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NOTE
Translation of the original instructions

*Art.-No. 55556

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Product designation	Art.-No.
MVK-MPNIO F DI16/8 7/8" IRT	55556
MVK-MPNIO F DI16/8 7/8" IRT xT	5555610
Operating instructions	V 1.3

LISTED IND.CONT.EQ. 54PM	USA / Canada	Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers Information. For use in NFPA 79 Applications only.

1 Introduction

Service and support

Sales

Our sales staff in-house and in the field, and our technicians will support you at all times.

Customer Service Center (CSC)

Our staff of the Customer Service Center will help you with all questions concerning installation and start-up. They support you, for example, if you have problems with combining hardware and software products from different manufacturers.

Call us on +49 7191 47-2050 or send us an e-mail to: support@murrelektronik.com

PROFIsafe

PROFIBUS Nutzerorganisation e.V. (PNO)

Storage and Transport

➔ Avoid mechanical shocks during transport or operation.

➔ Observe the climatic conditions according to chapter "Technical data".

Environmentally friendly disposal

➔ Dispose of the product at the end of its service life according to the applicable statutory regulations.

If you want to dispose of the product, it may be returned free of charge to Murrelektronik GmbH. This also applies to the original packaging and batteries or accumulators. Devices contaminated with hazardous substances will not be taken back, neither for repair nor for disposal.

We ensure disposal in accordance with German legislation. Transport to the place of return is the the last owner's responsibility.

Additional documents, tools and configuration files can be found on the Internet under the product's article number:shop.murrelektronik.com

NOTE
The operating instructions must be always available to the operator of the machine where the module is used.

Symbols

CAUTION!

Type and source of danger.

Consequences if the danger is ignored.

➔ Avoiding (measures to prevent the danger).

Pictogram	Signal	Signal word	Meaning	Consequences if ignored
		Danger!	Immediate danger	Death or serious injuries
		Warning!	Possible danger	Death or serious injuries
		Caution!	Low-risk danger	Minor injuries
		Attention!	Possible material damage	Damage to the device and/or the system.

NOTE

Other technical information and notes of Murrelektronik GmbH.

RECOMMENDATION

Notes with this symbol are recommendations of Murrelektronik GmbH.

PRODUCTS AND ACCESSORIES

This symbol indicates accessories or product recommendations.

Instruction for use

➔ An arrow marks instructions.

➔ Read and observe the instructions.

1 | If they are numbered, it is absolutely necessary to follow them in the correct order.

2 | Read and observe the instructions.

2 For your safety

Use of the device

➔ Comply with all safety and accident prevention regulations when conducting project engineering, installation, startup, operation and testing of the device.

➔ Verify material resistance if aggressive media are used.

NOTE
Work on the hardware and software of the module, unless described in this document, may only be performed by qualified personnel of Murrelektronik GmbH.

WARNING!

Life-threatening voltages.

If there is a defect in a power supply unit, voltages on touchable components may reach 120 V DC or 50 V AC and more.

➔ Use only a power supply unit which allows max. 60 V DC or 25 V AC in case of error. It must comply with SELV or PELV.

Designated use

The MVK device is a decentralized safety module. It can be used in harsh industrial environments up to degree of protection IP67.

The proper operation of the device and the degree of protection IP67 are only guaranteed if open males and females are closed using screw plugs.

Designated use also includes the EMC-compliant electrical installation. The device is intended for use in industrial environment. If it is used in living or mixing areas, radio interference may occur.

➔ When using the bus module in the living and mixing areas, observe the relevant standards.

Foreseeable misuse

- ➔ Do **not** alter the design, engineering, or electrical features of the device.
- ➔ Do **not** put emergency stop functions and devices out of operation! For this purpose, observe relevant standards, e.g. the DIN EN ISO 13850 Safety of machinery - Emergency stop - design principles.
- ➔ Do **not** use the device outside areas described in this manual, technical data and the operating instructions.
- ➔ Do **not** use the device outdoors or for permanent operation in liquids.
- ➔ Do **not** clean the device using high pressure.

Warranty and liability claims

Warranty and liability claims become void if

- the product is not used according to its designated use,
- damage is caused because the manual and the operating instructions have not been observed,
- the personnel was/is not qualified.

Competent personnel

The device may be mounted and set up only by competent personnel that has knowledge of safety technology.

3 Technical data

Safety characteristics to EN ISO 1 3849-1, IEC 61508 and IEC 62061	
PL	≤e
Category	≤4
PFH	1.70E-9
$MTTF_D$	148 years
DC	98 %
SIL	≤3
SIL CL	≤3
Service life	20 years

Ambient conditions	
Operating temperature	-20° C ... +55° C
Operating temperature (Art.-No. 5555610)	-30° C ... +55° C
Storage temperature	-40° C ... +70° C
Protection type of the housing to EN 60529	IP67

BUS	
Fieldbus protocol	PROFINET/PROFIsafe
Transfer rate	100 Mbit/s
PROFINET addressing	via DCP

Supply	
Operating voltage US and sensor supply US	24 V ⎓
Voltage range US	18 ... 29 V ⎓
Max. current at 7/8" female/male	9 A
Current consumption	≤0.16 A
Cross-section of 7/8" connector	≤1.5 mm²
Protection against reverse polarization for US (UA not used)	yes

Inputs	
Delay time	1,3, 10 or 15 ms (±0.5 ms)
Input characteristics	EN 61131-2, Type 1
Sensor supply When using pin 1 and pin 5 When using pin 1 or pin 5	 ≤0.2 A per pin ≤0.7 A per pin
Short-circuit protection, sensor supply	High-side switch with overload protection
Conductor cross-section M12 Connector	≤0.75 mm²
Cable length	≤300 m

4 Mounting

➔ Conditions for mounting:

- Even mounting surface to avoid mechanical tension
- Provide suitable grounding
- Suitable installation site in terms of vibration and shock load, temperature and humidity (see chap. 3 "Technical data")
- Protected to avoid tearing off the connecting cables by personnel or device

Dimensions MVK 7/8"

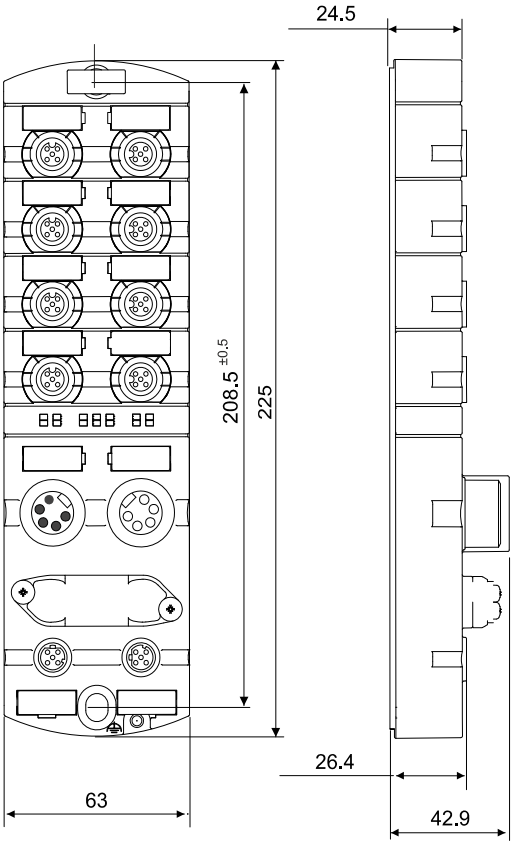


Fig. 4-1: Dimensions in mm

NOTICE

Risk of material damage

The fastening screws depend on the surface of the installation site.

➔ Use the screws according to the structure of the surface!

Fastening

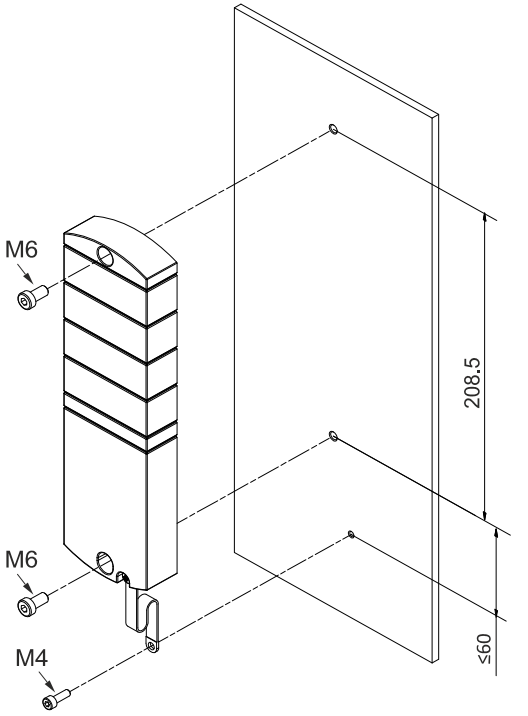


Fig. 4-2: Fastening dimensions in mm

M4	1,2 Nm		Art.-No. 7000-98001-0000000
M6	3 Nm		Art.-No. 7000-98001-0000000

Grounding strap fastening

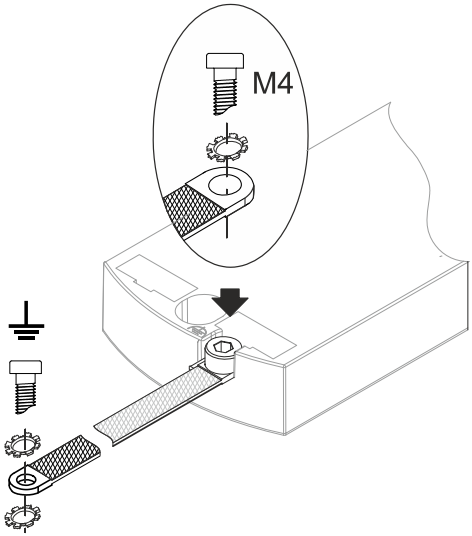
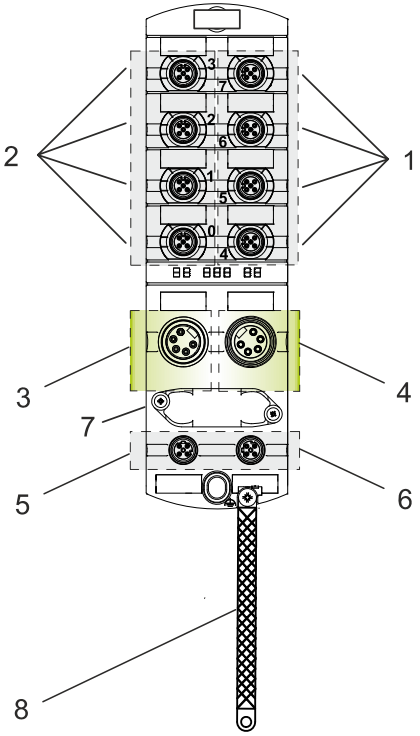


Fig. 4-3: Grounding strap fastening

M4	1,2 Nm		Art.-No. 7000-98001-0000000

NOTE
Use a conductive screw to attach the grounding strap.

5 Installation



1 DI Digital inputs M12 females
2 DI Digital inputs M12 females
3 Power supply POWER IN
4 Power supply POWER OUT
5 Port 1 PROFINET
6 Port 2 PROFINET
7 F addressing
8 Ground strap for functional earth

Fig. 5-1: Device design

NOTICE

Material damage caused by not closed males and females!

The degree of protection IP67 is only guaranteed if all connections are closed with connectors or screw plugs.

➔ Carefully close unused males and females with a screw plug.

Cable connection

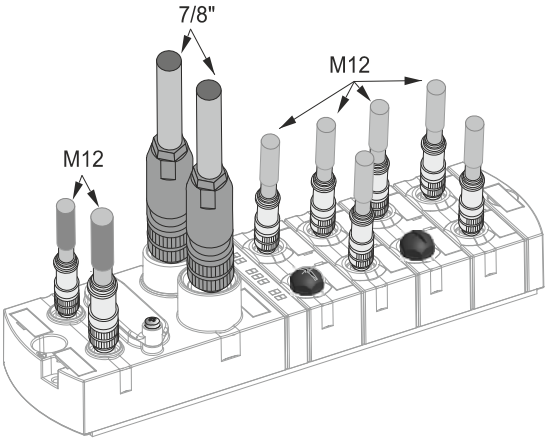


Fig. 5-2: Cable connections

M12	0,6 Nm		Art.-No. 7000-99102-0000000
7/8"	1,5 Nm		Art.-No. 7000-99102-0000000

Accessories

System components	Type	Article number	Packaging unit
Screw plug, metal	7/8"	55390	1 piece
Screw plug, plastic	7/8"	55385	1 piece
Screw plug, metal	M12	996049	1 piece
Screw plug, plastic	M12	58627	10 pieces
Cover for addressing, metal		55317	1 piece

Tools	Type	Article number	Packaging unit
Torque wrench	M12	7000-99102-0000000	1 piece
Torque wrench	7/8"	7000-99104-0000000	1 piece

For Safety Products	Type	Article number	Packaging unit
Label plates yellow	20x8	55316	20 pieces

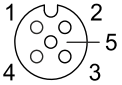
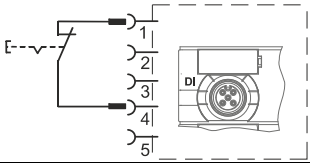
PRODUCTS AND ACCESSORIES
You will find a wide range of products in our catalog or in our Murrelektronik online shop: shop.murrelektronik.com

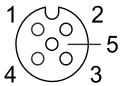
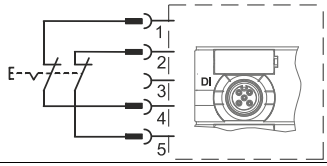
Usable sensors digital inputs

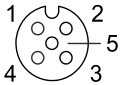
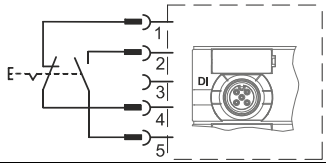
- Contact switches, e.g. Emergency stop buttons, protective door switches
- Sensors with 24 V PNP semiconductor switching outputs with test signals
- Sensors with 24 V PNP semiconductor switching outputs without test signals

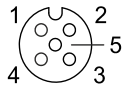
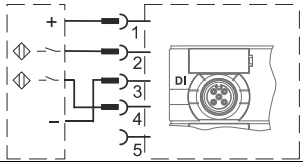
Characteristics

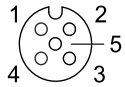
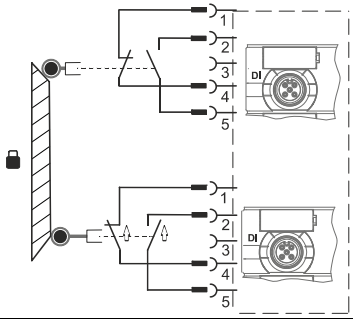
- 4 x 2 inputs
- The safe state is 0 V (de-energized state)
- Current sink against 0 V
- Characteristic according to IEC 61131-2 Type 1
- Each input has a yellow status LED and a red error LED

DI Connection			Switch with NC contact
	Pin 1	Test pulse 24V⎓	
	Pin 2	FDI	
	Pin 3	0V US	
	Pin 4	FDI	
	Pin 5	Test pulse 24V⎓	
x = no. of M12 female			

DI Connection			Emergency stop switch
	Pin 1	Test pulse 24V⎓	
	Pin 2	FDI	
	Pin 3	0V US	
	Pin 4	FDI	
	Pin 5	Test pulse 24V⎓	
x = no. of M12 female			

DI Connection			Mech. switch
	Pin 1	Test pulse 24V⎓	
	Pin 2	FDI	
	Pin 3	0V US	
	Pin 4	FDI	
	Pin 5	Test pulse 24V⎓	
x = no. of M12 female			

DI Connection			El. safety switch (OSSD)
	Pin 1	Test pulse 24V⎓	
	Pin 2	FDI	
	Pin 3	0V US	
	Pin 4	FDI	
	Pin 5	Test pulse 24V⎓	
x = no. of M12 female			

DI Connection			Protective door monitoring
	Pin 1	Test pulse 24V⎓	
	Pin 2	FDI	
	Pin 3	0V US	
	Pin 4	FDI	
	Pin 5	Test pulse 24V⎓	
x = no. of M12 female			

WARNING!

Unsafe safety function

If the "sensor analysis" parameter is set to 1oo1, and the test signals for the socket in question are deactivated, safe dual-channel sensors must be used, and the sensor signals must be evaluated in the PLC in two channels. Otherwise the input signals of this socket may not be used for safety-relevant applications!

- ➔ Use 1oo1 in this case only in combination with dual-channel safety switches.
- ➔ Deactivate the safety signals only if the safety switch is equipped with built-in cross-short detection.

NOTE

Switch-off test for the entire module:

The M branch of the entire module is disconnected in an additional internal test. The period is 60 s and the switch-off duration is max. 0.8 ms. This test cannot be deactivated.

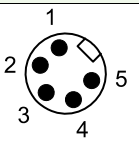
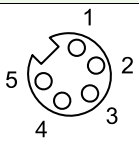
- ➔ Ensure that the actuators and sensors used can bridge or tolerate the switch-off test of the entire module!

NOTE
The assumptions about diagnostic coverage of the reverse polarity protection circuits with galvanically separated voltages for US and UA are not correct.

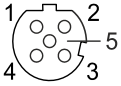
➔ Do not use galvanically separated voltage for US and UA.

➔ Connect 0V US and 0V UA of the power supplies.

POWER 7/8"

POWER IN			POWER OUT
	Pin 1	0 V UA	
	Pin 2	0 V US	
	Pin 3	⏚	
	Pin 4	24 V US / 9 A	
	Pin 5	24 V UA / 9 A	

BUS connection M12 ports d-coded XF1 (port 1) XF1 (port 2)

XF1 / XF2		
	Pin 1	TD +
	Pin 2	RD +
	Pin 3	TD -
	Pin 4	RD -
	Pin 5	n.c.

6 Start-up

⚠ WARNING!

Risk of fire due to short circuit

Damaged supply lines and/or devices may short circuit when damaged which may result in overheating and fire.

➔ Provide intelligent current monitoring or fuse. The fuse must be designed for max. 9 A.

Safety function requirements

➔ how the safety function must be designed (e.g., using 1 channel, 2 channels, etc.)

➔ how acknowledgement may be performed,

➔ which test functions are required.

⚠ CAUTION!

Uncontrolled processes can cause material damage and injuries.

Uncontrolled processes may happen during all start-up phases, for example first start-up, restart and configuration change.

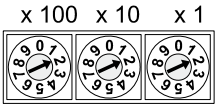
➔ Always perform start-up in this sequence:

1 | Insert the module.

2 | System check and approval by a qualified person.

3 | Put it into operation.

Setting the address switch



Address range 1 ... 999

x1 Rotary DIP switch (units)
x10 Rotary DIP switch (tens)
x100 Rotary DIP switch (hundreds)

Settings	Description
0	Factory reset
1 ... 999	Possible address range

Perform a factory reset (observe order!)

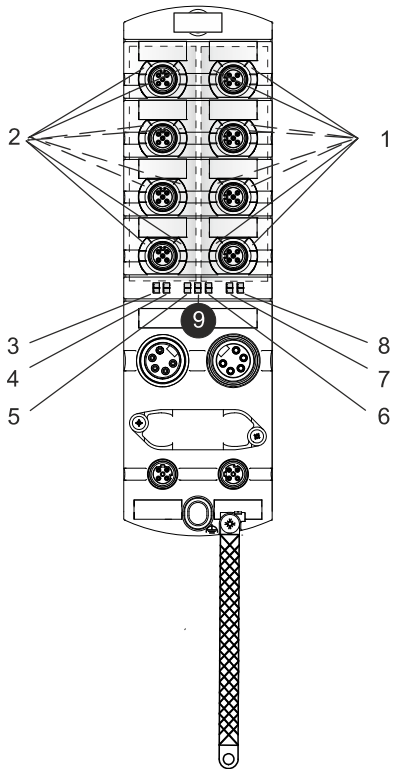
1 | De-energize the MVK safety device.
2 | Set the address 0 on the rotary switch.
3 | Supply the device again with power.

If the device has a PROFINET name, this will be reseted to the factory settings. In this case all status LEDs will be flashing (without LNK/ACT-LEDs)

4 | Set your F address and perform a voltage reset.

NOTE
Delivery state: switches set to “0”

7 Diagnostic



1 Digital input indication
2 Digital input indication
3 BUS RUN-LED
4 CfgF-LED
5 LNK1/ACT1 LED
6 LNK2/ACT2 LED
7 POWER LED UA
8 POWER LED US
9 F_Err-LED

Fig. 7-1: Indicating elements

More detailed information on LED indications is given in the corresponding manual in the online shop at: shop.murrelektronik.com

8 Maintenance and cleaning

NOTICE

Material damage caused by defective or damaged devices.

The functioning of the devices is not guaranteed.

➔ Replace defective or damaged devices.

NOTE

Device cleaning.

➔ Use only oil-free compressed air or spirit.

➔ Only use lint-free materials (e.g. leather cloth).

➔ Do not use contact spray.

NOTE

During maintenance, you can replace the device with a device of the same type if the PROFINET topology is saved in the F-PLC.

Prerequisite: The F addresses are the same.

➔ Check whether the F addresses of the old and new device are identical.

➔ If required, set the F address on the new device.
The F-PLC will then assign the name and the IP address suitable for the replaced device. The parameterization is applied automatically.

MURR ELEKTRONIK
stay connected

9 EU Declaration of Conformity

No.: 02-11.21

We (supplier's name): **Murrelektronik GmbH**
Address Falkenstraße 3
71570 Oppenweiler

declare under our sole responsibility that the product(s)

55556 **MVK-MPNIO F DI16/8 7/8" IRT**
55557 **MVK-MPNIO F DI8/4 F DO4 7/8" IRT**
Article number, Name,Type or Model, Hardware-, Software version

Product description: ***Safety IO Module***

complies with the requirements of the following European directive(s):

EMC Directive No.: 2014/30/EU **RoHS Directive 2011/65/EU**
Maschinery Directive No.: 2006/42/EC

The compliance with the requirements of these directives was examined by application of following standards:

EN ISO 13849-1:2015 Safety of machinery, safety-related parts of control systems Part 1: General principles for design

IEC 61508: 2010 Parts 1-7 Functional safety of electrical/electronic/programmable electronic safety-related systems

EN 61326-3-1: 2017 Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications

EN 61131-2: 2007 Programmable controllers – Part 2: Equipment requirements and tests.

IEC 63000: 2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction hazardous substances (IEC: 2016)

Authorized representative for the compilation of technical file:
Kay Augustin
Falkenstraße 3
71570 Oppenweiler

The Notified Body which is responisble for certification (EC type-examination) in accordance with Annex IX of 2006/42/EG:
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln, Germany
Kenn-Nr.: 0035

EC type-examination certificate No.: 01/205/5408.02/21

test reports No.: pz21-968-M380.07-21_tuev_e_a, A-214-15, 55557_pz15419_emv_p_a.pdf, 55557_pz21 210410-01-01-A-01_KRIWAN_emv_p_a, A-123-21, A-191-21, pz21279-Exemption_rohs_p_a

Oppenweiler, 11.11.2021 Place and date of issue	i.V. Ernst Greisiger Manager Test Center	i.V. Bernd Waser Development manager

Signatures present in the original.

Abbreviations

DC	Diagnostic Coverage / Error detection rate
F	Safety
IN	Input
M	Minus
MTTFd	Mean Time To (dangerous) Failure
n.c.	Not connected
OUT	Output
P	Plus
PELV	Protective Extra Low Voltage / protective extra low voltage with safe separation
PFH	Probability of Failure per Hour
PL	Performance Level / capability of safety-related parts to perform safety function under foreseeable conditions to ensure the expected risk reduction
SELV	Safety Extra Low Voltage / safety extra low voltage with safe separation
SIL	Safety Integrity Level
SIL CL	Safety Integrity Claim Limit
UT	Test pulse
TD	Transmit Data
RD	Receive Data