

PNOZ m ES Profibus

PILZ
THE SPIRIT OF SAFETY

- ▶ Configurable control systems 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 Profibus. 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 Profibus
- ▶ Jumper

2.2 Unit features

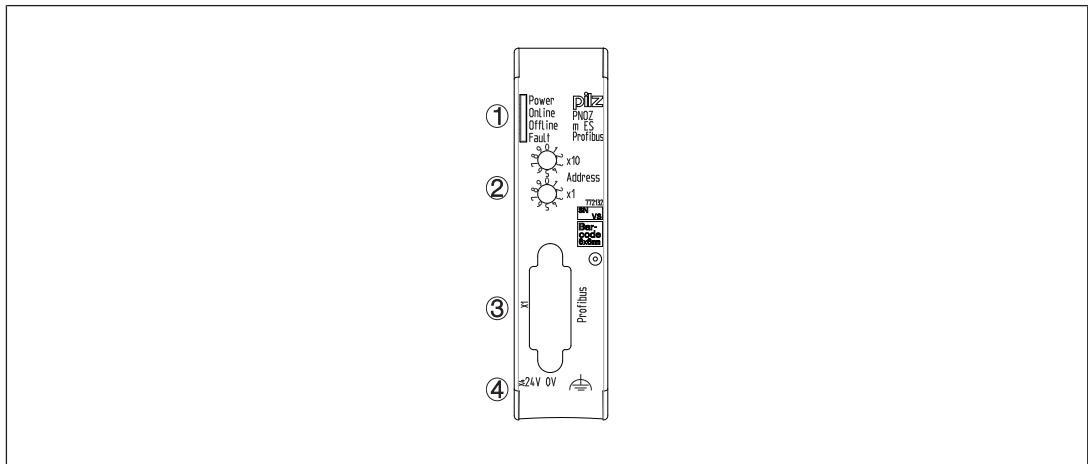
Using the product PNOZ m ES Profibus:

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 PROFIBUS-DP
- ▶ Station addresses from 0 ... 99, selected via rotary switch
- ▶ Status indicators for communication with PROFIBUS-DP and for errors
- ▶ In the PNOZmulti Configurator, 128 virtual outputs of the PNOZmulti 2 control system can be defined for communication with the fieldbus PROFIBUS-DP .
- ▶ Max. 1 PNOZ m ES Profibus 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
 - Online
 - Offline
 - Fault
- ② Rotary switch
 - x10 = Tens digit for the station address
 - x1 = Units digit for the station address
- ③ X1: PROFIBUS-DP interface (female 9-pin D-Sub connector)
- ④ X4: 0 V, 24 V:
 - Supply connections
-  Functional earth

3 Safety

3.1 Intended use

The expansion module PNOZ m ES Profibus is used for communication between the configurable control system PNOZmulti 2 and PROFIBUS-DP.

PROFIBUS-DP is designed for fast data exchange at field level. The expansion module PNOZ m ES Profibus 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 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 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](#) [ 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 PROFIBUS are selected and configured in the PNOZmulti Configurator. The base unit and the expansion module PNOZ m ES Profibus are connected via a jumper.

The station address is set via rotary switches. After the supply voltage is switched on or the control system PNOZmulti 2 is reset, the expansion module PNOZ m ES Profibus 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.



INFORMATION

The GSD 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 Profibus
The values for the inputs are set in the Master as an output and transferred to the PNOZmulti 2.
 - Output area PNOZ m ES Profibus
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).

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 PROFIBUS-DP inputs/outputs

Virtual inputs and outputs can be requested or set directly via the following objects. 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.

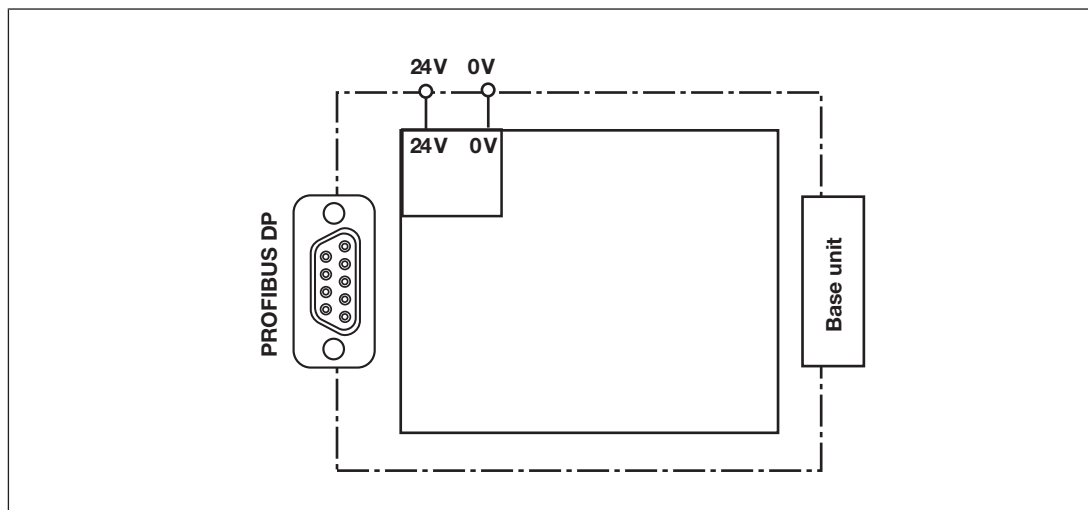
Description	Input data from PNOZmulti 2
Virtual inputs i0 – i31	4 Input Bytes
Virtual inputs i32 – i63	4 Input Bytes
Virtual inputs i64 – i95	4 Input Bytes
Virtual inputs i96 – i127	4 Input Bytes

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, otherwise air conditioning will be required.

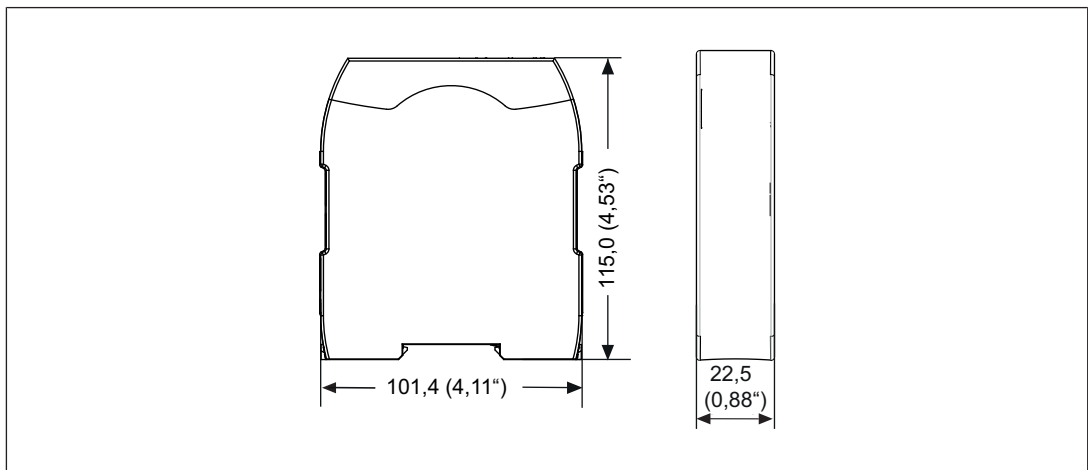


NOTICE

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.

5.2 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.
- ▶ 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.

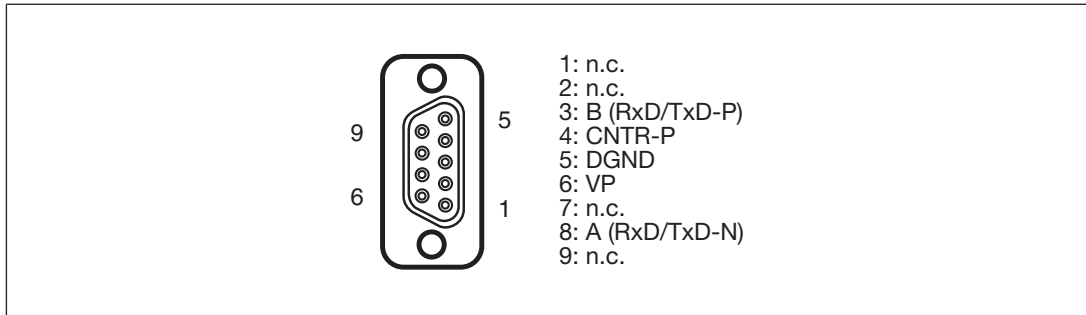
6.1.2 Connecting the supply voltage

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 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).



n.c. = not connected

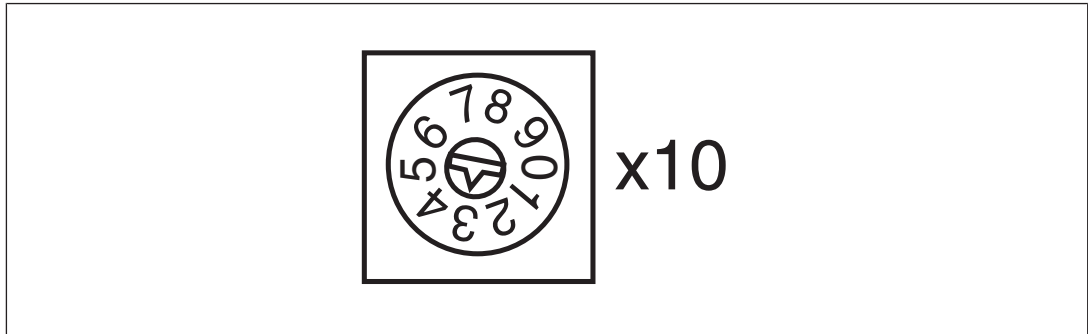
Please note the following when connecting to PROFIBUS-DP:

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

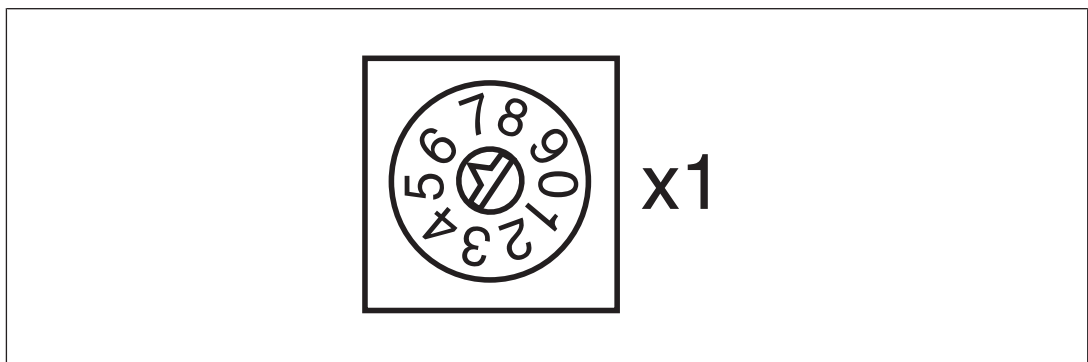
6.2 Preparing for operation

6.2.1 Setting the station address

The station address of the expansion module PNOZ m ES Profibus 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

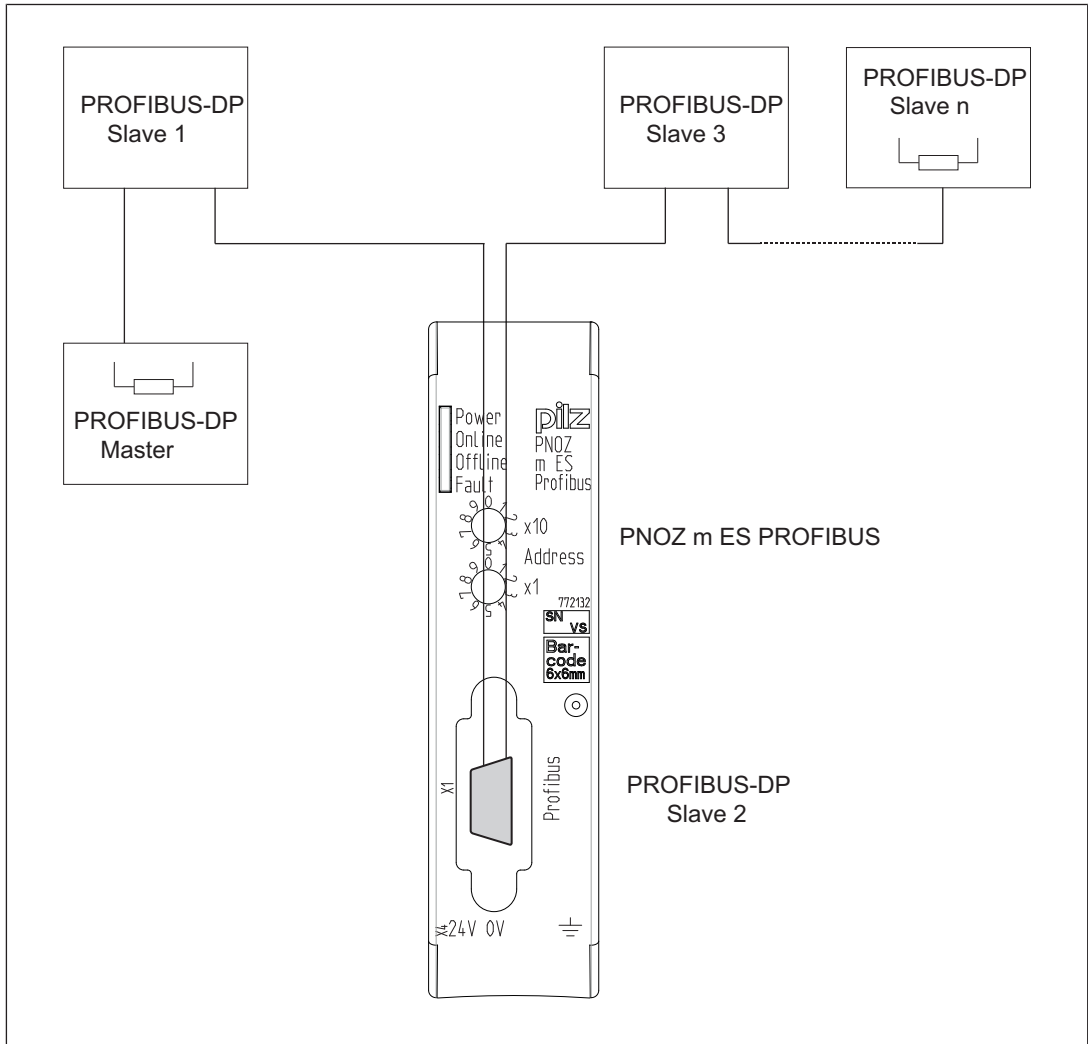
As soon as an additional expansion module has been connected to the system, the project must be amended using the PNOZmulti Configurator. Proceed as described in the operating instructions for the base unit.



NOTICE

For the commissioning and after every program change, you must check whether the safety devices are functioning correctly.

6.2.3 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", "IFAUULT" and "OFAULT" will light up on the base unit.






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

If the expansion module PNOZ m ES Profibus does not receive a configuration from the base unit for a period of 30 s, the expansion module PNOZ m ES Profibus connects to PROFIBUS-DP and the "ONLINE" status is displayed on the PROFIBUS-DP. The error message "No Connection with Base Module" is sent to the Master.

Legend

-  LED on
-  LED flashes
-  LED off

LED		Meaning
POWER		Supply voltage is present
		Supply voltage is not present
ONLINE		PNOZ m ES Profibus Online, data exchange is possible
		Master has sent the telegram "Global Control Clear". Virtual input bits i0 ... i127 are set to "0".
		PNOZ m ES Profibus Not online
OFFLINE		PNOZ m ES Profibus Offline, data exchange is not possible
		PNOZ m ES Profibus Not offline

LED	Meaning		
FAULT			Application Watchdog Timeout
		1 Hz	Configuration error, length of input and/or output data during initialisation of the PNOZ m ES Profibus does not match the configuration Remedy: Ensure that the right GSD file has been used.
		2 Hz	Configuration error, length/content of the configuration data during initialisation of the PNOZ m ES Profibus does not match the configuration Remedy: Ensure that the right GSD file has been used.
		4 Hz	Error when initialising PROFIBUS-DP
			No error

8 Technical details

General	
Approvals	CCC, CE, EAC (Eurasian), cULus Listed
Electrical data	
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
PROFIBUS-DP interface	
Number	1
Fieldbus interface	
Fieldbus interface	PROFIBUS DP
Device type	Slave DPV0
Station address	0 - 99d
Transmission rate	9,6 kBit/s - 12 MBit/s
Connection	9-pin D-Sub female connector
Galvanic isolation	yes
Test voltage	500 V AC
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
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

Environmental data	
Max. operating height above sea level	2000 m
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	
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
Connection type	Spring-loaded terminal, screw terminal
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
Rigid single-core, flexible multi-core or multi-core with crimp connector	0,5 - 1,5 mm²
Torque setting with screw terminals	0,50 Nm
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 with spring-loaded terminals	9 mm
Dimensions	
Height	101,4 mm
Width	22,5 mm
Depth	115,0 mm
Weight	95 g

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 Profibus	Fieldbus module, PROFIBUS for PNOZ m Bx	772 132

9.2 Accessories

Terminator, jumper

Product type	Features	Order No.
PNOZ mm0.xp connector left	Jumper yellow/black to connect the modules, 10 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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