

PNOZ s50

- Safety relays

PILZ
THE SPIRIT OF SAFETY

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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 safe PWM relay PNOZ s50 from Version 1.0.0. 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.



INFORMATION

The device is suitable for activating inductive loads within the specification. The terminology in this documentation is based on a safe mechanical holding brake. This terminology can easily be transferred to the physical circumstances of other applications.

1.1.1 Retaining the documentation

This documentation is intended for instruction and should be retained for future reference.

1.2 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 Unit structure

2.1.1 Scope of supply

- ▶ PWM relay PNOZ s50
- ▶ Connection terminals (spring-loaded terminals)
- ▶ Chip card
- ▶ Chip card holder
- ▶ Documentation on data medium

2.1.2 Unit features

Using the product PNOZ s50:

PWM relay for the safe activation of inductive loads, e.g. valves, mechanical holding brakes.

The product has the following features:

- ▶ Semiconductor outputs
 - 2 dual-pole failsafe power outputs, rated voltages 24 V or 48 VDC, e.g. for mechanical holding brakes, valves
 - Output voltage can be reduced through pulse width modulation (PWM)
 - Potential of the power outputs connected to the supply voltage B1/B2
 - 1 single-pole failsafe output for error
 - 2 single-pole failsafe outputs for status of the power circuits
 - 2 test pulse outputs
 - Potential of the single-pole outputs connected to supply voltage A1/A2
- ▶ Semiconductor inputs
 - 4 failsafe inputs for activating the power outputs (fast shutdown of power circuits)
 - 2 single-pole standard inputs for activating the power outputs (slow shutdown of power circuits)
 - 2 single-pole standard inputs for feedback loops

Potential of the semiconductor inputs connected to supply voltage A1/A2
- ▶ Supply voltage
 - 24 VDC for device
 - For power circuits, rated voltage 24 V, 48 VDC

Supply voltage for device and power circuit are isolated from each other
- ▶ Voltage output 24 VDC
 - Potential connected to supply voltage A1/A2
- ▶ Can be configured via the display on the device
- ▶ Configuration is stored on a chip card

- ▶ Display
 - Number of operations
 - System information
 - Status of the inputs and outputs
 - Warning and error messages
- ▶ Status and fault LEDs
- ▶ Plug-in connection terminals (spring-loaded terminals)

2.2 Front/side view

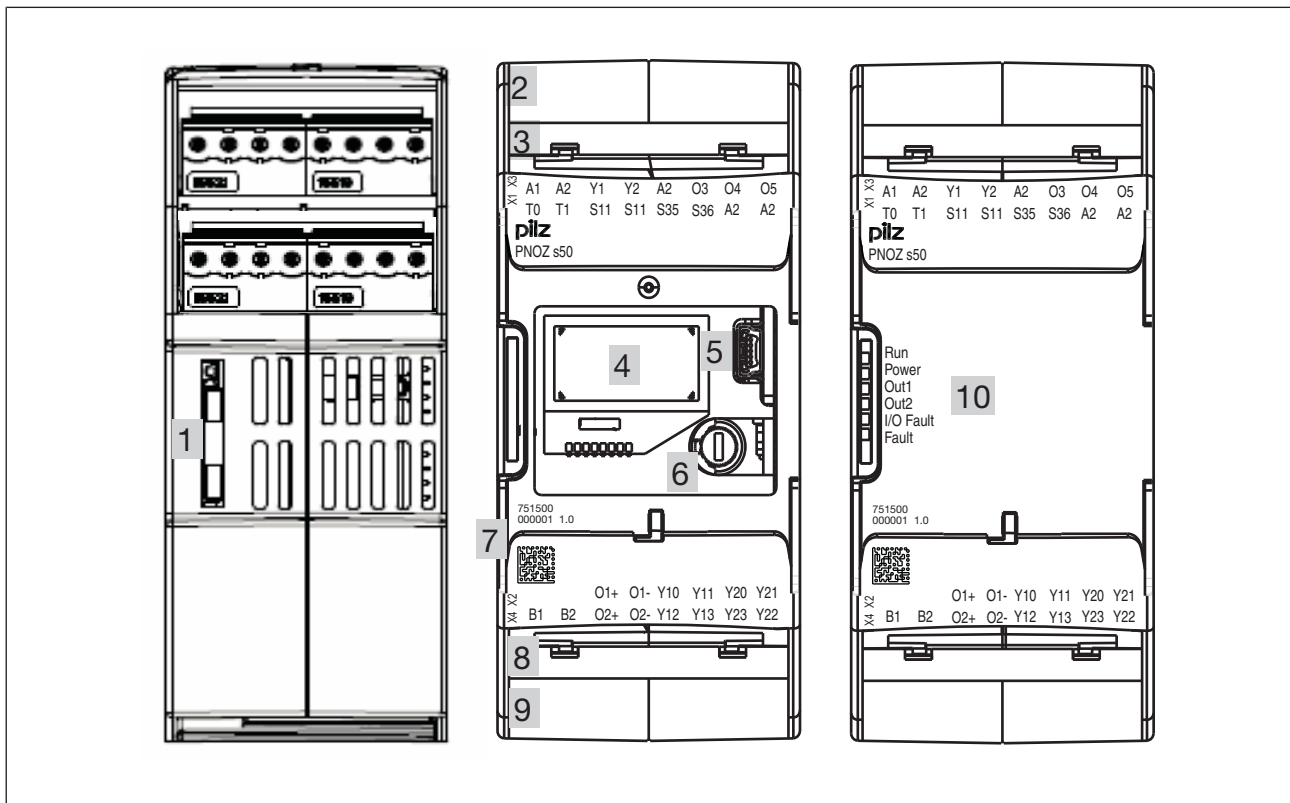


Fig.: Left: Side view, centre: Front view without cover, right: Front view with cover

Legend:

- ▶ 1: Chip card
- ▶ 2: Connection terminal X3
- ▶ 3: Connection terminal X1
- ▶ 4: Display
- ▶ 5: 4-pin socket (service only)
- ▶ 6: Rotary knob
- ▶ 7: Labelling strip with:
 - Order number
 - Serial number
 - Hardware version number

- 2D code
- ▶ 8: Connection terminal X2
- ▶ 9: Connection terminal X4
- ▶ 10: LEDs

3 Safety


3.1 Intended use

The PWM relay PNOZ s50 is designed for use in safety-related applications.

The device meets the requirements of EN ISO 13849-1 up to PL e and EN IEC 62061 up to SIL CL 3. For example, it is designed for use with

- ▶ Mechanical holding brakes.
- ▶ Valves.

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](#) [ 61]).



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.

Please note the following safety guidelines:

Hazard analysis

- ▶ The machine manufacturer must produce a hazard analysis for the machine. He must take appropriate measures to ensure that unexpected movements do not lead to hazardous situations for either people or equipment.

Demands on the safety control system

- ▶ The PNOZ s50 may only be operated in conjunction with a higher level safety control system.
- ▶ The outputs on the safety control system used to activate fast shutdown must be tested to detect shorts across contacts and earth faults.
- ▶ The fault signal output O3 must be evaluated together with status outputs O4 (if O1+/O1- is used) and O5 (if O2+/O2- is used), if this is demanded by the plant/machine's safety requirements. Processing of these signals is used to check the feasibility of the signal states. Evaluation of these signals must be suitable to achieve a safe condition for the application.

Demands on the connected, inductive load

- ▶ The inductive load must guarantee the demands on the safety function in a de-energised state. For example, in a de-energised state a connected safe brake must always be applied, must stop a hazardous movement and must prevent unintended start-up.

Slow shutdown in the event of a fault

- ▶ When designing a safe application, you should consider that a slow shutdown instead of a fast shutdown may be effective in the event of a fault. A connected brake may have a longer stopping distance.

Slow shutdown

- ▶ The power circuit's slow shutdown is not safety-related. It may only be used when permitted by the hazard analysis.
- ▶ To shut down the inductive load safely, the fast shutdown must be activated after the slow shutdown. That way the load has a dual-pole shutdown.

Measures to prevent unexpected start-up

- ▶ Appropriate measures must be taken to prevent unexpected start-up or unexpected movements from plant standstill.

Wiring measures

- ▶ The effective current at terminals B1/B2 to supply the power circuits must not exceed 10 A. The cables must be fitted with a 10 A fuse, characteristic B/C.
- ▶ The cables for the unit's supply voltage (A1/A2) must be fitted with a 4 A fuse, characteristic B/C.
- ▶ The wiring must be designed to achieve sufficient noise immunity and protection against emissions in terms of EMC. Please also refer to DIN EN 60204-1 (Electrical equipment of machines).
- ▶ Appropriate wiring measures should be taken to avoid earth faults and shorts between contacts.

Display

- ▶ The correct display of configuration data and messages are part of the device's safety concept. If the display is faulty (e.g. pixels are missing, faulty letters or numbers), the device must be taken out of service.

The machine manufacturer must check and verify the functionality of the employed safety functions.

- ▶ The safety functions may only be checked by qualified personnel.

The safety function must be checked


- ▶ After initial commissioning
- ▶ After changing the configuration of the safety functions
- ▶ After swapping the PNOZ s50 or connected equipment

A full check comprises

- ▶ Proper execution of the employed safety functions
- ▶ Inspection of the parameters

The result of the check on each safety function must be documented in a test report. This test report must be signed.

Regular checks

The PNOZ s50 uses appropriate tests to guarantee that it functions safely (see chapter entitled "Function description", under "Output test  22"). It does not test the entire safety function. You should check this at regular intervals. The aim of these regular checks is to uncover any changes to the plant/machine, safety functions and ambient conditions. In particular you should regularly check the function of the connected brake.

You must comply with the requirements of the applicable national regulations.

The intervals you select will depend on the application, the overall system and the associated risk analysis.

3.2 Safety regulations

3.2.1 Safety assessment

Before using a unit it is necessary to perform a safety assessment in accordance with the Machinery Directive.

Functional safety is guaranteed for the product as a single component. However, this does not guarantee the functional safety of the overall plant/machine. In order to achieve the required safety level for the overall plant/machine, define the safety requirements for the plant/machine and then define how these must be implemented from a technical and organisational standpoint.

3.2.2 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.

3.2.3 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.).

3.2.4 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).

3.3 For your safety

The unit meets all the necessary conditions for safe operation. However, please note the following:

- ▶ Note for overvoltage category III: If voltages higher than low voltage (>50 VAC or >120 VDC) are present on the unit, connected control elements and sensors must have a rated insulation voltage of at least 250 V.

4 Function description

4.1 Introduction

The PWM relay PNOZ s50 is used for the safety-related shutdown of inductive loads.

It has two power outputs to activate two independent, inductive loads. Each power circuit is switched independently by two inputs. Two feedback loops monitor the switch status of the inductive loads. Two failsafe outputs signal the switch status of the inductive loads to the higher level safety control system. A failsafe fault signal output signals any fault to a higher level safety control system.

The device is configurable. All the parameters can be set via a rotary knob with pushbutton. The state of the inputs and outputs, the configuration and any faults are shown on a display. The configuration is stored on a chip card.

There is an integrated counter, which records the number of operations for each power circuit.

Block diagram

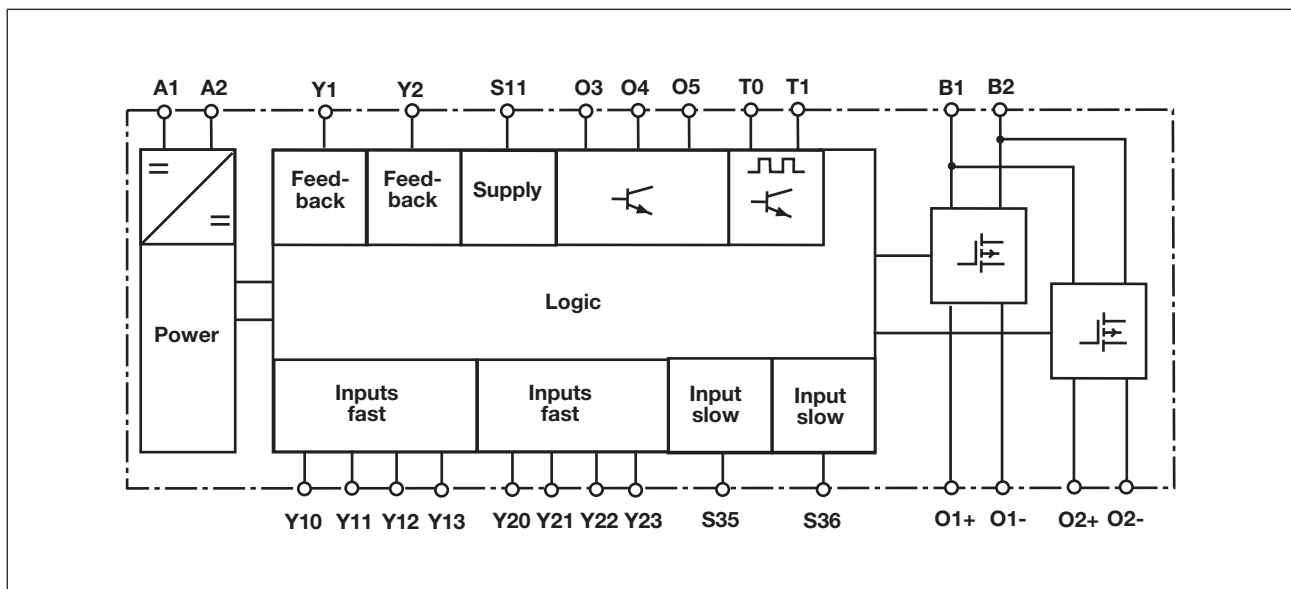


Fig.: Block diagram

Potential isolation, potential connection:

- ▶ Potential isolation between the supply voltages A1/A2 and B1/B2.
- ▶ Potential connection between the power outputs O1+/O1-, O2+/O2- and the supply voltage B1/B2.
- ▶ Potential connection between the semiconductor inputs and single-pole outputs, voltage output and supply voltage A1/A2.

4.2 Functions

4.2.1 Switching the power circuits on and off (fast shutdown)

The device has two safe dual-pole outputs O1+/O1- (power circuit 1) and O2+/O2- (power circuit 2), which can be switched using inputs Y10/Y11 (power circuit 1) and Y20/Y21 (power circuit 2):

- ▶ Switch-on (brake is ventilated):
 - O1+/O1- is switched on when there is a "1" signal (24 VDC) at Y10 **and** Y11.
 - O2+/O2- is switched on when there is a "1" signal (24 VDC) at Y20 **and** Y21.
 - Partial operation is not time-monitored. An output will not switch until both the corresponding inputs are "1".
- ▶ Switch-off (brake is applied):
 - O1+/O1- is switched off safely when there is a "0" signal (0 VDC) at Y10 **and/or** Y11.
 - O2+/O2- is switched off safely when there is a "0" signal (0 VDC) at Y20 **and/or** Y21.



INFORMATION

Please note that when using fast shutdown, the inputs for slow shutdown (S35 and S36) must have a "1" signal.

Power circuit 1	Y10	Y11	O1+, O1-	
	1	1	1	Load under current (power circuit 1 switched on)
	1	0	0	Load without current (power circuit 1 switched off)
	0	1	0	
	0	0	0	
Power circuit 2	Y20	Y21	O2+, O2-	
	1	1	1	Load under current (power circuit 2 switched on)
	1	0	0	Load without current (power circuit 2 switched off)
	0	1	0	
	0	0	0	

The power circuits are supplied via the terminals B1/B2 with the voltage U_{B1B2} (voltage range: rated voltage 24 V, 48 VDC).

**INFORMATION**

Max. current at the power circuits

It is essential to note that the effective current at terminals B1/B2 to supply the power circuits must not exceed 10 A. The cables must be fitted with a 10 A fuse, characteristic B/C.

Both poles are switched (e.g. O1+, O1-).

**INFORMATION**

At the safe inputs Y10 and Y11 / Y20 and Y21, a "0" signal must be present before the corresponding output O1+/O1- / O2+/O2- can be switched by a "1" signal at both inputs. If this is not the case, a fault is signalled and the LED "Out 1" or "Out 2" flashes (the diagram below illustrates this, using the dual-pole input Y10/Y11 and the output O1+/O1- as an example).

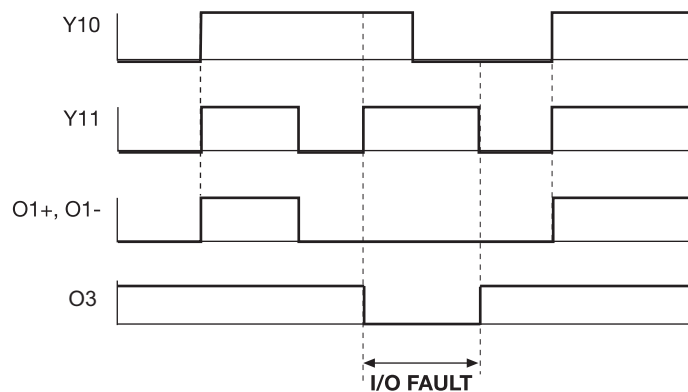


Fig.: Start-up condition for inputs Y10/Y11

**INFORMATION**

Please note: Inputs Y10/Y11 switch output O1+/O1-; inputs Y20/Y21 switch output O2+/O2-. In the event of a fault, however, both outputs will switch off. Status outputs O4/O5 also switch off, irrespective of the switch status of the inductive load. At the time an input, e.g. Y11, is switched on, if the other input, e.g. Y10, is not at "0", the fault signal output O3 will signal a fault via a "0" signal.

After the output O1+/O1- and/or O2+/O2- is switched on, the voltage U_{B1B2} is available for a configurable overexcitation time U_{over} . Once the overexcitation time t_{over} has elapsed, the voltage is reduced through pulse width modulation (PWM). The overexcitation time t_{over} and the reduced voltage U_{Avg} are configured via the display.

**INFORMATION**

The overexcitation time t_{over} can also be switched off for each power circuit. In this case, the output voltage of the power circuits O1+/O1- and/or O2+/O2- equals the supply voltage U_{B1B2} .

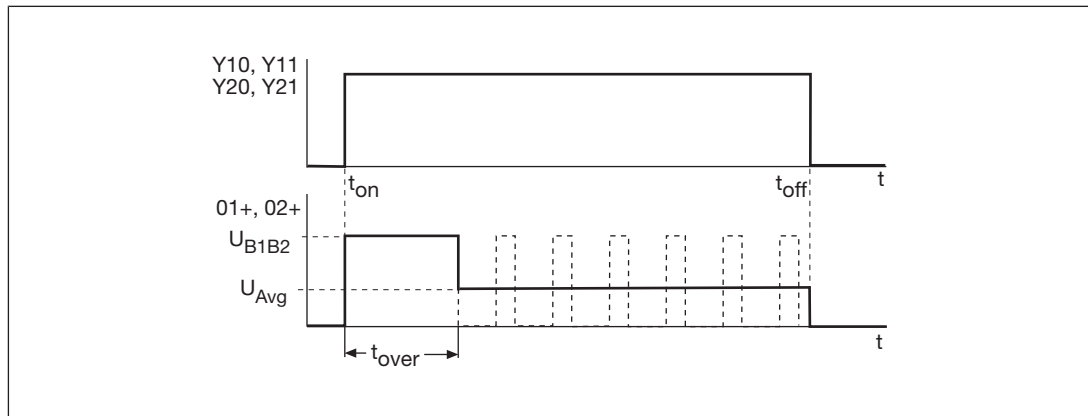


Fig.: Switching the power circuits on and off

Legend:

- ▶ Y10, Y11, Y20, Y21: Safe inputs to switch the outputs O1+, O2+
- ▶ O1+, O2+: Safe outputs, power circuit 1 and 2
- ▶ U_{B1B2} : Supply voltage to the power circuits
- ▶ t_{on} : Switch on power circuit
- ▶ t_{over} : Configured overexcitation time
- ▶ t_{off} : Switch off power circuit
- ▶ U_{Avg} : Configured reduced voltage (arithmetic mean of the voltage at the outputs once the overexcitation time has elapsed)

Inputs Y10, Y11 (or Y20, Y21) can be activated via single-pole or dual-pole safe outputs.

**INFORMATION**

Details of the wiring can be found in the chapter entitled "Commissioning", under "[Wiring \[26\]](#)".

4.2.2**Switching the power circuits on and off (slow shutdown S35, S36)**

If the switching times are not critical, the loads at the power circuits can also be shut down slowly. A connected brake is permitted to have longer application times, for example. The brake switches with lower noise and is lower wearing.

**NOTICE**

The power circuit's slow shutdown is not safety-related. It may only be used when permitted by the hazard analysis.

To shut down the inductive load safely, the fast shutdown must be activated after the slow shutdown. That way the brake has a dual-pole shutdown.

A 1/0 pulse edge at one of the slow shutdown inputs (S35 or S36) switches off the corresponding power circuit (O1+, O2+) in single-pole mode. A flywheel diode means that the current only dissipates the magnetic field slowly.

**INFORMATION**

Please note that when using slow shutdown, the inputs for fast shutdown (Y10/Y11 and Y20/21) must have a "1" signal.

Power circuit 1	S35	O1+, O1-
	1/0 pulse edge	Switches off power circuit 1
Power circuit 2	S36	O2+, O2-
	1/0 pulse edge	Switches off power circuit 2

**INFORMATION**

Please note: Input S35 switches output O1+/O1-; input S36 switches output O2+/O2-. In the event of a fault, however, both outputs will switch off.

**INFORMATION**

If slow shutdown is not being used, 24 VDC must be permanently applied to terminals S35 and S36 (see section entitled "Conditions for fast and slow shutdown").

4.2.3**Conditions for fast and slow shutdown**

To shut down the power circuits, the following conditions must be met:

Shutdown	Y10/Y11	S35	O1+/O1-
Fast	1/0 pulse edge	1	-> 0
Slow	1	1/0 pulse edge	-> 0

Shutdown	Y20/Y21	S36	O2+/O2-
Fast	1/0 pulse edge	1	-> 0
Slow	1	1/0 pulse edge	-> 0

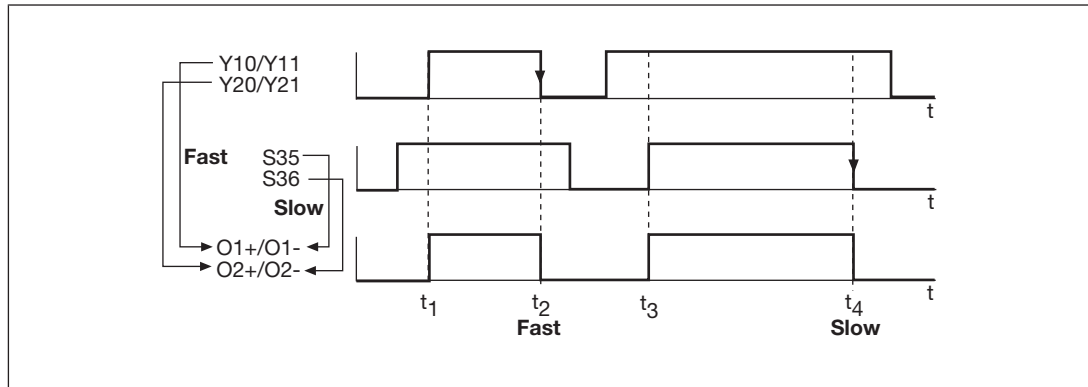


Fig.: Conditions for fast and slow shutdown

**NOTICE**

Please note that a fast shutdown has priority over a slow shutdown. Only a fast shutdown is safety-related.

Legend:

- ▶ Fast: Fast shutdown
- ▶ Slow: Slow shutdown
- ▶ t_1 and t_3 : Switch-on: Y10, Y11, S35 = 1, O1+/O1- switches on; Y20, Y21, S36 = 1, O2+/O2- switches on
- ▶ t_2 : Fast shutdown via 1/0 pulse edge from Y10/Y11 or Y20/Y21
- ▶ t_4 : Slow shutdown via 1/0 pulse edge from S35 or S36

**NOTICE**

Please note that if there is a fault on the negative pole (O1-, O2-) of the power circuit, the load only shuts down in single-pole mode. The load will only execute a slow shutdown. The reaction time of the overall application may be extended accordingly.

4.2.4 Feedback loop Y1, Y2

The operating state of the inductive load can be uploaded, for example, via

- ▶ Micro switches
- ▶ Proximity switches
- ▶ Hall sensors

**NOTICE**

The device may only be operated if the feedback loops Y1 and Y2 evaluate the switch state of the connected equipment. The feedback loops must be monitored continuously from the moment the ventilation time elapses until the output shuts down. The device may not be operated unless the feedback loops are connected.

Equipment with a reaction time of < 3 ms cannot be used. The device switches to the "I/O Fault" state.

The feedback loop can be configured for N/C or N/O contacts.

The 24 V voltage outputs S11 of the PNOZ s50 can be used to provide the 24 V DC supply to the equipment in the feedback loop. This is only permitted if test pulses are not used. Otherwise a wiring error will be registered.

The feedback loop will only be evaluated after a max. ventilation and application time, which is to be configured. Contact bounce during application or ventilation of the equipment is ignored.

- ▶ Max. ventilation time: Period within which the load must be ventilated once the power circuit is switched on.
- ▶ Max. application time: Period within which the load must be applied once the power circuit is switched off.

The max. ventilation and application time, plus the switch-on behaviour (N/C / N/O) are configured via the display. The max. application time is configured separately for slow and fast shutdown. The max. ventilation time is configured jointly for slow and fast shutdown.

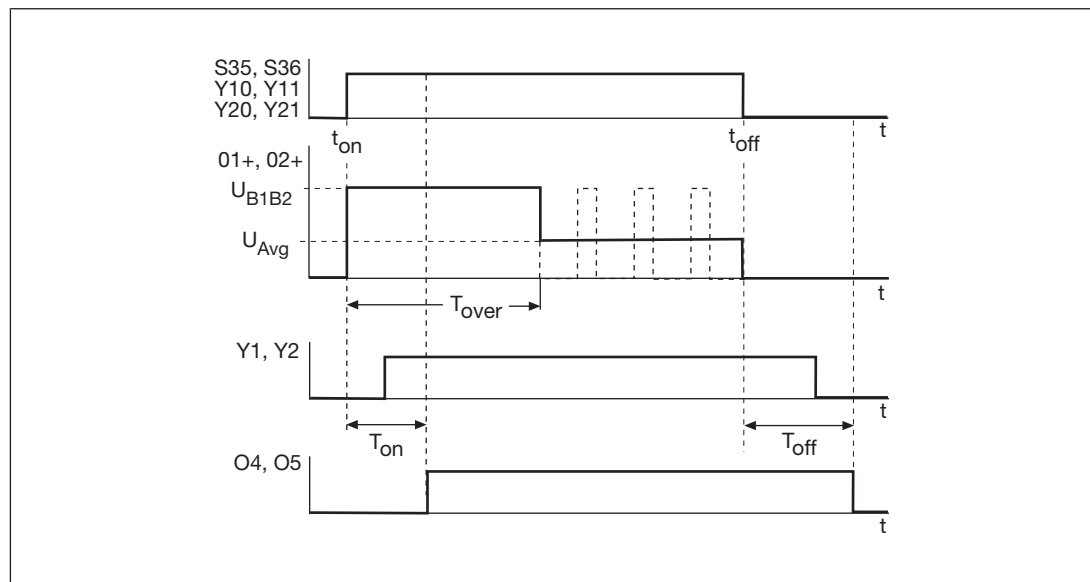


Fig.: Ventilation and application time

Legend:

- ▶ Y10, Y11, Y20, Y21: Safe inputs to switch the outputs O1+/O1-, O2+/O2-
- ▶ O1+, O2+: Safe outputs, power circuit 1 and 2

- ▶ U_{B1B2} : Supply voltage to the power circuits
- ▶ t_{on} : Switch on power circuit
- ▶ t_{over} : Configured overexcitation time
- ▶ t_{off} : Switch off power circuit
- ▶ U_{Avg} : Configured reduced voltage (arithmetic mean of the voltage at the outputs once the overexcitation time has elapsed)
- ▶ Y1, Y2: Feedback loops
- ▶ T_{on} : Configured duration of max. ventilation time
- ▶ T_{off} : Configured duration of max. application time
- ▶ O4, O5: Failsafe outputs for status of the load, change in state after T_{on} and T_{off} have elapsed

4.2.5 Test pulse outputs T0, T1

Feedback loops Y1 and Y2 can be assigned test pulses. The PNOZ s50 has 2 test pulse outputs, T0 and T1.



INFORMATION

The feedback loop can only use test pulses if mechanical switches are used to feed back the switch status.

Please note the fixed allocation of test pulses to the following inputs:

- ▶ T0 pulses the feedback loop Y1
- ▶ T1 pulses the feedback loop Y2

The test pulse outputs T0/T1 are switched on (24 V) in

- ▶ "RUN" operating status.
- ▶ "I/O Fault" operating status (fault on inputs and outputs).

The test pulse outputs T0/T1 are switched off (0 V) in

- ▶ "Fault" operating status (internal fault).

The test pulses can be switched on and off via the display.

- ▶ The default setting is for test pulses to be switched on.
- ▶ Test pulses will not be active in the event of a fault (I/O Fault and Fault).



NOTICE

The test pulses can only be activated simultaneously for both feedback loops Y1 and Y2.

4.2.6 Signal and status outputs O3, O4, O5

Single-pole failsafe semiconductor outputs signal the operating status of the load and indicate a fault.

**NOTICE**

The fault signal output O3 must be evaluated together with status outputs O4 (if O1+/O1- is used) and O5 (if O2+/O2- is used), if this is demanded by the plant/machine's safety requirements. Processing of these signals is used to check the feasibility of the signal states. Evaluation of these signals must be suitable to achieve a safe condition for the application.

Fault signal output	O3	
	1	No fault, LED "I/O Fault" and "Fault" is off
	0	Fault, LED "I/O Fault" or "Fault" is lit
Status outputs They signal the status of the load only after the ventilation or application time has elapsed.	O4	
	1	Load at O1+/O1- ventilated
	0	Load at O1+/O1- applied
	O5	
	1	Load at O2+/O2- ventilated
	0	Load at O2+/O2- applied

4.2.7 Output test

Outputs that are switched on are checked via regular off tests.

- ▶ Test pulses for outputs that are switched on: see technical details
- ▶ Outputs that are switched on are switched off for the duration of the test pulse.
- ▶ The load must not switch off because of the test.
- ▶ The switch-off tests cannot be turned off.

Dual-pole outputs that are switched off are checked via regular on tests.

- ▶ The test pulses switch the positive pole of the output. The load must not switch on because of the test.

Testing for shorts

- ▶ A test is regularly carried out to check for shorts between the outputs.

4.3 Status display, configuration and messages

4.3.1 Overview

The configuration is set using the device's rotary knob with pushbutton and is then displayed. Access to the configuration menu is password-protected.

The following device properties can be configured:

- ▶ Supply voltage to the power circuits
- ▶ Signals to the outputs of the power circuits:
 - Overexcitation time
 - Reduced voltage

- ▶ Feedback loop:
 - Max. ventilation and application time
 - High or low logic (N/O or N/C)
 - Evaluation of test pulses
- ▶ Offset (start value) for the number of operations

Additional information on the display:

- ▶ Status display
- ▶ Number of operations
- ▶ States of inputs and outputs
- ▶ Information on the device
- ▶ Software versions
- ▶ Error messages



INFORMATION

Further information on the configuration can be found in the section entitled "Commissioning", under "[Display menu and configuration \[61\]](#)".

4.3.2

Chip card

The set parameters, the device ID and the check sum for device configuration are stored on the chip card (for further information see chapter entitled "Commissioning", under "[Use chip card \[33\]](#)").

4.4

Reaction time

The reaction time (see [Technical details \[61\]](#)) of the PNOZ s50 is the time between a signal changing at the inputs for fast (Y10/Y11, Y20/Y21) or slow shutdown (S35, S36) and the signal changing at the outputs of the power circuit (O1+/O1-, O2+/O2-). The reaction time takes into account the input filter time, temperature drift and spread of components.

To determine the plant's overall reaction times, the corresponding internal processing times of the higher level safety control system and connected load must also be considered.

5 Installation

5.1 General installation guidelines

Control cabinet installation

- ▶ The unit should be installed in a control cabinet with a protection type of at least IP54.
- ▶ Fit the device to a horizontal DIN rail. The venting slots must face upwards and downwards. Other mounting positions could destroy the device.
- ▶ Use the locking element on the rear of the device to attach it to the DIN rail.
- ▶ Push the device upwards or downwards before lifting it from the DIN rail.



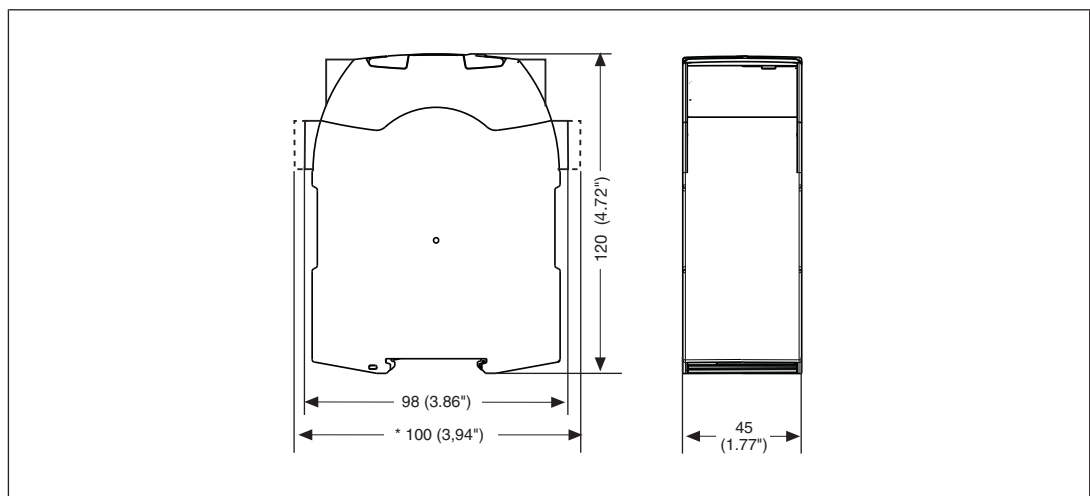
NOTICE

Damage due to electrostatic discharge!

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

5.1.1 Dimensions

*with spring-loaded terminals



5.2 Mounting distances

Depending on the ambient temperature, with control cabinet installation it may be necessary 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. Details of whether a distance needs to be maintained can be found in the section entitled "[Supplementary data](#) [65]".

Air conditioning may otherwise be required.

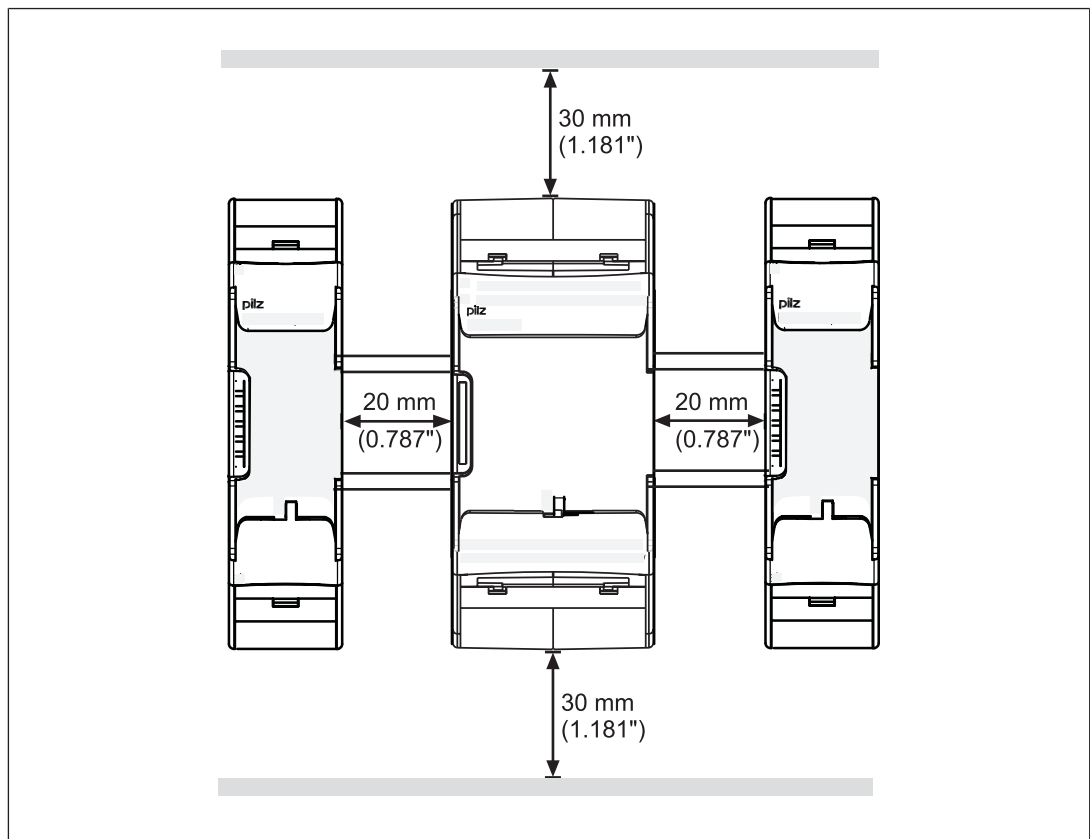


Fig.: Mounting distances for the PNOZ s50

6 Commissioning

6.1 Wiring

6.1.1 General wiring guidelines

Note:

- ▶ Information given in the "Technical details" must be followed.
- ▶ Use copper wire that can withstand 75 °C.
- ▶ The wiring must be designed to achieve sufficient noise immunity and protection against noise emissions in terms of EMC. Please also refer to DIN EN 60204-1 (Electrical equipment of machines).

Inputs

- ▶ Appropriate wiring must be used to exclude short circuits between the inputs or to a supply line!

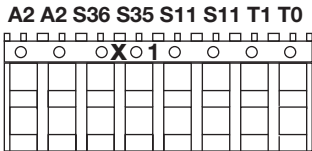
Outputs

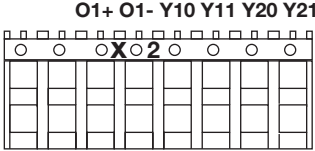
- ▶ If short circuits occur between the cable from the output to the load and a supply line, it will no longer be possible to switch off the load.

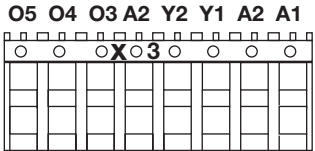
Possible remedy: Exclude the error by using separate multicore cable for supply voltages

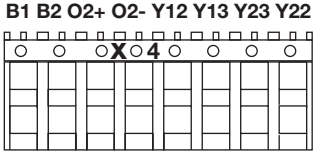
- ▶ Use appropriate wiring to exclude short circuits between the outputs!

6.1.2 Pin assignment

Female connector X1	Terminal	Description
	A2	Reference potential for - Device's supply voltage - Inputs - Fault signal and status outputs
	S36	Standard input for slow shutdown, power circuit 2
	S35	Standard input for slow shutdown, power circuit 1
	S11	Voltage output 24 VDC
	S11	Voltage output 24 VDC
	T1	Test pulse output 1
	T0	Test pulse output 0

Female connector X2	Terminal	Description
	O1+	Failsafe output for power circuit 1, positive
	O1-	Failsafe output for power circuit 1, negative
	Y10	Failsafe input for fast shutdown, power circuit 1
	Y11	Failsafe input for fast shutdown, power circuit 1
	Y20	Failsafe input for fast shutdown, power circuit 2
	Y21	Failsafe input for fast shutdown, power circuit 2

Female connector X3	Terminal	Description
	O5	Failsafe output for status, power circuit 2
	O4	Failsafe output for status, power circuit 1
	O3	Failsafe output for fault signal
	A2	0 V supply voltage for device
	Y2	Standard input for feedback loop 2
	Y1	Standard input for feedback loop 1
	A2	0 V supply voltage for device
	A1	24 VDC supply voltage for device

Female connector X4	Terminal	Description
	B1	Supply voltage of power circuits
	B2	Reference potential of the supply voltage to the power circuits
	O2+	Failsafe output for power circuit 2, positive
	O2-	Failsafe output for power circuit 2, negative
	Y12	Reference potential for failsafe inputs for fast shutdown, power circuit 1
	Y13	Reference potential for failsafe inputs for fast shutdown, power circuit 1
	Y23	Reference potential for failsafe inputs for fast shutdown, power circuit 2
	Y22	Reference potential for failsafe inputs for fast shutdown, power circuit 2

6.1.3 Supply voltage for device


WARNING!

Electric shock!

Safe electrical isolation must be ensured for the external power supply that generates the supply voltage. Failure to do so could result in electric shock. The power supplies must comply with EN 60950-1, 05/2006, EN 61558-2-6, 11/1997.

Supply voltage to the device	
<p>Please note: The supply voltage must be protected with a fuse.</p> <p>Fuse F1: Circuit breaker, 24 VDC, 4 A, characteristic B/C</p>	

Requirements:

- ▶ When selecting the power supply, please refer to the requirements stated under [Technical details](#) [61].
Make sure that the supply voltage for the device (A1/A2) complies with the specified tolerance of -15/+20 %. If the voltage is outside this tolerance, then
 - the device will change to a fault condition, if the outputs are switched on.
 - a message will be entered in the error stack if the outputs are switched off.

6.1.4 Supply voltage for power circuits

Requirements:

- ▶ When selecting the power supply, please refer to the requirements stated under [Technical details](#) [61].
Make sure that the supply voltage for the power circuits (B1/B2) complies with the specified tolerance of +/-10 %. If the voltage is outside this tolerance, then
 - the device will change to a fault condition, if the outputs are switched on.
 - a message will be entered in the error stack if the outputs are switched off.
- ▶ The power supply must be able to bridge a power outage of 20 ms.


WARNING!

Electric shock!

Safe electrical isolation must be ensured for the external power supply that generates the supply voltage. Failure to do so could result in electric shock. The power supplies must comply with EN 60950-1, 05/2006, EN 61558-2-6, 11/1997.



INFORMATION

Max. current at the power circuits

It is essential to note that the effective current at terminals B1/B2 to supply the power circuits must not exceed 10 A. The cables must be fitted with a 10 A fuse, characteristic B/C.

Supply voltage for power circuits	
Please note: The supply voltage must be protected with a fuse. Fuse F1: Circuit breaker 24 V, 48 VDC, 10 A, characteristic B/C	

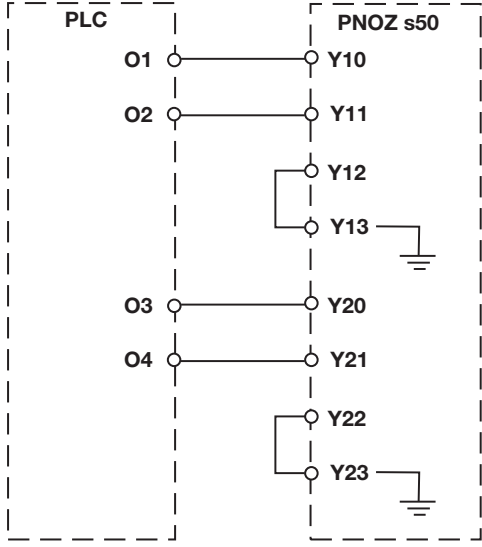
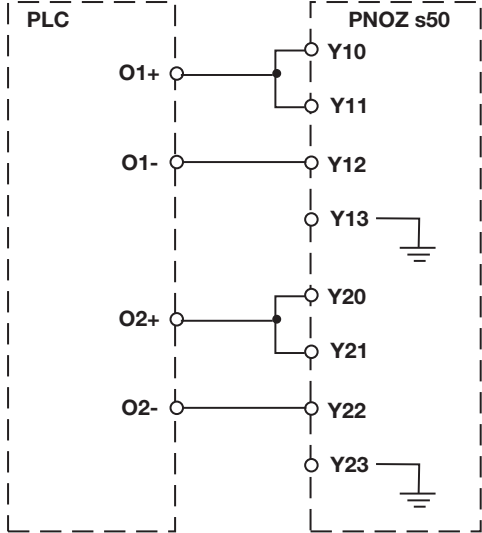
6.1.5

Power circuit

Power circuit	
Dual-pole outputs	

6.1.6 Inputs

6.1.6.1 Fast shutdown

Activation via safe single-pole outputs	
Link Y12 – Y13 Link Y22 – Y23 PLC: Safety control system	
Activation via safe dual-pole outputs	
Link Y10 – Y11 Link Y20 – Y21 PLC: Safety control system	

6.1.6.2 Slow shutdown

Activation via single-pole outputs	
PLC: Safety control system	
<p>Connect the inputs to 24 VDC if slow shutdown is not being used.</p> <p>S11: Voltage output 24 VDC</p>	

6.1.7 Outputs

Status outputs	
PLC: Safety control system	

6.1.8 Feedback loop

Feedback loop	
<p>A N/C contact is shown in the connection diagram. A N/O contact can also be configured.</p>	
Feedback loop with test pulses	
<p>Please note the allocation of the test pulses and feedback loops:</p> <p>T0 <-> Y1</p> <p>T1 <-> Y2</p>	

6.2 Display menu and configuration

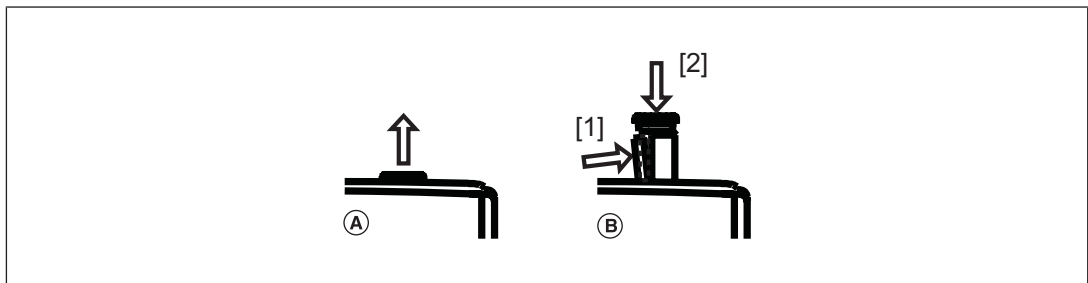
The menu settings are made on the unit's display via a rotary knob. You have the option to make the settings on the knob by hand or with a screwdriver. If you make the settings with a screwdriver, the knob can remain within the unit.



NOTICE

The correct display of configuration data and messages are part of the device's safety concept. If the display is faulty (e.g. pixels are missing, faulty letters or numbers), the device must be taken out of service.

6.2.1 Operate rotary knob



Pull out knob (A):

- ▶ until it locks into position
- ▶ Release knob (B) 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

6.2.2 Configure device

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

Press the knob

- ▶ Confirm selection/setting
- ▶ Switch to menu

Rotate knob

- ▶ Select menu level
- ▶ Set the parameter/numeric value

The display is backlit. It is

- ▶ switched on by turning or pressing the rotary knob.
- ▶ switched off if the rotary knob has not been operated for 30 seconds.



**NOTICE**

Please note that all parameters are set to their default values on delivery. Please check all the safety-related parameters at least, and enter the values that correspond to your application.

6.2.3**Password protection**

The configuration is password-protected.

- ▶ Parameters can only be changed once a password has been entered.
- ▶ Factory setting for the password: 000000
- ▶ The password consists of 6 figures in the range 000000 ... 999999.
- ▶ The password can be changed at any time in the menu.

**INFORMATION**

- Please note: Remember the assigned password. Without this password you will not be able to change the configuration.
- For details of how to enter the password, see the section entitled "[Status display and configuration \[40\]](#)", Level 2: Entering the password.
- For details of how to change the password, see the section entitled "[Status display and configuration \[40\]](#)", Level 3: Configuration.

6.2.4**Use chip card**

The parameters that are set on a device are stored on the chip card. The data is stored along with a device identifier and check sum. We recommend that you always operate the unit with a chip card.

When the chip card is inside the unit,

- ▶ The chip card is checked to verify the device identifier, valid parameters, and ensure that the data is identical.
- ▶ Device parameters are automatically saved to the chip card during configuration. As a result, the chip card always contains a copy of the unit's current internal data.

When the device is switched on in the Power On operating state (all LEDs illuminate briefly) a test is carried out to check whether

- ▶ a chip card is inserted or just an empty chip card holder.
- ▶ data on the chip card matches the data in the device.
- ▶ data on the chip card is valid.

**INFORMATION**

For details of the procedure when a message appears on the display, please see the section entitled "Display menu at cold start".

In the Configuration operating state ("Run" LED flashes):

- ▶ The data is written to the chip card during configuration.

In the RUN operating state ("Run" LED is lit):

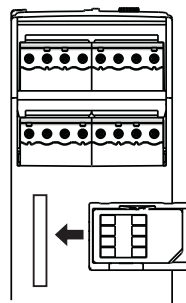
- ▶ The chip card containing a valid configuration must be inserted.
- ▶ The chip card must not be removed during operation.

6.2.4.1**Insert 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.

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

**6.2.5****Display and configuration****6.2.5.1****Menu overview**



The following diagrams illustrate the principle structure of the configuration menu on the display.

The menu consists of

- ▶ Messages at cold start, if there are problems with the chip card.
- ▶ Level 1: Status indicators, error stack
- ▶ Level 2: Password entry

► Level 3: Configuration



The displayed symbols illustrate the operation of the rotary knob.

	Rotate knob
	Press knob

Level 1 and 2: Status indicators and password entry

Status information is displayed when the device is switched on. This level is not password-protected.

The state of the signals is displayed as follows:

Icon	Description
	Signal inactive
	Signal active

The password is entered in Level 2. It authorises configuration of the device in Level 3.

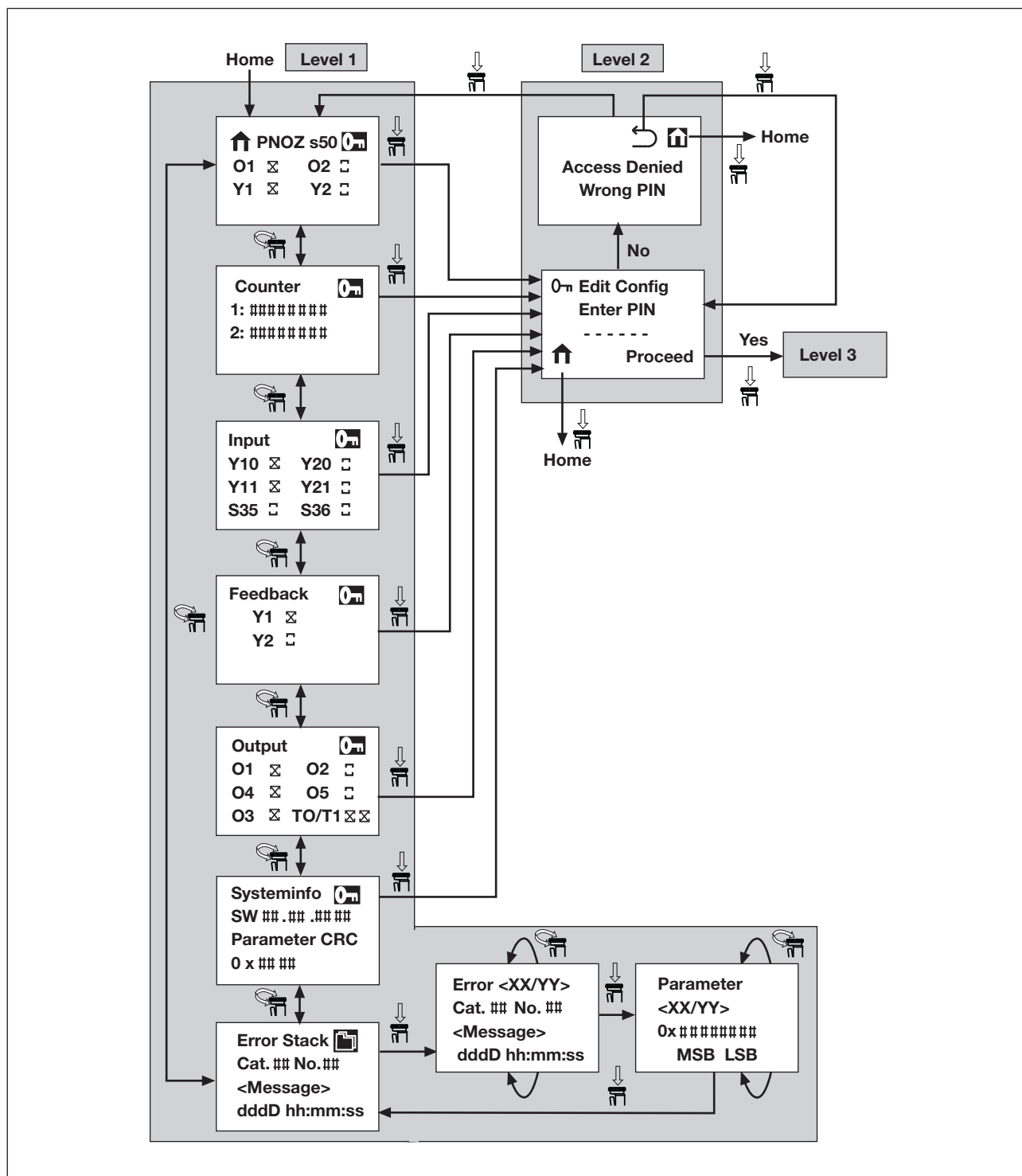


Fig.: Menu overview of Levels 1 and 2

Level 3: Configuration

The device is configured in Level 3.

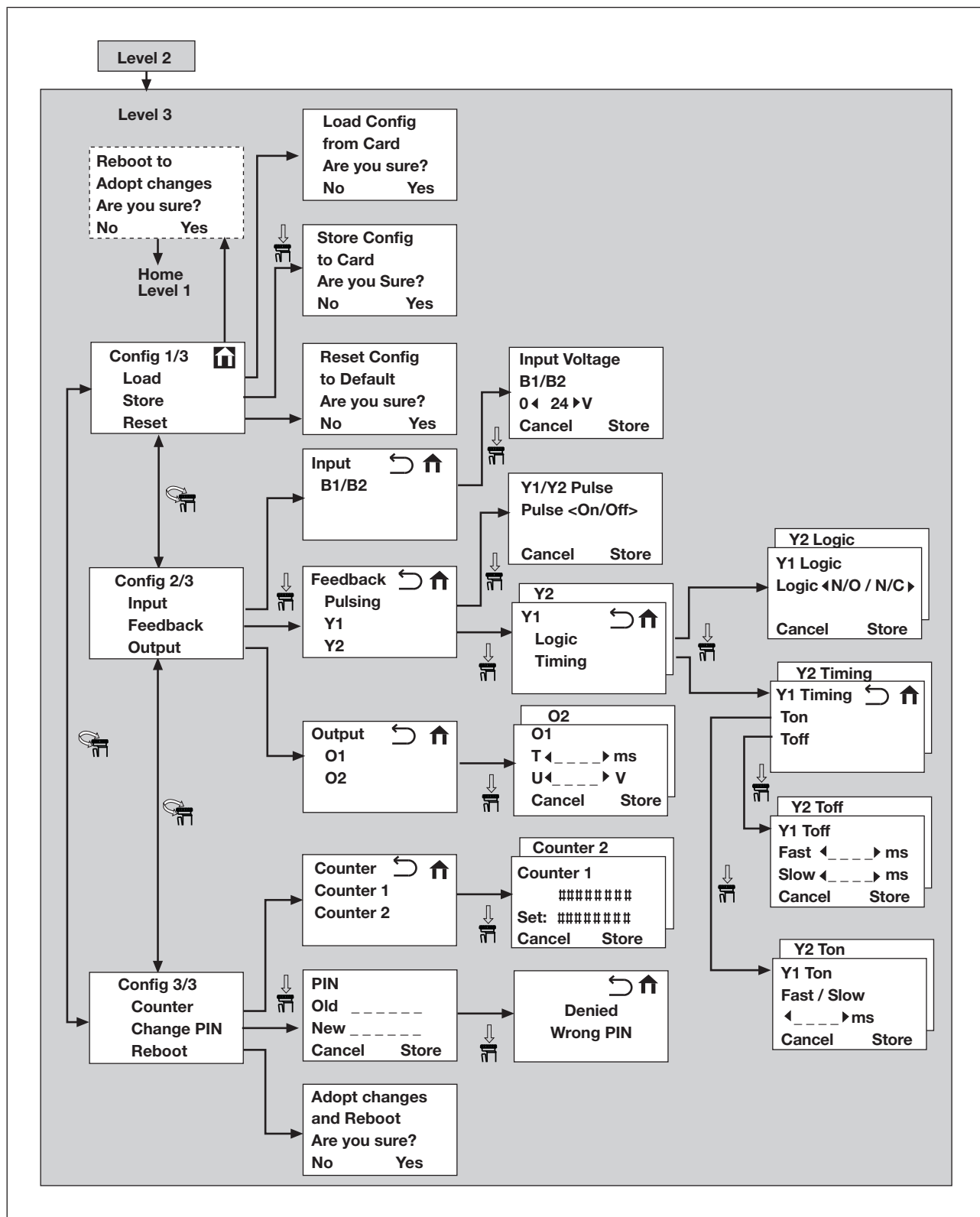






Fig.: Menu overview of Level 3

6.2.5.2 Operate menus and enter values

Various navigational aids are available on the display:

- ▶ Tags
- ▶ Text fields

Tags

Display	Description
	Returns to the previous menu
	Exits the configuration menu (Level 3) and switches to the home menu (Level 1)
	Switches from the current error in the error stack
	Switches to the password menu (Level 2)

Text fields

Text field	Description
Cancel or No	Rejects all the changes and returns to the previous menu
Proceed	Confirms the password entry and jumps to the configuration menu (Level 3)
Store or Yes	Saves all the changes and returns to the previous menu

To move within a menu and switch to another menu, proceed as follows:

1. Turn the rotary knob to jump from line to line.
The position within the menu is highlighted.
2. Press the rotary knob to move to the next menu or to the previous menu.

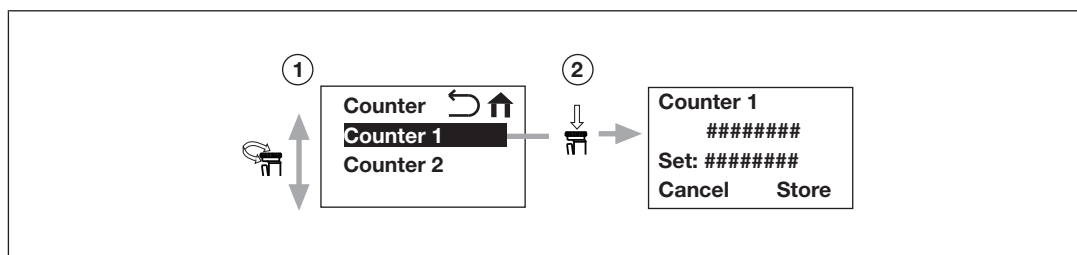


Fig.: Moving from line to line

To change values in a menu, follow the instructions below:

1. Turn the rotary knob to jump from line to line.
2. Press the rotary knob. Only then is it possible to change a numeric value.
The selected area flashes. Values can now be changed.
3. Turn the rotary knob to switch between numeric values.
4. Press the rotary knob to complete the entry.

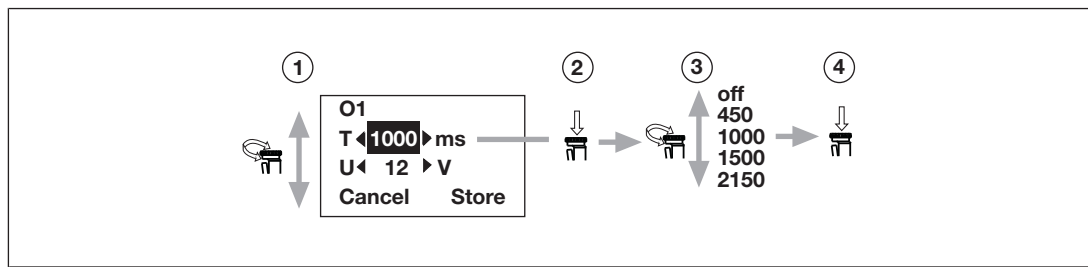


Fig.: Changing numeric values

6.2.5.3 Display menu at cold start

When the device is switched on in the Power On operating state (cold start), the memory contents of the device and the chip card are read and compared. If there are any deviations, messages will appear.









Overview	Display	Description
No Chipcard detected No chip card and no chip card holder in the device.	<div> No Cipcard detected Proceed? No Yes </div>	No – Insert chip card or only chip card holder Yes – Switch to RUN operating state, without a chip card inserted
Chipcard is Defect The chip card is defective or Only the chip card holder is inserted.	<div> Cipcard is defect, remove Or replace Proceed </div>	Proceed – 1. Use a valid chip card or insert chip card holder only. 2. Restart device with Proceed .
Memories are unequal The parameters on the chip card and in the device memory are not identical.		
	<div> Memories are unequal, Copy Ext. To Int. ? Int. To Ext. ? </div>	Ext. To Int. – Switch to the next menu to download parameters from the chip card to the device memory Int. To Ext. – Switch to the next menu to upload parameters from the device memory to the chip card



















Overview	Display	Description
	<div>Copy from Ext. Memory and Restart? No Yes</div>	No – Return to the previous menu Yes – Download parameters from the chip card to the device memory
	<div>Copy from Int. Memory and Restart? No Yes</div>	No – Return to the previous menu Yes – Upload parameters from the device memory to the chip card
Chipcard is Invalid The parameters on the chip card are invalid.	<div>Cipcard is Invalid, Copy Int. to Ext.? No Yes</div>	No – 1. Use a valid chip card or insert chip card holder only. 2. Restart device with No . Yes – Upload parameters from the device memory to the chip card

6.2.5.4

Status display and configuration

Level 1: Status indicators

Overview	Display	Description
PNOZ s50 C Start-up display	<div>  PNOZ s50  O1  O2  Y1  Y2  </div>	PNOZ s50 – Device name O1, O2 – Outputs of the power circuits O1 and O2 Y1, Y2 – Standard inputs of feedback loops 1 and 2.
Counter Number of operations	<div> Counter  1: ##### 2: ##### </div>	1: Counter for output O1+/ O1- 2: Counter for output O2+/ O2-
Systeminfo	<div> Systeminfo  SW ###.###.### Parameter CRC 0 x ### </div>	SW: Software version of device, e.g. 01.01.0001 Parameter CRC: Check sum covering the device configuration

Overview	Display	Description
Input States of the inputs are displayed	<div> Input  </div> <div> Y10  Y20  Y11  Y21  S35  S36  </div>	Y10 – Failsafe input 0 for fast shutdown, power circuit 1 Y11 – Failsafe input 1 for fast shutdown, power circuit 1 Y20 – Failsafe input 0 for fast shutdown, power circuit 2 Y21 – Failsafe input 1 for fast shutdown, power circuit 2 S35 – Standard input for slow shutdown, power circuit 1 S36 – Standard input for slow shutdown, power circuit 2
Feedback States of the feedback loops are displayed	<div> Feedback  </div> <div> Y1  Y2  </div>	Y1 – Standard input for feedback loop 1 Y2 – Standard input for feedback loop 2
Output States of the outputs are displayed	<div> Output  </div> <div> O1  O2  O4  O5  O3  TO/T1   </div>	O1 – Failsafe output for power circuit 1 O2 – Failsafe output for power circuit 2 O3 – Failsafe output for fault signal O4 – Failsafe output for status of power circuit 1 O5 – Failsafe output for status of power circuit 1 TO/T1 – Test pulse output 0/1

Overview	Display	Description
Error Stack Error messages are displayed		Current error stack entry Cat. – Error class (hexadecimal) No. – Error number (hexadecimal) <Message> – Error text dddD hh:mm:ss – Power-on time since Power On: Days, hours, minutes, seconds
		Error stack entries <XX/YY> – Entry number/number of entries (decimal) Cat. – Error class (hexadecimal) No. – Error number (hexadecimal) <Message> – Error text dddD hh:mm:ss – Power-on time since error occurred: Days, hours, minutes, seconds
		Parameters of a selected entry in the error stack <XX/YY> – Current parameter/number of available parameters (decimal) 0x##### – Parameters (hexadecimal), grouped by MSB and LSB

Level 2: Password entry

Overview	Display	Description
PIN Password entry		----- – Field for entering the password Proceed – Confirm entry and jump to Level 3 Home – To start menu, without confirming entry
		You entered an incorrect password. Back – Back to password entry Home – Back to start menu




Level 3: Configuration

The device is supplied with the following parameters:

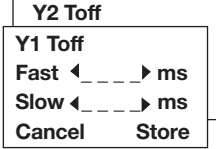
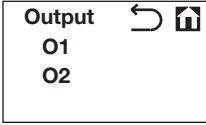
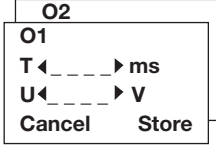
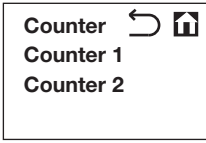
Function	Terminal	Description	Parameter	Value	In display menu
Supply voltage, power circuits 1 and 2	B1/B2	Supply voltage	Input Voltage	24 V	Input -> Input Voltage
Test pulses	Y1/Y2	Test pulses on feedback loops	Pulsing	On	Feedback -> Pulsing -> Y1/Y2 Pulse
Power circuit 1	O1+/O1-	Reduced voltage	U	6 V	Output -> O1
		Overexcitation time	T	100 ms	Output -> O1
	Y1	Maximum ventilation time	Ton	30 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Ton
		Maximum application time, fast shutdown	Toff fast	30 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Toff
		Maximum application time, slow shutdown	Toff slow	30 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Toff
		Logic of feedback loop 1	Logic	N/C	Feedback -> Y1 -> Logic -> Y1 Logic
Power circuit 2	O2+/O2-	Reduced voltage	U	6 V	Output -> O2
		Overexcitation time	T	100 ms	Output -> O2
	Y2	Maximum ventilation time	Ton	30 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Ton
		Maximum application time, fast shutdown	Toff fast	30 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Toff
		Maximum application time, slow shutdown	Toff slow	30 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Toff
		Logic of feedback loop 2	Logic	NC	Feedback -> Y2 -> Logic -> Y2 Logic

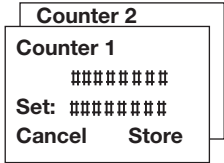
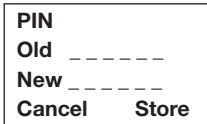

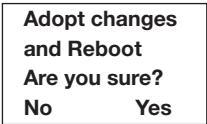
**INFORMATION**

The device must be restarted if the configuration has been changed (see section entitled "[Restart device \[📖 47\]](#)").

Overview	Display	Description
Switch to submenus		
Config 1/3	<div> Config 1/3  Load Store Reset </div>	<p>Load – Switches to the Load menu to download the configuration from the chip card</p> <p>Store – Switches to the Store menu to save the configuration to the chip card</p> <p>Reset – Switches to the Reset menu to reset the configuration to the default settings</p>
Config 2/3	<div> Config 2/3 Input Feedback Output </div>	<p>Input – Switches to the Input menu to configure the supply voltage for the power element</p> <p>Feedback – Switches to the Feedback menu to configure the feedback loops</p> <p>Output – Switches to the Output menu to configure the properties of the power outputs O1+/O1- and O2+/O2-</p>
Config 3/3	<div> Config 3/3 Counter Change PIN Reboot </div>	<p>Counter – Switches to the Counter menu to enter a start value for the counter</p> <p>Change PIN – Switches to the Change PIN menu to change the password</p> <p>Reboot – Switches to the Reboot menu to restart the device</p>
Load configuration from chip card		
Load Config from Card Download parameters from the chip card to the device	<div> Load Config from Card Are you sure? No Yes </div>	<p>Are you sure? – Security prompt</p> <p>No – Do not download parameters from chip card</p> <p>Yes – Download parameters from chip card</p>
Save configuration to chip card		
Store Config to Card Download parameters from the device to the chip card	<div> Store Config to Card Are you Sure? No Yes </div>	<p>Are you sure? - Security prompt</p> <p>No – Do not save parameters to chip card</p> <p>Yes – Save parameters to chip card</p>
Restore default settings		
Reset Config to Default Reset configuration to default settings	<div> Reset Config to Default Are you sure? No Yes </div>	<p>Are you sure? – Security prompt</p> <p>No – Do not load default settings</p> <p>Yes – Load default settings</p>
Configure supply voltage B1/B2 to the power circuits		
Input Switch to the menu for the supply voltage to the power circuits	<div> Input B1/B2   </div>	<p>B1/B2 – Switch to the Input Voltage menu to configure the inputs B1/B2</p>

Overview	Display	Description
Input Voltage Configure the supply voltage to the power circuits		U < 24 > V – Select supply voltage for power circuit, values: 24 V, 48 V Cancel – Exit menu without confirming the entry Store – Confirm entry
Configure feedback loops Y1 and Y2		
Feedback Configure feedback loops		Pulsing – Configure test pulses Y1 – Switch to the Y1 menu to configure feedback loop Y1 Y2 – Switch to the Y2 menu to configure feedback loop Y2
Y1/Y2 Pulse Activate test pulse		Pulse On : Test pulse on Pulse Off : Test pulse off Cancel – Exit menu without confirming the entry Store – Confirm entry Please note: The test pulses can only be activated simultaneously for both feedback loops Y1 and Y2.
Y1 or Y2 Switch to sub-menus for configuration of the feedback loops		Logic – Switch to Logic Y1 or Logic Y2 menu Timing – Switch to Timing Y1 or Timing Y2 menu
Y1 Logic or Y2 Logic Define N/C or N/O contact in the feedback loop		Logic < N/O / N/C > - Input logic for feedback loop Y1 or Y2: N/O : N/O contact N/C : N/C contact Cancel – Exit menu without confirming the entry Store – Confirm entry
Y1 Timing or Y2 Timing		Ton – Switch to submenu for configuration of the max. ventilation time Toff – Switch to submenu for configuration of the max. application time
Y1 Ton or Y2 Ton Configure max. ventilation time for fast and slow shutdown		Slow / Fast < 500 > ms – Max. ventilation time Values: 30 ... 4000 ms configurable in steps The max. ventilation times are the same for fast and slow shutdown. Cancel – Exit menu without confirming the entry Store – Confirm entry

Overview	Display	Description
Y1 Toff or Y2 Toff Configure max. application time for fast and slow shutdown		Fast < 500 > ms – Max. application time for fast shutdown Slow < 500 > ms – Max. application time for slow shutdown Values: 30 ... 4000 ms configurable in steps Cancel – Exit menu without confirming the entry Store – Confirm entry
Configure power circuits O1+/O1- and O2+/O2-		
Output Configure power circuits		O1 – Switch to the O1 menu to configure power circuit 1 O2 – Switch to the O2 menu to configure power circuit 2
O1 or O2 Configure overexcitation time and reduced voltage		O1 or O2 T < 1000 > ms – Configure overexcitation time, values: off, 100 ... 2500 ms configurable in steps. If "off" is configured, the voltage at B1/B2 is connected directly to outputs O1 or O2 without reduction. Any value entered for the reduced voltage will not be evaluated. U < 12 > V – Configure reduced voltage, values: 6, 8, 12, 16, 24 V Store – Confirm entry Cancel – Exit menu without confirming the entry
Configure counter		
Counter Specify offset for number of operations		Counter 1 – Event counter 1 - Switch to the Counter 1 menu to configure the number of operations for power circuit O1+/O1- Counter 2 – Event counter 2 - Switch to the Counter 2 menu to configure the number of operations for power circuit O2+/O2-

Overview	Display	Description
Counter 1 or Counter 2 Switch to menu to set the counter for the number of operations for power circuits O1+/O1- or O2+/O2-		Counter 1 – Event counter 1 - Configure number of operations for load at power circuit O1+/O1- Counter 2 – Event counter 2 - Configure number of operations for load at power circuit O2+/O2- ##### – Old counter status Set: – Enter new counter status, e.g. when a used load is applied Value range: 0 ... 99999999 Store – Confirm entry Cancel – Exit menu without confirming the entry
Change password		
PIN Change password		Old – Enter the old password New – Enter the new password Cancel – Exit menu without confirming the entry Store – Adopt new password
Denied Wrong PIN Error message		You entered an incorrect password
Restart after changing configuration		
Adopt changes and Reboot Restart and adopt configuration		No – Do not restart Yes – Restart

6.2.5.5

Restart device

Restart the device if you have changed the configuration. The changed configuration is adopted during a restart.

There are two options for restarting the device once the configuration is complete.

Option one:

1. Switch off the device's supply voltage (terminals A1 and A2).
2. Switch the device's supply voltage back on.

The configuration is adopted.

Option two:

1. Select **Reboot** in menu level 3.
2. Select **Yes** and press the rotary knob.



The device is restarted and the configuration is adopted.

7 Operation


























7.1 Display elements for device diagnostics

7.1.1 LED display

Legend

-  LED on
 LED flashes

The device has LEDs to display states and errors.

LED						Error
Run	Power	Out 1	Out 2	I/O Fault	Fault	
Green	Green	Green	Green	Red	Red	
						Device is in "Power On" state (start-up phase)
						Device is in "Configuration" state
						Device is in "RUN" state.
						Supply voltage to the power circuits is within the permitted range. The LEDs "Out 1" and "Out 2" may be on or off.
						Supply voltage to the power circuits is outside the permitted range. The LEDs "Out 1" and "Out 2" may be on or off.
						Output O1+/O1- is switched on.
						Output O2+/O2- is switched on.
						Inputs Y10 and/or Y11 for fast shutdown are not at "0" after Power On or after a fault has been reset. The "Power" LED may be on or may be flashing.
						Inputs Y20 and/or Y21 for fast shutdown are not at "0" after Power On or after a fault has been reset. The "Power" LED may be on or may be flashing.
						Fault at inputs and/or outputs. Fault that can be repaired by the user leading to safe condition.
						Internal error. Fault that cannot be repaired by the user, leading to safe condition.

7.1.2 Display

7.1.2.1 Error stack entries

Up to 32 status and error messages are stored. They can be called up via the display (see chapter entitled "Commissioning", under "[Status display and configuration \[📖 40\]](#)").

The following information is shown on the display:

- ▶ Sequential number of an error stack entry (1 ... 32)
- ▶ Error number
- ▶ Error category
- ▶ Up to 3 parameters to one error entry
- ▶ Time stamp: Time since system start ("Power On")
- ▶ Error Text
 - Errors that can be rectified by the user are described in the following list
Remedy: Rectify error; if necessary, contact Pilz
 - Internal errors (system errors, all errors that are not described in the list)
Remedy: Switch device on and off to restart it; contact Pilz if the error re-appears

7.1.2.2 Current error messages

- ▶ All errors lead to a safe condition.
- ▶ If an error is detected, the "I/O Fault" or "Fault" LED will light up on the device:
 - "I/O Fault": Fault at inputs or outputs. Fault that can be repaired by the user leading to safe condition.
 - "Fault": Internal error leading to a safe condition.
- ▶ An error is entered in the error stack (see error stack).
- ▶ The most recent error message is shown on the display.
- ▶ Once the error has been rectified and restarted, the error message is retained in the error stack.

List of the errors that can be rectified by the user



INFORMATION

Errors up to error category 27 can be rectified by the user. All other errors are internal errors. The "Fault" LED will light in the case of internal errors. Restart the device. Contact Pilz if the error re-appears.

Cat.	No.	Error message	Description	Remedy
0	2	Enter Stop	System is in "STOP" state	Purely for information
0	3	Enter Run	System is in "RUN" state	Purely for information
1	0	ACK IO-Fault	The "IO-Fault" error has been reset with the inputs Y10/Y11 and/or Y20/Y21 (1/0 pulse edge)	Purely for information

Cat.	No.	Error message	Description	Remedy
4	0	Copy Config	The configuration has been loaded from the chip card to the device.	Purely for information
4	1	Copy Config	The device has saved the configuration to the chip card.	Purely for information
4	2	Missing Card	There is no chip card in the card slot.	Insert a valid chip card into the card slot
4	3	Invalid Card	The data on the chip card is invalid	<ul style="list-style-type: none"> ▶ Check Chip Card ▶ Insert a valid chip card into the card slot
4	4	Mems. Differ	The data on the chip card differs from the data in the device	<ul style="list-style-type: none"> ▶ Use a chip card containing the device configuration ▶ Write the device configuration to chip card
4	5	Card Removed	The chip card has been removed during operation	Insert a valid chip card into the card slot
4	6	Unknown Card	The chip card does not contain device data for the PNOZ s50	Insert a valid chip card into the card slot
5	0	Wrong Pin	The password is invalid	Enter a valid password
5	1	Pin Changed	The password has been changed	Purely for information
5	2	Count. at Max	The event counter has reached the maximum value 99999999. The event counter is not reset automatically.	Reset event counter
5	3	Chan. Differ	Error in the device's parameter settings	Check parameter settings
6	0	Supply NOK	Supply voltage B1/B2 to the power circuits is outside the permitted range. Parameter 1: 0x000000002	Check the supply voltage
6	1	Supply OK	Supply voltage B1/B2 to the power circuits is once again within the permitted range. Parameter 1: 0x000000002	Purely for information
7	0	Reset Config	The device has been reset to its default settings.	Purely for information
7	1	Reinit Memory	The device memory has been reinitialised. All parameters have been set to the default settings.	Purely for information

Cat.	No.	Error message	Description	Remedy
20	0	Short Circuit	Short circuit at power circuit O1+/O1- or O2+/O2- Parameter 1: 0x00100000: O1+ 0x00200000: O1- 0x01000000: O2+ 0x02000000: O2-	<ul style="list-style-type: none"> ▶ Ensure that the power circuit is wired correctly ▶ Rectify short circuit
20	1	Readback fail	Output voltage of power circuit O1+/O1- or O2+/O2- does not correspond to the configured output voltage. Parameter 1: 0x00100000: O1+ 0x00200000: O1- 0x01000000: O2+ 0x02000000: O2-	<ul style="list-style-type: none"> ▶ Ensure that the power circuit is wired correctly ▶ Rectify short circuits or shorts between contacts
20	2	Open Circuit	Open circuit at power circuit O1+/O1- or O2+/O2-. Current is too low in the on state. Parameter 1 0x00100000: O1+ 0x00200000: O1- 0x01000000: O2+ 0x02000000: O2-	<ul style="list-style-type: none"> ▶ Ensure that the power circuit is wired correctly ▶ Rectify open circuit
20	3	Test fail	Error during off test of power circuits O1+/O1- or O2+/O2-. Parameter 1 0x00100000: O1+ 0x00200000: O1- 0x01000000: O2+ 0x02000000: O2-	<ul style="list-style-type: none"> ▶ Ensure that the power circuit is wired correctly ▶ Rectify short circuits or shorts between contacts
20	4	Test fail	Error during on test of power circuits O1+/O1- or O2+/O2-. Parameter 1 0x00100000: O1+ 0x00200000: O1- 0x01000000: O2+ 0x02000000: O2-	Ensure that the power circuit is wired correctly

Cat.	No.	Error message	Description	Remedy
21	0	Readback fail	The signal at output O3, O4 or O5 does not correspond to the expected value. Parameter 1: 0x00010000: O3 0x00400000: O4 0x04000000: O5	Ensure that the outputs are wired correctly
21	1	Test fail	Error during off test of outputs O3, O4 or O5. Parameter 1: 0x00010000: O3 0x00400000: O4 0x04000000: O5	Ensure that the outputs are wired correctly
22	0	Input Not Off	At least one of the inputs Y10/ Y11 or Y20/Y21 has a "1" signal following a restart or after resetting an error Parameter 1: 0x00000010: Y10 0x00000020: Y11 0x00000100: Y20 0x00000200: Y21	Set the inputs for fast shutdown to a "0" signal
22	1	Input Sin. On	Prior to the 0/1 pulse edge, neither of the inputs for fast shutdown were set to a "0" signal. 0x00000010: Y10 0x00000020: Y11 0x00000100: Y20 0x00000200: Y21	Set the inputs for fast shutdown to a "0" signal
22	2	Test fail	Input for feedback loop Y1 or Y2 was not at "0" during test pulse	<ul style="list-style-type: none"> ▶ Ensure that the test pulses are wired correctly ▶ Rectify short circuits or shorts between contacts

Cat.	No.	Error message	Description	Remedy
23	0	Feedback On	State of the feedback loop is not as expected when the power circuits are switched on 0x00000080: Y1 0x00000800: Y2	Ensure that <ul style="list-style-type: none"> ▶ the feedback loops are wired correctly ▶ the feedback loops are configured correctly ▶ the load is applied ▶ the logic (N/C, N/O) of the feedback loop is configured correctly ▶ the test pulses at Y10/Y11 / Y20/Y21 are < 1 ms
23	1	Feedback Err	State of the feedback loop is not as expected after the power circuits are switched on Parameter 1: 0x00000080: Y1 0x00000800: Y2	Ensure that <ul style="list-style-type: none"> ▶ the feedback loops are wired correctly ▶ the feedback loops are configured correctly ▶ the load is applied
23	2	Feedback Ton	State of the feedback loop is not as expected after the ventilation time has elapsed Parameter 1: 0x00000080: Y1 0x00000800: Y2 Parameter 2 (type of testing): 0x00000001: As ventilation time elapses 0x00000002: After ventilation time has elapsed	Ensure that <ul style="list-style-type: none"> ▶ the feedback loops are wired correctly ▶ the feedback loops are configured correctly ▶ the load is applied ▶ the ventilation time is configured correctly

Cat.	No.	Error message	Description	Remedy
23	3	Feedback Toff	<p>State of the feedback loop is not as expected after the application time has elapsed</p> <p>Parameter 1:</p> <p>0x00000080: Y1</p> <p>0x00000800: Y2</p> <p>Parameter 2 (type of application time):</p> <p>0x00000001: Toff fast shutdown</p> <p>0x00000002: Toff slow shutdown</p> <p>0x00000003: Toff fast shutdown before ventilation time has elapsed</p> <p>0x00000004: Slow shutdown before ventilation time has elapsed</p> <p>0x00000005: Fast shutdown after ventilation time for slow shutdown has elapsed</p>	<p>Ensure that</p> <ul style="list-style-type: none"> ▶ the feedback loops are wired correctly ▶ the feedback loops are configured correctly ▶ the load is applied ▶ the application time is configured correctly
24	0	Defect Card	Cannot read chip card.	<ul style="list-style-type: none"> ▶ Check Chip Card ▶ Insert a valid chip card into the card slot
26	0	Supply Error	<p>After switching on O1+/O1- or O2+/O2-, the supply voltage to the power circuits B1/B2 is outside the permitted range</p> <p>Parameter 1:</p> <p>0x00000002: B1/B2</p>	Check the supply voltage
26	1	Supply Error	<p>After on test at O1+/O1- or O2+/O2-, the supply voltage to the power circuits B1/B2 is outside the permitted range</p> <p>Parameter 1:</p> <p>0x00000002: B1/B2</p>	Check the supply voltage
27	0	Overtemp.	Temperature within the device has exceeded the permitted value	<ul style="list-style-type: none"> ▶ Switch off device and switch it back on once it has cooled ▶ Minimise load

For some error stack entries, the display shows a parameter that identifies the location of the error on the device.

The parameter consists of 32 Bits (8 places with 4 Bits each):

Place	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0
	MSB				LSB			

Example: S35, input for slow shutdown of power circuit 1

Place	7	6	5	4	3	2	1	0
0x	0	0	0	0	0	0	4	0
	MSB				LSB			

Place	Value	Terminal	Designation of the input/output state
0	0	---	No error
	1	A1/A2	Device's supply voltage
	2	B1/B2	Supply voltage of power circuits
	4	---	Reserved
	8	---	Reserved
1	0	---	No error
	1	Y10	Input for fast shutdown of power circuit 1
	2	Y11	Input for fast shutdown of power circuit 1
	4	S35	Input for slow shutdown of power circuit 1
	8	Y1	Input for feedback loop of power circuit 1
2	0	---	No error
	1	Y20	Input for fast shutdown of power circuit 2
	2	Y21	Input for fast shutdown of power circuit 2
	4	S36	Input for slow shutdown of power circuit 2
	8	Y2	Input for feedback loop of power circuit 2
3	0	---	Reserved
4	0	---	No error
	1	O3	Output for fault signal
	2	T0	Output for test pulse 0
	4	T1	Output for test pulse 1
	8	---	Reserved
5	0	---	No error
	1	O1+	Output of power circuit 1 (High Side)
	2	O1-	Output of power circuit 1 (Low Side)
	4	O4	Output of status for power circuit 1
	8	---	Reserved
6	0	---	No error
	1	O2+	Output of power circuit 2 (High Side)
	2	O2-	Output of power circuit 2 (Low Side)
	4	O5	Output of status for power circuit 2
	8	---	Reserved
7	0	---	Reserved

7.2 Reset I/O Fault

The device switches to the "I/O Fault" state if a fault has been detected at the inputs or outputs. Once it has been rectified, the fault must be reset.

There are three options for resetting an "I/O Fault" and restarting the device.

Option one: Switch supply voltage A1/A2 off and then on again

1. Switch off the device's supply voltage (terminals A1 and A2)
2. Switch the device's supply voltage back on.

The device restarts.

Option two: Display menu reboot

1. Select **Reboot** in menu level 3.
2. Select **Yes** and press the rotary knob.

The device restarts.

Option three: Switch inputs Y10/Y11 or Y20/Y22

This option should be considered if you wish to reset the fault from the higher level control system.

Using one power circuit:

- ▶ The fault is reset by a 1/0 pulse edge at one of the inputs Y10/Y11 or Y20/Y21.
- ▶ A 0/1 pulse edge switches on the corresponding power circuit.

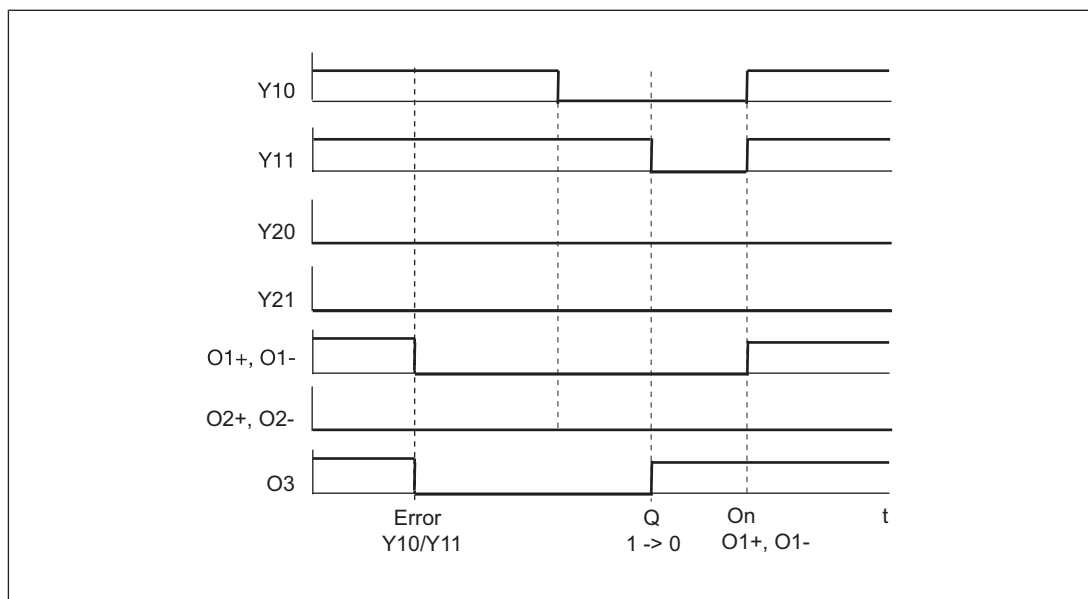


Fig.: Reset fault with single-channel load

Legend:

- ▶ Error Y10/Y11: Fault at Y10/Y11, load shuts down
- ▶ Q 1 -> 0: Fault: Reset fault at Y11
- ▶ On O1+, O1-: Switch load on; before switching on, Y10 and Y11 must both be at "0"
- ▶ O3: Fault signal output

Using two power circuits:

- ▶ With dual-channel activation, the fault can be reset through a 1/0 pulse edge at Y10/Y11 or Y20/Y21.
- ▶ In order to switch the load on, the relevant inputs must both already be at "0".

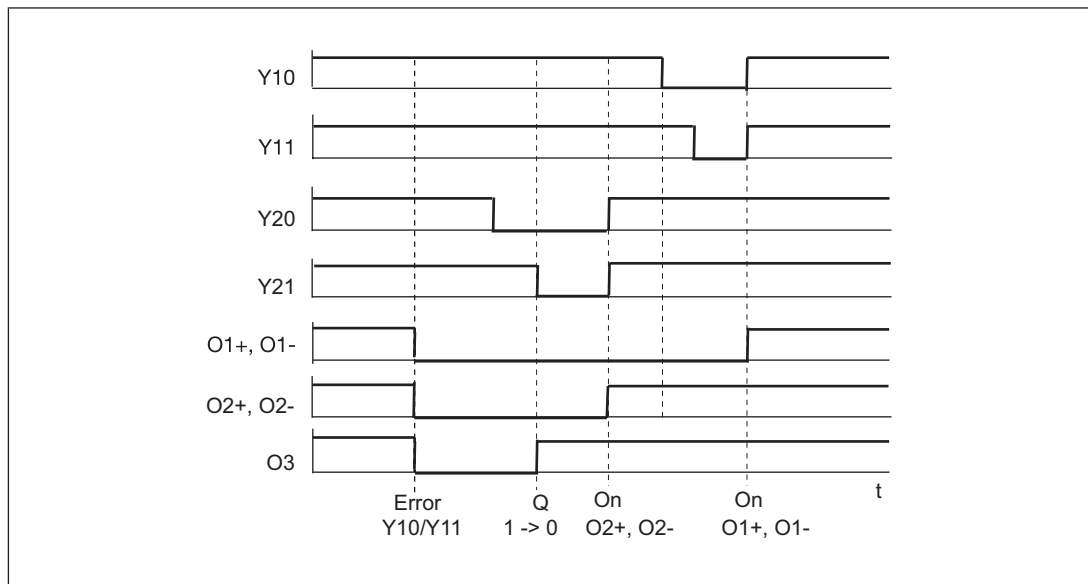


Fig.: Reset fault with dual-channel load

Legend:

- ▶ Error Y10/Y11: Fault at Y10/Y11, load shuts down
- ▶ Q 1 -> 0: Fault: Reset fault at Y21
- ▶ On O2+, O2-: Switch load on; before switching on, Y20 and Y21 must both be at "0"
- ▶ On O1+, O1-: Switch load on; before switching on, Y10 and Y11 must both be at "0"
- ▶ O3: Fault signal output

8 Examples

8.1 Overview

This chapter provides information on how to connect the PNOZ s50 to a safety control system. The connections illustrated are independent of any specific control system.



INFORMATION

The following examples are intended to help you configure the application using the display.

These settings and parameters should be regarded as example settings. It's possible that your own specific application may require different settings or parameters under certain circumstances.



CAUTION!

When considering the examples, please note that Pilz accepts no responsibility for the specific application. In particular, they may not be used without testing and approval.

The constructor is responsible for creating appropriate safety concepts for the overall plant and for connection to the safety control system (including configuration). The applicable standards and regulations must be considered and observed.

In each case it is necessary to consider the input and output requirements from the chapter entitled "[Function description \[14\]](#)". This is also true when using the applied safety control systems.

8.2 Mechanical holding brake

8.2.1 Properties

PNOZ s50

- ▶ Safe activation of two independent mechanical holding brakes
- ▶ Ventilation and application times are monitored
- ▶ Fast and slow shutdown of both brakes
- ▶ Feedback loop for brake B1 is monitored via input Y1
- ▶ Feedback loop for brake B2 is monitored via input Y2
- ▶ Fuses
 - F1: 24 V DC, 4 A, characteristic B/C
 - F2: 24 V DC, 10 A, characteristic B/C

Safety control system

- ▶ Inputs:
 - Fault signal O3
 - State of brakes O4, O5 (applied, ventilated) is monitored
- ▶ Outputs
 - Activation of fast and slow shutdown of brake

Brake

- ▶ Micro switch S1 to signal the state of brake B1
- ▶ Micro switch S2 to signal the state of brake B2

8.2.2 Configuration overview

The following parameters must be set in the display menu:

Function	Terminal	Description	Parameter	Value	In display menu
Supply voltage, power circuits 1 and 2	B1/B2	Supply voltage	Input Voltage	24 V	Input -> Input Voltage
Test pulse	Y1/Y2	Test pulses on feed-back loops	Pulsing	On	Feedback -> Pulsing -> Y1/Y2 Pulse
Power circuit 1	O1+/O1-	Reduced voltage	U	12 V	Output -> O1
		Overexcitation time	T	450 ms	Output -> O1
	Y1	Maximum ventilation time	Ton	60 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Ton
		Maximum application time, fast shutdown	Toff fast	30 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Toff
		Maximum application time, slow shutdown	Toff slow	150 ms	Feedback -> Y1 -> Y1 Timing -> Y1 Toff
		Logic of feedback loop 1	Logic	N/C	Feedback -> Y1 -> Logic -> Y1 Logic
Power circuit 2	O2+/O2-	Reduced voltage	U	12 V	Output -> O2
		Overexcitation time	T	450 ms	Output -> O2
	Y2	Maximum ventilation time	Ton	60 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Ton
		Maximum application time, fast shutdown	Toff fast	30 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Toff
		Maximum application time, slow shutdown	Toff slow	150 ms	Feedback -> Y2 -> Y1 Timing -> Y2 Toff
		Logic of feedback loop 2	Logic	NC	Feedback -> Y2 -> Logic -> Y2 Logic

8.2.3 Connection

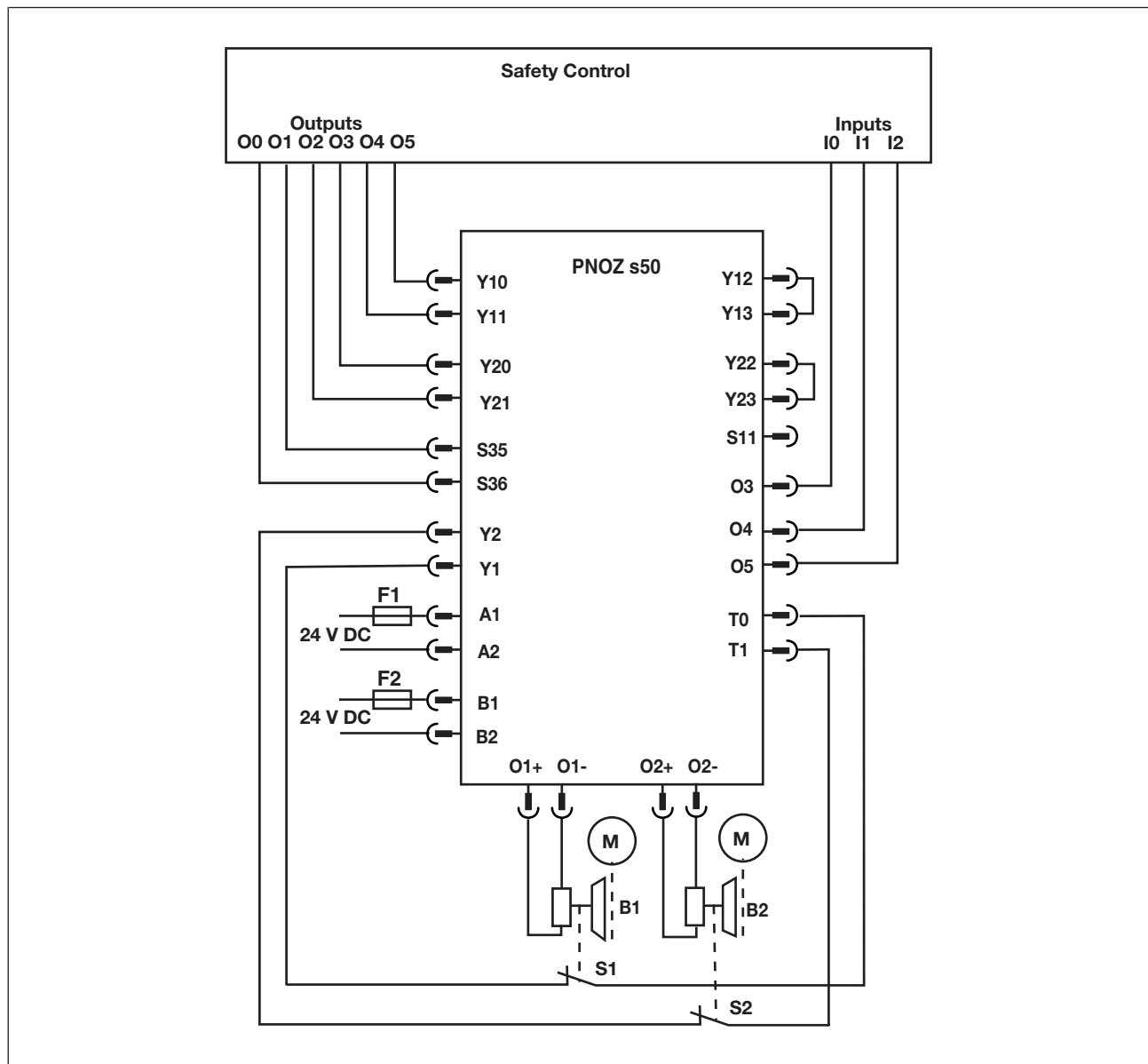


Fig.: Connection example: Two mechanical holding brakes

9 Technical details

General	
Approvals	CE, EAC (Eurasian), TÜV, cULus Listed
Electrical data	
Supply voltage	
for	Supply to the system
Voltage	24 V
Kind	DC
Voltage tolerance	-15 %/+20 %
Output of external power supply (DC)	18 W
Output of external power supply (DC) at no load	3 W
Residual ripple DC	5 %
External unit fuse protection F1	4 A, circuit breaker 24 V DC, characteristic B/C
Potential isolation	No
Supply voltage	
for	Supply to 2-pole SC outputs
Voltage	24 V, 48 V
Kind	DC
Voltage tolerance	-10 %/+10 %
Output of external power supply (DC)	240 W
External unit fuse protection F1	10 A, circuit breaker 48 V DC, characteristic B/C
Potential isolation	yes
Inputs	
Number	8
Number of safe inputs	4
Number of standard inputs	4
Input current, safe inputs	3 - 10 mA
Input current, standard inputs	3 - 10 mA
Min. threshold voltage when signal changes from "1" to "0", safe inputs	7 V
Max. threshold voltage when signal changes from "0" to "1", safe inputs	10 V
Min. threshold voltage when signal changes from "1" to "0", standard inputs	7 V
Max. threshold voltage when signal changes from "0" to "1", standard inputs	10 V
Pulse suppression	1 ms
Voltage at	
Input circuit DC	24 V
Feedback loop DC	24 V
Potential isolation	No
Semiconductor outputs	
Number of positive-switching single-pole semiconductor outputs	3

Semiconductor outputs	
Switching capability	
Voltage	24 V
Current	0,1 A
Max. duration of off time during self test	300 µs
Short circuit-proof	yes
Potential isolation	No
Permitted loads	inductive, capacitive, resistive
Semiconductor outputs, 2-pole	
Number of dual-pole semiconductor outputs	2
Maximum output power during continuous duty	84 W
Maximum output power during overexcitation	156 W
Reduced voltages	6 V, 8 V, 12 V, 16 V, 24 V
Voltage tolerance of reduced voltages	-10 %/+10 %
Max. output current at "1" signal, 24 V, continuous duty	3,5 A
Max. output current at "1" signal, 48 V, continuous duty	1,75 A
Max. output current at "1" signal, 24 V, overexcitation	6,5 A
Max. output current at "1" signal, 48 V, overexcitation	3,25 A
Min. current at 2-pole output at "1" signal	100 mA
Short circuit-proof	yes
Permitted loads	Inductive
Max. duration of off time during self test	500 µs
Voltage outputs	
Number	1
Voltage	24 V DC
Max. current	0,1 A
Short circuit-proof	yes
Potential isolation	No
Test pulse outputs	
Number of test pulse outputs	2
Voltage, test pulse outputs	24 V DC
Max. duration of off time during self test	6 ms
Short circuit-proof	yes
Max. output current at "1" signal	0,1 A
Potential isolation	No
Times	
Supply interruption before de-energisation	20 ms
Max. reaction time when the input signal changes	7 ms
Ventilation time configurable in steps	30 ms ... 4000 ms
Application time during fast shutdown configurable in steps	30 ms ... 4000 ms
Application time during slow shutdown configurable in steps	30 ms ... 4000 ms
Overexcitation time configurable in steps	100 ms ... 2500 ms

Environmental data	
Climatic suitability	EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-78
Ambient temperature	
Temperature range	0 - 55 °C
Storage temperature	
Temperature range	-40 - 85 °C
Climatic suitability	
Humidity	93 % r. h. at 40 °C
Condensation during operation	Not permitted
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61326-3-1
Vibration	
In accordance with the standard	EN 60068-2-6
Frequency	10 - 55 Hz
Amplitude	0,35 mm
Max. operating height above sea level	2000 m
Airgap creepage	
In accordance with the standard	EN 60664-1
Overvoltage category	III
Protection type	
Mounting area (e.g. control cabinet)	IP54
Housing	IP20
Terminals	IP20
Potential isolation	
Potential isolation between	2-pole semiconductor outputs and system voltage
Type of potential isolation	Basic insulation
Mechanical data	
Mounting position	Horizontal on top hat rail
Material	
Bottom	PC
Front	PC
Top	PC
Connection type	Spring-loaded terminal
Mounting type	plug-in
Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector	0,2 - 2,5 mm ² , 24 - 12 AWG
Spring-loaded terminals: Terminal points per connection	2
Stripping length with spring-loaded terminals	9 mm
Dimensions	
Height	100 mm
Width	45 mm
Depth	120 mm
Weight	255 g

The standards current on 2013-03 apply.

9.1 Safety characteristic data

Operating mode	EN ISO 13849-1: 2008 PL	EN ISO 13849-1: 2008 Category	EN 62061 SIL CL	EN 62061 PFH _D [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2008 T _M [year]
All	PL e	Cat. 4	SIL CL 3	7,83E-10	SIL 3	6,81E-05	20

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 be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.

The safety-related characteristic data (PFH, PFD) are mean values. They have been calculated at an average ambient component temperature of 40 °C and apply for the ambient temperature range stated in the technical details.

10 Supplementary data


The max. permitted load current at the power circuits O1+/O1- and O2+/O2- depends on the

- ▶ Ambient temperature.
- ▶ Distance between the PNOZ s50 and adjacent devices.
- ▶ Number of power circuits connected (one or two).
- ▶ Size of the supply voltage to the power circuits at B1/B2.



INFORMATION

You may need to consider the distance from adjacent devices!

If a distance needs to be maintained between adjacent devices, please refer to the information in the chapter entitled "Installation", under "[Mounting distances](#) [ 24]".

Distance re- quired between adjacent devices	Ambient tem- perature	Number of power circuits	Max. permitted output current at $U_{B1/B2} = 24\text{ V}$	Max. permitted output current at $U_{B1/B2} = 48\text{ V}$
Yes	45°C	1	6.5 A	3.25 A
Yes	55°C	1	5.5 A	2.75 A
Yes	45°C	2	4.5 A	2.25 A
Yes	55°C	2	4.0 A	2.0 A
No	45°C	1	6.0 A	3.0 A
No	55°C	1	5.0 A	2.5 A
No	45°C	2	4.0 A	2.0 A
No	55°C	2	3.5 A	1.75 A

Use of the devices in accordance with UL

Ambient tem- perature	Number of power circuits	Max. permitted output current at $U_{B1/B2} = 24\text{ V}$	Max. permitted output current at $U_{B1/B2} = 48\text{ V}$	Utilisation cat- egory
45°C	1	6.5 A	3.25 A	Pilot Duty
55°C	1	5.5 A	2.75 A	
45°C	2	4.5 A	2.25 A	
55°C	2	4.0 A	2.0 A	

When using the devices in accordance with UL, please note the following:

- ▶ The ambient temperature is understood to be the *Surrounding Air Temperature*.
- ▶ Appropriate measures e.g (tempering of the control cabinet) should be used to ensure that the stated values are maintained when devices are installed without a distance.

11 Order reference

11.1 Order references Module

Product type	Terminals	Order no.
PNOZ s50 C	Spring-loaded terminals	751 500

11.2 Order references Accessories

Chip cards

Product type	Features			Order no.
PNOZmulti Chipcard	Chip card	32 kB		779 211
PNOZmulti Chipcard Set	Chip card	32 kB	10 piece	779 212
Chipcard Holder	Chip card holder			779 240
PNOZmulti Seal	Chip card seal		10 piece	779 250

Terminals

Product type	Features			Order no.
PNOZ s Set1 Spring Loaded Terminals 45 mm	Set of plug-in spring-loaded terminals		1 piece	751 008

12 Appendix

12.1 Check list

Enter the device parameters in the following check list. It is intended as a guide to provide support when commissioning and recommissioning the PNOZ s50 and when carrying out the regular inspection as required.

We recommend that you keep the completed check list and store it with the machine documentation for reference.

Function	Terminal	Description	Parameters	Value
Supply voltage, power circuits 1 and 2	B1/B2	Supply voltage	Input Voltage	.....V
Test pulse	Y1/Y2	Test pulses on feedback loops	Pulsing On = Test pulse on Off = Test pulse off	
Power circuit 1	O1+/O1-	Reduced voltage	I	.....V
		Overexcitation time	T	.....ms
	Y1	Maximum ventilation time	Ton	.....ms
		Maximum application time Fast shutdown	Toff fast	.....ms
		Maximum application time Slow shutdown	Toff slow	.....ms
		Logic of feedback loop 1	Logic N/O = Normally open N/C = Normally closed	

Function	Terminal	Description	Parameters	Value
Power circuit 2	O2+/O2-	Reduced voltage	I	.....V
		Overexcitation time	T	.....ms
	Y2	Maximum ventilation time	Ton	.....ms
		Maximum application time Fast shutdown	Toff fast	.....ms
		Maximum application time Slow shutdown	Toff slow	.....ms
		Logic of feedback loop 2	Logic N/O = Normally open N/C = Normally closed	

Check sum (CRC):.....
(from "Systeminfo" menu page)

Date:.....

Signature:

.....

► Support

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