



PNOZ m ES Profinet

PILZ
THE SPIRIT OF SAFETY

- ▶ Configurable, safe small controllers PNOZmulti 2

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Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

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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 Profinet. 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.

1.4 **Third-party manufacturer licence information**

This product includes Open Source software with various licenses.

Further information is available in the document "Third-party manufacturer licence information PNOZ m ES Profinet" (document number 1006138) at www.pilz.com.

2 Overview

2.1 Scope of supply

- ▶ Expansion module PNOZ m ES Profinet
- ▶ Jumper

2.2 Unit features

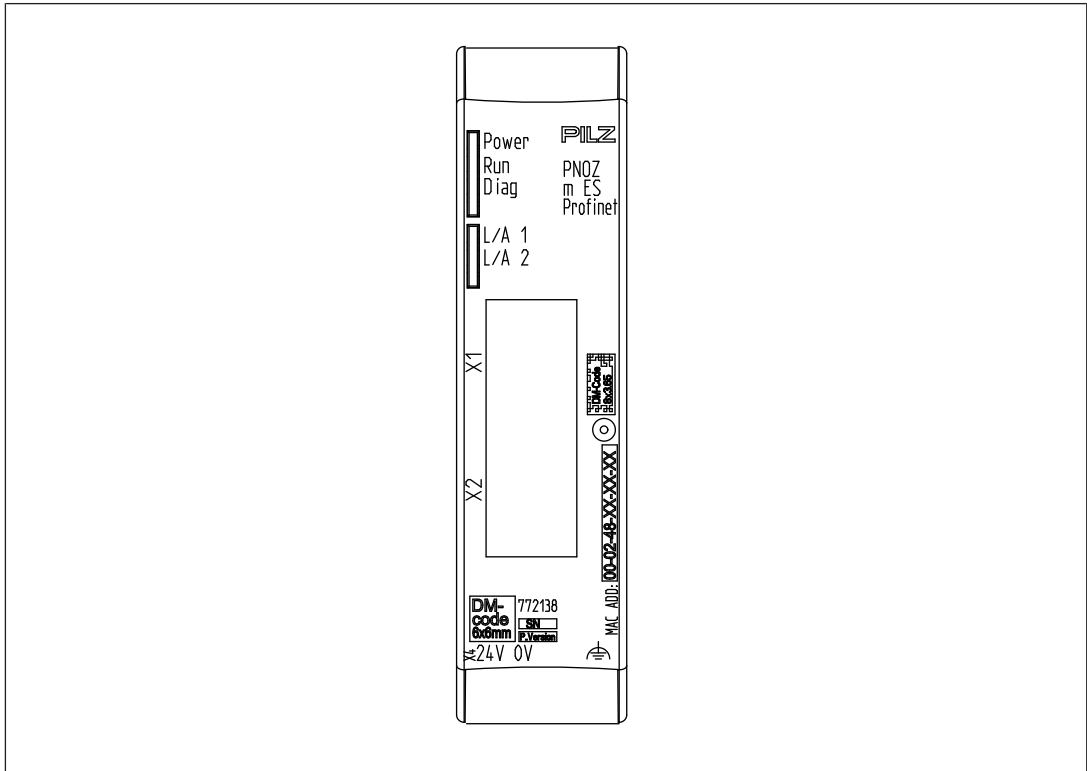
Application of the product PNOZ m ES Profinet:

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 PROFINET
- ▶ Status, diagnostic and error displays for communication with PROFINET
- ▶ 128 virtual inputs and outputs on the control system PNOZmulti 2 can be defined in the PNOZmulti Configurator for communication with the fieldbus PROFINET.
- ▶ Transmission rate 100 MBit/s (100BaseTX), full and half duplex
- ▶ Max. 1 PNOZ m ES Profinet can be connected to the base unit
- ▶ Two RJ45 ports
- ▶ PNOZ m ES Profinet <V2.0: Profinet IO device V2.2 functions in accordance with Conformance Class C
PNOZ m ES Profinet from V2.0: Profinet IO device V2.3 functions in accordance with Conformance Class C
- ▶ Supported functions:
 - RT
 - IRT
 - MRP
 - LLDP
 - I&M 0-4
- ▶ 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:

- ▶ X1, X2: Profinet interfaces
- ▶ 0 V, 24 V: Supply connections
- ▶ : Functional earth
- ▶ LED:
 - Power
 - Run
 - Diag
 - L/A 1
 - L/A 2

3 Safety

3.1 Intended use

The expansion module PNOZ m ES Profinet is used for communication between the configurable control system PNOZmulti 2 with the PROFINET.

PROFINET is designed for fast data exchange at field level. The expansion module PNOZ m ES Profinet is a passive subscriber (IO device) of the PROFINET. The basic communication functions with the PROFINET conform to the System Description published by the PROFIBUS & PROFINET International (PI) User Group. The central controller (IO controller) reads input information from the IO devices and writes output information to the IO devices as part of each cycle. As well as the cyclical transfer of payload data PROFINET also has diagnostic and commissioning functions. Data traffic is monitored on the IO controller and IO device 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 Profinet 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](#)  20).

**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 PROFINET are selected and configured in the PNOZmulti Configurator. The base unit and the expansion module PNOZ m ES Profinet are connected via a jumper.

After the supply voltage is switched on or the PNOZmulti 2 is reset, the expansion module PNOZ m ES Profinet is configured and started automatically.

LEDs indicate the status of the fieldbus module PROFINET.

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



INFORMATION

The GSDML file is available on the Internet at www.pilz.de.

4.2 Data access

The data is structured as follows:

▶ Virtual data

- Input area PNOZ m ES Profinet

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

- Output area PNOZ m ES Profinet

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).

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 PROFINET inputs/outputs

Virtual inputs and outputs can be requested or set directly via the following modules. Each element can be selected individually in the master control system, e.g. virtual inputs i0-31. The data width is also established this way.

Input data

The Master writes to the virtual inputs of the PNOZmulti 2.

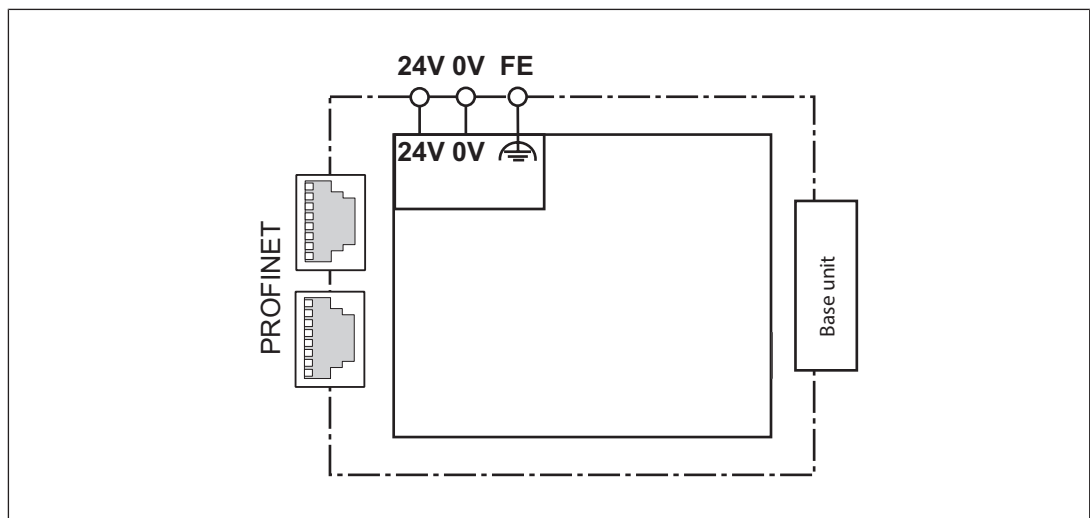
Description	Input data from PNOZmulti 2
Virtual inputs i0 – i31	4 Input Bytes
Virtual inputs i32 – i63	4 Input Bytes
Virtual inputs i64 – i95	4 Input Bytes
Virtual inputs i96 – i127	4 Input Bytes

Output data

The Master reads the virtual outputs of the PNOZmulti 2.

Description	Output data from PNOZmulti 2
Virtual outputs o0 – o31	4 Output Bytes
Virtual outputs o32 – o63	4 Output Bytes
Virtual outputs o64 – o95	4 Output Bytes
Virtual outputs o96 – o127	4 Output Bytes

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 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.

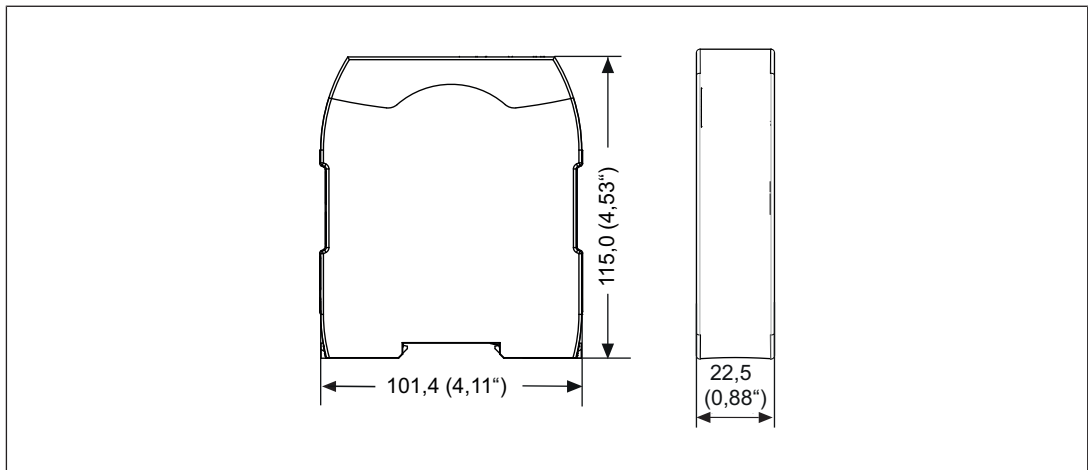


NOTICE

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 General wiring guidelines


The wiring is defined in the circuit diagram of the PNOZmulti Configurator. It is possible to define which inputs and outputs on the safety system will communicate with PROFINET.

Please note:

- ▶ Information given in the "[Technical details \[📖 20\]](#)" must be followed.
- ▶ Use copper wiring with a temperature stability of 75 °C.

Please note the following when connecting to PROFINET:

- ▶ The following minimum requirements of the connection cable and connector must be met:
 - Only use standard industrial Ethernet cable and connectors.
 - Only use double-shielded twisted pair cable and shielded RJ45 connectors (industrial connectors).
 - 100BaseTX cable in accordance with the Ethernet standard (min. Category 5)
- ▶ Measures to protect against interference:

Ensure the requirements for the industrial use of PROFINET are met, as stated in the Installation Manual published by the User Group.
- ▶ 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

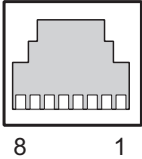
When installing, you must refer to the guidelines published by the RPOFIBUS & PROFINET International (PI) User Group.

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 Interface assignment

RJ45 socket 8-pin	PIN	Standard
	1	TD+ (Transmit+)
	2	TD- (Transmit-)
	3	RD+ (Receive+)
	4	n.c.
	5	n.c.
	6	RD- (Receive-)
	7	n.c.
	8	n.c.

n.c.: Not connected

6.4 Preparing for operation

6.4.1 Download modified project to the PNOZmulti 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.

6.4.2 Set IP address

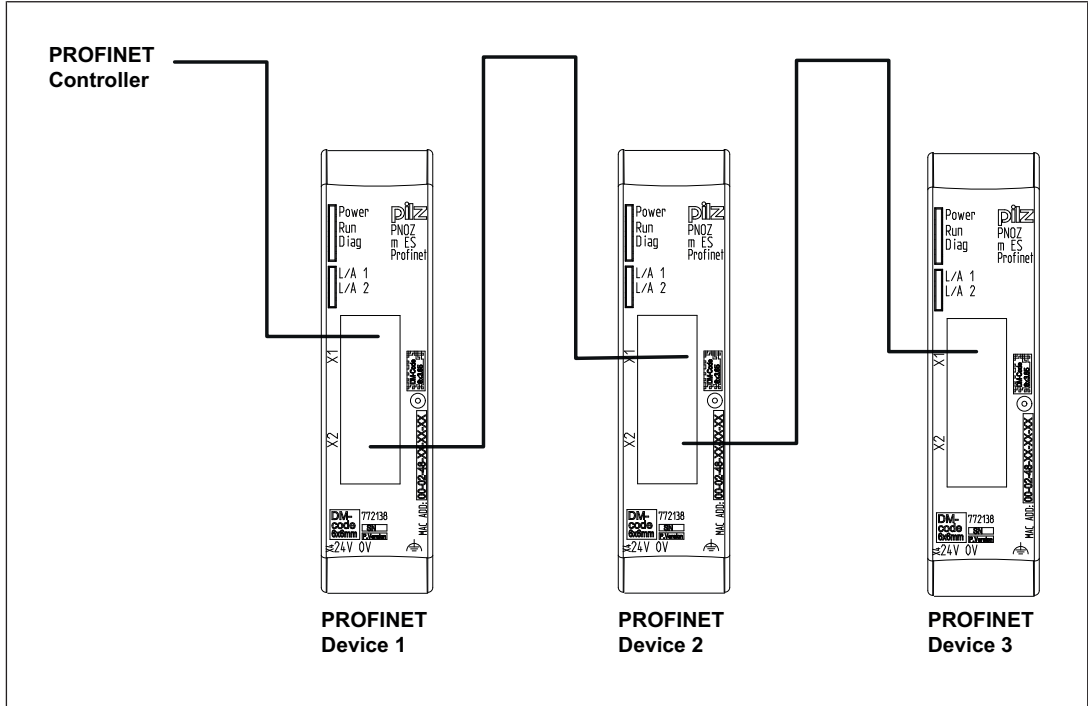
There are two options:

- ▶ Automatic assignment of the IP address with the Dynamic Host Configuration Protocol (DHCP)
- ▶ Assignment of the IP address by the IO controller before system startup based on the unique unit name.

6.4.3 Install GSDLM file

Install the GSDML file. You can find the GSDML file in the Internet at www.pilz.de.

6.5 Connection example



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 Profinet is configured and started automatically. The LEDs "RUN" and "ERR" display the status of the PNOZ m ES Profinet at the PROFINET.

If the expansion module PNOZ m ES Profinet does not receive a configuration from the base unit for a period of 30 s, the expansion module PNOZ m ES Profinet connects to the IO controller and "RUN" status is displayed on PROFINET. The error message "No Connection with Base Module" is sent to the IO controller.

Legend

-  LED on
-  LED flashes
-  LED off

LED	Meaning	
Power	 green	Supply voltage is present
		Supply voltage is not present
Run	 green	The connection to the IO controller is established, the IO controller is in RUN condition
	 green, 1x	The connection to the IO controller is established, the IO controller is in STOP condition
	 green	Device identification (LED "Diag" also flashes green)
		No connection to IO controller
Diag	 red	Diagnostic data available (maintenance required or error)
	 green	Device identification (LED "Run" also flashes green)
	 red	No device name or Ethernet connection does not exist
L/A1	 green	Bus connection available at X1
	 green	Data traffic present at X1
		Bus connection is not available at X1
L/A2	 green	Bus connection available at X2
	 green	Data traffic present at X2
		Bus connection not available at X2

8 Technical details

General	
Certifications	CE, EAC, UKCA, cULus Listed
Electrical data	
Supply voltage	
for	Module supply
Voltage	24 V
Kind	DC
Voltage tolerance	-20 %/+25 %
Max. continuous current that the external power supply must provide	60 mA
Output of external power supply (DC)	1,4 W
Potential isolation	yes
Supply voltage	
for	Module supply
internal	Via base unit
Voltage	3,3 V
Kind	DC
Current consumption	60 mA
Power consumption	0,2 W
Max. power dissipation of module	1,5 W
Status indicator	LED
Fieldbus interface	
Fieldbus interface	PROFINET
Device type	IO-Device
Transmission rates	100 MBit/s
Connection	2 x RJ45
Galvanic isolation	yes
Environmental data	
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
Max. operating height above sea level	2000 m
EMC	EN 61131-2

Environmental data

Vibration

In accordance with the standard	EN 60068-2-6
Frequency	10 - 150 Hz
Acceleration	1g

Shock stress

In accordance with the standard	EN 60068-2-27
Acceleration	15g
Duration	11 ms

Airgap creepage

In accordance with the standard	EN 61131-2
Overvoltage category	II
Pollution degree	2

Protection type

In accordance with the standard	EN 60529
Housing	IP20
Terminals	IP20
Mounting area (e.g. control cabinet)	IP54

Potential isolation

Potential isolation between	Fieldbus and module voltage
Type of potential isolation	Functional insulation
Rated insulation voltage	30 V
Rated surge voltage	500 V

Mechanical data

Mounting position	horizontally on mounting rail
DIN rail	
Top hat rail	35 x 7,5 EN 50022
Recess width	27 mm
Material	
Bottom	PC
Front	PC
Top	PC
Connection type	Spring-loaded terminal, screw terminal
Conductor cross section with screw terminals	
1 core flexible	0,25 - 2,5 mm², 24 - 12 AWG
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	0,2 - 1,5 mm², 24 - 16 AWG
Torque setting with screw terminals	0,5 Nm
Conductor cross section with spring-loaded terminals:	
Flexible with/without crimp connector	0,2 - 2,5 mm², 24 - 12 AWG
Spring-loaded terminals: Terminal points per connection	2
Stripping length with spring-loaded terminals	9 mm

Mechanical data

Dimensions

Height **101,4 mm**

Width **22,5 mm**

Depth **110,4 mm**

Weight **86 g**

Where standards are undated, the 2014-04 latest editions shall apply.

9 Order reference

9.1 Product

Product type	Features	Order no.
PNOZ m ES Profinet	Configurable safe small controllers PNOZmulti 2, fieldbus module, Profinet.	772138

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 Plug-in connector

Product type	Features	Order no.
RJ45 Connector	RJ45 plug-in connector, straight, IP20, 8-pin, Cat6a, IDC connection, AWG22, cable diameter: 5.5 - 8.5 mm	380401

9.2.3 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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