



## PNOZ m ES CANopen

**PILZ**  
THE SPIRIT OF SAFETY

- ▶ Configurable, safe small controllers PNOZmulti 2

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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 m ES CANopen. 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 m ES CANopen
- ▶ Jumper

### 2.2 Unit features

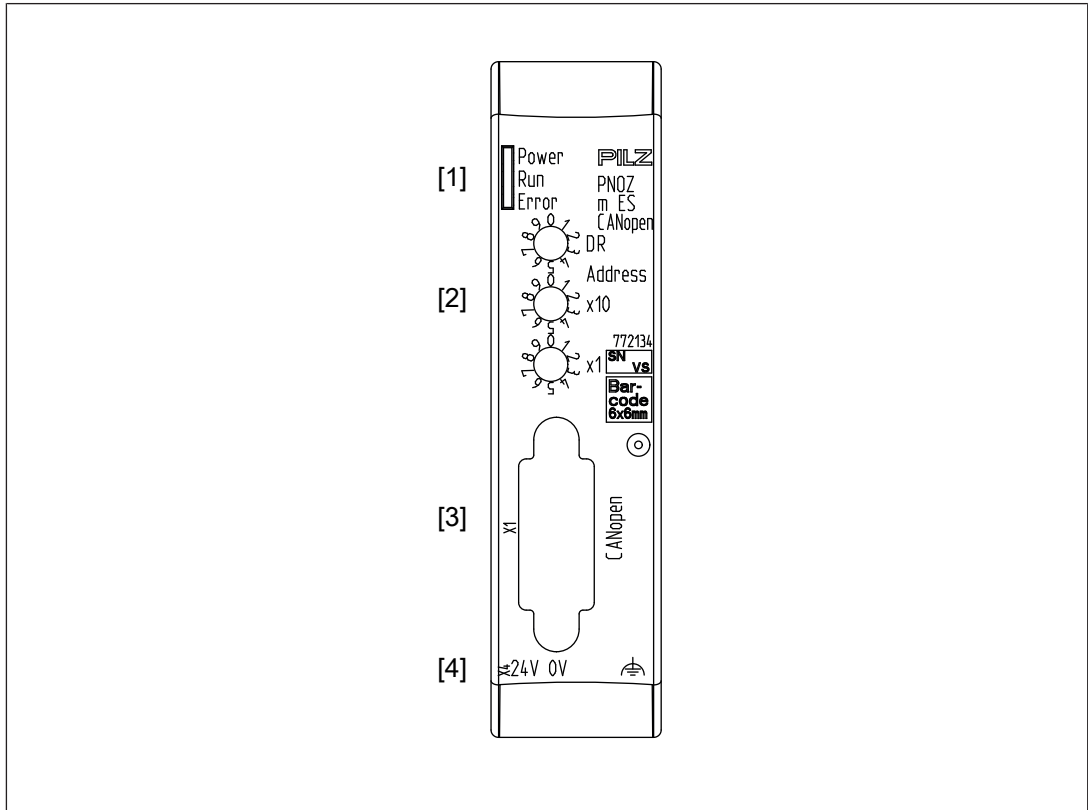
Application of the product PNOZ m ES CANopen:

Expansion module for connection to a base unit from the PNOZmulti 2 system.


The product has the following features:

- ▶ Can be configured in the PNOZmulti Configurator
- ▶ Connection for CANopen
- ▶ Station addresses from 0 ... 99, selected via rotary switch
- ▶ Transmission rate selected via rotary switch (1 MBit/s, 10 kbit/s, 125 kBit/s, 20 kbit/s, 250 kBit/s, 50 kbit/s, 500 kBit/s, 800 kbit/s)
- ▶ Status indicators for communication with CANopen and for errors
- ▶ 128 virtual inputs and outputs on the control system PNOZmulti 2 can be defined in the PNOZmulti Configurator for communication with the fieldbus CANopen.
- ▶ Max. 1 PNOZ m ES CANopen 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 2 that can be connected.

## 2.3 Front view



### Legend

- [1] LED
    - Power
    - Run
    - Error
  - [2] Rotary switch
    - DR = Transmission rate
    - X10 = Tens digit for the station address
    - X1 = Units digit for the station address
  - [3] X1: CANopen interface (male 9-pin D-Sub connector)
  - [4] X4: 0 V, 24 V:
    - Supply connections
-  Functional earth



## 3 Safety

### 3.1 Intended use

The fieldbus module PNOZ m ES CANopen is an expansion module of the configurable control system PNOZmulti 2. It is used for communication between the configurable control system PNOZmulti 2 and CANopen.

CANopen is designed for fast data exchange at field level. The expansion module PNOZ m ES CANopen is a passive CANopen subscriber (Slave). The basic communication functions with CANopen conform to the guidelines of the CANopen User Group CiA DS-301 V4.2.0. 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 m ES CANopen also has 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 2 (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected).

The configurable system PNOZmulti 2 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 module PNOZ m ES CANopen can be used as a non-safety-related component in accordance with the Lifts Directive 2014/33/EU.


It meets the environmental requirements for passenger and goods lifts in accordance with EN 81-1/2, EN 81-20, EN 81-22 and EN 81-50, as well as the requirements for escalators and moving walks in accordance with EN 115-1.

The safety controller should be installed in a protected environment that meets at least the requirements of pollution degree 2.

Example: Protected inside space or control cabinet with protection type IP54 and appropriate air conditioning.

#### 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](#)  21]).

**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 CANopen are selected and configured in the PNOZmulti Configurator. The base unit and the expansion module PNOZ m ES CANopen are connected via a jumper. The station address and the transmission rate are set using rotary switches. After the supply voltage is switched on or the control system PNOZmulti 2 is reset, the expansion module PNOZ m ES CANopen is configured and started automatically.

LEDs indicate the status of the expansion module on CANopen.

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

### 4.2 Data access

The data is structured as follows:

▶ Virtual data

- Input area PNOZ m ES CANopen

The values for the inputs are set as an output in the Master and transferred to the PNOZmulti 2.

- Output range PNOZ m ES CANopen

The outputs are configured in the PNOZmulti Configurator and transferred to the Master.

▶ Status of LEDs:

LED status 1 Output Byte

The LED status of the base unit can be requested directly as follows

- Bit 0 = 1: LED OFAULT is lit or flashes
- Bit 1 = 1: LED IFAULT is lit or flashes
- Bit 2 = 1: LED FAULT is lit or flashes
- Bit 3 = 1: LED DIAG is lit or flashes
- Bit 4 = 1: LED RUN FS is lit
- Bit 5: Reserved
- Bit 6 = 1: LED RUN ST is lit (not for PNOZ m B0)
- Bit 7: Reserved

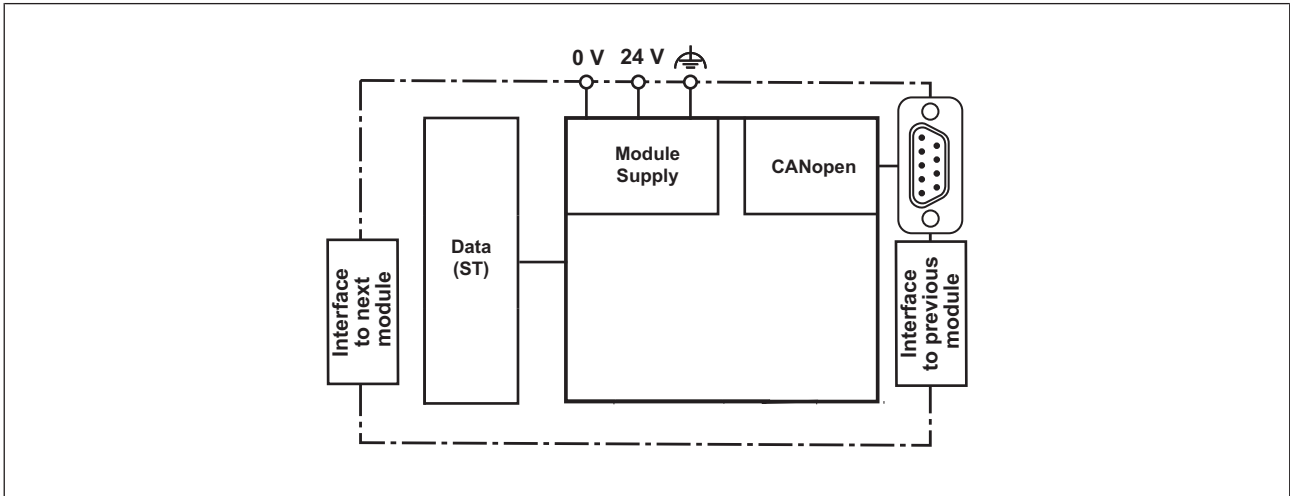
▶ Data exchange is displayed in Bit 5.

▶ Polling the payload data: 2 Bytes with the table number and segment number are sent by the Master for access to the payload data table (15 Bytes are returned to the Master).

The document "Communication Interfaces" contains detailed information

- ▶ on data exchange (tables, segments) in the section entitled "Fieldbus modules",
- ▶ on the virtual data in chapter "Service Data Objects (SDOs)" for PNOZ m ES CANopen.

### 4.3 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 upward and downward. Other mounting positions could damage the safety system.
- ▶ Use the locking elements 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).
- ▶ Open the locking slide before lifting the unit 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 of the PNOZmulti units in the control cabinet must not exceed the figure stated in the technical details. Air conditioning may otherwise be required.

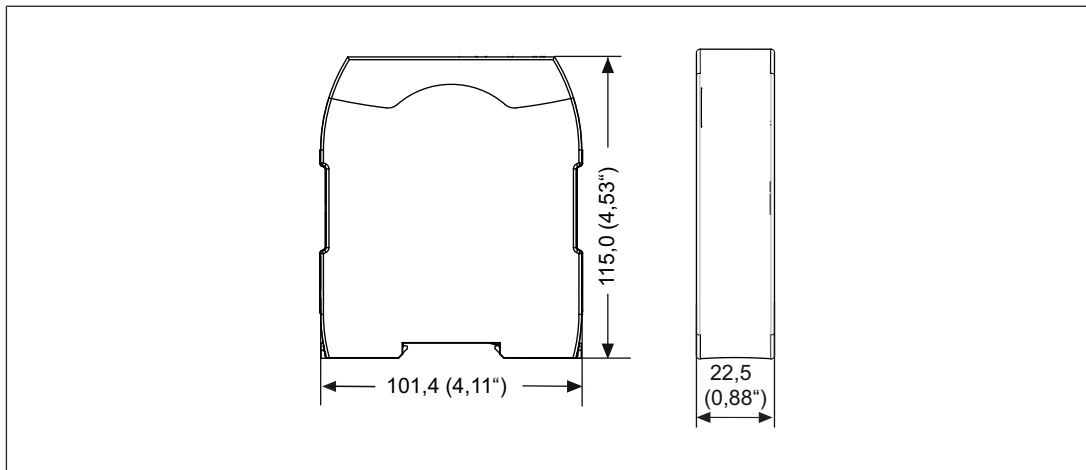


#### NOTICE

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 Wiring

#### 6.1.1 General wiring guidelines

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

Please note:

- ▶ Information given in the [Technical details \[21\]](#) 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 functional earth, when the mounting rail is **not** connected to the functional earth.
- ▶ 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).



#### CAUTION!

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



#### NOTICE

When installing, you must refer to the guidelines of the CANopenUser Group.

#### 6.1.2 Connecting the supply voltage

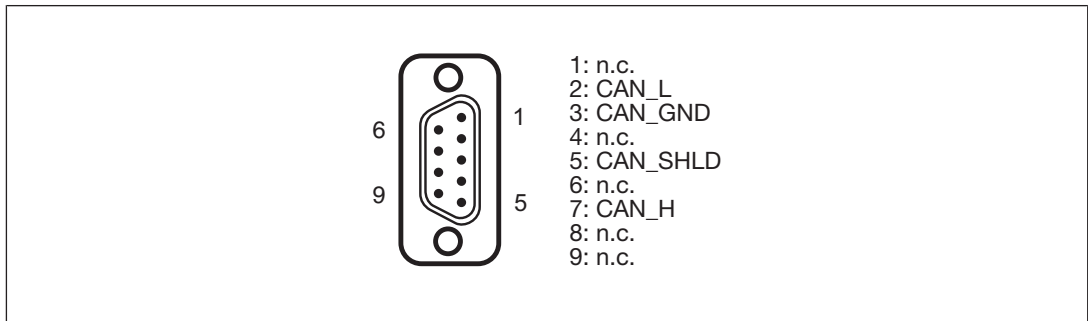
Connect the supply voltage to the fieldbus module:

- ▶ **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



### 6.1.3 CANopen interface

The connection to CANopen is made via a male 9-pin D-Sub connector.



n.c. = not connected

Please note the following when connecting to CANopen:

- ▶ Only use metal plugs or metallised plastic plugs
- ▶ Twisted pair, screened cable must be used to connect the interfaces

#### Termination CANopen

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

### 6.2 Setting the transmission rate



- ▶ On the upper rotary switch DR, use a small screwdriver to set the transmission rate (in the example, "3" corresponds to 50 kBit/s).

Switch setting	0	1	2	3	4	5	6	7	8	9
Transmission rate	-	10 kBit/s	20 kBit/s	50 kBit/s	125 kBit/s	250 kBit/s	500 kBit/s	800 kBit/s	1 MBit/s	-

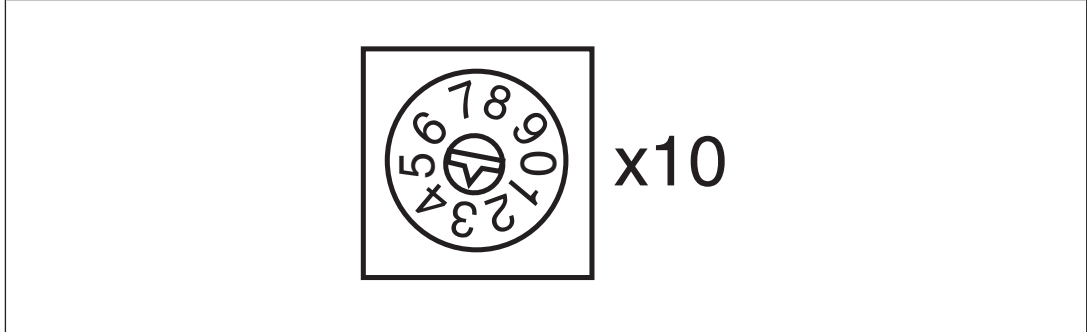


#### INFORMATION

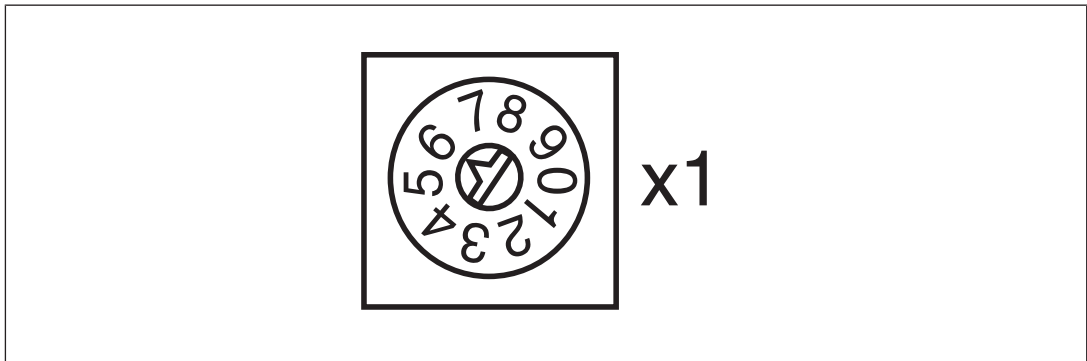
The transmission rate cannot be changed during operation.

### 6.3 Setting the station address

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



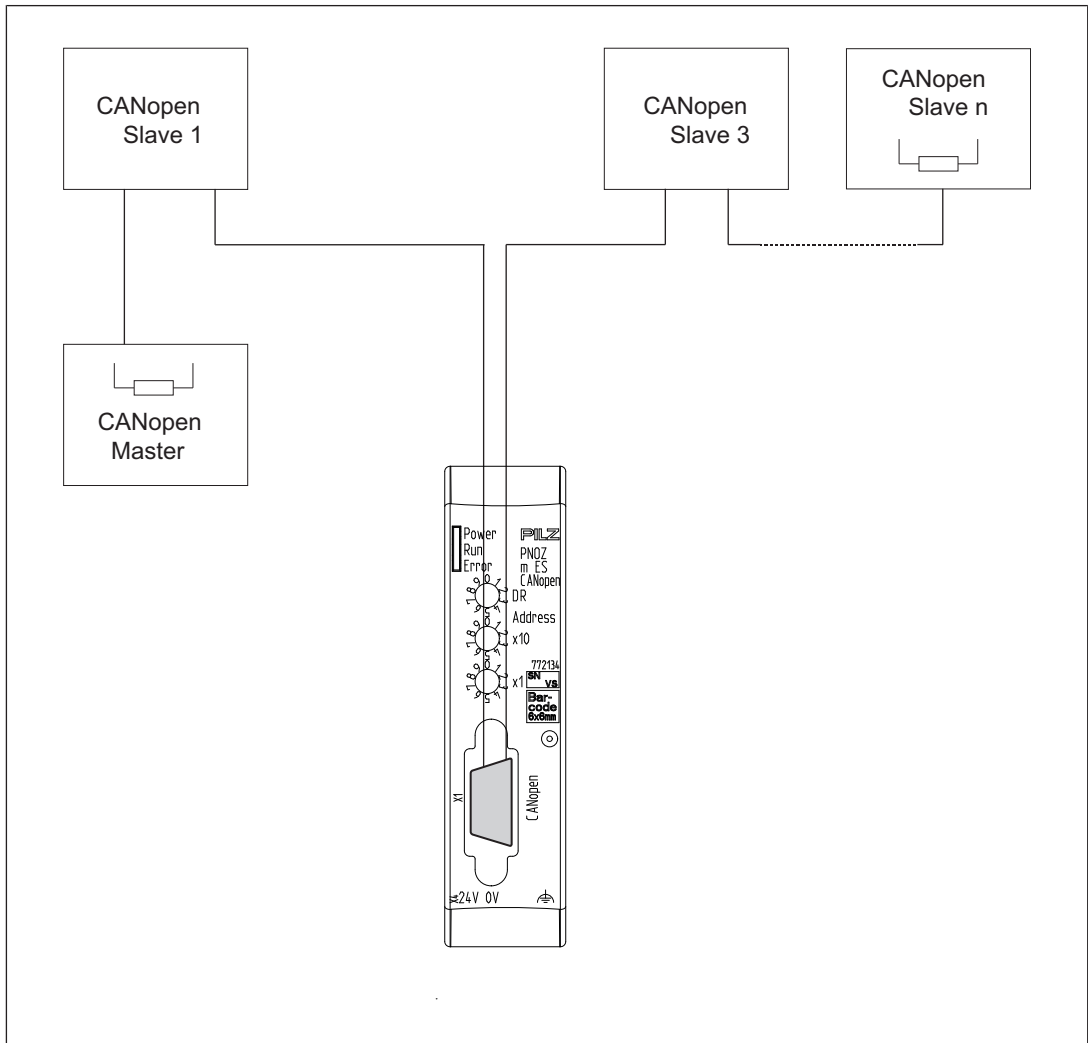
- ▶ On the middle rotary switch x10, use a small screwdriver to set the tens digit for the address ("3" in the example).



- ▶ 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.

## 6.4 Connection example



## 6.5 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.

## 7 Operation

### 7.1 Messages

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

The expansion module PNOZ m ES CANopen is configured and started automatically. The LEDs "RUN" and "ERR" display the status of the PNOZ m ES CANopen on CANopen.

If the expansion module PNOZ m ES CANopen does not receive a configuration from the base unit for a period of 30 s, the expansion module PNOZ m ES CANopen connects to CANopen and "RUN" status is displayed on CANopen. The error message "External Error" is sent to the Master.

#### 7.1.1 Display elements for device diagnostics

##### Legend

- LED off
- ◐ LED flashes
- ◐-1 LED flashes once
- ◐-2 LED flashes twice
- ◐-3 LED flashes three times
- ☀ LED on

LED		Meaning
PWR	☀	Supply voltage is present.
	●	Supply voltage is not present
RUN	☀	PNOZ m ES CANopen In "Operational" status
	◐-1	PNOZ m ES CANopen In "Stopped" status
	◐	PNOZ m ES CANopen In "Pre-Operational" status
	●	No supply voltage, CAN connection or module error detected
ERR	☀	CAN controller is in "Bus off" status
	◐-1	Error threshold value has been reached, the CAN controller has received too many error telegrams
	◐-2	Monitoring error, activation of master-slave monitoring error, e.g. heartbeat monitoring
	◐-3	Error in "Synchronisation" operating status, a synchronisation telegram, e.g. with simultaneous writing on several devices, did not occur within the configured time
	●	No error

## 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>
Max. continuous current that the external power supply must provide	<b>35 mA</b>
Output of external power supply (DC)	<b>0,9 W</b>
Potential isolation	<b>yes</b>
Supply voltage	
for	<b>Module supply</b>
internal	<b>Via base unit</b>
Voltage	<b>3,3 V</b>
Kind	<b>DC</b>
Current consumption	<b>60 mA</b>
Power consumption	<b>0,2 W</b>
Max. power dissipation of module	<b>1,5 W</b>
Status indicator	<b>LED</b>
<b>Fieldbus interface</b>	
Fieldbus interface	<b>CANopen</b>
Device type	<b>Slave</b>
Log	<b>CiA 301 V4.2.0</b>
Station address	<b>0 - 99d</b>
Transmission rates	<b>1 MBit/s, 10 kbit/s, 125 kBit/s, 20 kbit/s, 250 kBit/s, 50 kbit/s, 500 kBit/s, 800 kbit/s</b>
Connection	<b>9-pin D-Sub male connector</b>
Galvanic isolation	<b>yes</b>
Test voltage	<b>500 V AC</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>
Condensation during operation	<b>Not permitted</b>
Max. operating height above sea level	<b>2000 m</b>

<b>Environmental data</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>
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>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>101,4 mm</b>
Width	<b>22,5 mm</b>
Depth	<b>115 mm</b>
Weight	<b>95 g</b>

Where standards are undated, the 2012-10 latest editions shall apply.

## 9 Order reference

### 9.1 Product

Product type	Features	Order no.
PNOZ m ES CAN-open	Configurable safe small controllers PNOZmulti 2, fieldbus module, CANopen	772134

### 9.2 Accessories

#### 9.2.1 Terminals

Product type	Features	Order no.
Spring terminals PNOZ, 1 pc.	Spring-loaded terminals, for fieldbus modules on PNOZ mm0.xp, 1 set.	783542
Spring terminals PNOZ mmcxp, 10 pcs.	Spring-loaded terminals, for fieldbus modules on PNOZ mm0.xp, 10 sets.	783543
Screw terminals PNOZ mmcxp, 1 pc.	Plug-in screw terminal, fieldbus modules on PNOZ mm0.xp, 1 set.	793542
Screw terminals PNOZ mmcxp, 10 pcs.	Plug-in screw terminal, fieldbus modules on PNOZ mm0.xp, 10 sets.	793543

#### 9.2.2 Connector plug

Product type	Features	Order no.
PNOZ mm0.xp connector left (10 pcs)	Connector plug to connect the modules to the left-hand side of the PNOZmulti base unit, yellow/black (10 pieces).	779260

# ► Support

Technical support is available from Pilz round the clock.

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