

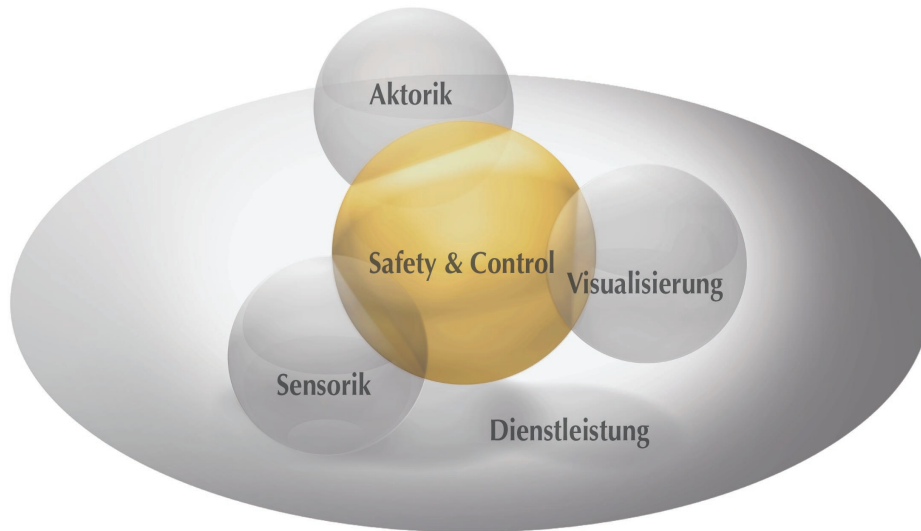


Technical Catalogue

PSENmag and PSENcode

pilz
more than automation
safe automation

Non-contact, magnetic and coded safety switches



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Standards and directives

1

Product range PSENmag and PSENcode

2

Introduction

2.1

Overview

2.2

Safety

2.3

Description

2.4

Installation and adjustment

2.5

Wiring and commissioning

2.6

Unit-specific descriptions

2.7

Applications

2.8

Appendix

2.9

Service

3

Pre-sales/after sales

Order reference

4

Product range PSENmag and PSENcode

Contents	Page
Standards and directives	
European directives and position of the standards in Europe	1-2
Legal regulations outside Europe	1-3
Risk parameters and categories	1-4
Functional safety and legal position of EN/IEC 61508	1-5

European directives and position of the standards in Europe

European directives

The concept of a single European internal market in terms of the "New Approach" can be traced right back to the start of the 70s: The low voltage directive was the first piece of European legislation to take into account the approach towards harmonisation of a common internal market.

Products that are covered by one or more of the following directives have to apply a CE-mark, i.e. the product must be accompanied

by a declaration of conformity. With a declaration of conformity the manufacturer confirms that his product meets all the requirements of the European directives that relate to his product. This means he can launch and sell his product within the scope of the EU without consideration of any national regulations.

Lifts	95/16/EC
Construction products	89/106/EEC
Pressure equipment directive	97/23/EC
EMC directive	89/336/EEC

ATEX	94/9/EC
Appliances burning gaseous fuels	90/396/EEC
Machinery directive	98/37/EC
Medical device directive	93/42/EEC
Low voltage directive	73/23/EEC
Personal protective equipment	89/686/EEC
Safety of toys directive	88/378/EEC

The directives are addressed to member states, who are obliged to incorporate the European directives into domestic law. In Germany this is normally achieved through the device safety law.

Position of the standards in Europe

The legal position of standards is discussed again and again. Inside Europe, i.e. within the scope of the European directives that are subject to the CE-marking obligation, a manufacturer is not bound by standards or other specifications. He simply needs to comply with the health and safety requirements of the directive(s). The associated benefits of a division between standards and legislation are obvious: It is easier for legislators to agree on the essential requirements than on technical details. Also, the directives do not regularly have to be adapted to the state of technology; member states can use their own legal system for incorporation and manufacturers are free to select the ways in which they implement the requirements of the directive.

So what are the benefits of applying the standards? With so-called harmonised standards with presumption of conformity, there is a shifting of the burden of proof, i.e. if manufacturers apply these standards, it is presumed that they will also comply with the specific requirements of the European directives.

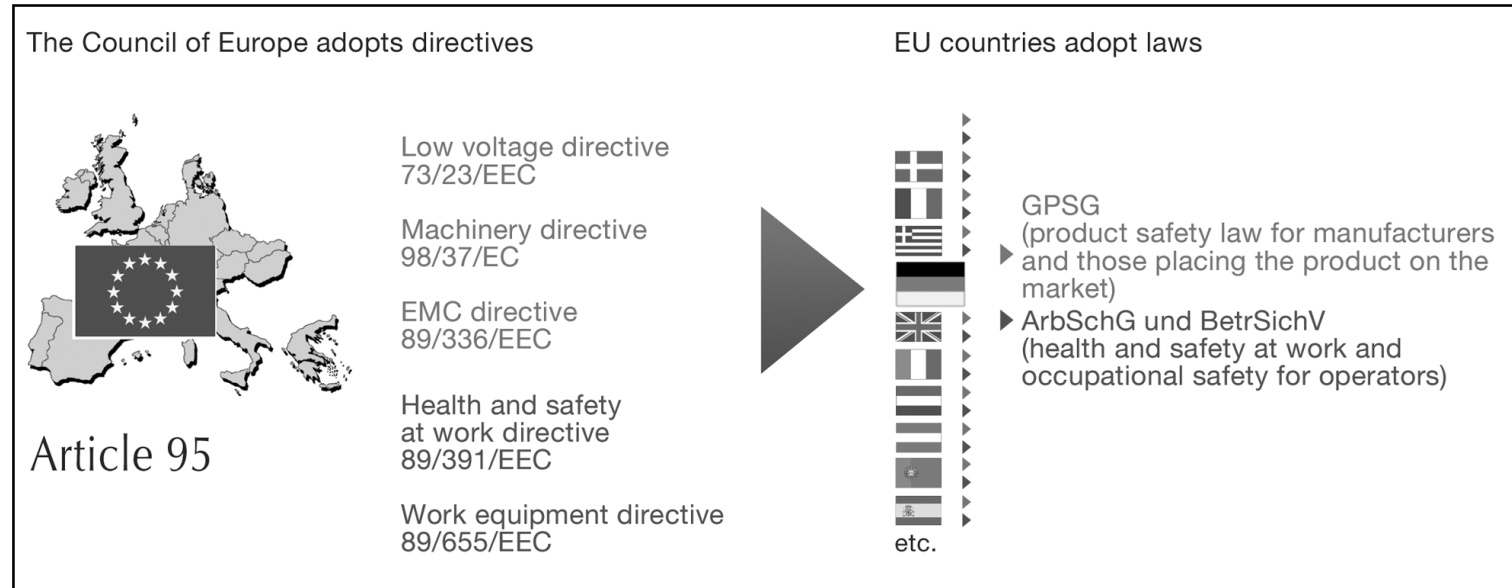


Fig. 1: Incorporation of the directives into domestic law (using Germany as an example)

Legal regulations outside Europe

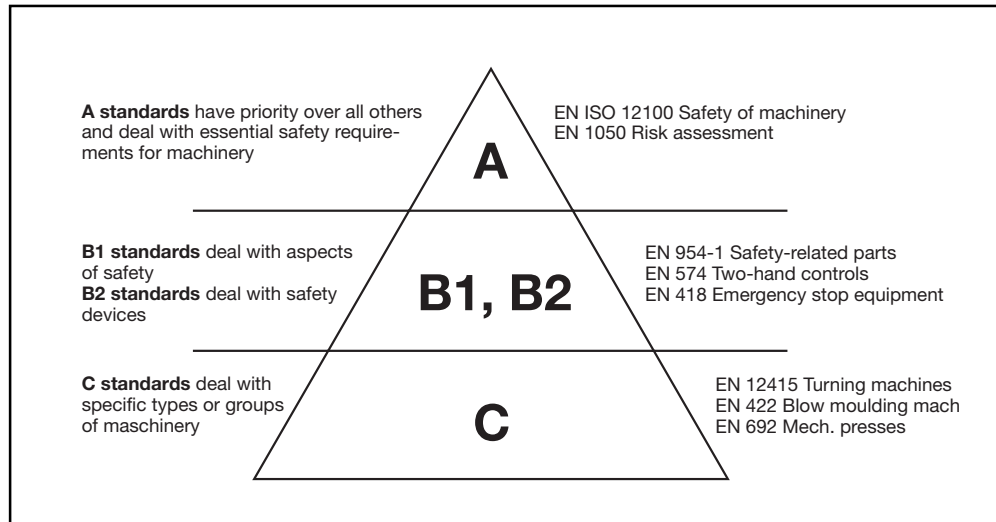


Fig. 2: Standards pyramid

The regulatory authorities would therefore need to prove that a manufacturer did not meet the legal requirements.

However, should a manufacturer deviate from the harmonised standards, he himself must prove how he has met the essential safety requirements. This is generally done via a hazard analysis. In practice one would endeavour to apply the harmonised standards, unless the products concerned are highly innovative and no harmonised standards yet exist. The standards for which this "presumption effect" applies can be researched in the Official Journal of the EU

(e.g. on the Internet). Standards in Europe are subdivided into what are termed A, B, and C standards.

Legal regulations outside Europe

The situation is somewhat different in the USA: people there are mainly familiar with two types of standards: ANSI (American National Standards Institute) and OSHA (Occupational Safety and Health Administration). OSHA standards are published by the state and compliance is mandatory. ANSI standards, on the other hand, are developed

by private organisations and their application is generally not absolutely essential. However, ANSI standards can still be found included as part of a contract. Beyond that ANSI standards are being taken over by OSHA. You can still come across the NFPA (National Fire Protection Association), which developed NFPA 79 as a counterpart to EN 60204-1, for example. The OSHA standards can be compared with the European directives. Unlike the European directives, the OSHA standards are more involved with formulating technical specifications than abstract requirements.

The legal basis in the USA can be seen as a mix of product standards, fire codes (NFPA), electrical codes (NEC) and national laws. Local government bodies have the authority to monitor that these codes are being enforced and implemented.

Russia and the CIS states have implemented GOST-R certification for some years now, in other words, technical devices that fall within a specific product area must undergo a certain certification process. Machinery and any corresponding technical accessories undergo a type approval test through a European notified body, for example. This test is generally recognised by a Russian-based approvals body. From the point of view of safety, the same requirements apply as in Europe.

China, on the other hand, has introduced CCC certification. Similar to the position in Russia, technical products are subject to mandatory certification through a national approvals body in China. In addition, production sites are inspected. If a technical device falls with the scope of the product list, which is subdivided into 19 categories, certification is mandatory, otherwise it will be necessary to supply a type of "declaration of no objection" from a national notified body.

Japan is currently in a transition period: The plan is for Japan to adopt the European "new approach" – in other words, to keep standards and legislation separate. At the moment the international ISO and IEC standards are being directly incorporated into national legislation, which is why people are currently confronted with frequent amendments to laws and lengthy implementation periods.

Risk parameters and categories

Standards for functional safety

Different standards may be called upon to observe functional safety on control systems, depending on the application. In the area of machine safety, EN 954-1 is the main standard named for safety-related control systems. Irrespective of the technology, this applies for the whole chain from the sensor to the actuator. The risk graphs and corresponding risk parameters can be used to estimate the potential risk for danger zones on machinery. The category is then established without the use of risk-reducing measures.

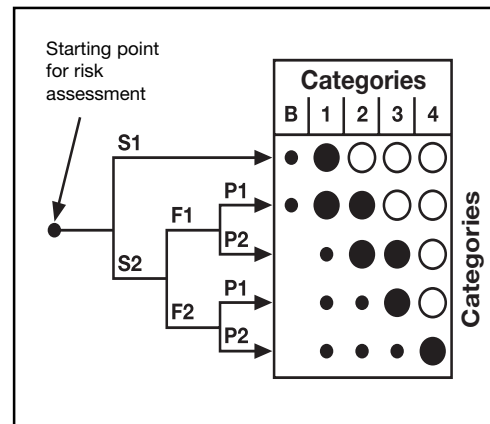


Fig. 3: Risk graph from EN 954

Risk parameters

S = Severity of injury:

- 1 = Slight (normally reversible) injury
- 2 = Serious (normally irreversible) injury, including death

F = Frequency and/or exposure to the hazard

- 1 = Seldom to quite often and/or exposure time is short
- 2 = Frequent to continuous and/or exposure time is long

P = Possibility of avoiding the hazard

- 1 = Possible under specific conditions
- 2 = Scarcely possible

Categories in accordance with EN 954-1

The control system requirements derived from the risk graph are specified as follows:

Category B

Basic category with no special requirements = "good industrial standard"

Category 1

Safety-related parts must be designed and constructed using well-tried components and well-tried safety principles.

Well-tried means: the components have been widely used in the past with successful results in similar applications, or they have been manufactured using principles that demonstrate its suitability and reliability for safety-related applications.

Example: safety switch with forced-opening contacts.

Well-tried safety principles are circuits that are constructed in such a way that certain faults can be avoided by the appropriate arrangement or layout of components.

Example: avoiding a short circuit through appropriate separation, avoiding component failures that result from over-dimensioning, using the failsafe principle (on switching off).

Note: When a fault occurs it can lead to the loss of the safety function.

Category 2

Safety-related parts of control systems must be designed so that their safety function(s) are checked at suitable intervals by the machine control system. The safety function(s) must be checked: at the machine start-up and prior to the initiation of any hazardous situation; periodically during operation, if the risk assessment and the kind of operation show that it is necessary.

This check may be initiated automatically or manually. Automatically, for example, the check may be initiated by a signal generated from a control system at suitable intervals. The automatic test should be provided by preference. The decision about the type of test depends on the risk assessment and the judgement of the end user or machine builder. If no fault is detected, operation may be approved as a result of the test. If a fault is detected, an output must be generated to initiate appropriate control action. A second, independent shutdown route is required for this.

Notes: In some cases Category 2 is not applicable because the checking of the safety function cannot be applied to all components and devices. Moreover, the cost involved in implementing Category 2 correctly may be considerable, so that it may make better economic sense to implement a different category. In general Category 2 can be realised with electronic techniques.

Functional safety and legal position of EN/IEC 61508

The system behaviour allows the occurrence of a fault to lead to the loss of the safety function between checks; the loss of safety function is detected by the check.

Category 3

Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to the loss of the safety function.

Whenever reasonably practicable, the single fault shall be detected at or before the next demand upon the safety function. This does not mean that all faults will be detected. The accumulation of undetected faults can lead to an unintended output signal and a hazardous situation at the machine.

Category 4

Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to a loss of the safety function; the single fault must be detected at or before the next demand upon the safety functions (e.g. immediately at switch on, at the end of a machine operating cycle).

If this detection is not possible, then an accumulation of faults shall not lead to a loss of the safety function.

Functional safety with EN/IEC 61508?

EN/IEC 61508 is regarded as a generic safety standard, which deals with the functional safety of electrical, electronic and programmable electronic systems, irrespective of the application.

One of the main tasks of EN/IEC 61508 is to serve as a basis for the development of application-oriented standards. Standards' committees are currently busy in the areas of machine safety with EN/IEC 62061, and process safety with EN/IEC 61511. Also under revision is EN 954, the standard harmonised under the scope of the machinery directive, which in future will be listed as EN/ISO 13849. These sector-specific standards are intended to continue the principle approaches of EN/IEC 61508 and to implement the requirements for the relevant application area in a suitably practical manner.

What is the legal status of IEC 61508?

As EN/IEC 61508 is not listed in the Official Journal of the European Communities for implementation as a European directive, it lacks the so-called "presumption effect". If

the standard is used on its own, a control system designer cannot presume that the relevant requirements of the specific European directive have been met.

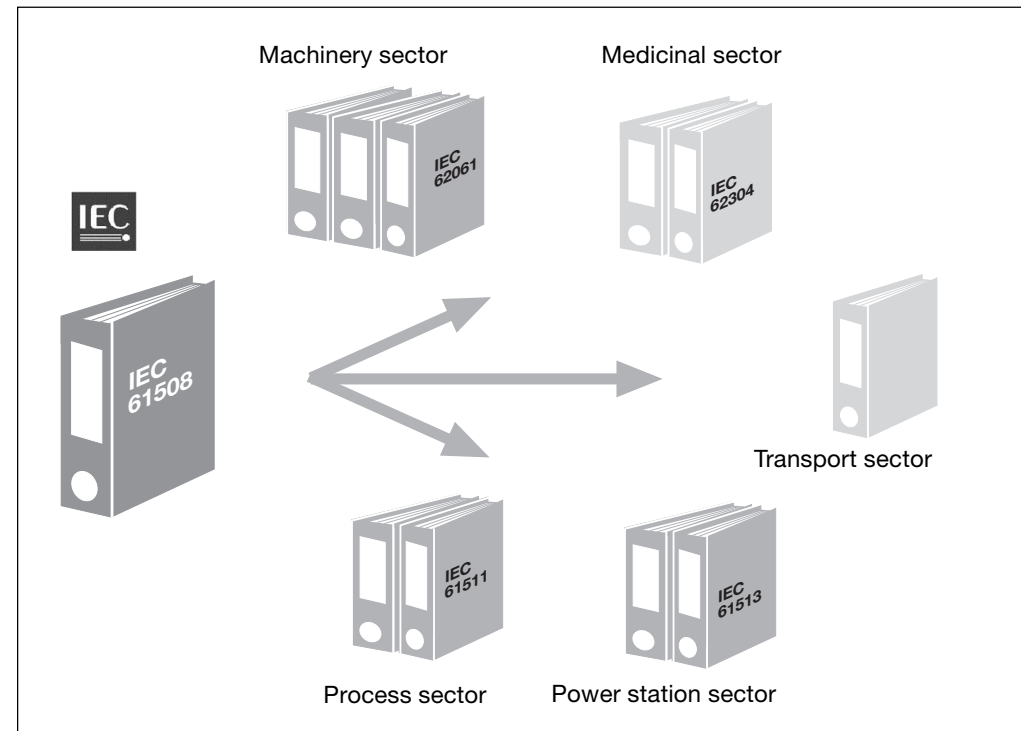


Fig. 4: Sector standards from IEC 61508

Risk assessment

Risk assessment

Under the terms of the machinery directive, a machine manufacturer must assess the hazards in order to identify all the hazards that apply to his machine. He must then design and construct the machine to take account of his assessment. This requirement also applies to operators who act as manufacturers under the terms of the machinery directive. For example, this may occur with machines that are interlinked or for machinery that has been upgraded and substantially modified.

EN 1050 contains "Principles for risk assessment" on machinery. These approaches can be called upon as part of a comprehensive analysis. EN 954-1 expands on EN 1050 with regard to the assessment of safety-related parts of control systems.

The hazards emanating from a machine may be many and varied, so for example, it is necessary to consider not just mechanical hazards through crushing and shearing, but also thermal and electrical hazards and hazards from radiation. Risk reduction is therefore an iterative process, i.e. it is carried out before and during the planning phase and after completion of the plant or machine.

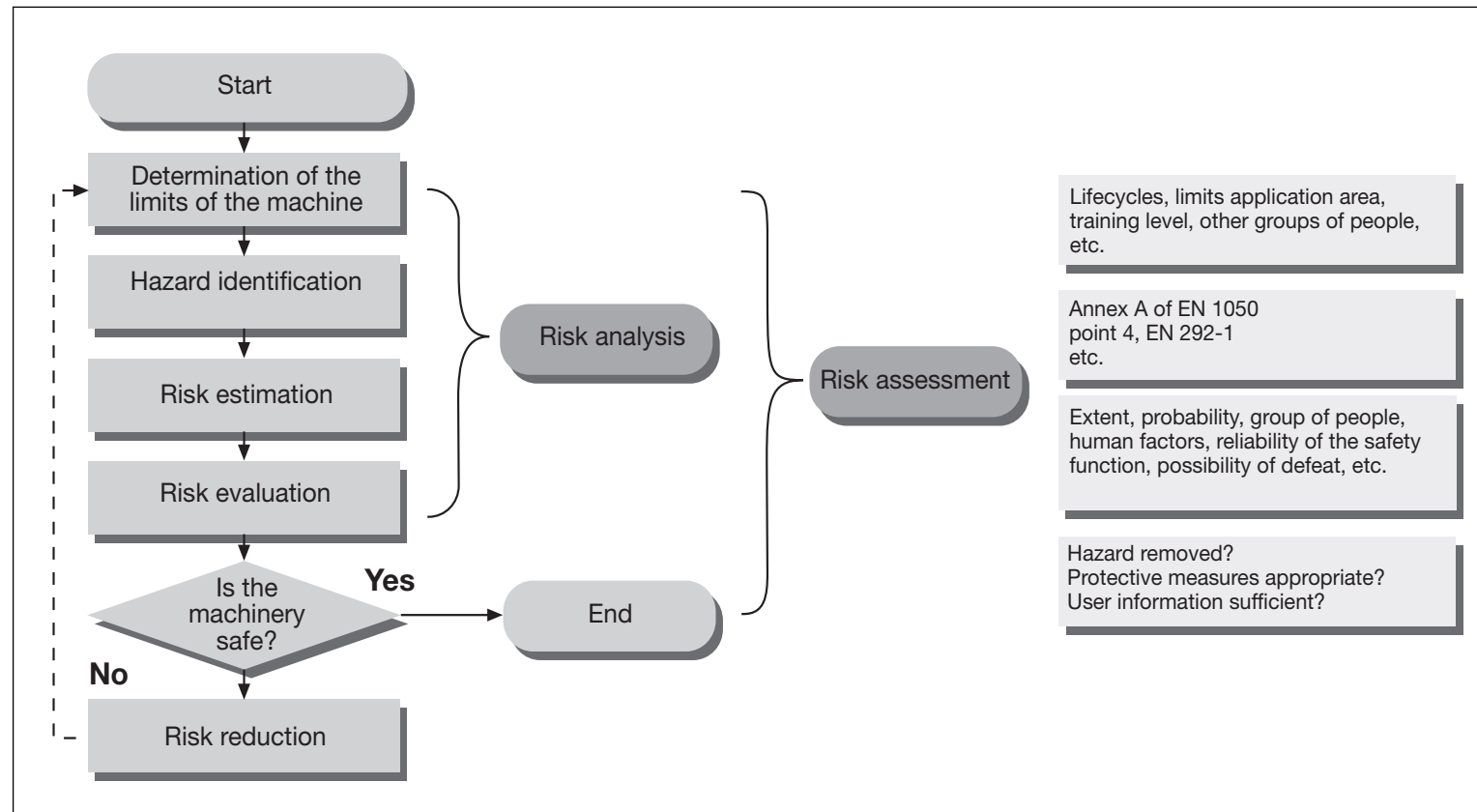


Fig. 5: Iterative process in accordance with EN 1050

Contents	Page
Product range PSENmag and PSENcode	
Introduction	2.1-1
Definition of symbols	2.1-1
Overview	2.2-1
Safety	2.3-1
Safety assessments	2.3-1
General safety requirements	2.3-1
Intended use	2.3-1
PSENmag description	2.4-1
Operation of the PSENmag safety switches	2.4-1
Protection against defeat	2.4-1
Selection criteria for PSENmag safety switches	2.4-1
Switching distance	2.4-1
Assured switching distances	2.4-1
Hysteresis	2.4-1
Lateral and vertical offset	2.4-1
Actuator's direction of movement	2.4-2
Actuator's pass-by speed	2.4-2
Compact design	2.4-2
Evaluation devices	2.4-2
Connecting safety switches in series	2.4-2
Housing material	2.4-3
Cable with connector	2.4-3
Category	2.4-3
Application areas	2.4-3
PSENcode description	2.4-5
Operation of the PSENcode safety switches	2.4-5
Protection against defeat	2.4-5
Selection criteria for PSENcode safety switches	2.4-5
Directions of actuation	2.4-5
Switching distance	2.4-5
Hysteresis	2.4-5
Lateral and vertical offset	2.4-6

Contents	Page
Product range PSENmag and PSENcode	
Actuator's direction of movement	2.4-6
Actuator's pass-by speed	2.4-6
Evaluation devices	2.4-6
Connecting safety switches in series	2.4-7
Housing material	2.4-7
Cable with connector	2.4-7
Category	2.4-7
Application areas	2.4-7
Installation and adjustment PSENmag	2.5-1
Installation position	2.5-1
Installation guidelines	2.5-1
Attachment	2.5-1
Adjustment	2.5-1
Installing the interfaces PSEN i1 and PSEN ix1	2.5-1
Accessories	2.5-2
Spacer for safety switch in square design	2.5-2
Bracket for safety switch in square design	2.5-2
Swing gates	2.5-2
Concealed installation	2.5-2
Installation and adjustment PSENcode	2.5-3
Installation position	2.5-3
Installation guidelines	2.5-3
Attachment	2.5-3
Adjustment	2.5-3
Concealed installation	2.5-3
Swing gates	2.5-4
Wiring and commissioning PSENmag	2.6-1
Permitted evaluation devices	2.6-1
Wiring, commissioning and fault diagnostics PSENcode	2.6-3
Block diagram	2.6-3
Connection examples	2.6-4

Contents	Page
Product range PSENmag and PSENcode	
Permitted evaluation devices	2.6-5
Status indicators	2.6-5
Troubleshooting	2.6-6
Unit-specific descriptions PSENmag	2.7-1
Comparison of PSENmag safety switches	2.7-1
Approvals	2.7-4
PSEN 1.1p-10, PSEN 1.1p-20	2.7-5
Intended use	2.7-5
Description	2.7-5
Connections	2.7-5
Switching distances	2.7-5
Vertical and lateral offset	2.7-5
Direct connection to PNOZ X and PNOZpower	2.7-6
Direct connection to PNOZmulti	2.7-7
Direct connection to a PSS, with or without SafetyBUS p	2.7-7
Dimensions in mm	2.7-8
Technical details	2.7-8
PSEN 1.1p-12, PSEN 1.1p-22	2.7-9
Intended use	2.7-9
Description	2.7-9
Wiring	2.7-9
Connections	2.7-9
Switching distances	2.7-9
Vertical and lateral offset	2.7-9
Dimensions in mm	2.7-10
Technical details	2.7-10
PSEN 1.1p-23 ATEX	2.7-11
Intended use	2.7-11
Description	2.7-11
Connections	2.7-11
Switching distances	2.7-11
Vertical and lateral offset	2.7-11

Contents	Page
Product range PSENmag and PSENcode	
Direct connection to PNOZ X and PNOZpower	2.7-12
Direct connection to PNOZmulti	2.7-13
Direct connection to a PSS, with or without SafetyBUS p	2.7-13
Dimensions in mm	2.7-14
Technical details	2.7-14
PSEN 1.1p-25 ATEX	2.7-15
Intended use	2.7-15
Description	2.7-15
Wiring	2.7-15
Connections	2.7-15
Switching distances	2.7-15
Vertical and lateral offset	2.7-16
Dimensions in mm	2.7-16
Technical details	2.7-17
PSEN 1.2p-20	2.7-18
Intended use	2.7-18
Description	2.7-18
Connections	2.7-18
Switching distances	2.7-18
Vertical and lateral offset	2.7-18
Direct connection to PNOZ X and PNOZpower	2.7-19
Direct connection to PNOZmulti	2.7-20
Direct connection to a PSS, with or without SafetyBUS p	2.7-20
Dimensions in mm	2.7-21
Technical details	2.7-21
PSEN 1.2p-22	2.7-22
Intended use	2.7-22
Description	2.7-22
Wiring	2.7-22
Connections	2.7-22
Switching distances	2.7-22
Vertical and lateral offset	2.7-22

Contents	Page
Product range PSENmag and PSENcode	
Dimensions in mm	2.7-23
Technical details	2.7-23
PSEN 1.2p-23 ATEX	2.7-24
Intended use	2.7-24
Description	2.7-24
Connections	2.7-24
Switching distances	2.7-24
Vertical and lateral offset	2.7-24
Direct connection to PNOZ X and PNOZpower	2.7-25
Direct connection to PNOZmulti	2.7-26
Direct connection to a PSS, with or without SafetyBUS p	2.7-26
Dimensions in mm	2.7-27
Technical details	2.7-27
PSEN 1.2p-25 ATEX	2.7-28
Intended use	2.7-28
Description	2.7-28
Connections	2.7-28
Wiring	2.7-28
Switching distances	2.7-28
Vertical and lateral offset	2.7-29
Dimensions in mm	2.7-29
Technical details	2.7-30
PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31	2.7-31
Intended use	2.7-31
Description	2.7-31
Connections	2.7-31
Switching distances	2.7-31
Vertical and lateral offset	2.7-31
Series connection via PSEN i1 interface	2.7-32
Direct connection to PNOZelog	2.7-32
Direct connection to PNOZmulti	2.7-32
Direct connection to a PSS, with or without SafetyBUS p	2.7-33

Contents	Page
Product range PSENmag and PSENcode	
Dimensions in mm	2.7-33
Technical details	2.7-33
PSEN 2.1p-34 ATEX	2.7-34
Intended use	2.7-34
Description	2.7-34
Connections	2.7-34
Switching distances	2.7-34
Vertical and lateral offset	2.7-34
Series connection via PSEN i1 interface	2.7-35
Direct connection to PNOZelog	2.7-35
Direct connection to PNOZmulti	2.7-35
Direct connection to a PSS, with or without SafetyBUS p	2.7-36
Dimensions in mm	2.7-36
Technical details	2.7-36
PSEN 2.2p-20, PSEN 2.2p-21	2.7-37
Intended use	2.7-37
Description	2.7-37
Connections	2.7-37
Wiring	2.7-37
Switching distances	2.7-37
Vertical and lateral offset	2.7-37
Dimensions in mm	2.7-38
Technical details	2.7-38
PSEN 2.2p-24 ATEX	2.7-39
Intended use	2.7-39
Description	2.7-39
Connections	2.7-39
Switching distances	2.7-39
Vertical and lateral offset	2.7-39
Direct connection to PNOZelog	2.7-40
Direct connection to PNOZmulti	2.7-40

Contents	Page
Product range PSENmag and PSENcode	
Direct connection to a PSS, with or without SafetyBUS p	2.7-40
Dimensions in mm	2.7-41
Technical details	2.7-41
PSEN i1	2.7-42
Intended use	2.7-42
Description	2.7-42
Internal wiring diagram	2.7-42
Series connection to PNOZelog via PSEN i1 interface	2.7-43
Series connection to PNOZmulti via PSEN i1 interface	2.7-43
Series connection to a PSS, with or without SafetyBUS p	2.7-44
Connecting the diagnostic outputs	2.7-44
Example 1: Evaluation of 2 safety switches	2.7-45
Example 2: Evaluation of 6 safety switches	2.7-46
Terminal configuration	2.7-47
Dimensions in mm	2.7-47
Technical details	2.7-48
PSEN ix1	2.7-49
Intended use	2.7-49
Description	2.7-49
Internal wiring diagram	2.7-49
Series connection via PSEN ix1 interface	2.7-50
Connecting the diagnostic outputs	2.7-52
Series connection of PSEN ix1	2.7-52
Example 1: Evaluation of 4 safety switches	2.7-53
Example 2: Evaluation of 9 safety switches	2.7-54
Terminal configuration	2.7-55
Dimensions in mm	2.7-55
Technical details	2.7-56
PSEN accessories	2.7-57
Spacer for safety switch	2.7-57
Bracket for safety switch	2.7-57
Cable for safety switch	2.7-58

Contents	Page
Product range PSENmag and PSENcode	
Unit-specific descriptions PSENcode	2.7-59
Comparison of the PSENcode safety switches	2.7-59
Approvals	2.7-59
PSEN cs 1.1p	2.7-61
Intended use	2.7-61
Description	2.7-61
Connections	2.7-61
Switching distances	2.7-61
Vertical and lateral offset	2.7-61
Connection to PNOZ X, PNOZelog, PNOZmulti and PSS	2.7-63
Dimensions in mm	2.7-64
Technical details	2.7-65
PSEN cs 2.1p, PSEN cs2.2p	2.7-66
Intended use	2.7-66
Description	2.7-66
Teaching in the actuator	2.7-66
Connections	2.7-66
Switching distances	2.7-67
Vertical and lateral offset	2.7-67
Connection to PNOZ X, PNOZelog, PNOZmulti and PSS	2.7-68
Dimensions in mm	2.7-69
Technical details	2.7-70
PSEN cs 1.13p ATEX	2.7-71
Intended use	2.7-71
Description	2.7-71
Connections	2.7-71
Switching distances	2.7-71
Vertical and lateral offset	2.7-71
Connection to PNOZ X, PNOZelog, PNOZmulti and PSS	2.7-73
Dimensions in mm	2.7-74
Technical details	2.7-75

Contents	Page
Product range PSENmag and PSENcode	
PSEN cs 2.13p ATEX	2.7-76
Intended use	2.7-76
Description	2.7-76
Teaching in the actuator	2.7-76
Connections	2.7-76
Switching distances	2.7-77
Vertical and lateral offset	2.7-77
Connection to PNOZ X, PNOZelog, PNOZmulti and PSS	2.7-78
Dimensions in mm	2.7-79
Technical details	2.7-80
Accessories	2.7-81
Cable for safety switch	2.7-81
Applications	2.8-1
Safety	2.8-1
Safety gate and E-STOP, Category 4, EN 954-1	2.8-2
Override safety gate with enable switch, Category 4, EN 954-1	2.8-6
Machine hoods with 3 x 2 safety sensors, Category 3, EN 954-1	2.8-14
Appendix	2.9-1
Chemical resistance	2-9-1

Product range PSENmag and PSENcode

This technical catalogue describes the units in the PSEN product range:

PSENmag:

- PSEN 1.1p-10
- PSEN 1.1p-12
- PSEN 1.1p-20
- PSEN 1.1p-22
- PSEN 1.1p-23 ATEX
- PSEN 1.1p-25 ATEX
- PSEN 1.2p-20
- PSEN 1.2p-22
- PSEN 1.2p-23 ATEX
- PSEN 1.2p-25 ATEX
- PSEN 2.1p-10
- PSEN 2.1p-11
- PSEN 2.1p-30
- PSEN 2.1p-31
- PSEN 2.1p-34 ATEX
- PSEN 2.2p-20
- PSEN 2.2p-21
- PSEN 2.2p-24 ATEX
- PSEN i1
- PSEN ix1

PSENcode:

- PSEN cs1.1p
- PSEN cs1.13p ATEX
- PSEN cs2.1p
- PSEN cs2.13p ATEX
- PSEN cs2.2p

The first part of the technical catalogue contains information relating to the whole product range. This is followed by descriptions of the specific units and application examples. The appendix contains a table showing the chemical resistance of the safety switches.

This technical catalogue is divided into the following chapters:

1 Introduction

The introduction is designed to familiarise you with the contents, structure and specific order of this technical catalogue.

2 Overview

This chapter provides information on the most important features of the product range and provides a brief overview of the application range.

3 Safety

This chapter **must be read** as it contains important information on safety regulations.

4 Description

The description contains important information on how the safety switches operate and also on selection criteria.

5 Installation and adjustment

This chapter describes how to install and adjust the safety switches.

6 Wiring and commissioning

This chapter contains important information on wiring the safety switches.

7 Unit-specific descriptions

These descriptions refer exclusively to the specific features for the unit, such as intended use, description and wiring of individual units.

8 Applications

This chapter is a collection of application examples.

9 Appendix

This chapter contains a table showing the chemical resistance of the safety switches.

Definition of symbols

Information in this technical catalogue that is of particular importance can be 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 unit(s) could be damaged and also provides information on preventive measures that can be taken.



INFORMATION

This gives advice on applications and provides information on special features, as well as highlighting areas within the text that are of particular importance.

Product range PSENmag and PSENcode

What is the PSEN product range?

The PSEN product range consists of:

- Non-contact, magnetic safety switches PSENmag
- Non-contact, coded safety switches PSENcode with transponder technology.

The PSEN product range consists of non-contact, magnetic safety switches, which monitor the position of movable protection devices in conjunction with an actuator and an evaluation device. For safety-related applications, the safety switches must only be used in conjunction with approved evaluation devices. Approved, complete solutions are available for evaluating the position of rotatable, removable and displaceable safety devices in accordance with EN 60947-5-3.

Approved, complete solutions are implemented using:

- PNOZelog electronic safety relays
- PNOZmulti modular safety relays
- PNOZ X and PNOZpower safety relays
- PSS programmable safety systems
- Safe, open bus system SafetyBUS p

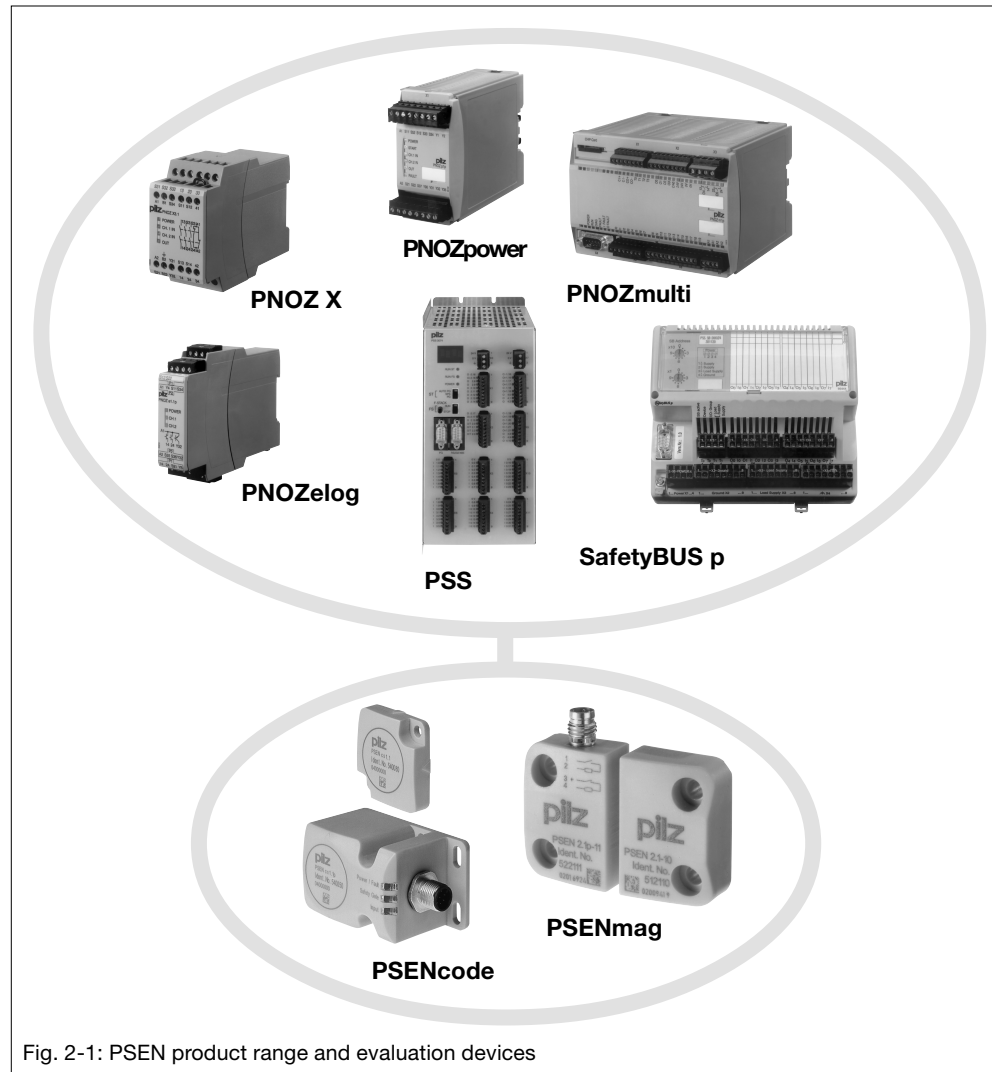


Fig. 2-1: PSEN product range and evaluation devices

Product range PSENmag and PSENcode

Safety assessments

Before using a unit it is necessary to perform a safety assessment in accordance with the Machinery Directive. The safety system guarantees functional safety, but not the safety of the entire application. You should therefore define the safety requirements for the plant as a whole, and also define how these will be implemented from a technical and organisational standpoint.

General safety requirements

Always ensure the following safety requirements are met:

- Only install and commission the unit if you are familiar with the information in the operating instructions or this technical catalogue, as well as the relevant regulations concerning health and safety at work and accident prevention.
- Only use the unit for the purpose for which it is intended and comply with both the general and specific technical details.
- Transport, storage and operating conditions should all conform to EN 60068-2-6, 01/00 (see general technical details on the individual units, in the chapter entitled "Unit-specific descriptions").

You must observe the warning notes given in other parts of this technical catalogue. These are highlighted visually through the use of symbols.



NOTICE

Failure to keep to these safety regulations will render the warranty invalid.

Intended use

The units' intended use depends on the individual unit and is therefore explained in the chapter entitled "Unit-specific descriptions".

PSENmag

Operation of the safety switch PSENmag

Safety switches in the PSEN product range act in conjunction with an actuator in non-contact, magnetic operation. Each safety switch has an approved actuator. Together with an authorised evaluation device they form an approved, complete solution.

The safety switches are available with different contact combinations (N/C / N/O, N/O / N/O). If the actuator is within the response range, the magnets switch the reed contacts on the safety switch. If the actuator is outside the response range (safety gate open), the reed contacts on the safety switch will switch. On some safety switches this is signalled by a red LED.

Protection against defeat

Safety switches from the PSEN range are designed to guarantee security against manipulation through protection against defeat in accordance with VDE 0660.

Selection criteria for safety switches PSENmag

- Switching distances
- Switch type (e.g. N/C / N/C combination)
- Design (compact, round, square)
- Type of evaluation device
- Connection to evaluation device
 - directly to the safety switch (single connection)
 - via an interface to the safety switch (series connection of several safety switches)
- Category to be achieved in accordance with EN 954-1 and EN 60947-5-3
- LED to display switch status
- Type of cable connection on the safety switch (plug-in with screw connection, straight or angled)
- Housing material, application area

Switching distance:

Safety switches with different switching distances are available for different applications, e.g. with an assured operating distance s_{ao} of 3 or 8 mm.

A high lateral and vertical offset can be achieved with long switching distances. This will provide greater tolerances for installation and even less sensitivity towards spring-back or swinging from safety gates.

Assured switching distances:

- Assured operating distance s_{ao} :
This is the distance from the sensing face, within which the presence of the specified target is correctly detected under all specified environmental conditions, manufacturing tolerances and internal component faults.
- Assured release distance s_{ar} :
This is the distance from the sensing face, beyond which the presence of the specified target is correctly detected under all specified environmental conditions, manufacturing tolerances and internal component faults.

Hysteresis:

The assured release distance is longer than the assured operating distance ($s_{ar} > s_{ao}$). The safety switches therefore have a hysteresis. If the actuator is within s_{ao} , vibrations up to s_{ar} will not cause the safety switch to de-energise.

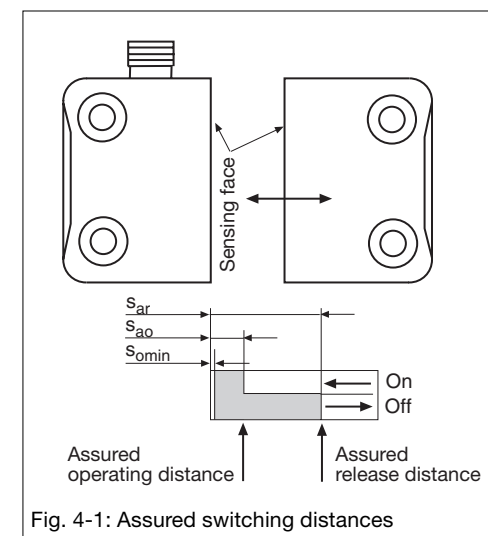


Fig. 4-1: Assured switching distances

Lateral and vertical offset:

The switching distances stated in the technical details only apply if the sensing faces of the safety switch and actuator are installed opposite each other in parallel. Switching distances may deviate if other arrangements are used. The maximum permitted lateral and vertical offset will depend on the safety switch you are using (see chapter entitled "Unit-specific descriptions", section on "Max. lateral and vertical offset in mm").

PSENmag

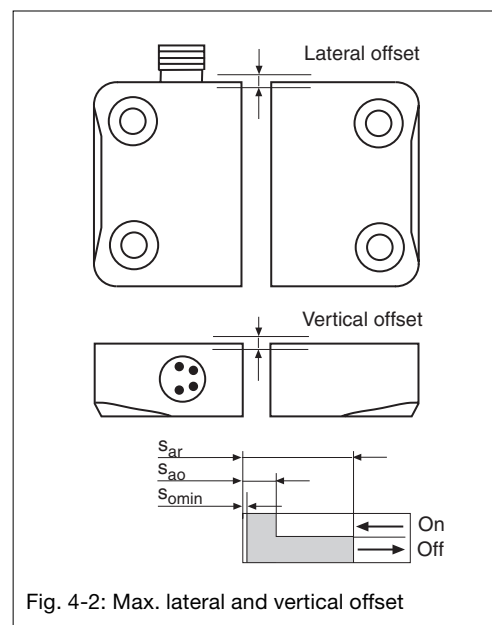


Fig. 4-2: Max. lateral and vertical offset

Actuator's direction of movement:

The sensing face of the actuator is permitted to move in parallel to the sensing face on the safety switch. Movements in which the actuator is tilted in relation to the safety switch are not permitted (Fig. 4-3).

Actuator's pass-by speed:

If the safety switch is being used as a position switch, the maximum permitted pass-by speed of the actuator is important. This must be defined so that the evaluation device can detect the status of the safety switch. This value is device-specific.

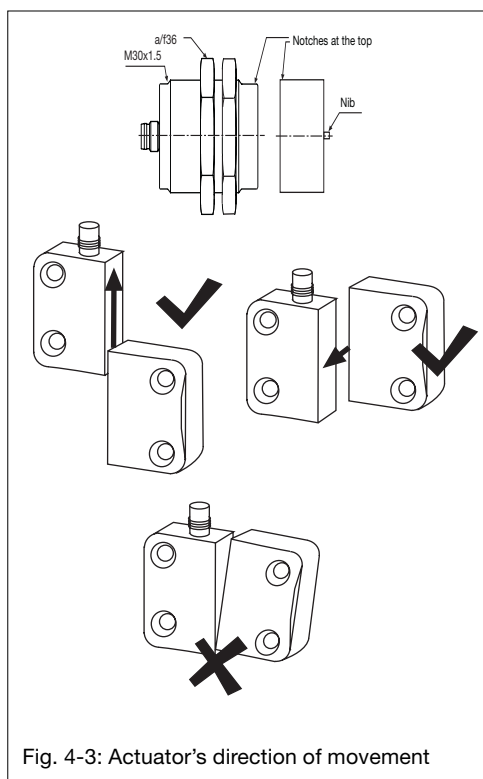


Fig. 4-3: Actuator's direction of movement

Compact structure:

The safety switches are small and compact in design, enabling them to integrate perfectly into an existing working environment.

With a round or square design, the safety switches can easily be adapted to suit installation requirements.

Evaluation devices:

Each safety switch has an approved evaluation device and possibly also an interface.



INFORMATION

For details of which evaluation device is approved for which safety switch, please refer to the chapter entitled "Wiring and commissioning" or to the details in the chapter entitled "Unit-specific descriptions".

Connecting safety switches in series:

Several safety switches are connected to an input on an evaluation device via an interface. This means, for example, that several safety gates on a plant can be monitored using a single evaluation device.

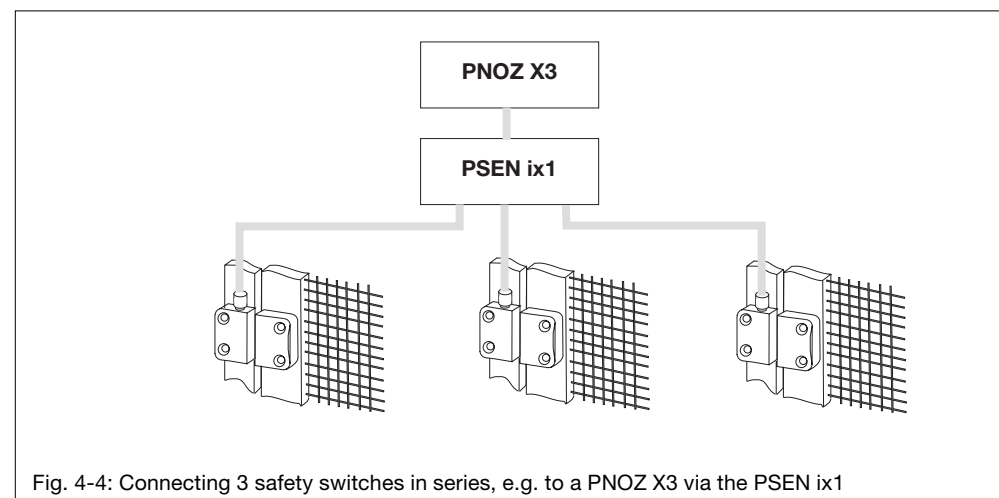


Fig. 4-4: Connecting 3 safety switches in series, e.g. to a PNOZ X3 via the PSEN ix1

PSENmag

The interface type and the number of safety switches that can be connected will depend on the selected evaluation device. The interface connects the safety switches in series to the evaluation device. The switch status of the individual safety switches (safety gate open or closed) is displayed through LEDs and can be evaluated via auxiliary outputs, e.g. with a PLC.

Housing material:

The housing of the PSEN safety switch is made from silicone-free PBT plastic, which is insensitive to dirt. For details of the chemical resistance of the housing material, please refer to the table in Chapter 9, "Appendix".

Cable with connector:

The cables for the safety sensors have a plug-in connection. This enables the cable and switches to be installed separately. The plug connectors are 4-pin male M8 screw connectors with lock. They are available straight or angled.

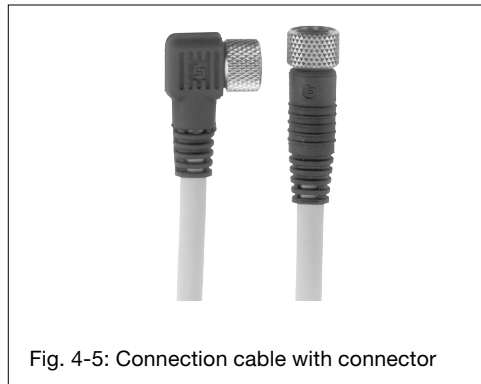


Fig. 4-5: Connection cable with connector

Category:

Safety switches in the PSEN product range have two independent contacts. They are classified as PDF-M in accordance with EN 60947-5-3 and can therefore be used for applications up to category 4 in accordance with EN 954-1.

If an interface (e.g. PSEN i1) is used to connect the safety switches in series, the classification to EN 60947-5-3 is reduced to PDF-S. This means the safety switches can be used for applications up to category 3 in accordance with EN 954-1.

Application areas:

Thanks to the high protection type IP65/67, integral protection against defeat and long service life, the safety switches are suitable for use:

- In mechanical engineering
- In areas with rigorous hygiene requirements, such as the food, packaging or pharmaceutical industry.

PSENcode

Operation of the PSENcode safety switches

PSENcode safety switches act in conjunction with a coded actuator in non-contact operation (transponder). Each safety switch has an actuator (transponder). Together with an authorised evaluation device they form an approved, complete solution.

Two microcontrollers evaluate the input circuits and switch the outputs accordingly. The microcontrollers monitor each other.

If the correct actuator (transponder) is in the response range, signal output **Y32** will switch on. If the input circuits are also closed, safety contacts **12** and **22** are switched on and the "Input" LED illuminates yellow.

If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety outputs **12** and **22** and signal output **Y32** are blocked.

If the shut down occurs via the inputs, reactivation of the outputs is only possible after both safety inputs are simultaneously de-energised (partial operation lock).

Protection against defeat

Safety switches from the PSEN range are designed to guarantee security against manipulation through protection against defeat in accordance with VDE 0660.

Selection criteria for PSENcode safety switches

- Coding
 - Coded actuator: Safety switch only accepts PILZ actuators
 - Fully coded actuator (unique code): The actuator has a unique electronic coding. The safety switch only reacts to a single actuator.
 - Fully coded actuator (unique code, teachable): The actuator has a unique electronic coding. The safety switch only reacts to a single actuator. New actuators can be taught in via a learning procedure at the safety switch (max. 8 additional learning procedures).
- Application area
 - Safety switch with ATEX approval for use in potentially explosive atmospheres.

Directions of actuation

PSENcs safety switches have 5 different sensing faces.

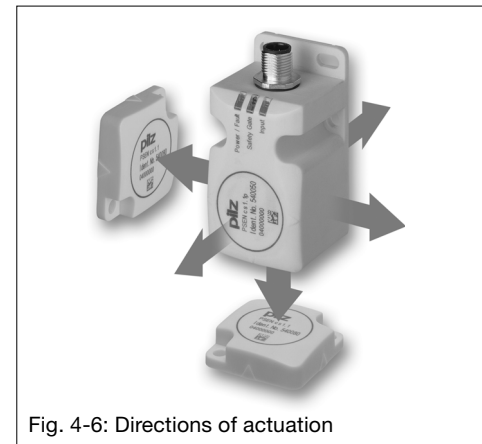


Fig. 4-6: Directions of actuation

Switching distance

A high lateral and vertical offset can be achieved as a result of the long switching distances. This will provide greater tolerances for installation and even less sensitivity towards spring-back or swinging from safety gates.

- Assured operating distance s_{ao} :
This is the distance from the sensing face, within which the presence of the specified target is correctly detected under all specified environmental conditions and manufacturing tolerances.

- Typical operating distance s_o :
This is the distance from the sensing face, within which the presence of the specified target is typically detected correctly.
- Release distance s_r :
This is the distance from the sensing face, beyond which the absence of the specified target is correctly detected under all specified environmental conditions and manufacturing tolerances.
- Typical release distance:
This is the distance from the sensing face, beyond which the absence of the specified target is typically detected correctly.
- Assured release distance s_{ar} :
This is the distance from the sensing face, beyond which the absence of the specified target is correctly detected under all specified environmental conditions, manufacturing tolerances **and internal component** faults.

Hysteresis:

The typical release distance is longer than the typical operating distance s_o . The safety switches therefore have a hysteresis. If the actuator is within s_o , vibrations up to the typical release distance will not cause the safety switch to de-energise.

PSEncode



CAUTION

If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the switching distances, as changes can be expected.

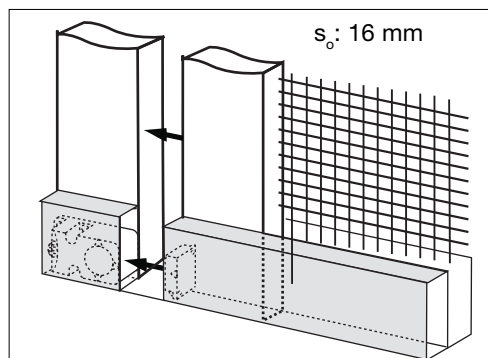


Fig. 4-7: Example 1: Concealed installation with 4 mm aluminium, visual contact between actuator and sensor

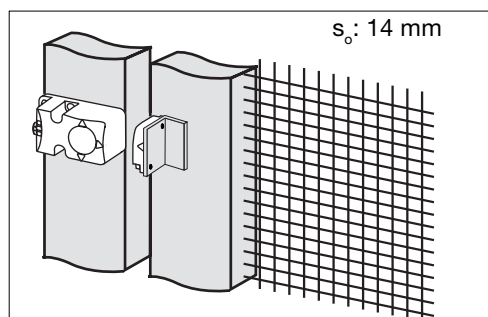


Fig. 4-8: Example 2: Installation with actuator on a 4 mm aluminium bracket and the sensor flush on to aluminium

Lateral and vertical offset:

The switching distances stated in the technical details only apply if the active areas of the sensing face and actuator are installed opposite each other in parallel. Switching distances may deviate if other arrangements are used. The maximum permitted lateral and vertical offset will depend on the safety switch you are using (see chapter entitled "Unit-specific descriptions", section on "Max. lateral and vertical offset in mm").

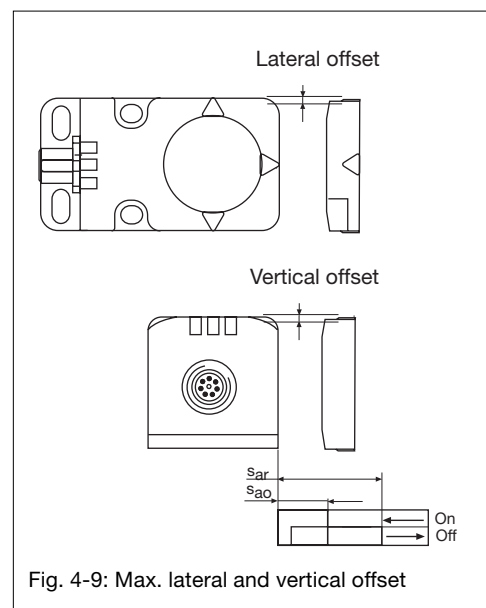


Fig. 4-9: Max. lateral and vertical offset

Actuator's direction of movement

The sensing face of the actuator is permitted to move in parallel to the sensing face on the safety switch. Movements in which the actuator is tilted in relation to the safety switch are not permitted (Fig. 4-10).

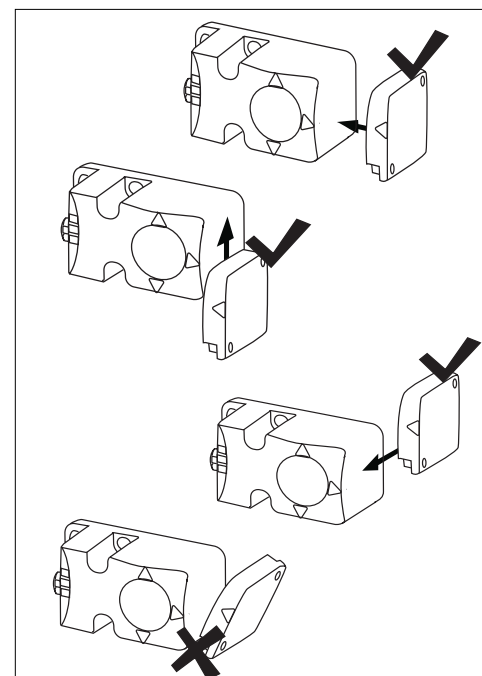


Fig. 4-10: Actuator's direction of movement when actuation direction is from the front

Actuator's pass-by speed:

If the safety switch is being used as a position switch, the maximum permitted pass-by speed of the actuator is important. This must be defined so that the evaluation device can detect the status of the safety switch. This value is device-specific.

Evaluation devices:

Each safety switch has an approved evaluation device.



INFORMATION

For details of which evaluation device is approved for which safety switch, please refer to the chapter entitled "Commissioning and fault diagnostics" or to the details in the chapter entitled "Unit-specific descriptions".

PSENcode

Connecting safety switches in series

Several safety switches are connected in series to an input on an evaluation device via a junction. This means, for example, that several safety gates on a plant can be monitored using a single evaluation device. Up to 10 safety switches can be connected in series (can be used for applications up to Category 4 in accordance with EN 954-1). The switch status of the individual safety switches (safety gate open or closed) is displayed through LEDs and can be evaluated via the signal output, e.g. with a PLC.



CAUTION

When connecting several safety switches in series, the delay-on de-energisation time increases in direct proportion to the number of interconnected safety switches.

Housing material

The housing of the PSENcode safety switch is made from silicone-free PBT plastic, which is insensitive to dirt. For details of the chemical resistance of the housing material, please refer to the table in Chapter 9, "Appendix".

Cable with connector

The cables for the safety sensors have a plug-in connection. This enables the cable and switches to be installed separately. The plug connectors are 8-pin male M12 screw connectors. They are available straight or angled.

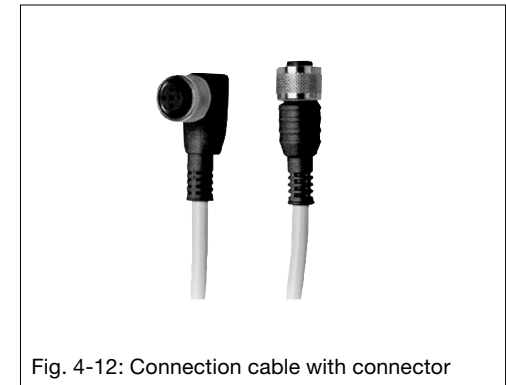


Fig. 4-12: Connection cable with connector

Category

PSENcode safety switches have a dual-channel structure. They are classified as PDF-M in accordance with EN 60947-5-3 and can therefore be used for applications up to category 4 in accordance with EN 954-1.

Application areas

Thanks to the high protection type IP67, integral protection against defeat and long service life, the safety switches are suitable for use:

- In mechanical engineering
- In areas with rigorous hygiene requirements, such as the food, packaging or pharmaceutical industry.

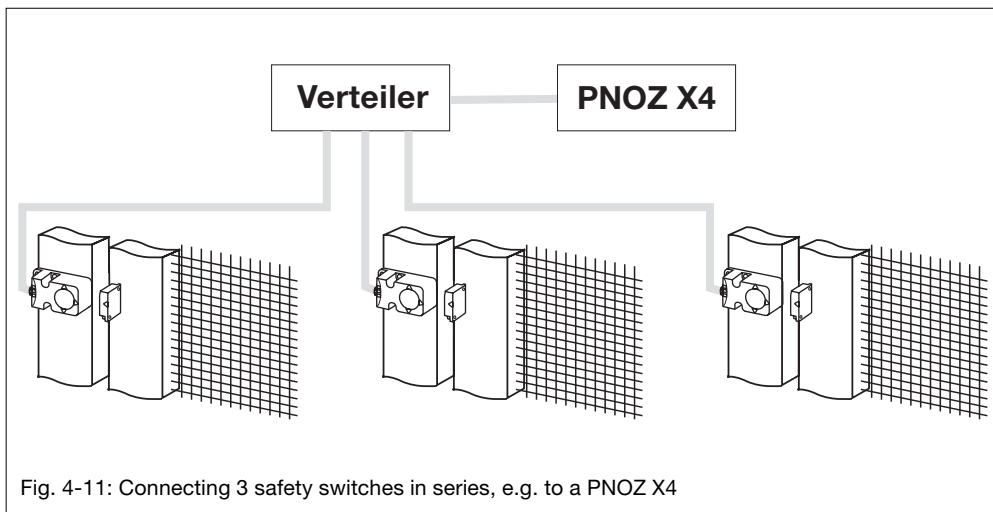
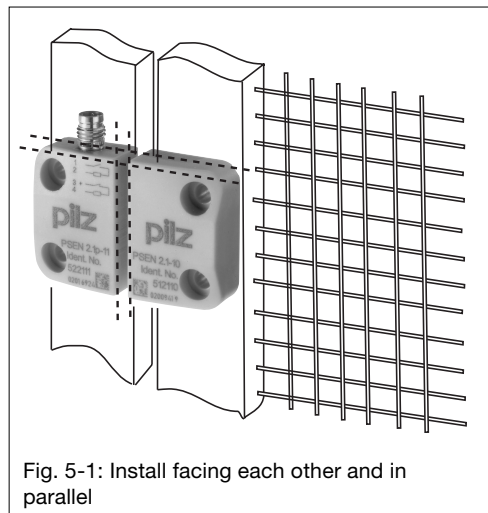


Fig. 4-11: Connecting 3 safety switches in series, e.g. to a PNOZ X4

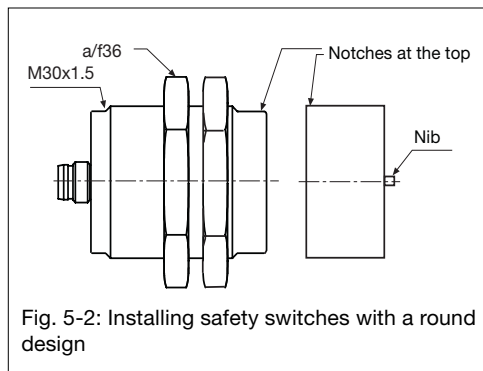
PSENmag

Installation position

The unit can be installed in any position. However, the sensing faces of the safety switch and actuator should be positioned opposite each other in parallel.



On units with a **round design**, make sure that the two notches are exactly opposite each other. A nib on the actuator prevents it twisting.



Installation guidelines

Safety switch and actuator

- Keep away from iron swarf
- Do not expose to strong magnetic fields
- Do not expose to heavy shock or vibration
- Do not use as a limit stop
- Where possible do not install on top of ferromagnetic material (changes in the switching distances can be expected). In this case, units in the **square design** can use the spacer, order number 534 310.

The distance between two systems made up of safety switch and actuator must be at least 25 mm (see installation example, "Safety switches on swing gates").

Attachment

Attach the safety switch to the fixed part of the safety device.

Square design:

Safety switches and actuators should only be secured using M4 screws with a flat head (e.g. M4 cheese-head or pan head screws). Torque setting max. 1 Nm. Use screws made of non-magnetic material (e.g. brass).

Round design:

Secure the safety switch using the M30 nuts provided.

The torque setting for the M30 nuts is max. 300 Ncm.

The actuator should be secured using an M4 or M5 screw made of non-magnetic material (e.g. brass).



CAUTION!

The actuator should be secured **permanently** to guarantee security against manipulation.

Adjustment

- The safety switch may only be used with a corresponding actuator.
- The actuator must not make contact with the safety switch. Please note the minimum switching distance stated in the technical details.

- Always test the function with one of the approved evaluation devices.
- Some safety switches have an LED. The LED lights when the contacts are unoperated (safety device open or safety switch and actuator wrongly adjusted). The LED is in the safety switch's N/C circuit. The LED goes out when the contacts are operated.



INFORMATION

Further information about the switching distances (operating and release distance) and the maximum permitted lateral and vertical offset can be found in the chapters entitled "Description" and "Unit-specific descriptions".

Installing the interfaces PSEN i1 and PSEN ix1



CAUTION!

The unit should be installed in a control cabinet with a protection type of at least IP54.

- Use the notch on the rear of the unit to attach it to a DIN rail.
- Secure the unit on a vertical DIN rail (35 mm) using a retaining bracket or end angle.

PSENmag

Accessories

Spacer for safety switch in square design:

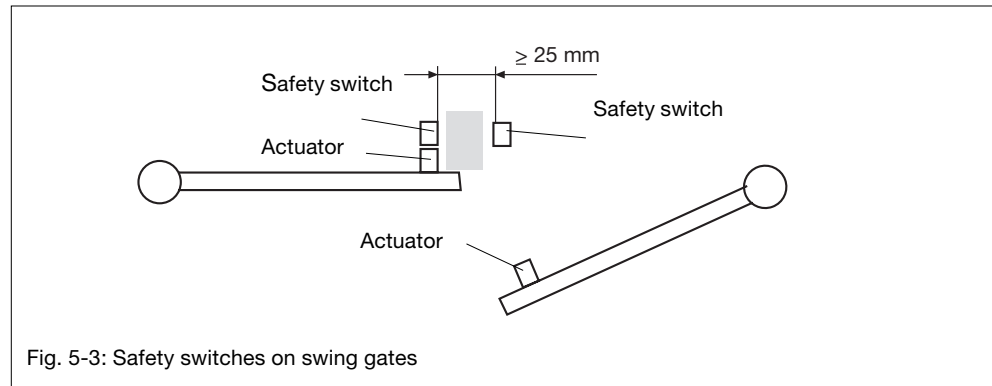
If the safety switch and actuator are installed on to ferromagnetic material, the switching distances may vary. If this is the case you should use the spacer supplied under order number 534 310 (for dimensions please refer to the chapter entitled "Unit-specific descriptions").

Bracket for safety switch in square design:

An aluminium bracket is available for installing the safety switch and actuator at an angle. On this bracket it is possible to adjust the position of the safety switch and actuator (for dimensions please refer to the chapter entitled "Unit-specific descriptions").

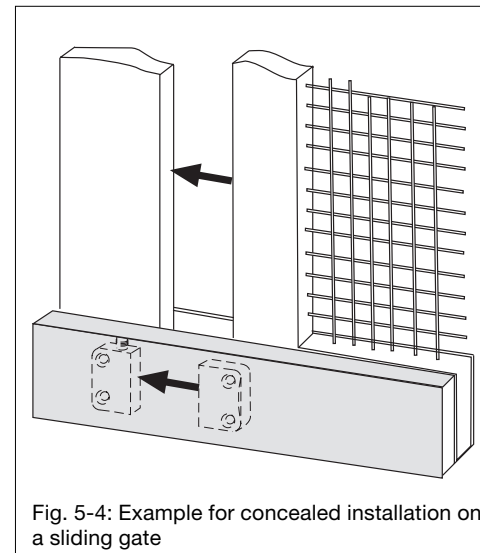
Swing gates

On swing gates the safety switch must be positioned on the closed edge. The distance between two systems made up of safety switch and actuator must be at least 25 mm (see Fig. 5-3).



Concealed installation

To exclude the possibility of manipulation, the actuator must be fitted in such a way that it cannot be removed by the operator. (see section entitled "Attachment"). Security against manipulation can also be guaranteed by concealing the installation of the safety switch and actuator. A concealed installation also reduces the risk of injury.



PSENcode

Installation position

The unit can be installed in any position. However, the sensing faces of the safety switch and actuator should be positioned opposite each other in parallel. Switching distances may deviate if other arrangements are used.



INFORMATION

Further information about the switching distances (operating and release distance) and the maximum permitted lateral and vertical offset can be found in the chapters entitled "Description" and "Unit-specific descriptions".

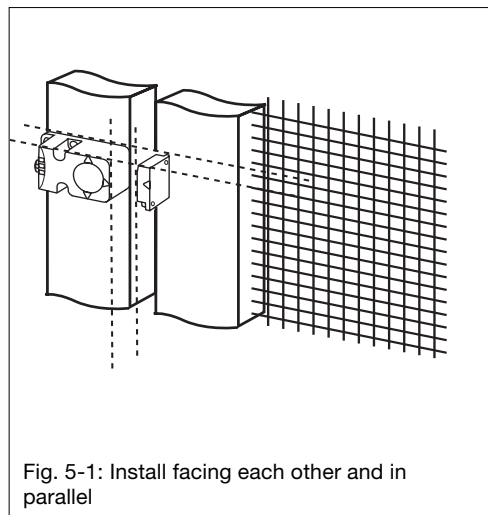


Fig. 5-1: Install facing each other and in parallel

Installation guidelines

- If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the switching distances, as changes can be expected.
- Safety switches and actuators should only be secured using M5 screws with a flat head (e.g. M5 cheese-head or pan head screws). Torque setting max. 1 Nm.
- The distance between two transponder systems must be at least 40 cm (see installation example, "Safety switches on swing gates").

Safety switch and actuator

- Do not expose to heavy shock or vibration
- Do not use as an end stop

Attachment

Attach the safety switch to the fixed part of the safety device.



CAUTION!

The actuator should be secured permanently to guarantee security against manipulation.

Adjustment

- The safety switch can only be used with a corresponding actuator.
- The actuator must not make contact with the safety switch. Please note the minimum switching distance stated in the technical details.
- Always test the function with one of the approved evaluation devices.
- The "Safety gate" LED on the safety switch illuminates yellow when the actuator is in the response range (guard closed, safety switch and actuator adjusted).

Concealed installation

Concealing the installation of the safety switch and actuator increases security against manipulation and reduces the risk of injury.

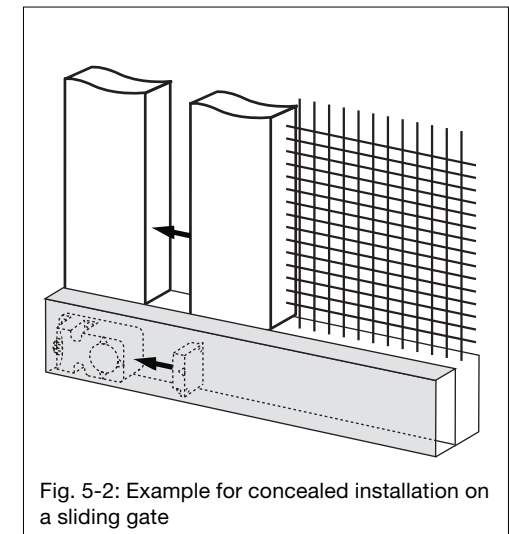
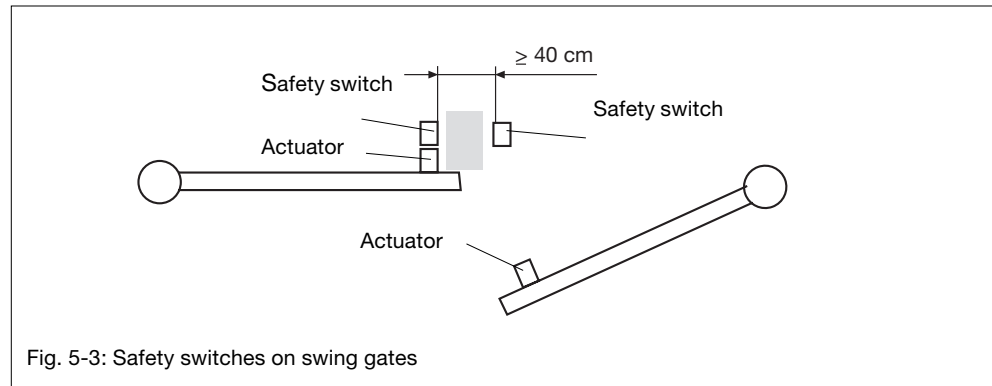


Fig. 5-2: Example for concealed installation on a sliding gate

PSENcode

Swing gates

On swing gates the safety switch must be positioned on the closed edge. The distance between two systems made up of safety switch and actuator must be at least 40 cm (see Fig. 5-3).



PSENmag

When wiring and commissioning, please note the following:

- The safety switches only conform to EN 60947-5-3 in conjunction with their approved evaluation devices and actuators.
- To connect the safety switches in series, the switches must be connected to the evaluation device via an interface that has been approved for this purpose.



NOTICE

Please note the colour marking on the connection cable. The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory.

- The safety switch is always shown in an unoperated condition.
- Calculating the max. cable runs $I_{\max}$ between the evaluation device and the safety switch, per channel:

$R_{I_{\max}}$ = max. overall cable resistance

R_1 /km = cable resistance/km

Permitted evaluation devices

Operation of the safety switches is only approved in conjunction with certain evaluation devices. During configuration, please refer to the operating manuals for the respective evaluation device.

Overview: Evaluation device -> Safety switch

PNOZ X, PNOZpower:

Evaluation devices	Safety switch actuator
PNOZ X	PSEN 1.1p-10 and PSEN 1-1-10
PMUT X1P	
PNOZ X2, PNOZ X2.1	
PNOZ X2P	PSEN 1.1p-12 and PSEN 1-1-10
PNOZ X2.3P	(only with PSEN ix1)
PNOZ X2.7P	
PNOZ X2.8P, PNOZ X2.9P	
PNOZ X2C	PNOZ 1.1p-20, PNOZ 1.1p-22 (only with PSEN ix1), PNOZ 1.1p-23
PNOZ X2.1C	ATEX, PNOZ 1.1p-25 ATEX (only with PSEN ix1) and PNOZ 1.1-20
PNOZ X4	
PNOZ X5, PNOZ X5J	
PNOZ 11, PNOZ X11P	
PNOZ 16	
PNOZ X13	
PNOZ X2.5P	
PNOZ X3, PNOZ X3.1	
PNOZ X3P	PNOZ 1.2p-20, PNOZ 1.2p-22 (only with PSEN ix1), PNOZ 1.2p-23
PNOZ X3.10P	ATEX, PNOZ 1.2p-25 ATEX (only with PSEN ix1) and PNOZ 1.2-20
PNOZ XV2, PNOZ XV2P	
PNOZ XV3, PNOZ XV3P	
PNOZ X6	
PNOZ X8P	
PNOZ X9, PNOZ X9P	
PNOZ X10, PNOZ X10.1	
PNOZ X10.11P	
PNOZ Ex	
PNOZpower	
PNOZ p1p, PNOZ p1vp	

PNOZmulti PSS-range with/without SafetyBUS p connection:

Evaluation devices	Safety switch actuator
PNOZmulti	PSEN 1.1p-10 and PSEN 1-1-10
PNOZ m1p	PSEN 1.1p-12 and PSEN 1-1-10 (only with PSEN ix1)
PSS-range with/without SafetyBUS p connection	PNOZ 1.1p-20, PNOZ 1.1p-22 (only with PSEN ix1), PNOZ 1.1p-23 ATEX, PNOZ 1.1p-25 ATEX (only with PSEN ix1) and PNOZ 1.1-20
	PNOZ 1.2p-20, PNOZ 1.2p-22 (only with PSEN ix1), PNOZ 1.2p-23 ATEX, PNOZ 1.2p-25 ATEX (only with PSEN ix1) and PNOZ 1.2-20

PNOZelog, PNOZmulti PSS-range with/without SafetyBUS p connection:

Evaluation devices	Safety switch actuator
PNOZelog	PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31, PSEN 2.1p-34 ATEX and PSEN 2.1-10
PNOZ e3.1p	
PNOZ e3vp 10 s	
PNOZ e3vp 300 s	
PNOZmulti	PSEN 2.2p-20
PNOZ m1p	PSEN 2.2p-21
	PSEN 2.2p-24 ATEX and PSEN 2.2-20
	Series connection via PSEN i1 possible with
PSS-range with/without SafetyBUS p connection	PSEN 2.1p-10
	PSEN 2.1p-11
	PSEN 2.1p-30
	PSEN 2.1p-31
	PSEN 2.1p-34 ATEX
	PSEN 2.2p-20

PSENcode

When wiring and commissioning, please note the following:

- The safety switches only conform to EN 60947-5-3 in conjunction with their approved evaluation devices and actuators.



NOTICE

Please note the colour marking on the connection cable. The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory.

- The safety switch is always shown in an unoperated condition.
- Connect inputs S11 and S21 to 24 VDC; with series connection, connect them to safety outputs 12 and 22 on the previous device.
- Calculating the max. cable runs $l_{\max}$ between the evaluation device and the safety switch, per channel:

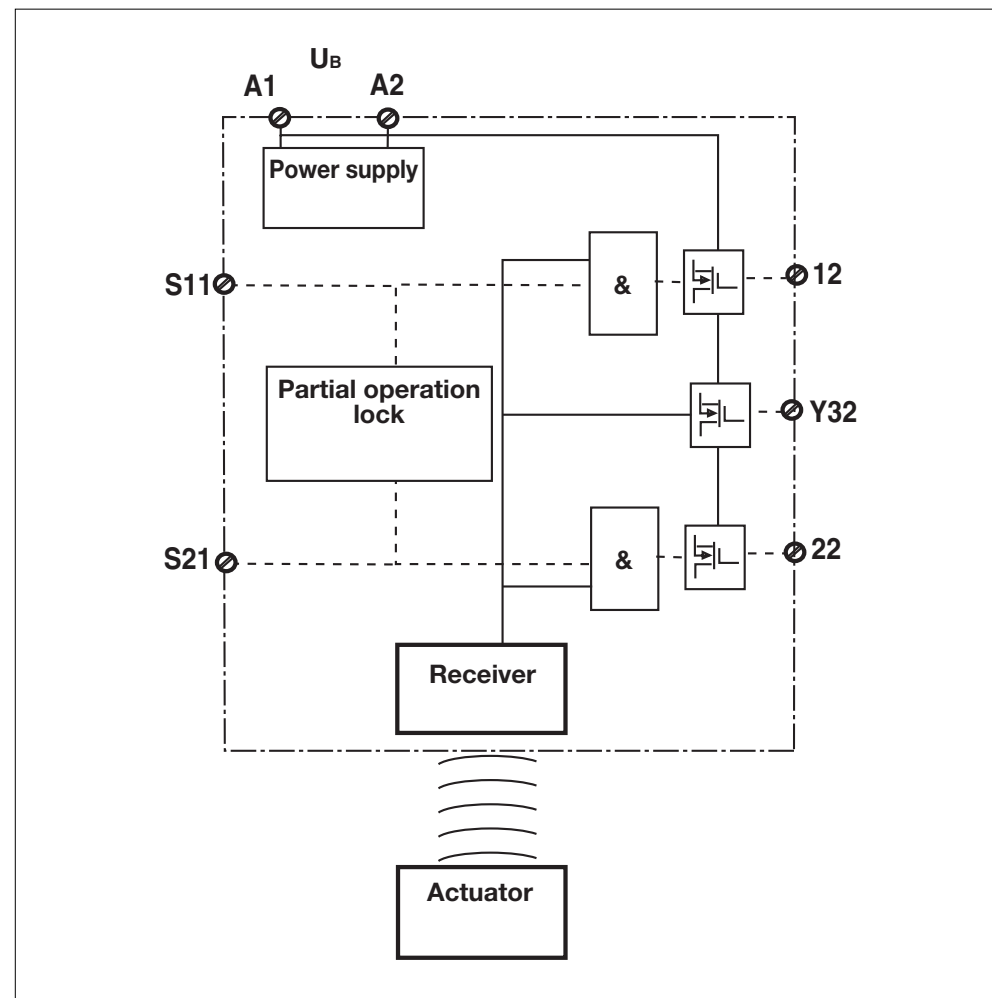
$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance

R_l / km = cable resistance/km

- Output 12, 22: at no-load, a capacitance of max. 2 nF can be driven.

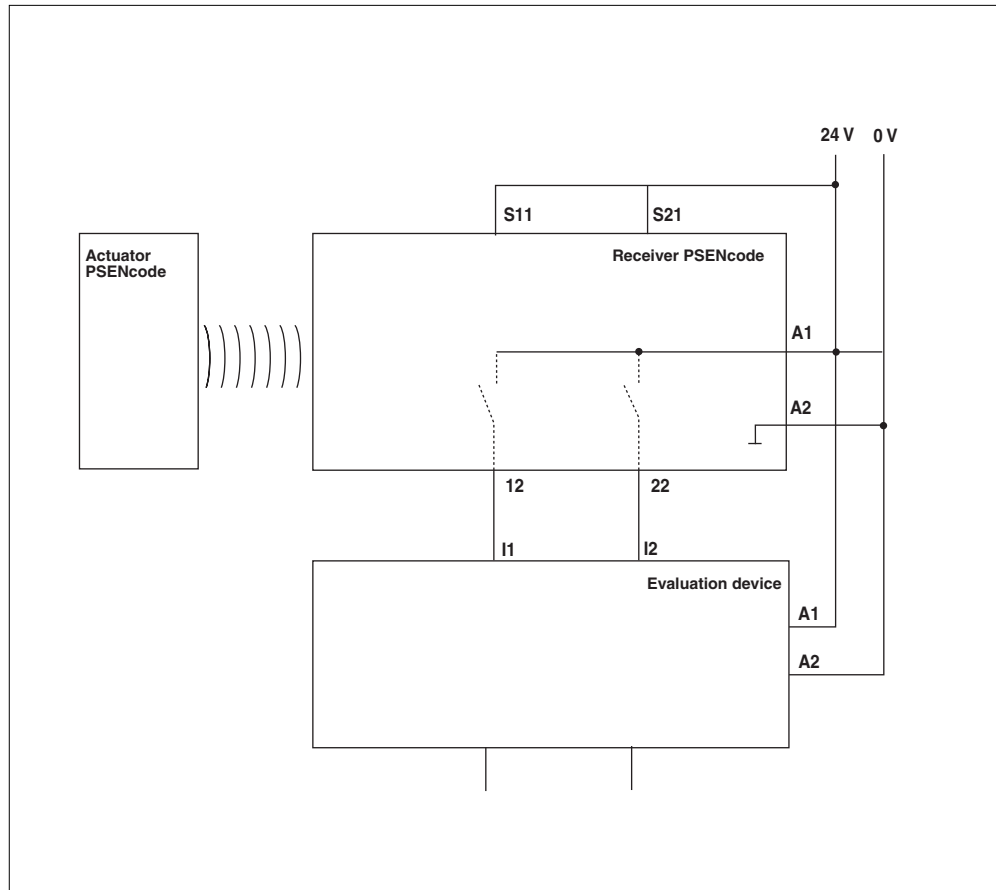
Block diagram



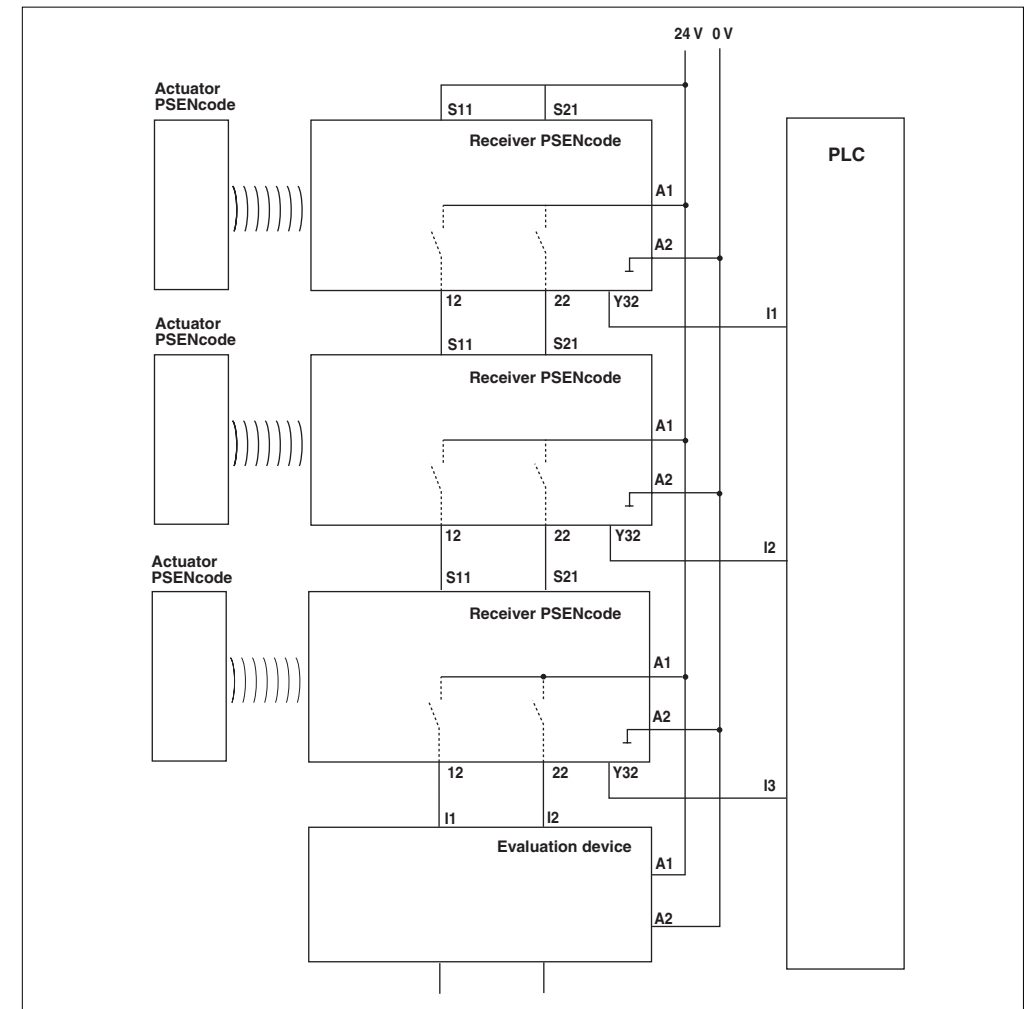
PSENcode

Connection examples

Independent circuit



Series connection



PSENcode

Permitted evaluation devices

Operation of the safety switches is only approved in conjunction with certain evaluation devices. During configuration, please refer to the operating manuals for the respective evaluation device.

Overview: Evaluation device -> Safety switch

PNOZ X, PNOZelog, PNOZmulti **PSS-range with/without** **SafetyBUS p connection:**

Evaluation devices	Safety switch actuator
PNOZ X PNOZ X2.7P PNOZ X2.8P PNOZ X4 PNOZ X8P PNOZ X9 PNOZ X9P PNOZ X5 PNOZ X6 PNOZ X10.11P	PSEN cs1.1p, PSEN cs1.13p ATEX and PSEN cs1.1
PNOZelog PNOZ e1p PNOZ e1vp PNOZ e5.11p PNOZ e5.13p	PSEN cs2.1p, PSEN cs2.2p, PSEN cs2.13p ATEX and PSEN cs2.1
PNOZmulti All	
PSS-range with/without SafetyBUS p connection	

Status indicators

During operation, 3 LEDs indicate the units' operating status and the fault conditions:

- "POWER/Fault" LED illuminates green:
The unit is ready for operation
- "Safety gate" LED illuminates yellow:
Actuator is in the response range
- "Input" LED illuminates yellow: Input
circuits are closed or a HIGH signal is
present

PSENcode

Troubleshooting

Fault conditions are indicated by flashing the LEDs. Some errors are displayed through periodic flashing (see table on the right); with other errors it is possible to establish an error code through the number of flashes.

These errors are always indicated by three short flashes at the "Input" or "Safety gate" LED. After a longer pause, the LED will then flash at one-second intervals. The number of LED flashes corresponds to a digit in the error code. The error code can consist of up to 4 digits. The digits are separated by a longer period without flashing. The entire sequence is constantly repeated.

LED	Troubleshooting	Remedy
LEDs unlit	Supply voltage is missing, too low, wrongly connected	Apply supply voltage: A1 - +24 VDC and A2 - 0 VDC
"Input" LED illuminates yellow	Only one channel of the input circuit open (partial operation)	Both channels of the input circuit open
"Power/Fault" LED illuminates red	Error message	Read flashing codes for fault diagnostics
"Safety gate" or "Input" LEDs flash a code and "Power/Fault" LED illuminates red	Error coding, see table below	See table below

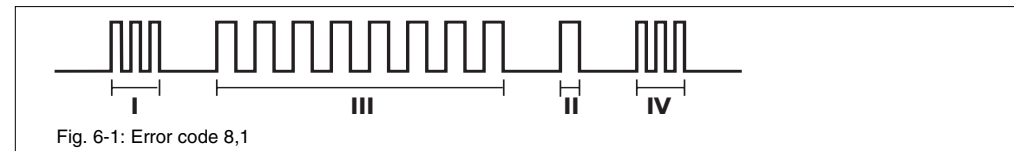
Number of flashes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Decimal error code		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0

Example

Error code 8, 1:

"Safety gate" or "Input" flashes

- 3 times, briefly
- Pause
- 8 times for one second each
- Pause
- Once for one second



- I Code for error message
- II Code for 1st digit
- III Code for 2nd digit
- IV Code for error message repeated

Decimal error code	Number of flashes	Description	Remedy
1, 4, 1	3x short - 1x long - 4x long - 1x long - 3x short	During system start-up, at least one of the safety outputs 12 and 22 is not without voltage.	Check wiring of terminals 12 and 22, rectify wiring error at terminal.
1, 12	3x short - 1x long - 12x long - 3x short	During operation, short circuit between safety output 12 and 0 VDC	Rectify wiring error at terminal 12
1, 13	3x short - 1x long - 13x long - 3x short	During operation, short circuit between safety output 22 and 0 VDC	Rectify wiring error at terminal 22
14	3x short - 14x long - 3x short	During operation, short circuit between safety output 22 and 24 VDC	Rectify wiring error at terminal 12
15	3x short - 15x long - 3x short	During operation, short circuit between safety output 22 and 24 VDC	Rectify wiring error at terminal 22

Comparison of PSENmag safety switches

The previous chapters have all described the common features of the safety switches. This chapter will deal with the specific features. The table shows the units' most important features. The pages that follow provide information on intended use, wiring and unit-specific data for each individual unit.

Safety switches	Actuator	Assured operating/release distance $s_{\text{op}}/s_{\text{ar}}$	Switch type	Design	LED	Evaluation device	Connection to evaluation device
PSEN 1.1p-10	PSEN 1.1-10	3 mm / 19 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	Direct
PSEN 1.1p-12	PSEN 1.1-10	3 mm / 19 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	via PSEN ix1 interface
PSEN 1.1p-20	PSEN 1.1-20	6 mm / 25 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	Direct
PSEN 1.1p-22	PSEN 1.1-20	6 mm / 25 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	via PSEN ix1 interface
PSEN 1.1p-23 ATEX	PSEN 1.1-20	6 mm / 25 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	Direct
PSEN 1.1p-25 ATEX	PSEN 1.1-20	6 mm / 25 mm	2 N/O	Square	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	via PSEN ix1 interface
PSEN 1.2p-20	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	Direct

Safety switches	Actuator	Assured operating/release distance s_{ao}/s_{ar}	Switch type	Design	LED	Evaluation device	Connection to evaluation device
PSEN 1.2p-22	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	via PSEN ix1 interface
PSEN 1.2p-23 ATEX	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	Direct
PSEN 1.2p-25 ATEX	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	PNOZ X, PNOZpower, PNOZmulti, PSS-range with/without SafetyBUS p	via PSEN ix1 interface
PSEN 2.1p-10	PSEN 2.1-10	3 mm / 19 mm	1 N/C / 1 N/O	Square	No	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.1p-11	PSEN 2.1-10	3 mm / 19 mm	1 N/C / 1 N/O	Square	Yes	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.1p-30	PSEN 2.1-10	6 mm / 25 mm	1 N/C / 1 N/O	Square	No	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.1p-31	PSEN 2.1-10	6 mm / 25 mm	1 N/C / 1 N/O	Square	Yes	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.1p-34 ATEX	PSEN 2.1-10	6 mm / 25 mm	1 N/C / 1 N/O	Square	Yes	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface

Safety switches	Actuator	Assured operating/release distance s_{ao}/s_{ar}	Switch type	Design	LED	Evaluation device	Connection to evaluation device
PSEN 2.2p-20	PSEN 2.2-20	8 mm / 26 mm	1 N/C / 1 N/O	Round	No	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.2p-21	PSEN 2.2-20	8 mm / 26 mm	1 N/C / 1 N/O	Round	Yes	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct or via PSEN i1 interface
PSEN 2.2p-24 ATEX	PSEN 2.2-20	8 mm / 26 mm	1 N/C / 1 N/O	Round	Yes	PNOZelog PNOZmulti PSS-range with/without SafetyBUS p	Direct

Approvals

Type						
PSEN 1.1p-10	◆	◆	◆	◆		
PSEN 1.1p-12	◆	◆	◆	◆		
PSEN 1.1p-20	◆	◆	◆	◆		
PSEN 1.1p-22	◆	◆	◆	◆		
PSEN 1.1p-23 ATEX	◆	◆	◆	◆	◆	◆
PSEN 1.1p-25 ATEX	◆	◆	◆	◆	◆	◆
PSEN 1.2p-20	◆	◆	◆	◆		
PSEN 1.2p-22	◆	◆	◆	◆		
PSEN 1.2p-23 ATEX	◆	◆	◆	◆	◆	◆
PSEN 1.2p-25 ATEX	◆	◆	◆	◆	◆	◆
PSEN 2.1p-10	◆	◆	◆	◆		
PSEN 2.1p-11	◆	◆	◆	◆		
PSEN 2.1p-30	◆	◆	◆	◆		
PSEN 2.1p-31	◆	◆	◆	◆		
PSEN 2.1p-34 ATEX	◆	◆	◆	◆	◆	◆
PSEN 2.2p-20	◆	◆	◆	◆		
PSEN 2.2p-21	◆	◆	◆	◆		
PSEN 2.2p-24 ATEX	◆	◆	◆	◆	◆	◆
PSEN i1	◆	◆	◆	◆		
PSEN ix1	◆	◆	◆	◆		

PSEN 1.1p-10, PSEN 1.1p-20

Intended use

Safety switches PSEN 1.1p-10 and PSEN 1.1p-20 are intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices). The safety switches only comply with EN 60947-5-3 in conjunction with the corresponding actuators and approved evaluation devices:

- PSEN 1.1p-10 with actuator PSEN 1.1-10
 - PSEN 1.1p-20 with actuator PSEN 1.1-20
- The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ X4
- PNOZ X5, PNOZ X5J

- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3, PNOZ XV3P

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

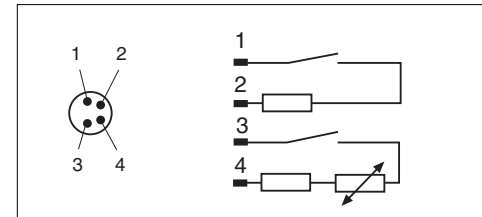
The safety switch PSEN 1.1p-10 is used with the actuator PSEN 1.1-10.

The safety switch PSEN 1.1p-20 is used with the actuator PSEN 1.1-20.

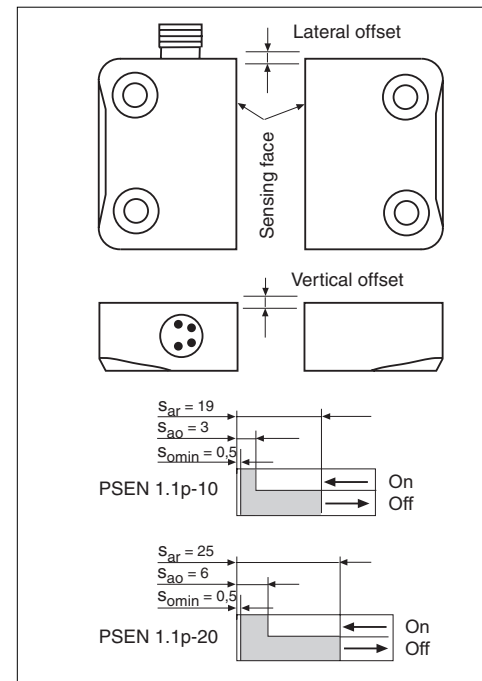
Features:

- 2 reed contacts (2 N/O)
- Assured operating distance:
 - PSEN 1.1p-10: 3 mm
 - PSEN 1.1p-20: 6 mm
- Assured release distance:
 - PSEN 1.1p-10: 19 mm
 - PSEN 1.1p-20: 25 mm
- Square design
- Works magnetically
- Switching voltage 24 VDC

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN 1.1p-10:

Assured operating distances s_{ao} in mm

		Vertical offset in mm					
Lateral offset in mm		0.5	1.0	1.5	2.0	2.5	3.0
	1.0	2.5	2.5	2.5	2.0	1.5	1.5
	1.5	2.0	2.0	2.0	2.0	1.0	1.0
	2.0	2.0	2.0	1.5	1.5	1.0	0.5
	2.5	1.5	1.5	1.0	0.5	-	-
	3.0	0.5	0.5	0.5	-	-	-

Assured release distance s_{ar} :

max. 19 mm with all vertical and lateral offsets

PSEN 1.1p-10, PSEN 1.1p-20

PSEN 1.1p-20:

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm				
	1.0	2.0	3.0	4.0	5.0
1.0	5.5	5.5	5.0	5.0	3.5
2.0	5.5	5.0	5.0	4.5	3.5
3.0	5.0	5.0	5.0	4.0	3.5
4.0	4.5	4.5	4.0	3.5	3.0
5.0	4.0	4.0	4.0	3.0	2.5

Assured release distance s_{ar} :
max. 25 mm with all vertical and lateral offsets

Direct connection to PNOZ X and PNOZpower

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device). The maximum permitted overall cable resistance is as follows:

- Evaluation devices with DC supply voltage: **15 ohms** per channel
- Evaluation devices with AC supply voltage: **20 ohms** per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Preparing for operation

- Connect the units from the **PNOZ X or PNOZpower series**. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.



CAUTION

Please note the following when using evaluation devices with delay-on de-energisation contacts (e.g. PNOZ XV2):

- **Delay time ≤ 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
- **Delay time > 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 1 in accordance with EN 954-1 and the requirements of a PDF with designed reliability (PDF-D).

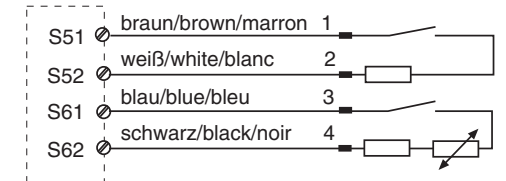
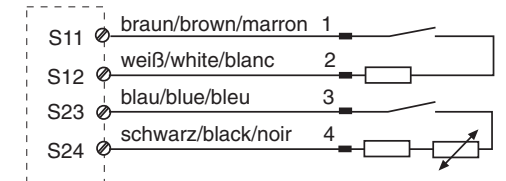
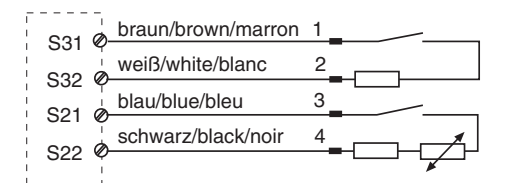
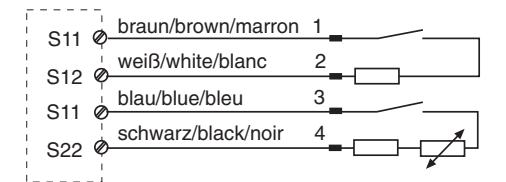
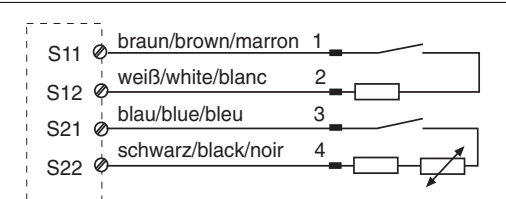
- PNOZ p1p
- PNOZ p1vp
- PNOZ X2/X2P
- PNOZ X2.1 (24 V DC only)
- PNOZ X2.3P
- PNOZ X2.7P/2.8P/X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 V DC only)
- PNOZ X4/X8P
- PNOZ X9/X9P
- PNOZ X10/X10.1
- PNOZ X10.11P
- PNOZ Ex

- PNOZ X5
- PNOZ X5J

- PNOZ 11
- PNOZ 16
- PNOZ X11P
- PNOZ X13
- PNOZ X2.5P
- PNOZ X3
- PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ XV2
- PNOZ XV2P
- PNOZ XV3

- PNOZ X6 (Y3-Y4 linked)

- PMUT X1P



PSEN 1.1p-10, PSEN 1.1p-20

Direct connection to PNOZmulti

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):



CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to a PSS, with or without SafetyBUS p

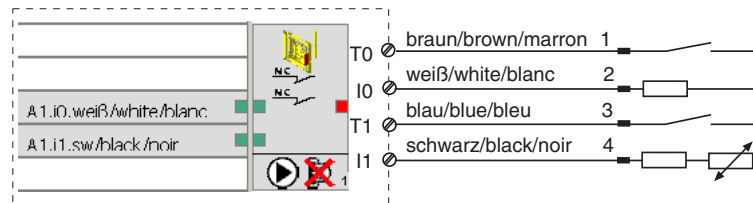
Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

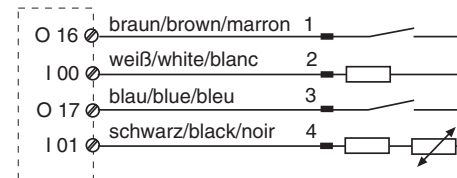
PNOZmulti

- Safety gate, switch type 3
- I0, I1: Inputs
- T0, T1: Test pulse outputs



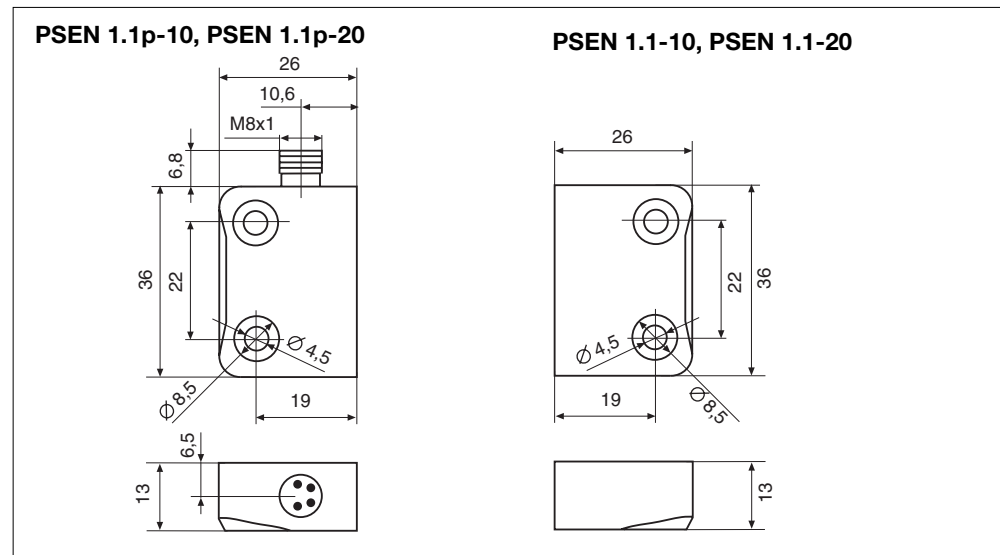
PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



PSEN 1.1p-10, PSEN 1.1p-20

Dimensions in mm



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	
PSEN 1.1p-10	s_{aomin} : 0,5, s_{ao} : 3 mm, s_{ar} : 19 mm
PSEN 1.1p-20	s_{aomin} : 0,5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	24 VDC
Max. Switching current	500 mA
Max. Breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.1-10 for PSEN 1.1p-10 PSEN 1.1-20 for PSEN 1.1p-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 1.1p-10, PSEN 1.1p-20: 15 g PSEN 1.1-10, PSEN 1.1-20: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.1p-12, PSEN 1.1p-22

Intended use

Safety switches PSEN 1.1p-12 and PSEN 1.1p-22 are intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switches only comply with EN 60947-5-3 in conjunction with the PSEN ix1 interface, corresponding actuators and approved evaluation devices:

- PSEN 1.1p-12 with actuator PSEN 1.1-10
- PSEN 1.1p-22 with actuator PSEN 1.1-20

The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6

- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3, PNOZ XV3P

PNOZpower:

- PNOZ p1p

PNOZmulti:

- PNOZ m1p
- PNOZ p1vp

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

The safety switch PSEN 1.1p-12 is used with the actuator PSEN 1.1-10.

The safety switch PSEN 1.1p-22 is used with the actuator PSEN 1.1-20.

Features:

- 2 reed contacts (2 N/O)
- Assured operating distance:
 - PSEN 1.1p-12: 3 mm
 - PSEN 1.1p-22: 6 mm
- Assured release distance:
 - PSEN 1.1p-12: 19 mm
 - PSEN 1.1p-22: 25 mm
- Connection to evaluation device only via PSEN ix1 interface
- Square design
- Works magnetically
- Switching voltage 24 VDC

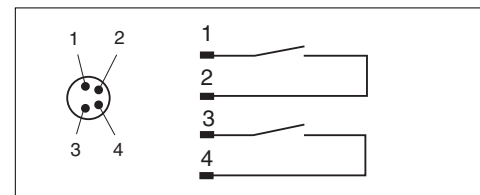
Wiring



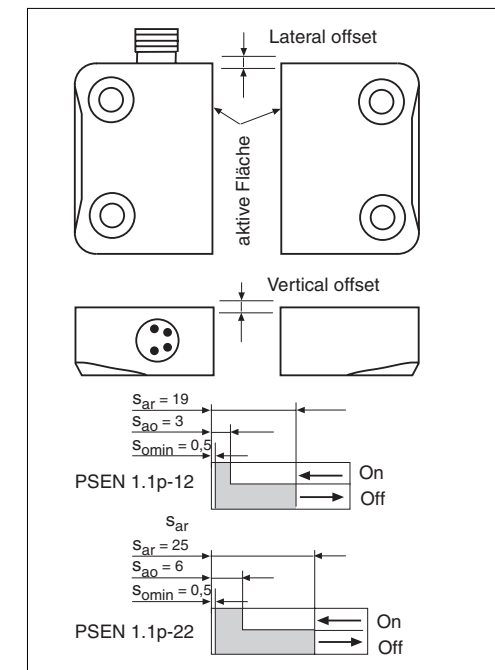
INFORMATION

For details of how to wire the PSEN 1.1p-12, please refer to **PSEN ix1**, in this chapter.

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN 1.1p-12, PSEN 1.1p-22

PSEN 1.1p-12:

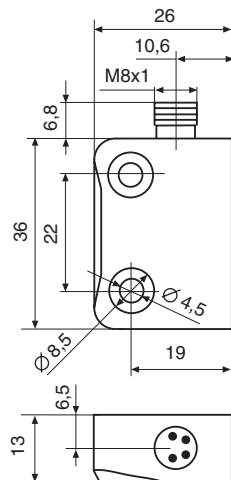
Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm					
	0.5	1.0	1.5	2.0	2.5	3.0
1.0	2.5	2.5	2.5	2.0	1.5	1.5
1.5	2.0	2.0	2.0	2.0	1.0	1.0
2.0	2.0	2.0	1.5	1.5	1.0	0.5
2.5	1.5	1.5	1.0	0.5	-	-
3.0	0.5	0.5	0.5	-	-	-

Assured release distance s_{ar} :
max. 19 mm with all vertical and lateral offsets

Dimensions in mm

PSEN 1.1p-12, PSEN 1.1p-22



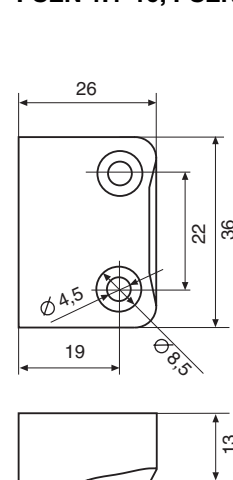
PSEN 1.1p-22:

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm					
	1.0	2.0	3.0	4.0	5.0	
1.0	5.5	5.5	5.0	5.0	3.5	
2.0	5.5	5.0	5.0	4.5	3.5	
3.0	5.0	5.0	5.0	4.0	3.5	
4.0	4.5	4.5	4.0	3.5	3.0	
5.0	4.0	4.0	4.0	3.0	2.5	

Assured release distance s_{ar} :
max. 25 mm with all vertical and lateral offsets

PSEN 1.1-10, PSEN 1.1-20



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	
PSEN 1.1p-12	s_{aomin} : 0,5, s_{ao} : 3 mm, s_{ar} : 19 mm
PSEN 1.1p-22	s_{aomin} : 0,5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	24 VDC
Max. Switching current	500 mA
Max. Breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.1-10 for PSEN 1.1p-12 PSEN 1.1-20 for PSEN 1.1p-22
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 1.1p-12, PSEN 1.1p-22: 15 g PSEN 1.1-10, PSEN 1.1-20: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.1p-23 ATEX

Intended use

The safety switch PSEN 1.1p-23 ATEX is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The PSEN 1.1p-23 ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN 1.1-20 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P

- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p
- PNOZ mi1p

PSS in conjunction with standard function block SB066:

- PSS DI
- PSS(1) DI 2
- PSS(1) DIF2
- PSS(1) DIO T
- PSS(1) DIO Z
- PSS(1) DI2O T
- PSS(1) DI2O Z
- PSS 3032
- PSS 3046
- PSS 3056
- PSS 3074
- PSS SB2 3006-3 CN-A
- PSS SB2 3006-3 DP-S
- PSS SB 3006-3
- PSS SB 3006
- PSS SB 3056
- PSS SB DI16
- PSS SB DI8O8
- PSS SB DI8OZ4

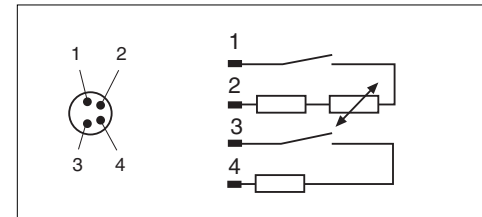
Description

The safety switch PSEN 1.1p-23 is used with the actuator PSEN 1.1-20.

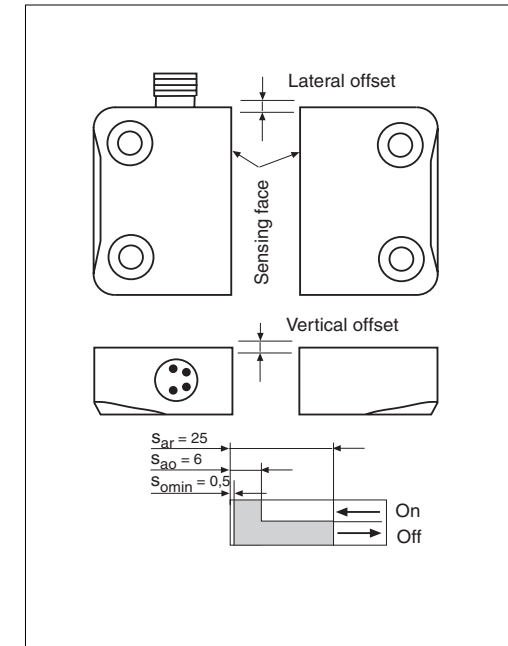
Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 6 mm
- Assured release distance: 25 mm
- Square design
- Works magnetically
- Switching voltage 24 VDC

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN 1.1p-23 ATEX

Assured operating distances s_{ao} in mm

		Vertical offset in mm				
Lateral offset in mm		1.0	2.0	3.0	4.0	5.0
	1.0	5.5	5.5	5.0	5.0	3.5
	2.0	5.5	5.0	5.0	4.5	3.5
	3.0	5.0	5.0	5.0	4.0	3.5
	4.0	4.5	4.5	4.0	3.5	3.0
	5.0	4.0	4.0	4.0	3.0	2.5

Assured release distance s_{ar} :

max. 25 mm with all vertical and lateral offsets

Please observe the following when wiring:

- The safety switch is installed in the Ex area, the corresponding evaluation device in the non-Ex area.



CAUTION

Risk of explosion! Within the Ex area, only insert and unplug the safety switch connector when the supply voltage is switched off.

Direct connection to PNOZ X and PNOZpower

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device). The maximum permitted overall cable resistance is as follows:

- Evaluation devices with DC supply voltage: **15 ohms** per channel

- Evaluation devices with AC supply voltage: **20 ohms** per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Preparing for operation

- Connect the units from the **PNOZ X or PNOZpower series**. Please refer to the operating manual for the relevant units.

- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.



CAUTION

Please note the following when using evaluation devices with delay-on de-energisation contacts (e.g. PNOZ XV2):

- Delay time ≤ 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
- Delay time > 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 1 in accordance with EN 954-1 and the requirements of a PDF with designed reliability (PDF-D).

- PNOZ p1p - PNOZ p1vp - PNOZ X2/X2P - PNOZ X2.1 (24 V DC only) - PNOZ X2.3P - PNOZ X2.7P/2.8P/X2.9P	- PNOZ X2C - PNOZ X2.1C (24 V DC only) - PNOZ X4/X8P - PNOZ X9/X9P - PNOZ X10/X10.1 - PNOZ X10.11P - PNOZ Ex	
- PNOZ X5 - PNOZ X5J		
- PNOZ 11 - PNOZ 16 - PNOZ X11P - PNOZ X13 - PNOZ X2.5P - PNOZ X3	- PNOZ X3.1 - PNOZ X3P - PNOZ X3.10P - PNOZ XV2 - PNOZ XV2P - PNOZ XV3	
PNOZ X6 (Y3-Y4 linked)		
PMUT X1P		

PSEN 1.1p-23 ATEX

Direct connection to PNOZmulti

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to a PSS, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

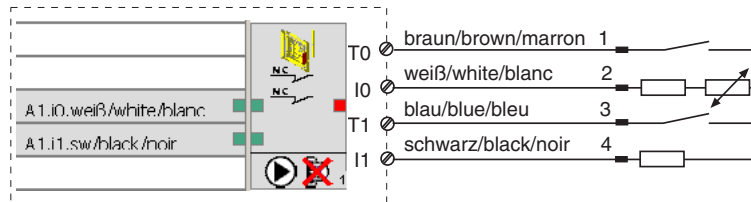


CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

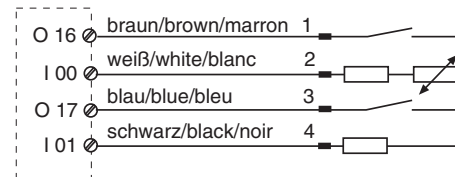
PNOZmulti

- Safety gate, switch type 3
- I0, I1: Inputs
- T0, T1: Test pulse outputs



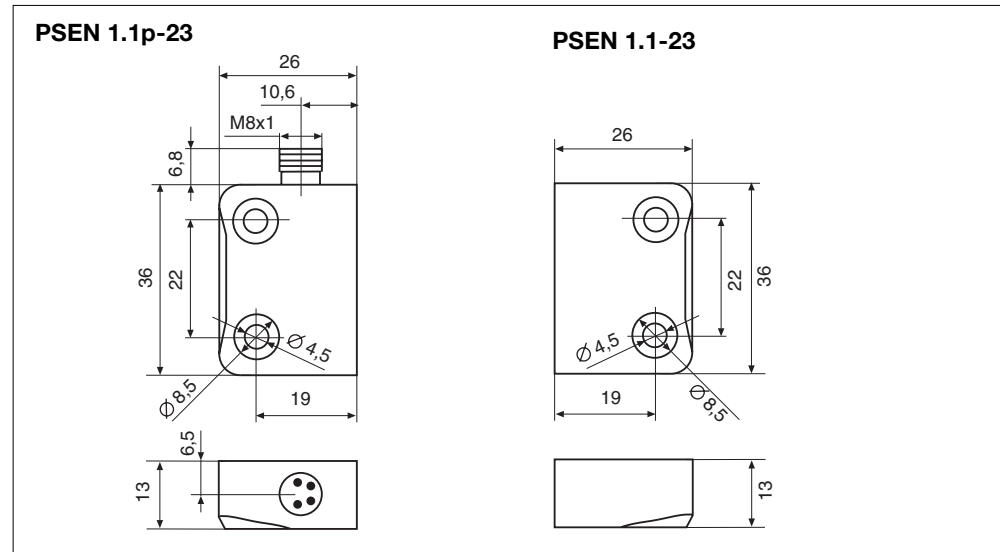
PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



PSEN 1.1p-23 ATEX

Dimensions in mm



Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0.5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.1p-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30 g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 1.1p-23: 15, PSEN 1.1p-20: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.1p-25 ATEX

Intended use

The safety switch PSEN 1.1p-25 ATEX is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The PSEN 1.1p-25 ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the corresponding actuator PSEN 1.1-20 and the relevant, approved evaluation devices:

The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P

- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p
- PNOZ mi1p

PSS in conjunction with standard function block SB066:

- PSS DI
- PSS(1) DI 2
- PSS(1) DIF2
- PSS(1) DIO T
- PSS(1) DIO Z
- PSS(1) DI2O T
- PSS(1) DI2O Z
- PSS 3032
- PSS 3046
- PSS 3056
- PSS 3074
- PSS SB2 3006-3 CN-A
- PSS SB2 3006-3 DP-S
- PSS SB 3006-3
- PSS SB 3006
- PSS SB 3056
- PSS SB DI16
- PSS SB DI8O8
- PSS SB DI8OZ4

Description

The safety switch PSEN 1.1p-25 ATEX is used with the actuator PSEN 1.1-20.

Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 6 mm
- Assured release distance: 25 mm
- Connection to evaluation device only via PSEN ix1 interface
- Square design
- Works magnetically
- Switching voltage 24 VDC

Wiring

Please observe the following when wiring:

- The safety switch is installed in the Ex area, the corresponding evaluation device in the non-Ex area.



CAUTION

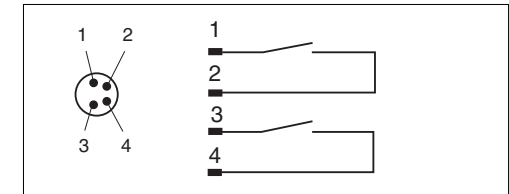
Risk of explosion! Within the Ex area, only insert and unplug the safety switch connector when the supply voltage is switched off.



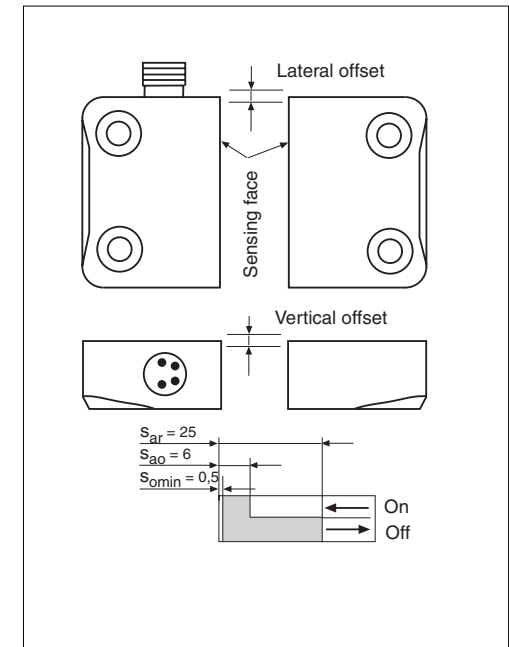
INFORMATION

For details of how to wire the PSEN 1.1p-25 ATEX, please refer to **PSEN ix1**, in this chapter.

Connections



Switching distances



PSEN 1.1p-25 ATEX

Vertical and lateral offset

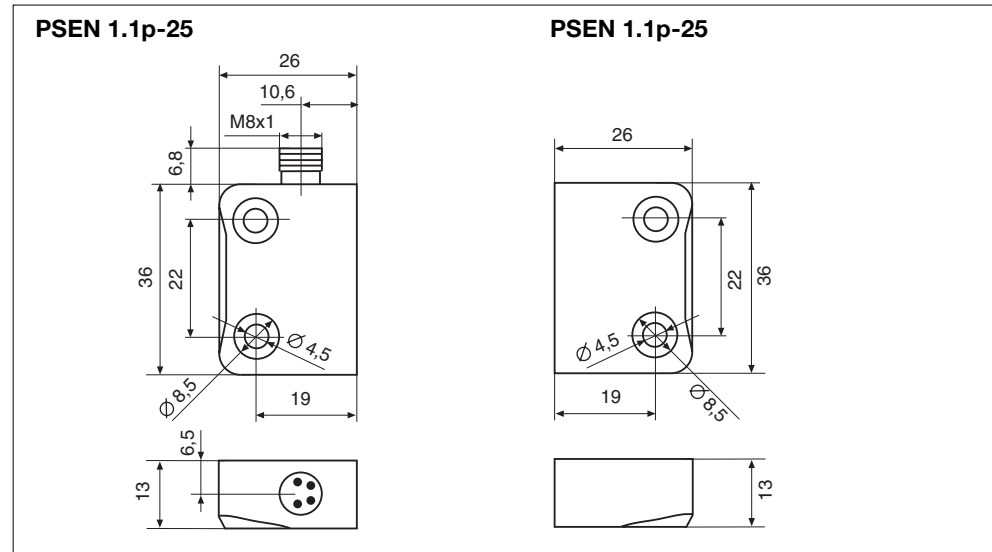
The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm				
	1.0	2.0	3.0	4.0	5.0
1.0	5.5	5.5	5.0	5.0	3.5
2.0	5.5	5.0	5.0	4.5	3.5
3.0	5.0	5.0	5.0	4.0	3.5
4.0	4.5	4.5	4.0	3.5	3.0
5.0	4.0	4.0	4.0	3.0	2.5

Assured release distance s_{ar} :
max. 25 mm with all vertical and lateral offsets

Dimensions in mm



PSEN 1.1p-25 ATEX

Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.1p-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30 g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 1.1p-25: 15, PSEN 1.1p-20: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.2p-20

Intended use

The safety switch PSEN 1.2p-20 is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator PSEN 1.2-20 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P

- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

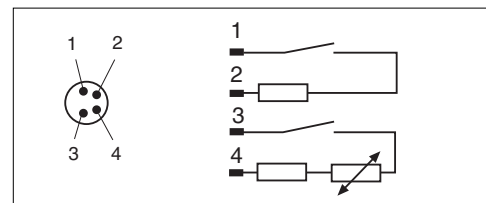
Description

The safety switch PSEN 1.2p-20 is used with the actuator PSEN 1.2-20.

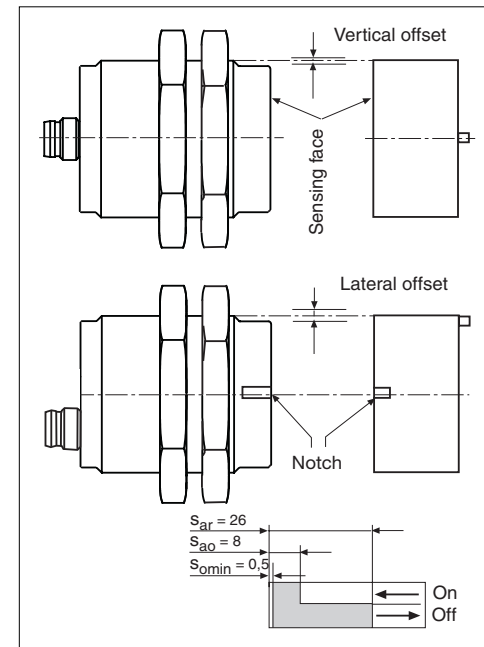
Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Round design
- Works magnetically
- Switching voltage 24 VDC

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

		Vertical offset in mm				
Lateral offset in mm		1.0	2.0	3.0	4.0	5.0
	1.0	7.5	7.5	7.0	7.0	5.5
	2.0	7.5	7.0	7.0	6.5	5.5
	3.0	7.0	7.0	7.0	6.0	5.5
	4.0	6.5	6.5	6.0	5.5	5.0
	5.0	6.0	6.0	6.0	5.0	4.5

Assured release distance s_{ar} :
max. 26 mm with all vertical and lateral offsets

PSEN 1.2p-20

Direct connection to PNOZ X and PNOZpower

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device). The maximum permitted overall cable resistance is as follows:

- Evaluation devices with DC supply voltage: **15 ohms** per channel
- Evaluation devices with AC supply voltage: **20 ohms** per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Preparing for operation

- Connect the units from the **PNOZ X** or **PNOZpower** series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.



CAUTION

Please note the following when using evaluation devices with delay-on de-energisation contacts (e.g. PNOZ XV2):

- **Delay time ≤ 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
- **Delay time > 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 1 in accordance with EN 954-1 and the requirements of a PDF with designed reliability (PDF-D).

• PNOZ p1p • PNOZ p1vp • PNOZ X2/X2P • PNOZ X2.1 (24 V DC only) • PNOZ X2.3P • PNOZ X2.7P/2.8P/X2.9P	• PNOZ X2C • PNOZ X2.1C (24 V DC only) • PNOZ X4/X8P • PNOZ X9/X9P • PNOZ X10/X10.1 • PNOZ X10.11P • PNOZ Ex	
• PNOZ X5 • PNOZ X5J		
• PNOZ 11 • PNOZ 16 • PNOZ X11P • PNOZ X13 • PNOZ X2.5P • PNOZ X3	• PNOZ X3.1 • PNOZ X3P • PNOZ X3.10P • PNOZ XV2 • PNOZ XV2P • PNOZ XV3	
• PNOZ X6 (Y3-Y4 linked)		
• PMUT X1P		

PSEN 1.2p-20

Direct connection to PNOZmulti

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to a PSS, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

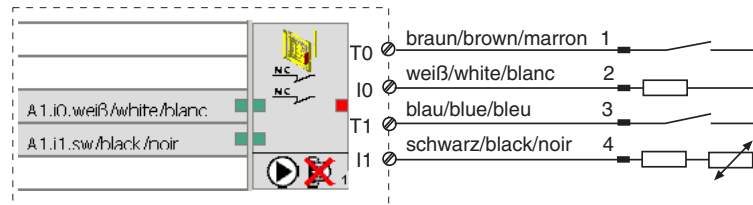


CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

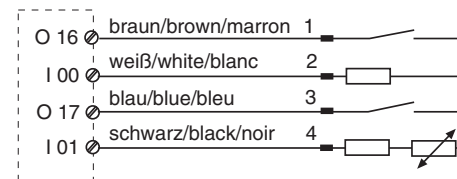
PNOZmulti

- Safety gate, switch type 3
- I0, I1: Inputs
- T0, T1: Test pulse outputs



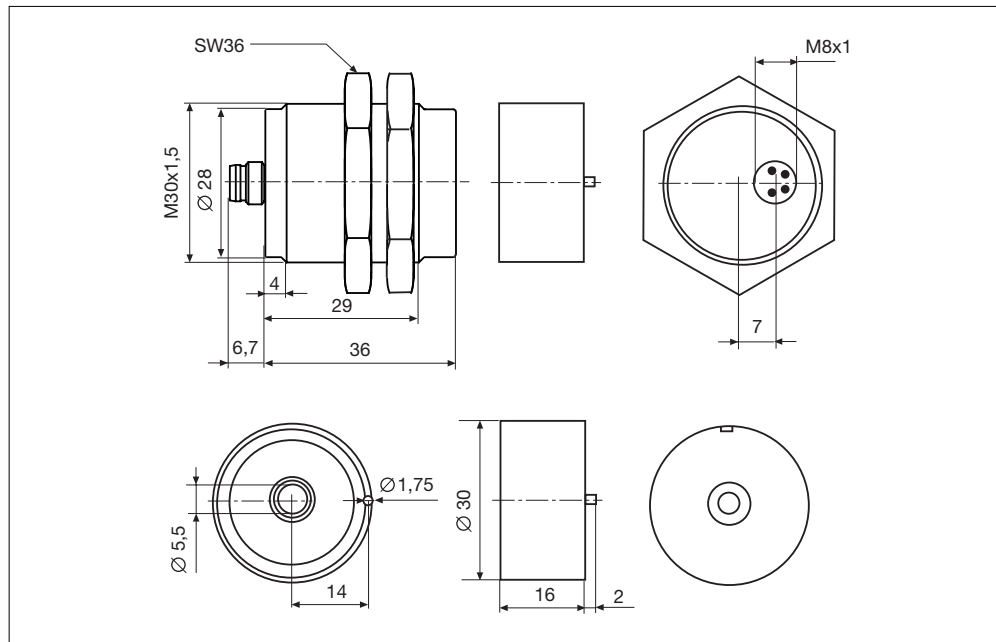
PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



PSEN 1.2p-20

Dimensions in mm



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm s_{ar} : 26 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.2-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	See drawing
Weight	PSEN 1.2p-20: 28 g PSEN 1.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.2p-22

Intended use

The safety switch PSEN 1.2p-22 is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the corresponding actuator PSEN 1.2-20 and the relevant, approved evaluation devices.

The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P

- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

The safety switch PSEN 1.1p-12 is used with the actuator PSEN 1.1-10.

The safety switch PSEN 1.1p-22 is used with the actuator PSEN 1.1-20.

Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Connection to evaluation device only via PSEN ix1 interface
- Round design
- Works magnetically
- Switching voltage 24 VDC

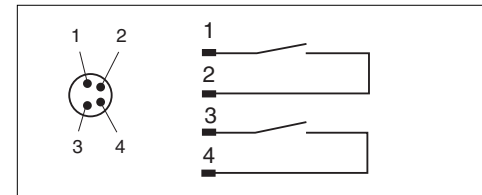
Wiring



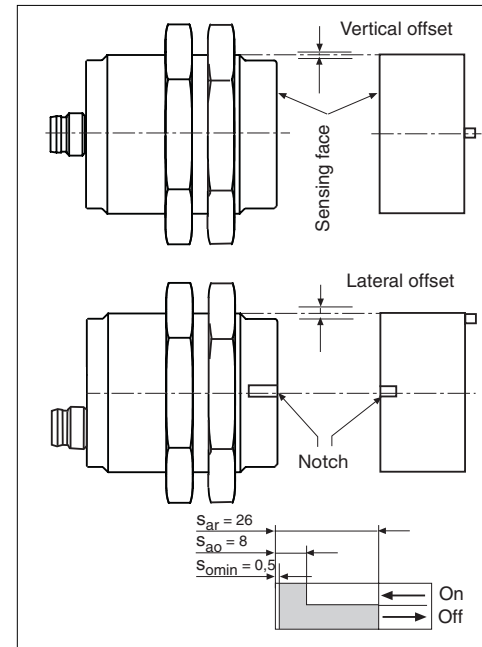
INFORMATION

For details of how to wire the PSEN 1.1p-12, please refer to **PSEN ix1**, in this chapter.

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

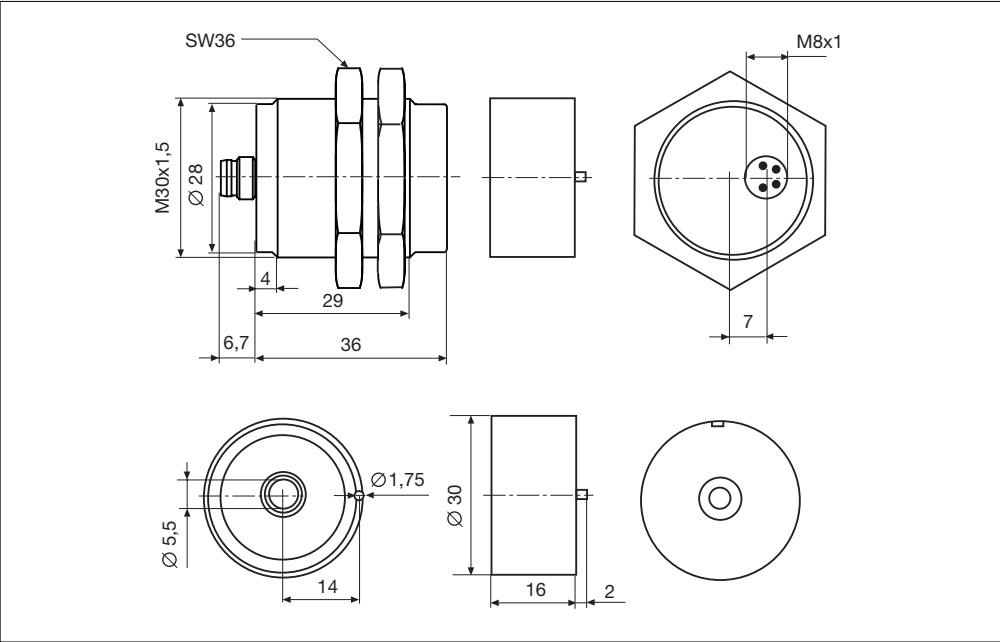
		Vertical offset in mm				
Lateral offset in mm		1.0	2.0	3.0	4.0	5.0
	1.0	7.5	7.5	7.0	7.0	5.5
	2.0	7.5	7.0	7.0	6.5	5.5
	3.0	7.0	7.0	7.0	6.0	5.5
	4.0	6.5	6.5	6.0	5.5	5.0
	5.0	6.0	6.0	6.0	5.0	4.5

Assured release distance s_{ar} :

max. 26 mm with all vertical and lateral offsets

PSEN 1.2p-22

Dimensions in mm



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm s_{ar} : 26 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.2-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	See drawing
Weight	PSEN 1.2p-22: 28 g PSEN 1.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.2p-23 ATEX

Intended use

The safety switch PSEN 1.2p-23 ATEX is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1, (position monitoring of movable safety devices).

The PSEN 1.1p-23 ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN 1.1-20 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P

- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p
- PNOZ mi1p

PSS in conjunction with standard function block SB066:

- PSS DI
- PSS(1) DI 2
- PSS(1) DIF2
- PSS(1) DIO T
- PSS(1) DIO Z
- PSS(1) DI2O T
- PSS(1) DI2O Z
- PSS 3032
- PSS 3046
- PSS 3056
- PSS 3074
- PSS SB2 3006-3 CN-A
- PSS SB2 3006-3 DP-S
- PSS SB 3006-3
- PSS SB 3006
- PSS SB 3056
- PSS SB DI16
- PSS SB DI8O8
- PSS SB DI8OZ4

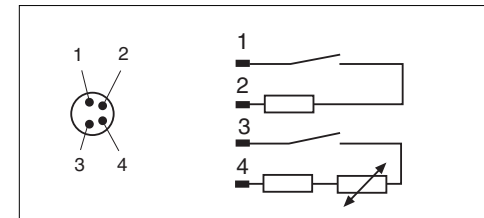
Description

The safety switch PSEN 1.2p-23 is used with the actuator PSEN 1.1-20.

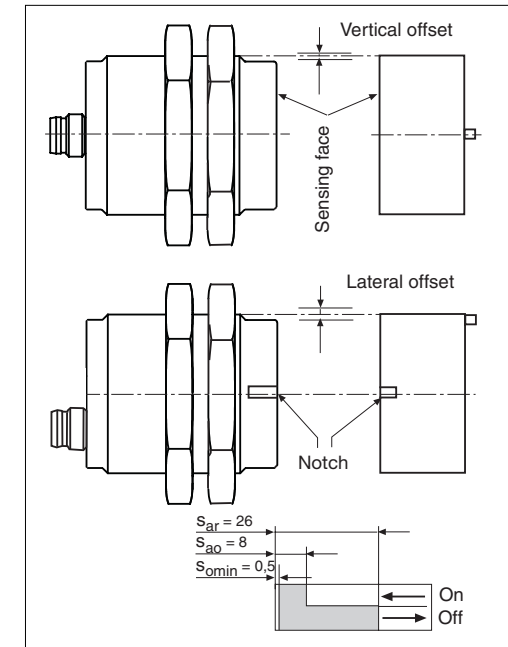
Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Round design
- Works magnetically
- Switching voltage 24 VDC

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN 1.2p-23 ATEX

Assured operating distances s_{ao} in mm

		Vertical offset in mm				
Lateral offset in mm		1.0	2.0	3.0	4.0	5.0
	1.0	7.5	7.5	7.0	7.0	5.5
	2.0	7.5	7.0	7.0	6.5	5.5
	3.0	7.0	7.0	7.0	6.0	5.5
	4.0	6.5	6.5	6.0	5.5	5.0
	5.0	6.0	6.0	6.0	5.0	4.5

Assured release distance s_{ar} :
max. 26 mm with all vertical and lateral offsets

Please observe the following when wiring:

- The safety switch is installed in the Ex area, the corresponding evaluation device in the non-Ex area.



CAUTION

Risk of explosion! Within the Ex area, only insert and unplug the safety switch connector when the supply voltage is switched off.

Direct connection to PNOZ X and PNOZpower

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device). The maximum permitted overall cable resistance is as follows:

- Evaluation devices with DC supply voltage: **15 ohms** per channel

- Evaluation devices with AC supply voltage: **20 ohms** per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Preparing for operation

- Connect the units from the **PNOZ X** or **PNOZpower** series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.



CAUTION

Please note the following when using evaluation devices with delay-on de-energisation contacts (e.g. PNOZ XV2):

- Delay time ≤ 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
- Delay time > 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 1 in accordance with EN 954-1 and the requirements of a PDF with designed reliability (PDF-D).

- PNOZ p1p - PNOZ p1vp - PNOZ X2/X2P - PNOZ X2.1 (24 V DC only) - PNOZ X2.3P - PNOZ X2.7P/2.8P/X2.9P	- PNOZ X2C - PNOZ X2.1C (24 V DC only) - PNOZ X4/X8P - PNOZ X9/X9P - PNOZ X10/X10.1P - PNOZ X10.11P - PNOZ Ex	
- PNOZ X5 - PNOZ X5J		
- PNOZ 11 - PNOZ 16 - PNOZ X11P - PNOZ X13 - PNOZ X2.5P - PNOZ X3	- PNOZ X3.1 - PNOZ X3P - PNOZ X3.10P - PNOZ XV2 - PNOZ XV2P - PNOZ XV3	
PNOZ X6 (Y3-Y4 linked)		
PMUT X1P		

PSEN 1.2p-23 ATEX

Direct connection to PNOZmulti

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to a PSS, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

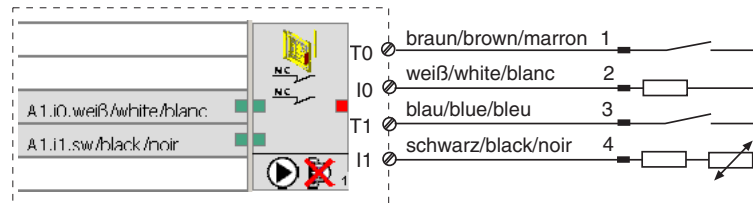


CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

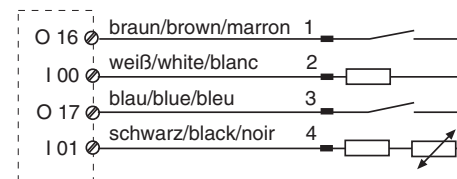
PNOZmulti

- Safety gate, switch type 3
- I0, I1: Inputs
- T0, T1: Test pulse outputs



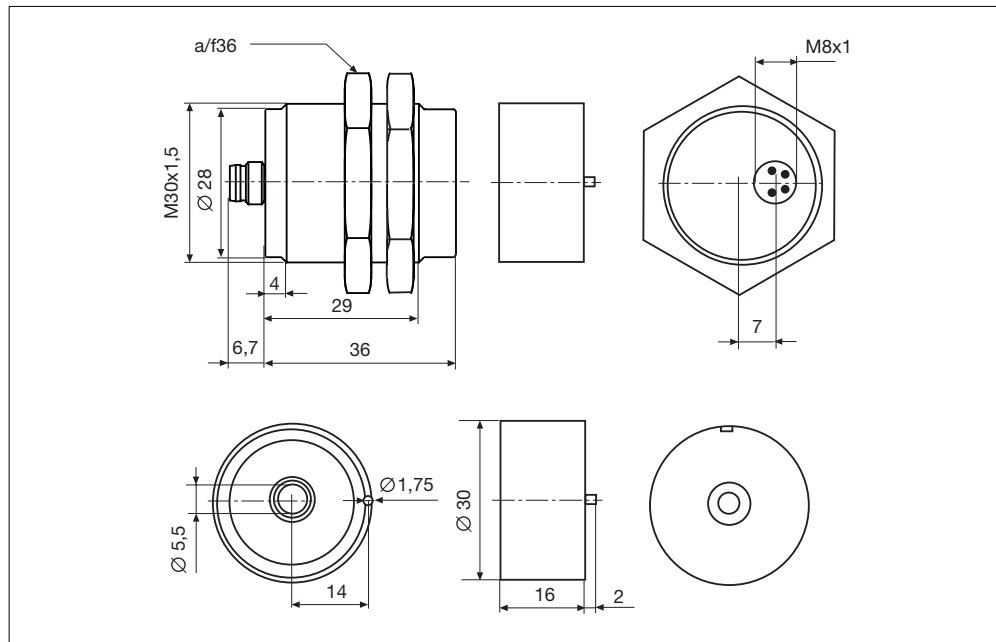
PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



PSEN 1.2p-23 ATEX

Dimensions in mm



Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm s_w : 26 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.2-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	See drawing
Weight	PSEN 1.2p-23: 28 g PSEN 1.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN 1.2p-25 ATEX

Intended use

The safety switch PSEN 1.2p-25 ATEX is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1, (position monitoring of movable safety devices).

The PSEN 1.1p-25 ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the corresponding actuator PSEN 1.2-20 and the relevant, approved evaluation devices:

PNOZ X:

- PNOZ 11
- PNOZ 16
- PNOZ Ex
- PMUT X1P
- PNOZ X11P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.5P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2.9P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P
- PNOZ X4

- PNOZ X5, PNOZ X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ X13
- PNOZ XV2, PNOZ XV2P
- PNOZ XV3

PNOZpower:

- PNOZ p1p
- PNOZ p1vp

PNOZmulti:

- PNOZ m1p
- PNOZ mi1p

PSS in conjunction with standard function block SB066:

- PSS DI
- PSS(1) DI 2
- PSS(1) DIF2
- PSS(1) DIO T
- PSS(1) DIO Z
- PSS(1) DI2O T
- PSS(1) DI2O Z
- PSS 3032
- PSS 3046
- PSS 3056
- PSS 3074
- PSS SB2 3006-3 CN-A
- PSS SB2 3006-3 DP-S
- PSS SB 3006-3
- PSS SB 3006
- PSS SB 3056
- PSS SB DI16
- PSS SB DI8O8
- PSS SB DI8OZ4

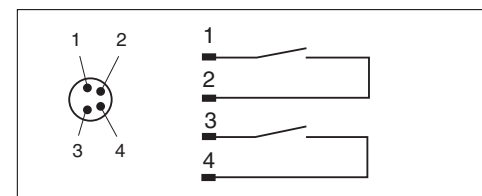
Description

The safety switch PSEN 1.2p-25 ATEX is used with the actuator PSEN 1.1-20.

Features:

- 2 reed contacts (2 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Connection to evaluation device only via PSEN ix1 interface
- Round design
- Works magnetically
- Switching voltage 24 VDC

Connections



Wiring

Please observe the following when wiring:

- The safety switch is installed in the Ex area, the corresponding evaluation device in the non-Ex area.



CAUTION

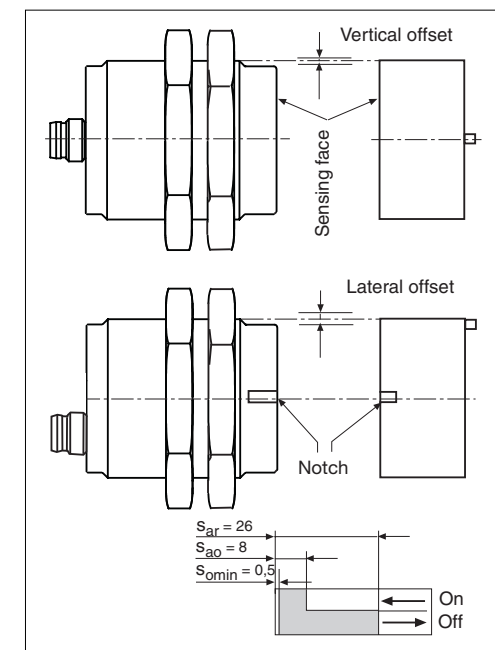
Risk of explosion! Within the Ex area, only insert and unplug the safety switch connector when the supply voltage is switched off.



INFORMATION

For details of how to wire the PSEN 1.2p-25 ATEX, please refer to **PSEN ix1**, in this chapter.

Switching distances



PSEN 1.2p-25 ATEX

Vertical and lateral offset

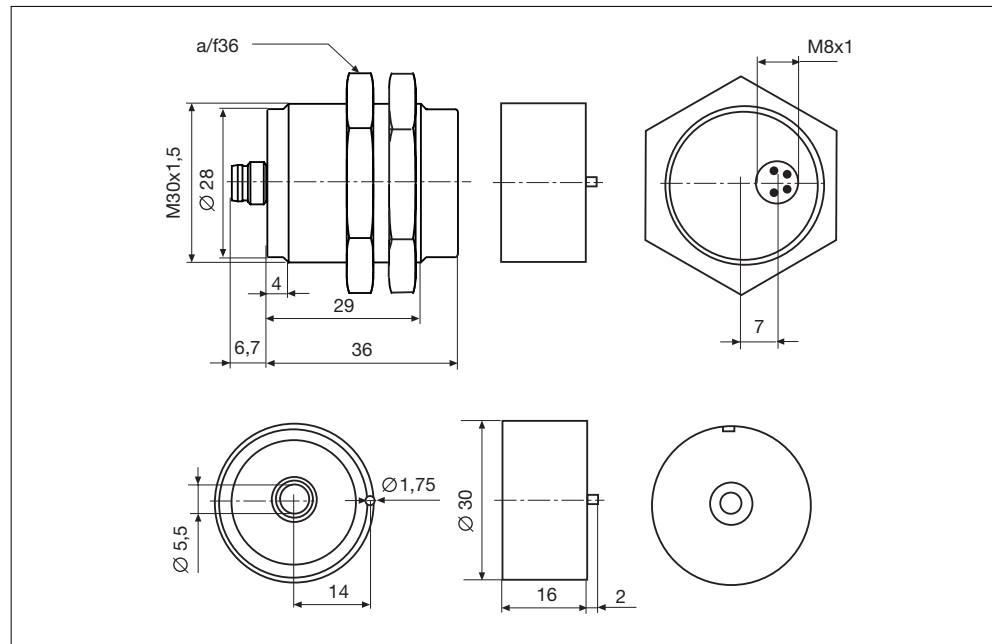
The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

		Vertical offset in mm				
Lateral offset in mm		1.0	2.0	3.0	4.0	5.0
	1.0	7.5	7.5	7.0	7.0	5.5
	2.0	7.5	7.0	7.0	6.5	5.5
	3.0	7.0	7.0	7.0	6.0	5.5
	4.0	6.5	6.5	6.0	5.5	5.0
	5.0	6.0	6.0	6.0	5.0	4.5

Assured release distance s_{ar} :
max. 26 mm with all vertical and lateral offsets

Dimensions in mm



PSEN 1.2p-25 ATEX

Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm s_{ar} : 26 mm
Switching voltage	24 VDC
Max. switching current	500 mA
Max. breaking capacity	10 W
Max. switching frequency	1 Hz
Max. cable runs	Depends on evaluation device
Actuator	PSEN 1.2-20
Ambient temperature	-10 ... +55 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	See drawing
Weight	PSEN 1.2p-25: 28 g PSEN 1.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31

Intended use

Safety switches PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30 and PSEN 2.1p-31 are intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator PSEN 2.1-10 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

- PNOZ e3.1p
- PNOZ e3vp 10s
- PNOZ e3vp 300s
- PNOZ m1p
- PSS-range programmable safety system in conjunction with standard function block SB066

Description

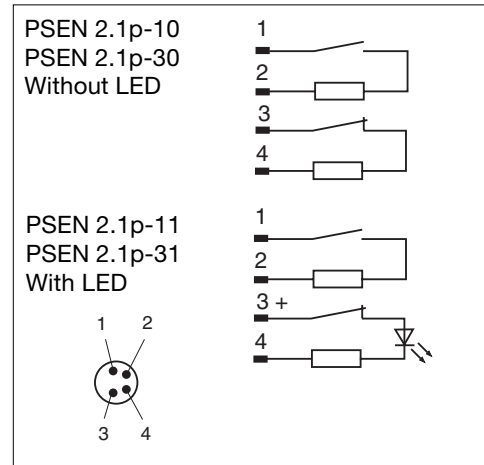
Safety switches PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30 and PSEN 2.1p-31 are used with the actuator PSEN 2.1-10.

Features:

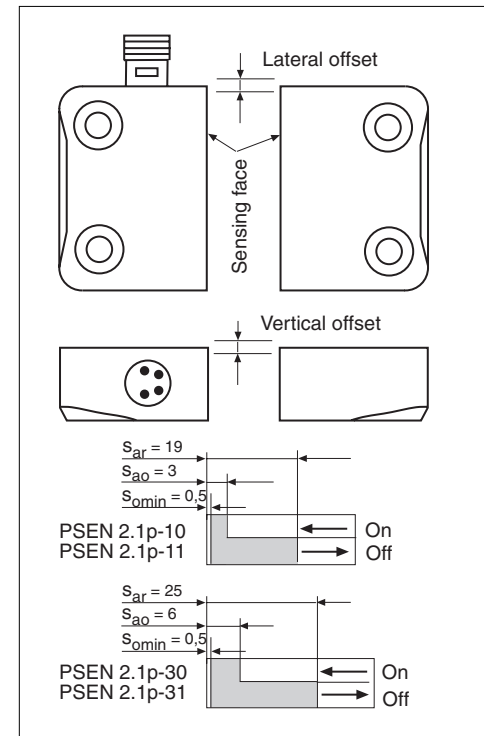
- 2 reed contacts (1 N/C / 1 N/O)
- Assured operating distance:
 - PSEN 2.1p-10, PSEN 2.1p-11: 3 mm
 - PSEN 2.1p-30, PSEN 2.1p-31: 6 mm

- Assured release distance:
 - PSEN 2.1p-10, PSEN 2.1p-11: 19 mm
 - PSEN 2.1p-30, PSEN 2.1p-31: 25 mm
- Safety switches connected in series via PSEN i1 interface
- Square design
- Works magnetically
- Switching voltage 30 VDC
- PSEN 2.1p-11, PSEN 2.1p-31: with LED to display switch status

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN 2.1p-10, PSEN 2.1p-11:

Assured operating distances s_{ao} in mm

		Vertical offset in mm					
Lateral offset in mm		0.5	1.0	1.5	2.0	2.5	3.0
	1.0	2.5	2.5	2.5	2.0	1.5	1.5
	1.5	2.0	2.0	2.0	2.0	1.0	1.0
	2.0	2.0	2.0	1.5	1.5	1.0	0.5
	2.5	1.5	1.5	1.0	0.5	-	-
	3.0	0.5	0.5	0.5	-	-	-

Assured release distance s_{ar} :

max. 19 mm with all vertical and lateral offsets

PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31

PSEN 2.1p-30, PSEN 2.1p-31:

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm				
	1.0	2.0	3.0	4.0	5.0
1.0	5.5	4.5	4.5	4.0	3.0
2.0	5.0	4.5	4.5	3.5	2.5
3.0	4.5	4.5	3.5	2.5	0.5
4.0	4.0	-	-	-	-

Assured release distance s_{ar} :
max. 25 mm with all vertical and lateral offsets

Series connection via PSEN i1 interface

INFORMATION



To connect the safety switches in series you will need the PSEN i1 interface. For wiring details please refer to **PSEN i1**, in this chapter.

Direct connection to PNOZelog

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device). The maximum permitted overall cable resistance at the inputs of a PNOZelog unit is 2 kohms. When **one** safety switch is connected, 1760 ohms remain for the cable.

Preparing the unit for operation:

- Connect the units from the **PNOZelog series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to PNOZmulti

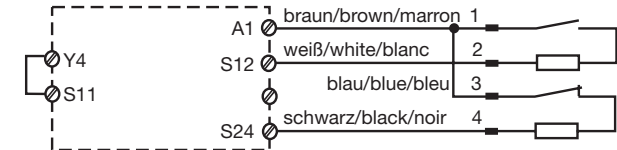
Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.

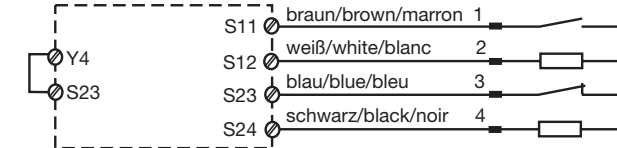
Without detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s



With detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s



- Establish the operating mode with/without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

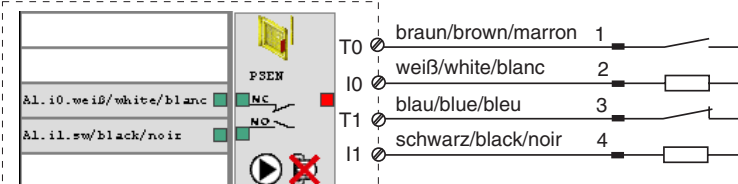
Please note:

- Connect the N/O contact on the PSEN to I0
- Connect the N/C contact on the PSEN to I1

Example:

- Safety gate, switch type 2
- I0, I1: Inputs
- T0, T1: Test pulse outputs

- PNOZ m1p



PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31

Direct connection to a PSS, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.

- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Example:

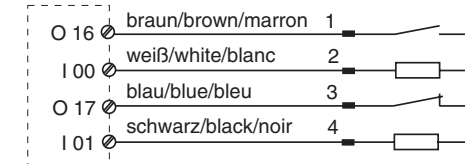
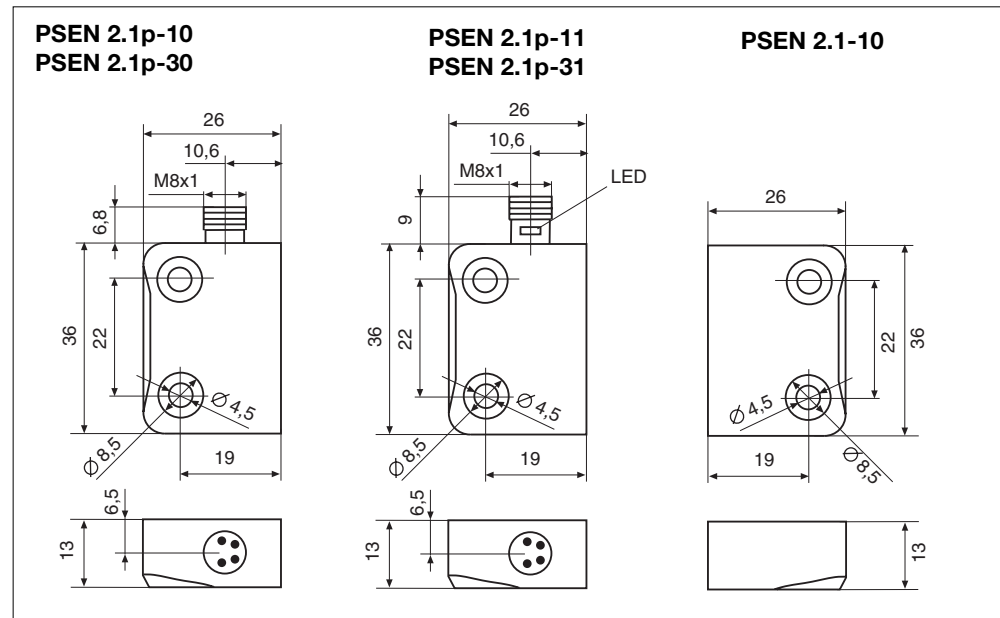
- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

Dimensions in mm



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	
PSEN 2.1p-10, PSEN 2.1p-11	s_{aomin} : 0,5, s_{ao} : 3 mm, s_{ar} : 19 mm
PSEN 2.1p-30, PSEN 2.1p-31	s_{aomin} : 0,5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	30 VDC
Max. switching current	10 mA
Max. breaking capacity	0.3 W
Max. switching frequency	5 Hz
Actuator	PSEN 2.1-10
Ambient temperature	-25 ... +70 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 2.1p: 15 g PSEN 2.1-10: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 2.1p-34 ATEX

Intended use

The PSEN 2.1p-34 ATEX safety switch is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The PSEN 2.1p-34 ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area, Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator PSEN 2.1-10 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

- PNOZ e3.1p
- PNOZ e3vp 10s
- PNOZ e3vp 300s
- PNOZ m1p
- PSS-range programmable safety system in conjunction with standard function block SB066

Description

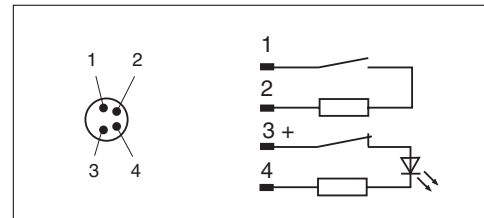
The safety switch PSEN 2.1p-34 ATEX is used with the actuator PSEN 2.1-10.

Features:

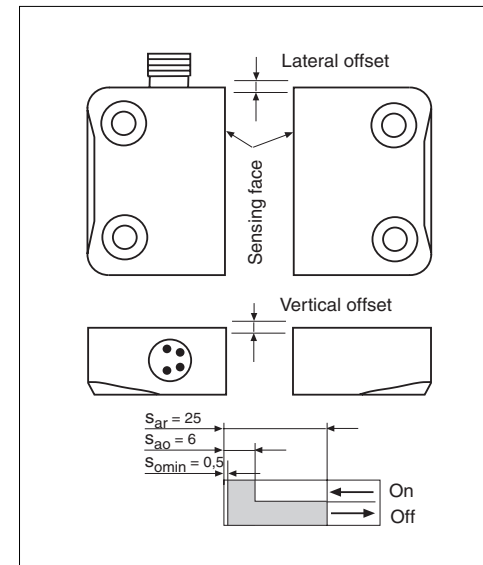
- 2 reed contacts (1 N/C / 1 N/O)
- Assured operating distance: 6 mm
- Assured release distance: 25 mm

- Safety switches connected in series via PSEN i1 interface
- Square design
- Works magnetically
- Switching voltage 30 VDC
- with LED to display switch status

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm				
	1.0	2.0	3.0	4.0	5.0
1.0	5.5	4.5	4.5	4.0	3.0
2.0	5.0	4.5	4.5	3.5	2.5
3.0	4.5	4.5	3.5	2.5	0.5
4.0	4.0	-	-	-	-

Assured release distance s_{ar} :
max. 25 mm with all vertical and lateral offsets

PSEN 2.1p-34 ATEX

Series connection via PSEN i1 interface



INFORMATION

To connect the safety switches in series you will need the PSEN i1 interface. For wiring details please refer to **PSEN i1**, in this chapter.

Direct connection to PNOZelog

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):
The maximum permitted overall cable resistance at the inputs of a PNOZelog unit is 2 kohms. When **one** safety switch is connected, 1760 ohms remain for the cable.

Preparing the unit for operation:

- Connect the units from the **PNOZelog series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to PNOZmulti

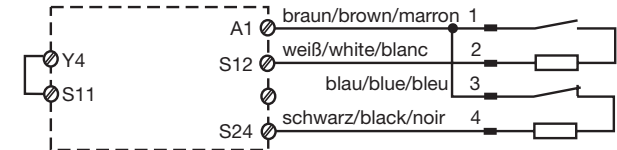
Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

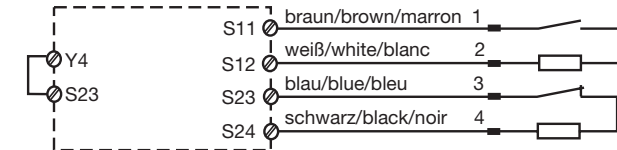
Without detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s



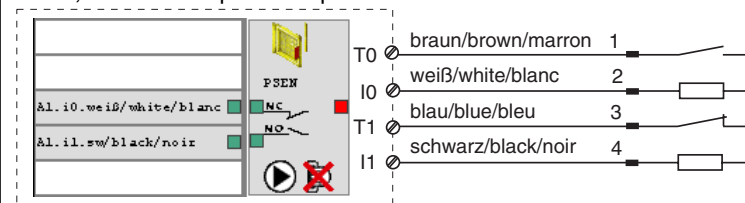
With detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s



PNOZmulti

- Safety gate, switch type 2
- I0, I1: Inputs
- T0, T1: Test pulse outputs



Please note:

- Connect the N/O contact on the PSEN to I0
- Connect the N/C contact on the PSEN to I1

PSEN 2.1p-34 ATEX

Direct connection to a PSS, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.

- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

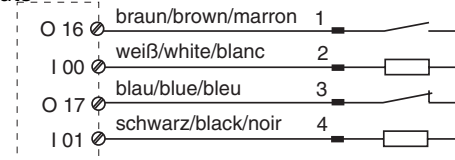


CAUTION

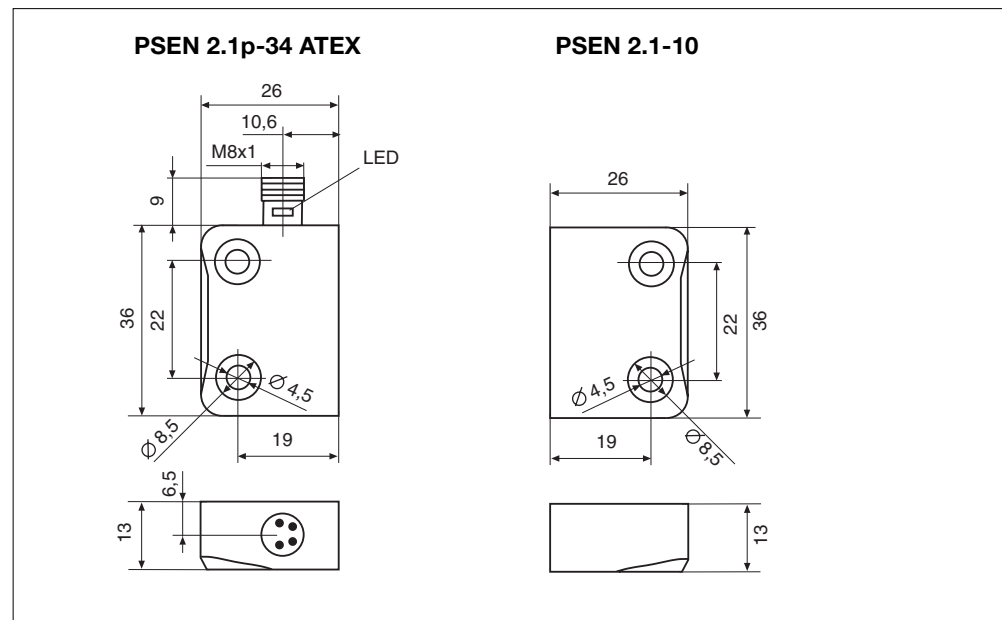
The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



Dimensions in mm



Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 6 mm, s_{ar} : 25 mm
Switching voltage	30 VDC
Max. switching current	10 mA
Max. breaking capacity	0.3 W
Max. switching frequency	5 Hz
Actuator	PSEN 2.1-10
Ambient temperature	-25 ... +70 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions L x W x H	36 x 26 x 13 mm
Weight	PSEN 2.1p-34 ATEX: 15 g PSEN 2.1-10: 15 g

The version of the standards current at 2003-11 shall apply.

PSEN 2.2p-20, PSEN 2.2p-21

Intended use

Safety switches PSEN 2.2p-20 and PSEN 2.2p-21 are intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices). The safety switch only complies with EN 60947-5-3 in conjunction with the actuator PSEN 2.2-20 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

- PNOZ e3.1p
- PNOZ e3vp 10s
- PNOZ e3vp 300s
- PNOZ m1p
- PSS-range programmable safety system in conjunction with standard function block SB066

Description

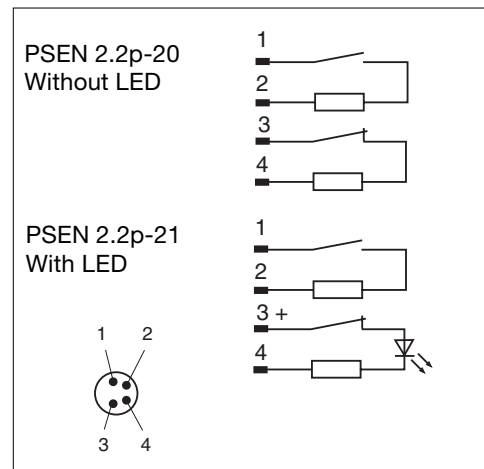
The safety switch PSEN 2.2p-20 and PSEN 2.2p-21 are used with the actuator PSEN 2.2-20.

Features:

- 2 reed contacts (1 N/C / 1 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Series connection via PSEN ix interface
- Round design
- Works magnetically
- Switching voltage 30 VDC

- PSEN 2.2p-21: with LED to display switch status

Connections



Wiring

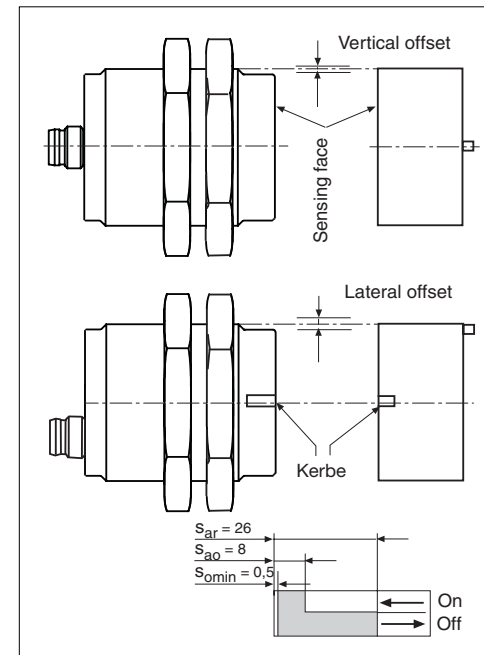


INFORMATION

For details of how to connect the safety switch directly to an approved evaluation device, please refer to **PSEN 2.1p-10, PSEN 2.1p-11, PSEN 2.1p-30, PSEN 2.1p-31**, in this chapter.

To connect the safety switches in series you will need the PSEN i1 interface. For wiring details please refer to **PSEN i1**, in this chapter.

Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm	
	0.5	1.0
1.0	7.5	7.5
2.0	7.0	7.0
3.0	6.5	6.5
4.0	6.0	6.0
5.0	5.0	5.0
6.0	4.5	4.5

Assured release distance s_{ar} :
max. 26 mm with all vertical and lateral offsets

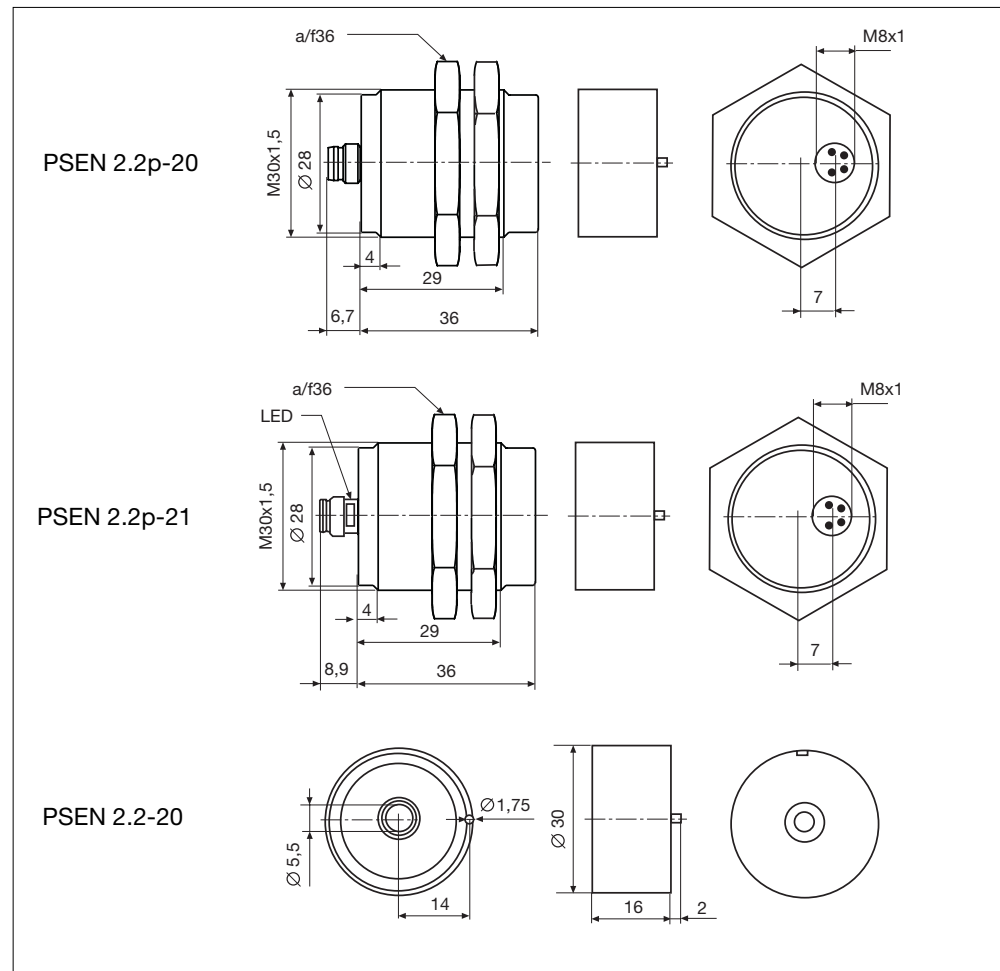


NOTICE

The details given in the table "Max. lateral and vertical offset" apply when the notches on the safety sensor and actuator are positioned on top.

PSEN 2.2p-20, PSEN 2.2p-21

Dimensions in mm



Technical details

Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm, s_{ar} : 26 mm
Switching voltage	30 VDC
Maxc. switching current	10 mA
Max. breaking capacity	0.3 W
Max. switching frequency	5 Hz
Status display	Red LED (PSEN 2-2p-21 only)
Actuator	Magnet PSEN 2.2-20
Ambient temperature	-25 ... +70 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic, signal yellow
Dimensions	See drawing
Weight	PSEN 2.2p-20/-21: 28 g PSEN 2.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN 2.2p-24 ATEX

Intended use

The safety switch PSEN 2.2p-24 ATEX is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switch PSEN 2.2p-24 ATEX is approved for use in potentially explosive atmospheres in accordance with EN 50021, 02/00, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN 2.2-20 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZelog:

- PNOZ e3.1p
- PNOZ e3vp 10s
- PNOZ e3vp 300s

PNOZmulti:

- PNOZ m1p
- PNOZ mi1p

PSS in conjunction with standard function block SB066:

- PSS DI
- PSS(1) DI 2
- PSS(1) DIF2
- PSS(1) DIO T
- PSS(1) DIO Z
- PSS(1) DI2O T
- PSS(1) DI2O Z
- PSS 3032
- PSS 3046

- PSS 3056
- PSS 3074
- PSS SB2 3006-3 CN-A
- PSS SB2 3006-3 DP-S
- PSS SB 3006-3
- PSS SB 3006
- PSS SB 3056
- PSS SB DI16
- PSS SB DI8O8
- PSS SB DI8OZ4

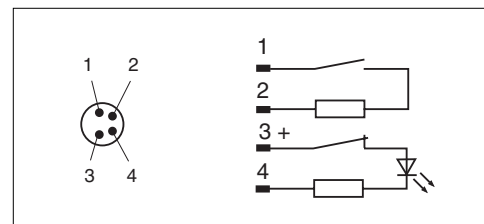
Description

The safety switch PSEN 2.2p-24 ATEX is used with the actuator PSEN 2.2-20.

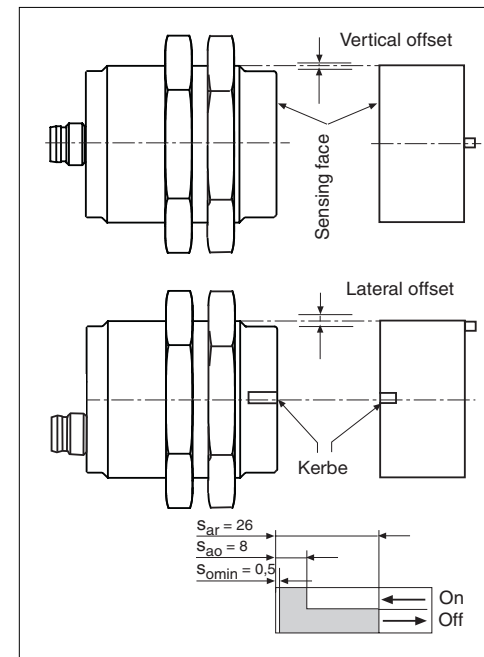
Features:

- 2 reed contacts (1 N/C / 1 N/O)
- Assured operating distance: 8 mm
- Assured release distance: 26 mm
- Round design
- Works magnetically
- Switching voltage 30 VDC
- with LED to display switch status

Connections



Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

Assured operating distances s_{ao} in mm

Lateral offset in mm	Vertical offset in mm	
	0.5	1.0
1.0	7.5	7.5
2.0	7.0	7.0
3.0	6.5	6.5
4.0	6.0	6.0
5.0	5.0	5.0
6.0	4.5	4.5

Assured release distance s_{ar} :
max. 26 mm with all vertical and lateral offsets



NOTICE

The details given in the table "Max. lateral and vertical offset" apply when the notches on the safety sensor and actuator are positioned on top.

PSEN 2.2p-24 ATEX

Please observe the following when wiring:

- The evaluation devices approved for use with the safety switch PSEN 2.2p-24 ATEX are listed under "Intended use".
- The safety switch is installed in the Ex area, the corresponding evaluation device in the non-Ex area.



NOTICE

Connections 1 and 3 of the safety switch must be connected to test pulse outputs.



CAUTION

Risk of explosion! Within the Ex area, only insert and unplug the safety switch connector when the supply voltage is switched off.

Direct connection to PNOZelog

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):
The maximum permitted overall cable resistance at the inputs of a PNOZelog unit is 2 kohms.

Preparing the unit for operation:

- Connect the units from the **PNOZelog series**. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to PNOZmulti

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

Direct connection to a PSS, with or without SafetyBUS p

Preparing the unit for operation:

- Connect the **PSS**. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.



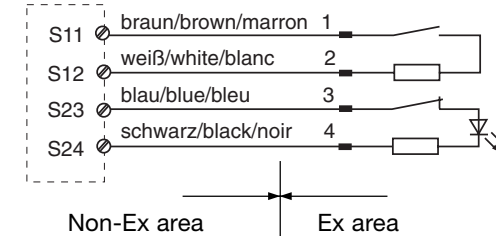
CAUTION

The safety switch may only be operated on a PSS in conjunction with standard function block SB066.

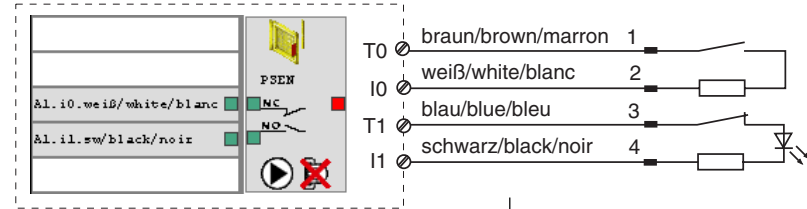
PNOZelog

S12, S24: Inputs

S11, S23: Test pulse outputs



PNOZmulti



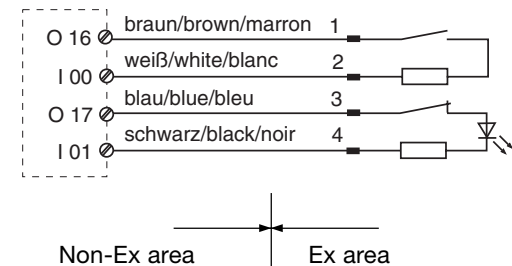
Please note:

- Connect the N/O contact on the PSEN to I0
- Connect the N/C contact on the PSEN to I1

PSS with and without SafetyBUS p

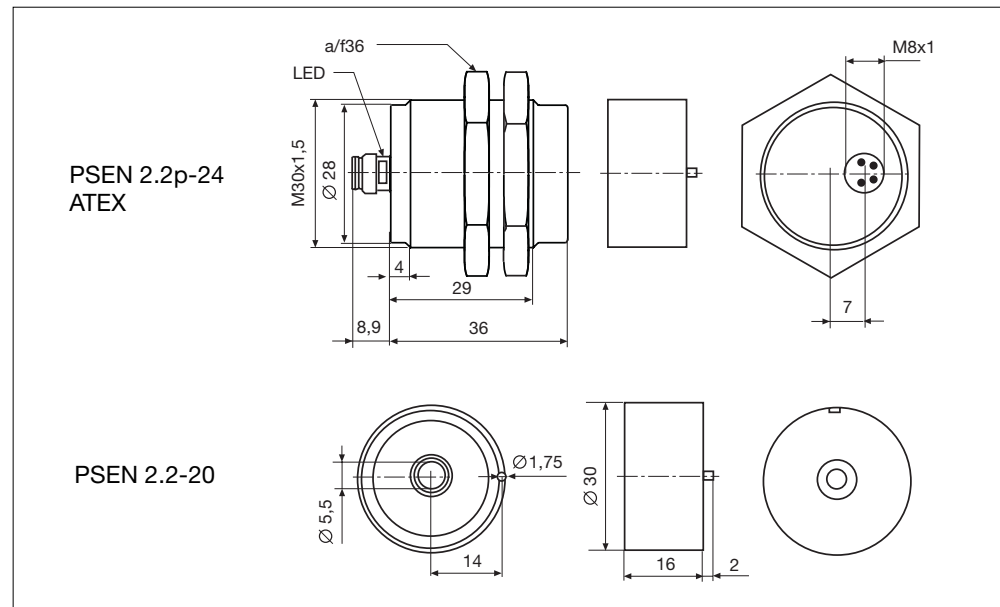
I 00, I 01: Inputs

O 16, O 17: Test pulse outputs



PSEN 2.2p-24 ATEX

Dimensions in mm



Technical details

ATEX category	II 3GD EEx nC IIC T6
Operation	Reed contacts/magnetic actuation
Switching distances	s_{aomin} : 0,5, s_{ao} : 8 mm, s_{ar} : 26 mm
Switching voltage	30 VDC
Max. switching current	10 mA
Max. breaking capacity	0.3 W
Max. switching frequency	Max. 5 Hz
Status display	Red LED
Actuator	Magnet PSEN 2.2-20
Ambient temperature	T6/max. 85 °C
Vibration in accordance with 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30g, 11 ms
Connection type	4 pin M8 male connector
Cable	LiYY 4 x 0.25 mm ²
Protection type depends on cable	IP65/IP67
Housing material	PBT plastic
Dimensions	See drawing
Weight	PSEN 2.2p-24: 28 g PSEN 2.2-20: 16 g

The version of the standards current at 2003-11 shall apply.

PSEN i1

Intended use

The PSEN i1 interface enables several safety switches or position switches to be connected to safety gate monitors or programmable safety systems and evaluated.

The following may be connected to the PSEN i1:

- Safety switches from the PSEN 2 series (e.g. PSEN 2.1p-10, PSEN 2.1p-11)
- Position switch with N/C / N/O combination

The PSEN i1 may be connected to:

- Safety gate monitors from the PNOZ e3p series from the PNOZelog product range (e.g. PNOZ e3.1p, PNOZ e3vp)
- Compact programmable safety systems from the PSS-range
- Modular programmable safety systems from the PSS-range with centralised input module
- SafetyBUS p-compatible programmable safety systems from the PSS-range and decentralised input module (I/OD)



NOTICE

Use of the PSEN i1 reduces the classification to EN 60947-5-3 from PDF-M to PDF-S.

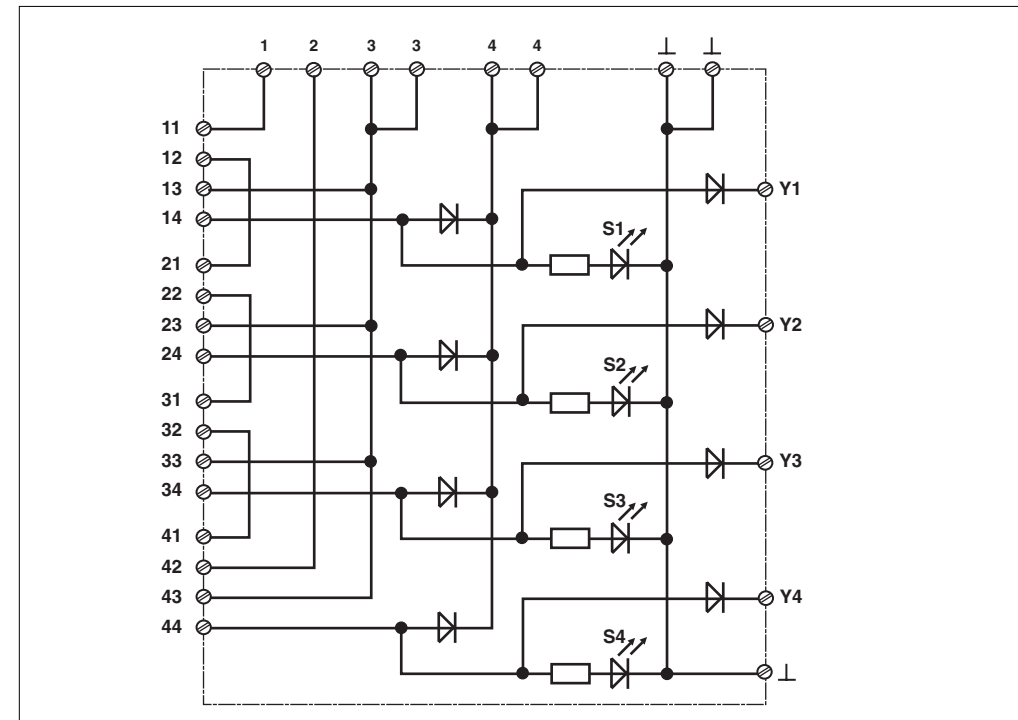
Description

The PSEN i1 switches the 4 N/C circuits of the connected safety switches/position switches in parallel and the 4 N/O circuits in series. A status indicator lights when the N/O circuit is closed. Diagnostic outputs are used to evaluate the switch status of the N/C circuits via external LEDs or a PLC

When using

- PNOZ e3.1p and PNOZ e3vp, a max. of 12 (from October 2003: max. 24) safety switches/position switches can be connected by linking a max. of 6 PSEN i1s in series.
- A compact programmable safety system from the PSS-range, a modular programmable safety system from the PSS-range with centralised input module or a SafetyBUS p-compatible PSS with decentralised input module, a max. of 6 safety switches/position switches (from October 2003: max. 12) can be connected by linking a max. of 4 PSEN i1s in series.
- PNOZmulti, a max. of 6 safety switches/position switches can be connected by linking a max. of 2 PSEN i1s in series.

Internal wiring diagram



PSEN i1

Series connection to PNOZelog via PSEN i1 interface

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

When 24 safety switches are connected, the maximum permitted overall cable resistance between the evaluation device and the safety switch is 400 Ohms per channel.

Preparing for operation

- Connect the units from the **PNOZelog series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the PSEN i1 to the input circuits of the evaluation devices in accordance with the table.
- Wire the safety switches to the PSEN i1 in accordance with the table. Please refer to the operating manual for the PSEN i1.

Series connection to PNOZmulti via PSEN i1 interface

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing for operation

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the PSEN i1 to the input circuits of the evaluation devices in accordance with the table.
- Wire the safety switches to the PSEN i1 in accordance with the table. Please refer to the operating manual for the PSEN i1.

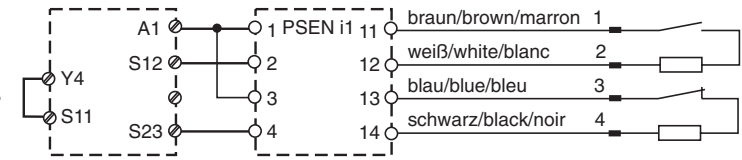


NOTICE

When connecting fewer than 4 safety switches to a PSEN i1, please note: **Link out the free inputs for N/O contacts** on the PSEN i1.

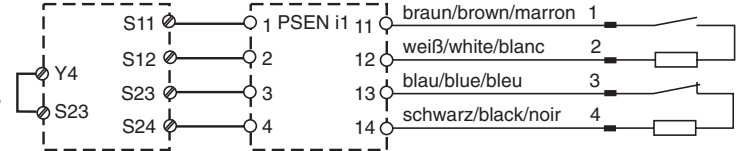
Without detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s

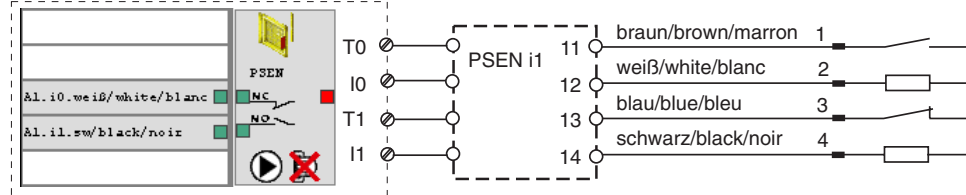


With detection of shorts across contacts

- PNOZ e3.1p
- PNOZ e3vp 10 s
- PNOZ e3vp 300 s



- PNOZ m1p



PSEN i1

Series connection to a PSS via a PSEN i1 interface, with or without SafetyBUS p

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device).

Preparing the unit for operation:

- Connect the units from the **PNOZmulti series**. Please refer to the operating manual for the relevant units.
- Establish the operating mode with/ without detection of shorts across contacts through the wiring of the **input circuit**.
- Wire the PSEN ix1 to the input circuits of the evaluation devices in accordance with the table.
- Wire the safety switches to the PSEN i1 in accordance with the table. Please refer to the operating manual for the PSEN i1.



NOTICE

When connecting fewer than 4 safety switches/position switches, please note: **Link out the free inputs for N/O contacts** on the PSEN i1.

Example:

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

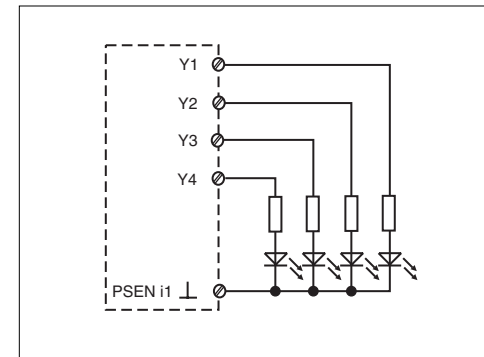
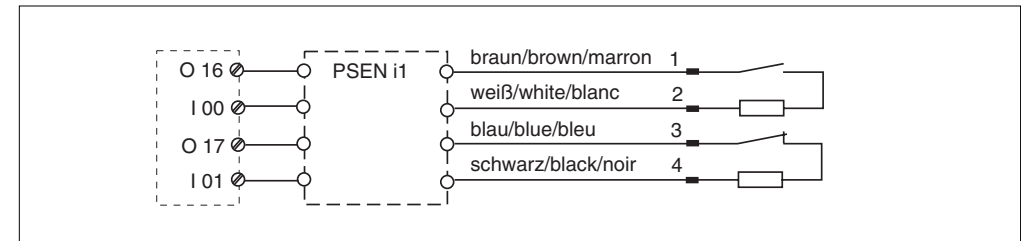
Connecting the diagnostic outputs:

- If required, connect the diagnostic outputs Y1 ... Y4 of the PSEN i1.

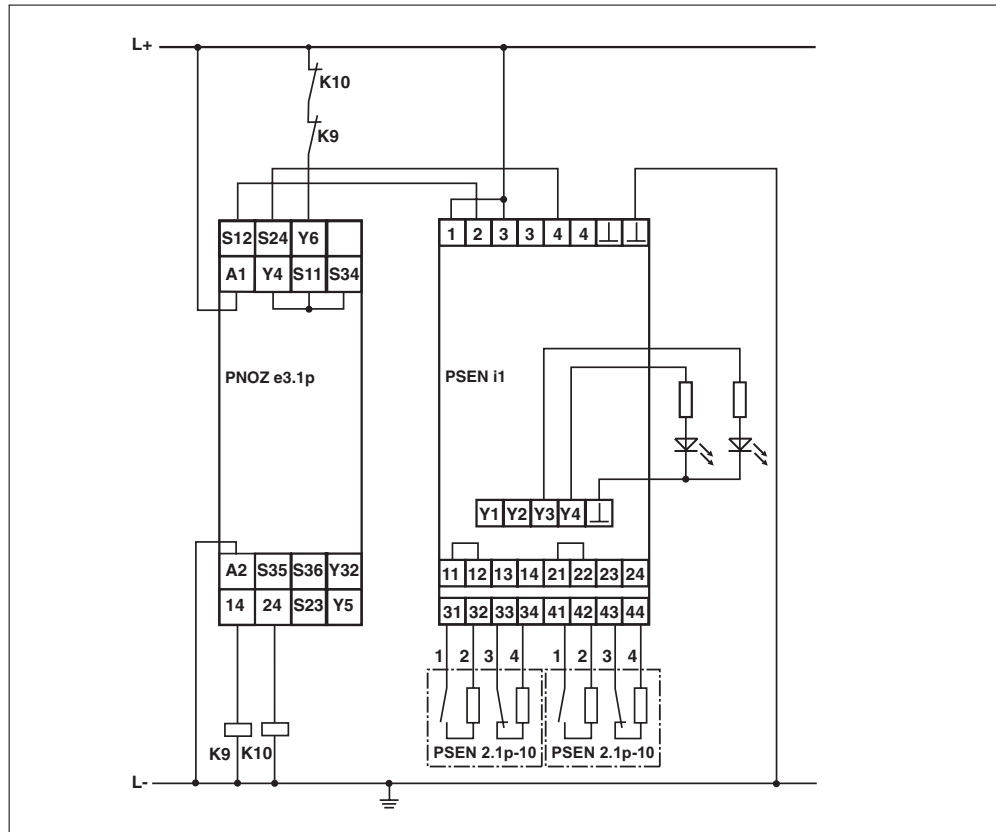


INFORMATION

When connecting the diagnostic outputs to a PLC, please note: use the operating mode **without** detection of shorts across contacts.

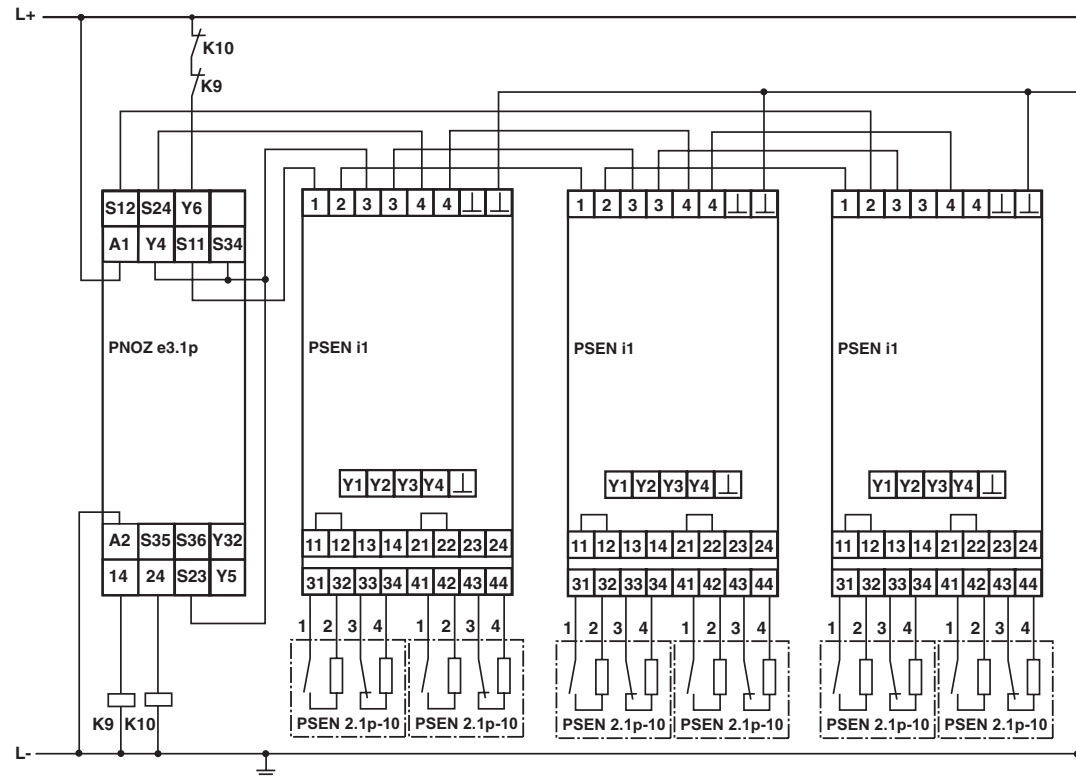


Evaluation (PNOZ e3.1p) of 2 safety switches PSEN 2.1p-10



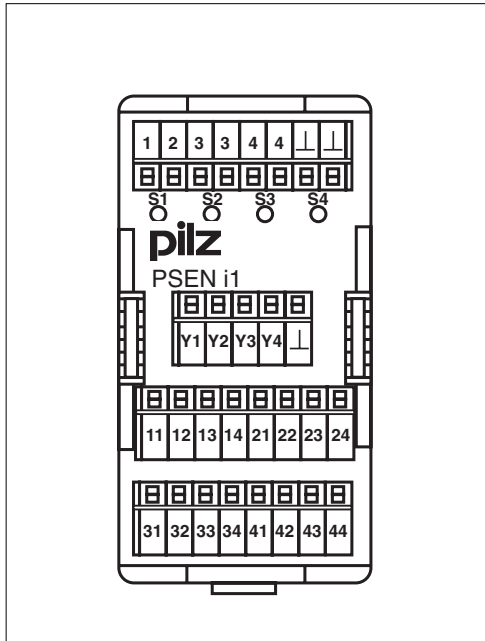
PSEN i1

Example 2:
Evaluation (PNOZ e3.1p) of 6 safety switches via 3 PSEN i1 units connected in series. **Link out the free inputs for N/O contacts.**

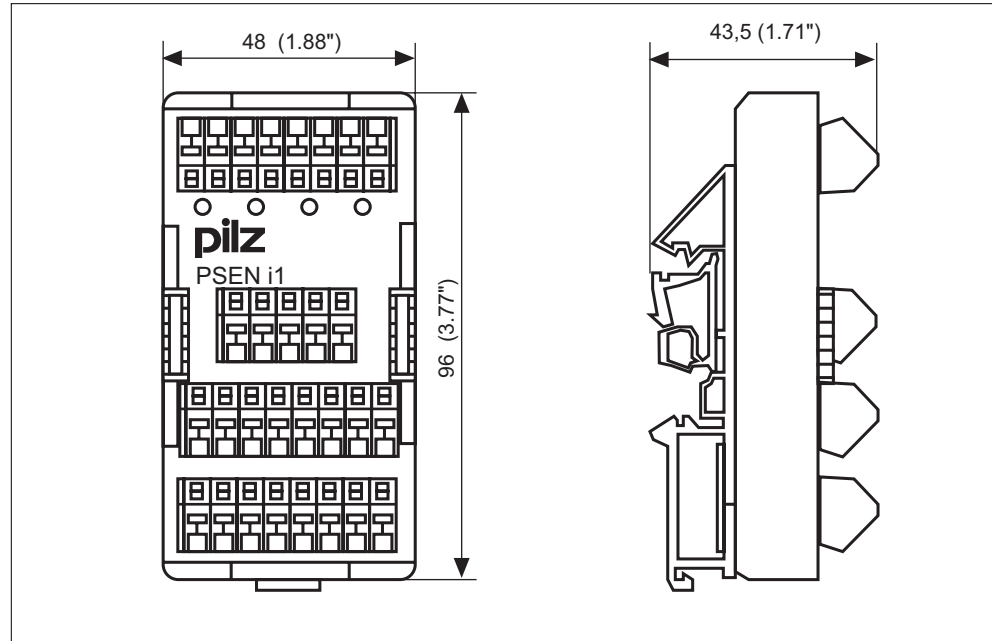


PSEN i1

Terminal configuration



Dimensions in mm



PSEN i1

Technical details

Supply voltage U _B	From PNOZ or PSS
Voltage tolerance	80 ... 125%
Power consumption at U _B without load	Max 0.4 W
Residual ripple U _B	DC: 20%
Voltage and current at Y1, Y2, Y3, Y4	24V/50 mA
Airgap creepage	DIN VDE 0110-1
Climate suitability	DIN IEC 60068-2-3
EMC	EN 60947-5-3
Vibration to	EN 60068-2-6
Frequency	10 ... 55 Hz
Amplitude	0.35 mm
Ambient temperature	-10 ... +55 °C
Storage temperature	-25 ... +70 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP20
Terminals	IP20
Connection type	Spring-loaded terminals
Cross section of external conductors	
1 core flexible	0.08 ... 2.5 mm ²
2 core, same cross section	
flexible with crimp connectors, no plastic sleeve	0.08 ... 1 mm ²
flexible without crimp connectors or with TWIN crimp connectors	0.08 ... 1.5 mm ²
Housing material	
Housing	PA 6 UL 94-HB
Base	PA 66 UL 94-V2
Dimensions H x W x D	96 x 48 x 43.5 mm
Weight	90 g

The version of the standards current at 2003-11 shall apply.

PSEN ix1

Intended use

The PSEN ix1 interface enables several safety switches or position switches to be connected to safety relays from the PNOZ series and evaluated.

The following may be connected to the PSEN ix1:

- Safety sensors
 - PSEN 1.1p-12
 - PSEN 1.1p-22
 - PSEN 1.1p-25 ATEX
 - PSEN 1.2p-22
 - PSEN 1.2p-25 ATEX
- Position switch with N/O / N/O combination
- E-STOP button with N/C / N/C combination

The PSEN ix1 should only be connected to the following evaluation devices:

PNOZ X:

- PMUT X1P
- PNOZ X2
- PNOZ X2.1 (24 VDC only)
- PNOZ X2P
- PNOZ X2.3P
- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X2C
- PNOZ X2.1C (24 VDC only)
- PNOZ X4
- PNOZ X5, PNOZ X5J
- PNOZ 11
- PNOZ 16
- PNOZ X13
- PNOZ X2.5P
- PNOZ X3, PNOZ X3.1
- PNOZ X3P
- PNOZ X3.10P

- PNOZ XV2, PNOZ XV2P
- PNOZ XV3
- PNOZ X5, X5J
- PNOZ X6
- PNOZ X8P
- PNOZ X9, PNOZ x9P
- PNOZ X10, PNOZ X10.1
- PNOZ X10.11P
- PNOZ Ex

PNOZpower:

- PNOZ p1p

PNOZpower:

- PNOZ p1p

PNOZmulti:

- PNOZ m1p

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066



NOTICE

Use of the PSEN ix1 reduces the classification to EN 60947-5-3 from PDF-M to PDF-S.

Description

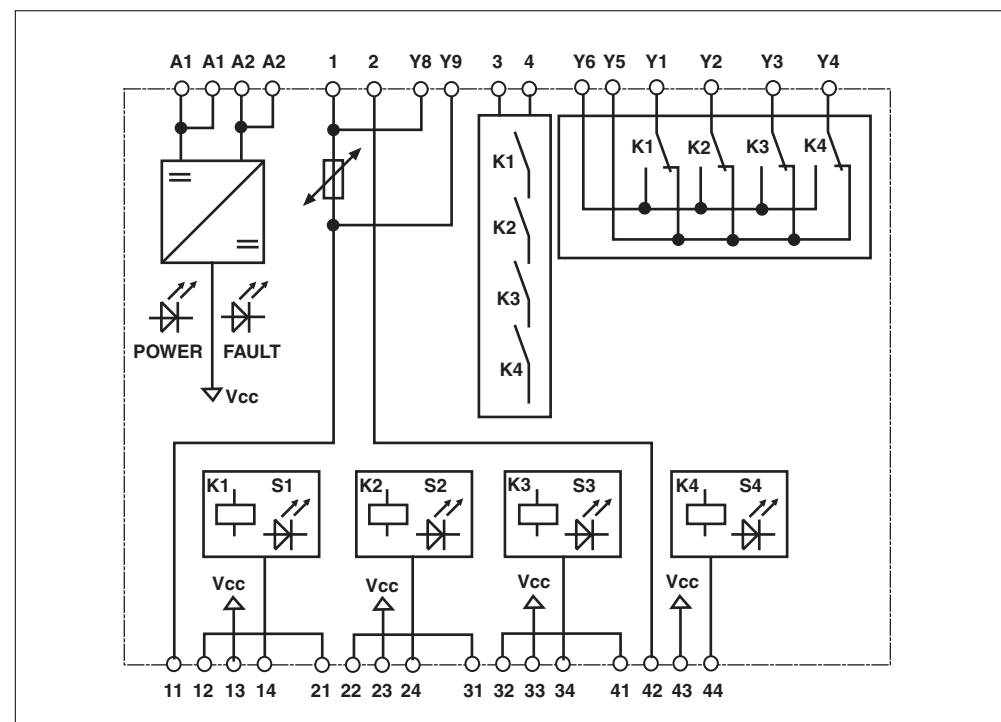
The PSEN ix1 connects the PSEN 1.1p-12, PSEN 1.1p-22, PSEN 1.2p-22 safety switches or position switches in series.

- Max. of 13 PSEN ix1 units can be connected in series
- Connection option for:
 - max. 50 safety switches or position switches with N/O / N/O combination
 - or max. 50 E-STOP buttons with N/C / N/C combination

- Status indicators for the switch status of the N/O circuits of the connected safety switches

- 4 diagnostic outputs to display or evaluate the switch status of the N/O circuits via external LEDs or a controller

Internal wiring diagram



PSEN ix1

Series connection via PSEN ix1 interface

Before commissioning, check that shorts across contacts are detected (see operating manual for the evaluation device):

- The maximum permitted overall cable resistance is **30 ohms** per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Preparing for operation

- Connect the supply voltage to the PSEN ix1:
Terminal **A1**: +24 VDC
Terminal **A2**: 0 V
- Connect units from the **PNOZ X, PNOZpower, PNOZmulti or PSS series**. Please refer to the operating manual for the relevant units.
- Wire the PSEN ix1 to the input circuits of the evaluation devices in accordance with the table.
- Wire the safety switches to the PSEN ix1 in accordance with the table. Please refer to the operating manual for the PSEN ix1.



NOTICE

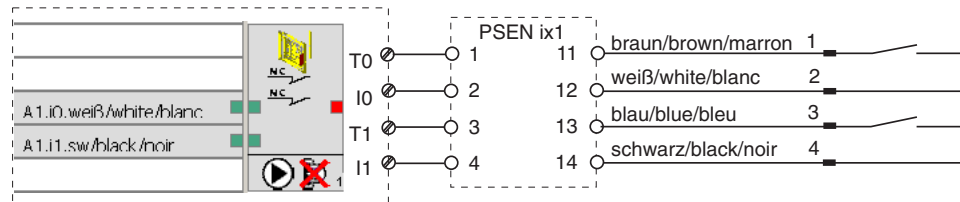
When connecting fewer than 4 safety switches to a PSEN ix1, please note: **Link out the free inputs for N/O contacts** (see example 2).

• PNOZ p1p • PNOZ X2/X2P • PNOZ X2.1 (24 VDC only) • PNOZ X2.3P • PNOZ X2.7P/2.8P • PNOZ X2C • PNOZ X2.1C (24 VDC only) • PNOZ X4/X8P • PNOZ X9/X9P • PNOZ X10/X10.1 • PNOZ X10.11P • PNOZ Ex		PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.2p-22
• PNOZ X5 • PNOZ X5J		PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.2p-22
• PNOZ 11 • PNOZ 16 • PNOZ X13 • PNOZ X2.5P • PNOZ X3 • PNOZ X3.1 • PNOZ X3P • PNOZ X3.10P • PNOZ XV2 • PNOZ XV2P • PNOZ XV3		PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.2p-22
• PNOZ X6 (Y3-Y4 linked)		PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.2p-22
• PMUT X1P		PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.2p-22

PSEN ix1

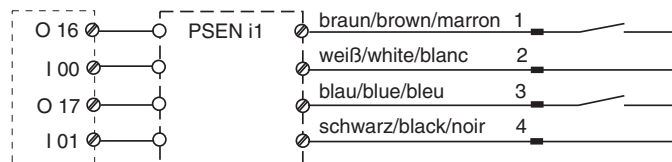
PNOZmulti

- Safety gate, switch type 3
- I0, I1: Inputs
- T0, T1: Test pulse outputs



PSS with and without SafetyBUS p

- Safety gate
- I00, I01: PSS inputs
- O16, O17: Test pulse outputs



CAUTION

The safety switches may only be operated on a PSS in conjunction with standard function block SB066.

PSEN ix1



CAUTION

Please note the following when using evaluation devices with delay-on de-energisation contacts (e.g. PNOZ XV2):

- **Delay time ≤ 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1, 12/96 and the requirements of a PDF with single-fault tolerance (PDF-S).
- **Delay time > 30 s:**
Delay-on de-energisation contacts satisfy the requirements of category 1 in accordance with EN 954-1, 12/96 and the requirements of a PDF with designed reliability (PDF-D).

Connecting the diagnostic outputs:

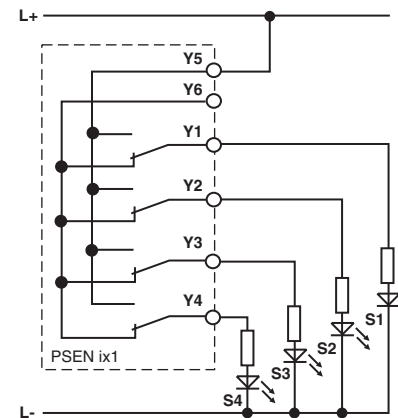
- If required, connect the diagnostic outputs Y1 ... Y4 of the PSEN ix1.



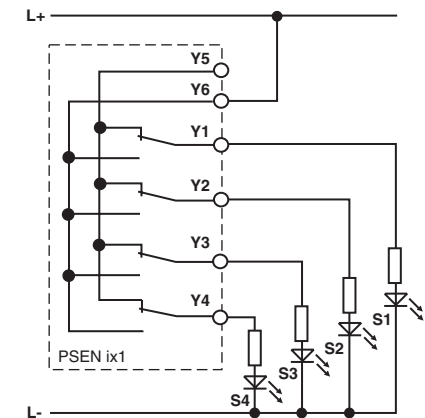
INFORMATION

Connect either Y5 or Y6. By connecting Y5 or Y6 you define whether the N/O or N/C contact is to be evaluated.

LED lights when the safety gate is open



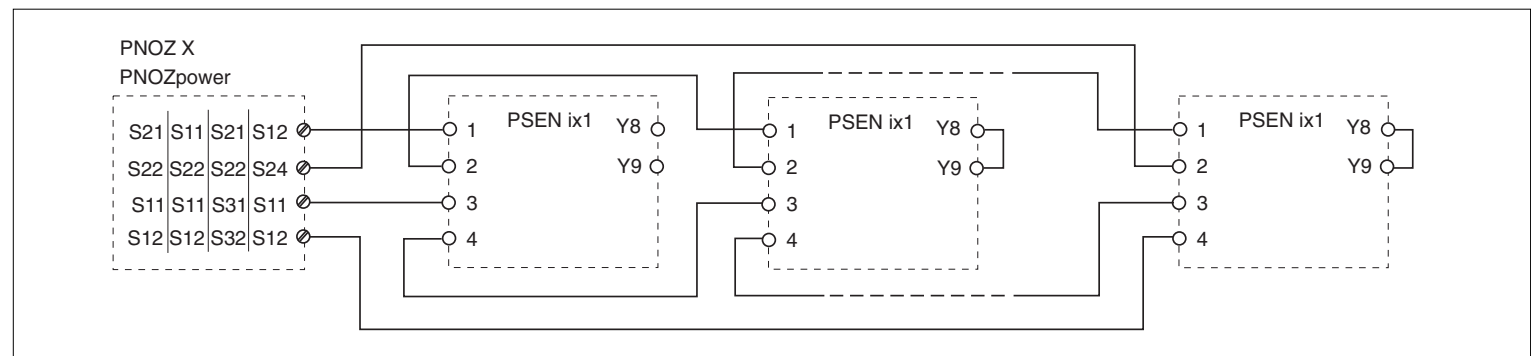
LED lights when the safety gate is closed



Series connection of PSEN ix1

When connecting more than 4 safety switches: connect PNOZ ix1 in series (see diagram: "Series connection of PSEN").

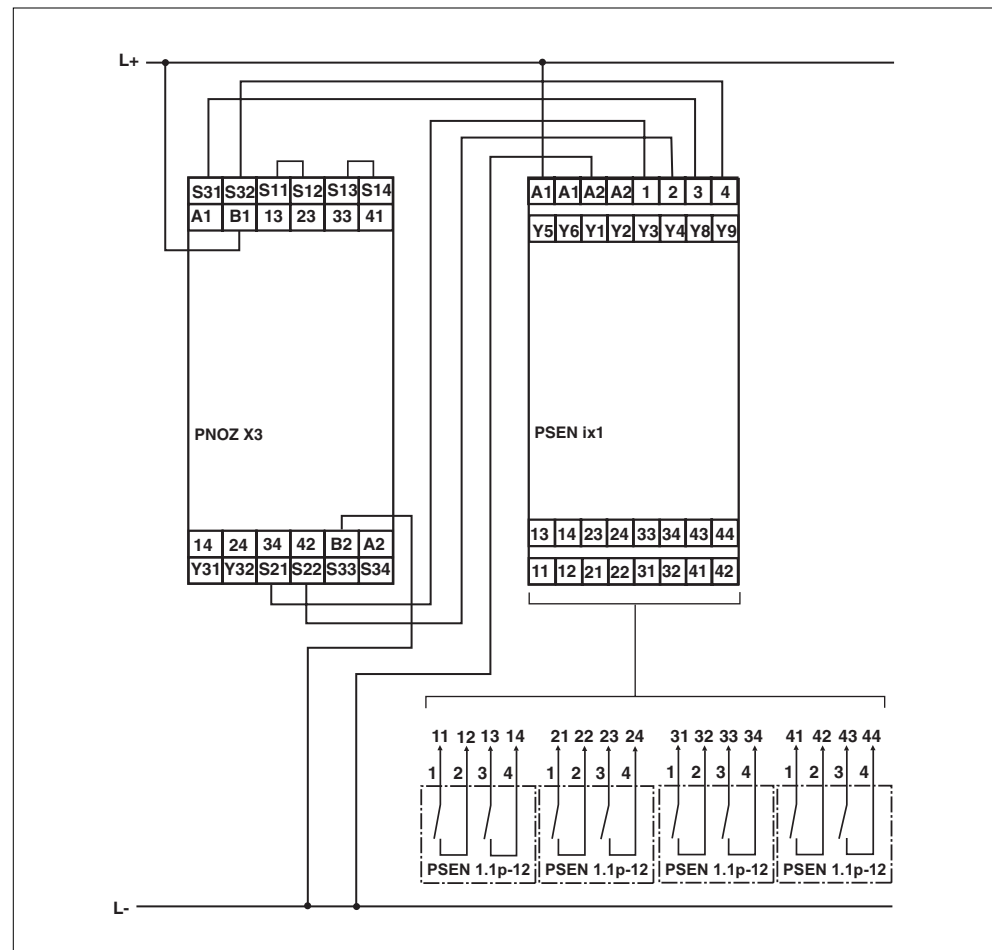
After the second PSEN ix1, link Y8-Y9



PSEN ix1

Example 1

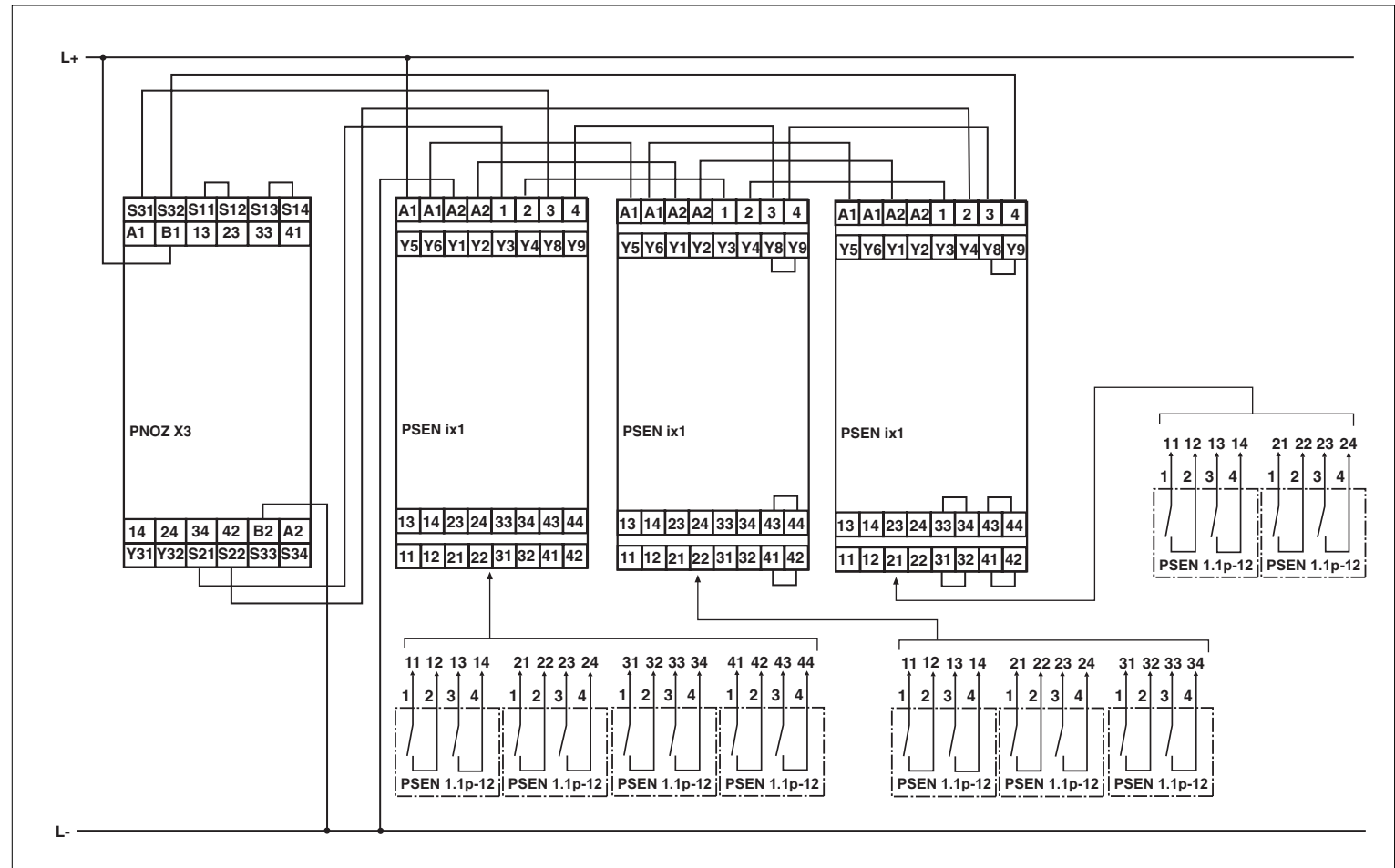
Evaluation (PNOZ X3) of 4 PSEN 1.1p-12 safety sensors



PSEN ix1

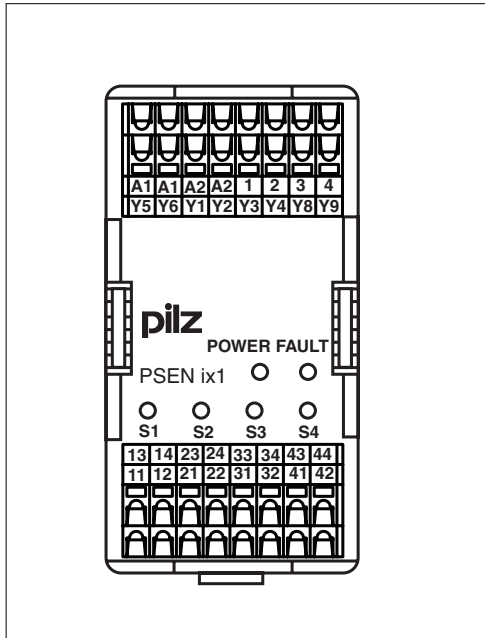
Example 2

Evaluation (PNOZ X3) of 9 safety switches via 3 PSEN ix1 units connected in series.
With a series connection, link Y8-Y9 after the second PSEN ix1
Link out the free inputs for N/O contacts.

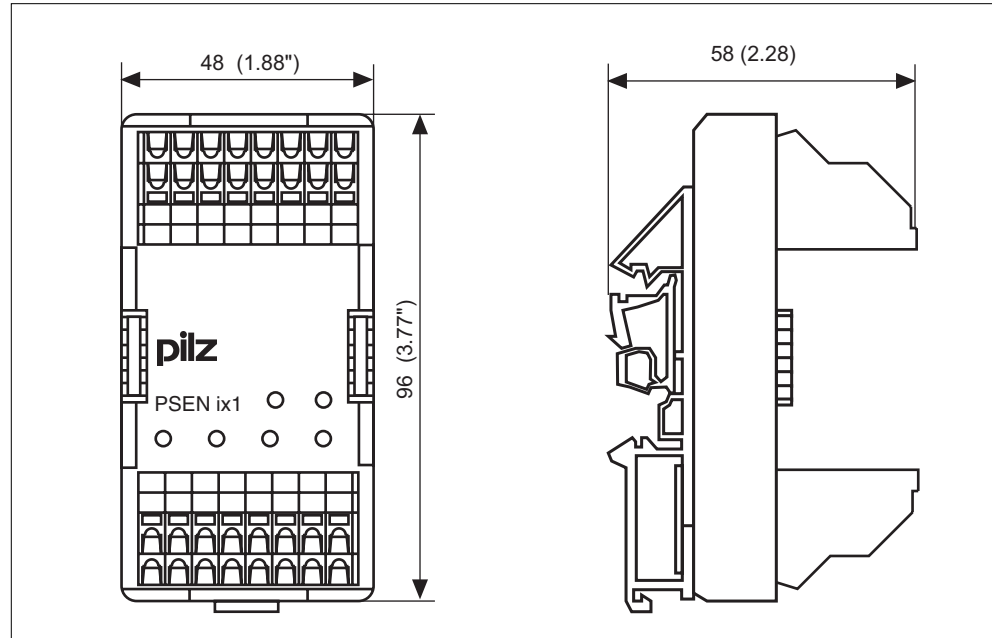


PSEN ix1

Terminal configuration



Dimensions in mm



PSEN ix1

Technical details

Supply voltage U_B	24 VDC
Voltage tolerance	85 ... 110 %
Power consumption at U_B without load	Max 1.5 W
Residual ripple U_B	DC: 20%
Voltage and current at Y1, Y2, Y3, Y4	24V/500 mA
Airgap creepage	DIN VDE 0110-1
Climate suitability	DIN IEC 60068-2-3
EMC	EN 60947-5-3
Vibration in accordance with	EN 60068-2-6
Frequency	10 ... 55 Hz
Amplitude	0.35 mm
Ambient temperature	-10 ... +55 °C
Storage temperature	-25 ... +70 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP20
Terminals	IP20
Connection type	Spring-loaded terminals
Cross section of external conductors	
1 core flexible	0.08 ... 2.5 mm ²
2 core with the same cross section	
flexible with crimp connectors, no plastic sleeve	0.08 ... 1 mm ²
flexible without crimp connectors or with TWIN crimp connectors	0.08 ... 1.5 mm ²
Housing material	
Housing	PA 6 UL 94-HB
Base	PA 66 UL 94-V2
Dimensions H x W x D	96 x 48 x 58 mm
Weight	100 g

The version of the standards current at 2003-11 shall apply.

PSEN accessories

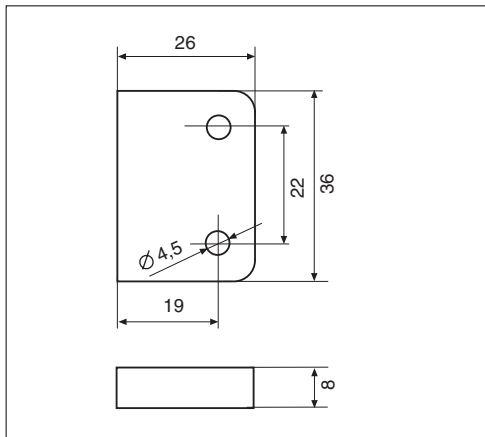
Spacer for safety switch

Description:

If a safety switch is to be installed on top of ferromagnetic material, the spacer provides the necessary distance. The spacer has a height of 8 mm.

The spacer is suitable for safety switches with a square design.

Dimensions in mm

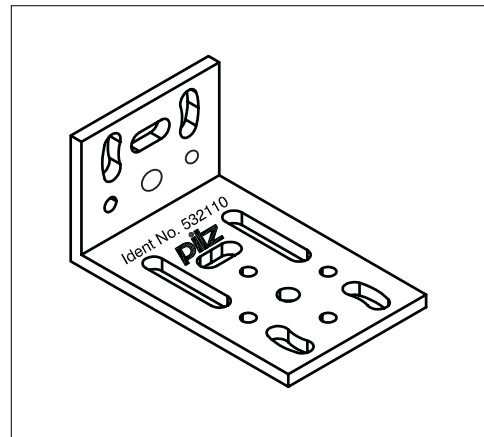


Bracket for safety switch

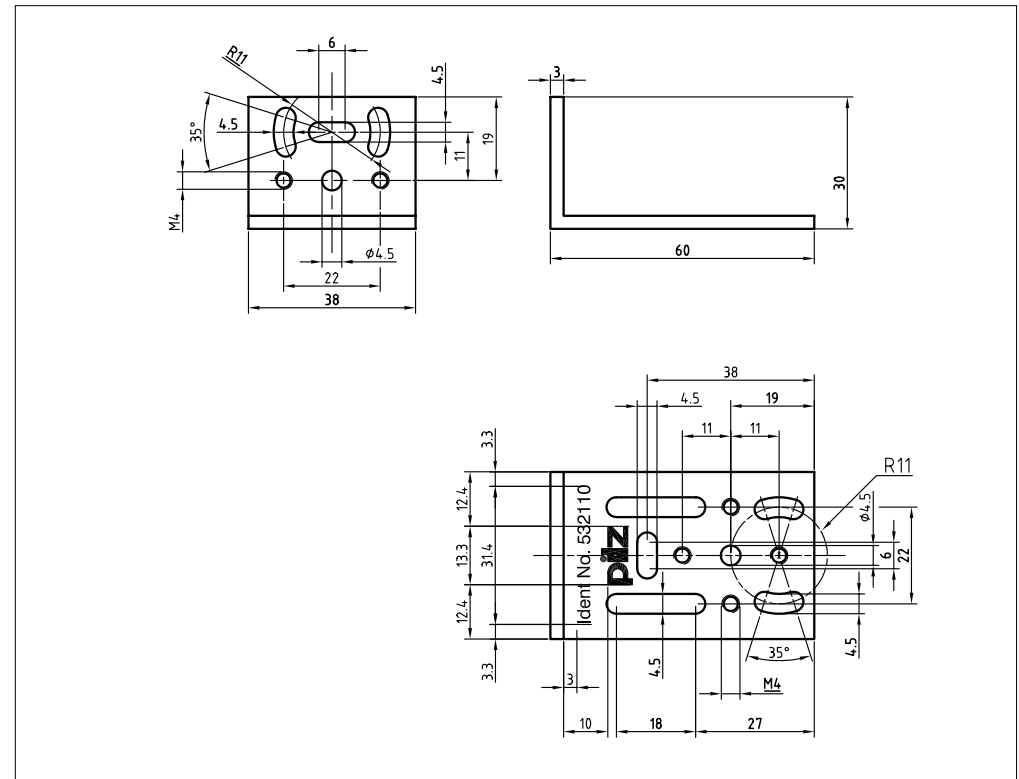
Description:

The bracket is suitable for installing safety switches at a right-angle. The bracket has slots, ensuring that the mounting position can be varied.

The bracket is suitable for safety switches with a square design.



Dimensions in mm



PSEN accessories

Cable for safety switch

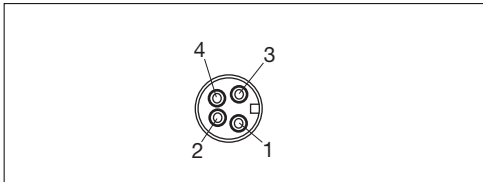
Description:

The cable is suitable for connecting safety switches to an evaluation device.

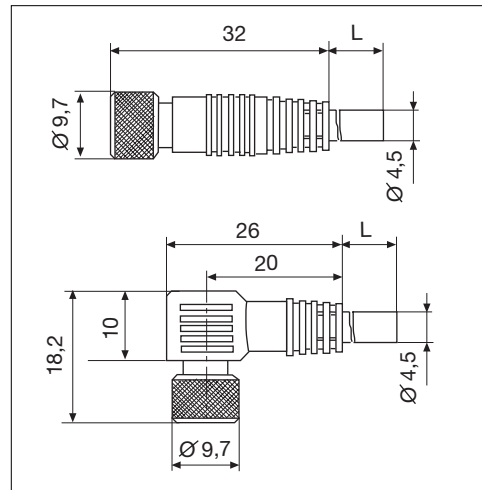
Features:

- Straight or angled connector
- 4 pin M8x1 male connector
- Screw-on, with lock
- Cable runs: 2, 5, 10 m

Plug connection



Dimensions in mm



Colour marking on the cable ends

- 1 = brown
- 2 = white
- 3 = blue
- 4 = black

Comparison of the PSENcs safety switches

The previous chapters have all described the common features of the safety switches. This chapter will deal with the specific features. The table shows the units' most important features. The pages that follow provide information on intended use, wiring and unit-specific data for each individual unit.

Safety switches	Actuator	Assured/Typ. Operating dist./Release distance/ Assured release distance $s_{ao}/s_o/s_r/s_{ar}$	Coding	LED	Evaluation device	Connection to evaluation device
PSEN cs1.1p	PSEN cs1.1	15 mm / 21 mm / 30 mm / 40 mm	Coded	Power/Fault, Safety Gate, Input	PNOZ X, PNOZelog, PNOZmulti, PSS with/ without SafetyBUS p	Direct
PSEN cs1.13p ATEX	PSEN cs1.1	15 mm / 21 mm / 30 mm / 40 mm	Coded	Power/Fault, Safety Gate, Input	PNOZ X, PNOZelog, PNOZmulti, PSS with/ without SafetyBUS p	Direct
PSEN cs2.1p	PSEN cs2.1	15 mm / 21 mm / 30 mm / 40 mm	Fully coded (8 x teachable)	Power/Fault, Safety Gate, Input	PNOZ X, PNOZelog, PNOZmulti, PSS with/ without SafetyBUS p	Direct
PSEN cs2.13p ATEX	PSEN cs2.1	15 mm / 21 mm / 30 mm / 40 mm	Fully coded (8 x teachable)	Power/Fault, Safety Gate, Input	PNOZ X, PNOZelog, PNOZmulti, PSS with/ without SafetyBUS p	Direct
PSEN cs2.2p	PSEN cs2.1	15 mm / 21 mm / 30 mm / 40 mm	Fully-coded	Power/Fault, Safety Gate, Input	PNOZ X, PNOZelog, PNOZmulti, PSS with/ without SafetyBUS p	Direct

Approvals

Type						
PSENcs 1.1p	◆	◆	◆	◆		
PSENcs 1.13p ATEX	◆	◆	◆	◆	◆	◆
PSENcs 2.1p	◆	◆	◆	◆		
PSENcs 2.13p ATEX	◆	◆	◆	◆	◆	◆
PSENcs 2.2p	◆	◆	◆	◆		

PSENcs 1.1p

Intended use

The PSENcs 1.1p safety switch is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN cs1.1 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X4
- PNOZ X8P
- PNOZ X9
- PNOZ X9P
- PNOZ X3.10P
- PNOZ X5
- PNOZ X6
- PNOZ X10.11P

PNOZelog:

- PNOZ e1p
- PNOZ e1.1p
- PNOZ e1vp
- PNOZ e5.11p
- PNOZ e5.13p

PNOZmulti:

- All

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

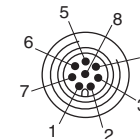
The safety switch PSENcs 1.1p is used with the actuator PSENcs 1.1.

Features:

- For applications up to Category 4 of EN 954-1
- Transponder technology
- Coded actuator: Safety switch only accepts the actuators PSENcs 1.1
- Assured operating distance: 15 mm
- Typical operating distance: 21 mm
- Release distance: 30 mm
- Assured release distance: 40 mm
- Dual-channel operation
- 2 safety inputs for series connection of several safety switches
- 2 safety outputs
- 1 signal output
- LED indicator for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- 5 directions of actuation
- Switching voltage 24 VDC

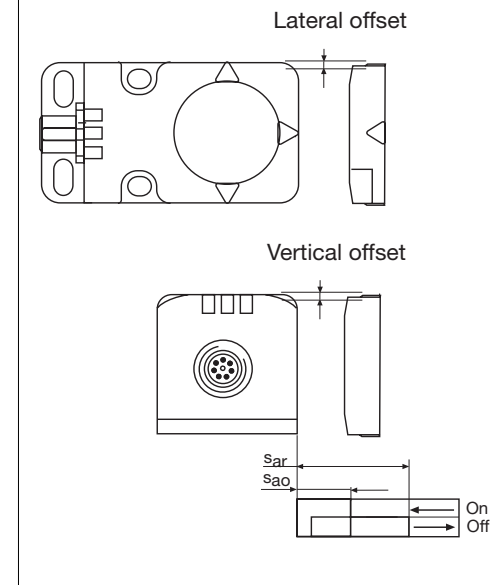
Connections

Pin assignment on 8-pin M12 male connector



PIN	Function	Cable colour
1:	Input, channel 2	white
2:	+24 U _B	brown
3:	Output, channel1	green
4:	Output, channel2	yellow
5:	Signal output	grey
6:	Input, channel 1	pink
7:	0 V U _B	blue
8:	not connected	red

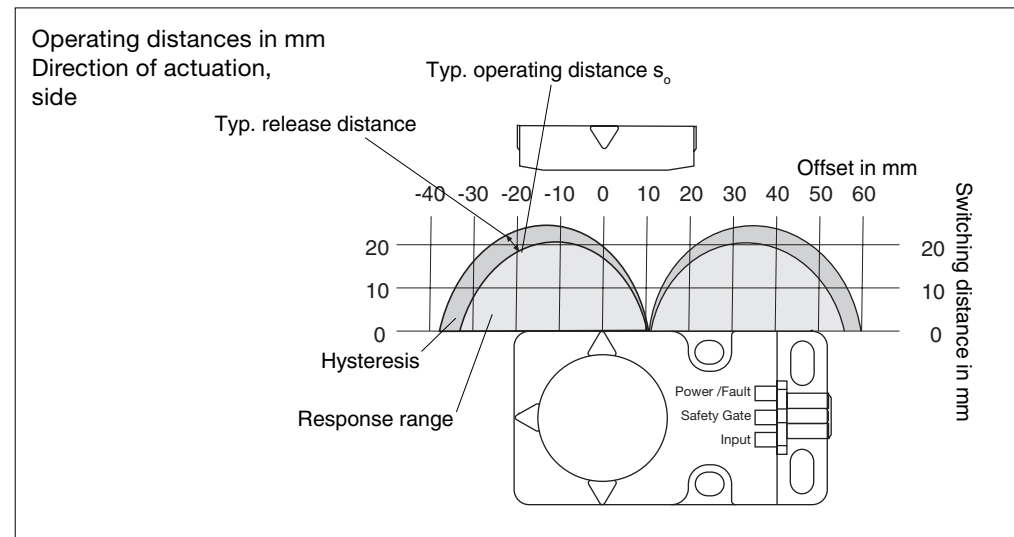
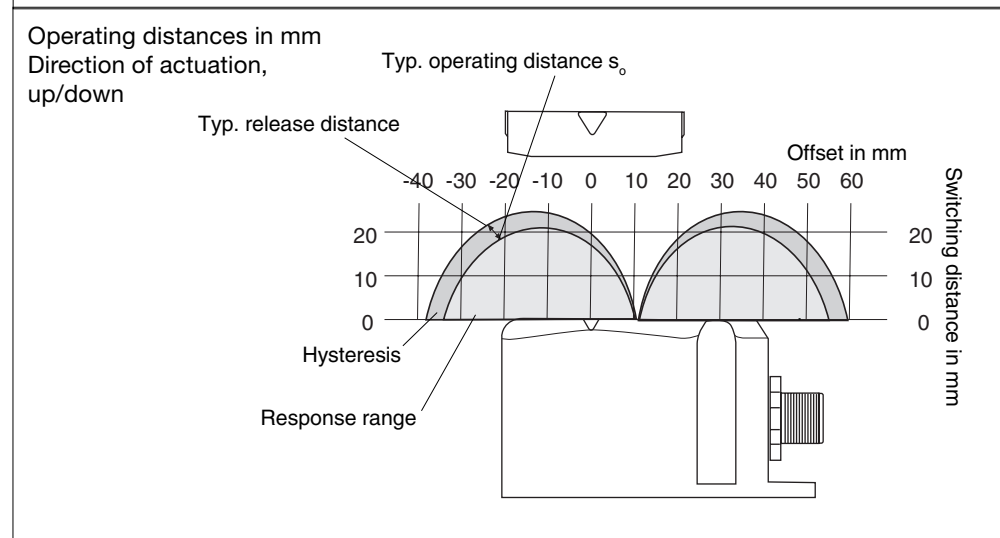
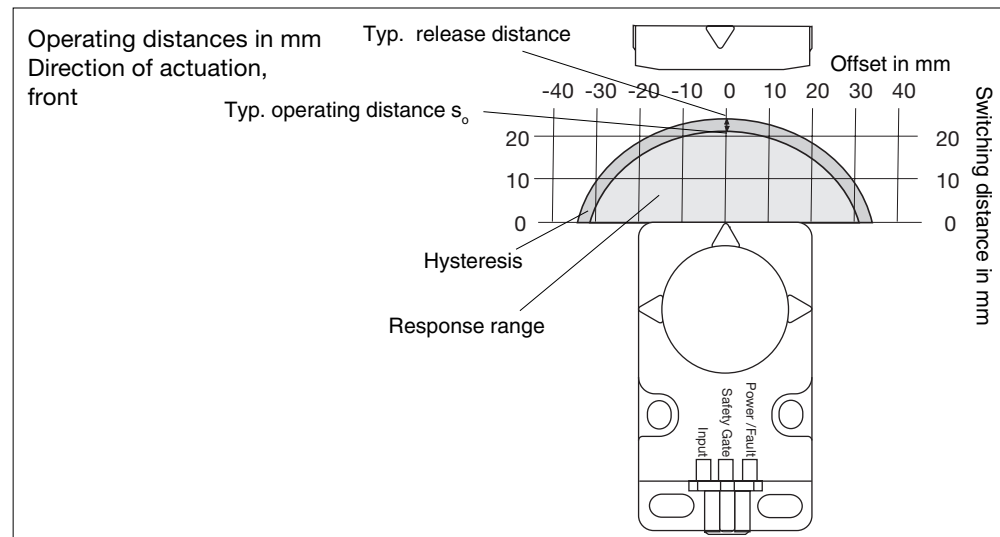
Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSENcs 1.1p



Assured release distance s_{ar} :
max. 40 mm with all vertical and lateral
offsets

PSENCs 1.1p

Connection to PNOZX, PNOZelog, PNOZmulti and PSS

Preparing for operation

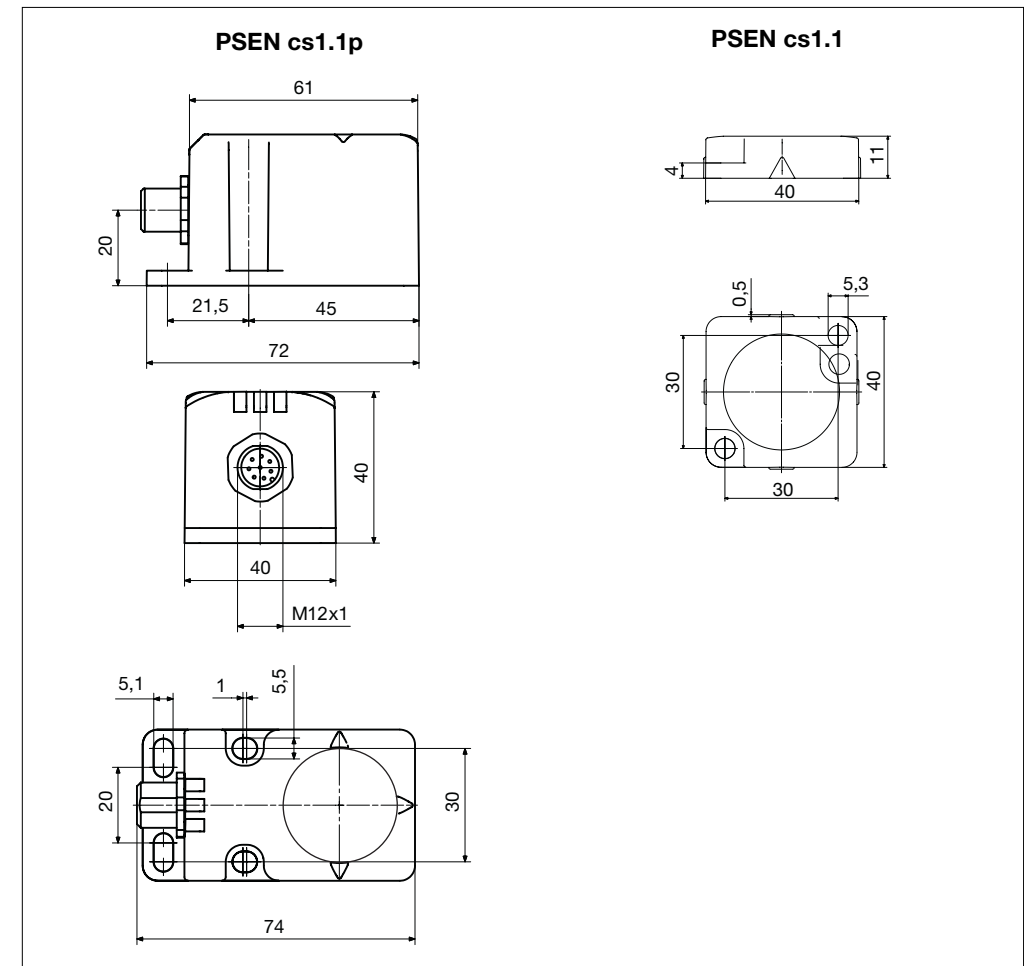
- Connect units from the PNOZX, PNOZelog, PNOZmulti or PSS series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

- PNOZ X2.7P - PNOZ X2.8P - PNOZ X4 - PNOZ X8P - PNOZ X9 - PNOZ X9P	
PNOZ X5	
PNOZ X6	
PNOZ X10.11P	
- PNOZ e1P - PNOZ e1.1P - PNOZ e1VP - PNOZ e5.11P - PNOZ e5.13P	

PSENcs 1.1p

PNOZmulti (all)	
PSS (all)	

Dimensions in mm



PSENcs 1.1p

Technical details

Functionality	Transponder technology	
Switching distance		
Assured operating distance s_{ao}	15 mm	
Typical operating distance s_o	21 mm	
Release distance s_r	30 mm	
Assured release distance s_{ar}	40 mm	
Typ. hysteresis	3 mm	
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C	
Supply voltage U_g	24 VDC	
Voltage tolerance	-20 % ... 20 %	
Switching current, outputs	500 mA	
Breaking capacity	12 W	
Max. switching frequency	3 Hz	
Output contacts in accordance with EN 954-1, short circuit-proof	2 safety outputs (N/O) 1 signal output (N/O)	
Supply interruption before de-energisation	20 ms	
Switch-on delay		
Inputs, PSEN cs2.1p	Typ. 13 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 45 ms	Max. 100 ms
Delay-on de-energisation		
Inputs, PSEN cs2.1p	Typ. 15 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 30 ms	Max. 260 ms
Test pulses, safety outputs 12, 22	Max. 300 µs	
Simultaneity, channel 1 and 2	Infinite	
Max. overall cable resistance R_{lmax} in the input circuit	1 kohm	
Actuator	PSEN cs1.1 transponder	
Ambient temperature	-25 ... +70 °C	
Vibration in accordance with EN 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm	
Shock	30 g, 11 ms	

Connection type	8 pin M12 connector
Cable	LiYY 8 x 0.25 mm ²
Protection type	IP67
Housing material	Plastic: PBTP VALOX RAL 1003
Dimensions L x W x H	PSEN cs1.1p: 40 x 40 x 75 mm PSEN cs1.1: 40 x 40 x 11 mm
Weight	PSEN cs1.1p: 105 g, PSEN cs1.1: 20 g

The version of the standards current at 2004-11 shall apply.

PSEN cs2.1p/PSEN cs2.2p

Intended use

The PSEN cs2.1p and PSEN cs2.2p safety switches are intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1, (position monitoring of movable safety devices). The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN cs2.1 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X4
- PNOZ X8P
- PNOZ X9
- PNOZ X9P
- PNOZ X3.10P
- PNOZ X5
- PNOZ X6
- PNOZ X10.11P

PNOZelog:

- PNOZ e1p
- PNOZ e1.1p
- PNOZ e1vp
- PNOZ e5.11p
- PNOZ e5.13p

PNOZmulti:

- All

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

The safety switches PSEN cs2.1p and PSEN cs2.2p are used with the actuator PSEN cs2.1.

Features:

- For applications up to Category 4 of EN 954-1
- Transponder technology
- Fully-coded actuator:
The actuator has a unique electronic coding. The safety switch only reacts to a single actuator.
- **PSEN cs2.1p:** New actuators can be taught in via a learning procedure at the safety switch (max. 8 additional learning procedures).
- Assured operating distance: 15 mm
- Typical operating distance: 21 mm
- Release distance: 30 mm
- Assured release distance: 40 mm
- Dual-channel operation
- 2 safety inputs for series connection of several safety switches
- 2 safety outputs
- 1 signal output

- LED indicator for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- 5 directions of actuation
- Switching voltage 24 VDC

Teaching in the actuator

Initially teaching in an actuator:

The first actuator detected by the safety switch is automatically taught in as soon as it is brought into the response range.

To teach in a new actuator (PSEN cs2.1p only):

1. Bring the actuator to be taught in into the response range of the safety switch as the only transponder. As soon as the actuator is detected, the operating indicator switches to a yellow flashing light.
2. After a waiting period of 20 s has elapsed, the operating indicator switches to yellow flashes. Trigger a system reset in the next 120 s by interrupting the power supply.
3. After the device is switched back on, the learning procedure has successfully concluded and the number of permitted additional learning procedures is reduced by 1.



Notice!

The actuator must not be removed during the learning procedure

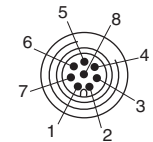


INFORMATION

An actuator can be taught just once

Connections

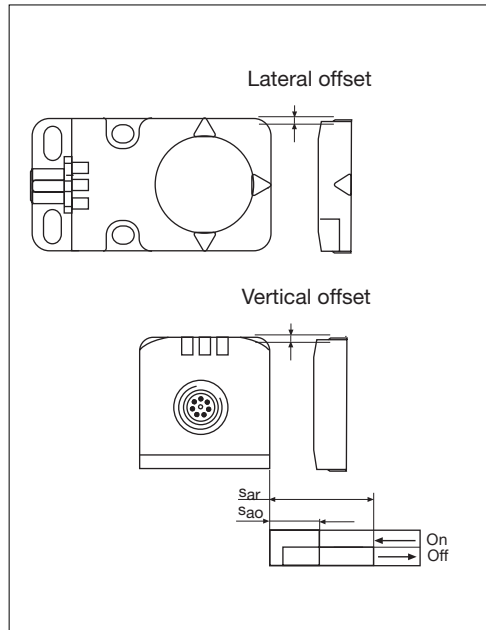
Pin assignment on 8-pin M12 male connector



PIN	Function	Cable colour
1:	Input, channel 2	white
2:	+24 U _B	brown
3:	Output, channel1	green
4:	Output, channel2	yellow
5:	Signal output	grey
6:	Input, channel 1	pink
7:	0 V U _B	blue
8:	not connected	red

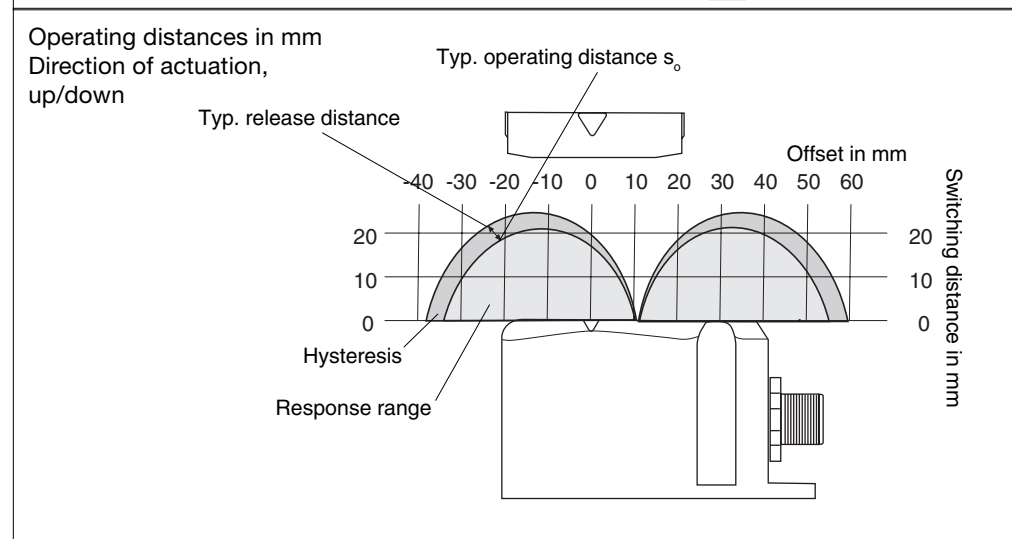
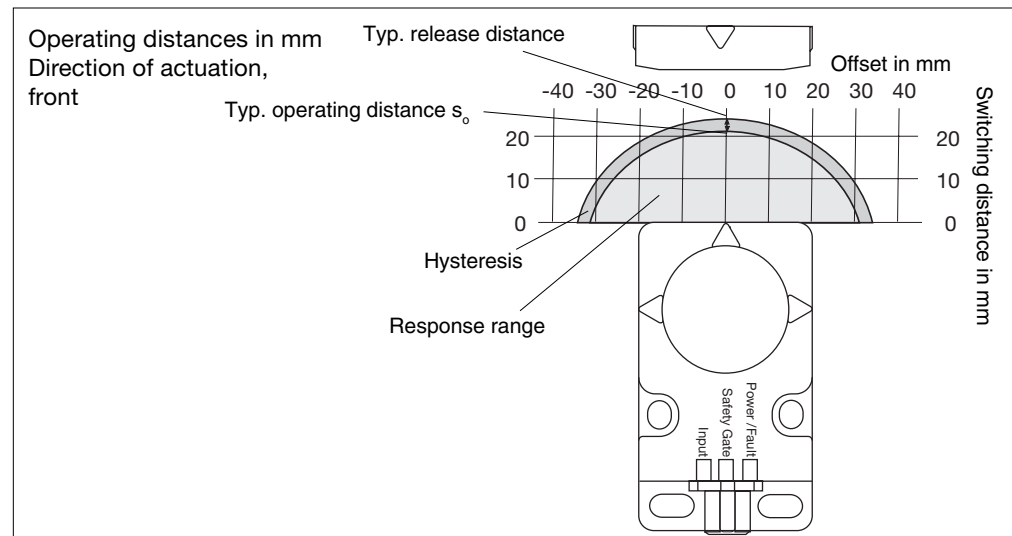
PSEN cs2.1p/PSEN cs2.2p

Switching distances

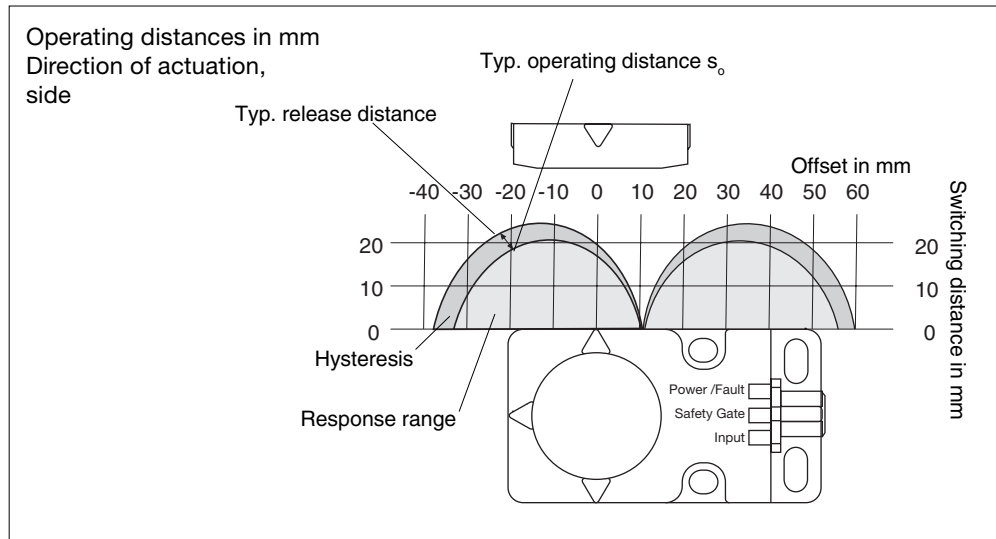


Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.



PSEN cs2.1p/PSEN cs2.2p



Assured release distance s_{ar} :
max. 40 mm with all vertical and lateral
offsets

Connection to PNOZX, PNOZelog, PNOZmulti and PSS

Preparing for operation

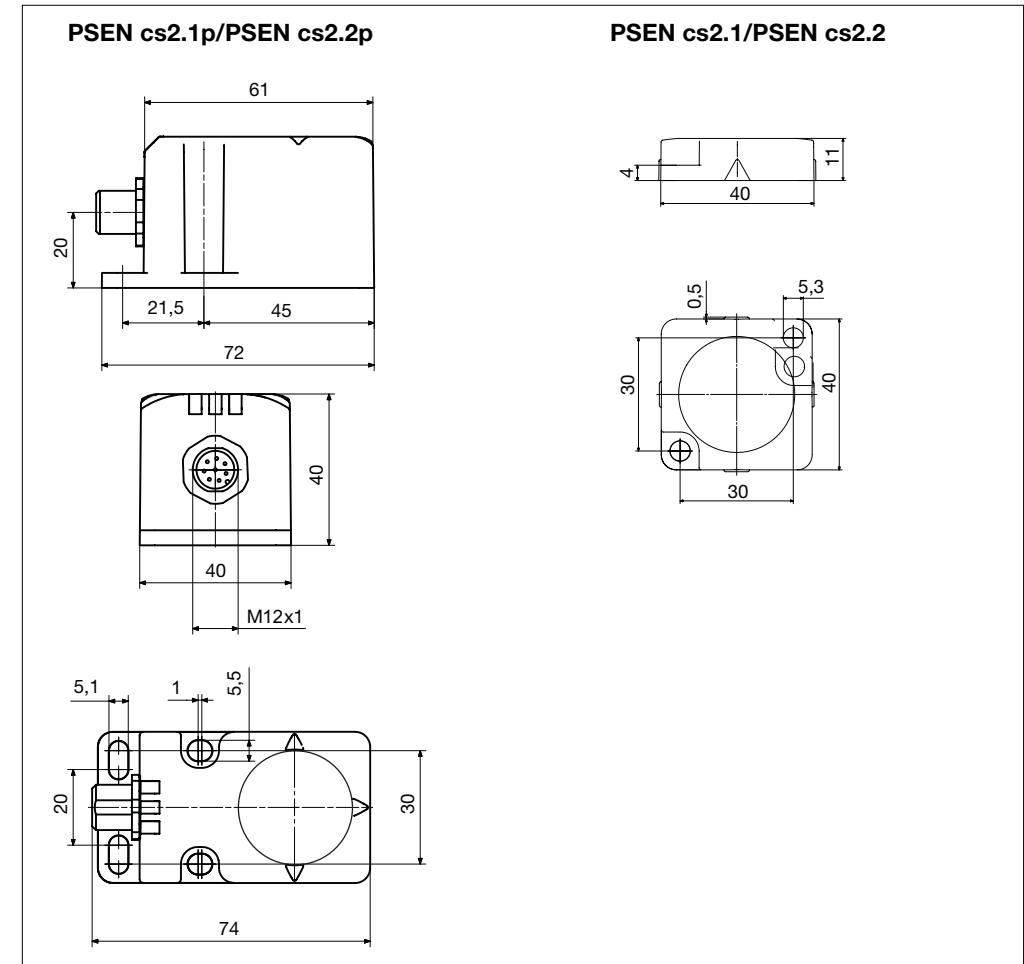
- Connect units from the PNOZX, PNOZelog, PNOZmulti or PSS series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

• PNOZ X2.7P • PNOZ X2.8P • PNOZ X4 • PNOZ X8P • PNOZ X9 • PNOZ X9P	
• PNOZ X5	
• PNOZ X6	
• PNOZ X10.11P	
• PNOZ e1P • PNOZ e1.1P • PNOZ e1VP • PNOZ e5.11P • PNOZ e5.13P	

PSEN cs2.1p/PSEN cs2.2p

PNOZmulti (all)	
PSS (all)	

Dimensions in mm



PSEN cs2.1p/PSEN cs2.2p

Technical details

Functionality	Transponder technology	
Switching distance		
Assured operating distance s_{ao}	15 mm	
Typical operating distance s_o	21 mm	
Release distance s_r	30 mm	
Assured release distance s_{ar}	40 mm	
Typ. hysteresis	3 mm	
Change of switching distance with fluctuations in temperature	±0.01mm/°C	
Supply voltage U_g	24 VDC	
Voltage tolerance	-20 % ... 20 %	
Switching current, outputs	500 mA	
Breaking capacity	12 W	
Max. switching frequency	3 Hz	
Output contacts in accordance with EN 954-1, short circuit-proof	2 safety outputs (N/O) 1 signal output (N/O)	
Supply interruption before de-energisation	20 ms	
Switch-on delay		
Inputs, PSEN cs2.1p	Typ. 13 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 45 ms	Max. 100 ms
Delay-on de-energisation		
Inputs, PSEN cs2.1p	Typ. 15 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 30 ms	Max. 260 ms
Test pulses, safety outputs 12, 22	Max. 300 µs	
Simultaneity, channel 1 and 2	Infinite	
Max. overall cable resistance R_{lmax} in the input circuit	1 kohm	
Actuator	PSEN cs2.1 transponder	
Ambient temperature	-25 ... +70 °C	
Vibration in accordance with EN 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm	
Shock	30 g, 11 ms	

Connection type	8 pin M12 connector
Cable	LiYY 8 x 0.25 mm ²
Protection type	IP67
Housing material	Plastic: PBTP VALOX RAL 1003
Dimensions L x W x H	PSEN cs2.1p /PSEN cs2.2p: 40 x 40 x 75 mm PSEN cs2.1: 40 x 40 x 11 mm
Weight	PSEN cs2.1p /PSEN cs2.2p: 105 g, PSEN cs2.1: 20 g

The version of the standards current at 2004-11 shall apply.

PSEN cs1.13p ATEX

Intended use

The PSENcs 1.13p ATEX safety switch is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1 (position monitoring of movable safety devices).

The PSENcs 1.13p ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 50021, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN cs1.1 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X4
- PNOZ X8P
- PNOZ X9
- PNOZ X9P
- PNOZ X3.10P
- PNOZ X5
- PNOZ X6
- PNOZ X10.11P

PNOZelog:

- PNOZ e1p
- PNOZ e1.1p
- PNOZ e1vp
- PNOZ e5.11p
- PNOZ e5.13p

PNOZmulti:

- All

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

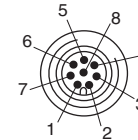
The safety switch PSENcs 1.13p is used with the actuator PSENcs 1.1.

Features:

- For applications up to Category 4 of EN 954-1
- Transponder technology
- Coded actuator: Safety switch only accepts the actuators PSENcs 1.1
- Assured operating distance: 15 mm
- Typical operating distance: 21 mm
- Release distance: 30 mm
- Assured release distance: 40 mm
- Dual-channel operation
- 2 safety inputs for series connection of several safety switches
- 2 safety outputs
- 1 signal output
- LED indicator for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- 5 directions of actuation
- Switching voltage 24 VDC

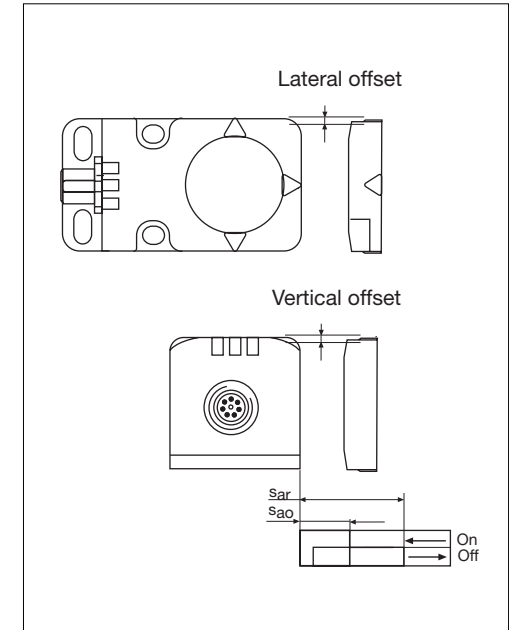
Connections

Pin assignment on 8-pin M12 male connector



PIN	Function	Cable colour
1:	Input, channel 2	white
2:	+24 U _B	brown
3:	Output, channel1	green
4:	Output, channel2	yellow
5:	Signal output	grey
6:	Input, channel 1	pink
7:	0 V U _B	blue
8:	not connected	red

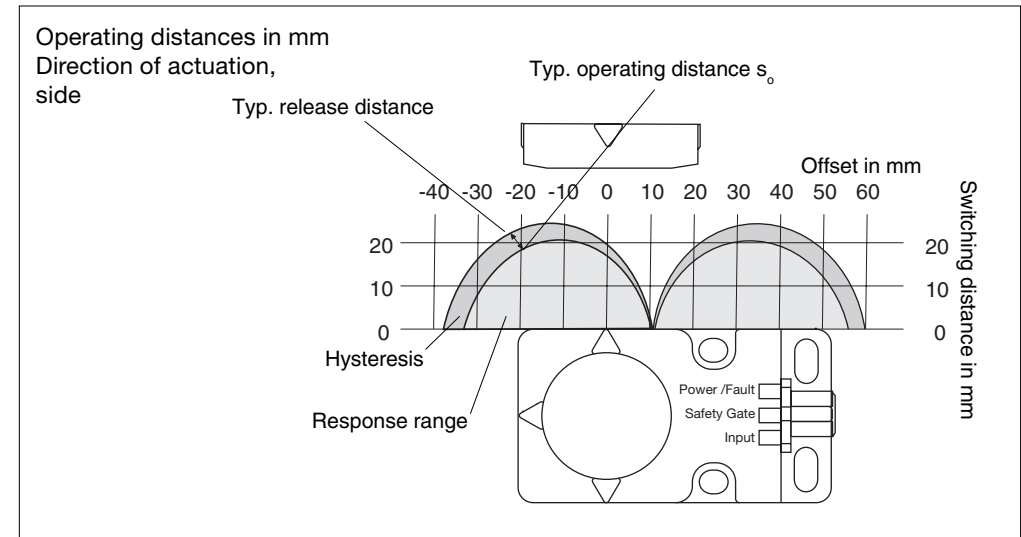
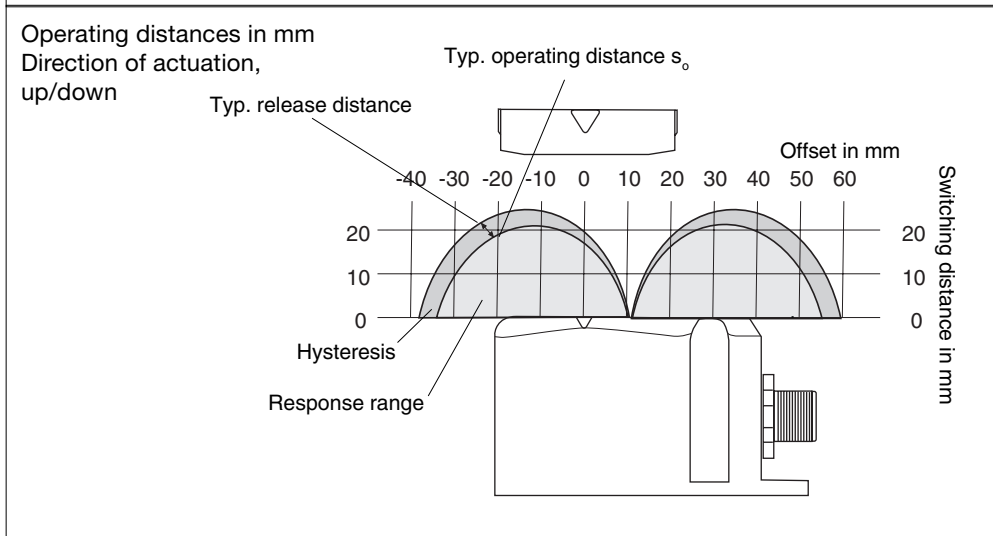
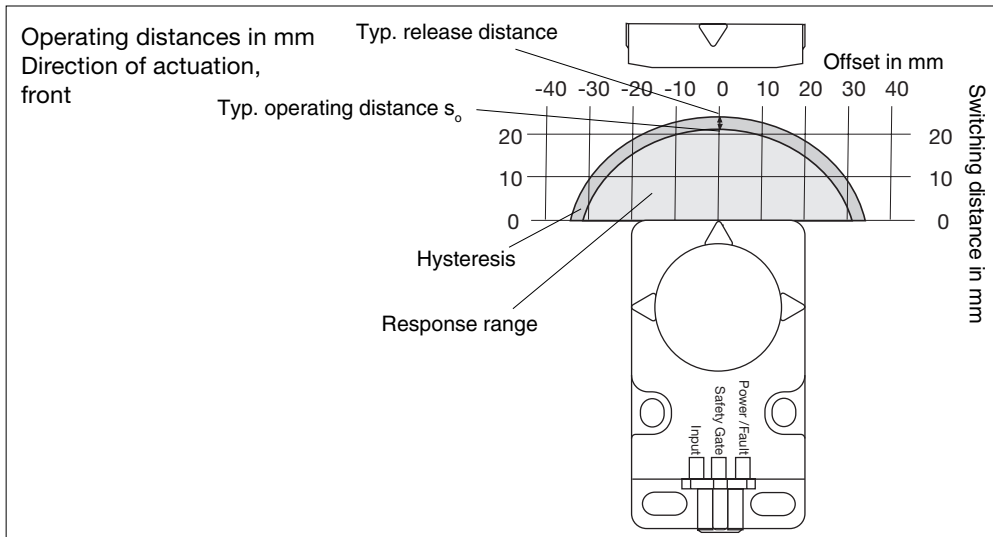
Switching distances



Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.

PSEN cs1.13p ATEX



PSEN cs1.13p ATEX

Connection to PNOZX, PNOZelog, PNOZmulti and PSS

Preparing for operation

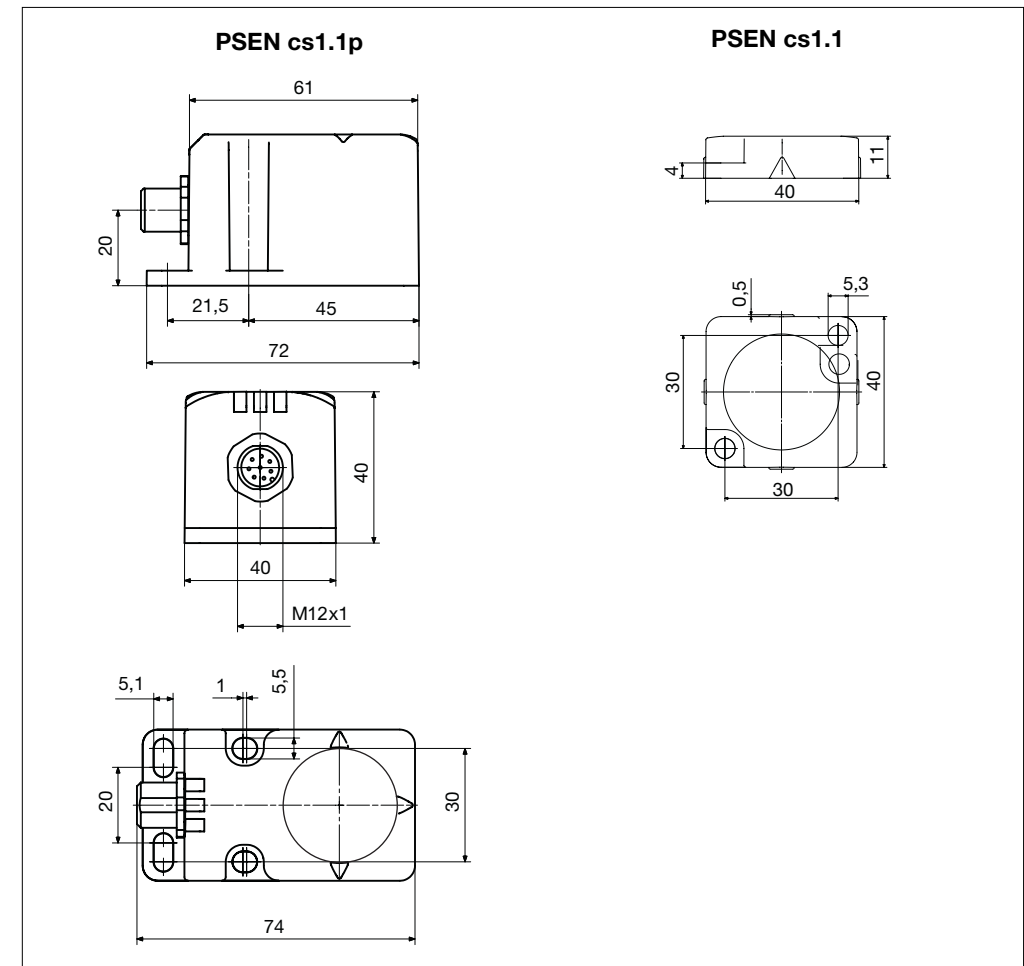
- Connect units from the PNOZX, PNOZelog, PNOZmulti or PSS series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

- PNOZ X2.7P - PNOZ X2.8P - PNOZ X4 - PNOZ X8P - PNOZ X9 - PNOZ X9P	
PNOZ X5	
PNOZ X6	
PNOZ X10.11P	
- PNOZ e1P - PNOZ e1.1P - PNOZ e1VP - PNOZ e5.11P - PNOZ e5.13P	

PSEN cs1.13p ATEX

PNOZmulti (all)	
PSS (all)	

Dimensions in mm



PSEN cs1.13p ATEX

Technical details

Functionality	Transponder technology	
ATEX category	II 3GD EEx nC IIC T6	
Switching distance		
Assured operating distance s_{ao}	15 mm	
Typical operating distance s_o	21 mm	
Release distance s_r	30 mm	
Assured release distance s_{ar}	40 mm	
Typ. hysteresis	3 mm	
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C	
Supply voltage U_B	24 VDC	
Voltage tolerance	-20 % ... 20 %	
Switching current, outputs	500 mA	
Breaking capacity	12 W	
Max. switching frequency	3 Hz	
Output contacts in accordance with EN 954-1, short circuit-proof	2 safety outputs (N/O) 1 signal output (N/O)	
Supply interruption before de-energisation	20 ms	
Switch-on delay		
Inputs, PSEN cs2.1p	Typ. 13 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 45 ms	Max. 100 ms
Delay-on de-energisation		
Inputs, PSEN cs2.1p	Typ. 15 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 30 ms	Max. 260 ms
Test pulses, safety outputs 12, 22	Max. 300 µs	
Simultaneity, channel 1 and 2	Infinite	
Max. overall cable resistance R_{lmax} in the input circuit	1 kohm	
Actuator	PSEN cs2.1 transponder	
Ambient temperature	-25 ... +55 °C	

Vibration in accordance with EN 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30 g, 11 ms
Connection type	8 pin M12 connector
Cable	LiYY 8 x 0.25 mm ²
Protection type	IP67
Housing material	Plastic: PBTP VALOX RAL 1003
Dimensions L x W x H	PSEN cs1.13p: 40 x 40 x 75 mm PSEN cs1.1: 40 x 40 x 11 mm
Weight	PSEN cs1.13p: 105 g, PSEN cs1.1: 20 g

The version of the standards current at 2004-11 shall apply.

PSEN cs2.13p ATEX

Intended use

The PSEN cs2.13p ATEX safety switch is intended for use in safety circuits in accordance with EN 60204-1 (VDE 0113-1) and IEC 60204-1, (position monitoring of movable safety devices).

The PSEN cs2.13p ATEX safety switch is approved for use in potentially explosive atmospheres in accordance with EN 5002, Ex area Category 3, Zone 2 (gas) and 22 (dust), (II 3GD EEx nC IIC T6).

The safety switch only complies with EN 60947-5-3 and EN 50021 in conjunction with the actuator PSEN cs2.1 and the relevant, approved evaluation devices. The safety switch should only be connected to the following evaluation devices:

PNOZ X:

- PNOZ X2.7P
- PNOZ X2.8P
- PNOZ X4
- PNOZ X8P
- PNOZ X9
- PNOZ X9P
- PNOZ X3.10P
- PNOZ X5
- PNOZ X6
- PNOZ X10.11P

PNOZelog:

- PNOZ e1p
- PNOZ e1.1p
- PNOZ e1vp
- PNOZ e5.11p
- PNOZ e5.13p

PNOZmulti:

- All

PSS:

- PSS-range programmable safety system in conjunction with standard function block SB066

Description

The safety switch PSENcs 2.13p ATEX is used with the actuator PSENcs 2.1.

Features:

- For applications up to Category 4 of EN 954-1
- Transponder technology
- Fully-coded actuator:
The actuator has a unique electronic coding. The safety switch only reacts to a single actuator.
New actuators can be taught in via a learning procedure at the safety switch (max. 8 additional learning procedures).
- Assured operating distance:
15 mm
- Typical operating distance:
21 mm
- Release distance:
30 mm
- Assured release distance:
40 mm
- Dual-channel operation
- 2 safety inputs for series connection of several safety switches
- 2 safety outputs
- 1 signal output

- LED indicator for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- 5 directions of actuation
- Switching voltage 24 VDC

Teaching in the actuator

Initially teaching in the actuator:

The first actuator detected by the safety switch is automatically taught in as soon as it is brought into the response range.

To teach in a new actuator:

1. Bring the actuator to be taught in into the response range of the safety switch as the only transponder. As soon as the actuator is detected, the operating indicator switches to a yellow flashing light.
2. After a waiting period of 20 s has elapsed, the operating indicator switches to yellow flashes. Trigger a system reset in the next 120 s by interrupting the power supply.
3. After the device is switched back on, the learning procedure has successfully concluded and the number of permitted additional learning procedures is reduced by 1.



Notice!

The actuator must not be removed during the learning procedure

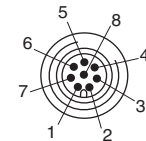


INFORMATION

An actuator can be taught just once

Connections

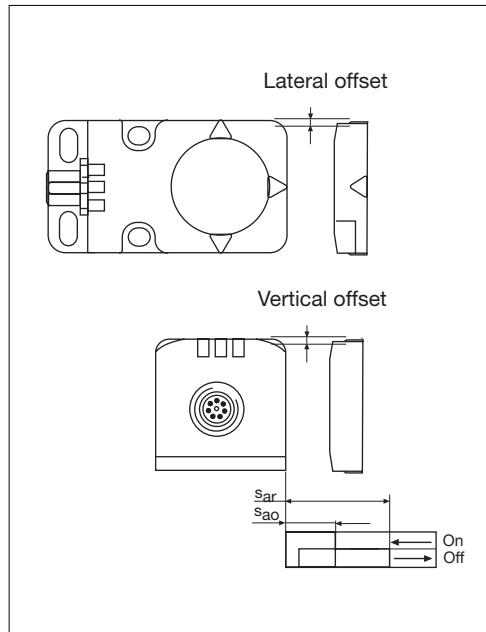
Pin assignment on 8-pin M12 male connector



PIN	Function	Cable colour
1:	Input, channel 2	white
2:	+24 U _B	brown
3:	Output, channel1	green
4:	Output, channel2	yellow
5:	Signal output	grey
6:	Input, channel 1	pink
7:	0 V U _B	blue
8:	not connected	red

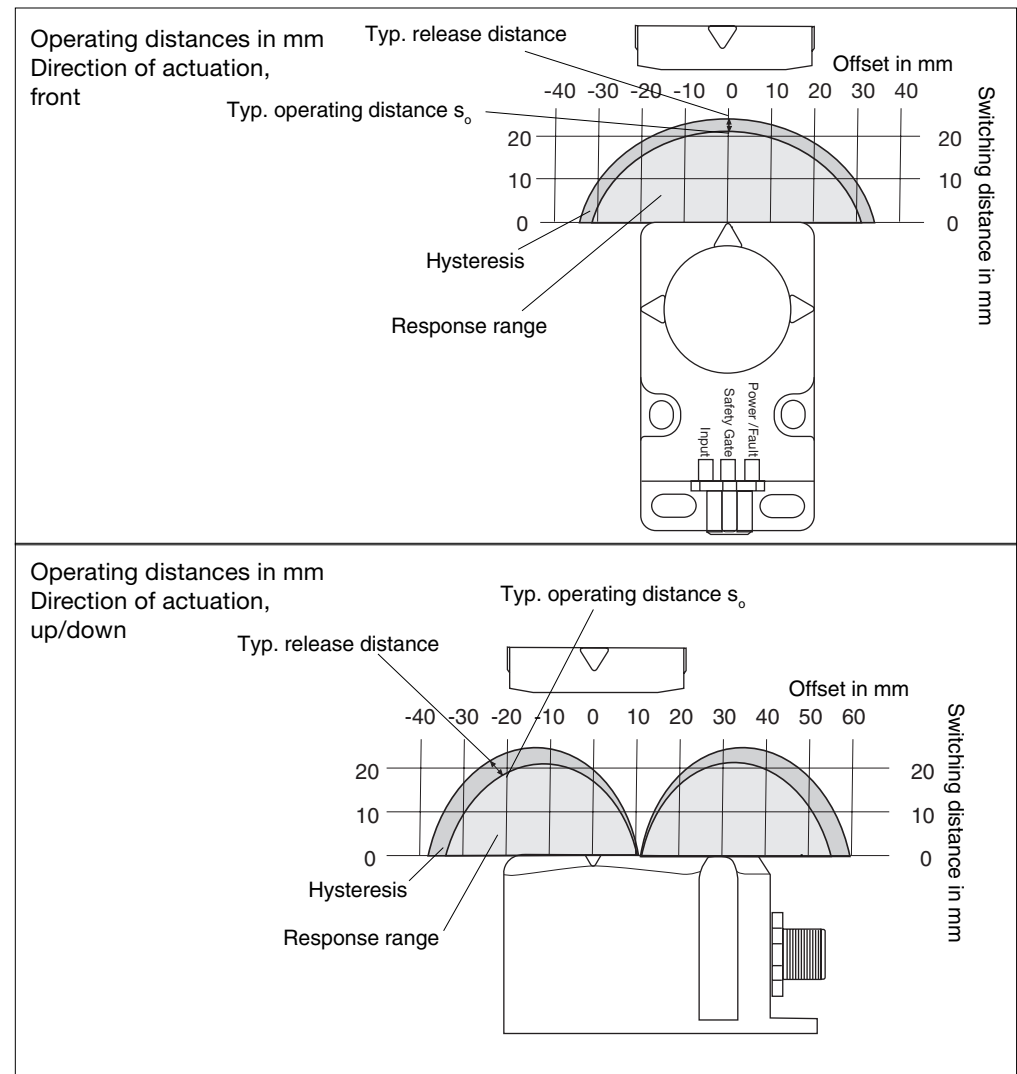
PSEN cs2.13p ATEX

Switching distances

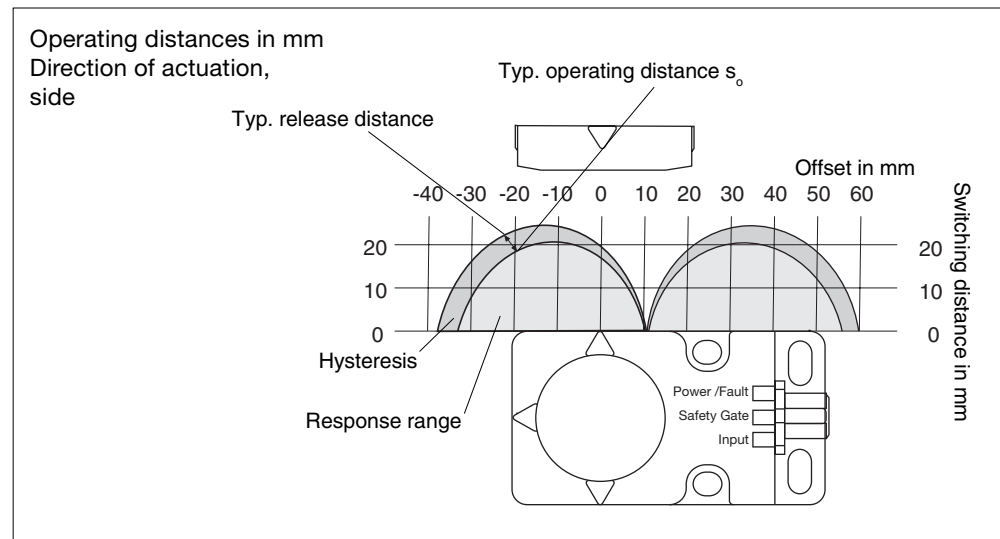


Vertical and lateral offset

The stated switching distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Switching distances may deviate if other arrangements are used. Please note the maximum permitted lateral and vertical offset. The stated values are valid at a temperature of 20°C.



PSEN cs2.13p ATEX



Assured release distance s_{ar} :
max. 40 mm with all vertical and lateral
offsets

Connection to PNOZX, PNOZelog, PNOZmulti and PSS

Preparing for operation

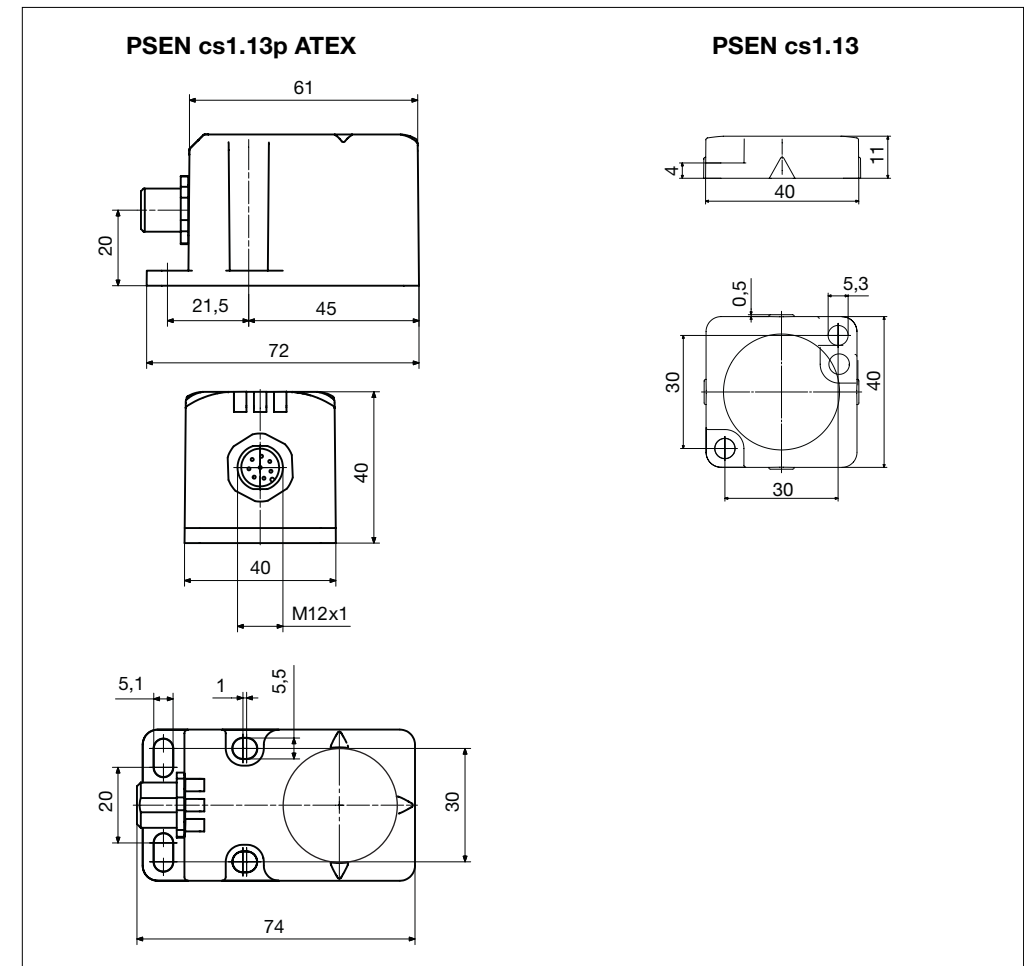
- Connect units from the PNOZX, PNOZelog, PNOZmulti or PSS series. Please refer to the operating manual for the relevant units.
- Wire the safety switches to the input circuits of the evaluation devices in accordance with the table.

• PNOZ X2.7P • PNOZ X2.8P • PNOZ X4 • PNOZ X8P • PNOZ X9 • PNOZ X9P	
• PNOZ X5	
• PNOZ X6	
• PNOZ X10.11P	
• PNOZ e1P • PNOZ e1.1P • PNOZ e1VP • PNOZ e5.11P • PNOZ e5.13P	

PSEN cs2.13p ATEX

PNOZmulti (all)	
PSS (all)	

Dimensions in mm



PSEN cs2.13p ATEX

Technical details

Functionality	Transponder technology	
ATEX category	II 3GD EEx nC IIC T6	
Switching distance		
Assured operating distance s_{ao}	15 mm	
Typical operating distance s_o	21 mm	
Release distance s_r	30 mm	
Assured release distance s_{ar}	40 mm	
Typ. hysteresis	3 mm	
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C	
Supply voltage U_B	24 VDC	
Voltage tolerance	-20 % ... 20 %	
Switching current, outputs	500 mA	
Breaking capacity	12 W	
Max. switching frequency	3 Hz	
Output contacts in accordance with EN 954-1, short circuit-proof	2 safety outputs (N/O) 1 signal output (N/O)	
Supply interruption before de-energisation	20 ms	
Switch-on delay		
Inputs, PSEN cs2.1p	Typ. 13 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 45 ms	Max. 100 ms
Delay-on de-energisation		
Inputs, PSEN cs2.1p	Typ. 15 ms	Max. 20 ms
Actuator, PSEN cs2.1	Typ. 30 ms	Max. 260 ms
Test pulses, safety outputs 12, 22	Max. 300 µs	
Simultaneity, channel 1 and 2	Infinite	
Max. overall cable resistance R_{lmax} in the input circuit	1 kohm	
Actuator	PSEN cs2.1 transponder	
Ambient temperature	-25 ... +55 °C	

Vibration in accordance with EN 60947-5-2	Frequency: 10 ... 55 Hz Amplitude: 1 mm
Shock	30 g, 11 ms
Connection type	8 pin M12 connector
Cable	LiYY 8 x 0.25 mm ²
Protection type	IP67
Housing material	Plastic: PBTP VALOX RAL 1003
Dimensions L x W x H	PSEN cs2.13p: 40 x 40 x 75 mm PSEN cs2.1: 40 x 40 x 11 mm
Weight	PSEN cs2.13p: 105 g, PSEN cs2.1: 20 g

The version of the standards current at 2004-11 shall apply.

PSEN cs accessories

Cable for safety switch

Description

The cables are suitable for connecting PSENcode safety switches to an evaluation device.

Features:

- Straight or angled connector
- 8-pin M12 male connector
- Unshielded
- Screw-on
- Cable runs: 3, 5, 10 m

Safety

Safety assessments

Before using a unit it is necessary to perform a safety assessment in accordance with the Machinery Directive. The units as individual components guarantee functional safety, but not the safety of the entire application. You should therefore define the safety requirements for the plant as a whole, and also define how these will be implemented from a technical and organisational standpoint (e.g. refer to BIA [BG Institute for Occupational Safety] Report 1997-06).

PSEN 2.1p-10

Safety gate and E-STOP, Category 4, EN 954-1

Features

- 1 E-STOP button
- 2 safety gates
- Dual-channel with detection of shorts across contacts
- 1 PLC enabling signal
- 1 instantaneous load shutdown

Description

Two safety gates are used to protect a hazardous area. The machine's motor will only start if:

- Both safety gates are closed and
- The E-STOP button has not been operated and
- The PLC enabling signal (not safety-related) is present.

If one of these conditions is not met, the signal at outputs A4.o4 and A4.o5 will switch from high to low and the motor will be switched off.

Feedback loop

N/C contacts K3 and K4 on contactors K3 and K4 are connected to the feedback loop input A4.i9.

Reset

E-STOP and safety gate monitoring must be activated through the reset button S11 (monitored reset). If the conditions for starting the motor have been met and the feedback loop is closed, operation of the plant is enabled.

Safety assessment

- The PNOZ m1p and contactors K3 and K4 must be installed in a single location.
- If a switch contact (A4.i0 ... A4.i5) is overridden, this will be detected as an error at the next operation. Safety outputs A4.o4 and A4.o5 will carry a low signal.
- A short circuit between 24 VDC and inputs A4.i0 ... A4.i5 will be detected as an error. All the safety outputs will carry a low signal.

- A short circuit between 24 VDC and the reset circuit input A4.i8 will be detected. The unit cannot be started.
- A short circuit between 24 VDC and a safety output will be detected and all the safety outputs will carry a low signal.

Pilz units

Number	Type	Features	Order number
1	PNOZ m1p	24 VDC	773 100
1	PSEN 2.1p-10/PSEN 2.1-10		502 210

Drawing file:

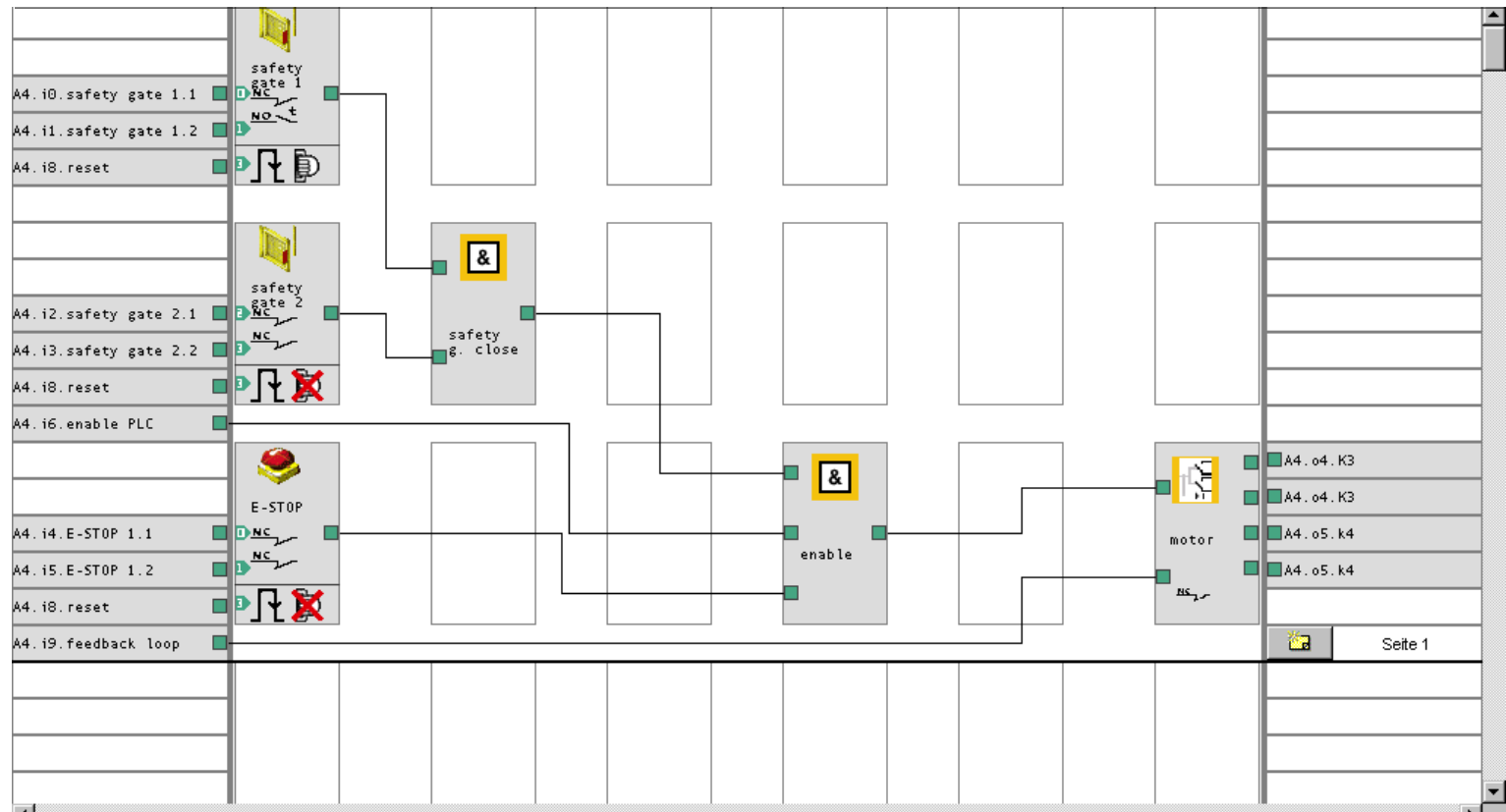
Page 4 and 5 in the project EPLAN4/Pilz/SE32002

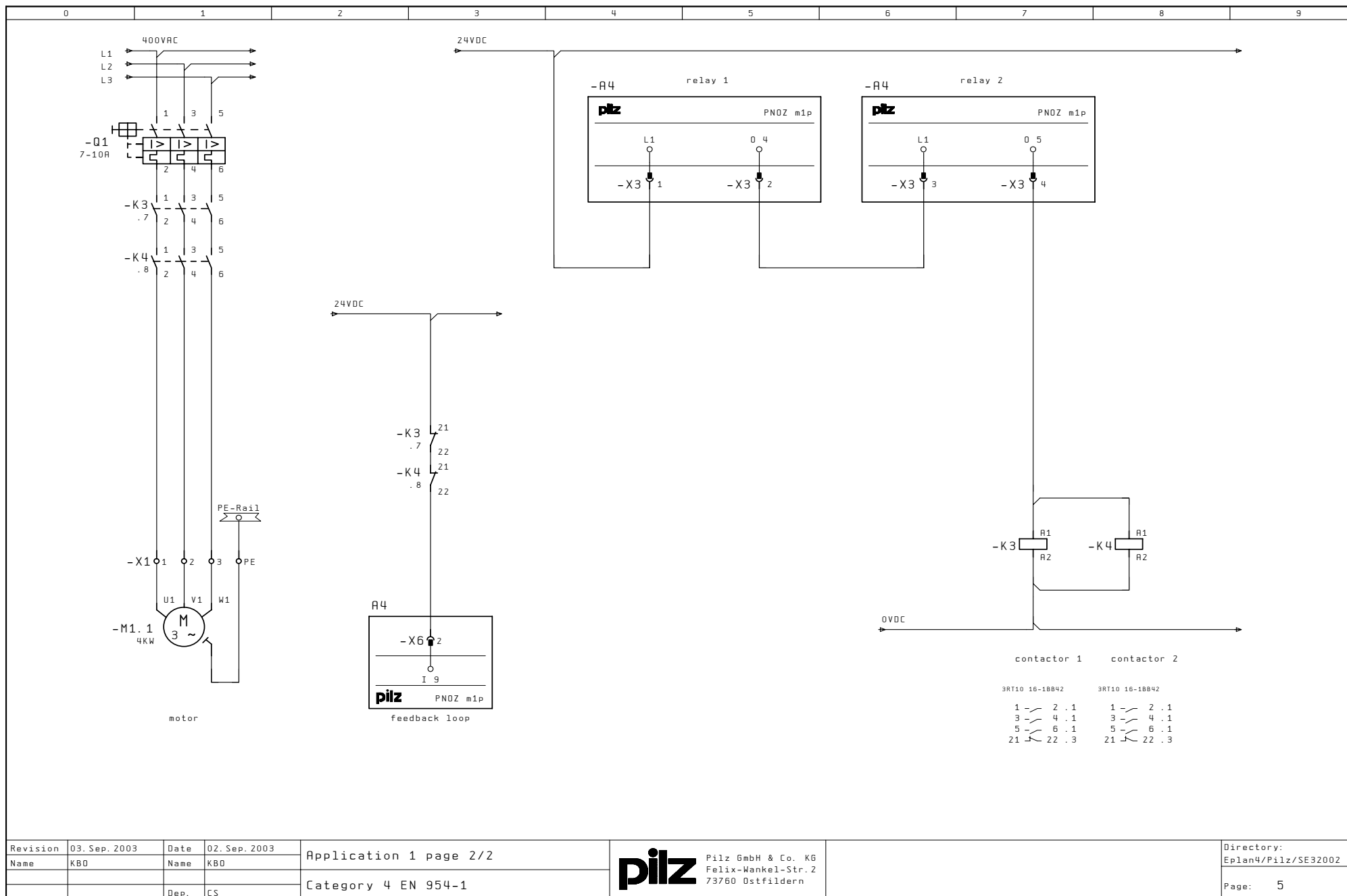
PSEN 2.1p-10

Safety gate and E-STOP, Category 4, EN 954-1

Configuration

- Safety gate 1
 - Switch type 2 with simultaneity monitoring (N/C - N/O)
 - Detection of shorts between contacts (A4.i0 - test pulse 0, A4.i1 - test pulse 1)
 - Monitored reset (A4.i8 - test pulse 3)
 - Start-up test
- Safety gate 2
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (A4.i2 - test pulse 2, A4.i3 - test pulse 3)
 - Monitored reset (A4.i8 - test pulse 3)
- E-STOP
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (A4.i4 - test pulse 0, A4.i5 - test pulse 1)
 - Monitored reset (A4.i8 - test pulse 3)
- AND element
 - 2 inputs
- AND element
 - 3 inputs
- Outputs
 - Safety output, relay type
 - Redundant
 - Use feedback loop





PSEN 2.1p-10

Override safety gate with enable switch, Category 4, EN 954-1

Features

- 1 E-STOP button
- 1 safety gate with PSEN 2.1p-10 safety sensor
- 1 enable switch
- 1 operating mode selector switch
- Dual-channel with detection of shorts across contacts
- 1 instantaneous load shutdown

Description

A safety gate is used to protect a hazardous area. The motor of the machine in the hazardous area will only be switched on if:

- The E-STOP button has not been operated and
- The operating mode selector switch is in position "0" and the safety gate is closed or the operating mode selector switch is in position "1" and the enable switch is operated.

If one of these conditions is not met, the signal at outputs A5.o4 and A5.o5 will switch from high to low and the motor will be switched off. Outputs A5.o0 and A5.o1 indicate the status of the operating mode selector switch. There will be a high signal at output A5.o0 if the operating mode selector switch is in position "0"; there will be a high signal at output A5.o1 if the operating mode selector switch is in position "1".

Feedback loop

N/C contacts K5 and K6 on contactors K5 and K6 are connected to the feedback loop input A5.i9.

Reset

Safety gate monitoring starts as the gates close. If the conditions for starting the motor have been met and the feedback loop is closed, the unit is ready to start. Plant operation is not enabled until the reset button S15 has been operated and then released (monitored reset).

Safety assessment

- The drive may not be started via the enable switch. This should be prevented via the reset module with reset button S15.
- The two-hand control elements and the enable switch must be installed in such a way that only one of the two elements can be connected.
- The PNOZ m1p and contactors K5 and K6 must be installed in a single location.
- If a switch contact (A5.i0 ... A5.i5) is overridden, this will be detected as an error at the next operation. The safety outputs will carry a low signal.
- A short circuit between 24 VDC and inputs A5.i0 ... A5.i5 will be detected as an error. The safety outputs will carry a low signal.
- A short circuit between 24 VDC and the reset input A5.i8 will be detected. The unit cannot be started.
- A short circuit between 24 VDC and a safety output will be detected and the safety outputs will carry a low signal.

Pilz units

Number	Type	Features	Order number
1	PNOZ m1p	24 VDC	773 100
1	PSEN 2.1p-10/PSEN 2.1-10		502 210

Drawing file:

Page 6 ... 8 in the project EPLAN4/Pilz/SE32002

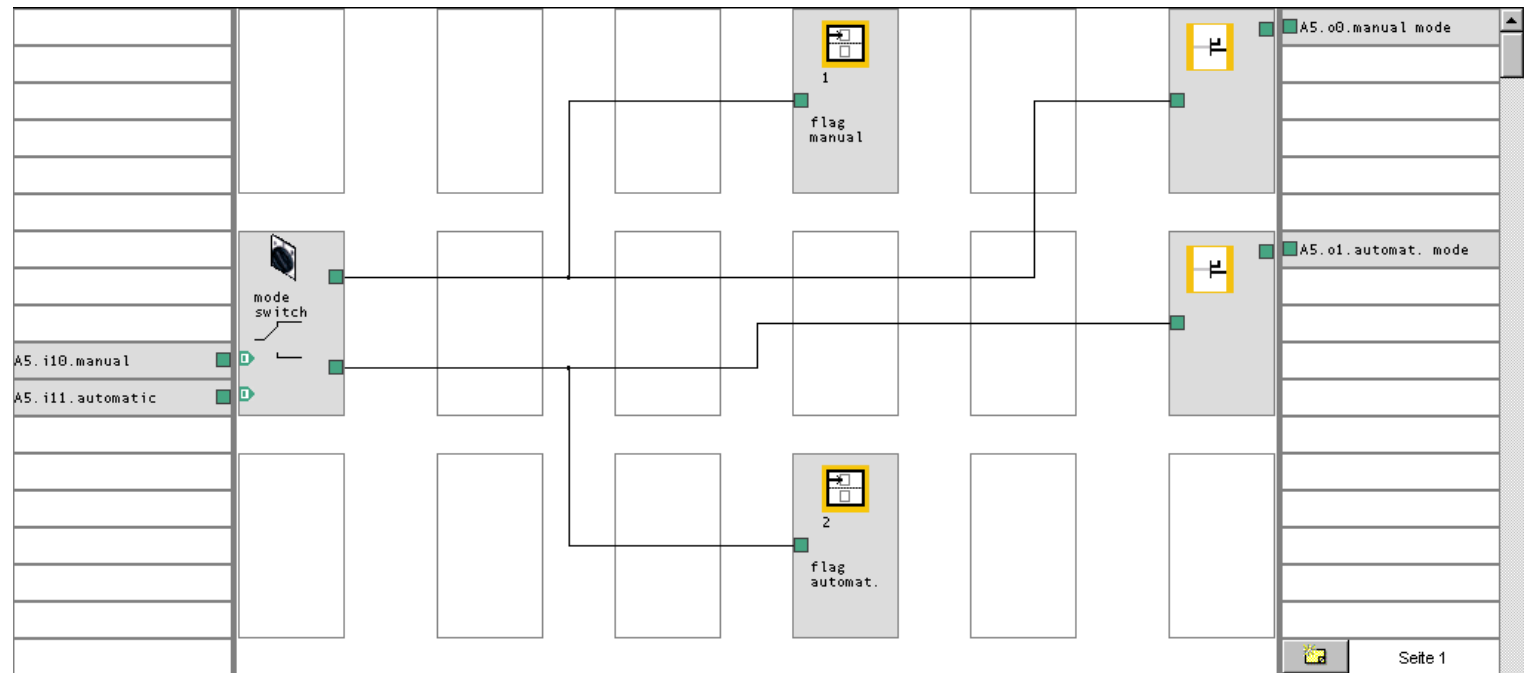
PSEN 2.1p-10

Override safety gate with enable switch, Category 4, EN 954-1

Configuration, page 1

- Operating mode selector switch
 - Select switch type 9
 - Detection of shorts between contacts (A5.i10 - test pulse 0, A5.i11 - test pulse 0)
- 2 connection point elements
 - Source connection point 1 and source connection point 2
- Manual mode output
 - Safety output, semiconductor type
 - Single-pole
- Automatic mode output
 - Safety output, semiconductor type
 - Single-pole

Continued overleaf

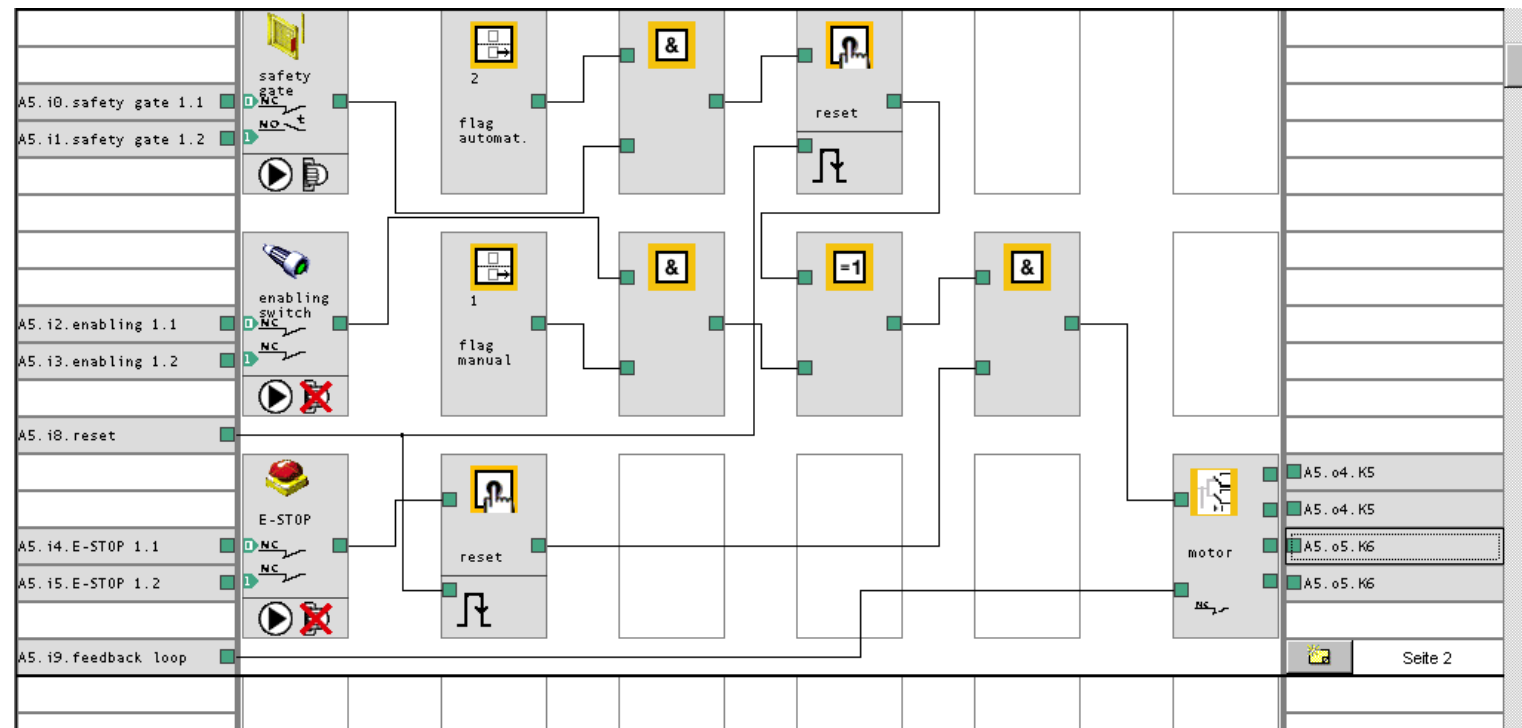


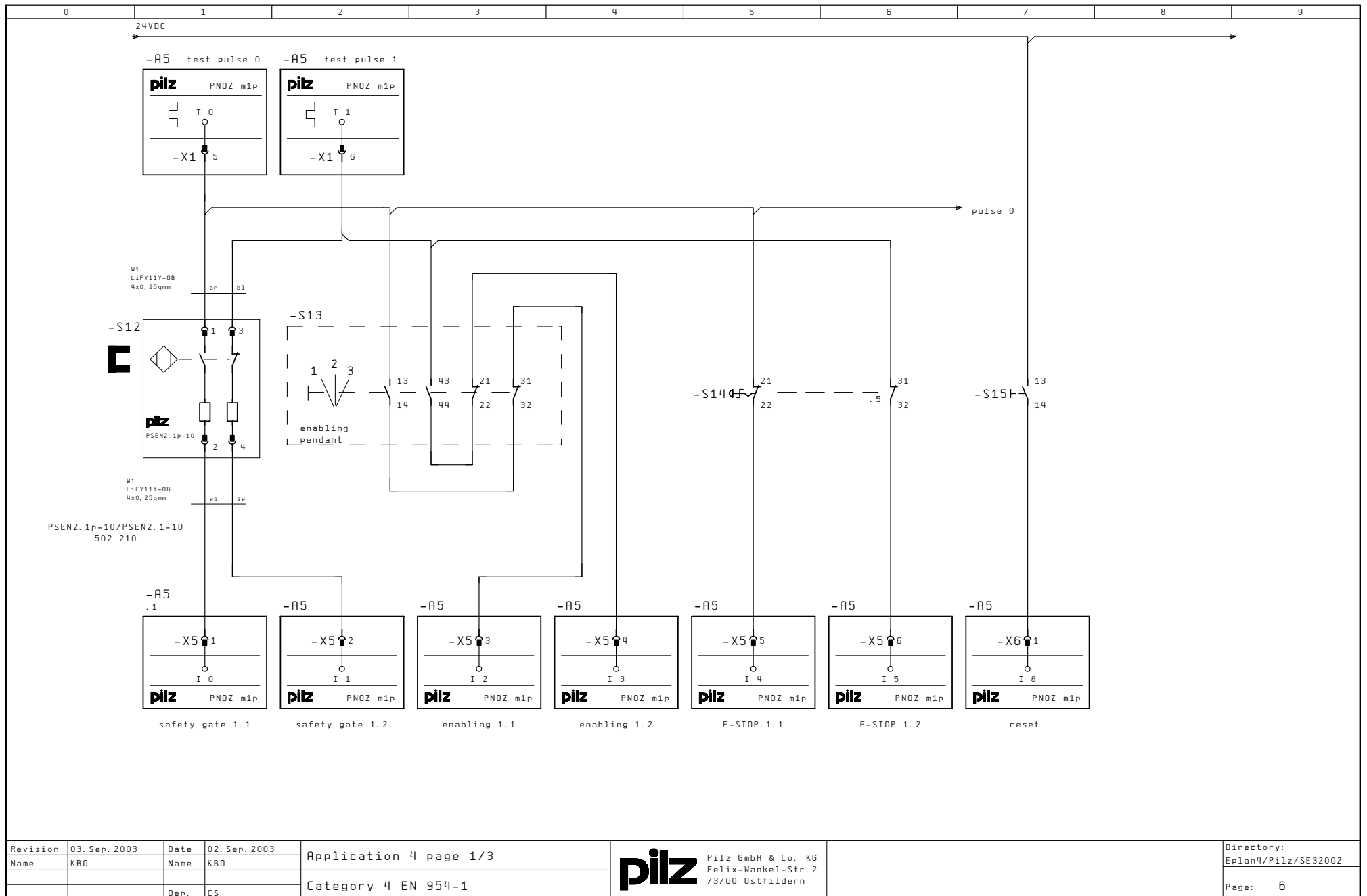
PSEN 2-1p-10

Override safety gate with enable switch, Category 4, EN 954-1

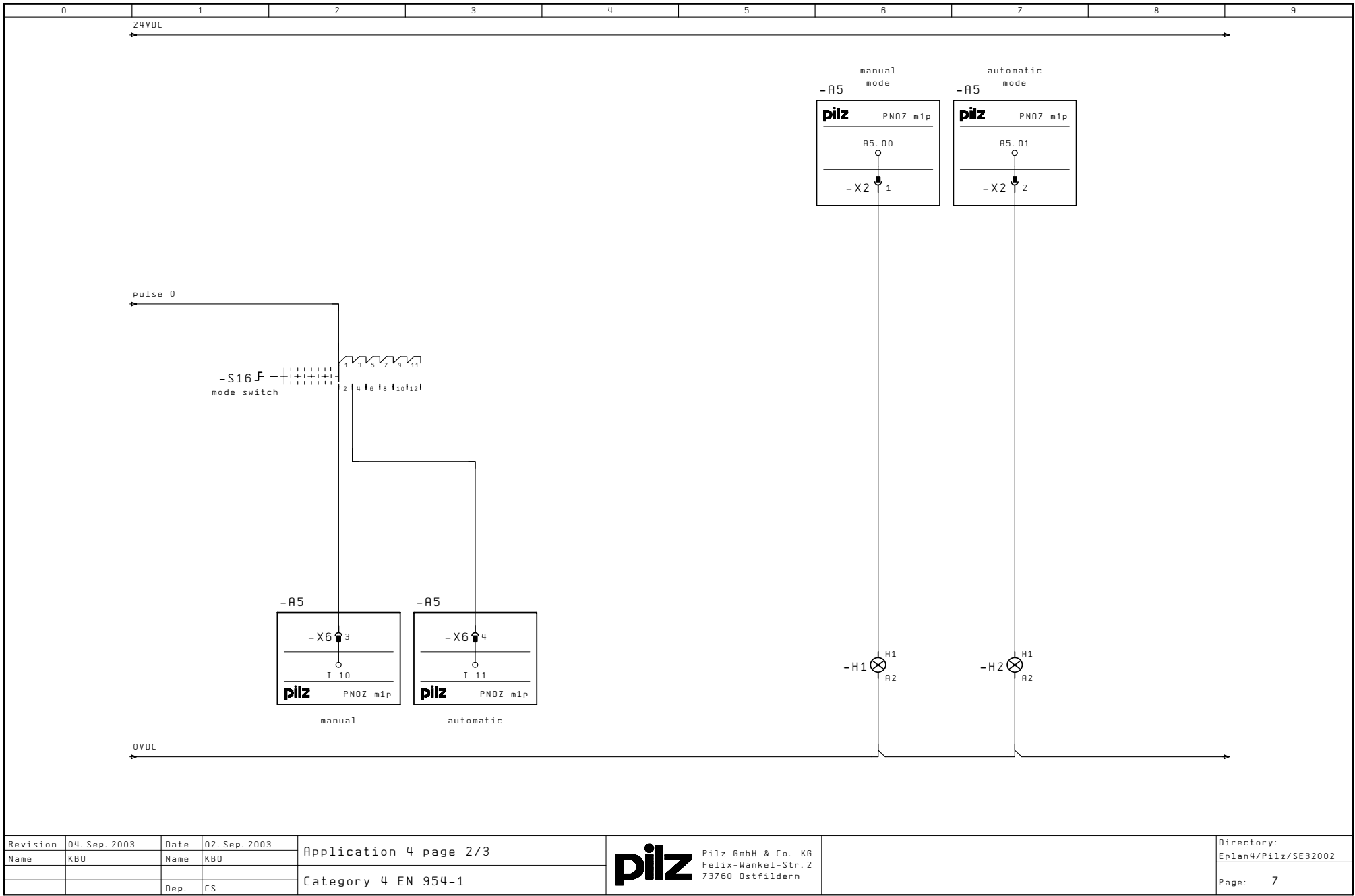
Configuration, page 2

- Safety gate 1
 - Switch type 2 with simultaneity monitoring (N/C - N/O)
 - Detection of shorts between contacts (A5.i0 - test pulse 0, A5.i1 - test pulse 1)
 - Automatic reset
 - Start-up test
- Enable switch
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (A5.i2 - test pulse 0, A5.i3 - test pulse 1)
 - Automatic reset
- E-STOP
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (A5.i4 - test pulse 0, A5.i5 - test pulse 1)
 - Automatic reset
- 2 connection point elements
 - Destination connection point 1 and destination connection point 2
- Exclusive OR element
 - 2 inputs
- 3 AND elements
 - 2 inputs
- Reset element
 - 2 inputs
 - Monitored reset
- Motor output
 - Safety output, relay type
 - Redundant
 - Use feedback loop

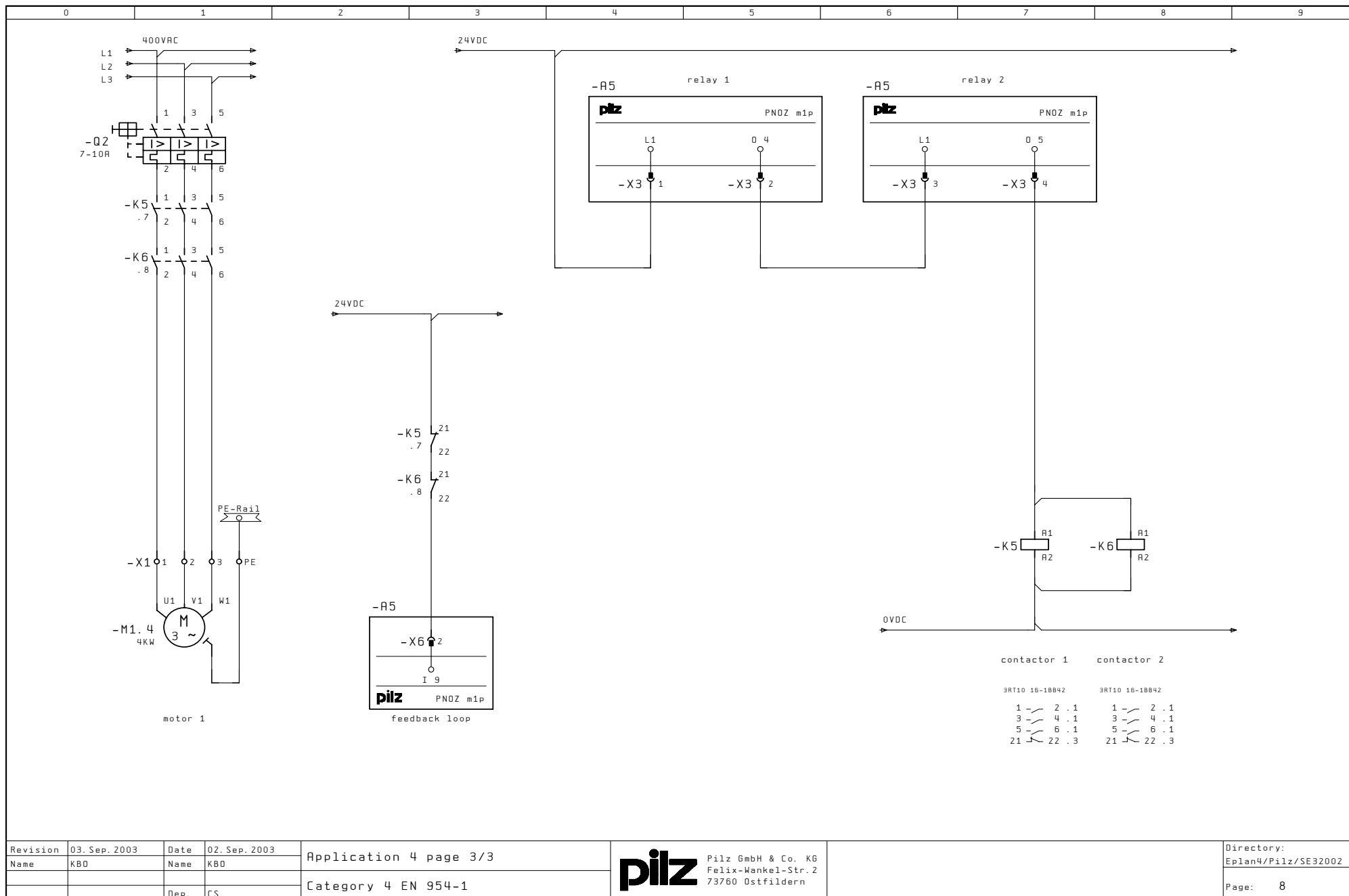




Revision	03. Sep. 2003	Date	02. Sep. 2003	Application 4 page 1/3 Category 4 EN 954-1	pilz Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern	Directory:
Name	KBO	Name	KBO			Eplan4/Pilz/SE32002
		Dep.	CS			Page: 6



Revision	04. Sep. 2003	Date	02. Sep. 2003	Application 4 page 2/3	 Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern	Directory: Eplan4/Pilz/SE32002	
Name	KBO	Name	KBO				
		Dep.	CS	Category 4 EN 954-1		Page: 7	



PSEN 2.1p-10

Machine hoods with 3 x 2 safety switches, Category 3, EN 954-1

Features

- 3 interlinked safety gates
- 1 instantaneous load shutdown

Description

Monitoring function

3 machine hoods are fitted on a machine for service reasons. The machine is shut down as soon as one of the 3 machine hoods is opened.

Each machine hood has 2 safety switches. The PSEN i1 interface switches the N/C contacts on the sensors in parallel and the N/O contacts in series. The PNOZ e3.1p switches the machine on or off, depending on the status of the safety switches. If all the machine hoods are closed, safety outputs 14 and 24 will carry a high signal. If a machine hood is opened, the output signals will switch from high to low and contactors K1 and K2 will de-energise.

The unit is to use both contactors K1 and K2 at safety outputs 14 and 24 to switch a single load.

Feedback loop

The unit has a separate feedback loop. The N/C contacts on the contactors are connected to the feedback loop input Y6. When the unit is started, a test is carried out to check whether both N/C contacts are closed, i.e. whether the contactors have de-

energised. If one of the contacts is open, the safety outputs will retain the low signal. The unit will not be ready for operation again until the feedback loop is closed and the input circuits have been opened and then closed again.

If the signal at the safety outputs switches from high to low, the N/C contacts must close within a max. of 150 ms. If one contactor fails to de-energise, the corresponding N/C contact will remain open; an error is detected and is displayed as a flashing pulse (1, 8). It will not be possible to switch the unit back on until the error has been rectified and the supply voltage has been switched off and then on again.

Reset

If all the machine hoods are closed and the feedback loop is closed, the unit can be started by pressing the reset button S7 (monitored reset).

PSEN 2.1p-10

Machine hoods with 3 x 2 safety switches, Category 3, EN 954-1

Safety assessment

- The PNOZe3.1p and contactors K1 and K2 do **not** have to be installed in a single location.
- Errors within the safety gate series connection may remain undetected when
 - the safety gates are opened simultaneously.
 - the sequence in which the safety gates open is unfavourable.



NOTICE

In order to detect every fault, only one safety gate may be opened at a time or each safety gate must be tested individually.

- If a switch contact in the input circuit is overridden, this will be detected as an error the next time the PNOZelog is operated. Safety outputs 14 and 24 will carry a low signal. The error is reset by

operating another switch contact; after a restart the safety outputs will again carry a high signal.

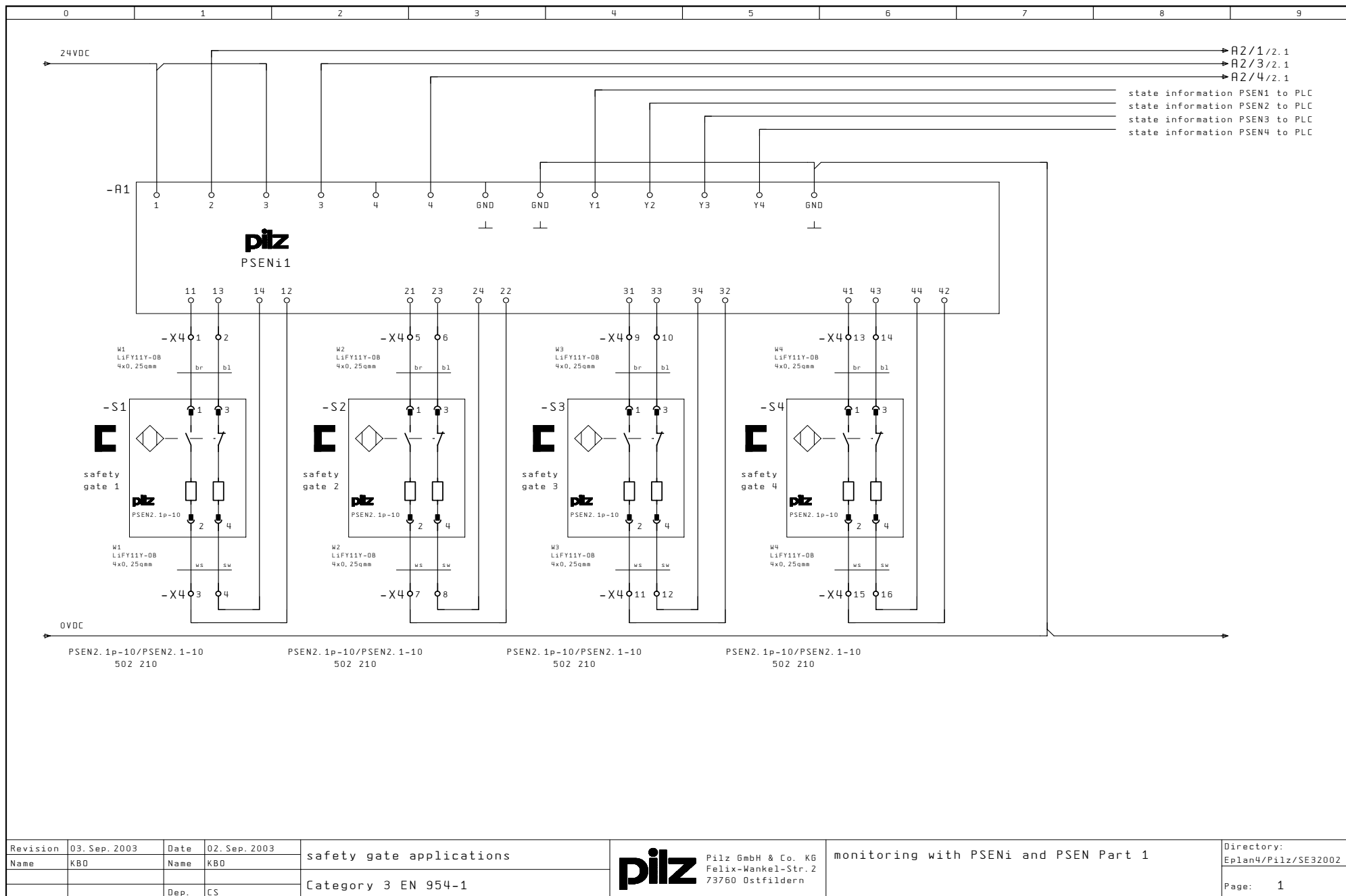
- A short circuit between 24 VDC and the input circuits (S12, S24) will be detected as an error after the next operation of the affected input circuits, depending on the location of the error. Safety outputs 14 and 24 will carry a low signal.
- A short circuit between 24 VDC and a safety output will be detected and the safety outputs will carry a low signal. The load will be switched off via the second safety output.

Pilz units

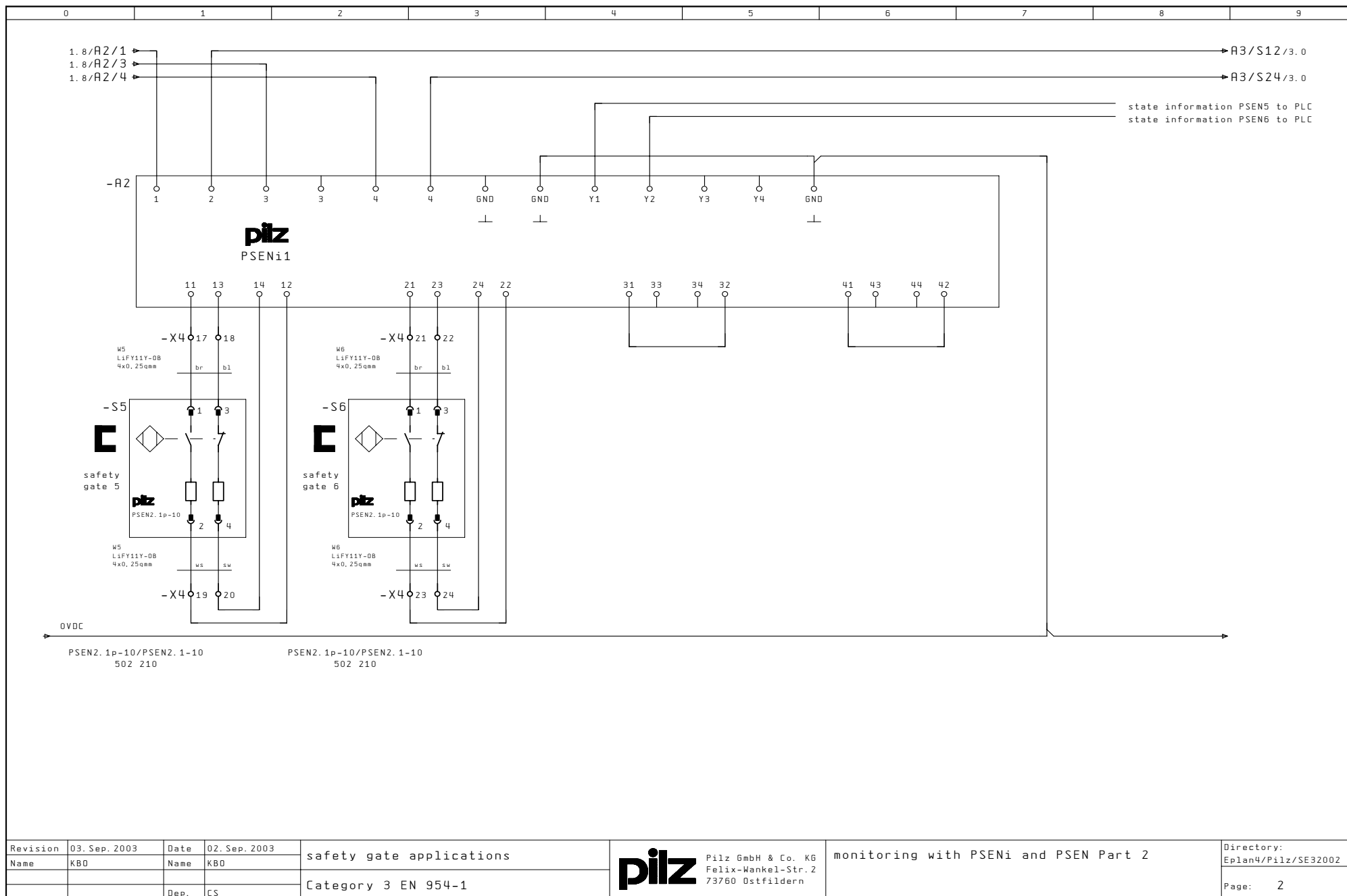
Number	Type	Features	Order number
1	PNOZ e3.1p	24 VDC	774 139
6	PSEN 2.1p-10/PSEN 2.1p-11		502 210
2	PSEN i1		535 110

Drawing file:

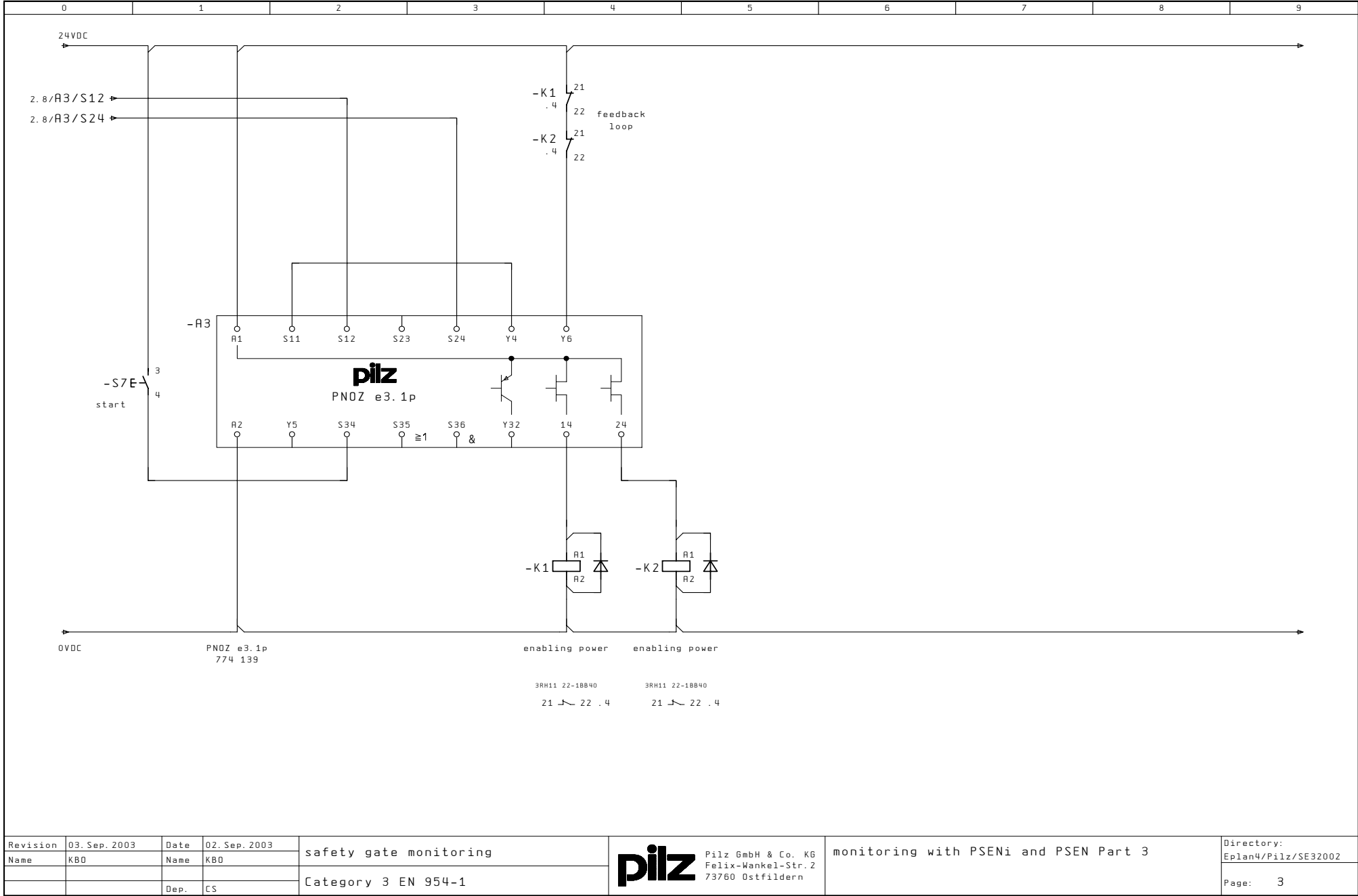
Page 1 ... 3 in the project EPLAN4/Pilz/SE32002



Revision	03. Sep. 2003	Date	02. Sep. 2003	safety gate applications	pilz Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern	monitoring with PSENi and PSEN Part 1	Directory: Eplan4/Pilz/SE32002
Name	KBO	Name	KBO				Page: 1
		Dep.	CS	Category 3 EN 954-1			



Revision	03. Sep. 2003	Date	02. Sep. 2003	safety gate applications	Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern	monitoring with PSENi and PSEN Part 2	Directory: Eplan4/Pilz/SE32002
Name	KB0	Name	KB0				Page: 2
		Dep.	CS	Category 3 EN 954-1			



Product range PSENmag and PSENcode

Chemical resistance, housing material for:

- PSENmag safety switches
- PSENmag actuators
- PSENcode safety switches

The resistance values listed here are only standard values and may be fundamentally changed by influencing factors such as filling material, changing temperatures, high load, environmental influences, reaction period etc. For this reason we cannot guarantee this information. This data was determined at room temperature and with normal to strong concentrations.

Resistance level index:

A = resistant
B = resistant under certain conditions
C = non-resistant
D = soluble

Resistance to	Resistance level
Acetaldehyde (ethanal)	A
Acetic anhydride	A
Acetic ester	B
Acetic ether	B
Acetone	B
Allyl alcohol (2 propene 1-cl)	A
Aluminium hydroxide	A
Aluminium nitrate	A
Aminobenzene (aniline)	A
Ammonia 30%	A
Ammonia (aqueous) (liquid ammonia)	A
Ammonium bicarbonate (sal volatile)	A
Ammonium chloride (salmiac)	A
Ammonium hydroxide (aqueous ammonia)	A
Ammonium nitrate (fertiliser)	A
Ammonium phosphate (fertiliser)	B
Amyl alcohol (pentanol, pentyl alcohol)	A
Anethole	A
Aniline (aminobenzene)	A
Argon	A
Barium chloride	A
Barium sulphate (baryte)	A
Barium sulphide	A
Benzaldehyde (bitter almond oil)	A
Benzine, lead-free	A
Benzine, super	A
Benzoic acid	A
Benzoyl	A
Benzyl alcohol (phenylcarbinol)	A

Resistance to	Resistance level
Benzyl chloride (d-chlorotoluene)	A
Blue vitriol (copper sulphate)	A
Borax	A
Boric acid	A
Brake fluid (DIN 53521)	A
Butane, liquid	A
Butanol (butyl alcohol)	B
Butanone-2	A
Butyl acetate	A
Butyl alcohol (butanol)	B
Butyl glycol	A
Butyl glycol ether	A
Calcium carbonate (chalk)	A
Calcium chloride, aqueous	A
Calcium hydroxide	B
Calcium hypochlorite (bleaching powder)	A
Calcium sulphate (gypsum)	A
Carbolic acid (phenol)	C
Carbonic acid (carbon dioxide)	A
Carbon tetrachloride (tetrachloromethane)	A
Castor oil	A
Caustic potash (potassium hydroxide)	B
Caustic soda (sodium hydroxide)	B
Cellulose acetate	A
Cetyl alcohol (1 hexadecanol)	A
Chlorobenzoyl	A
Chloroform (trichloromethane)	B
Chloroethene (trichloroethene)	A
Chromic acid 50 %	A

Resistance to	Resistance level
Chromic acid anhydride (chromium trioxide)	A
Citric acid	A
Copper nitrate, aqueous	A
Crude oil	A
Cyclohexanol (hexalin)	A
Dextrin	A
Diacetone alcohol (Pyranon, Dial, DA)	A
Dibutyl ether (butyl ether)	A
Dibutylphthalate	A
Dibutylsebacate	A
Dichloroethane	C
Dichloroethylene	B
Dichloromethane (methylene chloride)	D
Diethyl ether (ether)	A
Dimethylbenzoyl (xylol)	A
Dimethyl ether	A
Dimethyl formamide DMF	B
Dioxan	A
Ethanol (acetaldehyde)	A
Ethanol (ethyl alcohol, spirit)	A
Ether (diethyl)	A
Ethyl acetate (acetic ether, acetic ester)	B
Ethyl alcohol (ethanol, spirit)	A
Ethyl chloride (chloroethane)	A
Ethylene chloride (1.2 dichloroethane)	C
Ethylene glycol (cellosolve)	A
Ethylene glycol (glycol, 1.2 ethanediol)	A

PSEN product range

Resistance to	Resistance level	Resistance to	Resistance level	Resistance to	Resistance level	Resistance to	Resistance level
Ethyl ether (ether, diethyl)	A	Isopropanol (persprit)	A	Naphtha / crude oil	A	Potassium hypochloride	A
Fat, mineral	A	Javel water (12.5% Cl ₂)	A	Naphthalene (mineral oil)	A	Potassium manganate 10 %	A
Fat (salad oil)	A	Javel water (sodium hypochloride)	A	Natural gas	A	Potassium nitrate (potash nitre)	A
Fatty acids above C ₆	A	Kerosene	A	Nickel sulphate	A	Propanol (propyl alcohol)	A
Fluosilicic acid (hydrofluosilicic acid)	B	Lanolin (wool fat)	A	Nitrating acid	B	Propanone (acetone)	B
Formaldehyde (formalin) (methanal)	A	Laughing gas (nitric oxide)	A	Nitric acid	A	Propyl alcohol	A
Formamide	A	Lighting gas	A	Nitric acid, concentrated (aqua fortis)	B	Pure acetic acid (100% acetic acid)	A
Formic acid	A	Linseed oil	A	Nitric acid, fuming	B	Salad oil/fat	A
Freon 11 (fluorotrichloromethane)	A	Magnesium carbonate	A	Nitrobenzoyl (mirbane)	D	Seawater	A
Freon 12 (dichlorodifluoromethane)	A	Magnesium nitrate	A	Nitrogen	A	Silicic acid	A
Freon 22 (chlorodifluoromethane)	A	Magnesium sulphate (Epsom salts)	A	Nitrohydrochloric acid (HNO ₃ /HCl)	C	Silicone oil	A
Freon 113 (trichlorofluoroethane)	A	Menthol	A	Octane	A	Silver nitrate	A
Furfuryl alcohol (furfuryl aldehyde, furfural)	A	Mercury	A	Oleic acid	A	Soda, aqueous (sodium carbonate)	A
Gasoline	A	Methanal (formaldehyde)	A	Oleum (fuming sulphuric acid)	C	Sodium bicarbonate	A
Glucose (grape sugar)	A	Methane alcohol	A	Oxygen	A	Sodium bisulphate	A
Glycerin /glycerol	A	Methane (pit gas, natural gas)	A	Ozone	A	Sodium borate	A
Glycol (ethylene glycol)	A	Methanol (methane alcohol, wood spirit)	A	Paraffin	B	Sodium borate (borax)	A
Heptane	A	Methyl acetate	A	Pentanol (pentyl alcohol, amyl alcohol)	A	Sodium carbonate	A
Hexahydrobenzene (cyclohexane)	A	Methylbenzoyl (toluene)	A	Perchloric acid	A	Sodium chloride (salt)	A
Hexalin (cyclohexanol)	A	Methylcellosolve (methyl glycol)	A	Perchloroethylene (tetrachloroethylene)	A	Sodium hydroxide (caustic soda, sodium hydrate)	B
Hexane	A	Methylchloride	D	Petroleum, kerosene	A	Sodium hypochlorite (Javel water)	A
Hydrochloric acid	A	Methylchloroform (trichloroethene, chloroethene)	A	Phenol (carbolic acid)	C	Sodium nitrate (Chile salpêtre)	A
Hydrochloric acid 10 %	A	Methylene chloride (dichloromethane)	D	Phenylcarbinol (benzyl carbinol)	A	Sodium sulphate (mirabilite)	A
Hydrochloric acid, concentrated	A	Methyl ethyl ketone	A	Phosphoric acid	A	Sodium sulphide	A
Hydrofluoric acid	B	Methyl glycol (methyl cellosolve)	A	Polyglycol	A	Spirits	A
Hydrogen peroxide	A	Mineral oils	A	Potassium carbonate (potash)	A	Stearyl alcohol (1-octadecanol)	A
Hydrogen sulphide	C	Monochloroacetic acid (chlorobenzoyl)	A	Potassium chloride (sylvine)	A	Styrene (vinylbenzene, phenylethylene)	C
		Myristil alcohol (myristic alcohol)	A	Potassium hydroxide (caustic potash, caustic potash solution)	B		

Product range PSENmag and PSENcode

Resistance to	Resistance level
Sulphur	A
Sulphur chloride (disulphur dichloride)	C
Sulphurdichloride	C
Sulphur dioxide (sulphuric acid)	B
Sulphuric acid 10%	A
Sulphuric acid 60%	B
Sulphuric acid 95%	C
Sulphuric acid, fuming (oleum)	C
Sulphuric ether (diethyl)	A
Sulphur trioxide	C
Tetrachloroethylene (perchloroethylene)	A
Tetrachloromethane (carbon tetrachloride)	A
Tetrahydrofurane (diethylene oxide, tetramethyloxide)	A
Tetrahydronaphthalene (tetralin)	A
Toluene (methylbenzoyl)	A
Trichloroethylene (chloroethene)	A
Trichloroethylene (trichloroethene)	A
Trichloromethane (chloroform)	B
Turpentine oil	A
Urine	A
Vaseline oil	A
Vinegar (wine vinegar)	A
Vinylidene chloride (dichlorethylene)	B
Water, spring water	A
Water, carbonated	A
Xylol (dimethylbenzoyl)	A

Product range PSENmag and PSENcode

Chemical resistance, housing material for:

• PSENcode actuators

The resistance values listed here are only standard values and may be fundamentally changed by influencing factors such as filling material, changing temperatures, high load, environmental influences, reaction period etc. For this reason we cannot guarantee this information. This data was determined at room temperature and with normal to strong concentrations.

Resistance level index:

A = resistant

B = resistant under certain conditions

C = non-resistant

D = soluble

Resistance to	Resistance level
Acetaldehyde (ethanal)	B
Acetic anhydride	A
Acetone	B
Ethanol (acetaldehyde)	A
Ethanol (ethyl alcohol, spirit)	A
Ether (diethyl)	A
Ethyl acetate (acetic ether, acetic ester)	B
Ethyl ether (ether, diethyl)	A
Ethyl alcohol (ethanol, spirit)	A
Ethyl chloride (chloroethane)	B
Ethylene chloride (1.2 dichloroethane)	B
Ethylene glycol (glycol, 1.2 ethanediol)	A
Ethylene glycol (cellosolve)	A
Caustic potash (potassium hydroxide)	B
Caustic soda (sodium hydroxide)	B
Allyl alcohol (2 propene 1-cl)	A
Aluminium hydroxide	A
Aluminium nitrate	A
Formic acid	C
Aminobenzene (aniline)	B
Ammonia (aqueous) (liquid ammonia)	A
Ammonia 30%	A
Ammonium chloride (salmiac)	A
Ammonium hydroxide (aqueous ammonia)	A
Ammonium bicarbonate (sal volatile)	A
Ammonium nitrate (fertiliser)	A

Resistance to	Resistance level
Ammonium phosphate (fertiliser)	A
Amyl alcohol (pentanol, pentyl alcohol)	A
Anethole	A
Aniline (aminobenzene)	B
Argon	A
Barium chloride	A
Barium sulphate (baryte)	A
Barium sulphide	A
Benzaldehyde (bitter almond oil)	B
Benzine, lead-free	A
Benzine, super	A
Benzoic acid	A
Benzoyl	B
Benzyl alcohol (phenylcarbinol)	A
Benzyl chloride (d-chlorotoluene)	A
Javel water (12.5% Cl2)	A
Borax	A
Boric acid	A
Brake fluid (DIN 53521)	A
Butane, liquid	A
Butanol (butyl alcohol)	A
Butanone-2	A
Butyl acetate	B
Butyl alcohol (butanol)	A
Butyl glycol	A
Butyl glycol ether	A
Calcium carbonate (chalk)	A
Calcium chloride, aqueous	A
Calcium hydroxide	B
Calcium hypochlorite (bleaching powder)	A
Calcium sulphate (gypsum)	A

Resistance to	Resistance level
Cellulose acetate	A
Cetylic alcohol (1 hexadecanol)	A
Chlorobenzoyl	C
Chloroform (trichloromethane)	C
Chlorothene (trichloroethene)	C
Hydrochloric acid	B
Chromic acid 50 %	B
Chromic acid anhydride (chromium trioxide)	A
Citric acid	A
Cyclohexanol (hexalin)	A
Dextrin	A
Diacetone alcohol (Pyranon, Dial, DA)	A
Diethyl ether (ether)	A
Dibutyl ether (butyl ether)	A
Dibutylphthalate	A
Dibutylsebacate	A
Dichloroethane	C
Dichloroethylene	C
Dichloromethane (methylene chloride)	C
Dimethyl ether	A
Dimethylbenzoyl (xylol)	B
Dimethyl formamide DMF	B
Propanone (acetone)	B
Dioxan	B
Pure acetic acid (100% acetic acid)	B
Natural gas	A
Vinegar (wine vinegar)	A
Acetic ester	B
Acetic anhydride	A

Product range PSENmag and PSENcode

Resistance to	Resistance level	Resistance to	Resistance level	Resistance to	Resistance level	Resistance to	Resistance level
Acetic ether	B	Castor oil	A	Mineral oils	A	Phenol (carbolic acid)	B
Butyl acetate	B	Kerosene	B	Monochloracetic acid (chlorobenzoyl)	C	Phenylcarbinol (benzyl carbinol)	A
Methyl acetate	B	Silicic acid	A	Myristil alcohol (myristic alcohol)	A	Phosphoric acid	C
Fat (salad oil)	A	Carbonic acid (carbon dioxide)	A	Naphtha / crude oil	A	Polyglycol	A
Fat, mineral	A	Carbon tetrachloride (tetrachloromethane)	C	Naphthalene (mineral oil)	A	Propanol (propyl alcohol)	A
Fatty acids above C ₆	A	Nitrohydrochloric acid (HNO ₃ /HCl)	C	Sodium bicarbonate	A	Propanone (acetone)	B
Fluosilicic acid (hydrofluosilicic acid)	B	Copper nitrate, aqueous	A	Sodium bisulphate	A	Propyl alcohol	A
Hydrofluoric acid	C	Blue vitriol (copper sulphate)	A	Sodium borate	A	Mercury	A
Hydrofluoric acid	C	Laughing gas (nitric oxide)	A	Sodium chloride (salt)	A	Castor oil	A
Formaldehyde (formalin) (methanal)	C	Lanolin (wool fat)	A	Sodium hydroxide (caustic soda, sodium hydrate)	B	Crude oil	A
Formamide	A	Linseed oil	A	Sodium hypochlorite (javel water)	A	Nitric acid	C
Furfurylalcohol (furfuryl aldehyde, furfural)	A	Lighting gas	A	Sodium carbonate	A	Nitric acid, concentrated (aqua fortis)	D
Gasoline	A	Magnesium carbonate	A	Sodium nitrate (Chile salpêtre)	A	Nitric acid, fuming	D
Glucose (grape sugar)	A	Magnesium nitrate	A	Sodium sulphate (mirabilite)	A	Hydrochloric acid, concentrated	B
Glycerin / glycerol	A	Magnesium sulphate (Epsom salts)	A	Sodium sulphide	A	Hydrochloric acid 10 %	B
Glycol (ethylene glycol)	A	Seawater	A	Sodium borate (borax)	A	Oxygen	A
Heptane	B	Menthol	A	Caustic soda (sodium hydroxide)	B	Sulphur	A
Hexahydrobenzene (cyclohexane)	A	Methanal (formaldehyde)	B	Nickel sulphate	A	Sulphuric ether (diethyl)	A
Hexalin (cyclohexanol)	A	Methane (pit gas, natural gas)	A	Nitrating acid	B	Sulphur chloride (disulphur dichloride)	C
Hexane	A	Methanol (methane alcohol, wood spirit)	A	Nitrobenzoyl (mirbane)	B	Sulphurdichloride	C
Isopropanol (persprit)	A	Methyl acetate	B	Octane	A	Sulphur dioxide (sulphuric acid)	B
Javel water (sodium hypochloride)	A	Methane alcohol	A	Oleic acid	A	Sulphuric acid 10%	B
Potassium chloride (sylvine)	A	Methyl ethyl ketone	B	Oleum (fuming sulphuric acid)	C	Sulphuric acid 60%	C
Potassium hydroxide (caustic potash, caustic potash solution)	A	Methylbenzoyl (toluene)	B	Ozone	A	Sulphuric acid 95%	C
Potassium hypochloride	A	Methylcellosolve (methyl glycol)	A	Paraffin	A	Sulphuric acid, fuming (oleum)	C
Potassium carbonate (potash)	A	Methylchloride	C	Pentanol (pentyl alcohol, amyl alcohol)	A	Sulphur trioxide	C
Potassium nitrate (potash nitre)	A	Methylchloroform (trichloroethylene, chlorothene)	C	Perchloroethylene (tetrachloroethylene)	C	Hydrogen sulphide	C
Potassium manganate 10 %	A	Methylene chloride (dichloromethane)	C	Perchloric acid	C	Silver nitrate	A
Carbolic acid (phenol)	C	Methyl glycol (methyl cellosolve)	A	Petroleum, kerosene	A	Silicone oil	A
						Soda, aqueous (sodium carbonate)	A

Product range PSENmag and PSENcode

Resistance to	Resistance level
Salad oil/fat	A
Spirits	A
Stearyl alcohol (1-octadecanol)	A
Nitrogen	A
Styrene (vinylbenzene, phenylethylene)	B
Turpentine oil	A
Tetrachloroethylene (perchloroethylene)	C
Carbon tetrachloride (tetrachloromethane)	C
Tetrachloromethane (carbon tetrachloride)	C
Tetrahydrofurane (diethylene oxide, tetramethyloxide)	B
Tetrahydronaphthalene (tetralin)	B
Toluene (methylbenzoyl)	B
Trichloroethylene (chloroethene)	C
Trichloroethylene (trichloroethene)	C
Trichloromethane (chloroform)	C
Perchloric acid	C
Urine	A
Vaseline oil	A
Vinylidene chloride (dichlorethylene)	C
Water, spring water	A
Water, carbonated	A
Hydrogen peroxide	A
Xylol (dimethylbenzoyl)	B
Citric acid	A

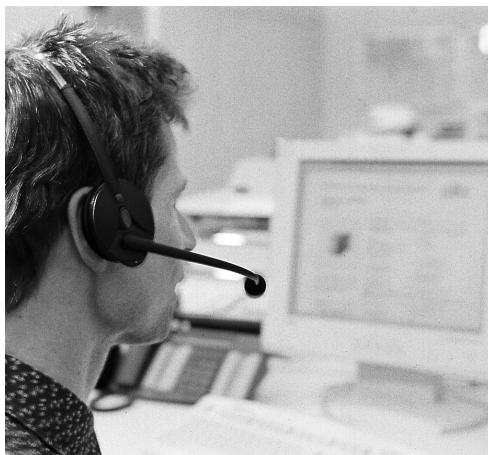
Contents**Page**

Service

Pre-sales/after sales – Services, concepts and solutions

3-2

Pre-sales/after sales Services, concepts and solutions



We are happy to advise you, in the configuration phase or during commissioning.



Safety advice

As you design your machine or on-site at your installation, Pilz can provide professional advice on safety, based on current standards.



Risk analysis

Our application engineers can perform a risk assessment for you, based on current standards.



Safety concepts

If the risk assessment shows you need to reduce the risk, appropriate protective measures can be selected and a safety concept drawn up.



Safety check

Pilz will assess your application, plant or machine with the necessary safety aspects.



System supplier

and project management
If required, Pilz can undertake all tasks from the generation of documentation and control cabinet design right through to completion - the whole system from one source.



Application support

When configuring and commissioning both hardware and software, our application engineers can provide support based on expertise gained from international projects.



Technical support

Our engineers can support you in the selection, use and application of our products. They are in constant contact with customers from the widest range of areas and industrial sectors and are happy to answer your queries at any time.



E-Mail:

techsupport@pilz.de



Telephone:

+49 711 3409-444



Hotline

Technical support is available round the clock on our central hotline number
+49 711 3409-444.



Training and education

A wide range of training and seminars helps to pass on knowledge based on theory



ice.

Worldwide representatives

Our worldwide network of subsidiaries and sales partners ensures comprehensive support and assistance with your questions and problems.



Internet

Our homepage at www.pilz.com provides the latest information, electronic shopping, direct dialogue and enquiry functions as well as extensive download options.



E-Business

The focus of Pilz's E-Business activities is to strengthen customer orientation through the use of new media and to increase added value via a supplementary business model for Business-to-Business.



Supply and repair service

From a fast, economical repair through to a long supply guarantee to safeguard your investment - always expect more from Pilz.



Certificates and approvals

Pilz is certified to DIN ISO 9001. International approvals and certification from recognised test houses confirm our products' suitability for worldwide use.

Contents	Page
Order Reference	
Alphabetically by type	4-2
Numerically by order number	4-3

Alphabetically by type

Type	Quantity	Order number	Page
PSEN 1.1-10	1	514 110	2.7-5
PSEN 1.1p-10	1	524 110	2.7-5
PSEN 1.1p-10/PSEN1.1-10	1/1	504 210	2.7-5
PSEN 1.1p-12	1	524 112	2.7-9
PSEN 1.1p-12/PSEN 1.1-10	1/1	504 212	2.7-9
PSEN 1.1-20	1	514 120	2.7-5
PSEN 1.1p-20	1	524 120	2.7-5
PSEN 1.1p-20/PSEN 1.1-20	1/1	504 220	2.7-5
PSEN 1.1p-22	1	524 122	2.7-9
PSEN 1.1p-22/PSEN 1.1-20	1/1	504 222	2.7-9
PSEN 1.1p-23 ATEX/PSEN 1.1-20	1/1	504 223	2.7-11
PSEN 1.1p-25 ATEX/PSEN 1.1-20	1/1	504 225	2.7-15
PSEN 1.2-20	1	515 120	2.7-18
PSEN 1.2p-20	1	525 120	2.7-18
PSEN 1.2p-20/PSEN 1.2-20	1/1	505 220	2.7-18
PSEN 1.2p-22	1	525 122	2.7-22
PSEN 1.2p-22/PSEN 1.2-20	1/1	505 222	2.7-22
PSEN 1.2p-23 ATEX/PSEN 1.2-20	1/1	505 223	2.7-24
PSEN 1.2p-25 ATEX/PSEN 1.2-20	1/1	505 225	2.7-28
PSEN 2.1-10	1	512 110	2.7-31
PSEN 2.1-10	2	512 210	2.7-31
PSEN 2.1p-10	1	522 110	2.7-31
PSEN 2.1p-10	2	522 210	2.7-31
PSEN 2.1p-10/PSEN 2.1-10	1/1	502 210	2.7-31
PSEN 2.1p-10/PSEN 2.1-10	10/10	502 310	2.7-31
PSEN 2.1p-11	1	522 111	2.7-31
PSEN 2.1p-11	2	522 211	2.7-31
PSEN 2.1p-11/PSEN 2.1-10	1/1	502 211	2.7-31
PSEN 2.1p-11/PSEN 2.1-10	10/10	502 311	2.7-31
PSEN 2.1p-30	1	522 130	2.7-31
PSEN 2.1p-30	2	522 230	2.7-31
PSEN 2.1p-30/PSEN 2.1-10	1/1	502 230	2.7-31
PSEN 2.1p-30/PSEN 2.1-10	10/10	502 330	2.7-31

Type	Quantity	Order number	Page
PSEN 2.1p-31	1	522 131	2.7-31
PSEN 2.1p-31	2	522 231	2.7-31
PSEN 2.1p-31/PSEN 2.1-10	1/1	502 231	2.7-31
PSEN 2.1p-31/PSEN 2.1-10	10/10	502 331	2.7-31
PSEN 2.1p-34 ATEX/PSEN 2.1-10	1/1	502 234	2.7-34
PSEN 2.2-20	1	513 120	2.7-37
PSEN 2.2p-20	1	523 120	2.7-37
PSEN 2.2p-20/PSEN 2.2-20	1/1	503 220	2.7-37
PSEN 2.2p-21	1	523 121	2.7-37
PSEN 2.2p-21/PSEN 2.2-20	1/1	503 221	2.7-37
PSEN 2.2p-24 ATEX/PSEN 2.2-20	1	503 224	2.7-39
PSEN cs1.1	1	540 080	2.7-61
PSEN cs1.1p	1	540 050	2.7-61
PSEN cs1.1p/PSEN cs1.1	1/1	540 000	2.7-61
PSEN cs1.13p	1	540 055	2.7-71
PSEN cs1.3p/PSEN cs1.1	1/1	540 005	2.7-71
PSEN cs2.1	1	540 180	2.7-66
PSEN cs2.1p	1	540 150	2.7-66
PSEN cs2.1p/PSEN cs2.1	1/1	540 100	2.7-66
PSEN cs2.13p	1	540 155	2.7-76
PSEN cs2.13p/PSEN cs2.1 1/1	540 105	2.7-76	
PSEN i1	1	535 110	2.7-42
PSEN ix1	1	535 120	2.7-49

Alphabetically by type

Accessories

Description	Quantity	Order number	Page
Spacer	10	534 310	2-7-57
2 m cable M8 with angled plug	1	533 110	2-7-58
5 m cable M8 with angled plug	1	533 120	2-7-58
10 m cable M8 with angled plug	1	533 130	2-7-58
30 m cable M8 with angled plug	1	533 140	2-7-58
2 m cable M8 with straight plug	1	533 111	2-7-58
5 m cable M8 with straight plug	1	533 121	2-7-58
10 m cable M8 with straight plug	1	533 131	2-7-58
30 m cable M8 with straight plug	1	533 141	2-7-58
3 m cable M12 with angled plug	1	540 322	2-7-81
5 m cable M12 with angled plug	1	540 323	2-7-81
10 m cable M12 with angled plug	1	540 324	2-7-81
3 m cable M12 with straight plug	1	540 319	2-7-81
5 m cable M12 with straight plug	1	540 320	2-7-81
10 m cable M12 with straight plug	1	540 321	2-7-81
Mounting bracket	1	532 110	2.7-57

Numerically by order number

Order number	Type	Quantity	Page
502 210	PSEN 2.1p-10/PSEN 2.1-10	1/1	2.7-31
502 230	PSEN 2.1p-30/PSEN 2.1-10	1/1	2.7-31
502 231	PSEN 2.1p-31/PSEN 2.1-10	10/10	2.7-31
502 234	PSEN 2.1p-34 ATEX/PSEN 2.1-10	1/1	2.7-31
502 310	PSEN 2.1p-10/PSEN 2.1-10	10/10	2.7-31
502 330	PSEN 2.1p-30/PSEN 2.1-10	10/10	2.7-31
502 331	PSEN 2.1p-31/PSEN 2.1-10	1/1	2.7-31
503 220	PSEN 2.2p-20/PSEN 2.2-20	1/1	2.7-37
503 221	PSEN 2.2p-21/PSEN 2.2-20	1/1	2.7-37
503 224	PSEN 2.2p-24 ATEX/PSEN 2.2-20	1	2.7-39
504 220	PSEN 1.1p-20/PSEN 1.1-20	1/1	2.7-5
504 222	PSEN 1.1p-22/PSEN 1.1-20	1/1	2.7-9
504 223	PSEN 1.1p-23 ATEX/PSEN 1.1-20	1/1	2.7-11
504 225	PSEN 1.1p-25 ATEX/PSEN 1.1-20	1/1	2.7-15
505 220	PSEN 1.2p-20/PSEN 1.2-20	1/1	2.7-18
505 222	PSEN 1.2p-22/PSEN 1.2-20	1/1	2.7-22
505 223	PSEN 1.2p-23 ATEX/PSEN 1.1-20	1/1	2.7-24
505 225	PSEN 1.2p-25 ATEX/PSEN 1.1-20	1/1	2.7-28
522 111	PSEN 2.1p-11	1	2.7-31
522 211	PSEN 2.1p-11	2	2.7-31
502 211	PSEN 2.1p-11/PSEN 2.1-10	1/1	2.7-31
502 311	PSEN 2.1p-11/PSEN 2.1-10	10/10	2.7-31
504 210	PSEN 1.1p-10/PSEN 1.1-10	1/1	2.7-5
504 212	PSEN 1.1p-12/PSEN 1.1-10	1/1	2.7-9
512 110	PSEN 2.1-10	1	2.7-31
512 210	PSEN 2.1-10	2	2.7-31
513 120	PSEN 2.2-20	1	2.7-37
514 110	PSEN 1.1-10	1	2.7-5
514 120	PSEN 1.1-20	1	2.7-5
515 120	PSEN 1.2-20	1	2.7-18
522 110	PSEN 2.1p-10	1	2.7-31
522 130	PSEN 2.1p-30	1	2.7-31
522 131	PSEN 2.1p-31	1	2.7-31

Order number	Type	Quantity	Page
522 210	PSEN 2.1p-10	2	2.7-31
522 230	PSEN 2.1p-30	2	2.7-31
522 231	PSEN 2.1p-31	2	2.7-31
523 120	PSEN 2.2p-20	1	2.7-37
523 121	PSEN 2.2p-21	1	2.7-37
524 110	PSEN 1.1p-10	1	2.7-5
524 112	PSEN 1.1p-12	1	2.7-9
524 120	PSEN 1.1p-20	1	2.7-5
525 120	PSEN 1.2p-20	1	2.7-18
525 122	PSEN 1.2p-22	1	2.7-18
532 110	Mounting bracket	1	2.7-57
533 110	2 m cable M8 with angled plug	1	2.7-58
533 111	2 m cable M8 with straight plug	1	2.7-58
533 120	5 m cable M8 with angled plug	1	2.7-58
533 121	5 m cable M8 with straight plug	1	2.7-58
533 130	10 m cable M8 with angled plug	1	2.7-58
533 131	10 m cable M8 with straight plug	1	2.7-58
533 140	30 m cable M8 with angled plug	1	2.7-58
533 141	30 m cable M8 with straight plug	1	2.7-58
534 310	Spacer	10	2.7-37
535 110	PSEN i1	1	2.7-42
535 120	PSEN ix1	1	2.7-49
540 080	PSEN cs1.1	1	2.7-61
540 000	PSEN cs1.1p/PSEN cs1.1	1	2.7-61
540 005	PSEN cs1.13p/PSEN cs1.1	1	2.7-71
540 050	PSEN cs1.1p	1	2.7-61
540 055	PSEN cs1.13p	1	2.7-71
540 100	PSEN cs2.1p/PSEN cs2.1	1	2.7-66
540 105	PSEN cs2.13p/PSEN cs2.1	1	2.7-76
540 150	PSEN cs2.1p	1	2.7-66
540 155	PSEN cs2.13p	1	2.7-76
540 180	PSEN cs2.1	1	2.7-66

Numerically by order number

Order number	Type	Quantity	Page
540 319	3 m cable M12 with straight plug	1	2-7-81
540 320	5 m cable M12 with straight plug	1	2-7-81
540 321	10 m cable M12 with straight plug	1	2-7-81
540 322	3 m cable M12 with angled plug	1	2-7-81
540 323	5 m cable M12 with angled plug	1	2-7-81
540 324	10 m cable M12 with angled plug	1	2-7-81



The terms of delivery and of payment of the respective Pilz company with whom a sales contract is closed are applied. As a rule this is the Pilz company that places the order. Please select the legal contract partner from the order confirmation.