

Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

PNOZ mc4p

PILZ

THE SPIRIT OF SAFETY

- ▶ Configurable safety systems PNOZmulti

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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 mc4p. 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


- ▶ Expansion module PNOZ mc4p
- ▶ Jumper

2.2 Unit features

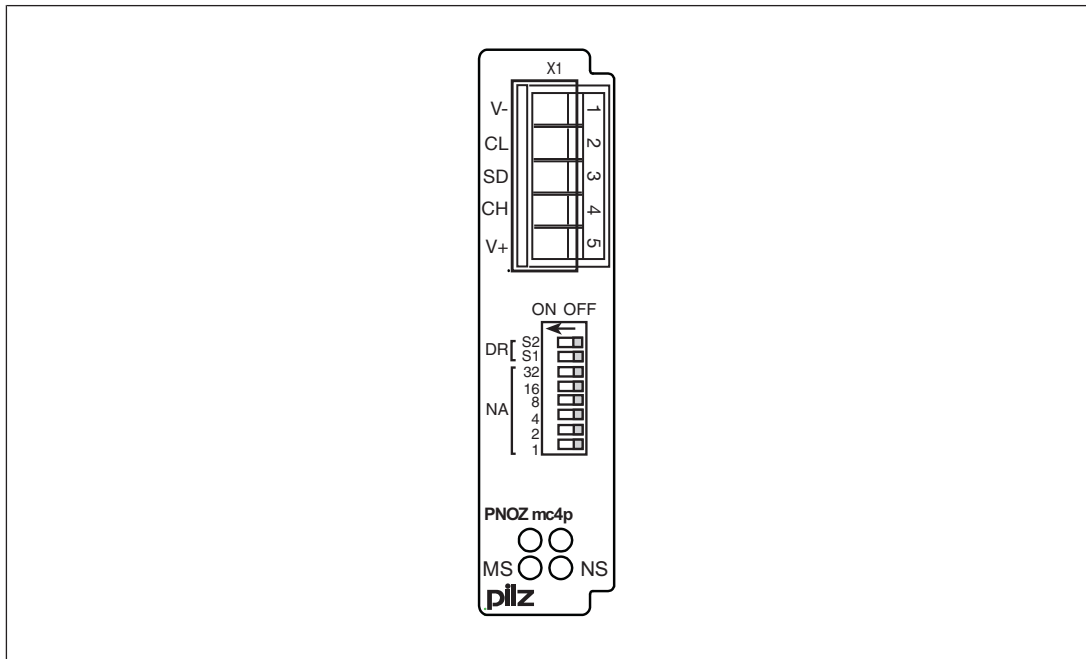
Using the product PNOZ mc4p:

Expansion module for connection to a base unit from the configurable control system PNOZmulti

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
- ▶ Please refer to the document "PNOZmulti System Expansion" for the PNOZmulti base units that can be connected.
- ▶ Coated version:
Increased environmental requirements (see [Technical details](#)  19])

2.3 Front view



Legend:

- ▶ X1: DeviceNet interface (5-pin screw connector)
- ▶ LED:
 - Power
 - NS
 - MS

3 Safety

3.1 Intended use

The expansion module PNOZ mc4p is used for communication between the configurable safety system and DeviceNet.

DeviceNet is designed for fast data exchange at field level. The expansion module PNOZ mc4p 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 mc4p 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 (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected).

The configurable system PNOZmulti 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.

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 manual
- ▶ Use of the product outside the technical details (see [Technical details](#)  19)).



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 mc4p are connected via a jumper. The expansion module PNOZ mc4p is also supplied with voltage via this 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 mc4p 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.

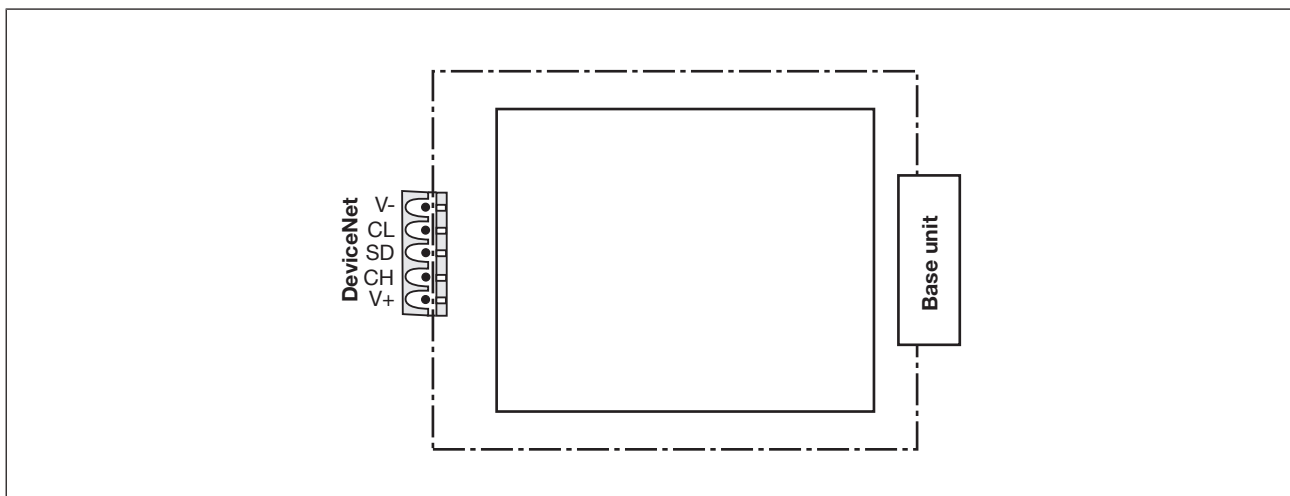
Detailed information on data exchange (tables, segments) is available in the document "Communication Interfaces" in the section entitled "Fieldbus modules".

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 control system should be installed in a control cabinet with a protection type of at least IP54. Fit the control system to a horizontal mounting rail. The venting slots must face upward and downward. Other mounting positions could destroy the control system.
- ▶ Use the notches on the rear of the unit to attach it to a mounting rail. Connect the control system to the mounting rail in an upright position, so that the earthing springs on the control system are pressed on to the mounting rail.
- ▶ The ambient temperature of the PNOZmulti units in the control cabinet must not exceed the figure stated in the technical details, otherwise air conditioning will be required.
- ▶ To comply with EMC requirements, the mounting rail must have a low impedance connection to the control cabinet housing.

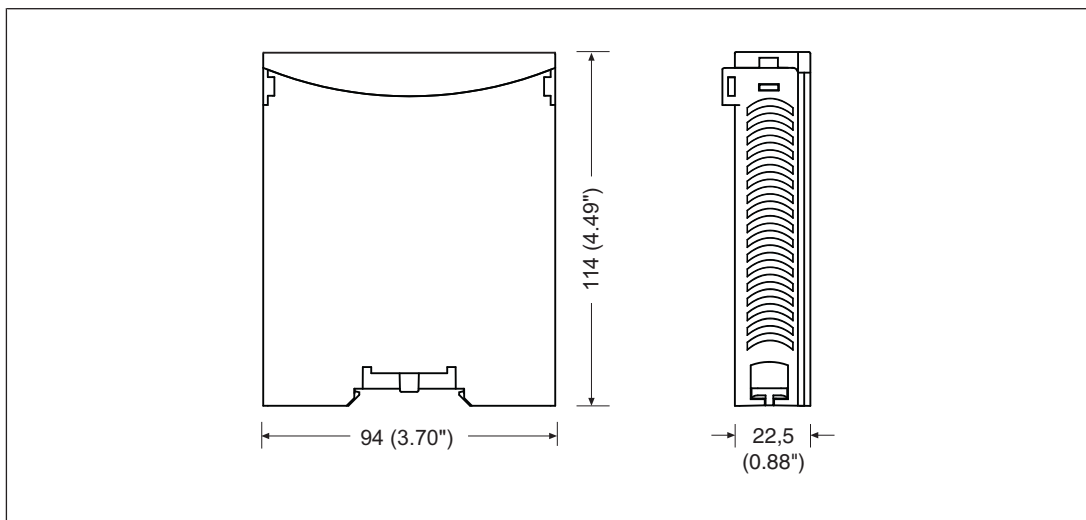


CAUTION!

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 Connecting the base unit and expansion modules

You can install a maximum of 1 PNOZ mc4p to the left of the base unit.

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

- ▶ Do **not** connect a terminator to the last expansion module on the left-hand side.
- ▶ Install the expansion module in the position in which it is configured in the PNOZmulti Configurator.
- ▶ A distance of at least 20 mm must be maintained between the fieldbus module PNOZ mc4p and any external heat sources.

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](#) [19] must be followed.
- ▶ Use copper wire that can withstand 75° C.
- ▶ The power supply must meet the regulations for extra low voltages with protective separation.



CAUTION!

Only connect and disconnect the expansion module when the supply voltage is switched off.

- ▶ 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.



NOTICE

Be sure to observe the requirements of the DeviceNet specification, volume I, release 2.0 during installation.

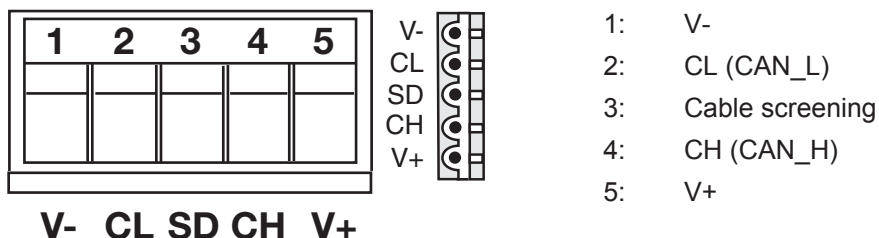
6.2 Connecting the supply voltage

Connect the supply voltage to the base unit:

- ▶ Terminal **24 V** and **A1 (+)**: + 24 VDC
- ▶ Terminal **0 V** and **A2 (-)**: 0 V

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 mc4p 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

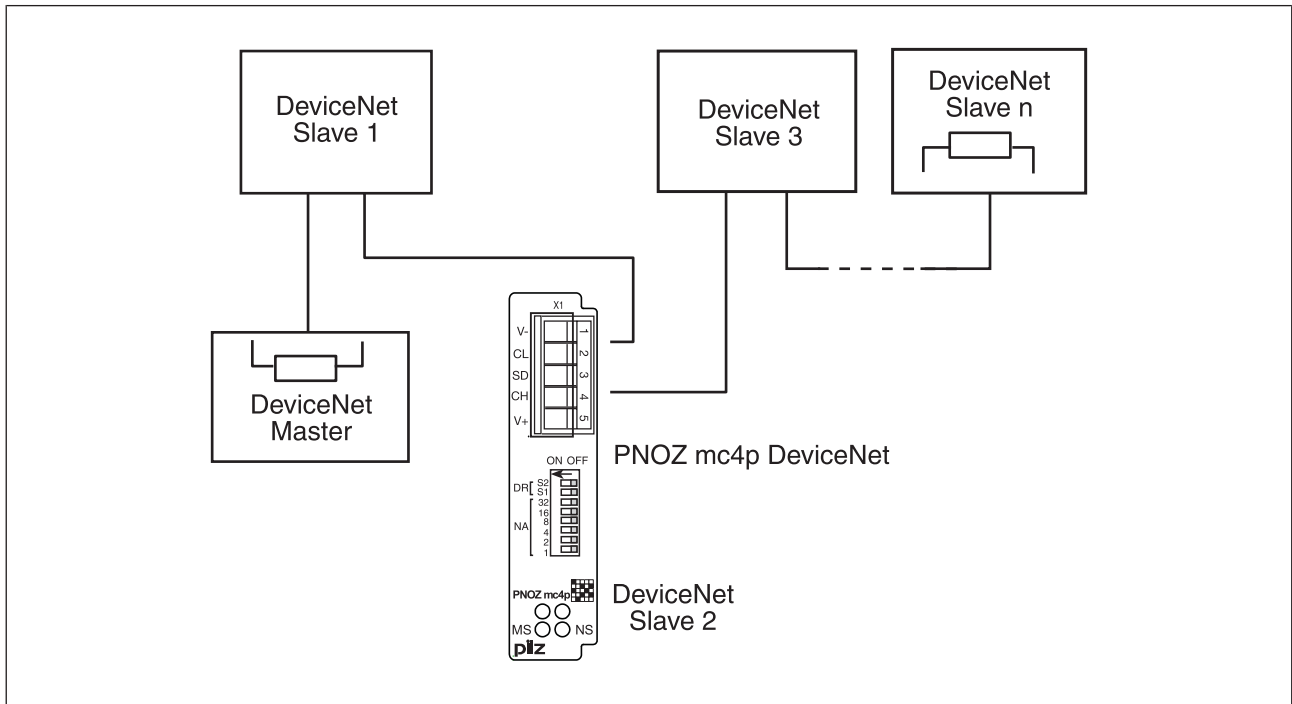
As soon as an additional expansion module has been connected to the system, the project must be amended using the PNOZmulti Configurator. Proceed as described in the operating instructions for the base unit.



NOTICE

For the commissioning and after every 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 safety system copies the configuration from the chip card.




The LEDs "POWER", "DIAG", "FAULT", "IFAULT" and "OFAULT" will light up on the base unit.











The expansion module PNOZ mc4p is configured and started automatically. The LEDs "MS" and "NS" display the status of the PNOZ mc4p on DeviceNet.

If the expansion module PNOZ mc4p does not receive a configuration from the base unit for a period of 30 s, the fieldbus module PNOZ mc4p 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 mc4p in "Link OK, Online, Connected" status
		Green	PNOZ mc4p in "Online, Not connected" status
		Red	PNOZ mc4p detects "Critical link failure"
		Red	Time monitoring ("Connection Timeout") has expired.
			No supply voltage or offline
MS		Green	PNOZ mc4p in "Device Operational" status
		Green	Configuration error; size of data does not correspond to the configuration
		Red	PNOZ mc4p detects non-recoverable error
		Red	PNOZ mc4p detects recoverable error ("Minor Fault").
			No supply voltage on PNOZ mc4p Remedy: Make sure that the fieldbus module PNOZ mc4p is connected to the base unit.

8 Technical Details

General	773711	773729
Approvals	CCC, CE, EAC (Eurasian), KCC, KOSHA, TÜV, cULus Listed	CCC, CE, EAC (Eurasian), KCC, KOSHA, TÜV, cULus Listed
Electrical data	773711	773729
Supply voltage		
for	Module supply	Module supply
internal	Via base unit	Via base unit
Voltage	5,0 V	5,0 V
Kind	DC	DC
Voltage tolerance	-2 %/+2 %	-2 %/+2 %
Power consumption	1,0 W	1,6 W
Status indicator	LED	LED
Fieldbus interface	773711	773729
Fieldbus interface	DeviceNet	DeviceNet
External supply (DC)	24 V	24 V
Power consumption	0,75 W	0,75 W
Device type	Slave	Slave
Station address	0 ... 63d	0 ... 63d
Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s	125 kBit/s, 250 kBit/s, 500 kBit/s
Connection	5-pin Combicon plug-in connector	5-pin Combicon plug-in connector
Galvanic isolation	yes	yes
Test voltage	500 V AC	500 V AC
Times	773711	773729
Supply interruption before de-energisation	20 ms	20 ms
Environmental data	773711	773729
Ambient temperature		
In accordance with the standard	EN 60068-2-14	EN 60068-2-14
Temperature range	0 - 60 °C	0 - 50 °C
Storage temperature		
In accordance with the standard	EN 60068-2-1/-2	EN 60068-2-1/-2
Temperature range	-25 - 70 °C	-25 - 70 °C
Climatic suitability		
In accordance with the standard	EN 60068-2-30, EN 60068-2-78	EN 60068-2-30, EN 60068-2-78
Humidity	93 % r. h. at 40 °C	93 % r. h. at 40 °C
Condensation during operation	Not permitted	Short-term
EMC	EN 61131-2	EN 61131-2
Vibration		
In accordance with the standard	EN 60068-2-6	EN 60068-2-6
Frequency	10,0 - 150,0 Hz	10,0 - 150,0 Hz
Acceleration	1g	1g

Environmental data	773711	773729
Shock stress		
In accordance with the standard	EN 60068-2-27	EN 60068-2-27
Acceleration	15g	15g
Duration	11 ms	11 ms
Max. operating height above sea level		
	2000 m	2000 m
Airgap creepage		
In accordance with the standard	EN 61131-2	EN 61131-2
Overvoltage category	III	III
Pollution degree	2	2
Rated insulation voltage		
	30 V	30 V
Protection type		
In accordance with the standard	EN 60529	EN 60529
Mounting area (e.g. control cabinet)	IP54	IP54
Housing	IP20	IP20
Terminals	IP20	IP20
Mechanical data	773711	773729
Mounting position		
	Horizontal on top hat rail	Horizontal on top hat rail
DIN rail		
Top hat rail	35 x 7,5 EN 50022	35 x 7,5 EN 50022
Recess width	27 mm	27 mm
Material		
Bottom	PPO UL 94 V0	PPO UL 94 V0
Front	ABS UL 94 V0	ABS UL 94 V0
Dimensions		
Height	94,0 mm	94,0 mm
Width	22,5 mm	22,5 mm
Depth	122,0 mm	122,0 mm
Weight		
	110 g	143 g

Where standards are undated, the 2010-05 latest editions shall apply.

9 Order reference

9.1 Product

Product type	Features	Order No.
PNOZ mc4p	Fieldbus module, DeviceNet	773 711
PNOZ mc4p coated version	Fieldbus module, DeviceNet, coated version	773 729

9.2 Accessories

Jumper

Product type	Features	Order No.
KOP-XE	Jumper	774 639

► Support

Technical support is available from Pilz round the clock.

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