MURR ELEKTRONIK

stay connected

| **Manual**
MVK METALL IO-Link
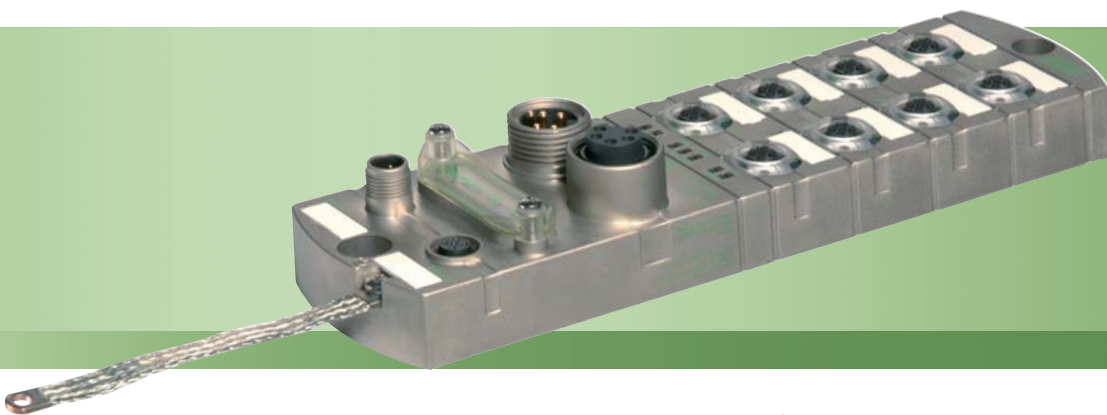
Publisher's Note

Service and Support

Website:

www.murrelektronik.com

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

The CSC supports customers over the entire course of the project, during planning and the conception of customer applications, configuration, installation, and startup. We also offer competent consulting or – in more complex cases – we even provide direct onsite support.

The CSC provides support tools. It performs measurements for fieldbus systems, such as Profibus DP, DeviceNet, CanOpen, and AS interface, as well as energy, heat, and EMC measurements.

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

You can contact the Customer Service Center at

telephone number +49 (0) 71 91 47-424

or by email at csc@murrelektronik.de.

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 and Product Manuals:
Describe the system in general and product-specific features.

Art. No.	Designation	
55315	MVK-MP IOL	Metall PROFIBUS IO Link
55374	MVK-MPNIO	Metall PROFINET
55387	MVK-MI	Metall INTERBUS
55388	MVK-MC	Metall CANopen
55392	MVK-MDN	Metall DeviceNet
55393	MVK-MP	Metall PROFIBUS
55394	MVK-P screw terminal	PROFIBUS
55395	MVK-P	PROFIBUS
55396	MVK-I	INTERBUS
55488	MVK12-P	PROFIBUS

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Safe switchoff of nonfunctional protected modules:

Art.No.	Designation
55499	MVK-MP Safe switchoff of nonfunctional protected modules

www.murrelektronik.com

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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:

>>> **PROFIBUS (www.profibus.com)**

>>> **http://www.io-link.com**

Table of Contents

Important Information

Icons

This manual contains instructions you must comply with in order to maintain safety and avoid personal injury or damage to property. These instructions are marked specially and are displayed as follows:

Notes indicate important information.

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.

➜ *Refer to our Catalog or visit:*   **www.murrelektronik.com**

Intended Purpose

Before starting up the devices, carefully read this manual and keep it at a place that is accessible to all users at all times.

In normal cases, these products do not constitute any danger to persons or assets, provided the handling specifications and safety instructions described in this manual are observed. The products meet the specifications of the European EMC Directive (2004/108/EC).

WARNING

Devices from the MVK MPNIO series are not safety devices conforming to the relevant standards.

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, troublefree functioning of the product requires proper transportation, storage, mounting, and installation, and careful operation.

Operating the device in accordance with its intended purpose is only assured when the housing is fully mounted.

Good resistance to chemicals and oil.
If other aggressive media are used, check their material resistance depending on the application.

MVK Metal fieldbus modules have a very rugged design and have very good protection against dust, soiling and most liquids due to the high IP67 protection class without requiring an additional housing. MVK Metal was specially developed for rugged industrial applications in machines and plants. Fieldbus modules are not suitable for applications outdoors, for permanent operation in liquids or in high-pressure cleaning machines.

The power supply must comply with SELV [1] or PELV[2]. Power sources in accordance with EN 61558-2-6 (transformers) or EN 60950-1 (switched-mode power supply) meet these requirements.

Only qualified, trained electricians knowledgeable in the safety standards of automation systems may configure, install, set up, service, and test the devices.

Current safety and accident prevention laws valid for the specific application must be observed for the configuration, installation, setup, servicing, and testing of the devices.

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

Please request your local Murrelektronik office for information on what cables and accessories are approved for installation, or refer to the descriptions in this manual.

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[1] Safety Extra Low Voltage

[2] Protective Extra Low Voltage:

Qualified Personnel

The requirements concerning qualified personnel are dependent on the requirements profiles described in ZVEI and VDMA publication

Only electricians who know the contents of this manual may install and maintain the products described here. "Weiterbildung in der Automatisierungstechnik"(Further training in automation systems), published by ZVEI and VDMA in the Maschinenbau-Verlag, P.O.Box 710864 in D-60498 Frankfurt, Germany.

They are therefore persons 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 the same level of knowledge from a similar field or after doing technical training.

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

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

1. Description of the MVK METAL IO Link

COMPACT BUS MODULES

Fieldbus modules with IP67 protection are an
important module in machine installation and
they replace complex wired, and therefore, high-
cost terminal boxes. Modular machine concepts can be supported in an excellent way.

Modules are place preferentially directly in the vicinity of the process. The hook up sensors and actua-
tors to the control system by means of plug-in, preterminated leads. With IO Link modules, the PROFI-
BUS communication comprises acyclic PROFIBUS services in compliance with DP-V1.

MAXIMUM FLEXIBILITY – DUE TO MULTIFUNCTIONAL I/Os AND IO LINK CHANNELS

- The two signals for each of the M12 slots are freely parameterizable, whether it is the input,
  output or diagnostic input. Many of the slots are also parameterizable as IO link channel.

- Modules can be used with greater efficiency.

IO link accelerates the development process

- fewer interfaces

- simplified integration

- continuous processes

FIND FAULTS INSTEAD OF SEARCHING FOR THEM – REAL DIAGNOSTICS

- Detailed information on the type and location of a fault or defect.

- Detailed information from IO link down to sensor level with exact fault description.

RESISTANT – DUE TO RUGGED DESIGN

System Design Principle
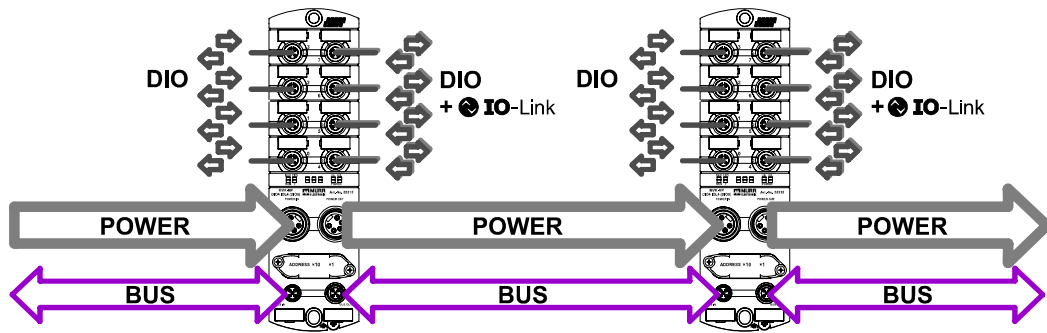
Fig. 1: System design principle

2. Configuration

2.1 System Components

2.1.1 Product Designation Code

The designation format of MVK METAL system components explains their function.

Examples:

Name			Description
MVK-M	P	DIO4 IOL4 (DIO8)	

I/O channels

D   = Digital

I   = Input
O   = Output

IOL = IO link channels

Function

P   = ProfiBus
DN = DeviceNet
C   = CANopen
I   = InterBus
PN = ProfiNet

Product Family

Fig. 2: Example of product designation

2.1.2 MVK METAL IO Link Modules

The function of the IMVK METAL System is to group I/O level signals decentrally and supply this information over a fieldbus network (e.g. PROFIBUS).

The module and I/O units are powered via a 5-pin power plug 7/8" (mini style).

Article Number	Description
55 315	MVK-MP DIO4 IOL4 (DIO8)

Tab. 1: MVK IO link module

2.2 PROFIBUS Cable

Murrelektronik offers a number of preterminated and matching round cables. Please refer to Chapter 7 Accessories.

The bus cable must be designed compliant with EN 50170 Part 2 (Cable Type A). We recommend the use of our preterminated PROFIBUS cables which are simple and reliable to install.
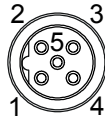
Every PROFIBUS segment must be installed with a terminating resistor at start and end.

Pin assignment of PROFIBUS connection

Bus IN Plug		BUS OUT Socket
n.c.	**Pin 1**	+5 V
a green	**Pin 2**	a green
n.c.	**Pin 3**	0 V
B red	**Pin 4**	B red
n.c.	**Pin 5**	n.c.
Shield	**Thread**	Shield

Tab. 2: Pin assignment of PROFIBUS connection

2.3 Power Supply

We recommend the use of primary switched-mode power supplies in applications with the MVK and to supply the sensors and actuators.

MVK modules require a DC power supply in the range 18 to 30 V.

Murrelektronik offers an extensive range of primary switched-mode power supply units (see section "Accessories"). Please also refer to our Catalogs or visit: www.murrelektronik.com

System-related limit values regarding system power supply must be strictly observed if maximum functional safety and fault-free operation are to be ensured.

Always ensure that the system power, measured at the device furthest from the power supply, does not drop below 18 VDC.

A load current-related voltage drop in the power supply cable occurs due to the central power supply of MVK modules, including all their connected sensors.

In critical cases, voltage drop optimization is obtainable by changing the location of the power supply unit within the overall system and by using power supply cables with a larger conductor cross-section.

Calculating the required conductor cross-sections is dependent on installation-specific configuration data and is therefore not discussed in this manual.

The power supply module may be damaged if power supply is polarity-reversed. For this reason, we recommend the use of our preterminated 7/8" cables.

2.3.1 Connecting the Power Supply to the Module

The auxiliary power is required to power the actuators and sensors. The electronics of the MVK module are powered from the sensor power supply.

The 7/8" connector is designed to carry a maximum current of 8 A per pin. This is taken into account when connecting the power supply to another circuit.

Power Supply Line

Only cables with VDE approval may be used to power the modules. All other power supply line characteristics depend on individual applications and are not covered in this manual.

Never switch off the power supply (Pin 4) at the power supply connector in service and do not route via the emergency off circuits. Otherwise, the MVK module can no longer participate in bus communication. The module electronics are powered via Pin 4.
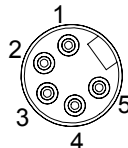
The actuator power supply (Pin 5) may be designed for EMERGENCY OFF circuits.
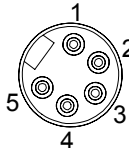
Murrelektronik offers an extensive range of primary switched-mode power supply units (see section "Accessories"). Please also refer to our Catalogs or visit: www.murrelektronik.com

Pin assignment of 5-pin power plug 7/8" (mini style)

		Power IN Plug		Power OUT Socket

0 V	**Pin 1**	0 V
0 V	**Pin 2**	0 V
⏚	**Pin 3**	⏚
+24 V US / max. 8 A	**Pin 4**	+24 V US / max. 8 A
+24 V UA / max. 8 A	**Pin 5**	+24 V UA / max. 8 A

Tab. 3: Contact assignment of EtherNet power plug

2.4 Connecting Sensors and Actuators

2.4.1 Connection

The tables below show the general pin assignment of M12 slots

Socket

M12
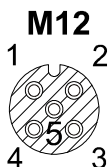
M12 socket, black (sockets 0 to 3)

Pin 1	+ 24 V	Sensor supply
Pin 2	Function channel	Freely parameterizable Channel (Input or output or diagnostic input)
Pin 3	0 V	Reference potential
Pin 4	Function channel	Freely parameterizable Channel (Input or output)
Pin 5	⏚	Function ground

Tab. 4:   General pin assignment of M12 slots with black socket

M12 socket, gray (sockets 4 to 7)

Pin 1	+ 24 V	Sensor supply
Pin 2	Function channel	Freely parameterizable Channel (Input or output or diagnostic input)
Pin 3	0 V	Reference potential
Pin 4	IO link function channel	Freely parameterizable Channel (IO link, Input or output)
Pin 5	0 V	Reference potential

Tab. 5:   General pin assignment of M12 slots with gray socket

Unused sockets must be closed off with blank plugs. Otherwise, IP 67 protection is not guaranteed.

The MVK module supports the IO link communication between Master and Device at the following baud rates:

- 230,400 baud (COM 3)

- 38,400 baud (COM 2)

- 4,800 baud (COM 1)

Line length is limited to 20 m. The MVK module selects automatic the communication speed to suit the IO link device.

2.4.1.1 Sensor power supply to M12 black socket (sockets 0 to 3)

Sensors can be powered directly via pins 1 (+24 V) and 3 (0 V) of the M12 sockets. The maximum permissible current for sensor power supply is 200 mA per M12 socket. In case of an overcurrent or short-circuit, the connected line or sensor must be disconnected from the M12 socket. Note the derating in the drawing below:

Derating of sensor power supply
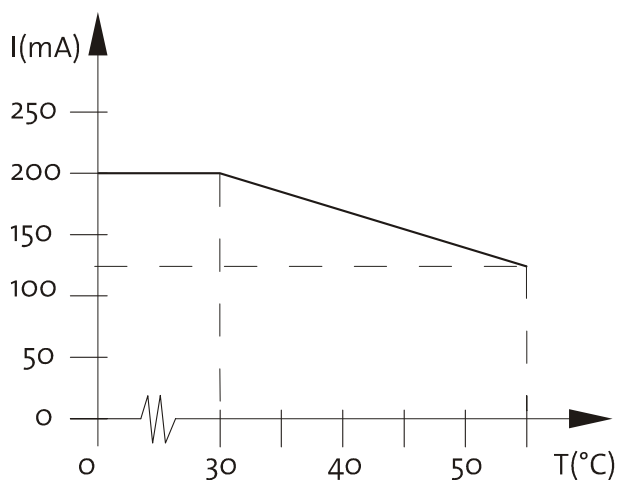
Fig. 3: Derating of sensor power supply

Pin 1 of black standard IO M12 sockets (sockets 0 to 3) may be loaded at max. 200 mA each.

It is recommended to keep to a wire cross-section of min. 0.34 mm² with the aim of achieving a rapid short-circuit switch-off time.

2.4.1.2 Power supply of M12 gray sockets (sockets 4 to 7)

Sensors can be powered directly via pins 1 (+24 V) and 3 (0 V) of the M12 sockets. The maximum permissible current for sensor power supply is 700 mA per M12 socket. In case of an overcurrent or short-circuit, the connected line or sensor must be disconnected from the M12 socket. Note the derating in the drawing below:

Derating the IO link power supply
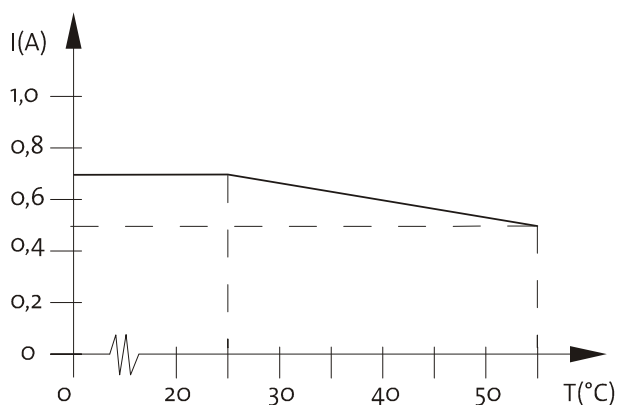
Fig. 4: Derating the IO link power supply

> **!** **Pin 1 of gray standard IO link M12 sockets (sockets 4 to 7) may be loaded at max. 700 mA each.**

It is recommended to keep to a wire cross-section of min. 0.34 mm² with the aim of achieving a rapid short-circuit switch-off time.

2.4.1.3 Actuators

Derating actuator power supply

I(A)
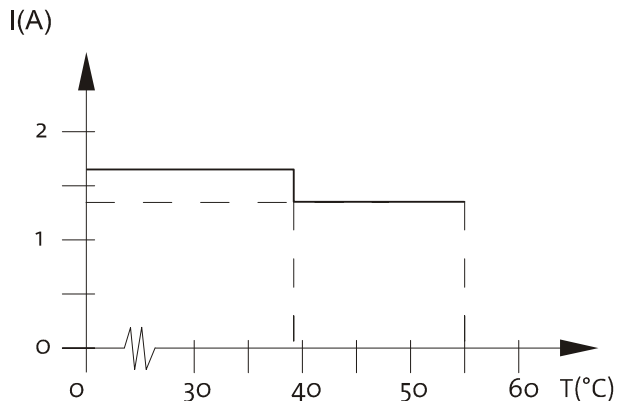
Fig. 5: Derating actuator power supply

Every output can be loaded to maximum 1.6 A.

If an overload or a short-circuit occurs at an output, the output is shut down. After removal of the fault, the output remains off. To delete the actuator shut-down diagnostic, the output must be switched off via the controller or the power supply UA must be reset.

The module may heat up depending on the load.

The total current may not exceed 8 A due to the maximum current carrying capacity of the 7/8" power plug.

If the actuator power supply is looped, make sure that the total current of all modules does not exceed 8 A.

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

We recommend not exceeding the following lengths in order to achieve a rapid short-circuit switch-off time:

max. 15 m feed line (POWER IN) 1.5 mm² and max. 1.5 m actuator line 0.75 mm²

max. 10 m feed line (POWER IN) 1.5 mm² and max. 3 m actuator line 0.75 mm²

2.4.2 Diagnostic Input

Digital inputs at Pin 2 of M12 sockets can be parameterized as diagnostic inputs. When a 0V signal is applied to a diagnostic input, it is displayed inverted in the process map. At the same time, a channel-related "External Error" diagnostic message is sent via the DP diagnostic. The associated LED lights up red. This provides the possibility of displaying faults from external devices on the MVK-MP. Below are some application notes.

2.4.2.1 Connecting Sensors / Actuators to Diagnostic Output

When sensors or actuators with diagnostic outputs are used (e.g. according to Desina standard), the diagnostic signal can also be evaluated by a conventional I/O system, and processed or displayed in the visualization system. However, there is no visual fault indication in the vicinity of the defective sensor that can also be fitted at a non-visible point.

Visual signaling at the M12 socket of the MVK-MP the facilitates en exact fault localization in the field. This permits the detection of:

- ■ Front face damage
- ■ Defective electronics
- ■ Wire break

Fig. 6: 3.6 Connecting sensors / actuators to diagnostic output

2.4.2.2 Monitoring a Line for Line Break

The M23 diagnostic adapter from Murrelektronik is a simple accessory if you do not use a Desina sensor or Desina actuator. It helps you to monitor M12 lines to the sensors and the actuators of systems for line breaks on wire 1 and wire 2.

Fig. 7: M12 diagnostic adapter

2.4.3 Unused Connections

Unused sockets must be closed off with blank plugs. Otherwise, IP 67 protection is not guaranteed.

3. Installation

3.1 Mounting

3.1.1 Dimensioning
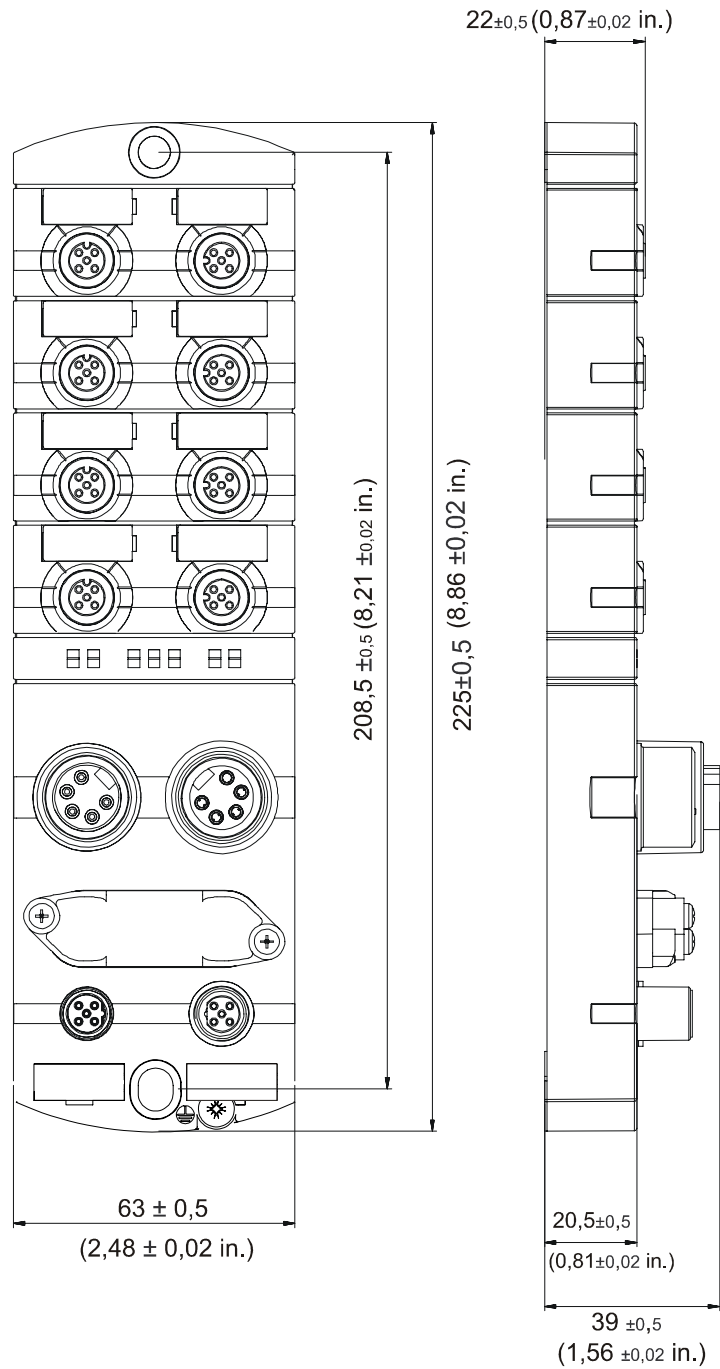
Fig. 8: Dimensioning

3.1.2 Spacing
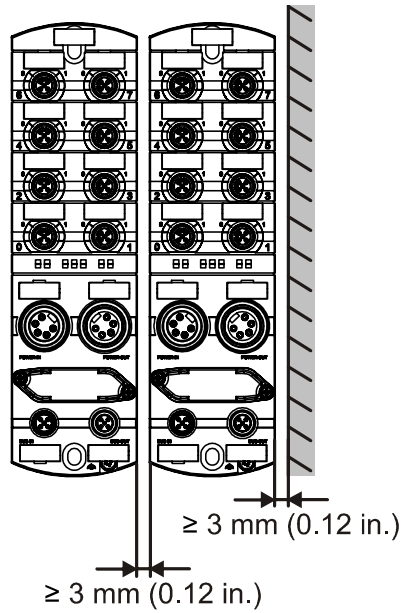
Fig. 9: Spacing

Angled connectors from Murrelektronik require a minimum spacing of 50 mm.

3.1.3 Addressing
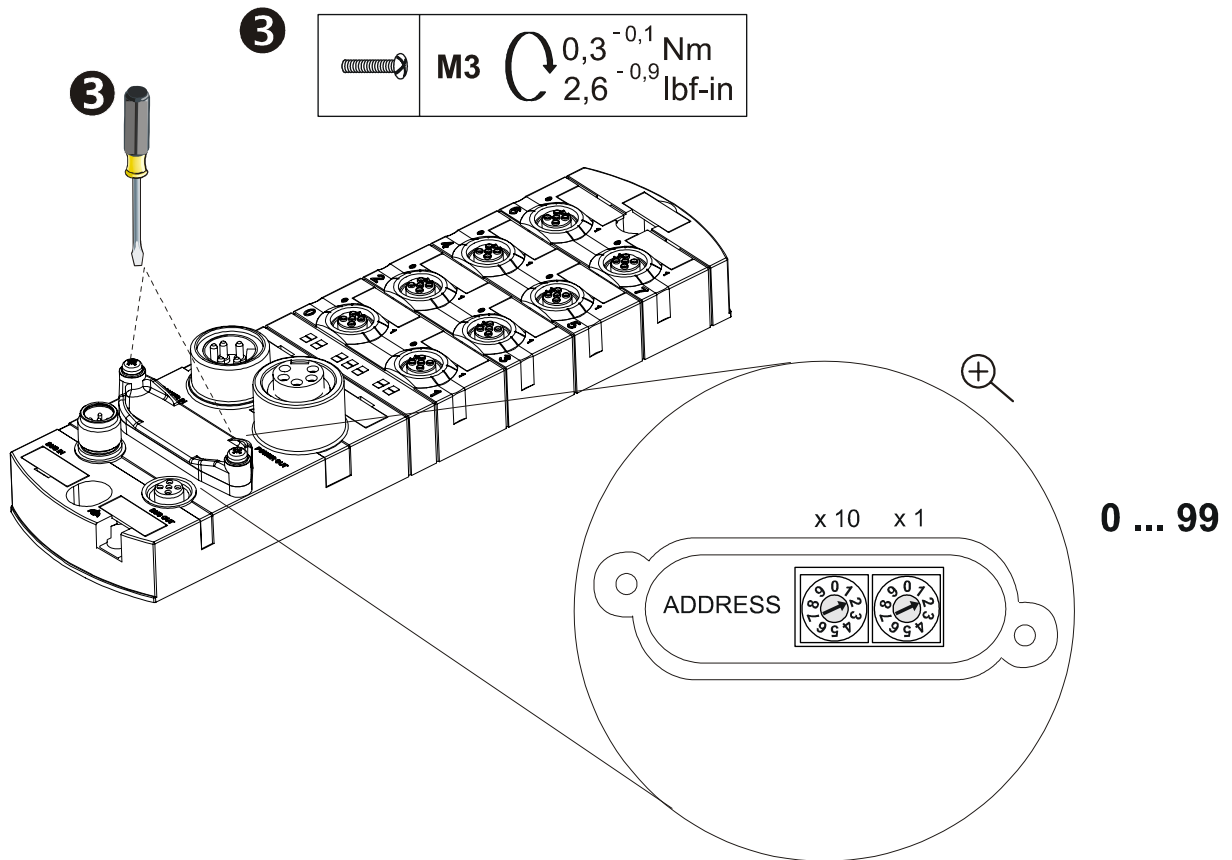
Fig. 10:   Setting the PROFIBUS address

Further information on addressing is contained in the chapter on Startup.

3.1.4 IP67

IP67 protection is only guaranteed when all sockets are wired up or provided with blank plugs.

4
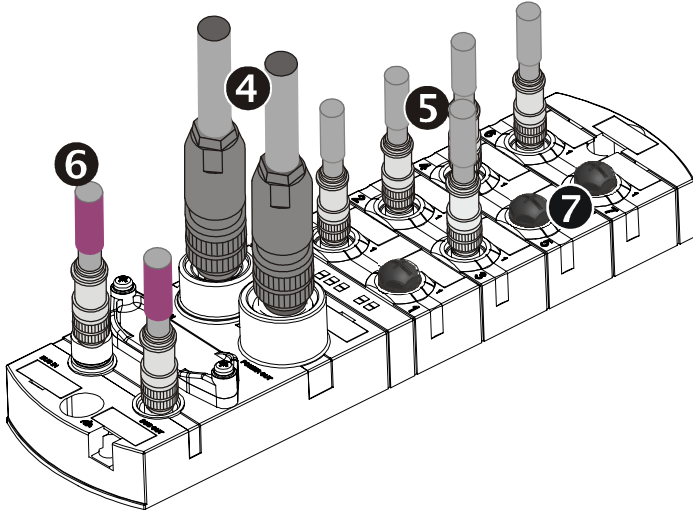
4 7/8" $1,5_{-0,2}^{+0,2}$ Nm $13,27_{-1,8}^{+1,8}$ lbf-in

Zubehör / accessories / accessoire / acessórios / accessori / los accesorios:
Art.-No.: 55385 (plastic)
or
Art.-No.: 55390 (metal)

5
6 M12 $0,6_{}^{+0,1}$ Nm $5,31_{}^{+0,9}$ lbf-in
7

x 10

Zubehör / accessories / accessoire / los accesorios / accessori /acessórios:
Art.-No.: 58627

BUS

Zubehör / accessories / accessoire / acessórios / accessori / los accesorios:
Art.-No.: 7000-14041-0000000

Zubehör / accessories / accessoire / los accesorios / accessori /acessórios:
Art.-No.: 7000-99102-000 0000
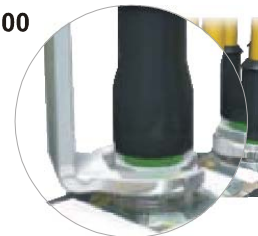
Fig. 11: Example of assembly for IP67

3.2 Terminal Overview of MVK-MP DIO4 IOL4 (DIO8) Art. No. 55315

A DIO4 + (DIO4)

Pin 1	+24V U_S / 0,2A
Pin 2	Signal Diag
	DI / DO: 10..13
	DO: U_A / 1,6 A
Pin 3	0V
Pin 4	Signal DI / DO: 00...03
Pin 5	⏚

B IO Link + (DIO4)

Pin 1	+24V U_S / 0,7A
Pin 2	Signal Diag
	DI / DO: 14..17
	DO: U_A / 1,6 A
Pin 3	0V
Pin 4	IO Link ⬤ DI
Pin 5	0V

C POWER IN   POWER OUT

Pin 1	0V
Pin 2	0V
Pin 3	⏚
Pin 4	+24V U_S / 8 A
Pin 5	+24V U_A / 8 A

D

Adressierung / Adressage / Addressing /
Direccionamiento / Indirizzamento /
Endereçamento :

x 10   x 1

ADDRESS   0 ... 99

E BUS IN   BUS OUT

	Pin 1	+5V
n.c.		
A grün / green / vert / verde / verde / verde	**Pin 2**	A grün / green / vert / verde / verde / verde
n.c.	**Pin 3**	0V
B rot / red / rouge/ rosso / vermelho / rojo	**Pin 4**	B rot / red / rouge/ rosso / vermelho / rojo
n.c.	**Pin 5**	n.c.
Schirmung / Blindage / Screening / Blindaje / Schermatura / Blindagem	Gewinde Thread Filet Rosca Filetto Rosca	Schirmung / Blindage / Screening / Blindaje / Schermatura / Blindagem

Fig. 12: Terminal overview of MVK-MP DIO4 IOL4 (DIO8) Art. No. 55315

3.2.1 Installing MVK METAL Modules

The modules of the MVK-MP Series can be fitted directly to a mounting panel or a machine. The module features two mounting holes for this purpose.

Make sure that the mounting surface is flat and level to prevent mechanical stress in the module housing.

Attach the module using two 6 mm diameter screws and two washers as per DIN 433 T1/T2. The tightening torque is 8 Nm.

Function Ground

The FE connection is located at the bottom facing edge of the module housing. In order to ensure proper functioning in compliance with the EMC regulations specified in the datasheet, we recommend the use of our grounding strap which is already pre-installed.

Connect the PE terminal on the housing at low impedance to the function ground (refer to EMC information).
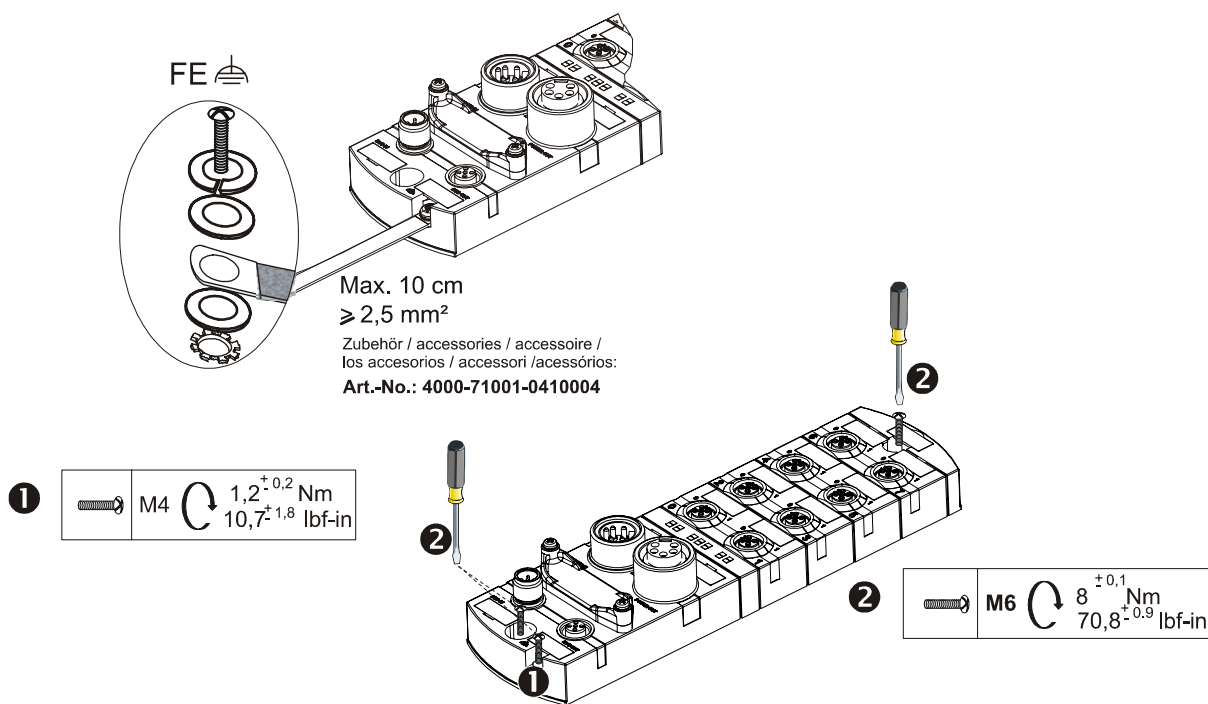
Fig. 13: Installing

Installation sequence

We recommend that you comply with the installation sequence below:

1. Install the MVK module.

2. Hook up the function ground.

3. Set the PROFIBUS Address.

4. Contact Bus In / Out; if you do not use Bus Out, fit a terminating resistor.

5. Contact 7/8" Power In /Out leads; if you do not use Power Out, fit a blank plug.

6. Contact M12 sensor/actuator leads; if you do not use an M12 socket, fit a blank plug.

4. Startup

4.1 Assigning and Setting the Profibus Address

The PROFIBUS address is set by means of two rotary switches directly on the MVK. Values are permitted between 0 and 99. Usually, a DP Master assigns addresses 0 to 2. We recommend setting the addresses for MVK starting with address 3.
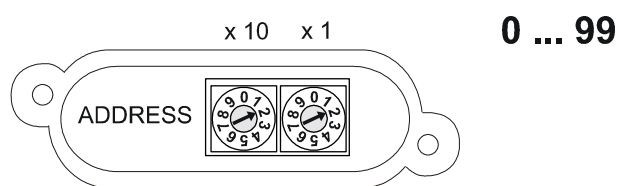
Fig. 14:   Setting the PROFIBUS address

> ⓘ **The address setting is read in once after the power supply is connected. A change of address only becomes effective, therefore, when the module power supply is reset.**

> ⓘ **When assigning the address, it must be ensured that each PROFIBUS device gets a clear and individual address.**

4.2 GSD File

The operation of the device described in this manual requires a GSD file

MURR0C2F.GSG.*

The file suffix indicates the language version. GSD files are available in six different languages.

File Suffix	Language
*.gsd	Default = English
*.gse	English
*.gsg	German
*.gss	Spanish
*.gsf	French
*.gsi	Italian
*.gsp	Portuguese

Tab. 6: GSD suffixes

The latest GDS files are downloadable over the web from:

http://www.murrelektronik.com. Navigate to the download section under configuration files.

4.3 Baud Rates

All devices in a PROFIBUS network operate at a standard baud rate that is defaulted by the bus master. The MVK module detects the baud rate setting automatically. Comply with the maximum permissible line lengths dependent on the baud rate used as shown in the table below. The values refer to one segment in each case. Larger network topologies are implementable across several segments by means of repeaters.

Maximum Permissible Line Lengths in a PROFIBUS Segment

Transmission speed in Kbps	9.6	19.2	45.45	93.75	187.5	500	1500	3000	6000	12000
Cable length in m	1200	1200	1200	1200	1000	400	200	100	100	100

Tab. 7: Line lengths in a PROFIBUS segment

4.4 Configuration

Configuring a PROFIBUS DP slave is necessary to define the I/O data quantity and reserve the addresses in the controller.

Physically, the MVK -P is a compact device. However, in the PROFIBUS DP system, it is treated as a modular system. This modular system comprises a "virtual" head module, a DIO module, and 4 IO link ports pre-assigned with "IOL_I_2Byte".

As in a building kit, the head module is first added to the configuration. Head modules always have zero data length and their function acts as module identification and parameterization. They are also in direct connection with the Article Number of each MVK module. Please note that only one head module can be added and it must always be the first element in the configuration. Then add one DIO module with two bytes input and output data length each and four IO link modules. If you do not want to use an IO link port, add the virtual module "IO link disabled". IO link modules must be arranged downstream of the DIO module.

MVK uses the special ID format described in IEC 61158.

4.4.1 Configuration Setup for Head Module and IO Link

> **!** **An MVK IO link configuration always comprises the head module, a DIO module, and 4 IO link ports. Unused IO link ports must be disabled.**

Fig. 15: Default configuration comprising head module, DIO module, and 4 virtual IO link modules

4.4.2 Correlation between Channel Number and Pin/Socket

Based on the channel number, you can define the socket and the associated pin.

Example: Channel number is 12, this corresponds to Pin 2 (x=1) of Socket No. 2 (Y=2).

Channel number = XY	X	Y
X = 0	Pin 4	
X = 1	Pin 2	
Y = 0 to (number of sockets)		Number of sockets

Tab. 8: Correlation between channel number and pin/socket

4.4.3 IO Link Sensor – Operating Modes

The IO link operating modes are mapped using Virtual Modules.

The IO link ports can be operated in the following operating modes:

Operating mode	Description	Hardware configurator
SIO[3] input with NO contact function	Digital input functionality, no IOL communication.	IOL_I_SIO_SCHLIESSER (NO)
SIO input with NC function		IOL_I_SIO_OEFFNER (NC)
SIO input with NO contact function after parameterization	The port starts with IOL communication for device parameterization. After parameterization is completed, switch over to digital input functionality using a fallback command.	IOL_I_SIO_SCHLIESSER after parameterization
SIO input with NC contact function after parameterization		IOL_I_SIO_SCHLIESSER after parameterization

---

[3] SIO is the abbreviation for standard IO.

Operating mode	Description	Hardware configurator
SCAN mode (IO link mode)	IOL communication for IOL devices enabled	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 …
DEAKTIVIERT (disabled)	Port disabled	IOL_DEAKTIVIERT (disabled)

Tab. 9: IO link port operating modes

Select functionality from the configuration tool and data size from the process map by drag&drop. The real physical configuration can be mapped very precisely

. If one of the sockets is not 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. 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.

In addition, you can freely define the I and O address for each IO link socket in the configuration tool using these modules.

The IO link ports must always be present in the configuration.

Errors in the IO link configuration lead to the signaling of a configuration error (LED "Cfg F" red).

Diagnostic message for IO link functionality are signaled at the slots of the IO link modules.

4.4.4 Structure of Virtual Data Modules

I/O data are compiled from a list of virtual data modules, just as for the MVK.

Virtual Head Module	Data Width	Identification
MVK-MP DIO4 IOL4 (DIO8) 55 315	0	03_{hex} $D8_{hex}$ 13_{hex} 08_{hex}

Tab. 10: Virtual head modules

DIO Module	Data Width		Identification
	IN	OUT	
DIO Module	2 bytes	2 bytes	$C3_{hex}$ 01_{hex} 01_{hex} DD_{hex} $B0_{hex}$ 06_{hex}

Tab. 11: DIO Module

Input/Output Byte	Bit	Assignment
0	0	M12 socket 0 channel 00 (Pin 4)
	1	M12 socket 1 channel 01 (Pin 4)
	2	M12 socket 2 channel 02 (Pin 4)
	3	M12 socket 3 channel 03 (Pin 4)
	4	M12 socket 4 channel 04 (Pin 4)[1]
	5	M12 socket 5 channel 05 (Pin 4)[1]
	6	M12 socket 6 channel 06 (Pin 4)[1]
	7	M12 socket 7 channel 07 (Pin 4)[1]
1	0	M12 socket 0 channel 10 (Pin 2)
	1	M12 socket 1 channel 11 (Pin 2)
	2	M12 socket 2 channel 12 (Pin 2)
	3	M12 socket 3 channel 13 (Pin 2)
	4	M12 socket 4 channel 14 (Pin 2)
	5	M12 socket 5 channel 15 (Pin 2)
	6	M12 socket 6 channel 16 (Pin 2)
	7	M12 socket 7 channel 17 (Pin 2)

Tab. 12: Bit assignment of virtual I/O module

[1] When virtual SIO modules for IOL ports are used

Virtual SIO Modules for IOL Ports	Data Width	Identification
IOL_DEAKTIVIERT (disabled)	1 byte	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_OEFFNER (NC)	1 byte	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_SCHLIESSER (NO)	1 byte	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_Oeffner_nach_Para.	1 byte	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_Schliesser_nach_Para.	0 byte	02_{hex} FF_{hex} 03_{hex}

Tab. 13: Virtual IO link modules

When virtual SIO modules are configured, the inputs are mapped in the input area of the DIO module.

Virtual IOL Input Data Modules for IOL Ports	Data Width IN	Identification
IOL_I_1 Byte	1 byte	42_{hex} 80_{hex} FF_{hex} 03_{hex}
IOL_I_2 Byte	2 bytes	42_{hex} 81_{hex} FF_{hex} 03_{hex}
IOL_I_4 Byte	4 bytes	42_{hex} 83_{hex} FF_{hex} 03_{hex}
IOL_I_6 Byte	6 Byte	42_{hex} 85_{hex} FF_{hex} 03_{hex}
IOL_I_8 Byte	8 Byte	42_{hex} 87_{hex} FF_{hex} 03_{hex}
IOL_I_10 Byte	10 bytes	42_{hex} 89_{hex} FF_{hex} 03_{hex}
IOL_I_12 Byte	12 Byte	42_{hex} $8B_{hex}$ FF_{hex} 03_{hex}
IOL_I_14 Byte	14 Byte	42_{hex} $8D_{hex}$ FF_{hex} 03_{hex}
IOL_I_16 Byte	16 bytes	42_{hex} $8F_{hex}$ FF_{hex} $03_{he}x$

Tab. 14: IO LINK INPUT

Virtual IOL Input/Output Data Modules for IOL Ports	Data Width		Identification
	IN	OUT	
IOL_I/O_1/1 Byte	1 byte	1 byte	$C2_{hex}$ 80_{hex} 80_{hex} FF_{hex} 03_{hex}
IOL_I/O_2/2 Byte	2 bytes	2 bytes	$C2_{hex}$ 81_{hex} 81_{hex} FF_{hex} 03_{hex}
IOL_I/O_4/4 Byte	4 bytes	4 bytes	$C2_{hex}$ 83_{hex} 83_{hex} FF_{hex} 03_{hex}
IOL_I/O_8/8 Byte	8 Byte	8 Byte	$C2_{hex}$ 87_{hex} 87_{hex} FF_{hex} 03_{hex}
IOL_I/O_4/1 Byte	4 bytes	1 byte	$C2_{hex}$ 80_{hex} 83_{hex} FF_{hex} 03_{hex}
IOL_I/O_4/2 Byte	4 bytes	2 bytes	$C2_{hex}$ 81_{hex} 83_{hex} FF_{hex} 03_{hex}
IOL_I/O_8/1 Byte	8 Byte	1 byte	$C2_{hex}$ 80_{hex} 87_{hex} FF_{hex} 03_{hex}
IOL_I/O_8/2 Byte	8 Byte	2 bytes	$C2_{hex}$ 81_{hex} 87_{hex} FF_{hex} 03_{hex}
IOL_I/O_8/4 Byte	8 Byte	4 bytes	$C2_{hex}$ 83_{hex} 87_{hex} FF_{hex} 03_{hex}

Tab. 15: IO LINK INPUT/OUTPUT

Virtual IOL Output Data Modules for IOL Ports	Data Width OUT	Identification
IOL_O_1 Byte	1 byte	82_{hex} 80_{hex} FF_{hex} 03_{hex}
IOL_O_2 Byte	2 bytes	82_{hex} 81_{hex} FF_{hex} 03_{hex}
IOL_O_4 Byte	4 bytes	82_{hex} 83_{hex} FF_{hex} 03_{hex}
IOL_O_6 Byte	6 Byte	82_{hex} 85_{hex} FF_{hex} 03_{hex}
IOL_O_8 Byte	8 Byte	82_{hex} 87_{hex} FF_{hex} 03_{hex}
IOL_O_10 Byte	10 bytes	82_{hex} 89_{hex} FF_{hex} 03_{hex}
IOL_O_12 Byte	12 Byte	82_{hex} $8B_{hex}$ FF_{hex} 03_{hex}
IOL_O_14 Byte	14 Byte	82_{hex} $8D_{hex}$ FF_{hex} 03_{hex}
IOL_O_16 Byte	16 bytes	82_{hex} $8F_{hex}$ FF_{hex} 03_{hex}

Tab. 16: IO LINK OUTPUT

4.4.5 Example

Normally, the configuration software you used supports a visual configuration so that you need not compile the configuration string yourself.

The configuration consists of a MVK-MP DIO4 IOL4 (DIO8) Art. No. 55 315. The output data must be transferred to the process map for Pin 4, station diagnostic, and diagnostic information for actuator shutdown and actuator warning at Pin 4 in cyclic data exchange.

① Selecting the head module

Head Module	Identification
MVK-MP DIO4 IOL4 (DIO8) 55 315	03_{hex} $D8_{hex}$ 13_{hex} 08_{hex}

Tab. 17: Head module

② Selecting the virtual DIO module

DIO Module	Identification
DIO Module	$C3_{hex}$ 01_{hex} 01_{hex} DD_{hex} $B0_{hex}$ 06_{hex}

Tab. 18: DIO module

③ Selecting the virtual IO LINK modules in the required sequence

Virtual IOL Modules in the Required Sequence	Identification
IOL_I_SIO_SCHLIESSER (NO)	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_SCHLIESSER (NO)	02_{hex} FF_{hex} 03_{hex}
IOL_I_SIO_OEFFNER (NC)	02_{hex} FF_{hex} 03_{hex}
IOL_DEAKTIVIERT (disabled)	02_{hex} FF_{hex} 03_{hex}

Tab. 19: IO link modules

④ This results in the following configuration string (all values in hexadecimal):

03 D8 13 08	C3 01 01 DD B0 06	02 FF 03	02 FF 03	02 FF 03	02 FF 03

Tab. 20: Configuration string

4.5 Example: Configuration of the MVK-MP using the S7 Hardware Manager

1 "Other Field Devices" and "I/O"

The MVK-MP is in the Hardware Catalog of the Simatic Manager under " PROFIBUS-DP → "Other Field Devices" and "I/O".
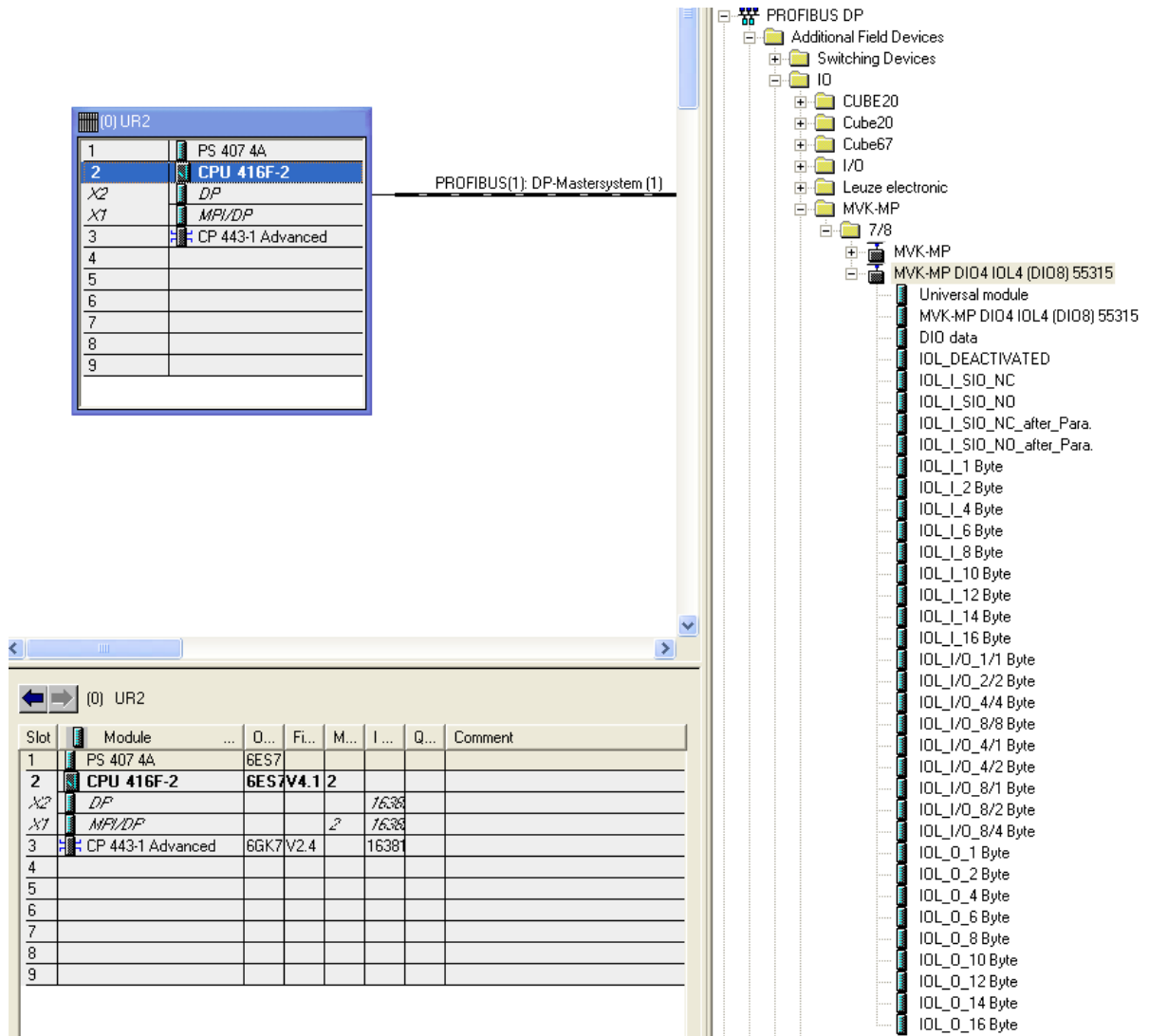
Fig. 16: Configuration: MVK-MP DIO4 IOL4 (DIO8) 55315 in the Catalog

2 Adding "MVK-MP DIO4 IOL4 (DIO8) 55315"

Choose "MVK-MP DIO4 IOL4 (DIO8) 55315" and drag the input holding the left mouse button down, or double-click on the PROFIBUS string. The head module "MVK-MP DIO4 IOL4 (DIO8) 55315", the DIO module "DIO Data", and four IO link modules "IOL_I_2 Byte" and then added automatically.

Fig. 17: Configuration: Use of MVK-MP DIO4 IOL4 (DIO8) 55315

3   Replacing Used Virtual Modules Automatically

Slots 3 to 6 contain IO link modules "IOL_I_2 Byte". They can be replaced by other IO-link-specific modules. In our case, delete the modules of slots 5 and 6 (choose, press Del key, and then confirm deletion), and replace by one "IOL_O_2 Byte" and "IOL_DEAKTIVIERT" (by Drag&Drop from the Catalog).
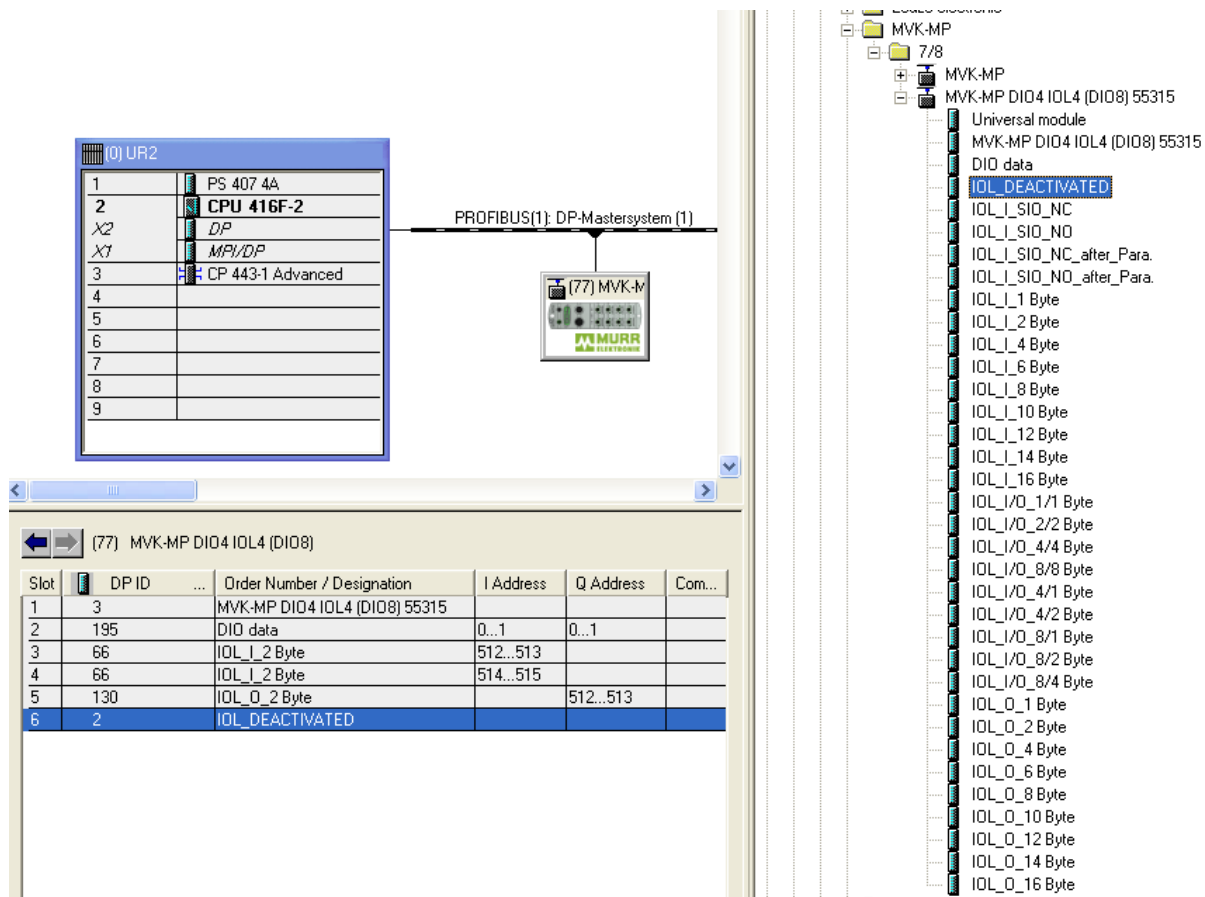
Fig. 18: Configuration: Replacing IO link modules

4 Setting Head Module Parameters

Double-click on the head module to obtain a list box of adjustable parameters. Select the settings you require.
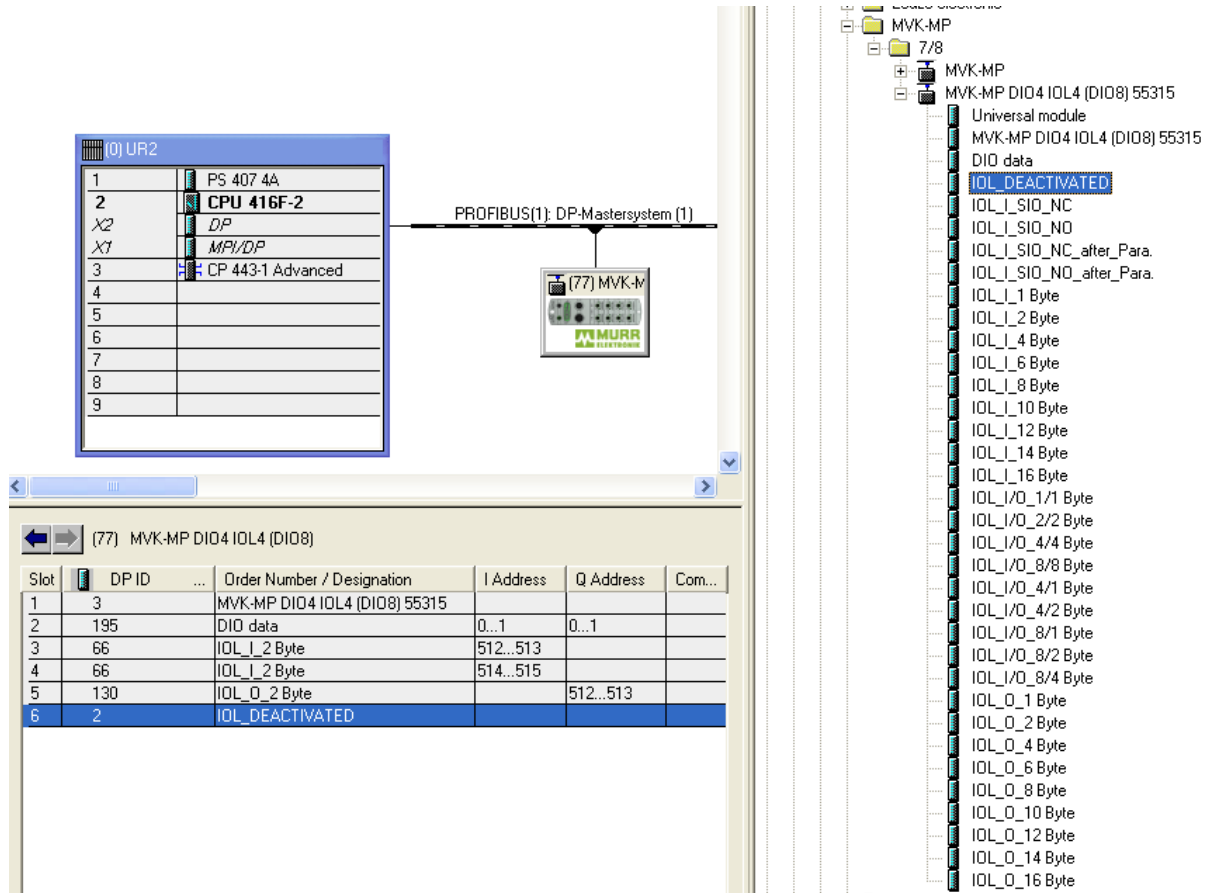
Fig. 19: Configuration: Head module parameters

5 Setting DIO Module Parameters

Double-click on the DIO module to obtain a list box of adjustable parameters for the DIO module. Select the settings you require.
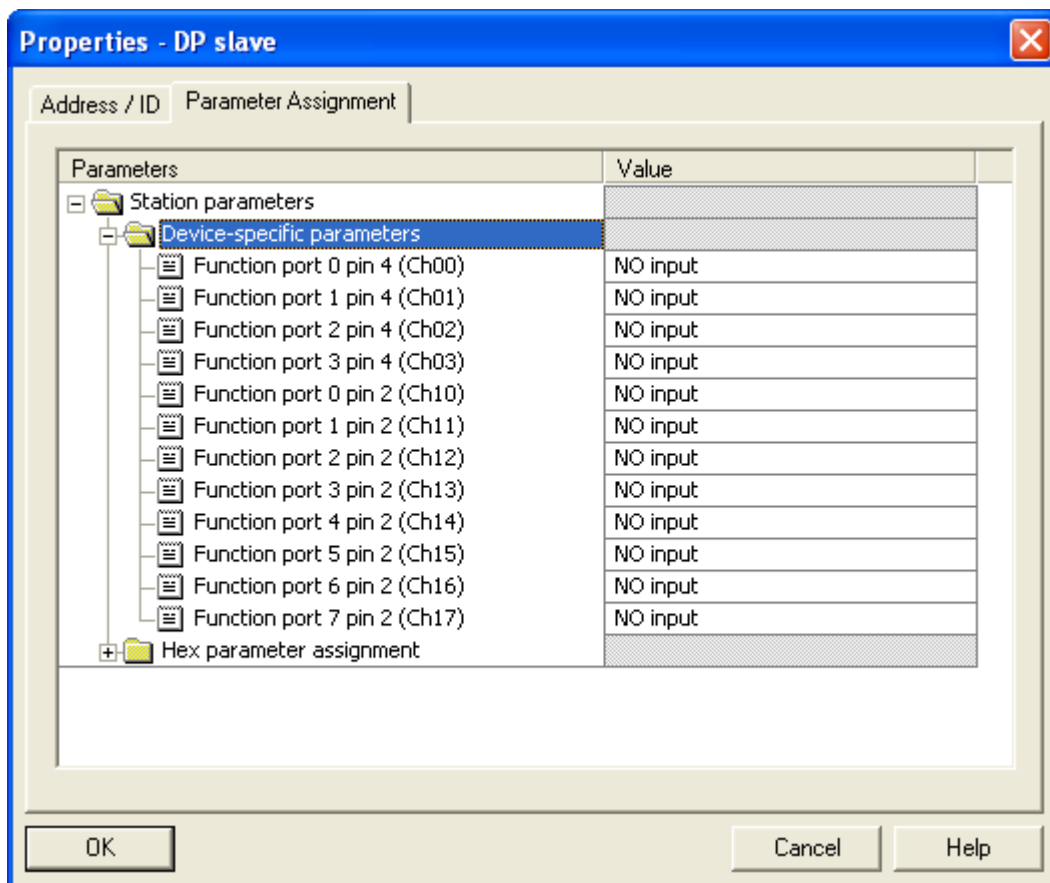
Fig. 20: Configuration: DIO module parameters

6 Setting IO Link Communication Module Parameters

Double-click on a IO link module to obtain a list box of adjustable parameters for the selected IO link port. Select the settings you require.
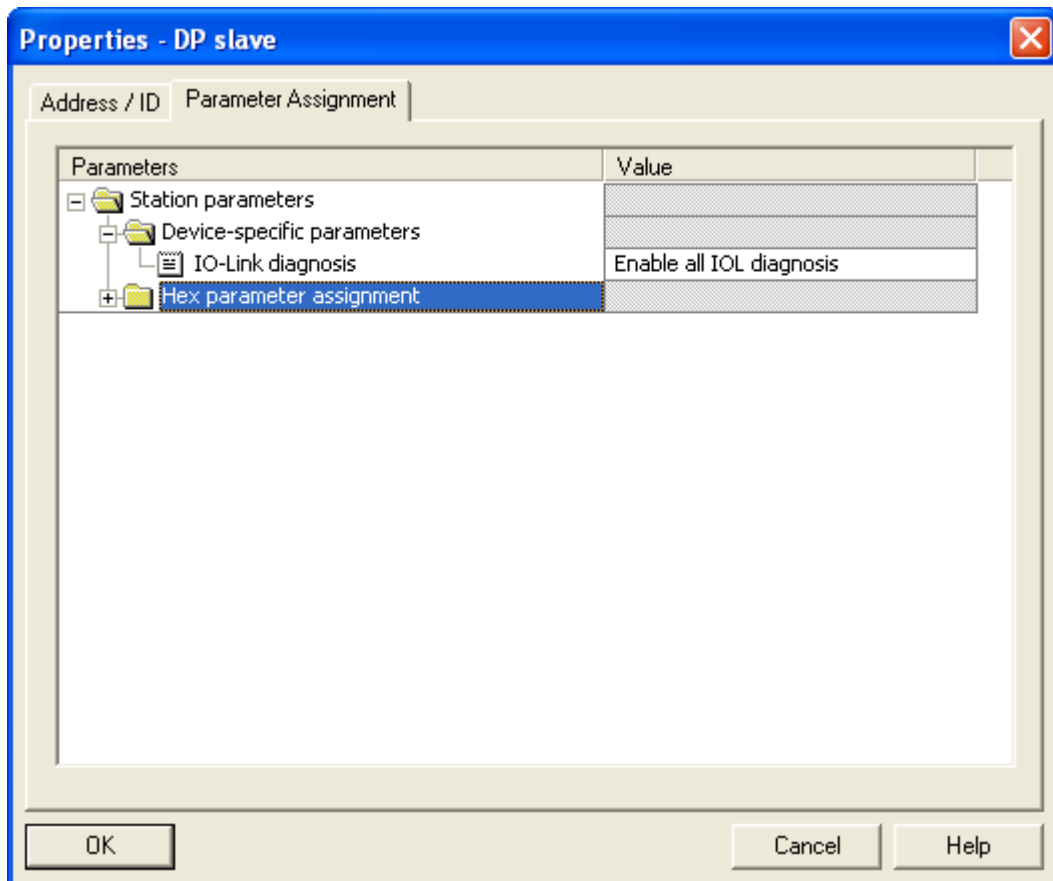
Fig. 21: Configuration: IO link module parameters

4.6 Parameterization

The parameter telegram in the MVK contains 36 bytes. The format and sequence are described below:

- 7 bytes are defined by PROFIBUS standard EN 50170.

- 3 bytes contain information about the DP-V1 status.

- 8 bytes contain user parameters assigned to the head module.

- 6 bytes contain setting parameters for the DIO module.

- 3 bytes and user parameters for each of the IO link ports.

> **❗ The majority of configuration tools divide user parameters in module-related and station-related parameters that normally appear in various dialogs on the user interface of the configuration tool.**

4.6.1 Structure of Standardized Parameters (Bytes 0 to 6)

Byte	Bit n								Selection
	7	6	5	4	3	2	1	0	
0	Lock Req	Unlock Req	Sync Req	Free Req	WD On	res	res	res	Station Status
1									WD_Fact_1
2									WD_Fact_2
3									Min. T_{SDR}
4									Ident_Number_High
5									Ident_Number_Low
6									Group_Ident

Fig. 22: Standardized parameters

TWD (s) = 10ms · WD_Fact_1 · WD_FACT_2. Time to expiry of watchdog timer in DP slave.

Time in T_{Bit} after which the DP slave replies at the earliest. The standard requires at least value 11. This value must be smaller than max. T_{SDR} in any case.

4.6.2 Structure DP-V1 Expansion Byte

Byte	Bit n								Selection
	7	6	5	4	3	2	1	0	
0									DP-V1_Status_1
1									DP-V1_Status_2
2									DP-V1_Status_3

Fig. 23: DP-V1 expansion byte

4.6.3 Head Module Parameters

Number of parameter bytes: 8

Bit assignment of Byte 0

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Diagnostic messages |

Diagnostic messages
0 = Enable global diagnostic
1 = Disable global diagnostic
This defines whether the diagnostics are reported or not. In Setting 1 "Do not report", the diagnostics of expansion modules are not reported.

ID-related diagnostic messages
0 = report
1 = do not report
This defines whether the ID-related diagnostics are reported or not. Setting 1 "Do not report" does not report ID-related diagnostics to the expansion modules.

Module status diagnostic messages
0 = report
1 = do not report
This defines whether the module-status diagnostics are reported or not. In Setting 1 "Do not report", the module status diagnostics of expansion modules are not reported.

Channel-related diagnostic messages
0 = report
1 = do not report
This defines whether the channel-related diagnostics are reported or not. In Setting 1 "Do not report", the channel-related diagnostics of expansion modules are not reported.

Unterspg Bus/Sensorvers.(Undervoltage Bus/Sensor Power Supply)
0 = report
1 = do not report
This defines whether an undervoltage in the bus or sensor power supply is reported or not.

Reserved

Reserved

Reserved

Fig. 24: Bit assignment of Byte 0

Byte 1 reserved

Bit assignment of Byte 2

| Byte 2 | | | | | | | | Global diagnostic reports |

7	6	5	4	3	2	1	0

Reserved

Diagnostic Actuator Power Supply

0 = report
1 = do not report

This defines whether actuator power supply diagnostics are reported or not.
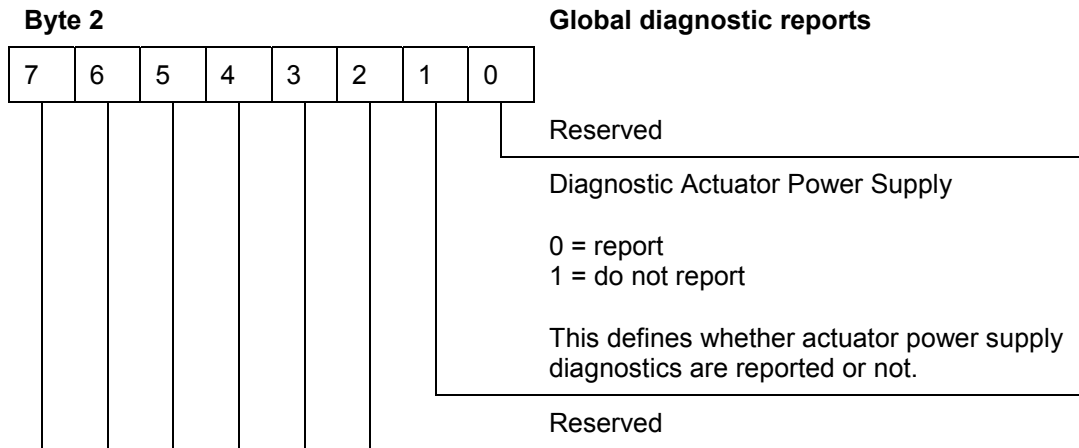
Reserved

Fig. 25: Bit assignment of Byte 2

Bytes 3 to 7 reserved

4.6.4 DIO Module Parameters

Number of parameter bytes: 6

Bit assignment of parameter byte 0

This defines whether each channel is an input or an output and whether the input functions as an NO contact or an NC contact.

Byte 0   **Function of Channels 00 to 03**

7	6	5	4	3	2	1	0

Function of Channel 00

0 = input with NO contact function
1 = input with NC contact function
2 = output

Function of Channel 01

0 = input with NO contact function
1 = input with NC contact function
2 = output

Function of Channel 02

0 = input with NO contact function
1 = input with NC contact function
2 = output

Function of Channel 03

0 = input with NO contact function
1 = input with NC contact function
2 = output
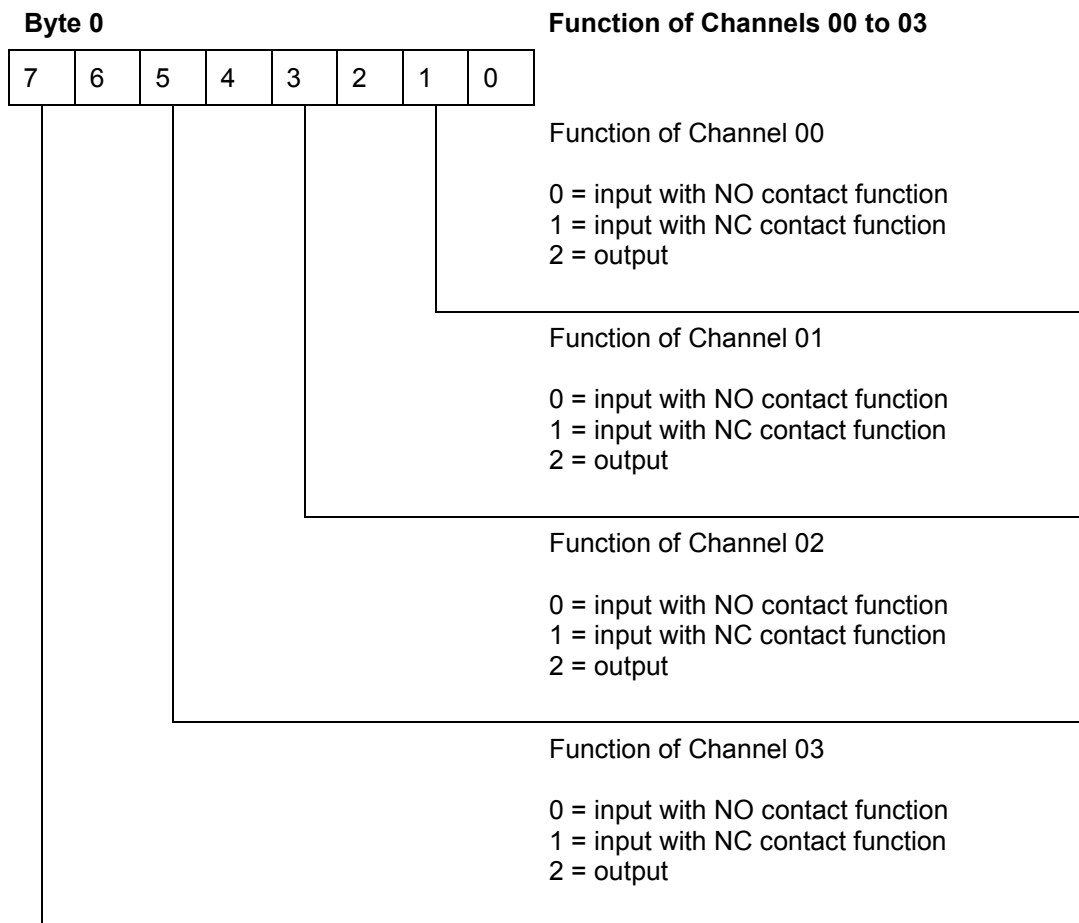
Fig. 26: DIO module parameter byte 0

Bit assignment of parameter byte 1

This defines whether each channel is an input or an output and whether the input functions as an NO contact or an NC contact.

Byte 1   **Function of Channels 10 to 13**

7	6	5	4	3	2	1	0

Function of Channel 10

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 11

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 12

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 13

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Fig. 27: DIO module parameter byte 1

Bit assignment of parameter byte 2

This defines whether each channel is an input or an output and whether the input functions as an NO contact or an NC contact.

Byte 2

7	6	5	4	3	2	1	0

Function of Channels 14 to 17

Function of Channel 14

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 15

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 16

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Function of Channel 17

0 = input with NO contact function
1 = input with NC contact function
2 = diagnostic acc. to DESINA
3 = output

Fig. 28: DIO module parameter byte 2

Parameter bytes 3 to 5 reserved

4.6.5 IO Link Communication Module Parameters

Number of parameter bytes per IO link module   3

Bit assignment of parameter bytes 0 and 1

Parameter bytes 0 and 1   reserved

Bit assignment of parameter byte 2

Byte 2   **Local diagnostic messages IO link
Port 1 / Socket 4, Pin 4**

7	6	5	4	3	2	1	0

Local diagnostic messages

0 = report
1 = report only line break
3 = do not report

This defines whether the diagnostics are reported or not.

0 (Reserved)
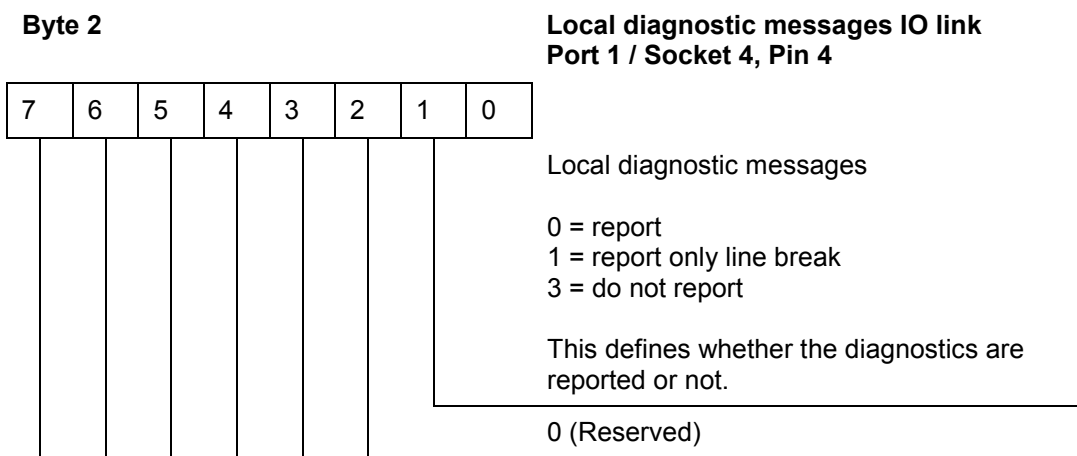
Fig. 29: Parameter byte 2 of IO link communication modules

IO link Ports 2 to 4 accordingly

4.6.6 SIO Link Communication Module Parameters

Number of parameter bytes per IO link module   3

SIO Communication Module	Parameters
IOL_I_SIO_OEFFNER (NC)	02_{hex} 00_{hex} 00_{hex}
IOL_I_SIO_Oeffner_nach_Para.	06_{hex} 00_{hex} 00_{hex}
IOL_I_SIO_SCHLIESSER (NO)	01_{hex} 00_{hex} 00_{hex}
IOL_I_SIO_Schliesser_nach_Para.	05_{hex} 00_{hex} 00_{hex}
IOL_DEAKTIVIERT (disabled)	08_{hex} 00_{hex} 03_{hex}

Tab. 21: SIO link communication module parameters

4.6.7 Parameterization of IO Link Devices Using Murrelektronik IO Link Device Tool

It is possible to parameterize IO link devices using the Murrelektronik IO Link Device Tool. The tool has a graphic use interface that is capable of assigning an IO link device to the MVK using a hardware catalog and performing the appropriate settings. The configuration can then be sent to the IO link device.
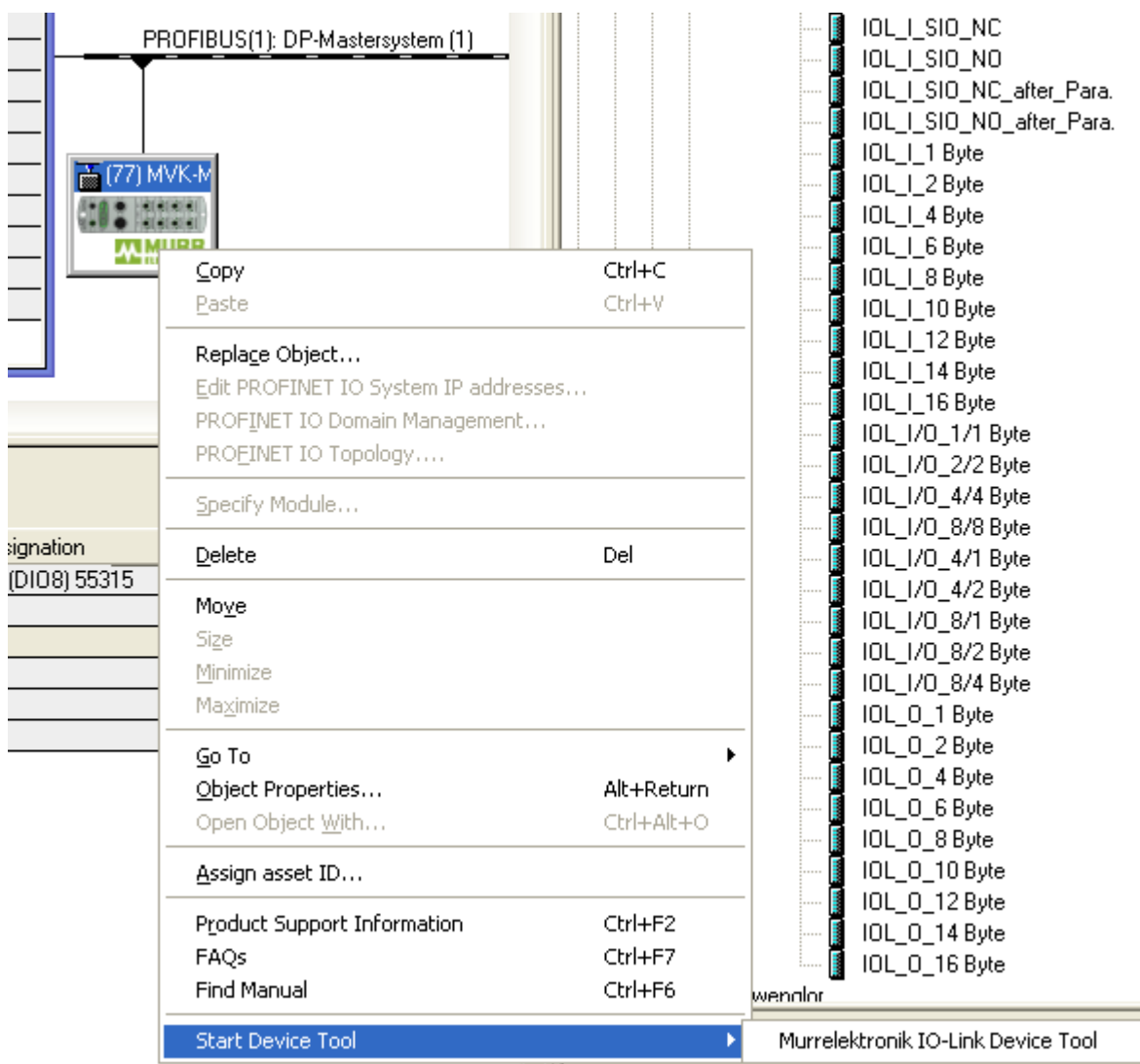
Fig. 30: Murrelektronik IO Link Device Tool

4.7 I&M Indices

the table below shows in overview of the I&M Indices supported:

I&M Index	Description
65000	IM0
...	...
65098	IM98 IO Link Profile
65099	IM99 IOL M Directory
65100	IM100 Manufacturer specific

Tab. 22: I&M index

4.7.1 I&M Index 65000; IM0

IM0 is formatted as follows:

Description	Size [Bytes]	Coding	Access Rights
Header	10	Manufacturer-specific 0x00	Read
Manufacturer ID	2	0x012F (Murrelektronik GmbH)	Read
Order ID	20	"55315", followed by 15 blanks	Read
Serial Number	16	" " (16 blanks)	Read
Hardware Revision	2	e.g. 0x0200	Read
Software Revision	4	e.g. 'V' 0x2 0x0 0x1	Read
Revision Counter	2	0x00 (not used, always 0)	Read
Profile ID	2	0x4E00 (IO link)	Read
Profile-specific Type	2	0x0000	Read
IM Version	2	0x0102 (version 1.2)	Read

Description	Size [Bytes]	Coding	Access Rights
IM Supported	2	0x0001 (Profile specific)	Read

Tab. 23: I&M Index 65000; IM0

4.7.2 I&M Index 65098; IO Link Profile (Content of an IOL_Call)

This index is used to permit access to an IO LINK index and an IO LINK subindex of an IO Link device. Access can be via a TCI tool or a Comm FB.

The structure of the IO Link header is listed in the table below:

Description	Byte	Mandatory Content	Access Rights
Function_Num	0	$5F_{Hex}$	
Slot_Number	1	$00…03_{Hex}$	
Index	2	FF_{Hex}	
Length (of net data)	3	$00…F0_{Hex}$	
Extended_Function_Num	4	08_{hex}	
Entity_Number	5	00_{hex}	read and write
FI_Index	6	FE_{Hex}	
	7	$4A_{Hex}$	
IO-Link specific extensions	8…243	IO-LINK Header → "State" → "IOL_Index" → "IOL_Subindex"	

Tab. 24: IO LINK index

Description	Byte	Mandatory Content	Access Rights
Control	0	00…FF$_{Hex}$	read and write
IOL_Index	1	FF$_{Hex}$	
	2	FF$_{Hex}$	
IOL_Subindex	3	00…FF$_{Hex}$ → Port Function → 0: reserved → 1: Fallback → 2: Wakeup → Reconfiguration	

Tab. 25: IO-LINK subindex

Using this IO Link Call (IOL_CALL), additional port functions can be implemented, such as FALLBACK or WAKEUP.

4.7.3 I&M Index 65099; IOL-M Directory

For an IOL-M device, support of directory is mandatory with IM_INDEX = 65099. IM99 is the access point to an IOL-M device.

The structure of an IOL-M Directory Object is defined in the table below:

Description	Byte	Mandatory Content	Access Rights
IO-Link_Version	0	00…FF IO-Link communication version	read and write
IO-Link_Profile_Version	1	00…FF IO-Link profile version	
IO-Link_Feature_Support	2 to 5	xx xx xx xx Bits indicate available features	
NumberofPorts	6	00…FF Number of supported ports	
REF_Port_Config	7	00…FF → 00 = No "Port Configuration" data → 01…FF = Index of the record	
REF_IO_Mapping	8	00…FF → 00 = No "I/O Mapping" data → 01…FF = Index of the record	
REF_iPar_directory	9	00…FF → 00 = No "iPar Directory" data → 01…FF = Index of the record	
REF_IOL_M	10	00…FF → 00 = No "IOL-M Parameter" data → 01…FF = Index of the record	
Number_of_cap	11	00…FF → 00 = No "I/O Mapping" data → 01…FF = Index of the record	
Index_cap1	12	00…FF → Index of client point 1	
…			
Index_capn	12 + n - 1	00…FF → Index of client point n	

Tab. 26: Structure of an IOL-M Directory Object

4.7.4 I&M Index 65100

Using the manufacturer-specific I&M Index 65100 (IM100), you can send read or write requests to the parameter bytes of the DIO module.

Example:

In the simple example below, Socket 0 Pin 2 of the MVK is set as a diagnostic input using an IM100 access.

The configuration:

Slot	DP ID	Order Number / Designation	I Address	Q Address
1	3	MVK-MP DIO4 IOL4 (DIO8) 55315		
2	195	DIO data	0...1	0...1
3	194	IOL_I/O_2/2 Byte	512...513	512...513
4	130	IOL_O_2 Byte		514...515
5	66	IOL_I_2 Byte	514...515	
6	2	IOL_DEACTIVATED		

All DIO Ports are parameterized as "Input with NO contact function", here are the parameters in detail:
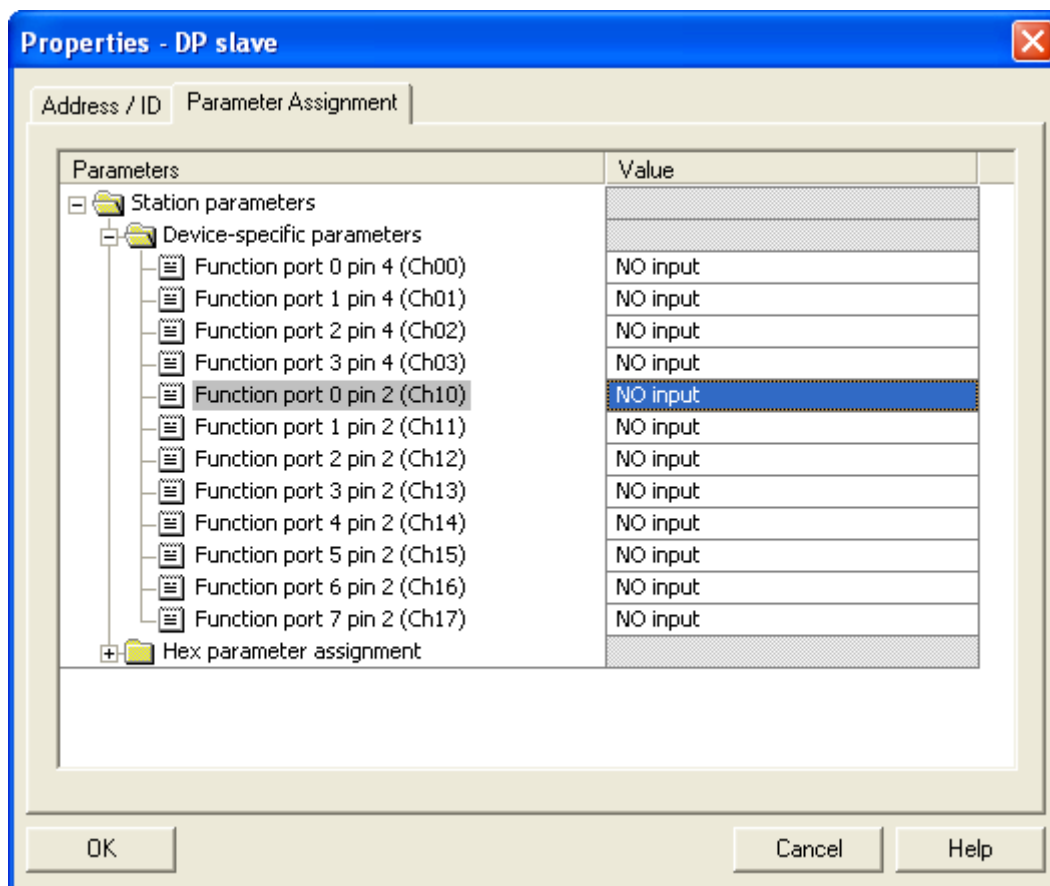
The current hex parameter string of the module is 00 00 00 00 00 00 (please refer to the parameter assignment in Section 0).

To parameterize Socket 0 Pin 2 as a diagnostic input, the second parameter byte of this module is changed to 02. The associated DP-V1 Write Request looks like this:

5F 02 FF 08 08 00 FE 4C A0 01 02 02

Meaning of the numerals in detail (all hexadecimal):

5F	Write Request
02	Slot Number
FF	Number of Index used (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.
02	The 2nd parameter byte (parameter byte 1) is processed.
02	The parameter to be written for the selected byte

After the write request, a reply telegram is sent containing the written data length. According to the IM standard, this must be followed by a read request (without parameters).

5E 02 FF 08

Meaning of the numerals in detail (all hexadecimal):

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

The parameter change was successful. Socket 0 Pin 2 is now parameterized as diagnostic input.

> ➔ **STEP7 libraries that contain modules for IM accesses are available in the download section of the Murrelektronik website:**
> **www.murrelektronik.com**

5. Diagnostics

5.1 LED Indicators

All MVK modules have separate and clearly arranged displays for bus status, device status, and I/O status displays. These displays are located on the front of the device.

5.1.1 Bus and Device Status LEDs

The LEDs on the front of the module are clearly marked for identification. Display is provided by LEDs that light up permanently or flash. The figure below depicts LED layout and the table lists the functions.
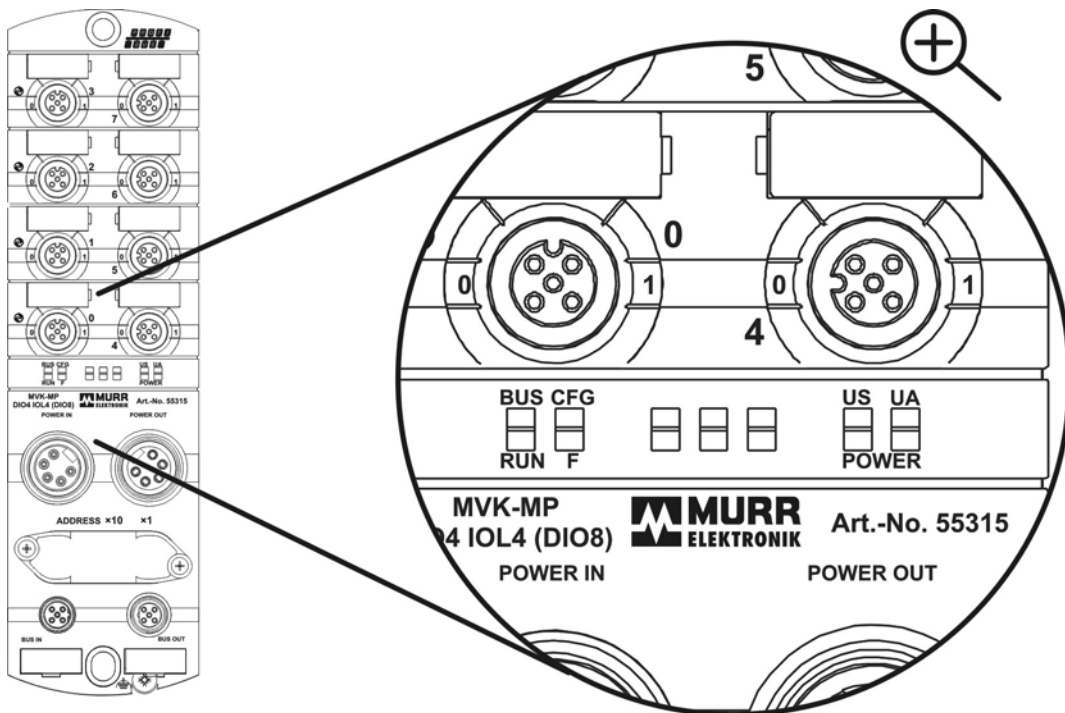
Fig. 31: Bus and device status LEDs on the module front panel

Bus Status LEDs on Module Front Panel

LED Designation	LED Display	Response	Meaning
Bus Run	🟩	green	PROFIBUS DP data exchange
„	🟩	flashing green	Not in DP data exchange **Note:** Always flashes when there is no bus communication.
„	⬜	off	PROFIBUS firmware not yet initialized **Note:** It may take a few seconds to initialize the bus node. -Bus and sensor < 12 V
Cfg-F	🟥	red	PROFIBUS DP configuration error or parameter error
„	⬜	off	-

Tab. 27: Bus status LEDs on module front panel

Voltage diagnostic LEDs on device front panel

LED Description	LED Display	Response	Meaning
Power Us	🟩	green	-Bus and sensor power supply ≥ 18 V
„	🟥	red	-Undervoltage of bus and sensor power supply < 18 V
„	▨	flashing (red or green)	MVK is in its initialization phase
„	⬜	off	-Bus and sensor power supply ≥ 13 V
Power U_A	🟩	green	-Actuator power supply ≥ 18 V
„	🟥	red	-Undervoltage of actuator power supply < 18 V
„	⬜	off	-Actuator power supply < 13 V

Tab. 28: Voltage diagnostic LEDs on device front panel

5.1.2 Correlation between Device Status and Channel Diagnostic

Error	LED on M12 socket No. x		POWER	
	Channel 0x	Channel 1x	U$_A$	U$_S$
Undervoltage of bus and sensor power supply				red
Actuator power supply undervoltage			red	
Bus and sensor power supply <12 V				off
No actuator supply			off	
External fault		red		
Sensor power supply short-circuit				
Sockets 0 to 3	red	red		
Sockets 4 to 7 in IO link mode	green flashing	red		
Sockets 4 to 7 in SIO mode	red	red		
Actuator disable	red	red		
Actuator warning	red	red		
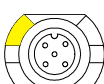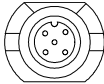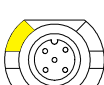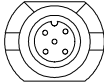
Tab. 29: Channel diagnostic MVK-MP DIO4 IOL4 (DIO8)

5.1.3 I/O Status LEDs at M12 Slots of MVK-MP DIO4 IOL4 (DIO8) Art. No. 55315

Each input and output is assigned a separate status display They are labeled with '00 to 07' and '10 to 17'. The displays are located directly next to the corresponding M12 socket. This makes it easy to identify the status of peripheral components, such as sensors and actuators.
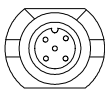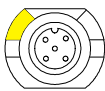
5.1.3.1 Correlation between signal – logic display and LED response of DIO channel

LED Display of Digital Inputs

	Voltage at Input	Logic Value	LED Display	
Input with NO contact function	0 V	0		off
	24 V	1		yellow
Input with NC contact function	0 V	1		off
	24 V	0		yellow
Diagnostic input	0 V	1		red
	24 V	0		off

Tab. 30: LED display of digital inputs
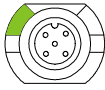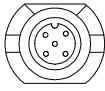
LED Display of Digital Outputs

Output	Logic Value	Voltage at Output	LED Display	
	0	0 V		off
	1	24 V		yellow

Tab. 31: LED display of digital outputs
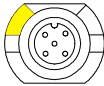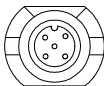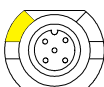
5.1.3.2 Correlation between signal – logic display and LED response of IO link channel

LED display of IO link communication

	State	LED Display	
I/O link Mode	Data exchange of IO link		green
	No IO link communication (e.g. Line break or parameterization error)		green flashing
	IO link disabled		off

Tab. 32: LED display of IO link communication

LED display of SIO inputs

	Voltage at Input	**Logic Value**	**LED Display**	
SIO Mode **Input with NO contact function**	0 V	0		off
	24 V	1		yellow
SIO Mode **Input with NC contact function**	0 V	1		off
	24 V	0		yellow

Tab. 33: LED display of SIO inputs

5.2 Diagnostics via the Fieldbus

There are a total of four levels of diagnostic information over PROFIBUS on the MVK.

1. ProfiBus standard diagnostics   **Bytes 0 to 5 of diagnostic telegram**

2. ID-related diagnostics   **Bytes 6 and 7**
(Information which module diagnostic contains)   (if ID-related diagnostic is not disabled)

3. Module status diagnostic   **Bytes 8 to 13**
(Information which modules have diagnostic, or   (if ID-related diagnostic is enabled)
are missing, or are incorrect).

4. Channel-related diagnostic   **Bytes 14 to**
(short-circuits of outputs, etc.)   (if ID-related and module status diagnostics are
                                                     enabled)
                                                     3 bytes per channel, max. 64 channel diagnos-
                                                     tics.

> **(!)** **Profibus DP-V1 offers the option of using alarms and status messages for diagnostics. This is not supported by the MVK. If the PROFIBUS Master configuration tool offers a choice, then select Mode DPV0 for the DP alarm mode (diagnostic mode).**

> **(!)** **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 1".**

The DP-V1 diagnostic is used via the status model to report diagnostics to the PROFIBUS Master. Alarms are not supported. At present, module status is the only status supported.

The MVK supports max. 64 simultaneously occurring diagnostics.

The maximum format of the diagnostic is as follows:

Byte	Bit	Contents	Diagnostic type
0		Status 1	Standard
1		Status 2	
2	7	1 is there are more than 64 diagnostics	
3		Master address	
4		ID No. of High Byte	
5		ID No. of Low Byte	
6	7 / 6	01 for ID-related diagnostic	ID-related
	0-5	0x02 for number of ID-related diagnostic bytes	
7		Modules 0 to 5 (head module, DIO module, and four IO link Masters)	
8	7/6	00 for Alarm/Status Header	Module Status
	0-5	0x06 for 6 bytes module status	
9	7	1 for Status Block	
	0-6	0x02 for module status	
10		0x0 Slot number	
11		0x0 for no further differentiation	
12		Modules 0 to 3 (head module, DIO module, and two IO link Masters)	
13		Modules 4 and 5 (two IO link Masters)	
14		3 bytes channel diagnostic per module, max. 64 diagnostics.	Channel-related diagnostic according to DP-V1
…			
205			

Tab. 34: Format of diagnostic telegram

The IO link ports (Masters) are regarded as modules.

The current PROFIBUS specification

(IEC 61158-6-10 2007) is used as the basis for channel-related diagnostics:

Code	Error Definition	ME Use	IO Link Event
0	Reserved		
1	Short-circuit	Sensor short-circuit	
2	Undervoltage	Sensor undervoltage	0x5110-0x5119
3	Overvoltage		
4	Overload		0x5410
5	Overtemperature		0x4110, 0x4210, 0x4310
6	Line break	Line break	Incorrect or missing device, IO data length too short
7	Upper limit exceeded	Upper limit exceeded	0x8C10, 0x8C20
8	Lower limit exceeded	Lower limit exceeded	0x8C30
9	Fault	Fault	All unassigned IO link errors
10	Simulation active		
11	Reserved		
12	Reserved		
13	Reserved		
14	Reserved		
15	Parameter missing		
16	Parameterization error	Parameterization error	
17	Power supply fault	Actuator undervoltage	Optional
18	Fuse tripped		Optional
19	Manufacturer-specific		
20	GND fault		
21	Reference point lost	Reference channel fault	
22	Process even lost, sampling error		
23	Limit warning	Actuator warning	
24	Output disabled	Actuator short-	

Code	Error Definition	ME Use	IO Link Event
		circuit	
25	Safety event		
26	External fault	DESINA	
27	Manufacturer-specific	No actuator supply	
28	Manufacturer-specific		
29	Manufacturer-specific	No ext. actuator pwr. sup.	
30	Manufacturer-specific	Ext. act. pwr. sup. undervoltg.	
31	Temporary error		

Tab. 35: Overview of channel-related diagnostics

5.2.1 Diagnostic Format

The diagnostic information comprises standard diagnostic information (6 bytes) and manufacturer-specific diagnostic information.

Standard diagnostic information Bytes 0 to 5

Byte 0

7	6	5	4	3	2	1	0

Diag.station_non_existent

Bit 0 sets the DP Master if this DP slave is not accessible (to generate the group diagnostic). The DP slave sets this bit to zero.

Diag.station_not_ready

This bit is set by the DP slave, if the SP slave is not ready for data exchange.

Diag.cfg_Fault

This bit is set by the DP slave when the configuration data previously received from the master does not match the configuration data detected by the DP slave..

Diag.ext_diag

This bit indicates that a diagnostic entry is present in the slave-specific diagnostic area (Ext_Diag_Data).

Diag.not supported

This bit is set by the DP slave when a function not supported by the DP slave is requested.

Diag. Invalid slave response

This bit is set by the DP master when an implausible response is received from an addressed DP slave. The DP slave sets this bit to zero.

Diag.prm_fault

This bit is set by the DP slave if the previous parameter telegram was defective, e.g. incorrect length, incorrect ID number, invalid parameter.

Diag.master_lock

The DP slave was parameterized by another master. This bit is set by the master, if the address in Byte 3 is not equal to Ffhex and is not equal to the slave's own address. The DP slave sets this bit to zero.

Fig. 32: Standard diagnostic information Byte 0

Byte 1

7	6	5	4	3	2	1	0

Diag.Prm_req

If the DP slave sets this bit, it must be reparameterized and reconfigured. This bit remains set until reparameterization is completed.

Diag.Stat_diag

If the DP slave sets this bit, the DP master must collect diagnostic data until this bit is deleted. The DP slave sets this bit if it can not provide valid useful data, for instance.

Set to 1

Diag.WD_ON

If this bit is set to 1, the watchdog timer is activated.

Diag.freeze_mode

This bit is set by the DP slave when it receives the Freeze command.

Sync_mode

This bit is set by the DP slave when it receives the Sync command.

Diag.Not_Present

This bit is set by the DP master for the DP slaves not contained in the master parameter block. The DP slave sets this bit to zero.

Diag.deactivated

This bit is set by the DP master when the DP slave is removed from the master parameter block of the DP master. The DP slave always sets this bit to zero.

Fig. 33: Standard diagnostic information Byte 1

Byte 2

7	6	5	4	3	2	1	0

Reserved

Diag.ext_overflow

If this bit is set, there is more diagnostic information available than is specified in Ext_Diag_Data. For example, the DP slave sets this bit when there is more channel diagnostic information available than the DP slave can enter in its send buffer; or the DP Master sets this bit when the DP slave sends more diagnostic information than the DP Master can take into account in its diagnostic buffer.

Fig. 34: Standard diagnostic information Byte 2

Byte 3

7	6	5	4	3	2	1	0

Diag.master_add

The address of the DP Master which parameterized this DP slave is entered in this byte. If the DP slave is not parameterized by a DP master, the DP slave sets the address Ffhex in this byte.

Fig. 35: Standard diagnostic information Byte 3

Byte 4

7	6	5	4	3	2	1	0

ID number high byte

Fig. 36: Standard diagnostic information Byte 4

Byte 5

7	6	5	4	3	2	1	0

ID number low byte

Fig. 37: Standard diagnostic information Byte 5

5.2.2 ID-related Diagnostic

Identification-related diagnostic Bytes 6 to 7

Byte 6   **Identification-related diagnostic (header byte)**

7	6	5	4	3	2	1	0

Block length in bytes, incl. header byte (here: 02hex / 02dec)

set to 01

Fig. 38: Identification-related diagnostic Byte 6

Byte 7   **Identification**

7	6	5	4	3	2	1	0

Slot 1 has diagnostic

Slot 2 has diagnostic

Slot 3 has diagnostic

Slot 4 has diagnostic

Slot 5 has diagnostic

Slot 6 has diagnostic

Slot 7 has diagnostic

Slot 8 has diagnostic

Fig. 39: Identification-related diagnostic Byte 7

5.2.3 Module Status Diagnostic

Module status diagnostic Bytes 8 to 13

Byte 8   **Module Status Diagnostic (Header Byte)**

7	6	5	4	3	2	1	0

Block length in bytes, incl. header byte (here: 6hex / 6dec)

set to 00

Fig. 40: Module status diagnostic Byte 8

Byte 9   **Module Status Type**

7	6	5	4	3	2	1	0

unused

set to 1 for module status

unused

unused

unused

unused

unused

set to 1 for status block
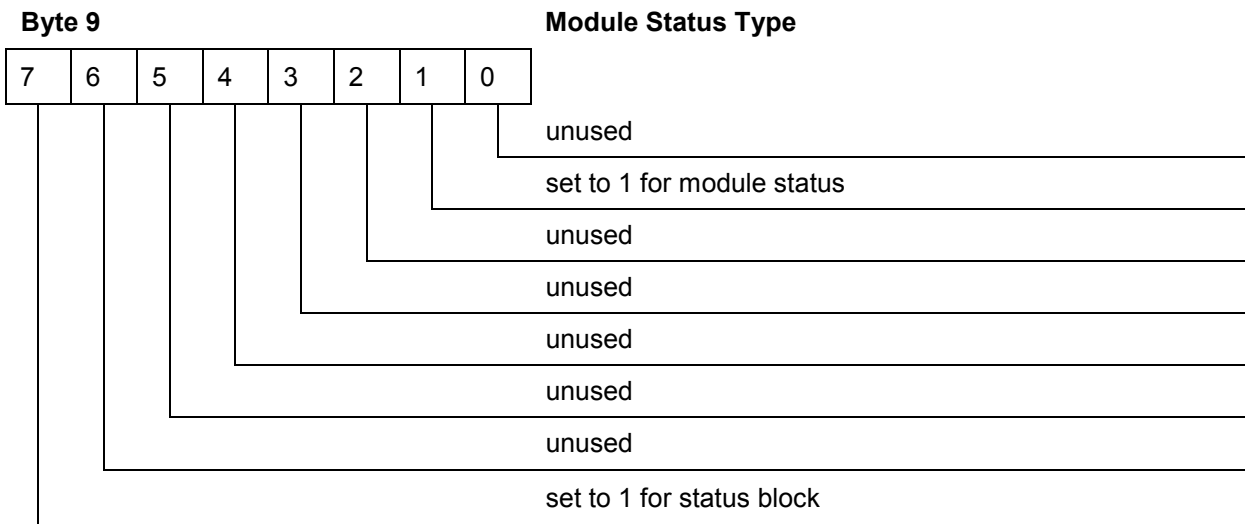
Fig. 41: Module status diagnostic Byte 9

Byte 10   **Slot Number**

7	6	5	4	3	2	1	0

set to 0 since all diagnostics are reported to the bus node slot.
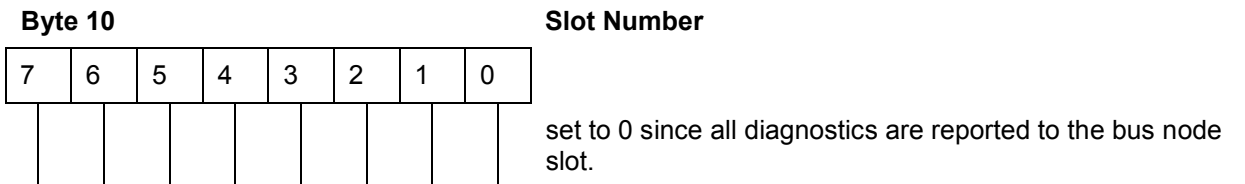
Fig. 42: Module status diagnostic Byte 10

Byte 11   **Status Specification**

7	6	5	4	3	2	1	0

Fixed to 0 since it is not further differentiated.

Fig. 43: Module status diagnostic Byte 11

Byte 12   **Status Report**

7	6	5	4	3	2	1	0

Slot 1   Possible bit combinations:

Slot 2   00 Valid data, no error
Slot 3   01 Invalid data, error
                         10 Incorrect module
Slot 4   11 Missing module
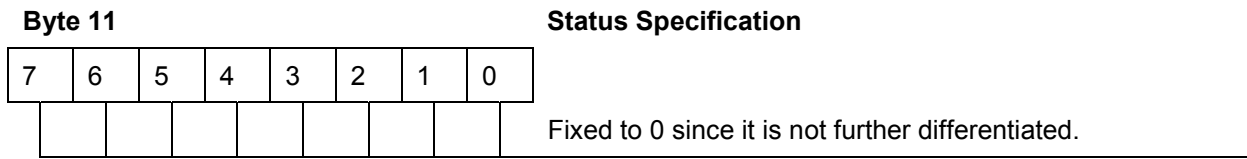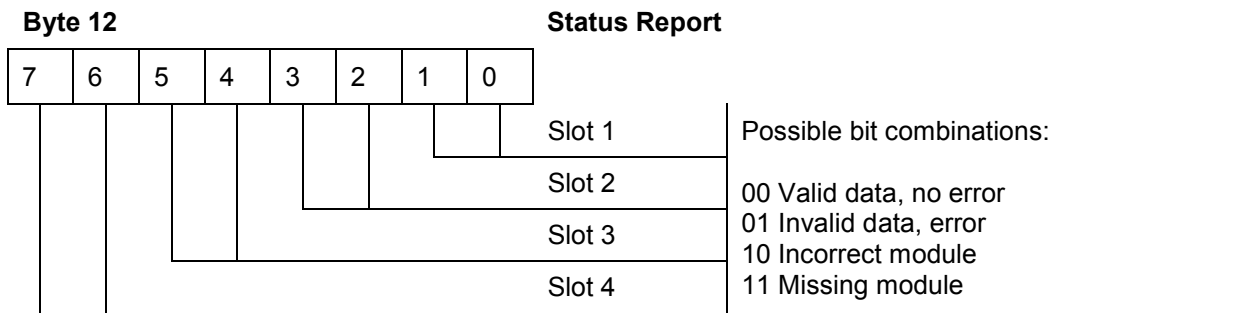
Fig. 44: Module status diagnostic Byte 12

Byte 13   **Status Report**

7	6	5	4	3	2	1	0

Slot 5   Possible bit combinations:

Slot 6   00 Valid data, no error
Slot 7   01 Invalid data, error
                         10 Incorrect module
Slot 8   11 Missing module
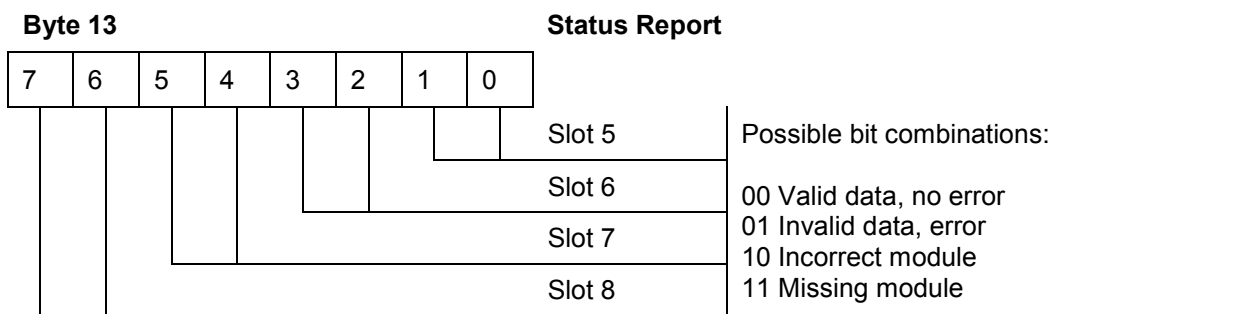
Fig. 45: Module status diagnostic Byte 13

5.2.4 Channel-related Diagnostic

Channel-related diagnostic Bytes 14 to 16 and following

Three bytes are assigned in the diagnostic telegram for each channel-related diagnostic. If, for example, 5 channel-related diagnostics are available, a total of 5 times 3 bytes channel-related diagnostic information will follow after byte 14.

Byte 14   **Header**

7	6	5	4	3	2	1	0

affected slots 0 to 15 (1 to 16)

set to 10
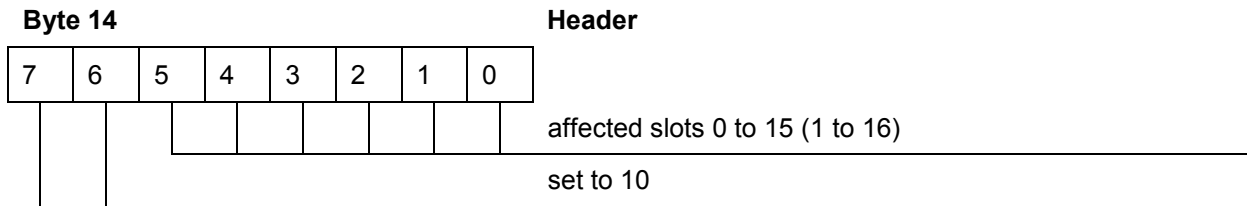
Fig. 46: Channel-related diagnostic Byte 14

Byte 15   **Channel Number**

7	6	5	4	3	2	1	0

Channel numbers 0 to 63

MVK-MP: 00 to 07 (Pin 4)
                10 to 17 (Pin 2)

Input/output

00 = reserved
01 = input
10 = output
11 input/output
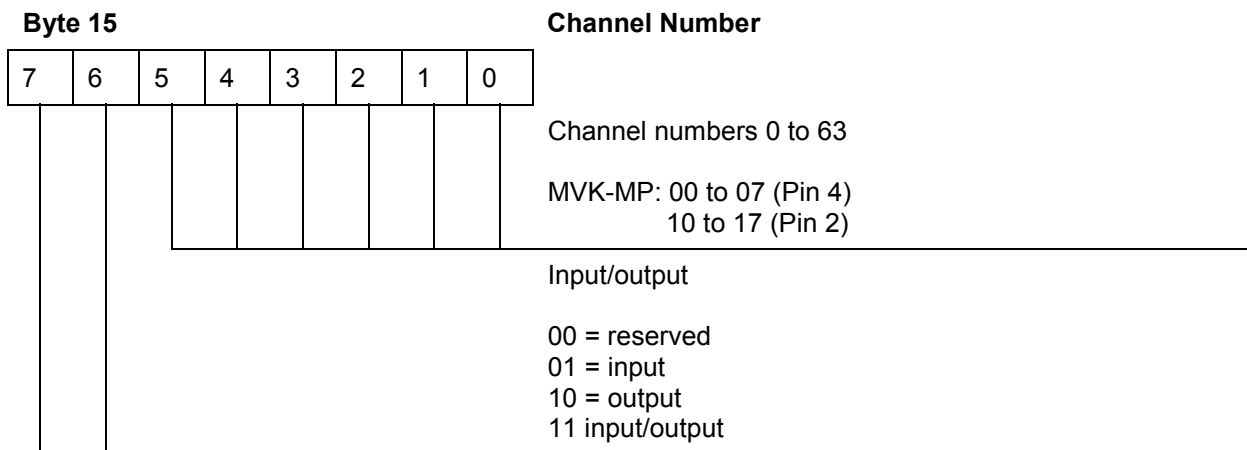
Fig. 47: Channel-related diagnostic Byte 15

Byte 16

7	6	5	4	3	2	1	0

Fault Type

Fault type

01hex (01dec)	Short-circuit (sensor power supply)
02hex (02dec)	I/O link undervoltage
06hex (06dec)	Line break
07hex (07dec)	Upper limit overshot
08hex (08dec)	Lower limit undershot
09hex (09dec)	Fault (e.g. I/O link)
10hex (16dec)	Parameterization error
11hex (17dec)	Actuator power supply undervoltage
17hex (23dec)	Actuator warning
18hex (24dec)	Actuator deactivation
1Ahex (26dec)	External fault
1Bhex (27dec)	No actuator power supply

Channel type

000 = reserved
001 = bit
010 = 2 bits
011 = 4 bits
100 = byte
101 = word
110 = 2 words
111 = reserved

Fig. 48: Channel-related diagnostic Byte 16

5.2.5 Troubleshooting

| Diagnostic Message		Possible Cause	Action
Chan-nel	Short-circuit (sensor supply)	Overload or short-circuit of sensor power supply to 0V.	Change cable to sensor or check sensor for short-circuit.
	Undervoltage I/O link	I/O link undervoltage (event 0x5100-0x5119)	Check cable to sensor.
	I/O link overload	I/O link overload (event 0x5410)	Check current load.
	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.
	Fault	I/O link fault not assignable to another fault	Check I/O link devices or read out their event memories.
	Parameterization error	Parameterization incorrect.	Check parameterization.
	Actuator power supply undervoltage	Actuator power supply < 18 V	Check power supply unit and cable.
	Actuator warning	External power supply to an output.	Check cable.
	Actuator disable	Overload or short-circuit of output signal to 0V.	Check wiring or actuator.
	External fault	Desina diagnostic	Check sensor or wiring.
	No actuator supply	actuator power supply < 12 V	Check power supply unit and cable.
	No sensor voltage	sensor power supply < 12 V	Check power supply unit and cable.
	No ext. actuator power supply	External actuator power supply < 13 V	Check power supply unit and cable.
	Ext. actuator power supply undervoltage	Ext. actuator power supply < 18 V	Check power supply unit and cable.

Tab. 36: Troubleshooting

6. Technical Data

6.1 Art. No. 55315 MVK-MP DIO4 IOL4 (DIO8)

General

PROFIBUS Slave IP67 with
[M12 socket, contact 4] →   4 inputs or 4 outputs
                                and 4 IO-Link master or 4 SIO-inputs
[M12 socket, contact 2] →   8 diagnostics or 8 inputs or 8 outputs
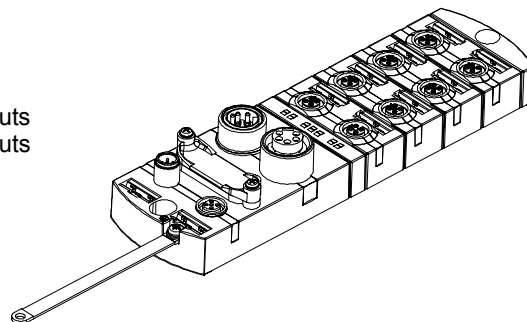
EMC

EN 61131-2 Product standard

EN 61000-4-2 ESD .... Contact ± 4 kV, air ± 8 kV
EN 61000-4-3 RF-Field + GSM... 10 V/m
EN 61000-4-4 Burst .... ± 2 kV
EN 61000-4-5 Surge .... asym./symm. ± 500 V (DC net input)
 .... asym. ± 1 kV (Signal connections)
EN 61000-4-6 HF-asymmetric .... 10 V
EN 61000-4-8 Magnetic field 50 Hz .... 30 A/m
EN 61000-6-4 Interference field strength .... QP 40 dBµV/m (30 - 230 MHz) class A
 .... QP 47 dBµV/m (230 - 1000 MHz) class A

Ambient conditions

Normal operating temperature .... 0°C to +55°C
Storage temperature .... -25°C to +70°C
Enclosure type according to EN 60529 .... IP 67

Please note:

The MVK metal field bus modules are very robust and due to the high protection class IP67 they are protected

from dust, dirt, and most liquids without an additional housing. MVK-Metal is specially designed for harsh industri-

al applications directly in machines and systems.

The field bus modules are 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 .... 10 … 58 Hz; const. amplitude 0,35 mm
 .... 58 … 150 Hz; const. acceleration 20 g
Shock according to EN 60068 Part 2-27 .... Amplitude 50 g, 11 ms duration

Connection Possibilities

Supply cable .... 2 x connector 7/8" (male and female connector)
Data cable .... 2 x M12 5-pin connector
 .... (male and female connector reverse-key coding)
Sensor / Actuator / IO-Link.. 8 x M12 5-pin female connectors

Miscellaneous

Dimensions (LxWxH) .... 225 x 63 x 39 mm
Mounting dimension .... 208,5 ±0,5 mm
Weight .... 770 g

Bus Data

Transfer protocol .... PROFIBUS-DP acc. to IEC 61158
Acyclic services... DP-V1 Master Class 1 and 2
Transfer rates 9,6/19,2/45,45/93,75/187,5/500/
.... 1500/3000/6000/12000 kBaud
Baudrate recognition .... automatic
Modes .... Sync. mode, Freeze mode are supported
Addressing .... 1 to 99 with BCD rotary switch
Ident. number 0C2FHex

Power Supply

Operation voltage UB .... 24 V DC
Operation voltage range .... 18 to 30 VDC
Current consumption (without inputs)... ≤130 mA
Current per PIN .... Max 8 A

Sensor supply socket 0 to 3 .... max. 700 mA per socket
Short circuit protection for I/O-Link socket 0 to 3......................... Multifuse,
.... up to 300 mA load: automatic startup
.... from 300 mA load: a reset is required
Multi-fuse reaction time (time to trip) .... 1s at IK ≥1 A and 23 °C

Sensor supply socket 4 to 7 .... max. 200 mA per socket
Short circuit protection for sensors .... electronic fuse, automatic start-up

Core cross section .... 7/8" (max. 1.5 mm²)
Reverse voltage protection sensor supply
and module electronics .... yes
Reverse voltage protection actuator power supply...................... yes
Over voltage protection .... yes (varistor)

Inputs Digital / Diagnostic

Input characteristics .... EN 61131-2, Type 2
Input filter .... ca. 1 ms
Delay time for signal change .... 2 … 5 ms
Cable length .... max. 30 m

Inputs IO-Link

Input characteristics .... EN 61131-2, Type 1,
.... deviating current ≤50 mA at 30 V
Input filter (SIO-mode only)... ca. 1 ms
Delay time for signal change .... 2 … 5 ms
Transfer protocol .... IO-Link 1.0
Transfer rates .... 4,8 / 38,4 / 230,4 kBaud
Baudrate recognition .... automatic
Cable length .... max. 20 m

Outputs

Actuator current load .... max. 1.6 A per actuator
Cable length... with 0,75 mm² max. 10 m
.... with 0,34 mm² max. 5 m
Core cross section .... M12 (max. 0.75 mm²)
Cycle frequency at ohmic load .... max. 50 Hz
Cycle frequency at inductive load............................... max. 5 Hz
Lamp load .... max. 10 W
Over load and short circuit protection......................... electrical short circuit detection
.... time of activation <10 ms

7. Accessories

7.1 Primary Switched-mode Power Supply Units

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

Input voltage 95 to. 132 V AC

Description	Phases	Output power	Art.No.	
MCS	1	240 W / 10 A	85086	
MCS	1	480 W / 20 A	85088	

Tab. 37: Power supply units, MCS single-phase, input voltage 95 to 132 V AC

Input voltage 185 to. 265 V AC

Description	Phases	Output power	Art.No.	
MCS	1	240 W / 10 A	85085	
MCS	1	480 W / 20 A	85087	

Tab. 38: Power supply units, MCS single-phase, input voltage 185 to 265 V AC

Input voltage 3 x 360 to. 520 V AC / 3 x 480 to. 7450 V DC

Description	Phases	Output power	Art.No.	
Evolution 5	3	22 to 28 V DC / 5 A	85000	
Evolution 10	3	22 to 28 V DC / 10 A	85001	
Evolution 20	3	22 to 28 V DC / 20 A	85002	
Evolution 40	3	22 to 28 V DC / 40 A	85004	

Tab. 39: Power supply units, Evolution, three-phase

Tab. 40:

Murrelektronik offers a comprehensive selection of primary switched-mode power supply units. Please refer to our Catalogs, or visit our Online Shop at onlineshop.murrelektronik.com

7.2 BUS Cables

Article Number	Description	Cable length
7000-44001-8400150	Straight connector / straight socket violet	1.5 m
7000-44001-8400300		3 m
7000-44001-8400500		5 m
7000-44001-8400750		7.5 m
7000-44001-8401000		10 m

Tab. 41: PROFIBUS cables

Article Number	Description	Cable length
7000-44021-8400150	Plug - angled / Socket - angled violet	1.5 m
7000-44021-8400300		3 m
7000-44021-8400500		5 m
7000-44021-8400750		7.5 m
7000-44021-8401000		10 m

Tab. 42: PROFIBUS cables

Article Number	Description	Cable length
7000-14051-8400150	Straight connector violet with nonterminated wire end	1.5 m
7000-14051-8400300		3 m
7000-14051-8400500		5 m
7000-14051-8400750		7.5 m
7000-14051-8401000		10 m

Tab. 43: PROFIBUS cables

Article Number	Description	Cable length
7000-14081-8400150	Plug - angled / violet with nonterminated wire end	1.5 m
7000-14081-8400300		3 m
7000-14081-8400500		5 m
7000-14081-8400750		7.5 m
7000-14081-8401000		10 m

Tab. 44: PROFIBUS cables

Article Number	Description	Cable length
7000-14061-8400150	straight socket violet with nonterminated wire end	1.5 m
7000-14061-8400300		3 m
7000-14061-8400500		5 m
7000-14061-8400750		7.5 m
7000-14061-8401000		10 m

Tab. 45: PROFIBUS cables

Article Number	Description	Cable length
7000-14071-8400150	Socket - angled violet with nonterminated wire end	1.5 m
7000-14071-8400300		3 m
7000-14071-8400500		5 m
7000-14071-8400750		7.5 m
7000-14071-8401000		10 m

Tab. 46: PROFIBUS cables

7.3 I/O Cables

Article Number	Description	Cable length
7000-12041-0250150	Straight connector yellow with nonterminated wire end	1.5 m
7000-12041-0250300		3 m
7000-12041-0250500		5 m
7000-12041-0250750		7.5 m
7000-12041-0251000		10 m

Tab. 47: I/O cables

The input/output cables are of course available in all shapes, colors, and combinations.

7.4 POWER 7/8" Cables

Article Number	Description	Cable length
7000-78021-9610150	Straight socket / with nonterminated wire end	1.5 m
7000-78021-9610300		3 m
7000-78021-9610500		5 m
7000-78021-9610750		7,5
7000-78021-9611000		10 m

Tab. 48: Power cable 7/8"

Article Number	Description	Cable length
7000-50021-9610030	Straight connector / straight socket	0.3 m
7000-50021-9610060		0.6 m
7000-50021-9610100		1 m
7000-50021-9610150		1.5 m
7000-50021-9610200		2 m

Tab. 49: Power cable 7/8"

Most cables and connectors are available in angled style.

7.5 PROFIBUS Connectors for Self-Connection

Article Number	Description	
7000-14005-0000000	Connector M12, straight Screw terminals B-coded, 2-pin, shielded	
7000-14201-0000000	Connector M12, straight IDC terminals B-coded, 3-pin, shielded	
7000-14221-0000000	Socket M12, straight IDC terminals B-coded, 3-pin, shielded	
7000-14025-0000000	Socket M12, straight Screw terminals B-coded, 2-pin, shielded	
55583	Bus connector plug 180° SUB-D9 (pin) IDC terminals (flexible cable)	
55584	Bus connector plug 180° SUB-D9 (pin) IDC terminals (rigid cable)	
55585	Bus connector plug SUB-D9 (pin) IDC terminals (rigid cable)	
55586	Bus connector plug SUB-D9 (pin) PG connection IDC terminals (rigid cable)	
55587	Bus connector plug SUB-D9 (pin) IDC terminals (flexible cable)	
55588	Bus connector plug SUB-D9 (pin) PG connection IDC terminals (flexible cable)	

Tab. 50: Connectors for self-connection

Article Number	Description	
7000-00000-8409999	Bus cable for PROFIBUS, 100 m collar	
7000-78081-0000000	Power 7/8" Connector, straight, 5-pin with screw terminals	
7000-78091-0000000	Power 7/8" Connector, straight, 5-pin IDC terminal Connection cross-section: 0.75 to 1.5 mm²	
7000-78201-0000000	Power 7/8" Socket, straight, 5-pin with screw terminals	
7000-78211-0000000	Power 7/8" Socket, straight, 5-pin IDC terminal Connection cross-section: 0.75 to 1.5 mm²	

Tab. 51: Connectors for self-connection

7.6 Terminating Resistors

Article Number	Description	
7000-14041-0000000	Terminating resistor M12 PROFIBUS (connector) B-coded, 4-pin	

Tab. 52: Terminating resistor accessories

7.7 Blank Plug

Article Number	Description
58 627	M12 plastic plug (SP 10 pieces)
338155	Diagnosis blanking plug M12x1 (VP 1 pc.)
55 390	7/8" screw plug, metal with chain (SP 1 piece)
55 385	7/8" screw plug, plastic (SP 1 piece)

Tab. 53: Blank plug

7.8 Diagnostic Adapter

Article Number	Description
7000-41241-0000000	M12 diagnostic adapter (for line monitoring to bridges)

Tab. 54: Diagnostic adapter

7.9 Identification Labels

Article Number	Description
996067	IDENTIFICATION LABELS 20X8MM (SP 10 pieces)

Tab. 55: Identification labels

7.10 Grounding Strap

Article Number	Description
4000-71001-0410004	Grounding strap 4 mm² 100 mm for M4 (SP 1 piece)

Tab. 56: Grounding strap

7.11 Torque Wrench

Article Number	Description
7000-99102-0000000	Set of M12 torque wrenches (SP 1 piece)
7000-99104-0000000	Set of 7/8" torque wrenches WAF22 (VP 1 piece)

Tab. 57: Torque wrench

7.12 Valve Connector Style A

Contact spacing 18 mm

Operating voltage 24 V AC/DC, pressure switch 24 V DC

Operating current max. 4 A

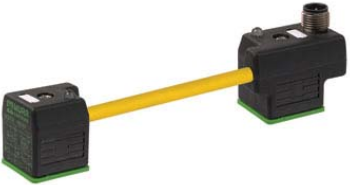| Article Number	Description	
7000-41341-0000000	M12 connection, straight	LED yellow, protection circuit for valves
7000-41361-0000000		LED yellow/green for pressure switch
7000-41461-0000000	M12 connection, angled	LED yellow, protection circuit for valves
7000-41481-0000000		LED yellow/green for pressure switch

Tab. 58: Valve connector Style A

7.13 Valve Connector Combination Style A

Contact spacing 18 mm

Operating voltage 24 V AC/DC

Operating current max. 4 A

Article Number	Description	Cable length
7000-41501-2260000	M12 top connection	100 mm
7000-41521-2260000		150 mm
7000-41541-2260000		200 mm
7000-41561-2260000	M12 rear connection	100 mm
7000-41581-2260000		150 mm
7000-41601-2260000		200 mm

Tab. 59: Valve connector combination Style A

Other System Accessories On Request

7.14 MICO

MICO monitors current

An maximum individual current value can be set for each of the two or four current paths. It is then monitored by the MICO.

The LED lights up green.

MICO signals limit loads

When 90% of the load current set for the channel is reached, MICO generates a visual alert

The LED flashes green.

MICO monitors current

If the load current exceed the set current value, or if short-circuits occur, MICO switches off the affected channel immediately.

The LED flashes red.

Article Number	Description	Current Setting [A]	
9000-41034-0100400	MICO 4.4 (4 channels)	1, 2, 3, 4	
9000-41034-0100600	MICO 4.6 (4 channels)	1, 2, 4, 6	
9000-41034-0401000	MICO 4.10 (4 channels)	4, 6, 8, 10	
9000-41034-0101000	MICO 4.4.10 ACTUATOR-SENSOR (4 channels)	2 x 1, 2, 3, 4 2 x 4, 6, 8, 10	
9000-41034-0401005	MICO 4.10 SPEED-START (4 channels)	4, 6, 8, 10	
9000-41042-0100400	MICO 2.4 (2 channels)	1, 2, 3, 4	
9000-41042-0100600	MICO 2.6 (2 channels)	1, 2, 4, 6	
9000-41042-0401000	MICO 2.10 (2 channels)	4, 6, 8, 10	

Tab. 60: Overview of MICO variants

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

onlineshop.murrelektronik.com

Glossary

Actuator disable	Short-circuit or overload at an output results in output switch-off.
Bus Run LED	LED to signal bus status.
Bus segment	Due to the electrical specification of the RS-485 interface, the number of users on the RS485 network is restricted to 32 users. If more than 32 PROFIBUS users are connected, the network must be divided into segments by means of repeaters.
1 byte	Equivalent to 8 bits.
Cfg F-LED	LED to signal a correct/incorrect configuration.
DI	Digital Input
DO	Digital Output
DP	Decentral Periphery. Decentralized periphery: PROFIBUS protocol for the high-speed cyclic data exchange.
I/O	Input/Output
EC Directive 2004/108/EC	EMC Directive.
EMC	Electromagnetic Compatibility.
ESD	Electrostatic Discharge
FE	Function ground/earth.
Freeze Command	The slave input data are "frozen".
GDS	The GDS (Device Data Base File) describes the technical features of a Profibus product. This file is required to configure a PROFIBUS system and is provided by the device manufacturer.
I	Current.
I/O	Input/Output
ID number	A 16-bit number that identifies a Profibus product uniquely. It represents a reference for the GDS file (DBB). Several devices may also have the same ID number, provided they are describable in a common GDS file (DBB). This number is issued by the Profibus Nutzerorganisation e.V. (German Profibus User Organization).
IEC 61158	World-wide valid standard for PROFIBUS DP and PROFIBUS FMS. Successor of international standard EN 50 170 Volume 2.
I/O link	Standardized communication system to link intelligent sensors and actuators to an automation system.
LSB	Least significant bit.
FO	Fiber optics, optical fiber.
MSB	Most significant bit.
PAA	Process map of outputs
PAE	Process map of inputs

PELV	Protective Extra Low Voltage.
PNO	Profibus Nutzerorganisation e.V. (German Profibus User Organization)
Repeater	Coupling element to process signals between Profibus segments.
Segment	Left segment of the internal system connection (Sockets 0 and 2) and right segment of the system link (Sockets 1 and 3)
SELV	Safety Extra Low Voltage.
Simatic Manager	Programming software for program-logic controllers made by Siemens.
SIO	SIO is the abbreviation for standard IO.
PLC	Program-logic controller
U	Voltage.
U/I	Voltage / current
VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machinery and Industrial Equipment Manufacturers)
ZVEI	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers' Association).

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