



## PNOZ mmc4p

**PILZ**  
THE SPIRIT OF SAFETY

- ▶ Configurable, safe compact controllers PNOZmulti Mini

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SD means Secure Digital

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# 1 Introduction

## 1.1 Validity of documentation

This documentation is valid for the product PNOZ mmc4p. It is valid until new documentation is published.

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

## 1.2 Using the documentation

This document is intended for instruction. Only install and commission the product if you have read and understood this document. The document should be retained for future reference.

## 1.3 Definition of symbols

Information that is particularly important is identified as follows:



### **DANGER!**

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



### **WARNING!**

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



### **CAUTION!**

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



### **NOTICE**

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.



**INFORMATION**

This gives advice on applications and provides information on special features.

## 2 Overview

### 2.1 Scope of supply

- ▶ Expansion module PNOZ mmc4p
- ▶ Jumper

### 2.2 Unit features

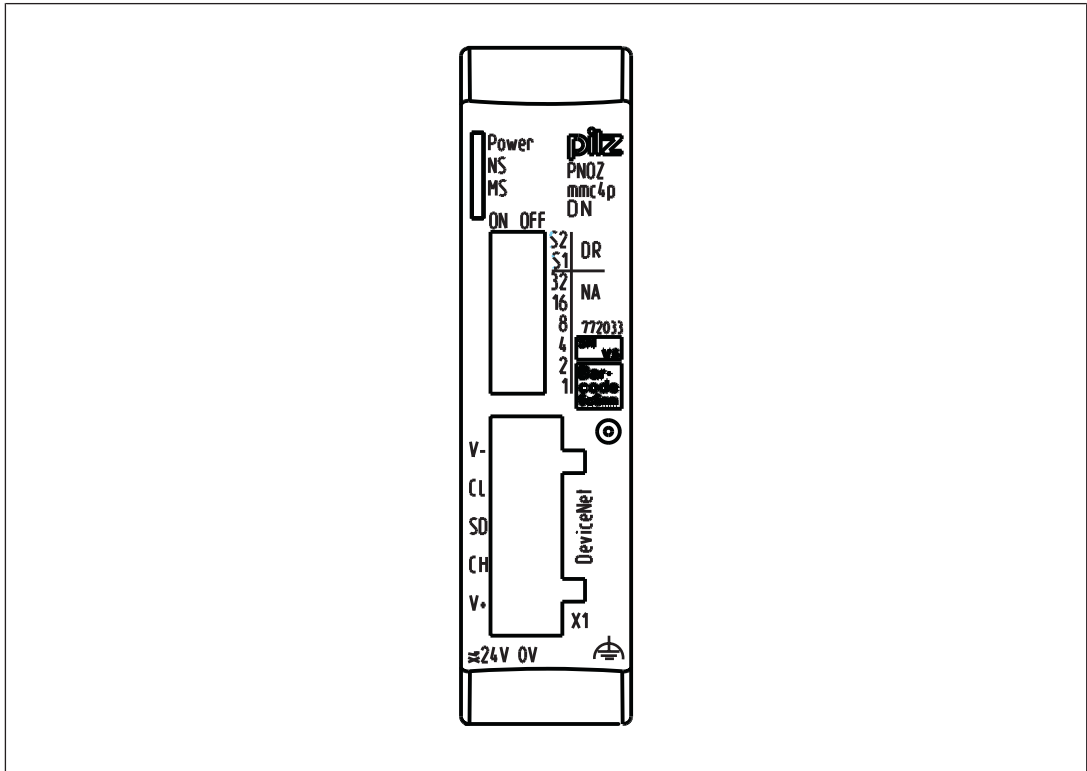
Application of the product PNOZ mmc4p:

Expansion module for connection to a base unit from the PNOZmulti Mini system.


The product has the following features:

- ▶ Can be configured in the PNOZmulti Configurator
- ▶ Connection for DeviceNet
- ▶ Station addresses from 0 ... 63 can be selected via DIP switches
- ▶ Status indicators for communication with DeviceNet and for errors
- ▶ 24 virtual inputs and outputs on the control system PNOZmulti can be defined in the PNOZmulti Configurator for communication with the fieldbus DeviceNet . The number of inputs and outputs can be extended to 128. Please note that when the extended inputs and outputs 24 - 127 are used they have different properties (see document entitled "Communication Interfaces").
- ▶ Max. 1 PNOZ mmc4p can be connected to the base unit
- ▶ Plug-in connection terminals:  
Either spring-loaded terminal or screw terminal available as an accessory (see Order references for accessories).
- ▶ Please refer to the document "PNOZmulti System Expansion" for details of the base units PNOZmulti Mini that can be connected.

## 2.3 Front view



### Legend:

- ▶ 0 V, 24 V:  
Supply connections
- ▶ X1: DeviceNet interface (5-pin screw connector)
- ▶ : Functional earth
- ▶ LED:
  - Power
  - NS
  - MS

## 3 Safety

### 3.1 Intended use

The expansion module PNOZ mmc4p is used for communication between the configurable control system PNOZmulti Mini and DeviceNet.

DeviceNet is designed for fast data exchange at field level. The expansion module PNOZ mmc4p is a passive DeviceNet subscriber (Slave). The basic communication functions with DeviceNet meet the requirements of the DeviceNet specification, Release 2.0. The central controller (master) reads input information from the slaves and writes output information to the slaves as part of each cycle. As well as the cyclical transfer of usable data, the expansion module PNOZ mmc4p can also be used for diagnostic and commissioning functions. Data traffic is monitored on the Master/Slave side.

The expansion module may only be connected to a base unit from the configurable system PNOZmulti Mini (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected).


The configurable system PNOZmulti Mini is used for the safety-related interruption of safety circuits and is designed for use in:

- ▶ Emergency stop equipment
- ▶ Safety circuits in accordance with VDE 0113 Part 1 and EN 60204-1

The expansion module may not be used for safety-related functions.

#### Improper use

The following is deemed improper use in particular

- ▶ Any component, technical or electrical modification to the product,
- ▶ Use of the product outside the areas described in this operating manual,
- ▶ Use of the product outside the technical details (see [Technical details](#) [ 18]).



#### **NOTICE** **EMC-compliant electrical installation**

The product is designed for use in an industrial environment. The product may cause interference if installed in other environments. If installed in other environments, measures should be taken to comply with the applicable standards and directives for the respective installation site with regard to interference.

### 3.2 System requirements

Please refer to the "Product Modifications PNOZmulti" document in the "Version overview" section for details of which versions of the base unit and PNOZmulti Configurator can be used for this product.



## **3.3 Safety regulations**

### **3.3.1 Use of qualified personnel**

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

A competent person is someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

It is the company's responsibility only to employ personnel who

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention,
- ▶ Have read and understood the information provided in this description under "Safety",
- ▶ And have a good knowledge of the generic and specialist standards applicable to the specific application.

### **3.3.2 Warranty and liability**

All claims to warranty and liability will be rendered invalid if

- ▶ The product was used contrary to the purpose for which it is intended,
- ▶ Damage can be attributed to not having followed the guidelines in the manual,
- ▶ Operating personnel are not suitably qualified,
- ▶ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

### **3.3.3 Disposal**

- ▶ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

### **3.3.4 For your safety**

The unit meets all the necessary conditions for safe operation. However, you should always ensure that the following safety requirements are met:

- ▶ This operating manual only describes the basic functions of the unit. The expanded functions are described in the PNOZmulti Configurator's online help. Only use these functions once you have read and understood the documentations.
- ▶ Do not open the housing or make any unauthorised modifications.
- ▶ Please make sure you shut down the supply voltage when performing maintenance work (e.g. exchanging contactors).

## 4 Function description

### 4.1 Operation

The virtual inputs and outputs that are to be transferred via DeviceNet are selected and configured in the PNOZmulti Configurator. The base unit and the expansion module PNOZ mmc4p are connected via a jumper.

The station address and the transmission rate are set using DIP switches. After the supply voltage is switched on or the PNOZmulti control system is reset, the expansion module PNOZ mmc4p is configured and started automatically.

LEDs indicate the status of the expansion module on DeviceNet.

The configuration is described in detail in the PNOZmulti Configurator's online help.

### 4.2 Input and output data

The data is structured as follows:

► Input area

The inputs are defined in the master and transferred to the PNOZmulti. Each input has a number, e.g. input bit 4 of byte 1 has the number i12.

► Output range

The outputs are defined in the PNOZmulti Configurator. Each output that is used is given a number there, e.g. o0, o5... The status of output o0 is stored in bit 0 of byte 0; the status of output o5 is stored in bit 5 of byte 0 etc.

► Output range only: Byte 3

Bits 0 ... 4: Status of LEDs on the PNOZmulti

- Bit 0: OFAULT
- Bit 1: IFAULT
- Bit 2: FAULT
- Bit 3: DIAG
- Bit 4: RUN

Bit 5: Data is being exchanged.

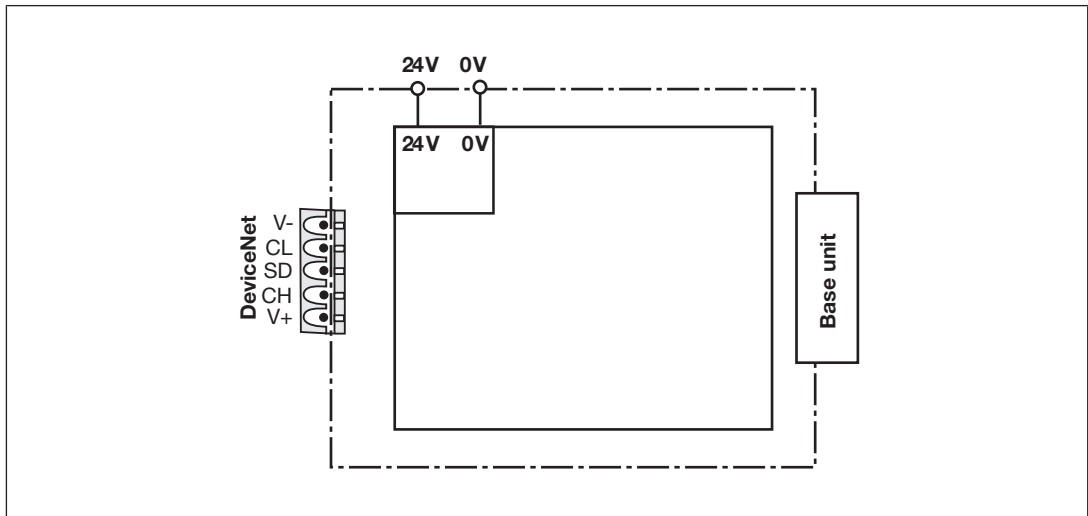
Detailed information on data exchange (tables, segments) is available in the document "Communication Interfaces" in the section entitled "Fieldbus modules".

### 4.3 Assigning the inputs/outputs in the PNOZmulti Configurator to the DeviceNet inputs/outputs

Virtual inputs on PNOZmulti Configurator	i0 ... i7	i8 ... i15	i16 ... i23
Input data DeviceNet	Byte 0: Bits 0 ... 7	Byte 1: Bits 0 ... 7	Byte 2: Bits 0 ... 7
Virtual outputs on PNOZmulti Configurator	o0 ... o7	o8 ... o15	o16 ... o23
Output data DeviceNet	Byte 0: Bits 0 ... 7	Byte 1: Bits 0 ... 7	Byte 2: Bits 0 ... 7

The number of virtual inputs and outputs can be extended to 128 (see document "Communication Interfaces" in the section entitled "Fieldbus modules")

## 4.4 Block diagram



## 5 Installation

### 5.1 General installation guidelines

- ▶ The unit should be installed in a control cabinet with a protection type of at least IP54.
- ▶ Fit the safety system to a horizontal mounting rail. The venting slots must face upwards and downwards. Other mounting positions could destroy the safety system.
- ▶ Use the notch on the rear of the unit to attach it to a mounting rail.
- ▶ In environments exposed to heavy vibration, the unit should be secured using a fixing element (e.g. retaining bracket or end angle).
- ▶ Push the unit upwards or downwards before lifting it from the mounting rail.
- ▶ To comply with EMC requirements, the mounting rail must have a low impedance connection to the control cabinet housing.
- ▶ The ambient temperature in the control cabinet must not exceed the figure stated in the technical details. otherwise air conditioning may be required.

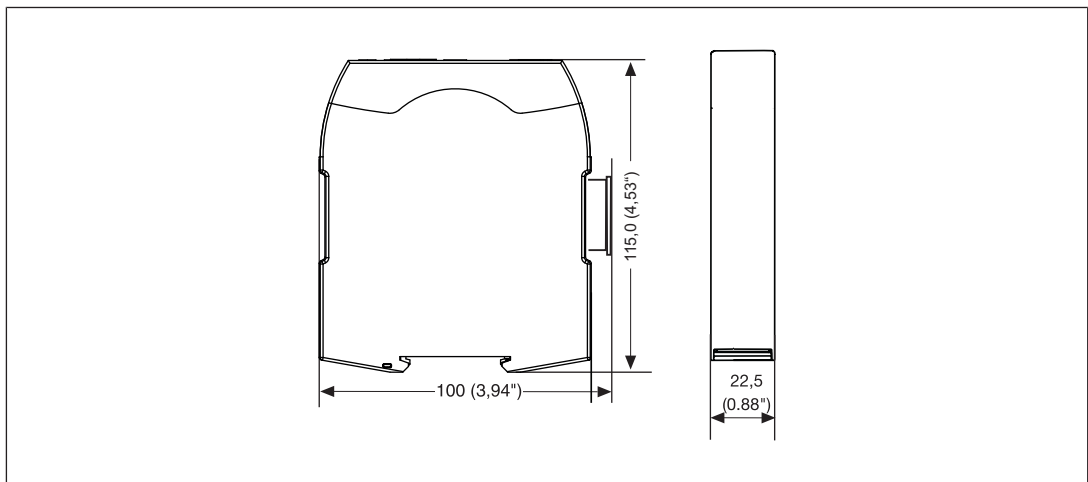


#### NOTICE

#### Damage due to electrostatic discharge!

Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

### 5.2 Dimensions in mm



### 5.3 **Connect the base unit and expansion modules**

Connect the base unit and the expansion module as described in the operating instructions for the base units.

- ▶ Connect the black/yellow terminator to the expansion module.
- ▶ Install the expansion module in the position in which it is configured in the PNOZmulti Configurator.

The position of the expansion modules is defined in the PNOZmulti Configurator. The expansion modules are connected to the left or right of the base unit, depending on the type.


Please refer to the document "PNOZmulti System Expansion" for details of the number of modules that can be connected to the base unit and the module types.

## 6 Commissioning

### 6.1 General wiring guidelines

The wiring is defined in the circuit diagram of the PNOZmulti Configurator.

Please note:

- ▶ Information given in the [Technical details \[18\]](#) must be followed.
- ▶ The position of the expansion module is specified in the Hardware configuration of the PNOZmulti Configurator.
- ▶ Use copper wiring with a temperature stability of 75 °C.
- ▶ External measures must be used to connect the  terminal to the function earth (e.g. mounting rail).
- ▶ Always connect the mounting rail to the protective earth via an earthing terminal. This will be used to dissipate hazardous voltages in the case of a fault.
- ▶ The power supply must meet the regulations for extra low voltages with protective electrical separation (SELV, PELV).

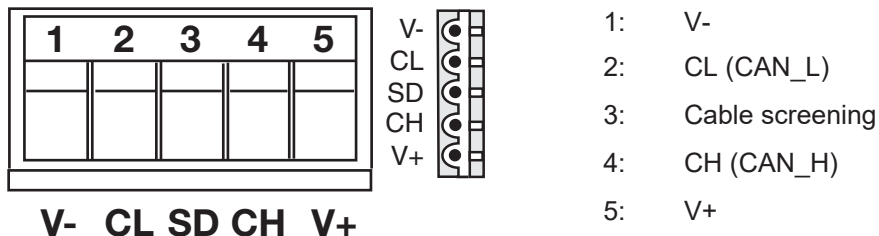
### 6.2 Connecting the supply voltage

Connect the supply voltage to the fieldbus module:

- ▶ **24 V** terminal: + 24 VDC
- ▶ **0 V** terminal: 0 V
- ▶ Protect the supply voltage as follows:
  - Circuit breaker, characteristic C - 6 A
  - or
  - Blow-out fuse, slow, 6A

### 6.3 DeviceNet interface

It is possible to define which outputs on the control system will communicate with DeviceNet. The connection to DeviceNet is made via a 5-pin screw connector.



#### Termination DeviceNet

To minimise cable reflection and to guarantee a defined rest signal on the transmission line, DeviceNet must be terminated at both ends.

## 6.4 Setting the transmission rate

Set the transmission rate using DIP switches S1 and S2 (DR).

Transmission rate	DIP switch	
	S1	S2
125 kBit/s	Off	Off
250 kBit/s	On	Off
500 kBit/s	Off	On
---	On	On



### INFORMATION

The transmission rate cannot be changed during operation.

## 6.5 Setting the station address

The station address of the expansion module PNOZ mmc4p is set from 0 ... 63 (binary) using DIP switches 1 to 32.

Station address	DIP switch					
	32	16	8	4	2	1
0	Off	Off	Off	Off	Off	Off
1	Off	Off	Off	Off	Off	On
2	Off	Off	Off	Off	On	Off
3	Off	Off	Off	Off	On	On
...	...	...	...	...	...	...
62	On	On	On	On	On	Off
63	On	On	On	On	On	On

## 6.6 Download modified project to the PNOZmulti safety system

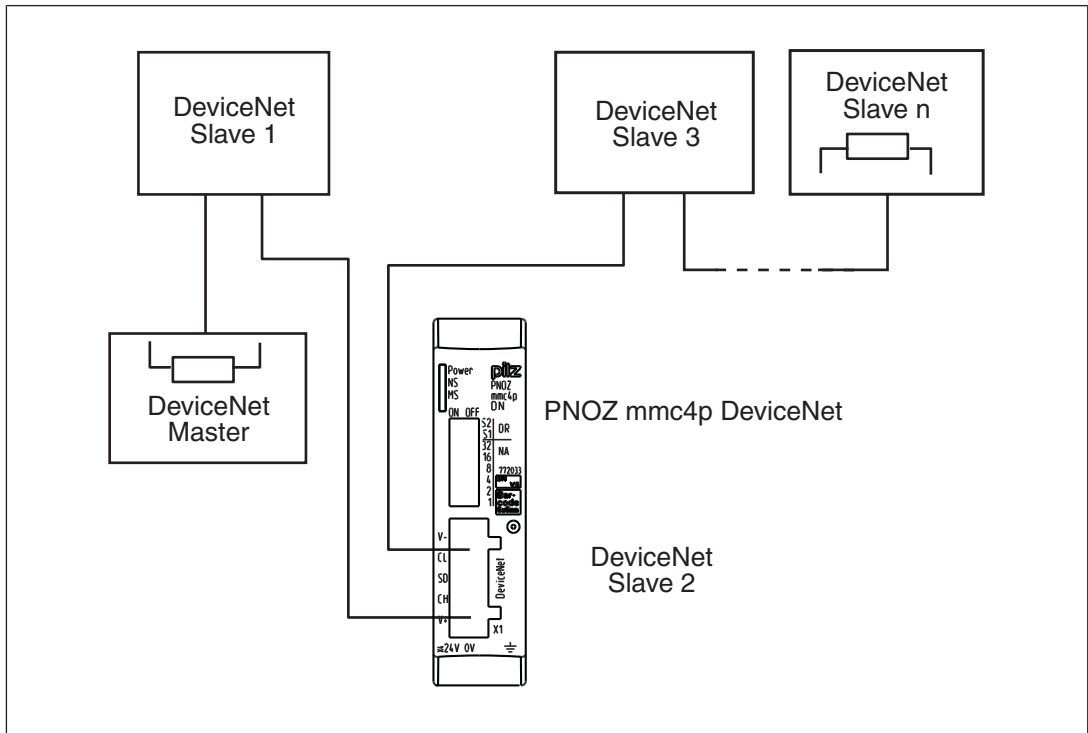
As soon as an additional expansion module has been connected to the system, the project must be amended in the PNOZmulti Configurator and downloaded back into the base unit. Proceed as described in the operating manual for the base unit.



### NOTICE

For the commissioning and after every user program change, you must check whether the safety devices are functioning correctly.

## 6.7 Connection example





## 7 Operation




When the supply voltage is switched on, the PNOZmulti copies the configuration from the chip card.











The expansion module PNOZ mmc4p is configured and started automatically. The LEDs "MS" and "NS" display the status of the PNOZ mmc4p on DeviceNet.

If the expansion module PNOZ mmc4p does not receive a configuration from the base unit for a period of 30 s, the fieldbus module PNOZ mmc4p connects to DeviceNet and "Online" status is displayed on DeviceNet. The "MS" LED flashes red.

### 7.1 Messages

#### Legend

-  LED on
-  LED flashes
-  LED off

LED			Meaning
NS		Green	PNOZ mmc4p in "Link OK, Online, Connected" status
		Green	PNOZ mmc4p in "Online, Not connected" status
		Red	PNOZ mmc4p detects "Critical link failure"
		Red	Time monitoring ("Connection Timeout") has expired.
			No supply voltage or offline
MS		Green	PNOZ mmc4p in "Device Operational" status
		Green	Configuration error; size of data does not correspond to the configuration
		Red	PNOZ mmc4p detects non-recoverable error
		Red	PNOZ mmc4p detects recoverable error ("Minor Fault").
			No supply voltage on PNOZ mmc4p Remedy: Make sure that the fieldbus module PNOZ mmc4p is connected to the base unit.

## 8 Technical details

<b>General</b>	
Certifications	CE, EAC, UKCA, cULus Listed
<b>Electrical data</b>	
Supply voltage	
for	<b>Module supply</b>
Voltage	<b>24 V</b>
Kind	<b>DC</b>
Voltage tolerance	<b>-20 %/+25 %</b>
Output of external power supply (DC)	<b>1,5 W</b>
Status indicator	<b>LED</b>
<b>Fieldbus interface</b>	
Fieldbus interface	<b>DeviceNet</b>
External supply (DC)	<b>24 V</b>
Power consumption	<b>0,75 W</b>
Device type	<b>Slave</b>
Station address	<b>0 ... 63d</b>
Transmission rates	<b>125 kBit/s, 250 kBit/s, 500 kBit/s</b>
Connection	<b>5-pin Combicon plug-in connector</b>
Galvanic isolation	<b>yes</b>
<b>Times</b>	
Supply interruption before de-energisation	<b>20 ms</b>
<b>Environmental data</b>	
Ambient temperature	
In accordance with the standard	<b>EN 60068-2-14</b>
Temperature range	<b>0 - 60 °C</b>
Forced convection in control cabinet off	<b>55 °C</b>
Storage temperature	
In accordance with the standard	<b>EN 60068-2-1/-2</b>
Temperature range	<b>-25 - 70 °C</b>
Climatic suitability	
In accordance with the standard	<b>EN 60068-2-30, EN 60068-2-78</b>
Humidity	<b>93 % r. h. at 40 °C</b>
Condensation during operation	<b>Not permitted</b>
Max. operating height above sea level	<b>2000 m</b>
EMC	<b>EN 61131-2</b>
Vibration	
In accordance with the standard	<b>EN 60068-2-6</b>
Frequency	<b>10 - 150 Hz</b>
Acceleration	<b>1g</b>
Shock stress	
In accordance with the standard	<b>EN 60068-2-27</b>
Acceleration	<b>15g</b>
Duration	<b>11 ms</b>

<b>Environmental data</b>	
Airgap creepage	
In accordance with the standard	<b>EN 61131-2</b>
Overvoltage category	<b>II</b>
Pollution degree	<b>2</b>
Rated insulation voltage	<b>30 V</b>
Protection type	
In accordance with the standard	<b>EN 60529</b>
Housing	<b>IP20</b>
Terminals	<b>IP20</b>
Mounting area (e.g. control cabinet)	<b>IP54</b>
<b>Potential isolation</b>	
Potential isolation between	<b>Fieldbus and module voltage</b>
Type of potential isolation	<b>Functional insulation</b>
Rated surge voltage	<b>500 V</b>
<b>Mechanical data</b>	
Mounting position	<b>horizontally on mounting rail</b>
DIN rail	
Top hat rail	<b>35 x 7,5 EN 50022</b>
Recess width	<b>27 mm</b>
Material	
Bottom	<b>PC</b>
Front	<b>PC</b>
Top	<b>PC</b>
Connection type	<b>Spring-loaded terminal, screw terminal</b>
Conductor cross section with screw terminals	
1 core flexible	<b>0,25 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b>
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	<b>0,2 - 1,5 mm<sup>2</sup>, 24 - 16 AWG</b>
Torque setting with screw terminals	<b>0,5 Nm</b>
Conductor cross section with spring-loaded terminals:	
Flexible with/without crimp connector	<b>0,2 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b>
Spring-loaded terminals: Terminal points per connection	<b>2</b>
Stripping length with spring-loaded terminals	<b>9 mm</b>
Dimensions	
Height	<b>100 mm</b>
Width	<b>22,5 mm</b>
Depth	<b>110 mm</b>
Weight	<b>95 g</b>

Where standards are undated, the 2011-09 latest editions shall apply.

## 9 Order reference

### 9.1 Product

Product type	Features	Order no.
PNOZ mmc4p	Fieldbus module, DeviceNet	772 033

### 9.2 Accessories

#### Connection terminals

Product type	Features	Order no.
Spring terminals PNOZ mmcxp 1 pc.	Spring-loaded terminals, 1 pieces	783542
Spring terminals PNOZ mmcxp 10 pcs.	Spring-loaded terminals, 10 pieces	783543
Screw terminals PNOZ mmcxp 1 pc.	Screw terminals, 1 piece	793542
Screw terminals PNOZ mmcxp 10 pcs.	Screw terminals, 10 pieces	793543

#### Terminator, jumper

Product type	Features	Order No.
PNOZ s terminator plug	Terminator, yellow, 10 pieces	750 010
PNOZ s connector	Jumper, 10 pieces	750 020

# ► Support

Technical support is available from Pilz round the clock.

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