PNOZ m ES CANopen

Configurable Control System PNOZmulti

Operating Manual-1002699-EN-04

This document is a translation of the original document.

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 Retaining the documentation

This documentation is intended for instruction and 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

2.2 Unit features

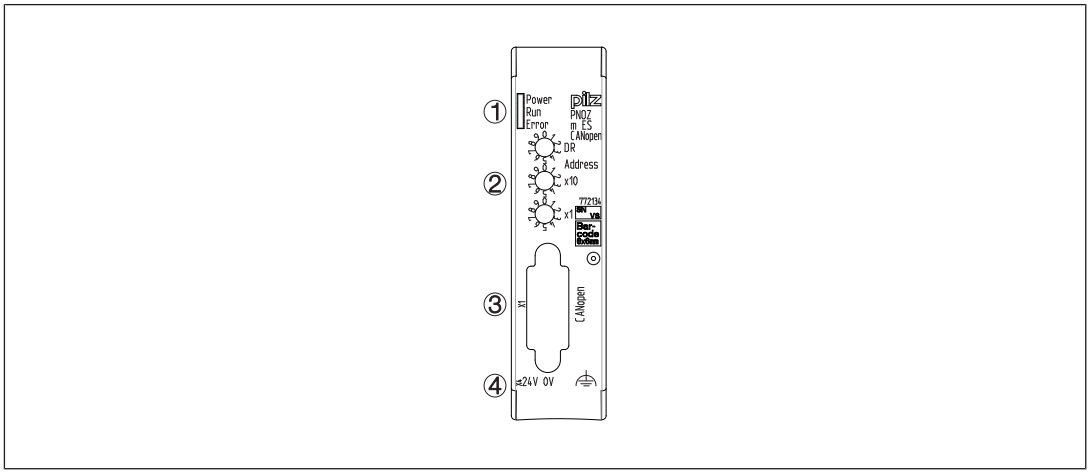
Using the product PNOZ m ES CANopen:

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

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 reference)
- 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 control system PNOZmulti 2 (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected).

The configurable control system PNOZmulti 2 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”)

3.2 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.

3.3 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

- 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).

3.3.4 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).

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 area PNOZ m ES CANopen

    The outputs are configured in the PNOZmulti Configurator and transferred to the Master.
- Status of LEDs:
  - Bits 0 … 4: Status of LEDs on the PNOZmulti 2

    Bit 0: OFAULT

    Bit 1: IFAULT

    Bit 2: FAULT

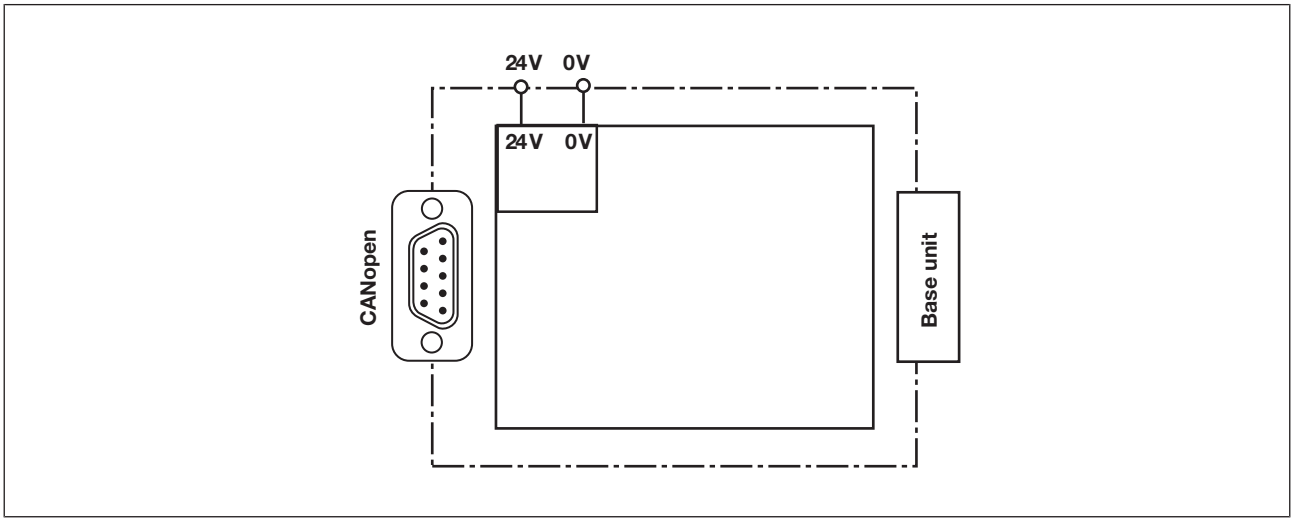
    Bit 3: DIAG

    Bit 4: RUN
- 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",
- and on virtual data in the section entitled "Object directory (Manufacturer Specific Profile Area) for PNOZ m ES CANopen .

4.3 Block diagram



5 Installation

5.1 General installation guidelines

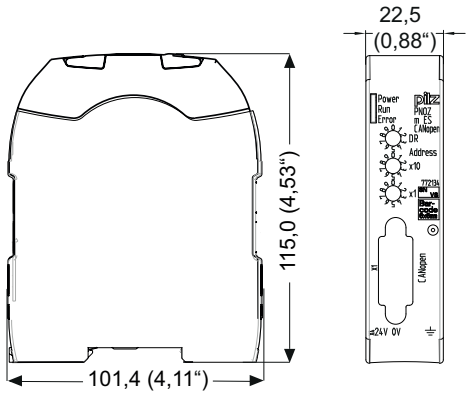
- The unit should be installed in a single mounting area with a protection type of at least IP54.
- Fit the safety system to a horizontal mounting rail. The venting slots must face upwards and downwards. Other mounting positions could destroy the safety system.
- Use the locking slide on the rear of 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, otherwise air conditioning will 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.

5.1.1 Dimensions



5.2 Connecting the base unit and expansion modules

You can install a maximum of 1 PNOZ m ES CANopen 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.

- Install the expansion module in the position in which it is configured in the PNOZmulti Configurator.
- Connect the base unit and expansion modules using the yellow/black jumper.
- Connect the black/yellow terminator to the expansion module.

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" must be followed.
- Use copper wire that can withstand 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 separation.

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 theCANopen -user group.

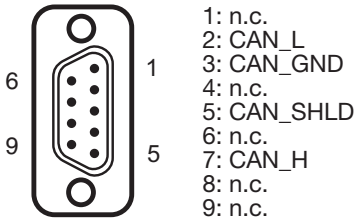
6.1.2 Connecting the supply voltage

Connect the supply voltage to the fieldbus module:

- Terminal **24 V**: + 24 V DC
- Terminal **0 V**: 0 V

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:

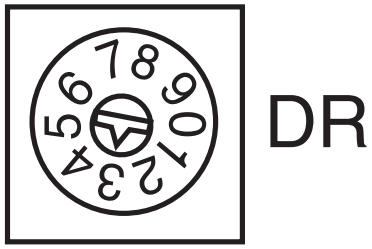
- Only use metal plugs or metallised plastic plugs
- Twisted pair, screened cable must be used to connect the interfaces

CANopen termination

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

6.2 Preparing for operation

6.2.1 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).

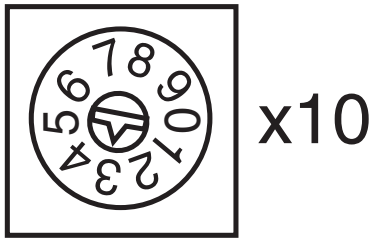
Switch setting	0	1	2	3	4	5	6	7	8	9
Transmission rate	-	10 kBit/s	20 kBit/s	50 kBit/s	125 kBit/s	250 kBit/s	500 kBit/s	800 kBit/s	1 MBit/s	-

INFORMATION

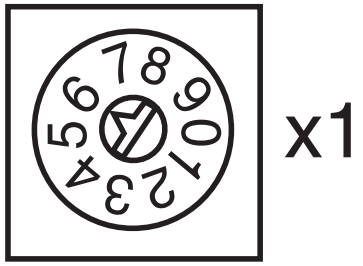
The transmission rate cannot be changed during operation.

6.2.2 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.

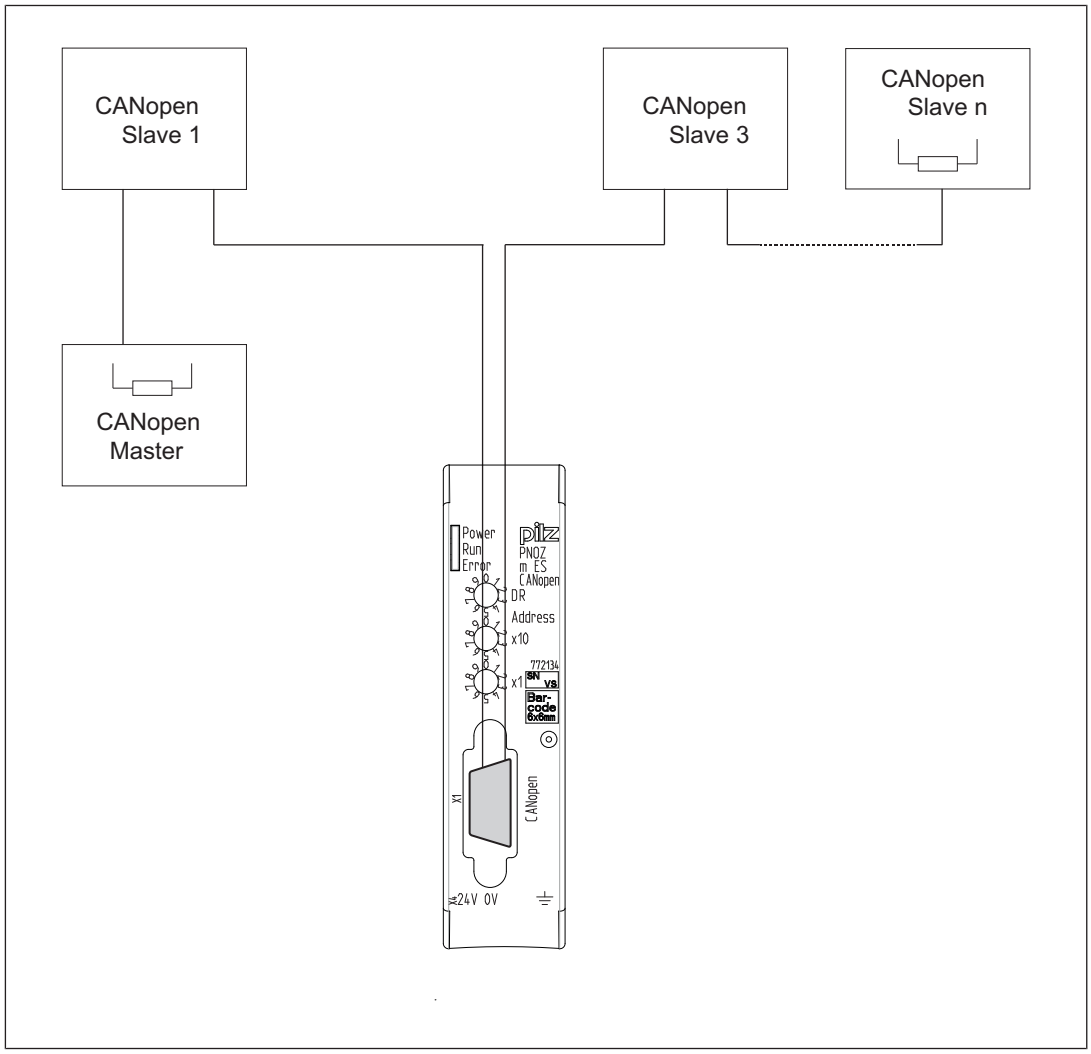
6.2.3 Download modified project to the PNOZmulti safety system

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.

6.2.4 Connection example



7 Operation

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 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

●	LED off
◐☼	LED flashes
◐☼1	LED flashes once
◐☼2	LED flashes twice
◐☼3	LED flashes three times
☼	LED on

LED		Key
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 or module error detected

LED		Key
ERR		CAN controller is in "Bus off" status
		Error threshold value has been reached, the CAN controller has received too many error telegrams
		Monitoring error, activation of master-slave monitoring error, e.g. heartbeat monitoring
		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

General	**772134**
Approvals	**CCC, CE, EAC (Eurasian), cULus Listed**
Electrical data	**772134**
Supply voltage	
for	**Module supply**
Voltage	**24 V**
Kind	**DC**
Voltage tolerance	**-20 %/+25 %**
Supply voltage	
Current consumption	**35 mA**
Power consumption	**0,9 W**
Max. power dissipation of module	**1,50 W**
Status indicator	**LED**
Fieldbus interface	**772134**
Fieldbus interface	**CANopen**
Unit type	**Slave**
Protocol	**CiA 301 V4.2.0**
Station address	**0 - 99d**
Transmission rates	**1 MBit/s, 10 kbit/s, 125 kBit/s, 20 kbit/s, 250 kBit/s, 50 kbit/s, 500 kBit/s, 800 kbit/s**
Connection	**9-pin male D-Sub connector**
Galvanic isolation	**Yes**
Test voltage	**500 V AC**
Environmental data	**772134**
Ambient temperature	
In accordance with the standard	**EN 60068-2-14**
Temperature range	**0 - 60 °C**
Forced convection in control cabinet off	**55 °C**
Storage temperature	
In accordance with the standard	**EN 60068-2-1/-2**
Temperature range	**-25 - 70 °C**
Climatic suitability	
In accordance with the standard	**EN 60068-2-30, EN 60068-2-78**
Condensation during operation	**Not permitted**
EMC	**EN 61131-2**
Vibration	
In accordance with the standard	**EN 60068-2-6**
Frequency	**10,0 - 150,0 Hz**
Acceleration	**1g**
Shock stress	
In accordance with the standard	**EN 60068-2-27**
Acceleration	**15g**
Duration	**11 ms**
Max. operating height above sea level	**2000 m**

Environmental data	772134
Airgap creepage	
In accordance with the standard	**EN 61131-2**
Overvoltage category	**II**
Pollution degree	**2**
Rated insulation voltage	**30 V**
Protection type	
In accordance with the standard	**EN 60529**
Mounting area (e.g. control cabinet)	**IP54**
Housing	**IP20**
Terminals	**IP20**
Mechanical data	**772134**
Mounting position	**Horizontal on top hat rail**
DIN rail	
Top hat rail	**35 x 7,5 EN 50022**
Recess width	**27 mm**
Material	
Bottom	**PC**
Front	**PC**
Top	**PC**
Conductor cross section with screw terminals	
1 core flexible	**0,25 - 2,50 mm², 24 - 12 AWG**
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	**0,20 - 1,50 mm², 24 - 16 AWG**
Torque setting with screw terminals	**0,50 Nm**
Connection type	**Spring-loaded terminal, screw terminal**
Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector	**0,20 - 2,50 mm², 24 - 12 AWG**
Spring-loaded terminals: Terminal points per connection	**2**
Stripping length	**9 mm**
Dimensions	
Height	**101,4 mm**
Width	**22,5 mm**
Depth	**115,0 mm**
Weight	**95 g**

The standards current on 2012-10 apply.

9 Order reference

9.1 Module

Product type	Features	Order no.
PNOZ m ES CANopen	Fieldbus module, CANopen for PNOZ m Bx	772 134

9.2 Accessories

Terminator, jumper

Product type	Features	Order no.
PNOZ mm0.xp connector left	Jumper yellow/black to connect the modules, 1 piece	779 260

Connection terminals

Product type	Features	Order no.
Spring terminals PNOZ mmcxp 1 pc.	Spring-loaded terminals, 1 pieces	783 542
Spring terminals PNOZ mmcxp 10 pcs.	Spring-loaded terminals, 10 pieces	783 543
Screw terminals PNOZ mmcxp 1 pc.	Screw terminals, 1 piece	793 542
Screw terminals PNOZ mmcxp 10 pcs.	Screw terminals, 10 pieces	793 543

Support

Technical support is available from Pilz round the clock.

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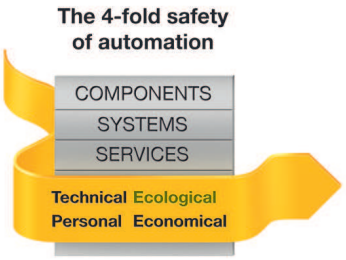

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