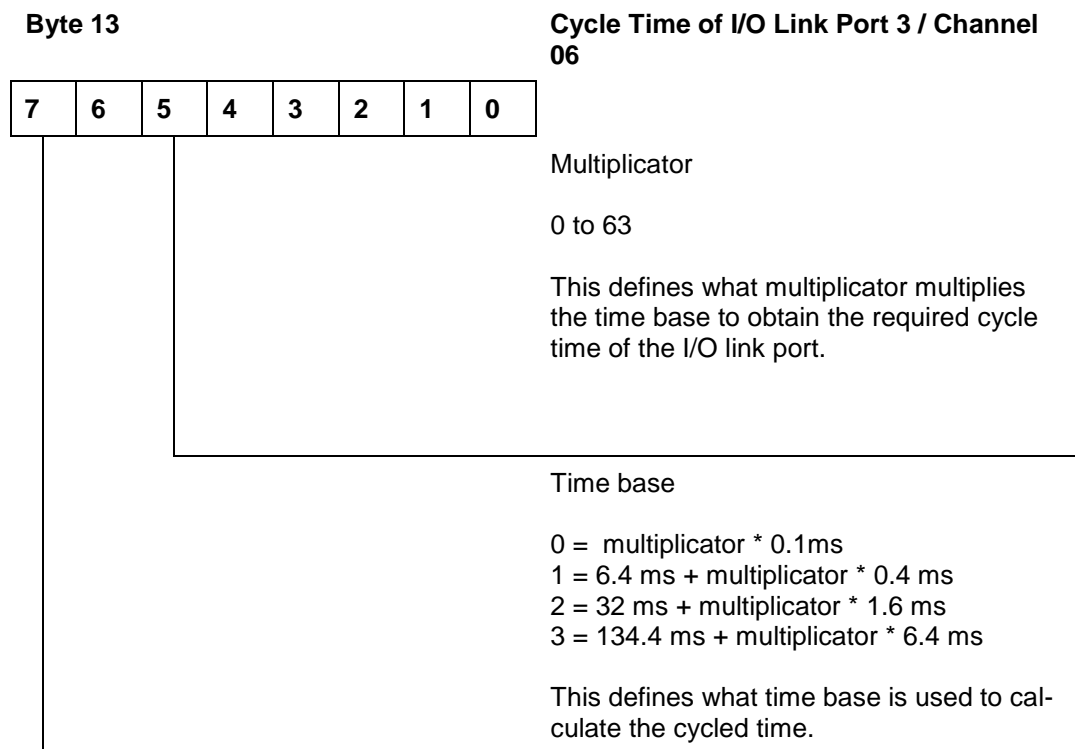


Fig. 79: Parameter byte 13 Art.-No. 56765

Bit assignment of parameter byte 14

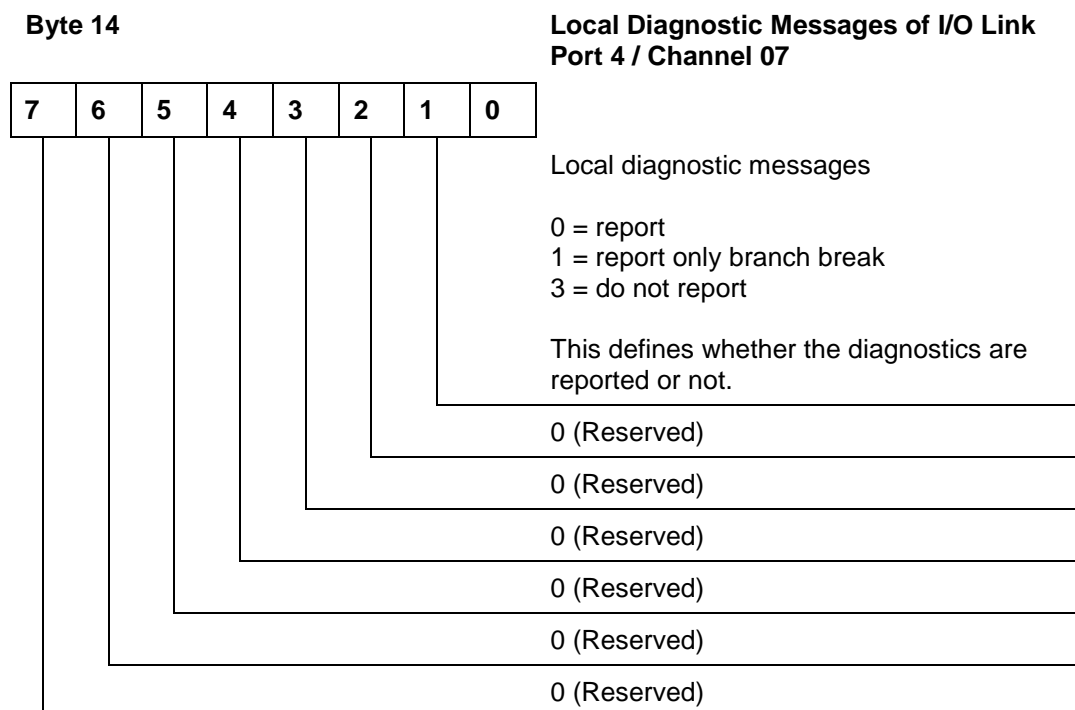


Fig. 80: Parameter byte 14 Art.-No. 56765



Bit assignment of parameter byte 15

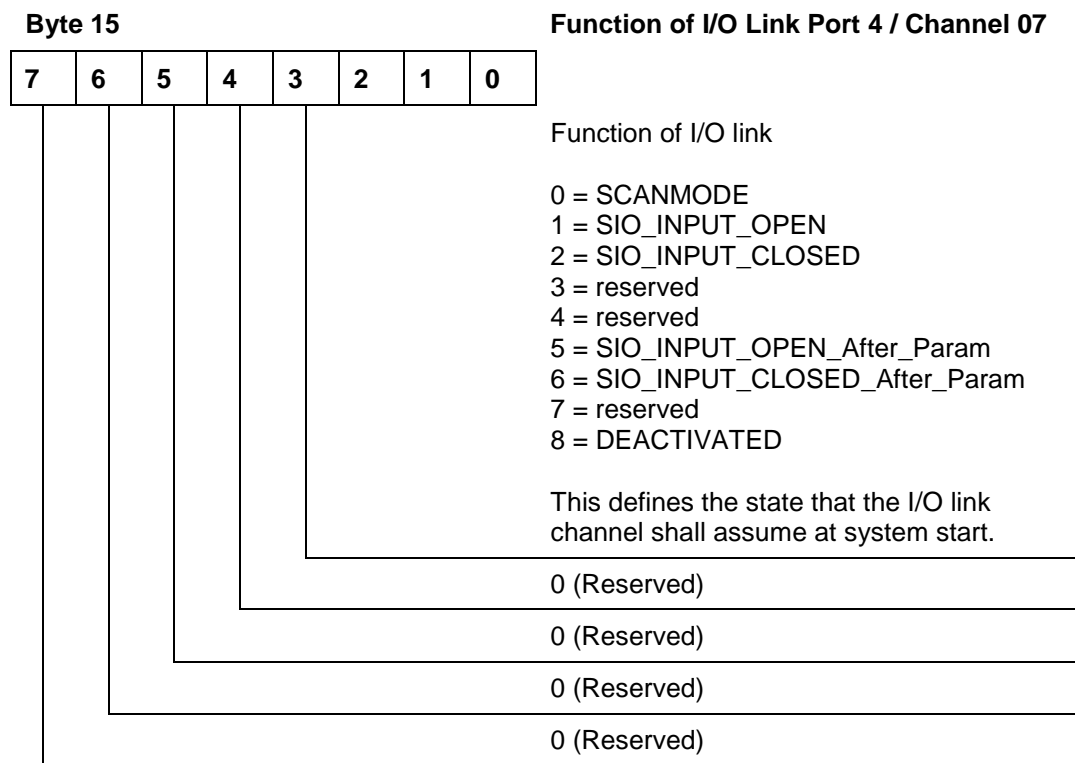


Fig. 81: Parameter byte 15 Art.-No. 56765

Bit assignment of parameter byte 16

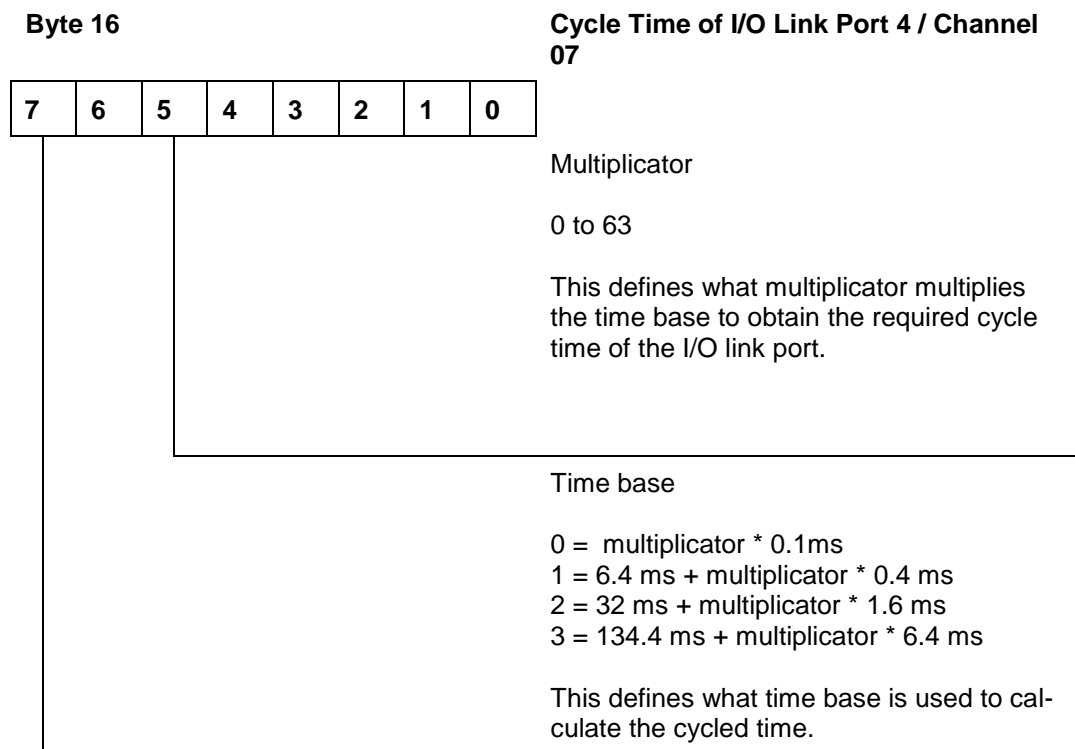


Fig. 82: Parameter byte 16 Art.-No. 56765

Bit assignment of parameter byte 17

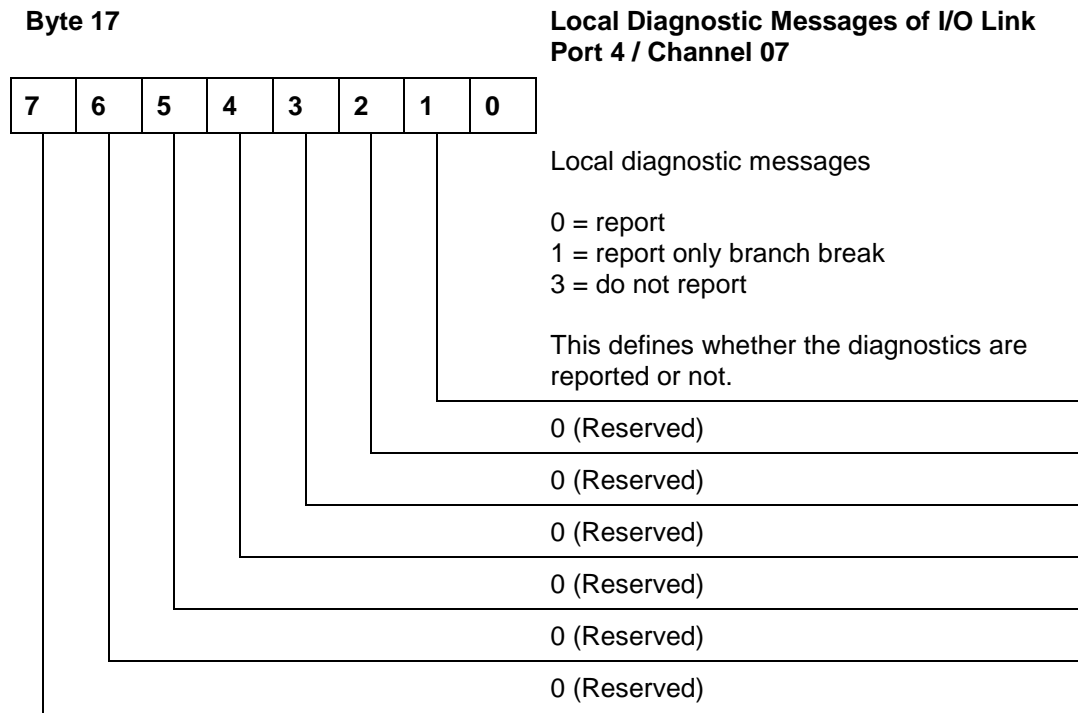


Fig. 83: Parameter byte 17 Art.-No. 56765

### 8.3.4 Data of Cube67+ DIO12 IOL4 E 8xM12

Bit assignment of I/O data – input data PAE

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	7	6	5	4	3	2	1	0

Tab. 28: PAE data byte 1 Art.-No. 56765

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	7	6	5	4	3	2	1	0

Tab. 29: PAE data byte 2 Art.-No. 56765

Bit assignment of I/O data – output data PAA

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Socket	7	6	5	4	3	2	1	0

Tab. 30: PAA data byte 1 Art.-No. 56765

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Socket	7	6	5	4	3	2	1	0

Tab. 31: PAA data byte 2 Art.-No. 56765

In addition to the 2 bytes for PAE and PAA each, the configured I/O Link PAE and PAA bytes are transmitted. The data length in each case depends on the virtual modules used.

### 8.3.5 I&M Functions of Cube67+ DIO12 IOL4 E 8xM12

For communication with the IO link sensors, the Cube67+ DIO12 IOL4 E 8xM12 also supports I&M functions. They are used for communication with the IO link devices as well as to represent module-specific information.

Index 65000 read = IM0 of Cube67+ DIO12 IOL4 E 8xM12

Index 65016 read = IO – Link – MM acc. to specification

Index 65017 read = IM17 information from IO – Link Port 1

Index 65018 read = IM18 information from IO – Link Port 2

Index 65019 read = IM19 information from IO – Link Port 3

Index 65020 read = IM20 information from IO – Link Port 4

Index 65098 read and write = communication channel to connected IO link devices

Index 65099 read = IO – Link Master Directory



I&M queries must always be requested at the slot of the Cube67+ DIO12 IOL4 E 8xM12. For port-related IO link queries via IM98 (65098), the requested port is contained in the I/O link protocol (Ports 1 to 4).

## 8.4 Cube67+ DIO12 IOL4 E 8xM12 – Art.-No. 56766



The function of the IO link 1.1 module is possible with the software version 2.01 of the 56526 Cube67 ProfiNet bus node!

### 8.4.1 Connection overview

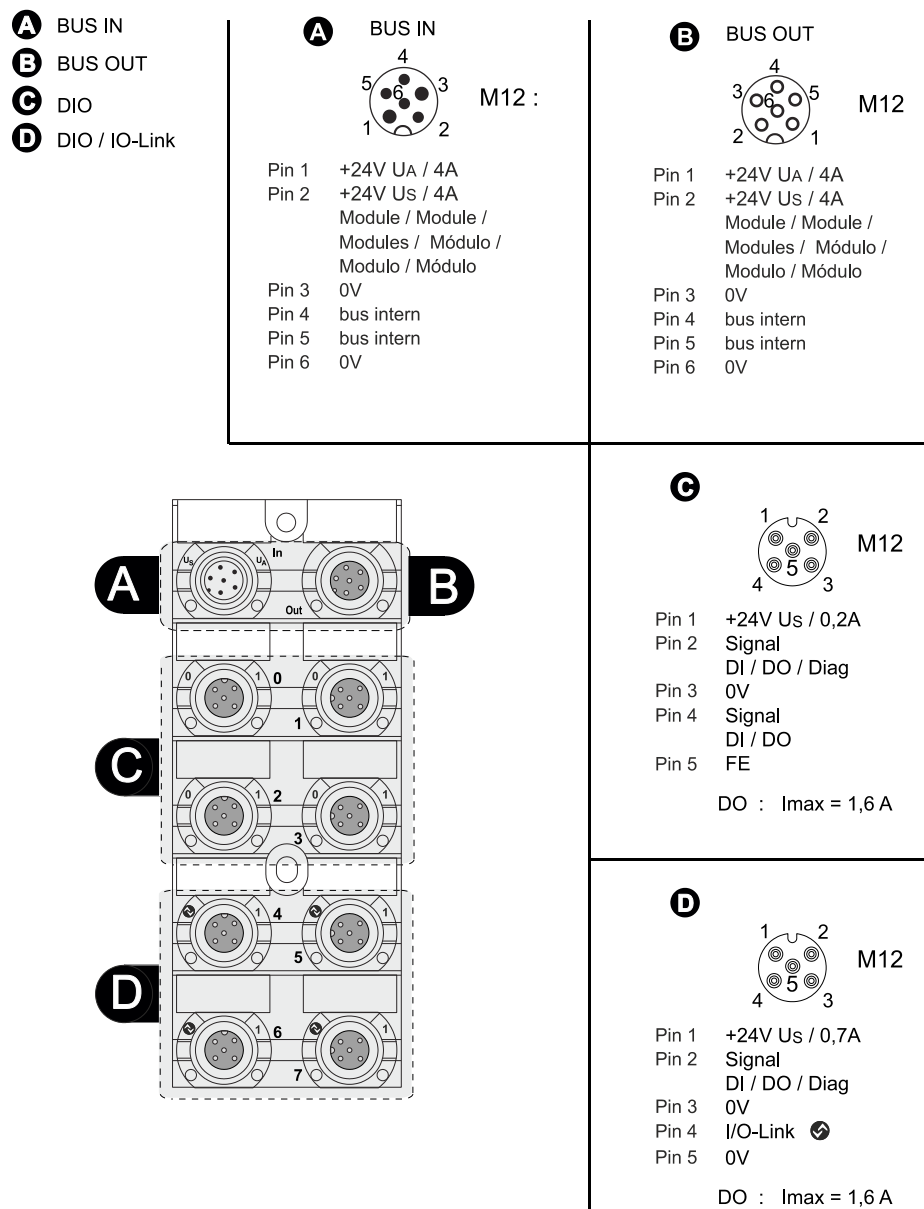


Fig. 84: Pin assignment and connection overview

## 8.4.2 Baud rates



The IO link masters of Cube67+ DIO12 IOL4 V1.1 E 8xM12 Art.-No. 56766 supports all three IO link baud rates COM1, COM2 and COM3 after IO-Link Communication Specification 1.0 and 1.1.

## 8.4.3 Parameters

Number of parameter bytes: 18

Bit assignment of parameter byte 0

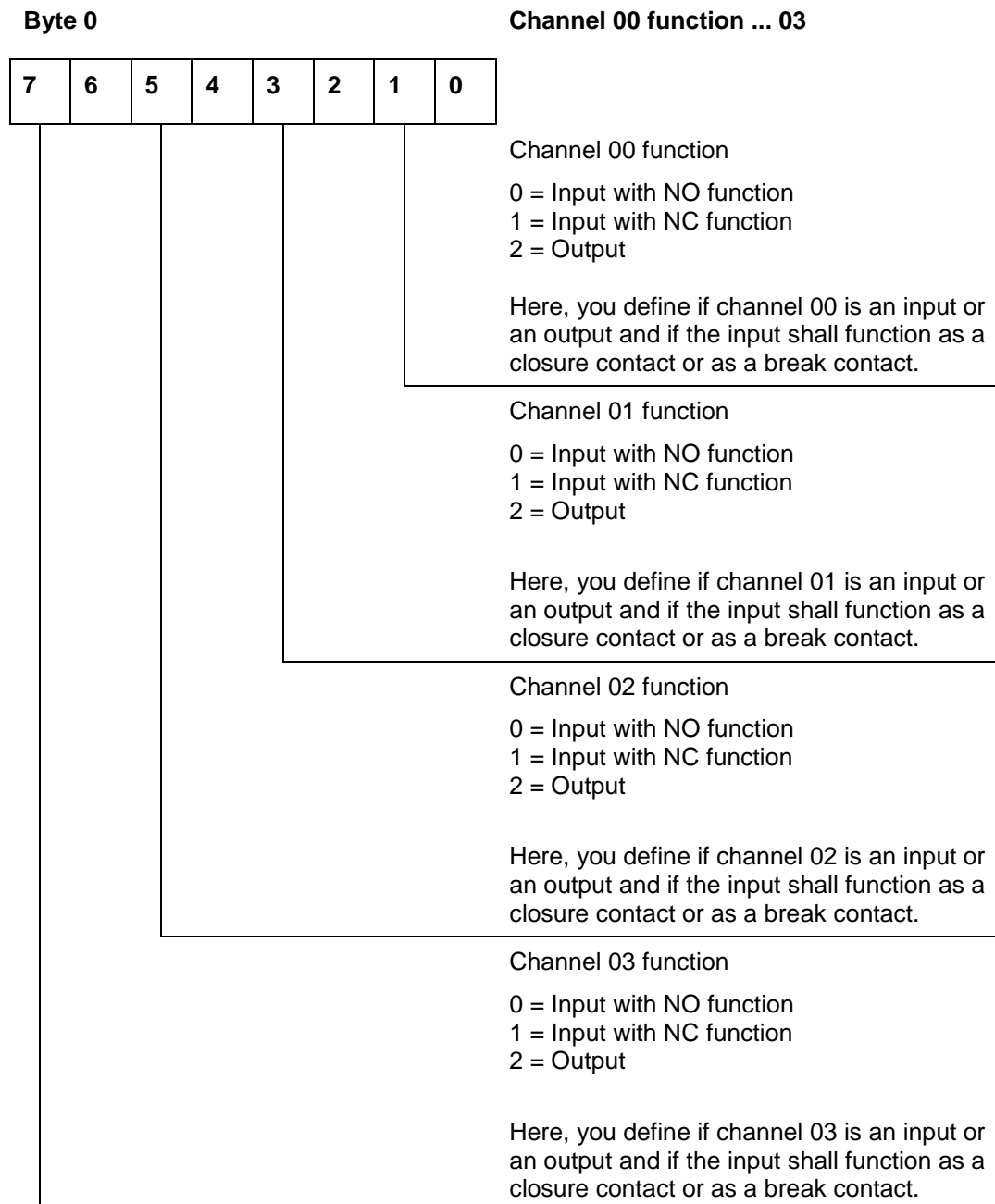


Fig. 85: Parameter byte 0, Art.-No. 56766

Bit assignment of parameter byte 1

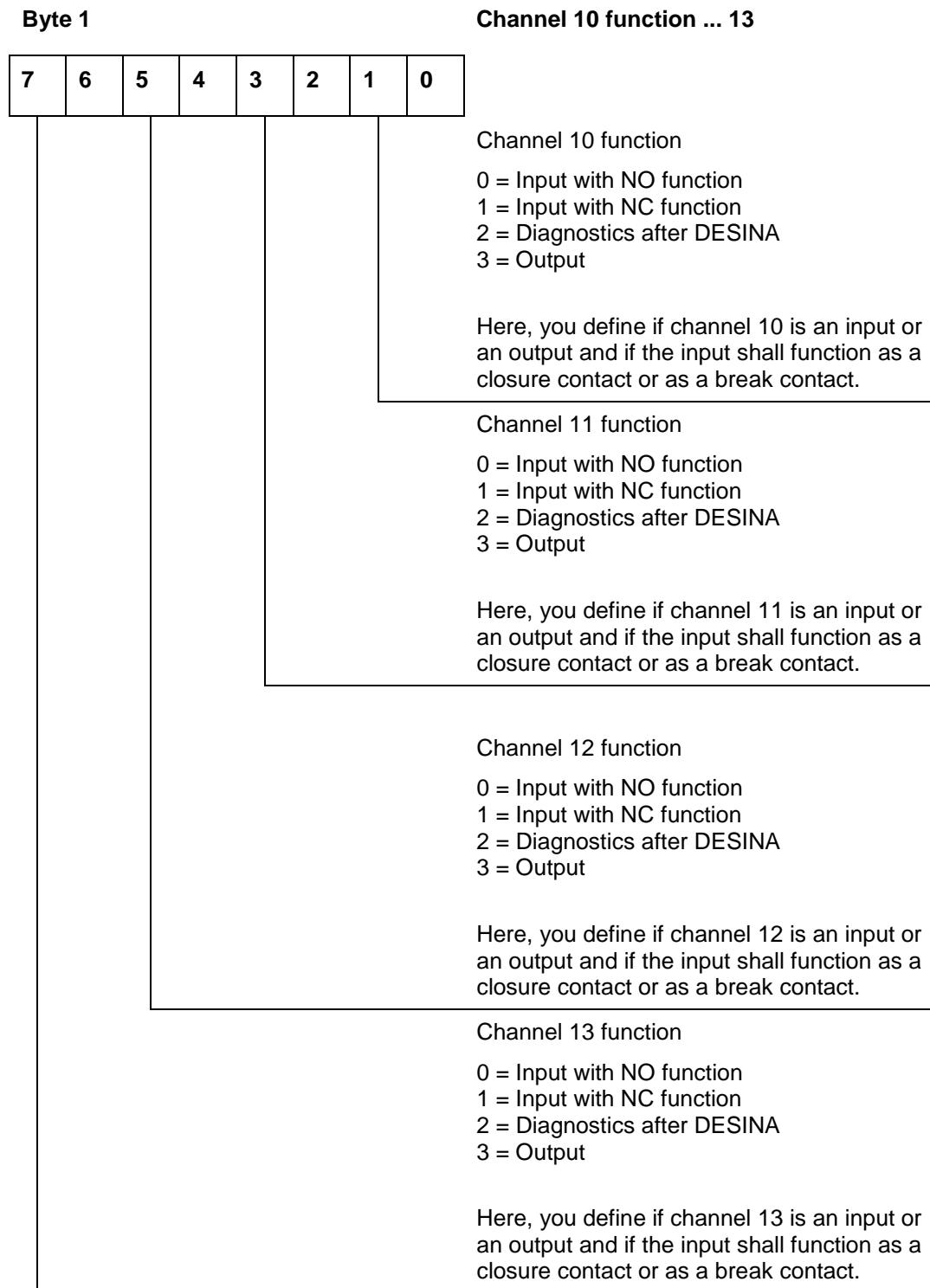


Fig. 86: Parameter byte 1, Art.-No. 56766

Bit assignment of parameter byte 2

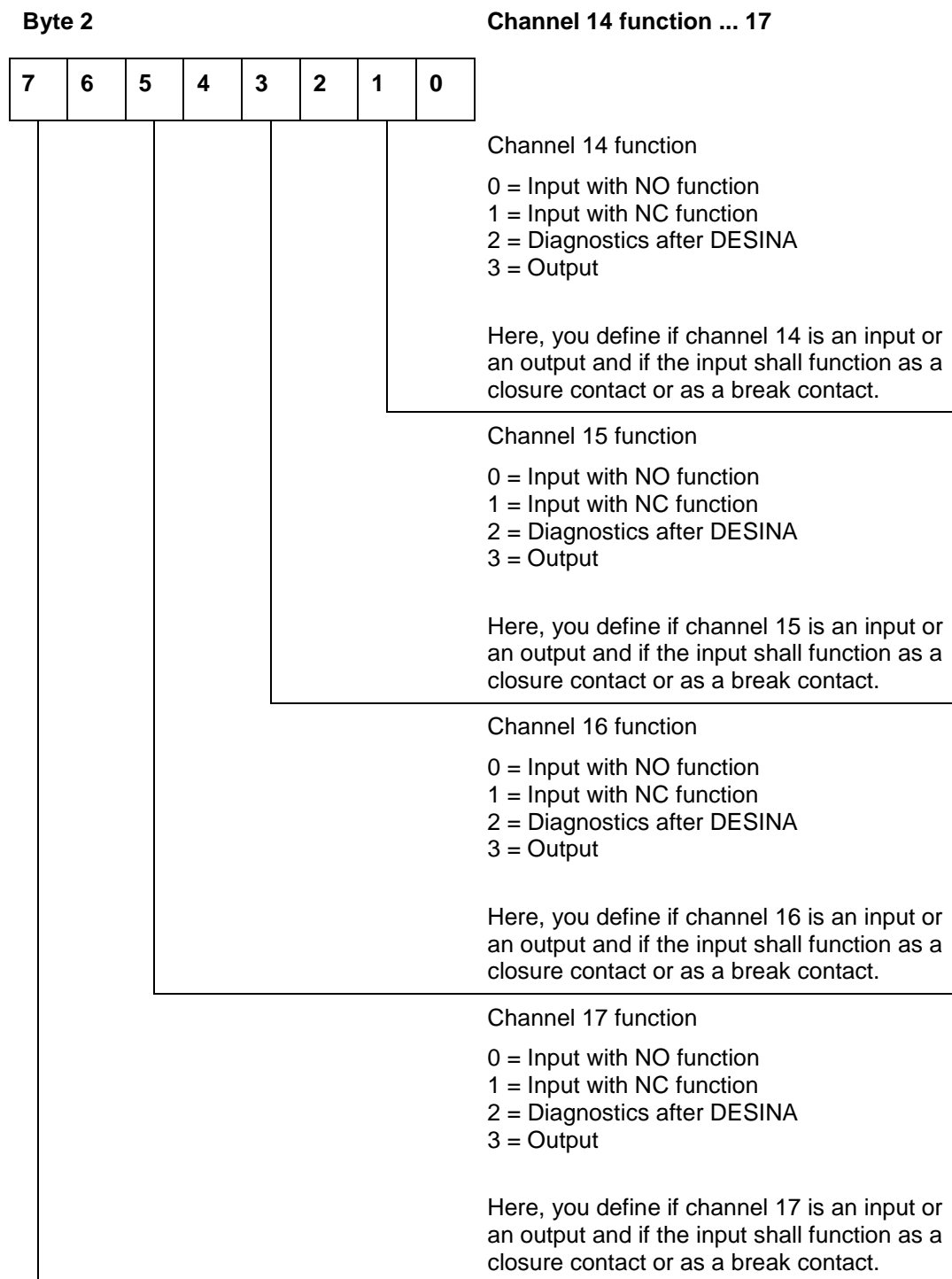


Fig. 87: Parameter byte 2, Art.-No. 56766

## Cube67+ Modules

Bit assignment of parameter bytes 3 ... 5

0 (reserved)

Bit assignment of parameter byte 6

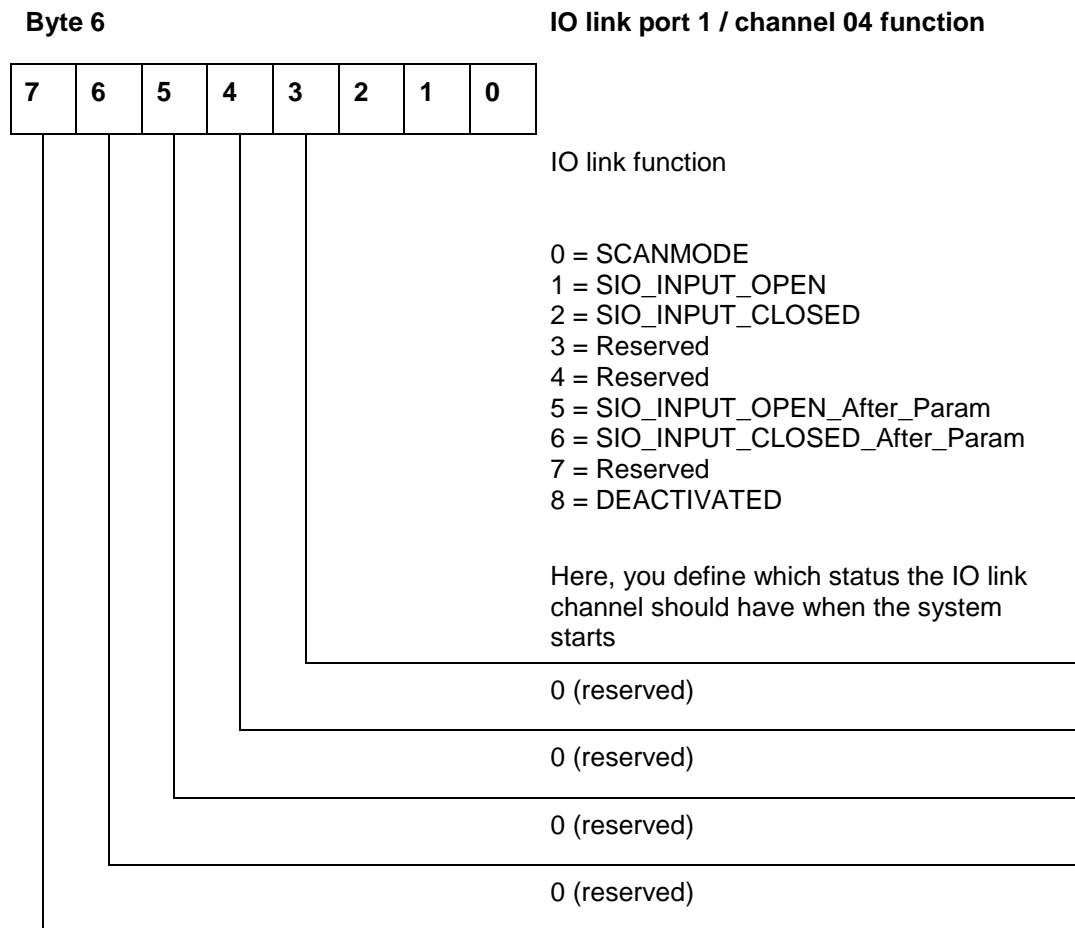


Fig. 88: Parameter byte 6, Art.-No. 56766



Bit assignment of parameter byte 7

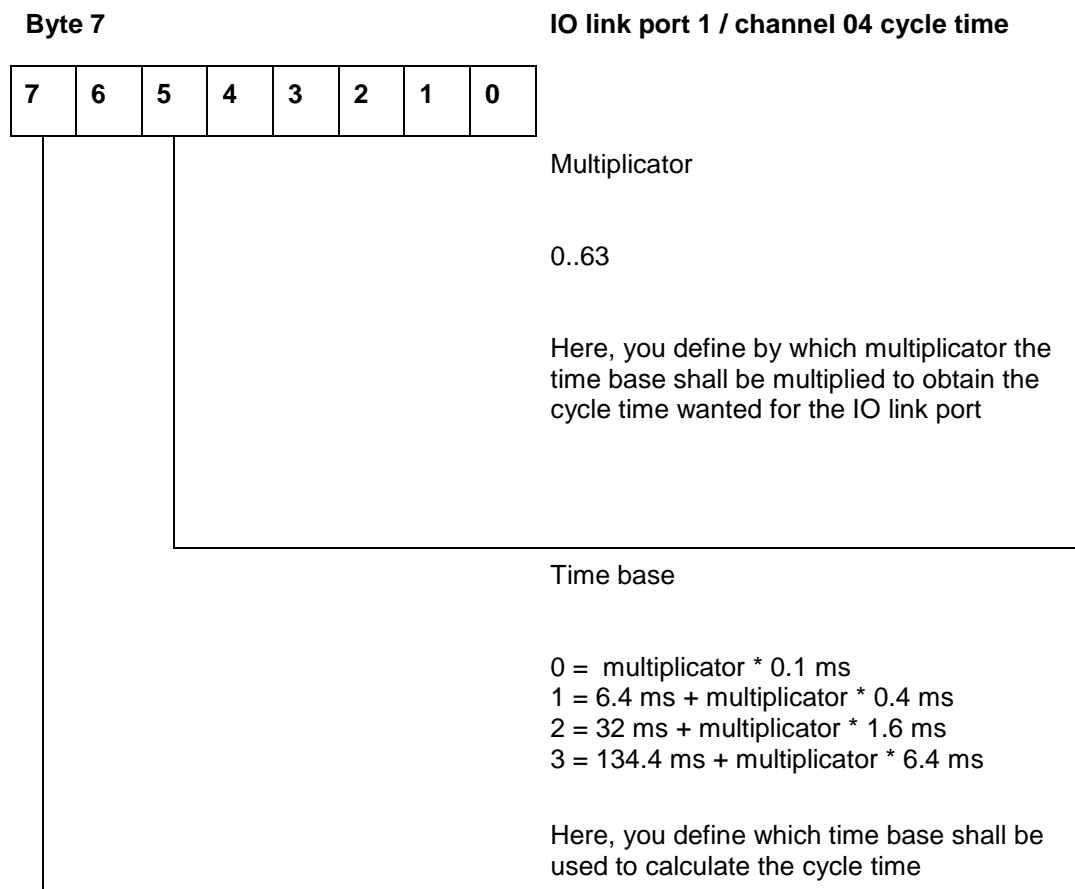


Fig. 89: Parameter byte 7, Art.-No. 56766

Bit assignment of parameter byte 8

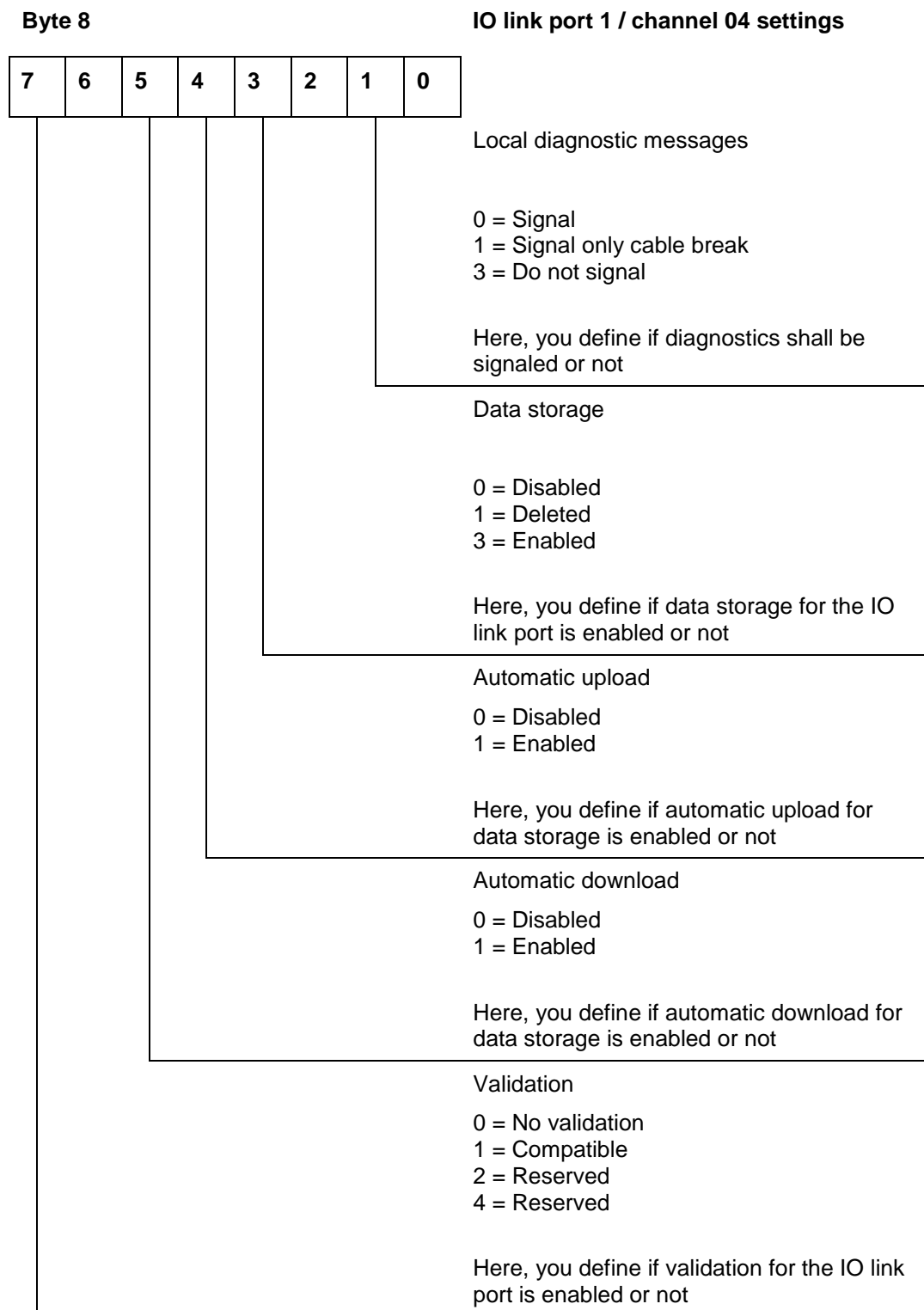


Fig. 90: Parameter byte 8, Art.-No. 56766

Bit assignment of parameter byte 9

**Byte 9**

**IO link port 1 / channel 04 vendor ID**

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Vendor ID High Byte

Fig. 91: Parameter byte 9, Art.-No. 56766

Bit assignment of parameter byte 10

**Byte 10**

**IO link port 1 / channel 04 vendor ID**

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Vendor ID Low Byte

Fig. 92: Parameter byte 10, Art.-No. 56766

Bit assignment of parameter byte 11

**Byte 11**

**IO link port 1 / channel 04 device ID**

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Device ID High Byte

Fig. 93: Parameter byte 11, Art.-No. 56766

Bit assignment of parameter byte 12

**Byte 12**

**IO link port 1 / channel 04 device ID**

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Device ID Middle Byte

Fig. 94: Parameter byte 12, Art.-No. 56766

Bit assignment of parameter byte 13

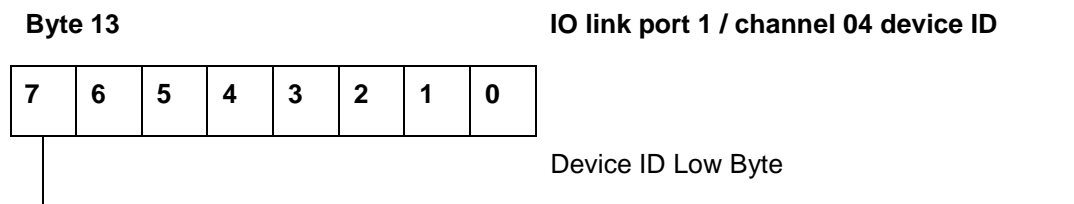


Fig. 95: Parameter byte 13, Art.-No. 56766

Bit assignment of parameter byte 14

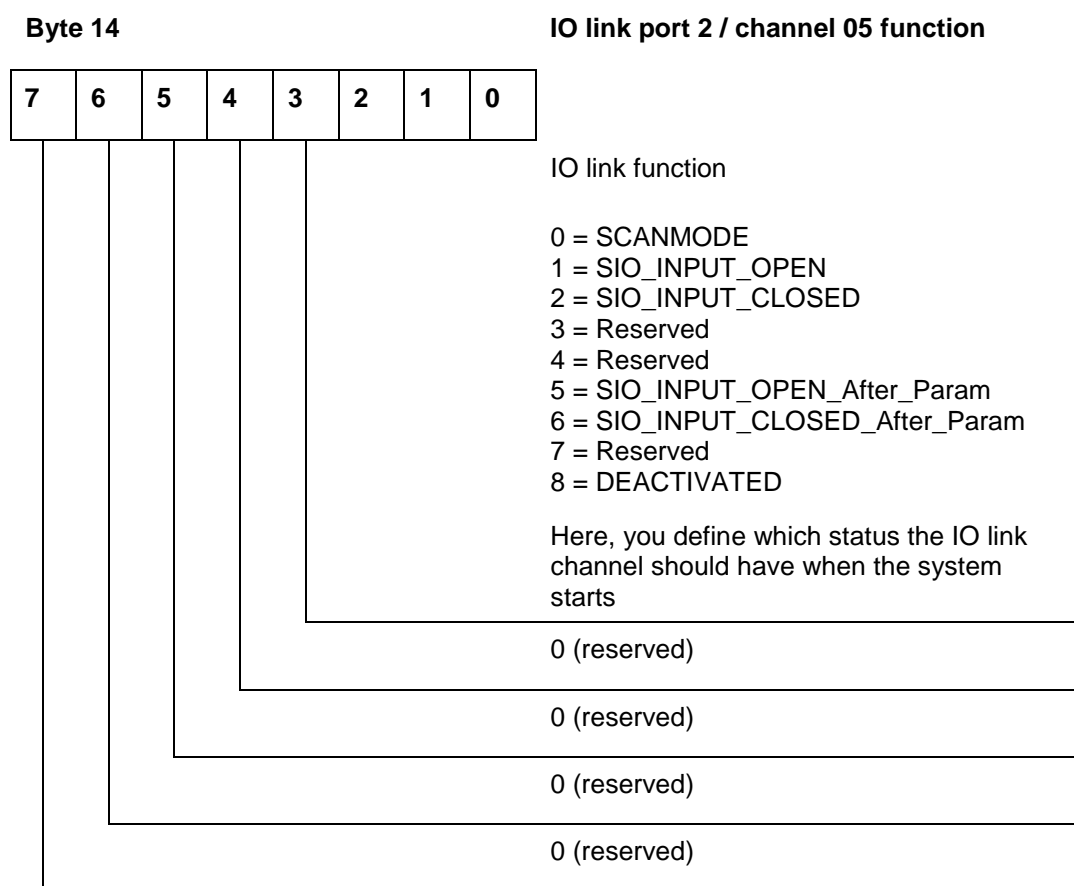


Fig. 96: Parameter byte 14, Art.-No. 56766

Bit assignment of parameter byte 15

**Byte 15**

**IO link port 2 / channel 05 cycle time**

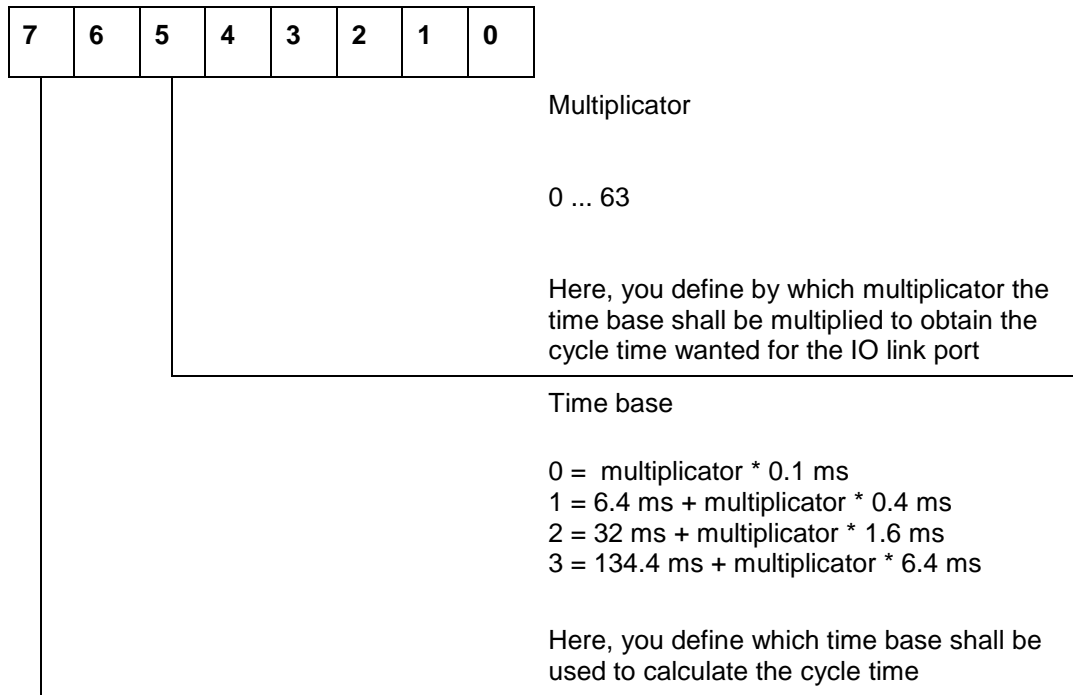


Fig. 97: Parameter byte 15, Art.-No. 56766

Bit assignment of parameter byte 16

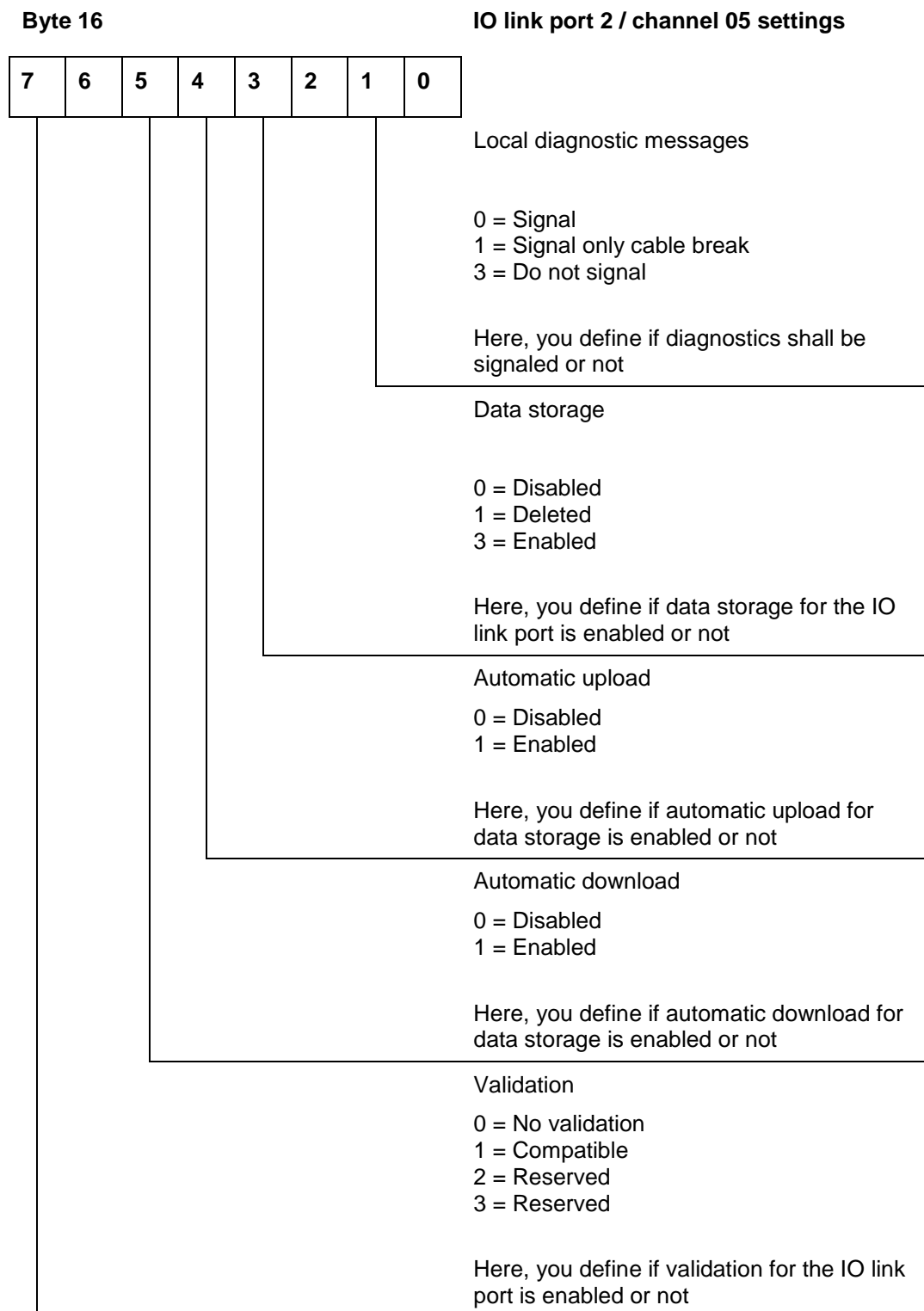


Fig. 98: Parameter byte 16, Art.-No. 56766

Bit assignment of parameter byte 17

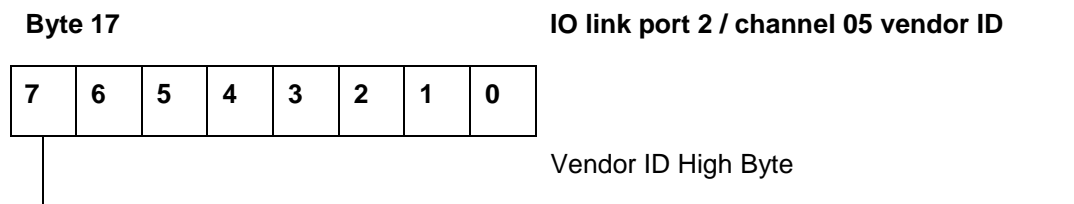


Fig. 99: Parameter byte 17, Art.-No. 56766

Bit assignment of parameter byte 18

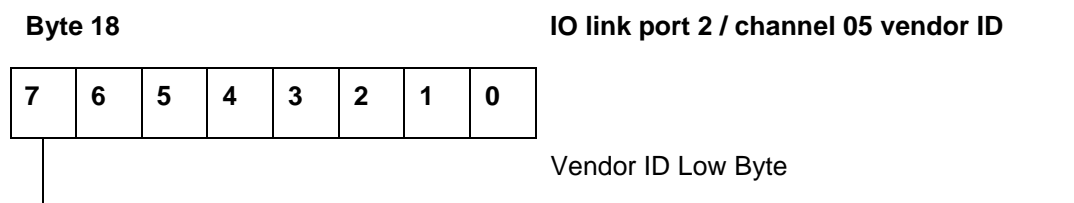


Fig. 100: Parameter byte 18, Art.-No. 56766

Bit assignment of parameter byte 19

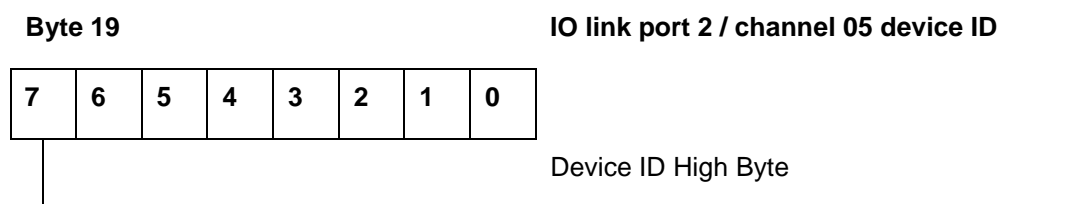


Fig. 101: Parameter byte 19, Art.-No. 56766

Bit assignment of parameter byte 20

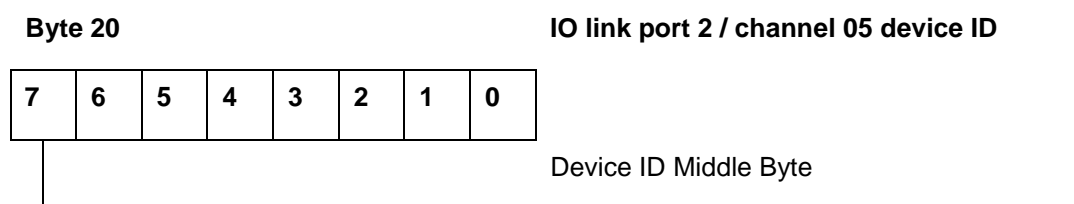


Fig. 102: Parameter byte 20, Art.-No. 56766

Bit assignment of parameter byte 21

**Byte 21**

**IO link port 2 / channel 05 device ID**

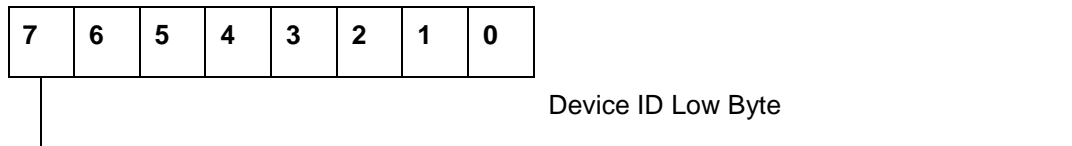


Fig. 103: Parameter byte 21, Art.-No. 56766

Bit assignment of parameter byte 22

**Byte 22**

**IO link port 3 / channel 06 function**

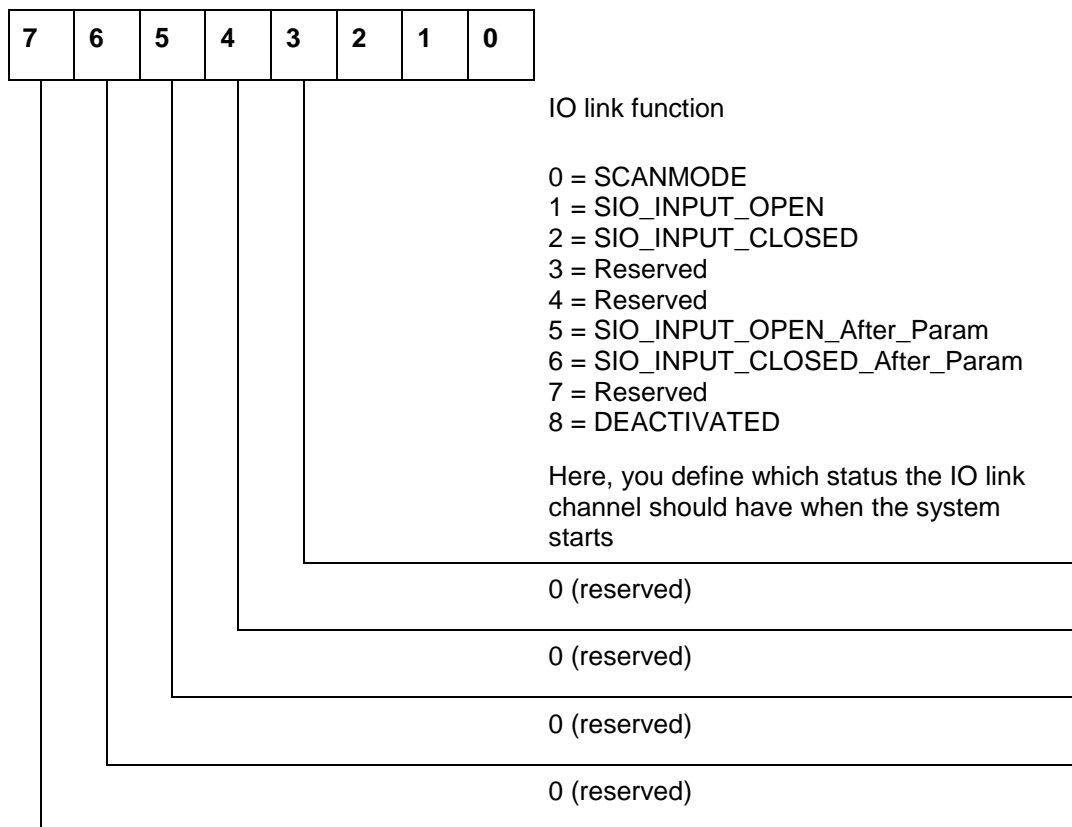


Fig. 104: Parameter byte 22, Art.-No. 56766



Bit assignment of parameter byte 23

**Byte 23**

**IO link port 3 / channel 06 cycle time**

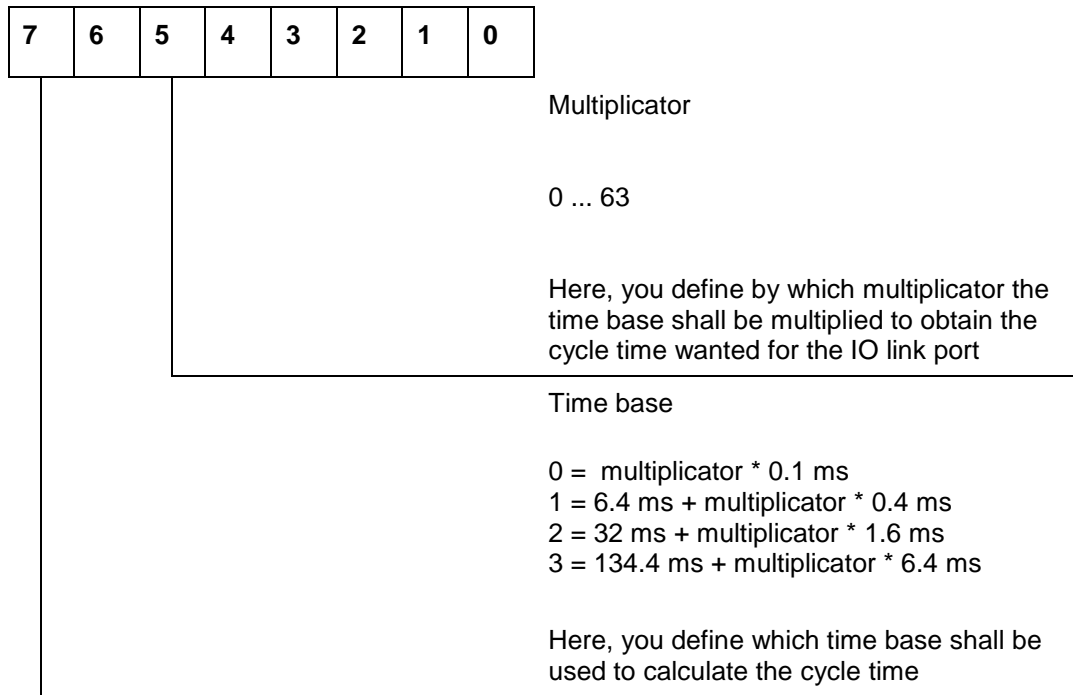


Fig. 105: Parameter byte 23, Art.-No. 56766

Bit assignment of parameter byte 24

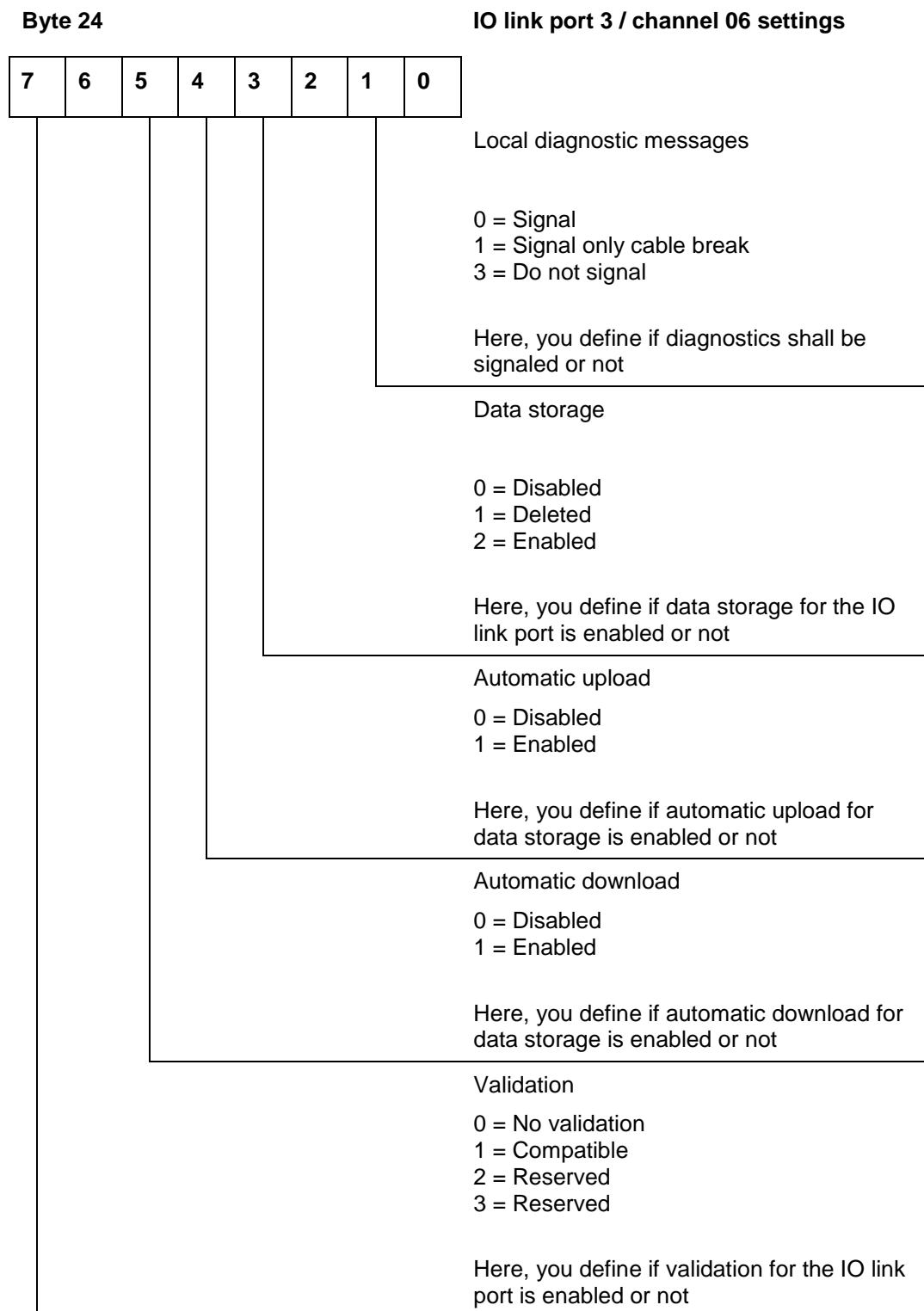


Fig. 106: Parameter byte 24, Art.-No. 56766

Bit assignment of parameter byte 25

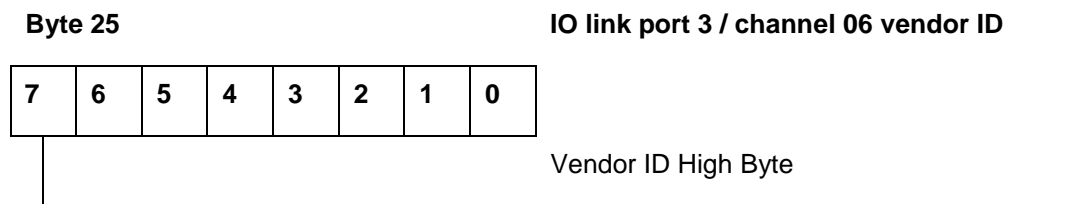


Fig. 107: Parameter byte 25, Art.-No. 56766

Bit assignment of parameter byte 26

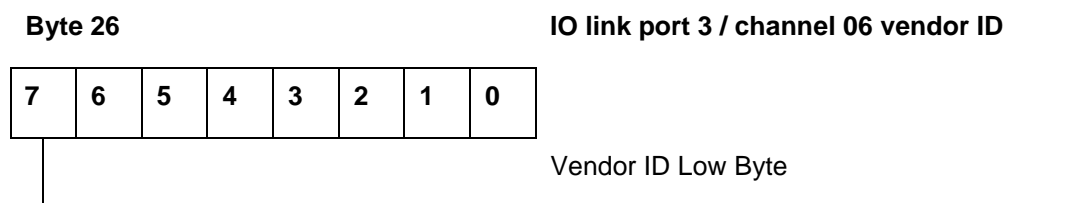


Fig. 108: Parameter byte 26, Art.-No. 56766

Bit assignment of parameter byte 27

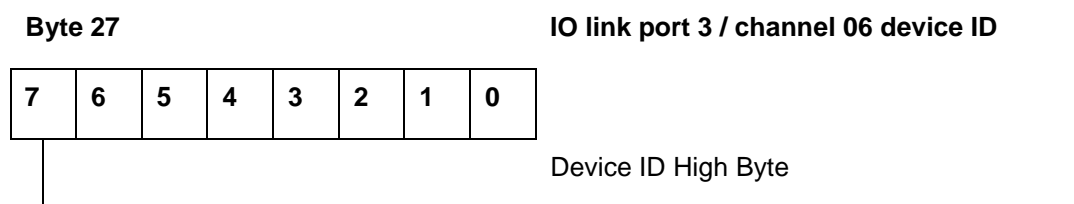


Fig. 109: Parameter byte 27, Art.-No. 56766

Bit assignment of parameter byte 28

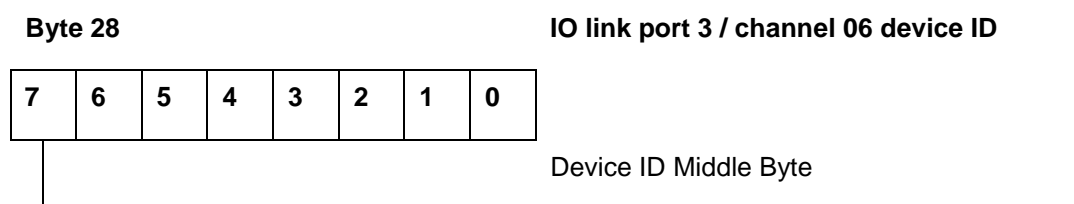


Fig. 110: Parameter byte 28, Art.-No. 56766

Bit assignment of parameter byte 29

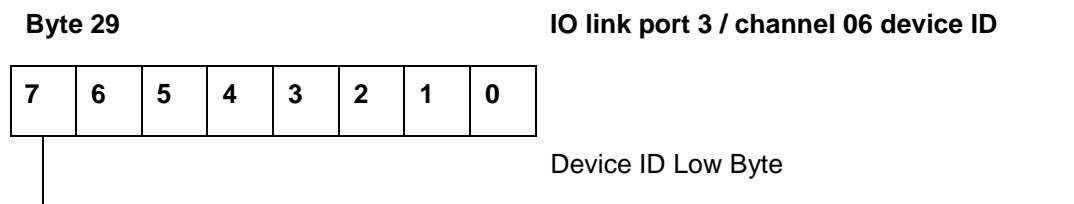


Fig. 111: Parameter byte 29, Art.-No. 56766

Bit assignment of parameter byte 30

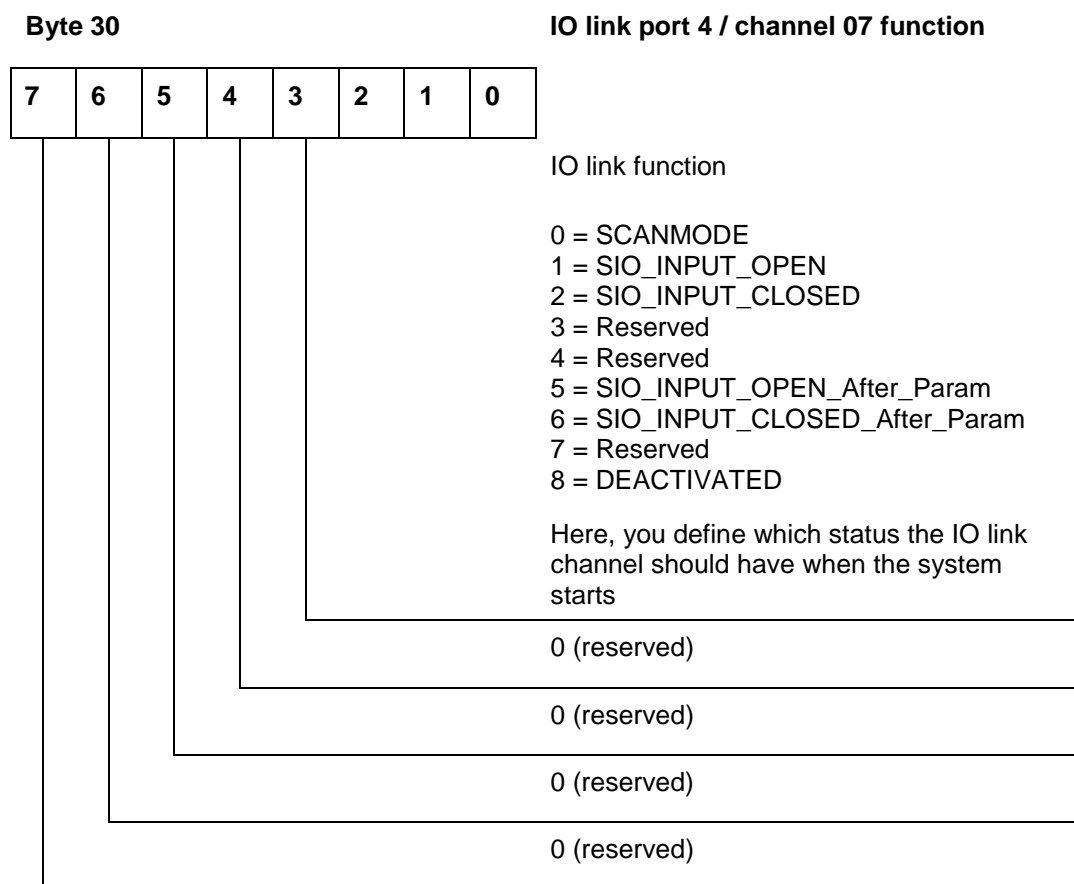


Fig. 112: Parameter byte 30, Art.-No. 56766

Bit assignment of parameter byte 31

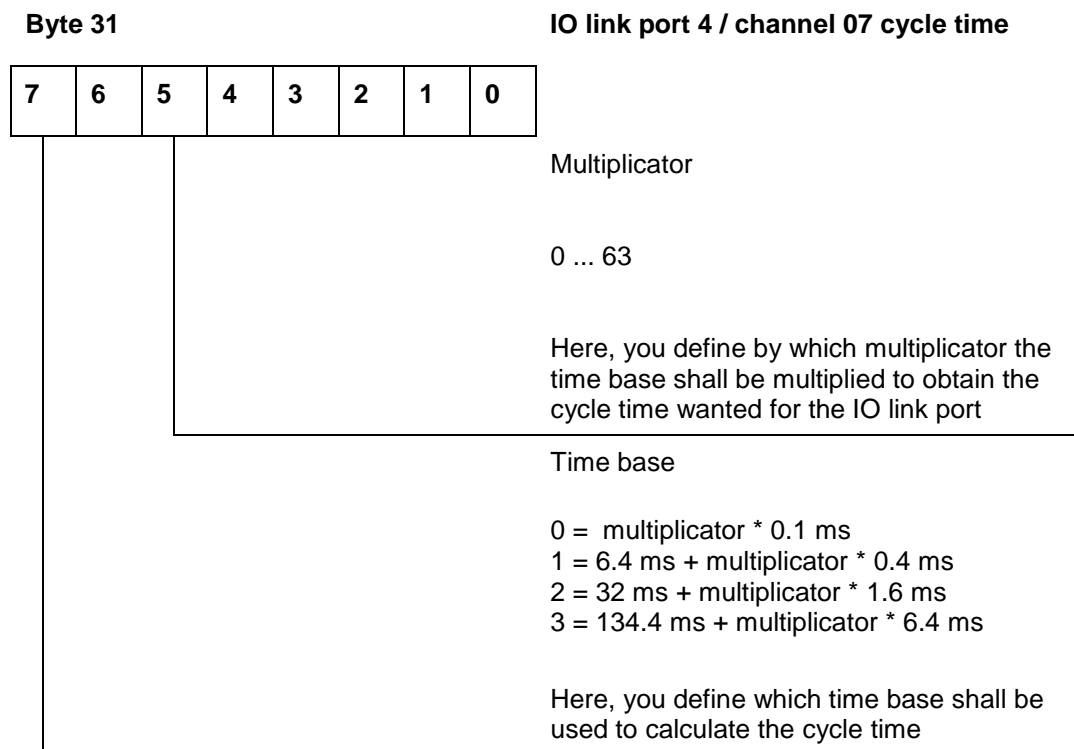


Fig. 113: Parameter byte 31, Art.-No. 56766

Bit assignment of parameter byte 32

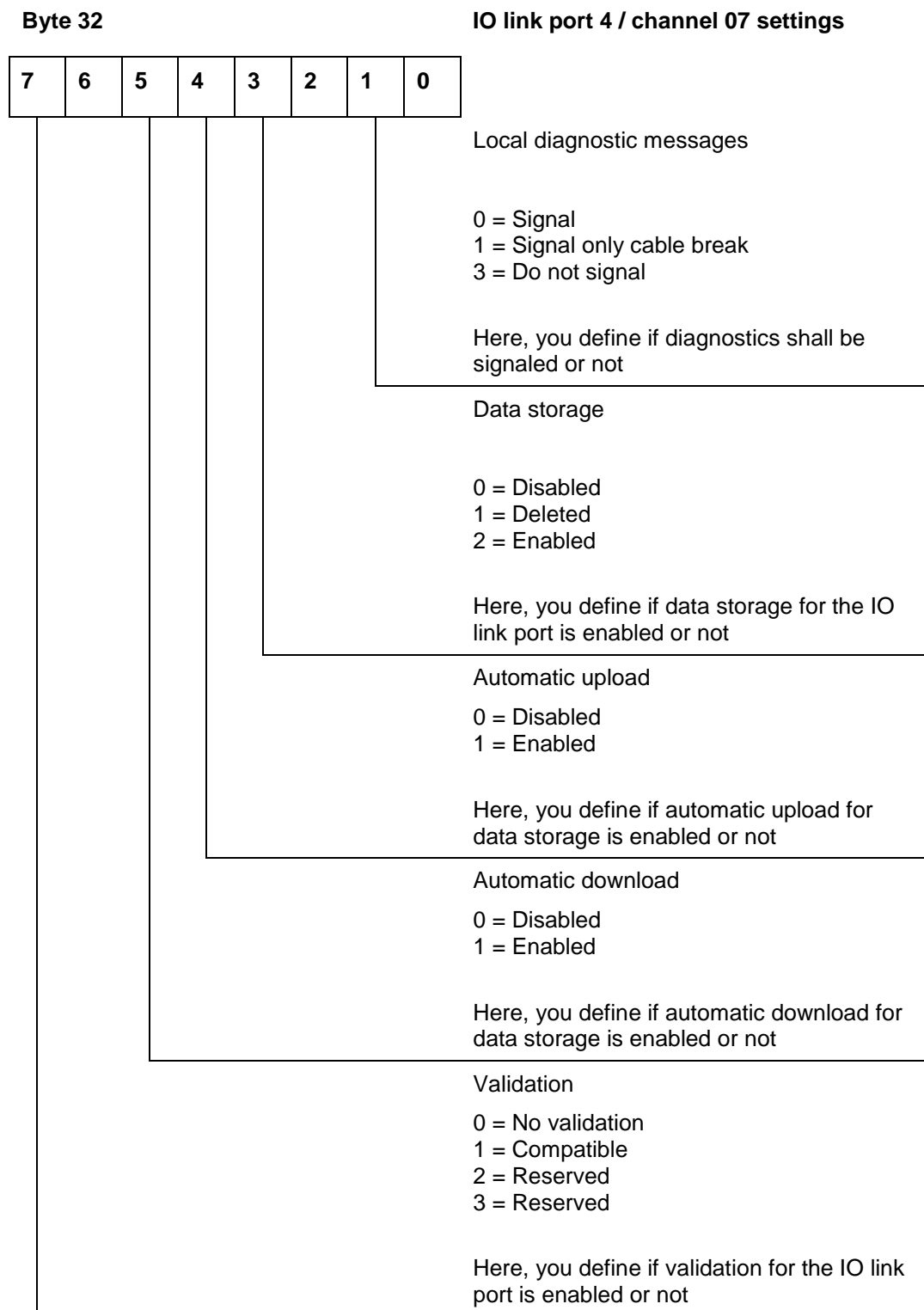


Fig. 114: Parameter byte 32, Art.-No. 56766

Bit assignment of parameter byte 33

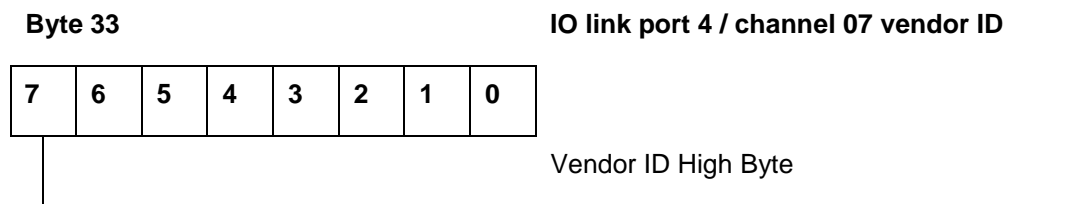


Fig. 115: Parameter byte 33, Art.-No. 56766

Bit assignment of parameter byte 34

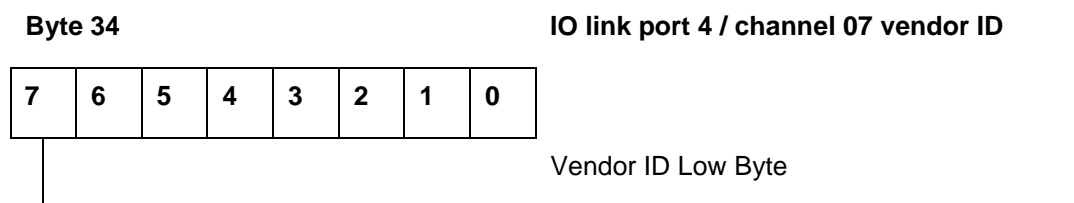


Fig. 116: Parameter byte 34, Art.-No. 56766

Bit assignment of parameter byte 35

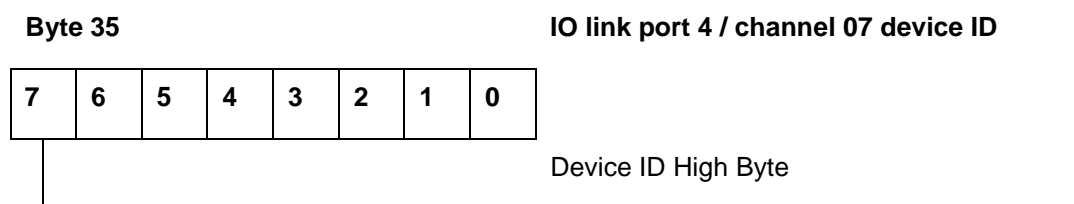


Fig. 117: Parameter byte 35, Art.-No. 56766

Bit assignment of parameter byte 36

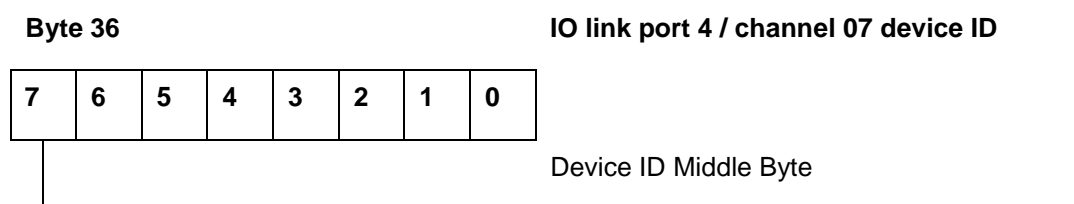


Fig. 118: Parameter byte 36, Art.-No. 56766

Bit assignment of parameter byte 37

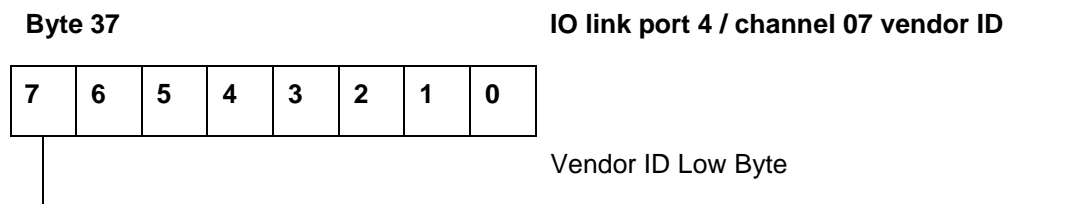


Fig. 119: Parameter byte 37, Art.-No. 56766

## 8.4.4 Data

Bit assignment I/O data – input data PII

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Female	7	6	5	4	3	2	1	0

Tab. 32: PII data Byte 1 Art.-No. 56766

Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Female	7	6	5	4	3	2	1	0

Tab. 33: PII data Byte 2 Art.-No. 56766

Bit assignment I/O data – output data PIO

Byte 1								
Bit	7	6	5	4	3	2	1	0
Pin 4 Female	7	6	5	4	3	2	1	0

Tab. 34: PIO data Byte 1 Art.-No. 56766



Byte 2								
Bit	7	6	5	4	3	2	1	0
Pin 2 Female	7	6	5	4	3	2	1	0

Tab. 35: PIO data Byte 2 Art.-No. 56766

Additionally to the each 2 bytes big PII and PIO, the configured IO link PII and PIO bytes are transmitted too. The length of each data depends on the virtual module used.

### 8.4.5 I&M functions

For communication with the IO link sensors, the Cube67+ DIO12 IOL4 E 8xM12 also supports I&M functions. They are used for communication with the IO link devices as well as to represent module-specific information.

Index 65000 read = IM0 of Cube67+ DIO12 IOL4 E 8xM12

Index 65016 read = IO – Link – MM acc. to specification

Index 65017 read = IM17 information from IO – Link Port 1

Index 65018 read = IM18 information from IO – Link Port 2

Index 65019 read = IM19 information from IO – Link Port 3

Index 65020 read = IM20 information from IO – Link Port 4

Index 65098 read and write = communication channel to connected IO link devices

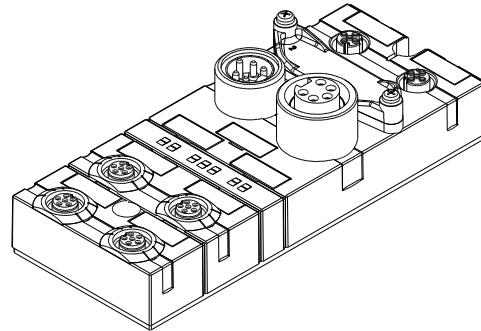
Index 65099 read = IO – Link Master Directory



I&M queries must always be requested at the slot of the Cube67+ DIO12 IOL4 E 8xM12. For port-related IO link queries via IM98 (65098), the requested port is contained in the I/O link protocol (Ports 1 to 4).

## 9. Technical Data

ProfiNet Device IP67



### EMC

#### EN 61131-2 Product standard

EN 61000-4-2 ESD .....	Contact $\pm 4$ kV, air $\pm 8$ kV
EN 61000-4-3 RF-Field & GSM .....	10 V/m
EN 61000-4-4 Burst .....	$\pm 2$ kV
EN 61000-4-5 Surge .....	asym./symm. $\pm 500$ V (DC input)
.....	asym. $\pm 1$ kV (Signal connections)
EN 61000-4-6 HF-asymmetric .....	10 V
EN 61000-4-8 Magnetic field 50 Hz .....	30 A/m
EN 55011 Emission .....	QP 40 dB $\mu$ V/m (30 - 230 MHz)
.....	QP 47 dB $\mu$ V/m (230 - 1000 MHz) (class A)

### Ambient conditions

Normal operating temperature .....	0°C ... +55°C
Storage temperature .....	-25°C ... +85°C
Enclosure type according to EN 60529 .....	IP 67

#### Please note:

The Cube67 field bus system is very robust and due to the high protection class IP67 it is protected from dust, dirt, and most liquids without an additional housing. Cube 67 is specially designed for harsh industrial applications directly in machines and systems.

The field bus system is not suitable for outdoor use, continuous operation in liquids or high pressure wash downs.

### Mechanical ambient conditions

Oscillation according to EN 60068 Part 2-6 .....	5 – 70 Hz; const. amplitude 0.75 mm
.....	70 – 500 Hz; const. acceleration 15 g
Shock according to EN 60068 Part 2-27 .....	Amplitude 50 g, 11 ms duration

### Connection possibilities

Supply cable .....	Plug connector 7/8"
Bus connection .....	2 x M12 female connector
.....	4-pin D-code
Internal system connection .....	4 x 6-pin M12 plug connector

## Technical Data

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### Miscellaneous

Dimensions (LxWxH) in mm ..... 151x62x40,5 mm  
 Weight ..... Approx. 360 g

### Bus data

Transfer protocol ..... ProfiNet IO  
 Transfer rates ..... 100 MBit/s  
 Addressing ..... via DCP

### Power supply

Operation voltage  $U_s$  and Sensor power supply 24VIN .... 24 V DC (must always be connected)  
 Actuator power supply 24V ..... 24 V DC  
 Current per PIN ..... Max 8A  
 Operation voltage range ..... 18 ... 30 V DC  
 Current consumption .....  $\leq 200$  mA  
 Sensor supply ..... 24 V DC (not switchable)  
 Operating voltage range sensor supply ..... 18 ... 30 V DC  
 Actuator supply ..... 24 V DC (switchable)  
 Operating voltage range actuator supply ..... 18 ... 30 V DC  
 Reverse voltage protection modul electronics ..... yes  
 Reverse voltage protection sensor supply ..... yes  
 Reverse voltage protection actuator supply ..... yes  
 Overvoltage protection ..... yes (suppressor diode)

### International system connection

Rated current sensor supply ..... 4 A for each module plug-in location  
 Rated current actuator supply ..... 4 A for each module plug-in location  
 Overload/short-circuit ..... electronic short-circuit recognition  
 ..... time of liberation  $< 10$  ms

## 10. Accessories



A list of Cube67+ accessories is contained in the Cube67+ System Manual Art.-No. 56974.

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

[onlineshop.murrelektronik.com](http://onlineshop.murrelektronik.com)

## 11. Glossary

Abbreviation/Term	Description
<b>Actuator short-circuit</b>	Short-circuit or overload at an output results in output switchoff.
<b>PN</b>	PROFINET IO
<b>Byte</b>	Equivalent to 8 bits.
<b>DI</b>	Digital Input
<b>DIN</b>	Deutsches Institut für Normung (German Standards Institute)
<b>DIN TH35</b>	Standardized DIN mounting rail (35x15 mm, 35x7.5 mm).
<b>DO</b>	Digital Output
<b>Drag &amp; Drop</b>	A method of operating graphic user interfaces on computers by moving graphic elements by means of a pointer device.
<b>I/O</b>	Input/Output
<b>EC Directive 2004/108/EC</b>	EMC Directive.
<b>EMC</b>	Electromagnetic Compatibility.
<b>EN</b>	European Standard
<b>ESD</b>	Electrostatic Discharge
<b>EEC</b>	European Economic Community
<b>FE</b>	Function ground/earth.
<b>GSD</b>	"The Device Data Base file describes the technical features of a PROFINET product. This file is required to configure a PROFINET system and is provided by the device manufacturer.
<b>IEC</b>	International Electrotechnical Commission
<b>IP67</b>	Ingress Protection, protection degree as per DIN EN 60529 1st code digit = Contact and foreign body protection 6: Dustproof, protection against access with a wire 2nd code digit = water protection 7: Protection against temporary immersion

## Glossary

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<b>ISO</b>	International Standard Organization
<b>LED</b>	Light Emitting Diode
<b>PELV</b>	Protective Extra Low Voltage.
<b>PNO</b>	Profibus Nutzerorganisation e.V. (German Profibus User Organization)
<b>SELV</b>	Safety Extra Low Voltage.
<b>Sensor short-circuit</b>	Short-circuit or overload at Terminal US
<b>Simatic Manager</b>	Programming software for program-logic controllers made by Siemens.
<b>PLC</b>	Program-logic controller
<b>UA</b>	Actuator Power Supply
<b>UI</b>	Module and sensor power supply.
<b>US</b>	Sensor power supply.
<b>VDMA</b>	Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machinery and Industrial Equipment Manufacturers)
<b>VZ</b>	Sign (+ or -)
<b>ZVEI</b>	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers' Association).

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