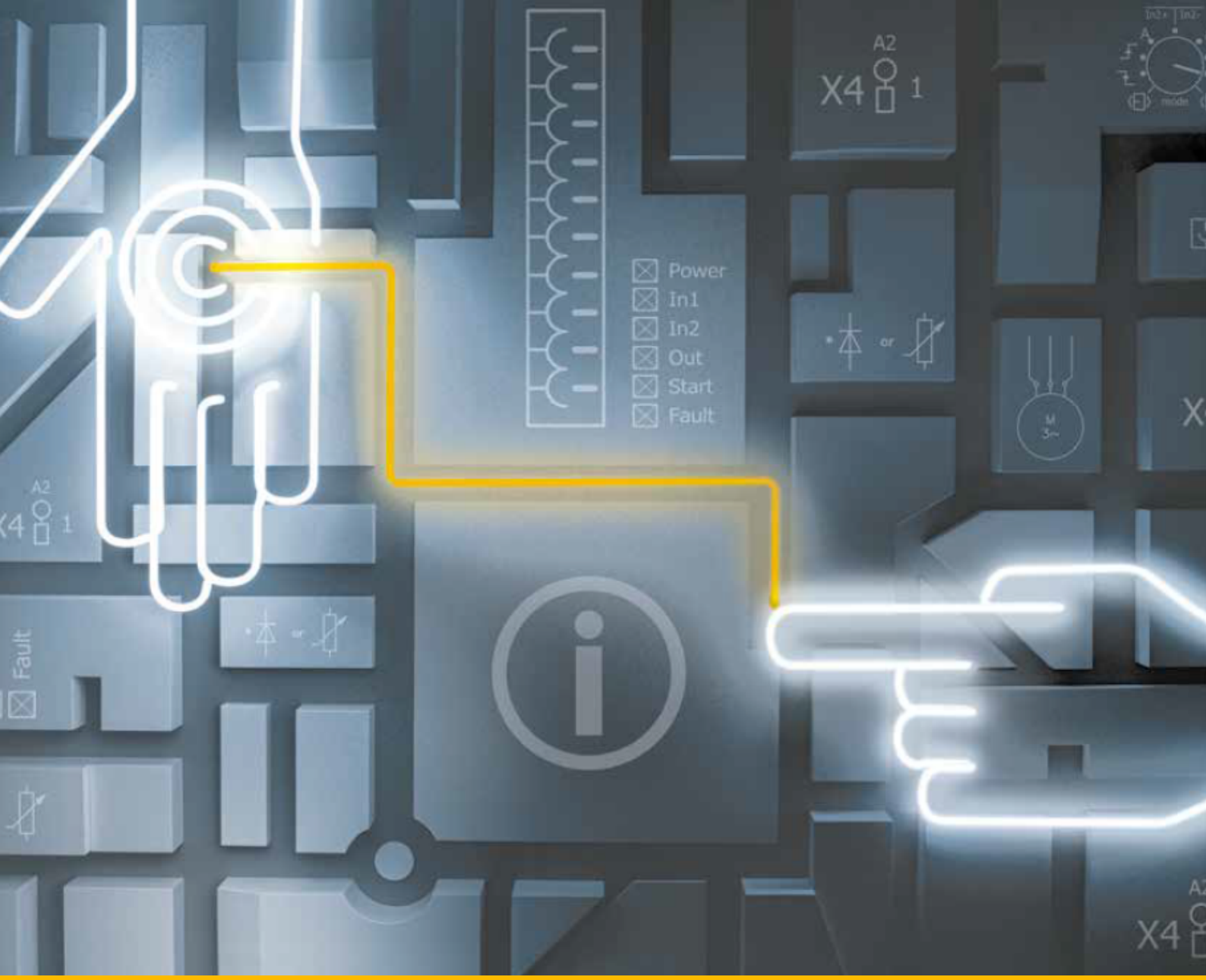


PNOZ m B0

PILZ
THE SPIRIT OF SAFETY

Operating Manual-1002660-EN-13

- Configurable, safe small controllers PNOZmulti 2




This document is the original document.

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.

1 Introduction

1.1 Validity of documentation

This documentation is valid for the product PNOZ m B0 from Version 3.3.

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 Range

- Base unit PNOZ m B0
- 2 terminators

2.2 Unit features

Application of the product PNOZ m B0:

Base unit of the configurable control system PNOZmulti 2

The product has the following features:

- Can be configured in the PNOZmulti Configurator
- Semiconductor outputs:

  4 safety outputs
  depending on the application, up to PL e of EN ISO 13849-1 and up to SIL 3 of EN IEC 62061
- 12 safe inputs for connecting, for example:
  - Emergency stop pushbuttons
  - Two-hand pushbuttons
  - Safety gate limit switches
  - Start buttons
  - Light barriers
  - Scanner
  - Enabling switches
  - PSEN
  - Operating mode selector switches
- 8 configurable inputs/outputs

  Can be configured as:
  - Safe inputs (see above for connection options)

  or
  - Auxiliary outputs
- 4 configurable outputs

  Can be configured as:
  - Auxiliary outputs

  or
  - Test pulse outputs

- LED display for:
  - Error messages
  - Diagnostics
  - Supply voltage
  - Fault at the outputs
  - Fault at the inputs
- Backlit display for:
  - Error messages
  - State of supply voltage
  - State of the inputs and outputs
  - Status information
  - Device information
- Test pulse outputs used to monitor shorts across the inputs
- Monitoring of shorts between the safety outputs
- Plug-in connection terminals:
  Either spring-loaded terminal or screw terminal available as accessories (see Order references)
- Rotary knob for menu control
- Device security
- Expansion modules can be connected
  (please refer to the document "PNOZmulti System Expansion" for details of the type and number that can be connected)

2.3 Chip card

As an option, a chip card can be used to transfer project data.

Chip cards with 8 kByte and 32 kByte memories are available. For large-scale projects we recommend the 32 kByte chip card (see Technical Catalogue: Accessories).

2.4 Front view

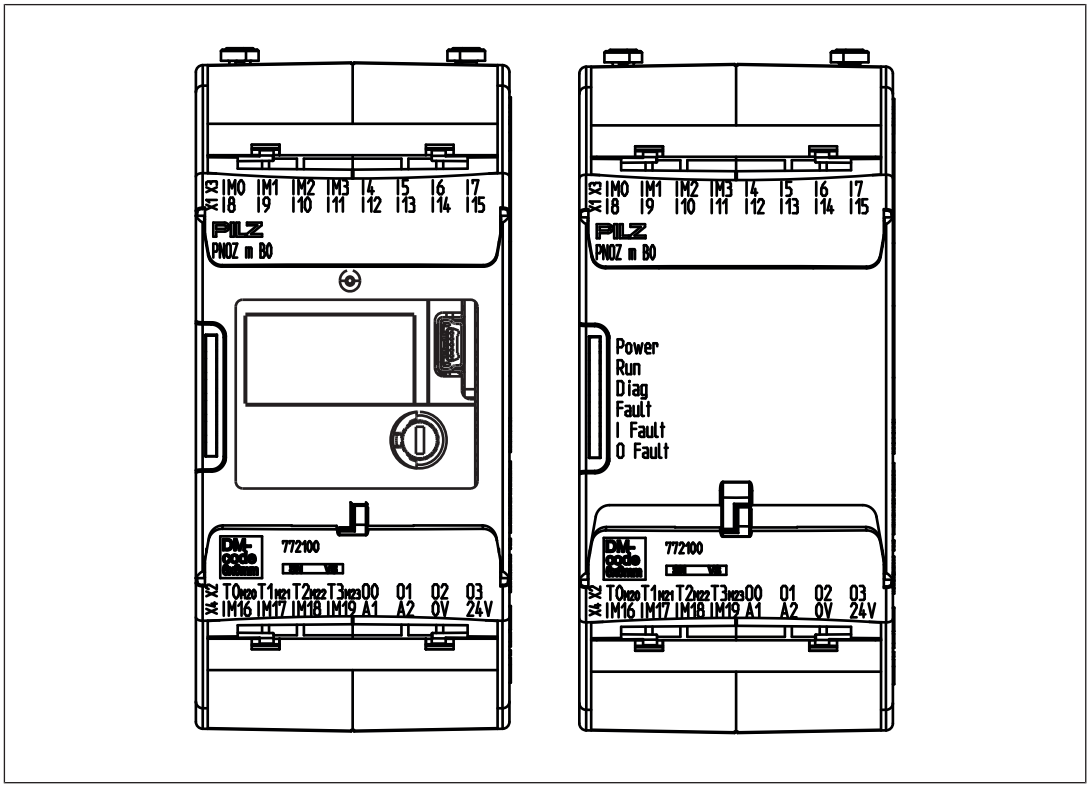


Fig.: Front view with and without cover

Legend

X1:	Inputs I8 ... I15
X2:	Configurable test pulse/auxiliary outputs T0M20 ... T3M23
	Semiconductor outputs O0 ... O3
X3:	Configurable inputs/outputs IM0 – IM3
	Inputs I4 ... I7
X4:	Configurable inputs/outputs IM16 – IM19
	Supply connections
LEDs:	PWR
	RUN
	DIAG
	FAULT
	I FAULT
	O FAULT

3 Safety

3.1 Intended use

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

CAUTION!

Inputs and outputs for standard functions must not be used for safety-related applications.

Lifts Directive

The product PNOZ m B0 can be used as a PESSRAL (programmable electronic system in safety-related applications for lifts) in accordance with the Lifts Directive 2014/33/EU. It meets the 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.

Use in furnaces

The product PNOZ m B0 can be used in furnaces in accordance with EN 298.
Please note:

- To protect against transient power failures (EN 61000-4-11) the AC power supply used for the system must provide secondary buffering for 20 ms.
- If the system is used in a DC network, sufficient overvoltage protection must be ensured. Use external protection elements for overvoltage protection that fulfil at least the following properties:
  Installation class 4 / test level 4 in accordance with EN 61000-4-5 (4 kV 1.2/50 µs)

Year of manufacture

The year of manufacture is specified on the product after the reference YOM (Year of Manufacturing).

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 chapter entitled Technical Details [44]).

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.

3.1.1 Third-party manufacturer licence information

The product contains open source software, whose terms of use could further limit the product's application area. It is essential that you observe the third-party manufacturer licence information.

Further information is available in the document "Third-party manufacturer licence information PNOZ m B0" (document number 1006756) at www.pilz.com.

3.2 Applicable documentation

This document includes only part of the information required for the use of the device. To understand and correctly use the product you must read further documents.

Please read the following documents:

- "PNOZmulti Safety Manual"
- "PNOZmulti Installation Manual"
- The advanced functions of the device are described in the online help for the PNOZmulti Configurator, in the "PNOZmulti Communication Interfaces" document and in "PNOZmulti Special Applications". Only use these functions once you have read and understood the documentation.
- For details of the modules that can be connected and the system's reaction times, please refer to the document "PNOZmulti System Expansion".

3.3 System requirements

Please refer to the "Product Modifications" document in the "Version overview" section for details of which versions of the PNOZmulti Configurator can be used for this product.

3.4 Safety regulations

3.4.1 Safety assessment

Before using a device, a safety assessment in accordance with the Machinery Directive is required.

The product as an individual component fulfils the functional safety requirements in accordance with EN ISO 13849 and EN IEC 62061. However, this does not guarantee the functional safety of the overall plant/machine. To achieve the relevant safety level of the overall plant/machine's required safety functions, each safety function needs to be considered separately.

3.4.2 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, directives and standards.

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 the section entitled Safety
- Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.4.3 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.).

3.4.4 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).

3.4.5 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. Advanced functions are described in the online help for the PNOZmulti Configurator, in the "PNOZmulti Communication Interfaces" document and in "PNOZmulti Special Applications". Only use these functions once you have read and understood the documentation.
- Please note the "PNOZmulti Installation Manual".
- You must note the information stated in the "PNOZmulti Safety Manual".

- Adequate protection circuit must be provided for all inductive consumers.
- 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 Security

The term "security" refers to information security in plants, systems, machines and networks. This includes protection from external attacks (remote access) as well as protection from attacks from insiders. Measures are taken that protect the integrity and confidentiality of sensitive data and guarantee plant/machine availability. So all measures that concern the integrity, availability, confidentiality and authenticity of data fall under the term "security" (see also the IEC 62443 series of standards).

Planning and implementation

Securing plants, systems, machines and networks against cyberthreats requires a holistic industrial security concept that is state of the art and is continuously developed further.
All plants, systems, machinery and networks that require protecting must be assessed individually. The assessment must take into account organisational as well as technical measures. If necessary, seek advice from Pilz Customer Support.
Planning and implementation should be carried out in accordance with a defined security process. For example, your security process should take the following into account:

- Note the regulatory specifications and requirements from the locally applicable safety and application standards with regard to protection from manipulation.
- Perform a risk analysis (e.g. in accordance with IEC 62443-3-2) and then plan the resulting security measures carefully.
- Where possible, counter the security risks using a multi-layered concept (e.g. defence-in-depth concept).
- Name the necessary security measures and document them.
- Check the security measures after implementation.
- Carry out a new risk analysis after every change and adapt the security measures if necessary.
- It is advisable to review the security measures regularly, for example annually.

Defence-in-depth concept

In accordance with IEC 62443-4-1, the defence-in-depth concept is an approach in which multiple layers of independent security methods are used.

The defence-in-depth concept is based on the following rationale:

- Every protective measure can be overcome, and probably will be overcome.
- A multi-layer structure (e.g. onion model) implements several concerted and coordinated measures.
- Due to independent defence mechanisms in each layer, successful exploitation of a weakness in one layer is prevented, or made more difficult, by a measure in another layer.
- Generally with the defence-in-depth concept, an attack is made more difficult because the attacker has to circumvent different, independent security measures, one after the other.

The standard series IEC 62443 distinguishes between the following three areas of responsibility:

- Manufacturer
- System integrator
- Operator

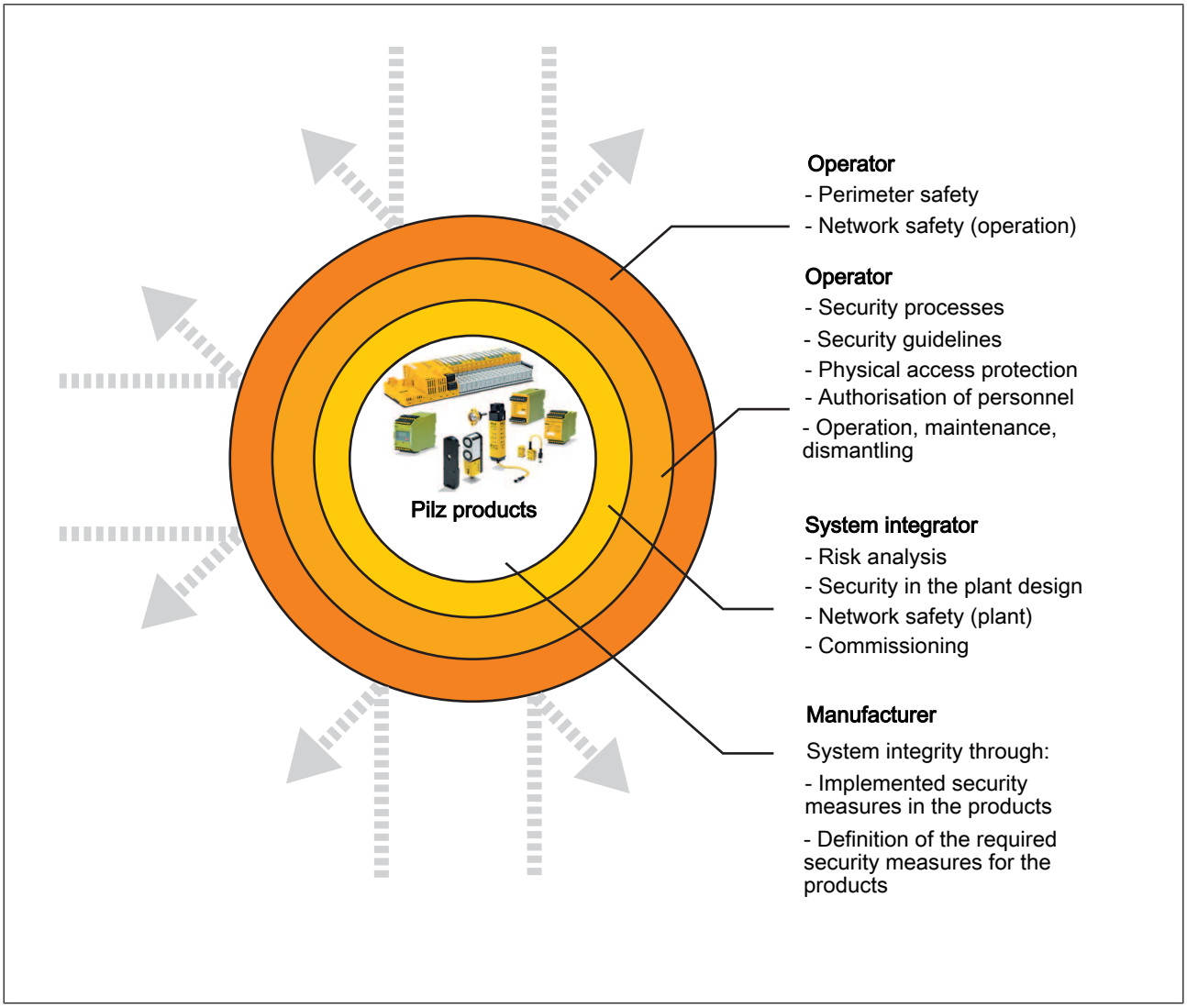


Fig.: Roles and responsibilities in the defence-in-depth onion model

Security incident management

Should the product have a security vulnerability, this will be published in a security advisory. You'll find the security advisories under www.pilz.com/security. You can also report any security problems there.

Implemented and required security measures

The section below describes the implemented and required security measures. To protect the Pilz devices and system solutions and the data/projects created using the Pilz tools from cyber threats, it is essential that you use the implemented security measures and implement the required security measures.

4.1 Implemented security measures

- To carry out relevant operations in the PNOZmulti Configurator, a user must authenticate himself on the device with user name and password.
- Multiple users with different permissions can be created and configured in the PNOZmulti Configurator.
  The user data is transmitted to the device and stored there.
- Certain actions in the device display can be protected from unauthorised access via password protection.
- A password policy can be configured in the PNOZmulti Configurator. Minimum criteria can be established, which must be adhered to when assigning a new password. The password policy should match that of the IT infrastructure.

4.2 Required security measures

- The product is not protected from physical manipulation or from reading of memory contents during physical access. Use appropriate measures to ensure that there is no physical access by unauthorised persons. You should also use security seals so that you can detect any manipulation of the product or interfaces. Installation inside a lockable control cabinet is recommended as a minimum measure.
- The product can be incorporated into a machine network using the expansion module PNOZ m ES ETH. Protect the product from unauthorised data exchange via the network by using a firewall or providing other appropriate measures. Only allow the data exchange that's required for the application. Any data exchange that is not required for the application must be prevented by the firewall.
- Check the product's log for unauthorised program changes on a regular basis.
- Modbus/TCP has no security mechanisms. Use a firewall to protect the product from unauthorised access.

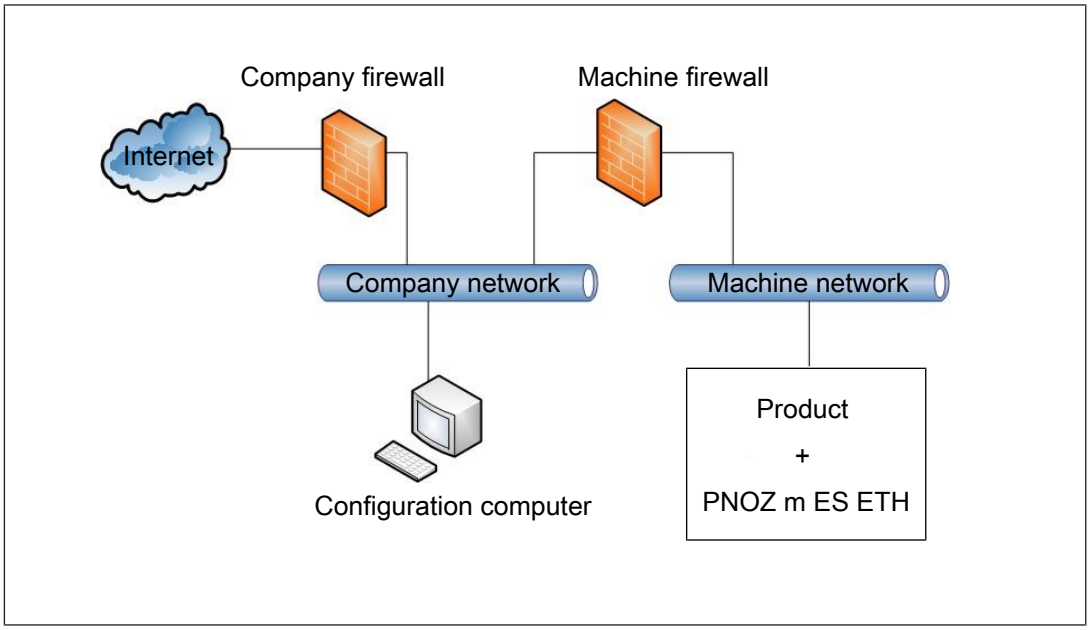


Fig.: Example network topology

- Note the network data for risk analysis and the security measures.
- Protect the configuration and log data from unauthorised changes.
- Delete or destroy the chip card before disposing of the product.

5 Function description

5.1 Integrated protection mechanisms

The relay meets the following safety requirements:

- The circuit is redundant with built-in self-monitoring.
- The safety device remains effective in the case of a component failure.
- The safety outputs are tested periodically using an off-test.
  Please note that the off-test is not carried out when the output is configured as an ***Output with reduced fault detection*** (see online help for the PNOZmulti Configurator).

5.2 Functions

The function of the inputs and outputs on the control system depends on the safety circuit created using the PNOZmulti Configurator. A chip card is used to download the safety circuit to the base unit. The base unit has 2 microcontrollers that monitor each other. They evaluate the input circuits on the base unit and expansion modules and switch the outputs on the base unit and expansion modules accordingly.

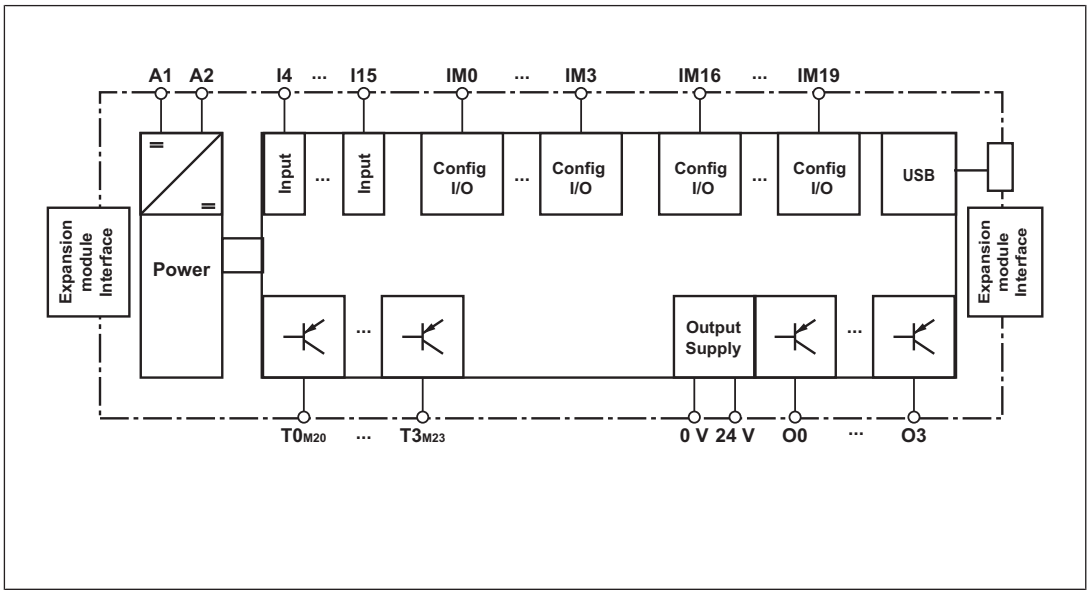
The LEDs on the base unit and expansion modules indicate the status of the configurable control system PNOZmulti.

The online help on the PNOZmulti Configurator contains descriptions of the operating modes and all the functions of the control system, plus connection examples.

5.3 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".

5.4 Block diagram



5.5 Diagnostics

The status and error messages displayed by the LEDs are saved in an error stack. This error stack can be shown on the device display or can be read from the PNOZmulti Configurator via the USB port.

5.6 Detection of shorts across contacts

4 Test pulse outputs (T0 … T3) are available for detection of shorts between the inputs.

If the system is in a stop state, the test pulse outputs can be switched manually via the menu on the display.

This function can be used to

- Commission inputs with the test pulse signal from the base unit
  or
- Locate the error source in the event of test pulse errors.

For details of how to switch the test pulse outputs manually, see section entitled Switching the test pulse outputs [📖 40].

5.7 Device security

User management

The base unit PNOZ m B0 can be protected from unauthorised access via user management.

In order to access the device or perform specific actions via the PNOZmulti Configurator, users must use their credentials to authenticate themselves.

A user account can be created for each user in the PNOZmulti Configurator user management.

There are user groups that have pre-defined permissions.
A user group is assigned to each user account.
Each user account obtains a unique user name and a password.

When you log into a new device for the first time or after a factory reset has been performed, use the factory-set default credentials to log in as administrator:

Login name	admin
Password	pilz

As administrator you have every permission. Change the default password immediately after logging in for the first time.

A password policy can be created in the PNOZmulti Configurator. Minimum criteria can be established, which must be adhered to when assigning a new password.

User management is configured in the PNOZmulti Configurator and transferred to the device.

Detailed information on user management and how it is configured can be found in the online help for the PNOZmulti Configurator.

Password for device display

Password protection for access to actions in the device display can be configured for the base unit PNOZ m B0 in the PNOZmulti Configurator.

Certain actions can only be performed when a user authenticates themself with the appropriate password in the device's display menu (see also User login menu [📖 37]).

NOTICE

Please note that user management and password protection for the device display must be reconfigured after a device is exchanged.

6 Installation

6.1 Control cabinet installation

- The unit should be installed in a control cabinet with a protection type of at least IP54.
- Install the system vertically on 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.

NOTICE

Damage due to electrostatic discharge!

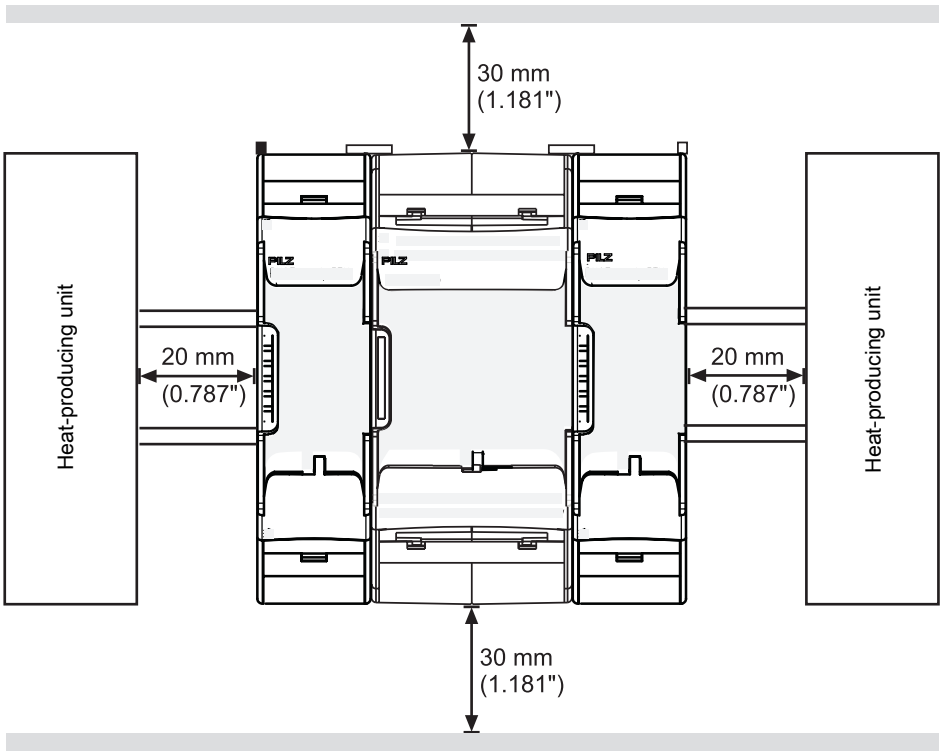
Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

6.1.1 Mounting distances

With control cabinet installation it is essential to maintain a certain distance from the top and bottom, as well as to other heat-producing devices (see diagram). The values stated for the mounting distances are minimum specifications.

The ambient temperature in the control cabinet must not exceed the figure stated in the technical details. Air conditioning may otherwise be required.

Mounting distances:

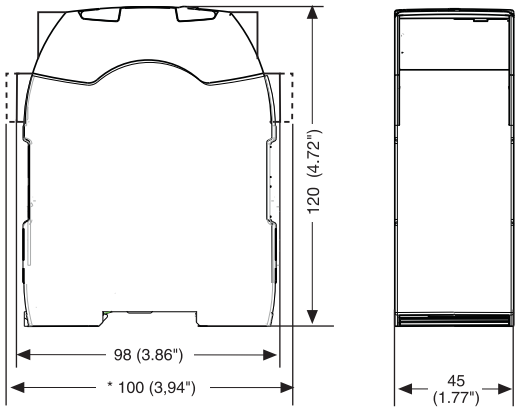


INFORMATION

Please note that at the stated minimum distance, it will be difficult to swap the chip card from above. If you cannot leave a greater distance, remove the unit from the mounting rail to swap the chip card.

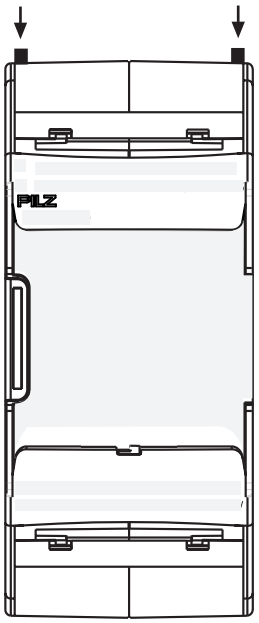
6.2 Dimensions in mm

*with spring-loaded terminals



6.3 Install base unit without expansion module

Make sure that the terminators are inserted on the top left and right of the unit.



6.4 Connecting the base unit and expansion modules

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.

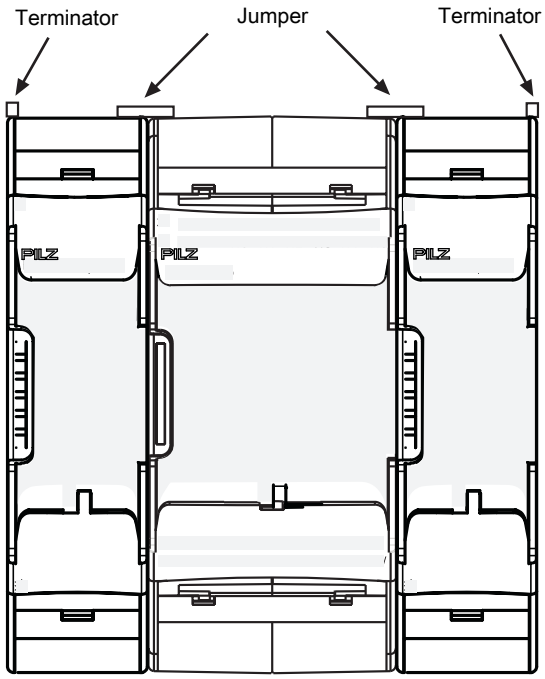
CAUTION!

Please note:

Only connect the expansion modules on the slot stated in the document "System expansion", otherwise the expansion module may be destroyed as a result.

The modules are linked via jumpers.

- Remove the terminator on the side of the base unit and on the expansion module.
- Install the base unit and expansion modules on the mounting rail in the order configured in the PNOZmulti Configurator and connect the units using the jumper supplied.
- Fit the terminator to the unconnected interfaces on the base unit and expansion module.



CAUTION!

Only connect the base unit and expansion modules when the supply voltage is switched off.

7 Commissioning

7.1 General wiring guidelines

The wiring is defined in the circuit diagram in the Configurator. There you can select the inputs that are to perform a safety function and the outputs that are to switch this safety function.

Note:

- Information given in the Technical details [📖 44] must be followed.
- Outputs O0 to O3 are semiconductor outputs
- Use copper wiring with a temperature stability of 75 °C.
- Sufficient protection circuit must be provided on all output contacts with inductive loads.
- The safety system and input circuits must always be supplied by a single power supply. The power supply must meet the regulations for extra low voltages with protective separation (SELV/PELV).
- Do not route the test pulse cables together with actuator cables within an unprotected sheathed cable.

7.2 Connection

Procedure:

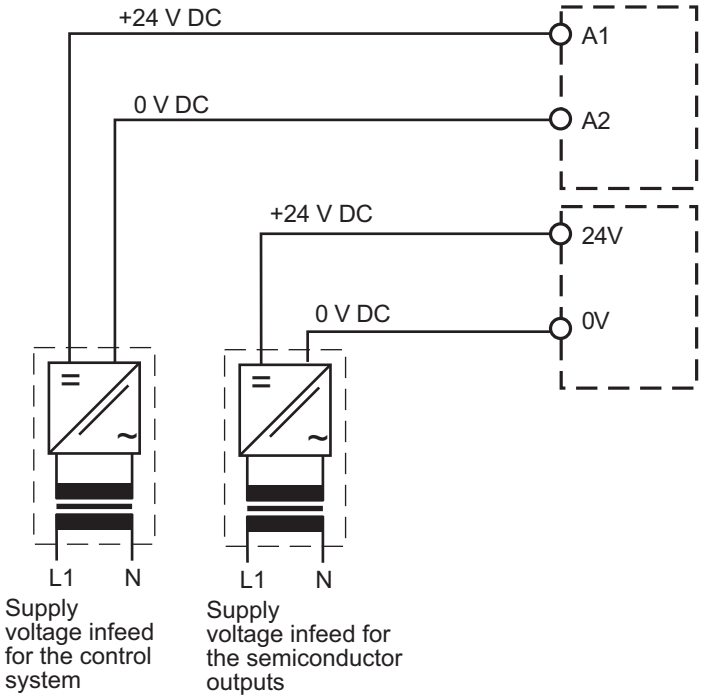
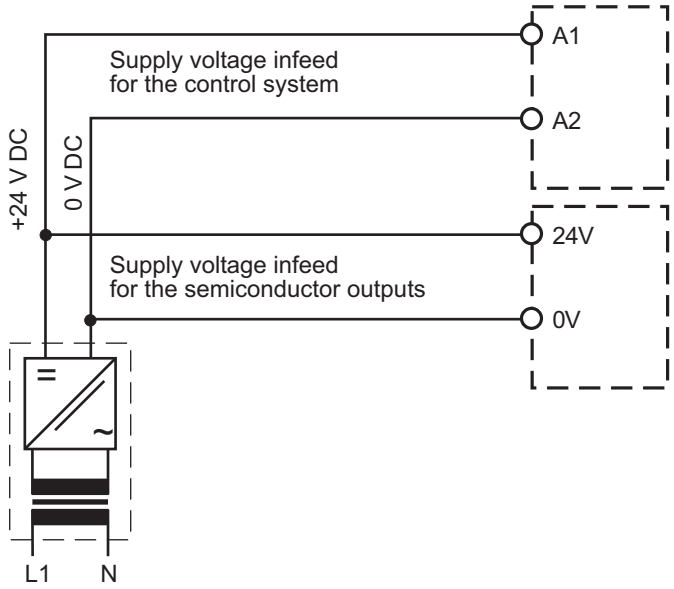
- Wire the inputs and outputs on the base unit in accordance with the circuit diagram.
- Connect the supply voltage:
  - Supply voltage for the control system:
  - Terminal A1: + 24 VDC
  - Terminal A2: 0 V
  - Supply voltage for the semiconductor outputs:
  - 24 V terminal: + 24 VDC
  - 0V terminal: 0 V

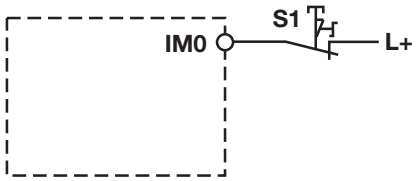
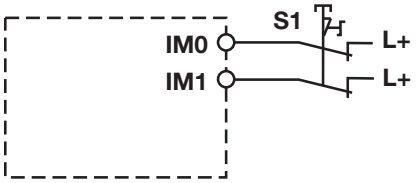
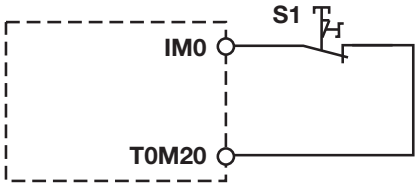
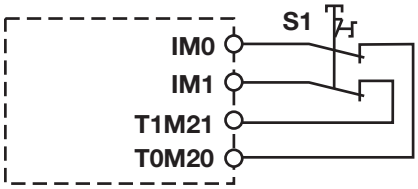
Please note: The supply voltage for the semiconductor outputs must always be present, even if you are not using the semiconductor outputs.

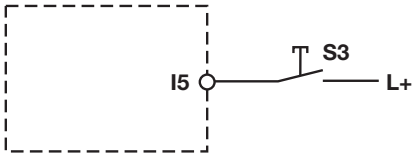
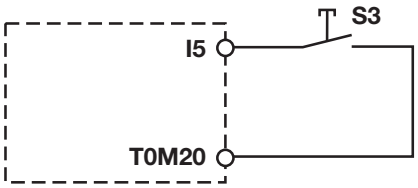
When the voltages are fed separately using two power supplies, the supply voltage for the control system and the supply voltage for the semiconductor outputs are galvanically isolated.

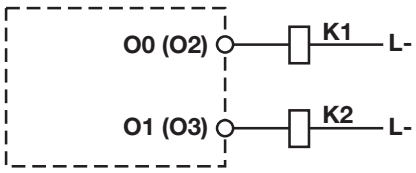
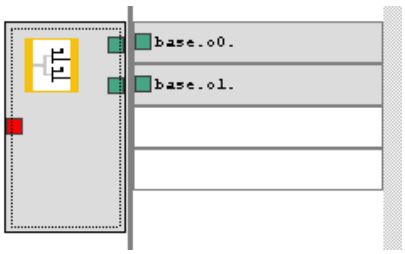
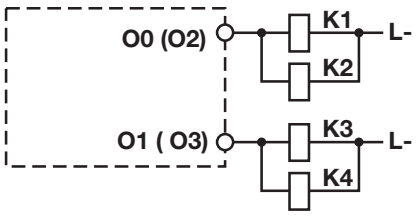
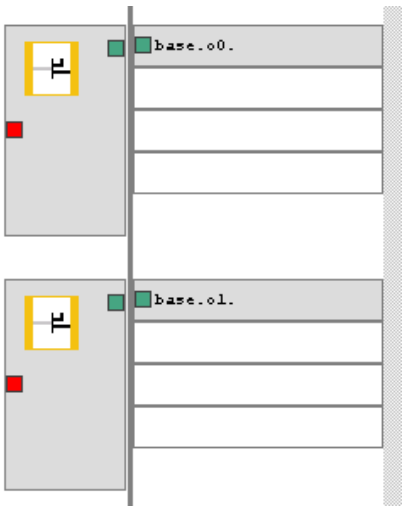
CAUTION!

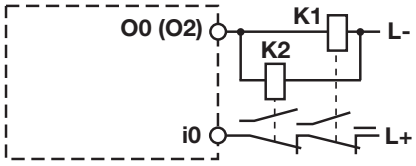
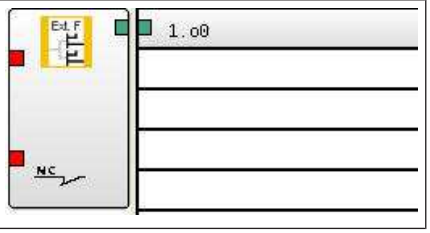
Do not connect or disconnect expansion modules and terminators during operation.

Supply voltage	
Separate power supplies for the supply voltage to the control system and the supply voltage to the semiconductor outputs	
Common power supply for the supply voltage to the control system and the supply voltage to the semiconductor outputs	

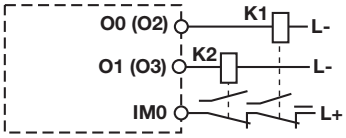
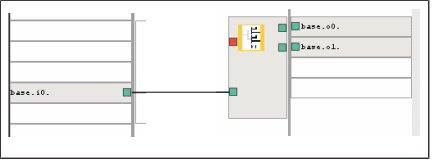
Input circuit	Single-channel	Dual-channel
Emergency stop **without** detection of shorts across contacts		
Emergency stop **with** detection of shorts across contacts		

Start circuit	Input circuit without detection of shorts across contacts	Input circuit with detection of shorts across contacts
		

Semiconductor outputs		
Redundant output		
Single output		

Semiconductor outputs		
Single output with advanced fault detection*		

*Two loads may be connected to each safety output with advanced fault detection, even on applications in accordance with EN IEC 62061, SIL 3. Prerequisite: Feedback loop is connected, shorts across contacts and external power sources are excluded (e.g. through separate multicore cables). Please note that, in the event of an error in the feedback loop, the safety system switches to a safe state and shuts down **all** outputs.

Feedback loop	Redundant output	
Contacts from external contactors		

7.3 Load project from chip card

Procedure:

- Insert the chip card containing the current project into the card slot on the base unit.
- Switch on the supply voltage. The LC display shows the project name, CRC sum and the date the project was created. Please check this information.
- Load the project by pressing the rotary knob. For the project to be downloaded, the rotary knob must be held down for between 3 and 8 seconds. Once the project has been successfully downloaded, the status of the inputs and outputs will be shown on the display.

7.4 Load project via USB port

Procedure:

- Connect the computer containing the PNOZmulti Configurator to the base unit via the USB port.
- Switch on the supply voltage.
- Download the project (see PNOZmulti Configurator's online help).
- Once the project has been successfully downloaded, the status of the inputs and outputs and the supply voltage will be shown on the display. The "RUN" LED is lit.

See also Project menu [📖 34]

INFORMATION

If a chip card is inserted in the base unit when the project is loaded via the USB port, then the project data is simultaneously saved on the chip card.

7.5 Function test during commissioning

CAUTION!

It is essential to check that the safety devices operate correctly

- after the chip card has been exchanged
- after a project has been downloaded
- when the project has been deleted from the base unit's memory ("Reset Project" menu)

7.6 Using the chip card

NOTICE

The chip card contact is only guaranteed if the contact surface is clean and undamaged. For this reason please protect the chip card's contact surface from

- Contamination
- Contact
- Mechanical impact, such as scratches.

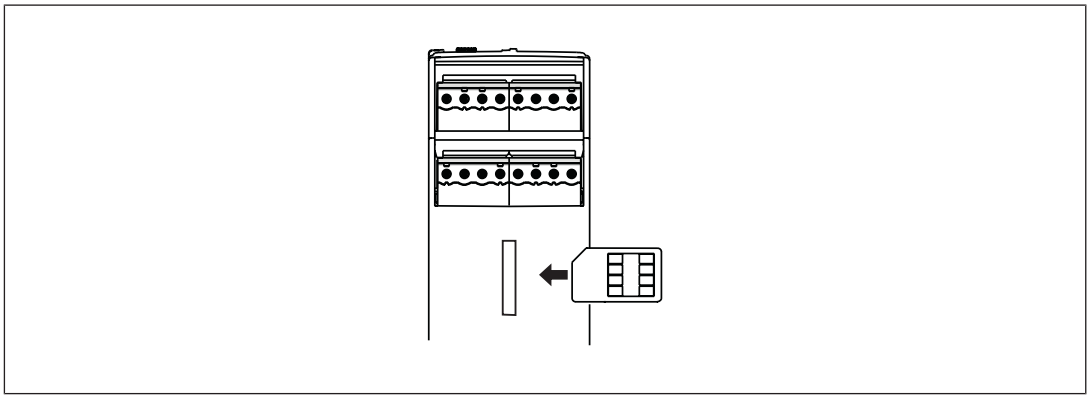
NOTICE

Switch off the product before inserting or exchanging the chip card.

Make sure that you do not bend the chip card as you insert it into the chip card slot.

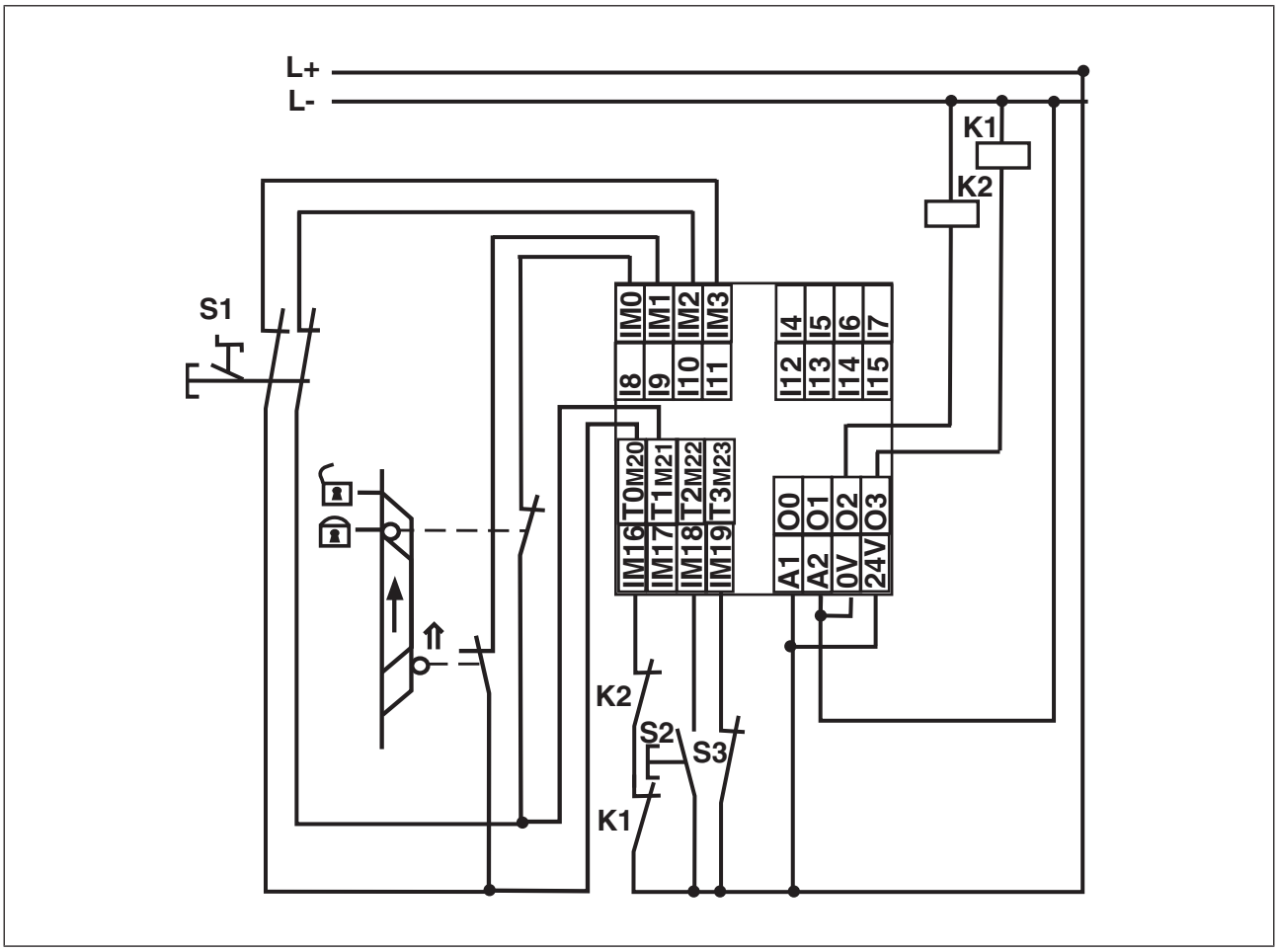
The chip card is not required in order to operate the device.

To remove the chip card, press on the chip card and then pull it out.



7.7 Connection example

Dual-channel E-STOP and safety gate wiring, monitored start (IM18), feedback loop (IM16)



8 Operation

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

8.1 LED indicators

The PNOZmulti control system is ready for operation when the "POWER" and "RUN" LEDs on the base unit are lit continuously.

Legend

 LED on

 LED flashes

● LED off

Basis					Error
Run	Diag	Fault	IFAULT	OFAULT	
●					The existing user program has been deleted.
●					External error on the base unit, leading to a safe condition, e.g. chip card not inserted
●					External error on the base unit outputs, e.g. short across the contacts, leading to a safe condition.
●					Internal error on the base unit
●					Internal error on the base unit (inputs)
●					Internal error on the base unit (outputs)
					Base unit in a STOP condition
					External error on the base unit inputs, which does not lead to a safe condition, e.g. partially operated
					External error on the base unit outputs, which does not lead to a safe condition, e.g. feedback input defective
					The fieldbus module has not been recognised. or The base unit was identified by the PNOZmulti Configurator via the Ethernet interface or An existing fieldbus connection was interrupted.

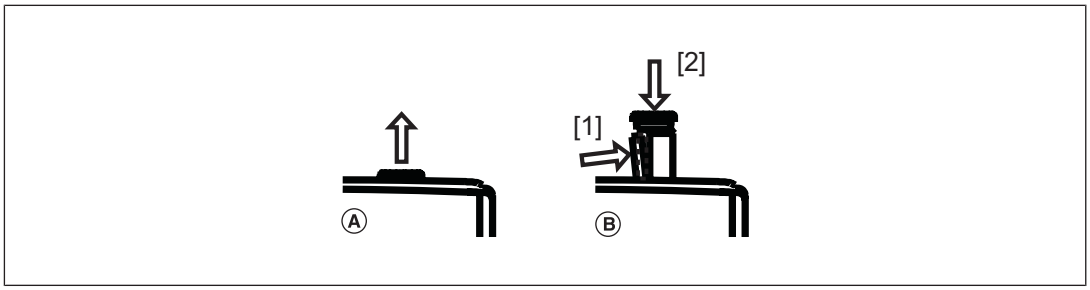
8.2 Display menu

8.2.1 Operate menu

Function

The menu settings are made on the unit's display via a rotary knob. You have the option to make the settings on the knob by hand or with a screwdriver. If you make the settings with a screwdriver, the knob can remain within the unit.

Pull out and retract the knob



Knob :

- (A) pull out until it locks into position
- (B) release and push it back into the unit:
  - Press the bar on the side of the knob [1] towards the centre of the knob. This releases the knob.
  - Press the knob downwards [2] while keeping the bar pressed in

Rotate and press the knob

The settings are made via the rotary knob, as follows:

Press knob

- Confirm selection/setting
- Switch to menu

Rotate knob

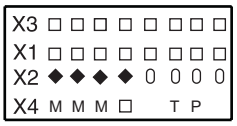
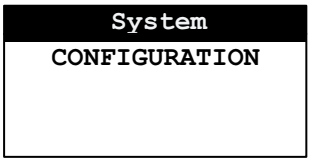
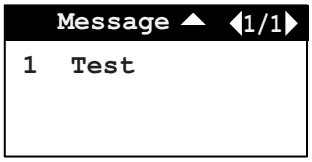
- Select menu level

8.2.2 Displays and settings

Information is shown on the device display and settings can be made.

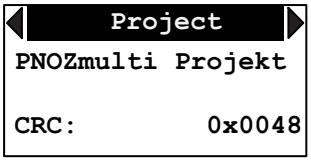
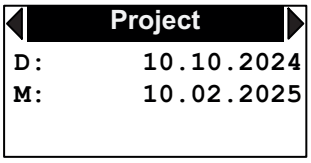
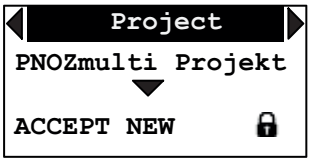
You can switch between the menu levels by pressing or turning the knob.

8.2.2.1 Status indicators

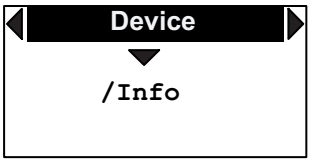
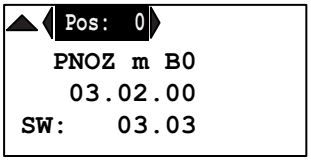
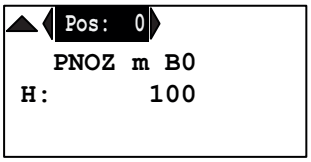
Display	Example	Description
RUN State of the inputs/ outputs and supply voltage		□ Input active ■ Input inactive ◆ Test pulse output active ◇ Test pulse output inactive O Semiconductor output M Signal output
Errors and messages Status and error messages		Error messages as short text
System		Restart system -> Hold down multifunction switch for 4 s in order to perform the action
Display Message Display messages		Messages that are created in the PNOZmulti Configurator.

8.2.2.2 Project menu

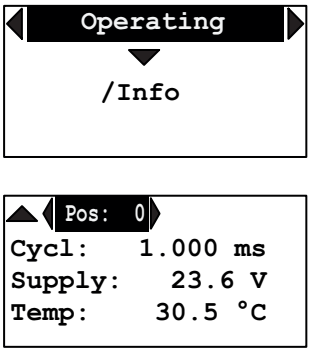
In the ***Project*** menu you can display information about the project that is stored on the device or chip card.

Display	Display	Description
Project name CRC		▸ Name of project ▸ Overall project check sum
D: M: Creation and modification date		▸ Date the project was created ▸ Date the project was modified
Project on the chip card Accept		Transfer the project on the chip card to the device Login required in the User login menu See Load project from chip card [📖 29]

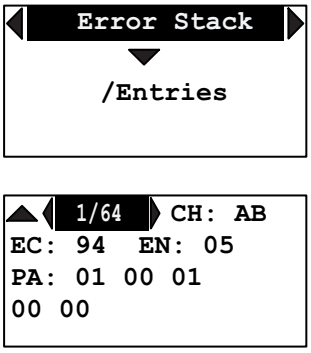
8.2.2.3 Device Info menu

Display	Example	Description
Device Info	  	Information on the base unit and expansion modules. Overview: ▸ Pos: Position/slot ▸ Device type ▸ Firmware version ▸ Software version ▸ H: Operating hours

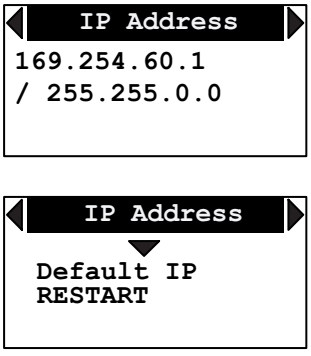
8.2.2.4 Operating Info menu

Display	Example	Description
Operating Info		Display of specific operating parameters for the base unit and expansion modules. ▸ Pos: Position/slot ▸ Cycle time ▸ Supply voltage ▸ Temperature

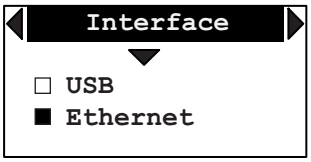
8.2.2.5 Error Stack menu

Display	Example	Description
Error Stack		Display of entries in the error stack (see also section entitled Error stack on the device display [📖 40] To read the error stack entries, please refer to the document ***PNOZmulti Error Messages***

8.2.2.6 IP address menu

Display	Example	Description
IP Address IP address of base unit (only appears on base units to which a communication module with Ethernet interface is connected)		IP address of base unit. ▸ IP address ▸ Subnet mask Reset to default IP address: 169.254.60.1

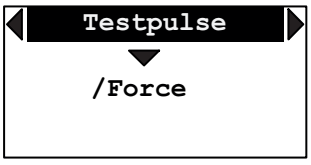
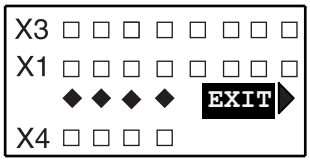
8.2.2.7 Interface menu

Display	Example	Description
Interface Interface		Show the selected interface ■ Interface active □ Interface inactive

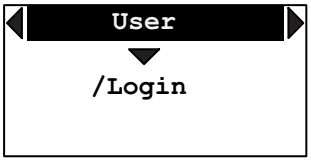
8.2.2.8 Project reset menu

Display	Example	Description
RESET project Delete project		Delete project from the base unit's memory Login required in the User login menu

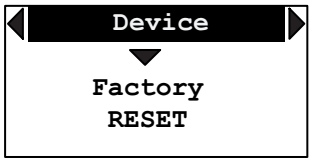
8.2.2.9 Force test pulse menu

Display	Example	Description
Force **Test Pulse** Activate test pulse outputs	 	□ Input active ■ Input inactive ◆ Test pulse output active ◇ Test pulse output inactive O Semiconductor output M Signal output See also Switching the test pulse outputs [📖 40]

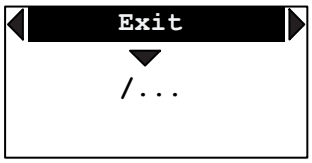
8.2.2.10 User login menu

Display	Example	Description
Password	 	Enter password to gain access to certain actions in the device display

8.2.2.11 Device factory reset menu

Display	Example	Description
Device Factory RESET		During a factory reset, all the data stored in the device is reset (see Factory reset [📖 42]).

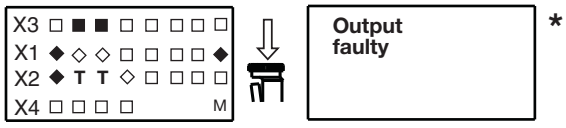
8.2.2.12 Exit menu

Display	Example	Description
Exit		Exit menu

8.2.3 Device diagnostics

Procedure for showing error messages on the LC display, when the errors do not lead to a safe state:

- Use the rotary knob to display stored errors:



* If an error leads to a safe state, the error message appears on the display immediately. Once the cause has been rectified, you will need to restart the device.

Procedure for restarting the device:

- Press the rotary knob for between 3 and 8 seconds to reset the device.

Error messages	Error
FAULTY PROJECT	The chip card or device memory contains a project that is faulty or incompatible.
NO PROJECT	There is no project in the device memory (e.g. after a factory reset).
CHIP CARD ?	Chip card is not inserted, blank or unreadable
FAULTY TEST PULSE	Error caused by test pulses
PARTIALLY OPERATED	Function element was or is partially operated
FEED BACK LOOP	External error at the feedback loop inputs

Error messages	Error
OPERATING MODE SWITCH SELECTOR	Error on the operating mode selector switch function element
FAULTY OUTPUT	External error on the output
OUTPUT WITH ADVANCED FAULT DETECTION	External error on the output with advanced fault detection
LOAD SUPPLY	Error in the supply voltage for the semiconductor outputs
FAULTY DEVICE	Internal error on the base unit
SUPPLY LOW	Supply voltage is below the tolerance level
SUPPLY HIGH	Supply voltage exceeds the tolerance level
CONFIGURATION	Hardware registry does not match the configuration
TEMPERATURE	Operating temperature is outside the permitted range
ERROR	Error that cannot be assigned
PRESSURE SENSITIVE MAT	Error on the input of a pressure-sensitive mat
PROJECT NOT RESET	The project was not deleted
NEW PROJECT	New project detected on the chip card
NUMERIC FAULT	A violation of the numeric value range was identified on an analogue module.
ANALOG INPUTSIGNAL FAULTY	A violation of the workspace was identified on an analogue current input on an analogue module.
ANALOG MEASUREMENT ERROR	A measurement error was identified on an analogue current input on an analogue module.
MEASURING RANGE VIOLATION	A violation of the measuring range was identified on an analogue current input on an analogue module.

8.2.4 Error stack on the device display

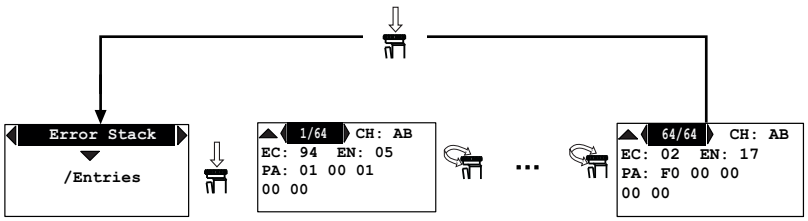
The error stack can be read from the PNOZmulti Configurator or shown on the device display. The error stack helps Pilz technical support with fault diagnostics. The error stack can store up to 64 status and error messages.

The following information is shown on the device display:

- Sequential number of an error stack entry. A new error stack entry is stored in first place.
- Error class (EC) and error information (EI)
- Error number (EN) and five error parameters (PA)

Procedure for displaying the error stack on the device display:

- Use the rotary knob to display the error stack.



INFORMATION

Use the rotary knob to exit the error stack.

For details of how to read the error stack in the PNOZmulti Configurator, read the online help for the PNOZmulti Configurator.

8.2.5 Switching the test pulse outputs

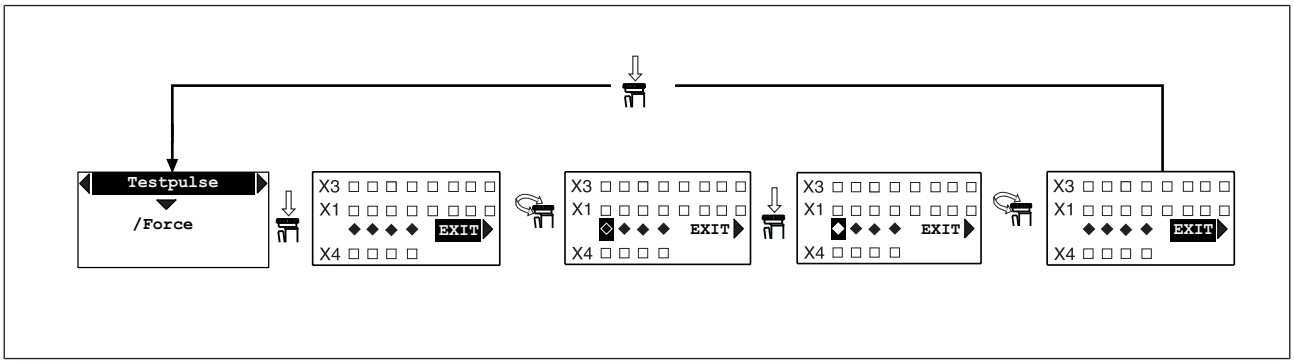
If the system is in a stop state, the test pulse outputs can be switched manually via the menu on the display.

This function can be used to

- Commission inputs with the test pulse signal from the base unit
  or
- Locate the error source in the event of test pulse errors.

Procedure for switching test pulse outputs manually:

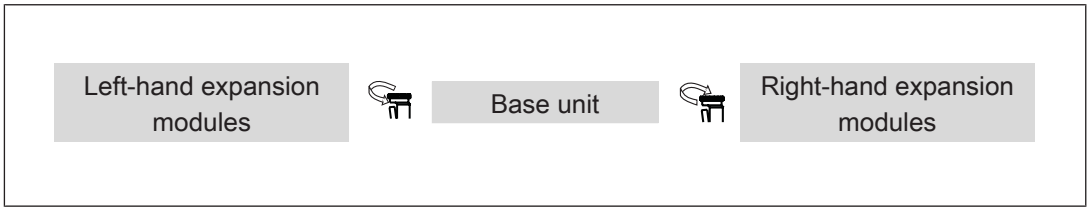
- Ensure that the system is in a stop state
- Use the rotary knob to make the settings.



8.2.6 Device information

Device data and operating parameters can be shown on the display.

In the menu, turn to the left to display the devices to the left of the base unit; turn to the right to display the devices to the right of the base unit.



9 Factory reset

A factory reset of the device is always sensible or indeed necessary when the device is removed from the existing plant/machine, possibly to re-use it in another application.

During a factory reset, all the data stored in the device is reset:

- Project data is deleted from the internal memory.
- If a chip card is inserted, it is deleted and formatted.
- Error stack is deleted.
- Program change log is deleted.
- Configured user data (user name, passwords, permissions) is deleted and is reset to the default values.

You can initiate a factory reset both in the PNOZmulti Configurator (see online help for the PNOZmulti Configurator) and also directly on the device.

Initiate factory reset directly on the device

- Switch off the supply voltage to the base unit.
- Press the rotary knob, keep it held down and switch the base unit's supply voltage back on.
- Keep the rotary knob held down until the display of the PILZ logo disappears.
- Ensure that the device is in a stop state.
- Select ***Device – Factory RESET*** from the main menu.
- Press and hold down the rotary knob until the progress bar runs its course.
- The factory reset has been completed successfully when the status ***System FACTORY RESET DONE*** is displayed and the ***Diag*** LED flashes.

INFORMATION

After switching on the supply voltage, the menu ***Device Factory RESET*** is only available for 60 s.
If a factory reset is not requested during this time, then ***Device Factory RESET*** is removed from the menu.

10 Maintenance and testing

It is not necessary to perform maintenance work on the product in normal operation. Please return any faulty products to Pilz.

11 Technical details

Where standards are undated, the 2018-07 valid editions apply.

General	
Certifications	**CE, EAC, KOSHA, TÜV, UKCA, cULus Listed**
Application range	**Failsafe**
Module's device code	**0060h**
Electrical data	
Supply voltage	
for	**Supply to the system**
Voltage	**24 V**
Kind	**DC**
Voltage tolerance	**-20 %/+25 %**
Max. continuous current that the external power supply must provide	**1,6 A**
Inrush current that the external power supply must provide	**3 A**
External unit fuse protection F1	**6 A, circuit breaker 24 V DC, characteristic B**
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 A**
External unit fuse protection F2	**10 A, circuit breaker 24 V DC, characteristic B/C**
Potential isolation	**Yes**
Supply voltage	
Max. current consumption	**32 mA**
Power consumption	**0,8 W**
Max. power dissipation of module	**7,4 W**
Status indicator	**Display, LED**
Permitted loads	**inductive, capacitive, resistive**
Configurable inputs/outputs (inputs or auxiliary outputs)	
Quantity	**8**
Potential isolation	**No**
Configurable inputs	
Input voltage in accordance with EN 61131-2 Type 1	**24 V**
Input current at rated voltage	**5 mA**
Input current range	**2,5 - 5,3 mA**
Pulse suppression	**0,5 ms**
Maximum input delay	**2 ms**

Configurable inputs/outputs (inputs or auxiliary outputs)	
Configurable auxiliary outputs	
Voltage	**24 V**
Output current	**75 mA**
Output current range	**0 - 100 mA**
Max. transient pulsed current	**500 mA**
Short circuit-proof	**Yes**
Residual current at "0"	**0,5 mA**
Voltage at "1"	**UB - 2 V at 0.1 A**
Inputs	
Quantity	**12**
Input voltage in accordance with EN 61131-2 Type 1	**24 V DC**
Input current at rated voltage	**5 mA**
Input current range	**2,5 - 5,3 mA**
Pulse suppression	**0,5 ms**
Maximum input delay	**2 ms**
Potential isolation	**No**
Semiconductor outputs	
Number of positive-switching single-pole semiconductor outputs	**4**
Switching capability	
Voltage	**24 V**
Current	**2 A**
Permitted current range	**0,000 - 2,500 A**
Residual current at "0" signal	**0,05 mA**
Max. transient pulsed current	**12 A**
Max. capacitive load	**1 µF**
Max. internal voltage drop	**500 mV**
Max. duration of off time during self test	**330 µs**
Switch-off delay	**1 ms**
Potential isolation	**Yes**
Short circuit-proof	**Yes**
Test pulse outputs	
Number of test pulse outputs	**4**
Voltage	**24 V**
Current	**0,1 A**
Max. duration of off time during self test	**5 ms**
Short circuit-proof	**Yes**
Potential isolation	**No**
Times	
Simultaneity in the two-hand circuit	**0,5 s**
Processing time	**30 ms**

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 SL	**2000 m**
EMC	**EN 61131-2**
Vibration	
in accordance with the standard	**EN 60068-2-6**
Frequency	**5 - 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	**SC output and system voltage**
Type of potential isolation	**Basic insulation**
Rated insulation voltage	**30 V**
Rated surge voltage	**2500 V**
Mechanical data	
Mounting position	**horizontally on mounting rail**
DIN rail	
Top hat rail	**35 x 15 EN/IEC 60715, 35 x 7,5 EN/IEC 60715**
Recess width	**27 mm**
Cable length	
Max. cable length per input	**1 km**
Sum of individual cable lengths at the test pulse output	**2 km**

Mechanical data	
Material	
Bottom	**PC**
Front	**PC**
Top	**PC**
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	**45 mm**
Depth	**120 mm**
Weight	**235 g**

11.1 Safety characteristic data

NOTICE

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

Unit	Operating mode	EN ISO 13849-1: 2015 PL	EN ISO 13849-1: 2015 Category	EN IEC 62061 SIL CL/ max. SIL	EN IEC 62061 61508 PFH_D [1/h]	EN/IEC 61511 61508 SIL	EN/IEC 61511 61508 PFD	EN ISO 13849-1: 2015 T_M [year]
Logic								
CPU	**2-channel**	**PL e**	**Cat. 4**	**SIL 3**	**4,74E-10**	**SIL 3**	**4,00E-05**	**20**
Expansion left	–	**PL e**	**Cat. 4**	**SIL 3**	**3,30E-11**	**SIL 3**	**2,49E-06**	**20**
Expansion right	–	**PL e**	**Cat. 4**	**SIL 3**	**2,79E-11**	**SIL 3**	**2,18E-06**	**20**
Input								
Inputs	**1-channel**	**PL d**	**Cat. 2**	**SIL 2**	**3,85E-09**	**SIL 2**	**3,38E-04**	**20**
Inputs	**2-channel**	**PL e**	**Cat. 4**	**SIL 3**	**7,95E-11**	**SIL 3**	**6,90E-06**	**20**
Inputs	**Short circuit-forming safety mats**	**PL d**	**Cat. 3**	**SIL 2**	**1,06E-09**	**SIL 2**	**9,14E-05**	**20**
Inputs	**1-ch., pulsed light barrier**	**PL e**	**Cat. 4**	**SIL 3**	**3,85E-10**	**SIL 3**	**3,40E-05**	**20**
Output								
SC outputs	**1-channel with reduced fault detection**	**PL d**	**Cat. 2**	**SIL 2**	**2,45E-09**	**SIL 2**	**1,04E-04**	**20**
SC outputs	**2-channel with reduced fault detection**	**PL e**	**Cat. 4**	**SIL 3**	**4,87E-09**	**SIL 3**	**2,06E-04**	**20**
SC outputs	**1-channel with advanced fault detection**	**PL e**	**Cat. 4**	**SIL 3**	**1,66E-11**	**SIL 3**	**1,46E-06**	**20**
SC outputs	**1-channel**	**PL d**	**Cat. 2**	**SIL 2**	**1,57E-10**	**SIL 2**	**1,35E-05**	**20**
SC outputs	**2-channel**	**PL e**	**Cat. 4**	**SIL 3**	**1,29E-10**	**SIL 3**	**1,12E-05**	**20**

Explanatory notes for the safety-related characteristic data:

- T_M is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN/IEC 61508-6 and EN/IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 62061

All the units used within a safety function must be considered when calculating the safety characteristic data.

INFORMATION

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may differ from these.

11.2 Classification in accordance with ZVEI, CB24I

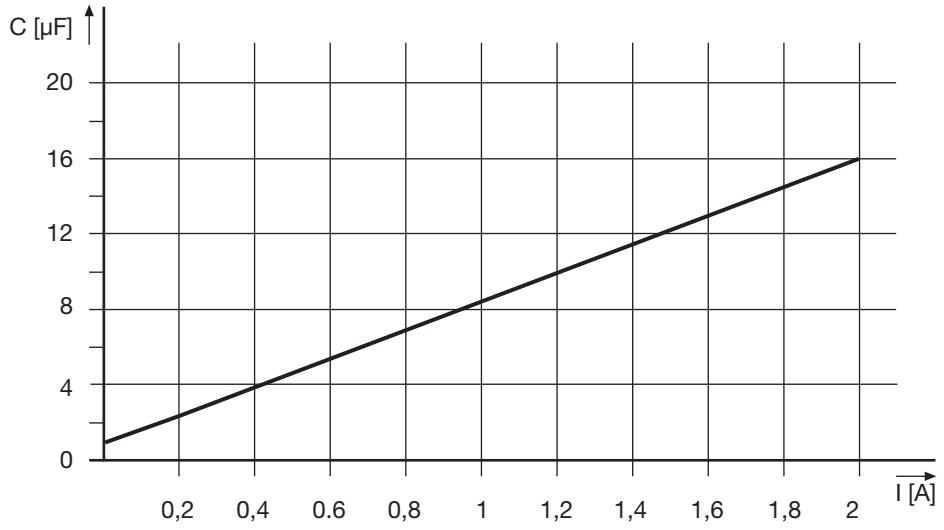
The following tables describe the classes and specific values of the product interface and the classes of interfaces compatible with it. The classification is described in the ZVEI position paper "Classification of Binary 24 V Interfaces - Functional Safety aspects covered by dynamic testing".

Input	
Interfaces	
Drain	
Interface	**Module**
Class	**C2**
Source	
Interface	**Sensor**
Class	**C2, C3**
Drain parameters	
Max. test pulse duration	**500 µs**
Min. input resistance	**5,6 kOhm**
Max. capacitive load	**126 nF**

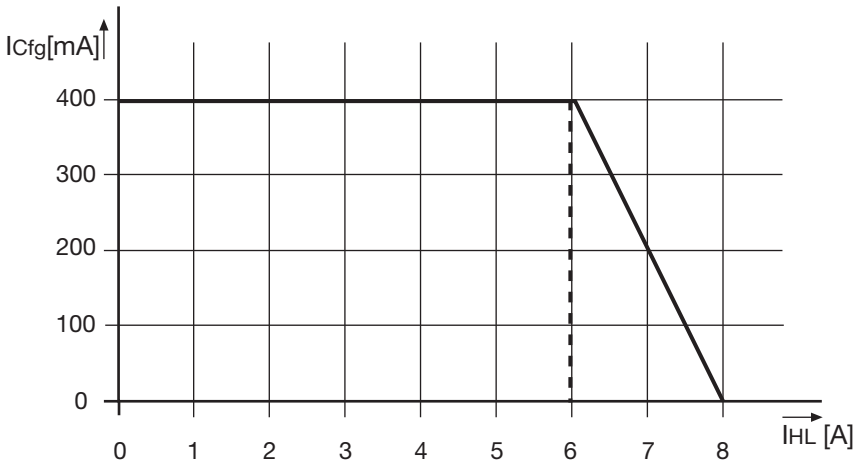
Single-pole output	
Interfaces	
Source	
Interface	**Module**
Class	**C2**
Drain	
Interface	**Actuator**
Class	**C1, C2**
Source parameters	
Max. test pulse duration	**330 µs**
Max. rated current	**2 A**
Max. capacitive load	**1 µF**

12 Supplementary data

12.1 Maximum capacitive load C (µF) with load current I (A) at the semiconductor outputs



12.2 Maximum permitted total current of the semiconductor outputs

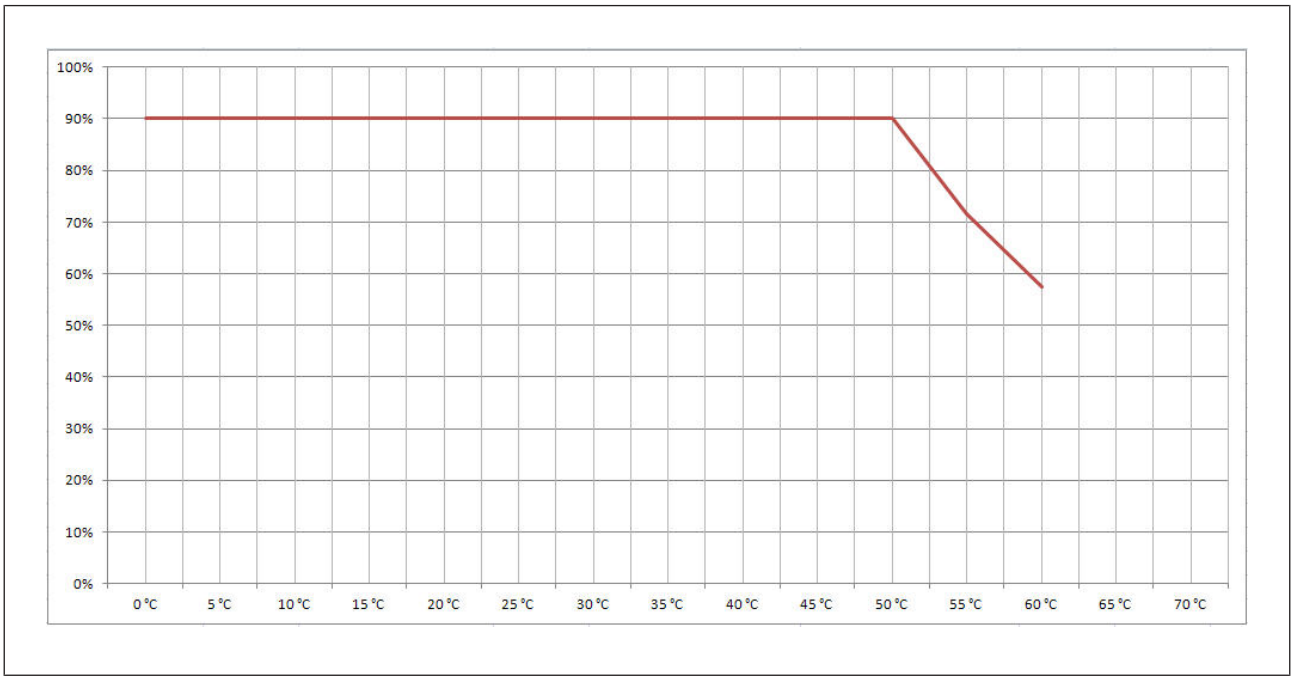


I_{Cfg}: Total current of the configurable semiconductor outputs (auxiliary outputs)

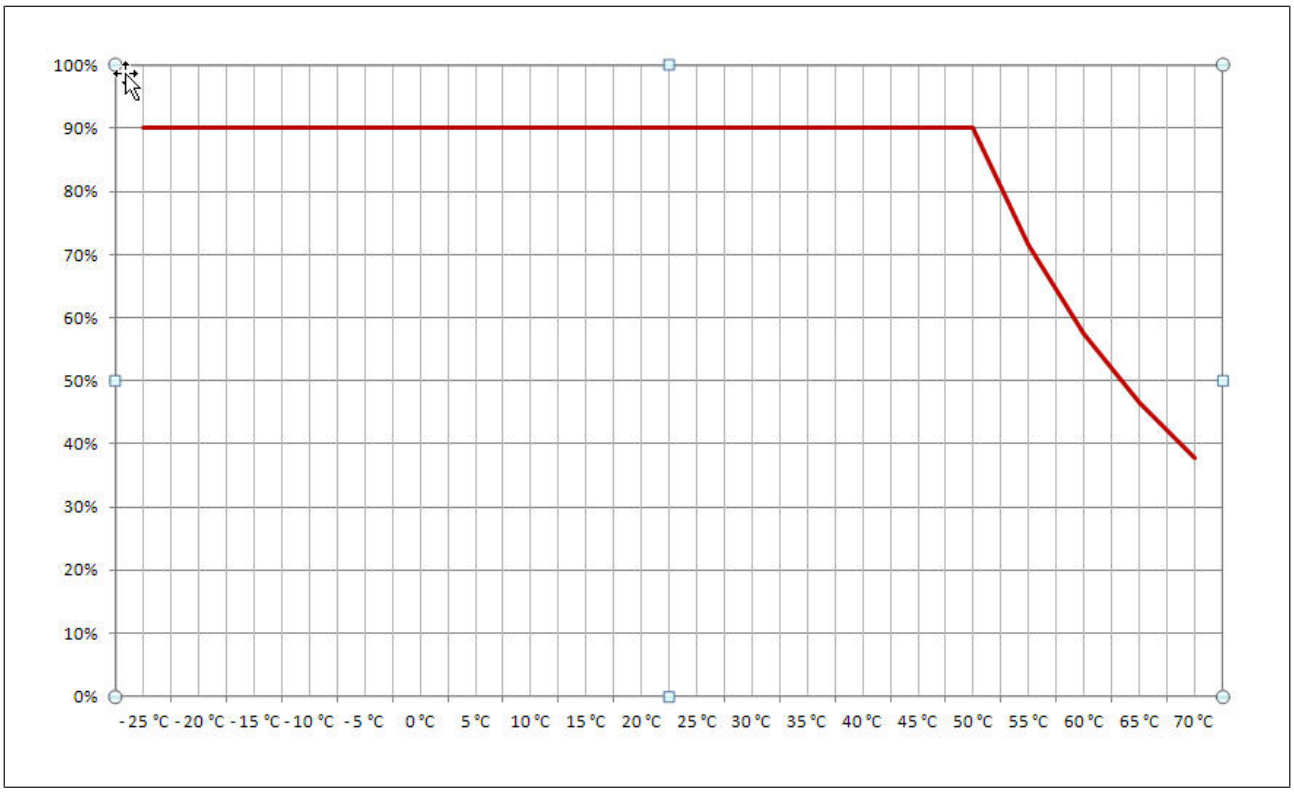
I_{HL}: Total current: Semiconductor outputs (safety outputs)

12.3 Maximum permitted humidity

12.3.1 Max. relative humidity, operation



12.3.2 Max. relative humidity, storage



13 Order reference

13.1 Product

Product type	Features	Order no.
PNOZ m B0	Configurable safe small controllers PNOZmulti 2, base unit, expandable, 20 safe digital inputs, 4 safe semiconductor outputs.	772100

13.2 Accessories

13.2.1 Chip card

Product type	Features	Order no.
PNOZmulti Chipcard 1 piece 32kB	PNOZmulti chip card, 1 piece, 32 kB.	779211
PNOZmulti Chipcard 1 piece 8kB	PNOZmulti chip card, 1 piece, 8 kB.	779201

13.2.2 Replacement terminals

Product type	Features	Order no.
PNOZ s Set1screw terminals 45mm	Set of plug-in replacement terminals 8-pin of screw type, PU = 1 piece each X1, X2, X3, X4.	750008
PNOZ s Set1 spring-loaded terminals 45mm	Set of plug-in replacement terminals 8-pin of spring-loaded type, PU = 1 piece each X1, X2, X3, X4.	751008

13.2.3 Cable

Product type	Features	Order no.
PSSu A USB-CAB03	PSSu, USB cable, length 3 m.	312992
PSSu A USB-CAB05	PSSu, USB cable, length 5 m.	312993

13.2.4 Terminating plug

Product type	Features	Order no.
PNOZ mm0.xp terminator left (10 pcs.)	Terminator on the left-hand side of the base unit PNOZmulti, yellow/black (10 pieces).	779261

14 EC declaration of conformity

This product/these products meet the requirements of the directive 2006/42/EC on machinery of the European Parliament and of the Council. The complete EC Declaration of Conformity is available on the Internet at www.pilz.com/downloads.
Representative: Pilz GmbH & Co. KG, Felix-Wankel-Str. 2, 73760 Ostfildern, Germany

15 UKCA-Declaration of Conformity

This product(s) complies with following UK legislation: Supply of Machinery (Safety) Regulation 2008.
The complete UKCA Declaration of Conformity is available on the Internet at www.pilz.com/downloads.

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