PNOZ m ES 14DO

PILZ
THE SPIRIT OF SAFETY

- Configurable control systems PNOZmulti 2

Operating Manual-1004299-EN-02

This document is a translation of the original document.

Source code from third-party manufacturers or open source software has been used for some components. The relevant licence information is available on the Internet on the Pilz homepage.


SD means Secure Digital

1 Introduction

1.1 Validity of documentation

This documentation is valid for the product PNOZ m ES 14DO from Version HW:01, FW:01.00 .

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 14DO
- Jumper

2.2 Unit features

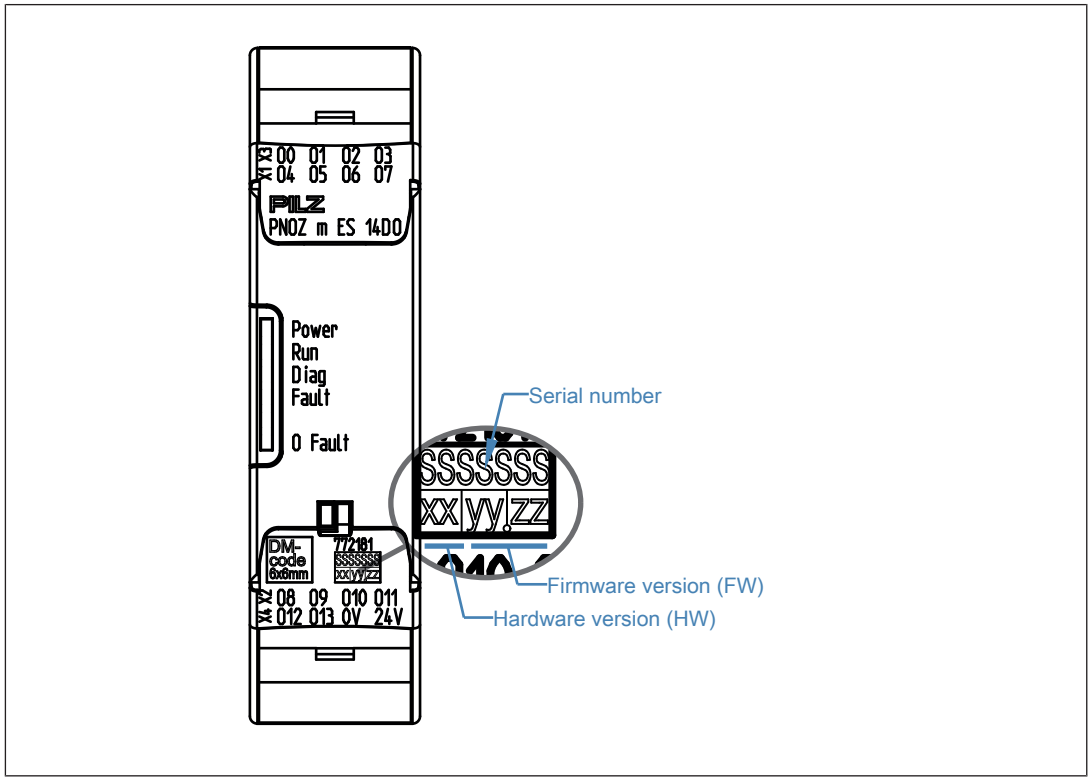
Using the product PNOZ m ES 14DO:

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
- 14 semiconductor outputs for standard applications
- LED display for:
  - Error messages
  - Diagnostics
  - Supply voltage
  - Output circuits
- Plug-in connection terminals:
  either spring-loaded terminal or screw terminal available as an accessory (see order reference)
- For details of the PNOZmulti 2 base units that can be connected, please refer to the document "PNOZmulti System Expansion".

2.3 Front view



Legend:

- 0 V, 24 V: Supply connections
- Outputs O0 – O13
- LEDs:
  - POWER
  - Run
  - Diag
  - Fault
  - O Fault

3 Safety

3.1 Intended use

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 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 [15]).

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 Functions

The expansion module provides additional semiconductor outputs for standard applications.

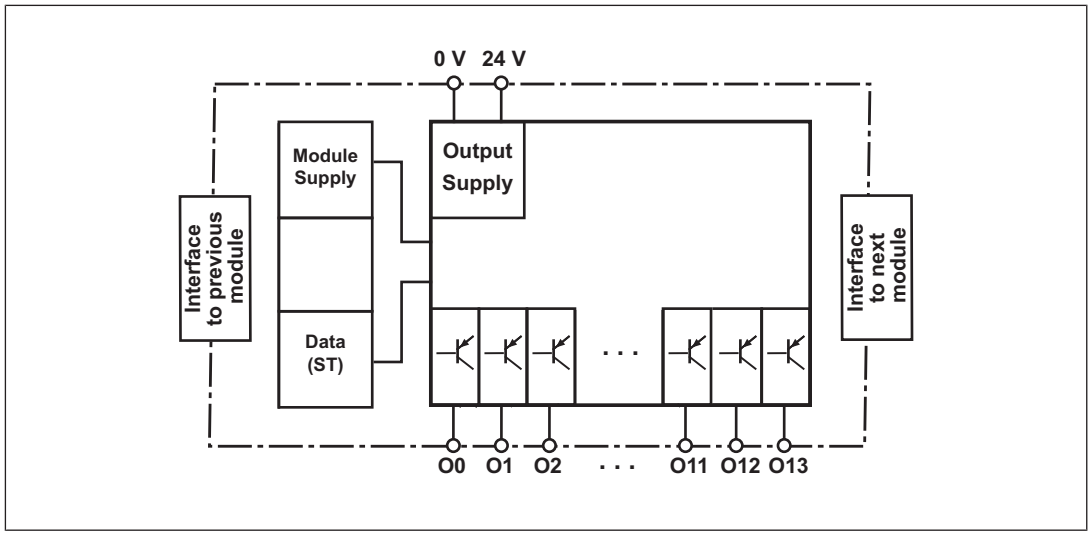
The function of the outputs depends on the user program created using the PNOZmulti Configurator. The online help on the PNOZmulti Configurator contains descriptions of the operating modes and all the functions of the PNOZmulti system, plus connection examples.

To be able to switch higher loads, you can switch several outputs in parallel.
There are two groups:
Any of the outputs O0 to O7 can be connected in parallel, and any of the outputs O8 to O13 can be connected in parallel.

4.2 System reaction time

Calculation of the maximum reaction time between an input switching off and a linked output in the system switching off is described in the document "PNOZmulti System Expansion".

4.3 Block diagram



5 Installation

5.1 General installation guidelines

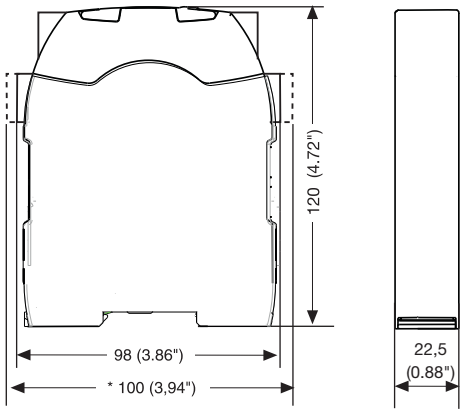
- The unit should be installed in a control cabinet with a protection type of at least IP54.
- Fit the safety system to a horizontal mounting rail. The venting slots must face upward and downward. Other mounting positions could damage the safety system.
- Use the locking elements on the rear of the unit 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, 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 Connecting the base unit and expansion modules

Connect the base unit and the expansion modules as described in the operating manuals for the base modules.

- The terminator must be fitted to the last expansion module
- Install the expansion module in the position 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.

The module for standard applications has to be placed to the right of the safe expansion modules.

6 Commissioning

6.1 General wiring guidelines

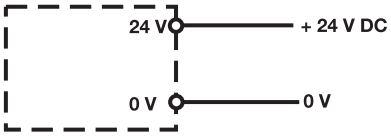
The wiring is defined in the circuit diagram of the PNOZmulti Configurator.

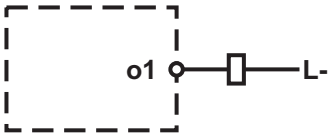
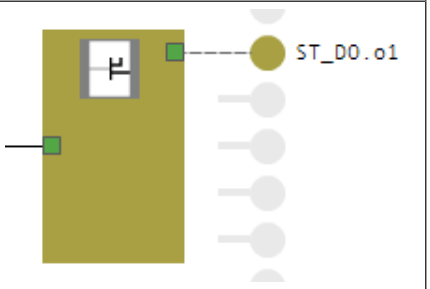
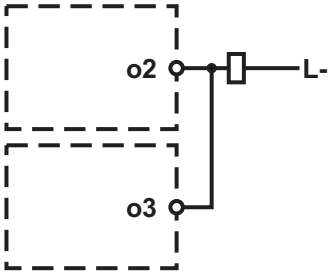
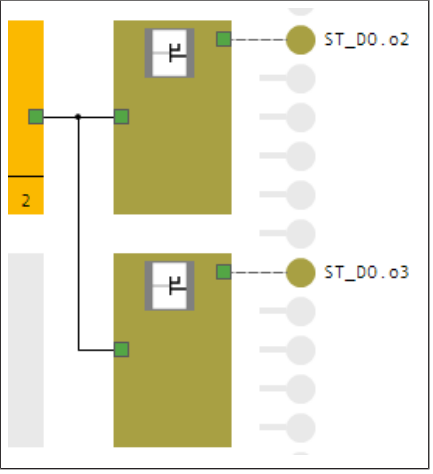
Please note:

- Information given in the Technical details [📖 15] must be followed.
- The position of the expansion module is specified in the Hardware configuration of the PNOZmulti Configurator.
- Use copper wire that can withstand 75° C.
- The supply voltage of the semiconductor outputs and the supply voltage of the system are galvanically isolated from each other.
- Protect the supply voltage as follows:
  - Circuit breaker, characteristic C - 10 A

    or
  - Blow-out fuse, slow, 10 A

6.2 Connection

Supply voltage	DC
	

Connection example		
Single output		
Two outputs parallel		

7 Operation

When the supply voltage is switched on, the PNOZmulti 2 system loads the active project from the USB memory.

7.1 Messages

Legend

- LED on
- LED flashes
- LED off

Fault					
POWER	Run	Diag	Fault	OFault	
					No supply voltage
					Supply voltage for the semiconductor outputs is not present
					Expansion module PNOZ m ES 14DO running without error.
					Expansion module PNOZ m ES 14DO is in a STOP condition.
					Internal error on the expansion module PNOZ m ES 14DO or on the overall system.
					External error on the expansion module PNOZ m ES 14DO or on the overall system.
					Internal error on the outputs of the expansion module PNOZ m ES 14DO. The module will switch to a STOP condition.
					Error on the outputs of the expansion module PNOZ m ES 14DO., e.g. short circuit. The module will switch to a STOP condition.

8 Technical details

General	
Approvals	**CE, UL Listed**
Application range	**Standard**
Module's device code	**00F8h**
Electrical data	
Supply voltage	
for	**Supply to the SC outputs**
Voltage	**24 V**
Kind	**DC**
Voltage tolerance	**-20 %/+25 %**
Max. continuous current that the external power supply must provide	**8,5 A**
Potential isolation	**yes**
Supply voltage	
for	**Module supply**
internal	**Via base unit**
Voltage	**24 V**
Kind	**DC**
Current consumption	**20 mA**
Power consumption	**0,5 W**
Max. power dissipation of module	**2,5 W**
Status indicator	**LED**
Permitted loads	**inductive, capacitive, resistive**
Semiconductor outputs	
Number of positive-switching single-pole semiconductor outputs	**14**
Switching capability	
Voltage	**24 V**
Typ. output current at "1" signal and rated voltage of semiconductor output	**0,5 A**
Permitted current range	**0,000 - 0,600 A**
Residual current at "0" signal	**0,5 mA**
Max. transient pulsed current	**1,4 A**
Max. internal voltage drop	**500 mV**
Switch-off delay	**1 ms**
Potential isolation	**yes**
Short circuit-proof	**yes**
Utilisation category in accordance with UL	
Voltage	**24 V DC P. D.**
Current	**0,5 A**

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**
Vibration	
In accordance with the standard	**EN 60068-2-6**
Frequency	**5 - 150 Hz**
Amplitude	**0,35 mm**
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**
Rated insulation voltage	**30 V**
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	**SC output and system voltage**
Type of potential isolation	**Basic insulation**
Rated surge voltage	**2500 V**
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**

Mechanical data	
Connection type	**Spring-loaded terminal, screw terminal**
Mounting type	**plug-in**
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**
Dimensions	
Height	**101,4 mm**
Width	**22,5 mm**
Depth	**120 mm**
Weight	**100 g**

Where standards are undated, the 2016-05 latest editions shall apply.

9 Order reference

9.1 Product

Product type	Features	Order no.
PNOZ m ES 14DO	Expansion module	772 181

9.2 Accessories

Connection terminals

Product type	Features	Order No.
Set spring terminals	1 set of spring-loaded terminals	751 004
Set screw terminals	1 set of screw terminals	750 004

Terminator, jumper

Product type	Features	Order No.
PNOZ mm0.xp connector left	Jumper yellow/black to connect the modules, 10 piece	779 260