PNOZ mc3p

Configurable Control System PNOZmulti

Operating Manual – No. 21010-EN-05

This document is a translation of the original document.

Suggestions and comments for improving this documentation will be gratefully received.

SD means Secure Digital.

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1.1 Validity of the documentation

This documentation is valid for the product **PNOZ mc3p**. 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.

1.1.1 Retaining the documentation

This documentation is intended for instruction and should be retained for future reference.

1.2 Overview of documentation

1 Introduction

The introduction is designed to familiarise you with the contents, structure and specific order of this manual.

2 Overview

This chapter provides information on the product's most important features.

3 Safety

This chapter must be read as it contains important information on intended use.

4 Function Description

This chapter describes the product's mode of operation.

5 Installation

This chapter explains how to install the product.

6 Commissioning

This chapter describes the product's commissioning and wiring.

7 Operation

This chapter describes how to operate the product and gives tips in the case of a fault.

8 Technical Details

This chapter contains the product's technical details and order reference.

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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 unit(s) 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.

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2.1 Unit structure

2.1.1 Scope of supply

- Expansion module **PNOZ mc3p**
- Jumper 774 639

2.1.2 Unit features

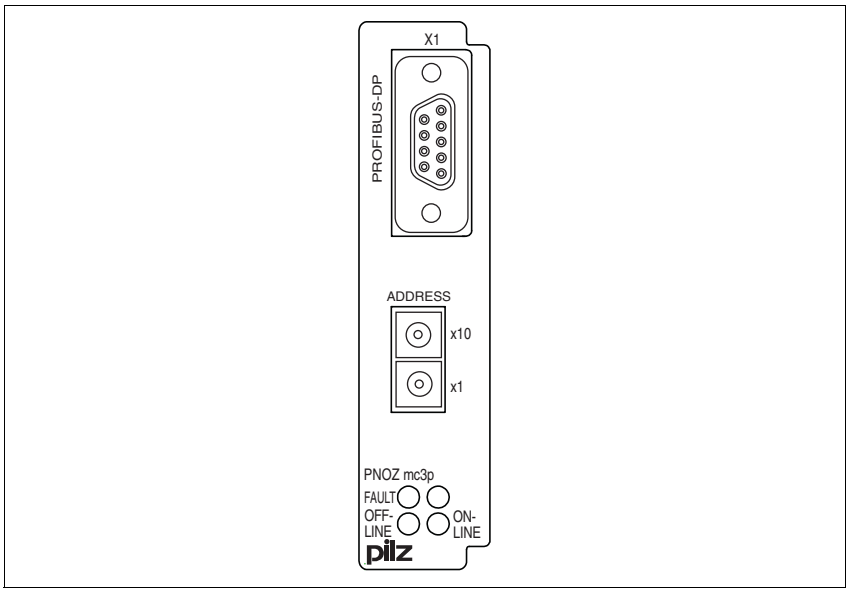
Using the product **PNOZ mc3p**:

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 PROFIBUS-DP
- Station addresses from 0 ... 99, selected via rotary switch
- Status indicators for communication with PROFIBUS-DP and for errors
- 24 virtual outputs on the control system PNOZmulti can be defined in the PNOZmulti Configurator for communication with the fieldbus **PROFIBUS DP**. 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 mc3p** can be connected to the base unit
- Please refer to the document "PNOZmulti System Expansion" for the PNOZmulti base units that can be connected

2.2 Front view



Key:

- X1:
  PROFIBUS-DP interface (female 9-pin D-Sub connector)
- LEDs:
  - FAULT
  - OFFLINE
  - ONLINE

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3.1 Intended use

The expansion module **PNOZ mc3p** is used for communication between the configurable control system PNOZmulti and PROFIBUS-DP. PROFIBUS-DP is designed for fast data exchange at field level. The expansion module **PNOZ mc3p** is a passive subscriber (Slave) of PROFIBUS-DP (DPV0). The basic functions of communication with PROFIBUS-DP conform to EN 50170. 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, PROFIBUS-DP can also be used for diagnostics 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 control system PNOZmulti (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected)

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

Intended use includes making the electrical installation EMC-compliant. The product is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

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 chapter entitled “Technical Details”)

3.1.1 System requirements

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

3.2 Safety regulations

3.2.1 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 safety guidelines given in this description
- Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.2.2 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.).

3.2.3 Disposal

- In safety-related applications, please comply with the mission time t_M in the safety-related characteristic data.
- When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

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3.2 Safety regulations

3.2.4 For your safety

The unit meets all 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. Information on the advanced functions can be found in the online help for the PNOZmulti Configurator and in the PNOZmulti technical catalogue. Only use these functions after you have read and understood the documentation. All necessary documentation can be found on the PNOZmulti Configurator CD.
- 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).

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4.1 Unit description

4.1.1 Operation

The virtual inputs and outputs that are to be transferred via PROFIBUS are selected and configured in the PNOZmulti Configurator. The base unit and the expansion module **PNOZ mc3p** are connected via a jumper. The expansion module **PNOZ mc3p** is also supplied with voltage via this jumper.

The station address is set via rotary switches. After the supply voltage is switched on or the PNOZmulti control system is reset, the expansion module **PNOZ mc3p** is configured and started automatically.

LEDs indicate the status of the expansion module on PROFIBUS.

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

4.1.2 Input and output data

The data is structured as follows:

- Input range
  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".

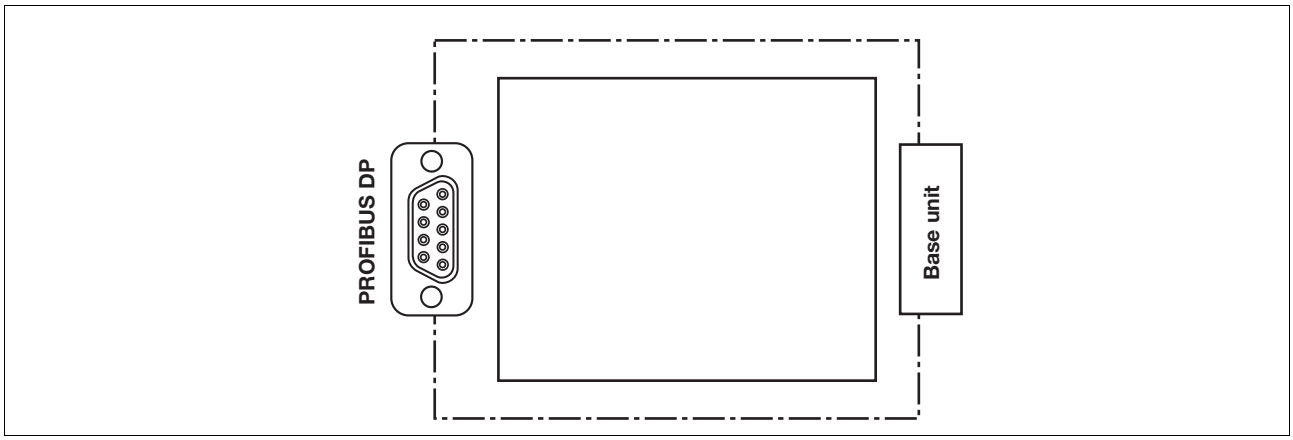
4.1 Unit description

4.1.3 Assigning the inputs/outputs in the PNOZmulti Configurator to the EtherCAT inputs/outputs

Virtual inputs on PNOZmulti Configurator	I0 ... I7	I8 ... I15	I16 ... I23
Input data **PROFIBUS DP**	Byte 0: Bit 0 ... 7	Byte 1: Bit 0 ... 7	Byte 2: Bit 0 ... 7
Virtual outputs on PNOZmulti Configurator	O0 ... O7	O8 ... O15	O16 ... O23
Output data **PROFIBUS DP**	Byte 0: Bit 0 ... 7	Byte 1: Bit 0 ... 7	Byte 2: Bit 0 ... 7

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

4.1.4 Block diagram



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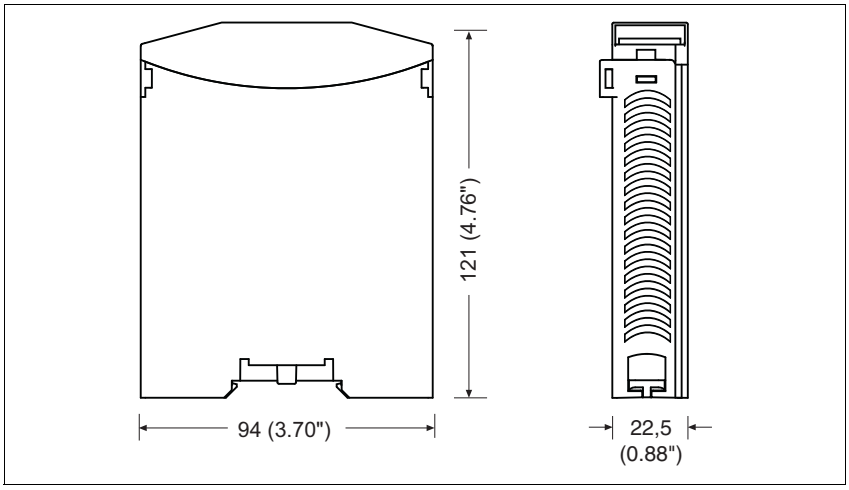
5.1 General installation guidelines

- 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.

5.1.1 Dimensions



5.2 Connecting the base unit and expansion modules

You can install a maximum of 1 **PNOZ mc3p** to the left of the base unit.

- 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.

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6.1 Wiring

6.1.1 General wiring guidelines

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

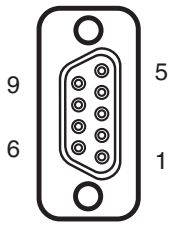
Note:
- Information given in the "Technical details" must be followed.
- Always connect the mounting rail to the protective earth via an earthing terminal. This will be used to dissipate hazardous voltages in the case of a fault.
- The power supply must meet the regulations for extra low voltages with safe separation.

6.1.2 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

6.1.3 PROFIBUS DP interface

It is possible to define which outputs on the control system will communicate with PROFIBUS-DP. The connection to PROFIBUS-DP is made via a female 9-pin D-Sub connector in accordance with the guidelines of the PROFIBUS User Group (PNO).



1: n.c.
2: n.c.
3: B (RxD/TxD-P)
4: CNTR-P
5: DGND
6: VP
7: n.c.
8: A (RxD/TxD-N)
9: n.c.

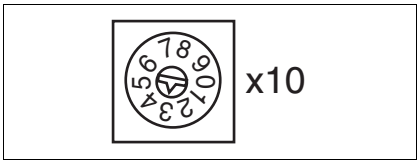
n.c. = not connected

Please note the following when connecting to PROFIBUS-DP:
- Only use metal plugs or metallised plastic plugs
- Twisted pair, screened cable must be used to connect the interfaces

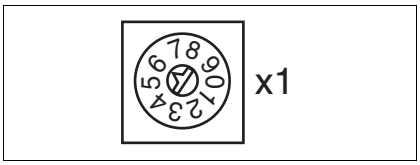
6.2 Preparing for operation

6.2.1 Setting the station address

The station address of the expansion module **PNOZ mc3p** is set between 0 ... 99 (decimal) via two rotary switches x1 and x10.



- On the upper rotary switch x10, use a small screwdriver to set the tens digit for the address (“3” in the example).



- On the lower rotary switch x1, set the ones digit for the address (“6” in the example).

Station address 36 is set in the diagrams as an example.

6.2.2 Download modified project to the control system PNOZmulti

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.

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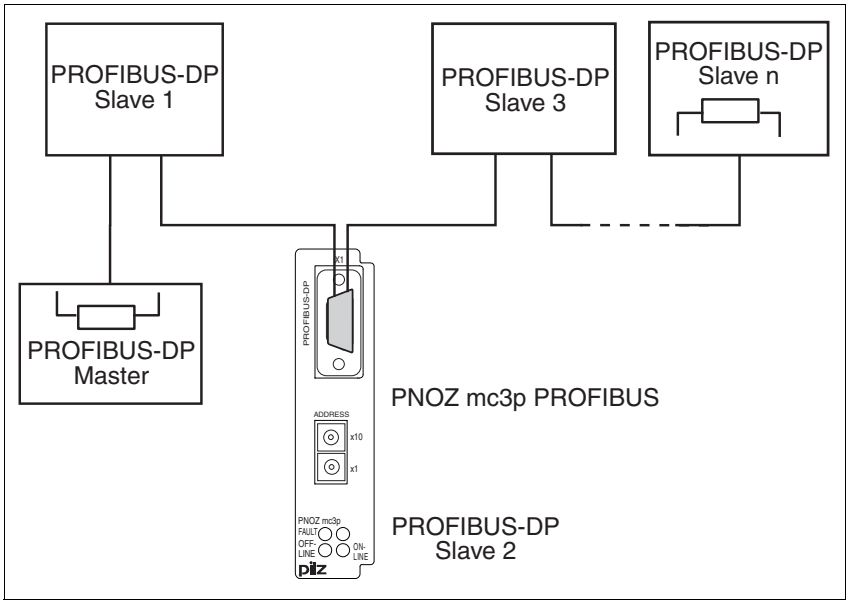
6.2 Preparing for operation

6.2.3 Connection example



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7.1 Messages

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" light up on the base unit.

The expansion module **PNOZ mc3p** is configured and started automatically. The "ONLINE" and "OFFLINE" LEDs indicate the status of the **PNOZ mc3p** on PROFIBUS-DP.

If the expansion module **PNOZ mc3p** does not receive a configuration from the base unit for a period of 30 s, the expansion module **PNOZ mc3p** connects to PROFIBUS-DP and "ONLINE" status is displayed on PROFIBUS-DP. The error message "External Error" is sent to the Master.

7.2 Display elements

Legend:

☼	LED on
◐	LED flashes
●	LED off

7.2.1 Display elements for device diagnostics

LED			Meaning
POWER	☼		Supply voltage is present
	●		Supply voltage is not present
ONLINE	☼		**PNOZ mc3p** online, data exchange is possible
	◐		Master has sent the telegram "Global Control Clear". Virtual input bits i0 ... i23 are set to "0"; expanded input bits i24 ... i127 are frozen.
	●		**PNOZ mc3p** not online
OFFLINE	☼		**PNOZ mc3p** offline, data exchange is not possible
	●		**PNOZ mc3p** not offline
FAULT	☼		Application Watchdog Timeout
	◐	1 Hz	Configuration error, length of input and/or output data during initialisation of the **PNOZ mc3p** does not match the configuration Remedy: Ensure that the right GSD file has been used.
	◐	2 Hz	Configuration error, length/contents of configuration data during initialisation of the **PNOZ mc3p** does not match the configuration Remedy: Ensure that the right GSD file has been used.
	◐	4 Hz	Error when initialising PROFIBUS-DP
	●		No error

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8.1 Technical Details

Technical details	
Electrical data	
Module's supply voltage **via base unit**	**5 V DC**
Voltage tolerance	**-2 %/+2 %**
Power consumption	**2.5 W**
Status display	**LED**
Times	
Supply interruption before de-energisation	**20 ms**
Fieldbus interface	
Fieldbus interface	**PROFIBUS DP**
Device type	**Slave**
Station address	**0 - 99d**
Transmission rate	**9.6 kBit/s - 12 MBit/s**
Connection	**Female 9-pin D-SUB connector**
Galvanic isolation	**yes**
Test voltage	**500 V AC**
Environmental data	
Ambient temperature	**0 - 60 °C**
Storage temperature	**-25 - 70 °C**
Climatic suitability in accordance with **EN 60068-2-30**, **EN 60068-2-78**	**93 % r. h. at 40 °C**
Condensation	**not permitted**
EMC	**EN 61131-2**
Vibration to **EN 60068-2-6**	
Frequency	**10 - 150 Hz**
Max. acceleration	**1g**
Airgap creepage in accordance with **EN 61131-2**	
Overvoltage category	**III**
Pollution degree	**2**
Rated insulation voltage	**30 V**
Shock stress	
EN 60068-2-27	**15g**
	11 ms
Mechanical data	
Protection type	
Mounting (e.g. cabinet)	**IP54**
Housing	**IP20**
Terminals	**IP20**
DIN rail	
Top hat rail	**35 x 7.5 EN 50022**
Recess width	**27 mm**
Housing material	
Housing	**PPO UL 94 V0**
Front	**ABS UL 94 V0**
Dimensions	
Height	**94.0 mm**
Width	**22.5 mm**
Depth	**119.0 mm**
Weight	**119 g**

The standards current on **2011-09** apply.

8.2 Order reference

Order reference

Product type	Features	Order no.
PNOZ mc3p	Fieldbus module, PROFIBUS-DP	773 732

Order reference: Terminator, jumper

Product type	Features	Order no.
PNOZmulti bus terminator	Terminator	779 110
KOP-XE	Jumper	774 639

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