



Safety switches PSENmag, PSENcode and PSENBolt

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safe automation

Configuration guide

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July 2008

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Description

1.1

Description

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Description Overview

Which products are included in the technical catalogue?

The technical catalogue contains:

Safety switch

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

Used in conjunction with an actuator and an evaluation device, the safety

switches monitor the position of movable protective devices.

Mechanical safety bolt PSEnbolt.

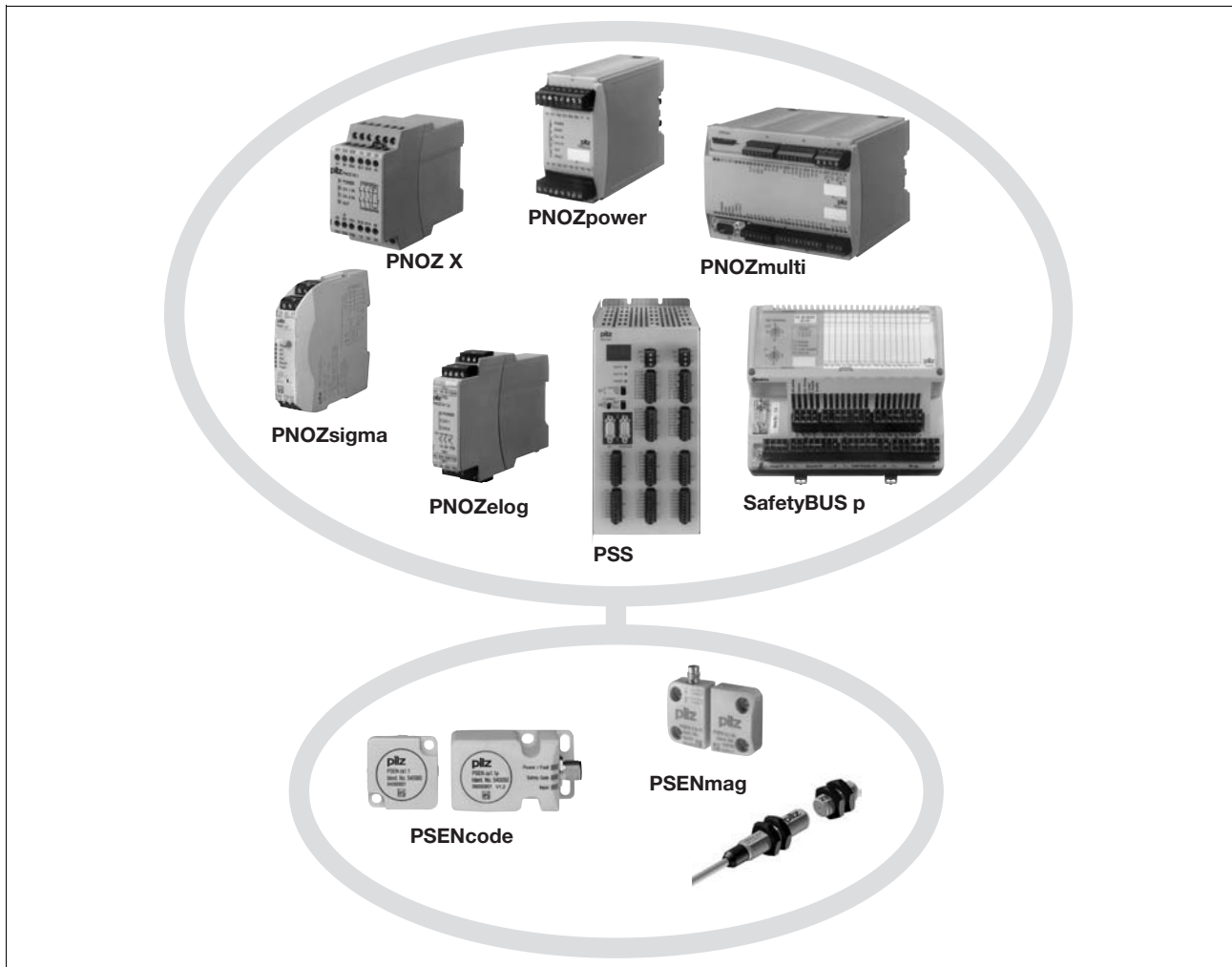
The bolt is used for mechanical guard locking on movable protective devices in conjunction with the safety switches PSENmech and PSENcode.

Features of PSENmag, PSENcode,

For safety-related applications, the safety switches must only be used in conjunction with approved evaluation devices. Approved, complete solu-

tions are available for position evaluation/guard locking 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, PNOZsigma and PNOZpower safety relays
- ▶ PSS programmable safety and control systems
- ▶ Safe, open bus system SafetyBUS p



Description

PSEnMag

Operation of the safety switch

PSEnMag safety switches 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. On some safety switches this is signalled by a yellow LED. 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

- ▶ Switch type: e.g. N/C / N/C combination
- ▶ Design: Compact, round (M30 or M12), 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)
- ▶ Achievable category in accordance with EN 954-1 and EN 60947-5-3
- ▶ LED to display switch status
- ▶ Type of cable connection:
 - With cable (5 or 10 m)
 - With plug-in connector (plug-in with screw connection, straight or angled)
- ▶ Safety switch with ATEX approval for use in potentially explosive atmospheres.

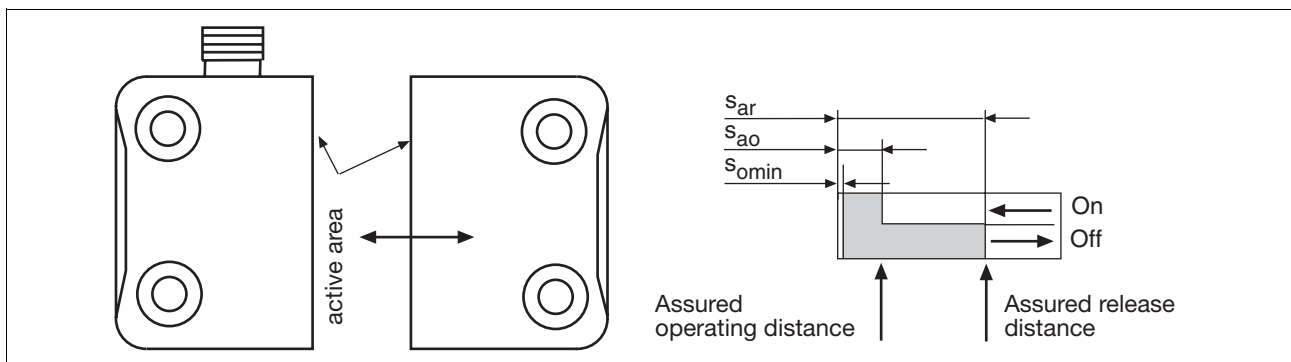
Operating distance

Safety switches with different operating 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 operating distances. This will provide greater tolerances for installation and even less sensitivity towards spring-back or swinging from safety gates.

Operating 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.
- ▶ Minimum operating distance s_{omin} : 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 absence 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.

Lateral and vertical offset:

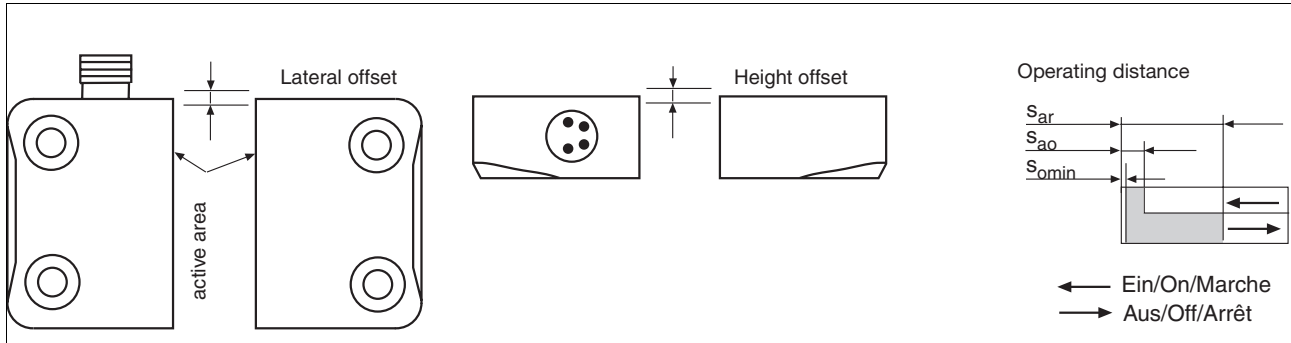
The operating distances stated in the technical details only apply if the active areas of the sensing face and actuator are installed opposite each other in parallel. Operating distances may deviate if other arrangements are used. The maximum permitted lateral and vertical offset will depend on the safety switch you are using (see chap-

ter entitled "Unit-specific Descriptions", section on "Max. lateral and vertical offset in mm").

Description

PSENmag

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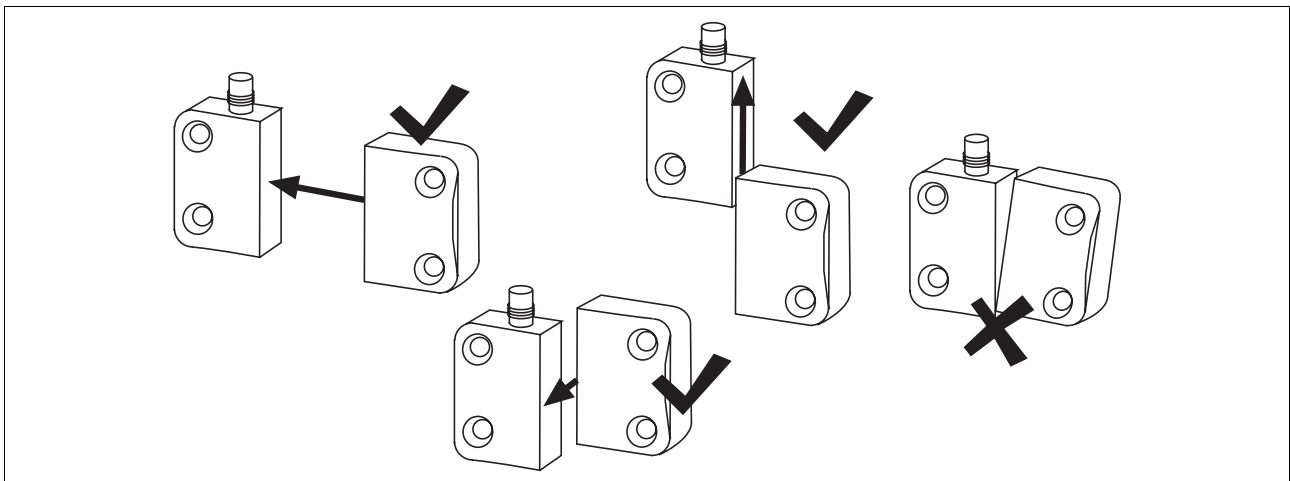


Actuator's direction of movement

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.



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.

Compact design

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

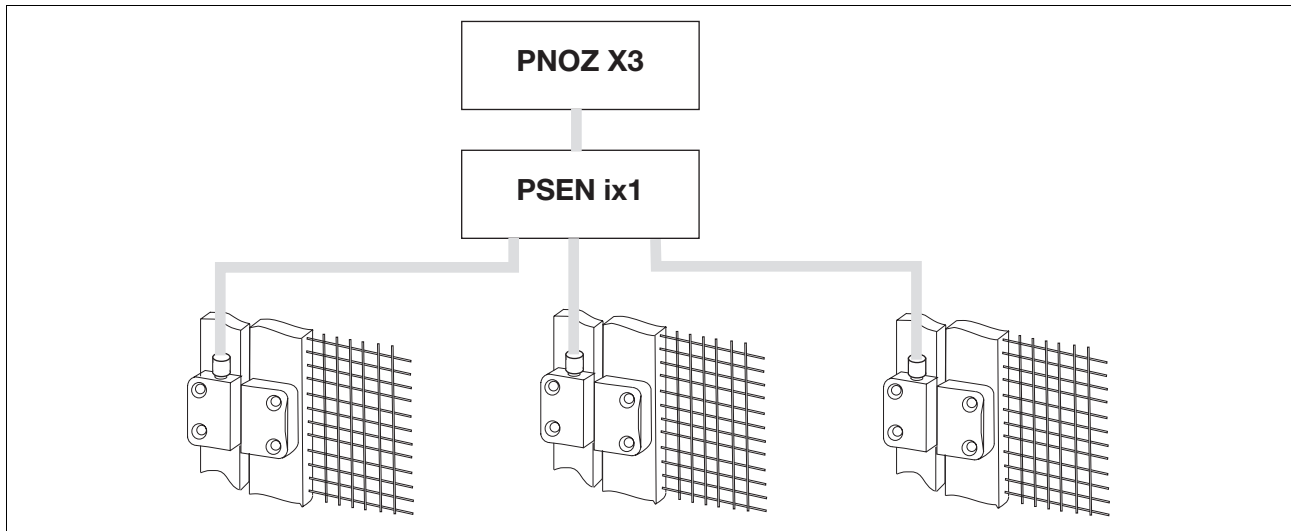
Several safety switches are connected to an input on an evaluation device via an interface. This means, for example, that several safety gates on a plant can be monitored using a single evaluation device. The interface type and the number of safety switches that can be connected will depend on the selected evaluation device. The interface connects the safety switches in series to the evaluation device.

Description

PSENmag

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 PSENmag safety switches 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 the chapter entitled "Chemical resistance".

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.

Connector or cable

The safety switches are available with cable or connector. PSENmag with cable have a 4-core cable of 5 or 10 m length. PSENmag with connectors have a 4-pin male M8 screw connector with lock. They are available straight or angled.

Application areas

Thanks to the high protection type IP65/67 on safety switches with IP69K cable, integral protection against defeat and long service life, the safety switches are suitable for use:

- ▶ In mechanical engineering. And for safety switches with cable in particular:
- ▶ In areas with rigorous hygiene requirements, such as the food, packaging or pharmaceutical industry.

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,

Description

PSENCODE

1.1

Operation of the safety switch

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** conduct 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 contacts **12** and **22** and signal output **Y32** are blocked.

If the shutdown occurs via the inputs, reactivation of the outputs is only possible after both safety inputs are locked simultaneously (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

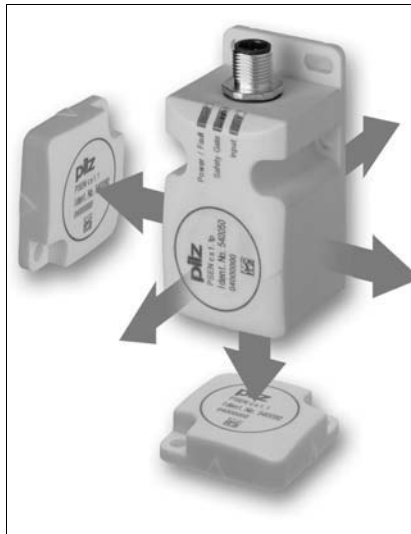
- ▶ Coding
 - Coded actuator: Safety switch only accepts PILZ actuators
 - Fully coded actuator (unique code): The actuator has a unique electronic coding. The safety switch only reacts to a single actuator.
 - Fully coded actuator (unique code, teachable): The actuator has a unique electronic coding. 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).

- ▶ Safety switch with ATEX approval for use in potentially explosive atmospheres.

Directions of actuation

PSENCODE safety switches have 5 different sensing faces:



Description PSENcode

Operating distance

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

Operating distances:

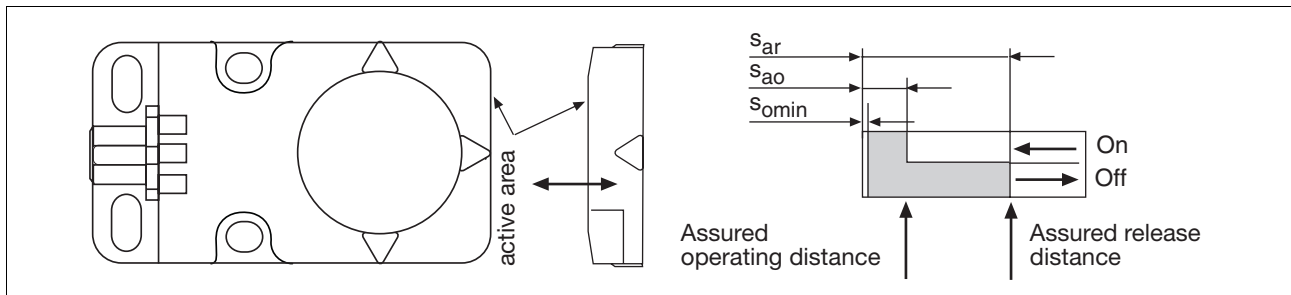
▶ Assured operating distance s_{ao} : This is the distance from the sensing face, within which the presence

of the specified target is correctly detected under all specified environmental conditions, manufacturing tolerances and internal component faults.

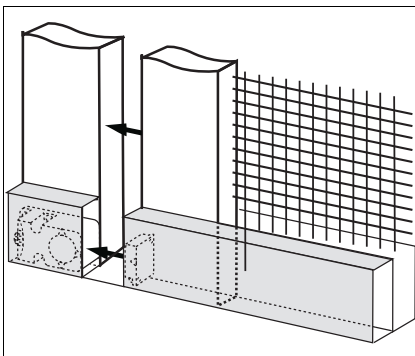
- ▶ Typical operating distance s_o : This is the distance from the sensing face, within which the presence of the specified target is typically detected correctly.
- ▶ Release distance s_r : This is the distance from the sensing face, beyond which the absence

of the specified target is correctly detected under all specified environmental conditions and manufacturing tolerances.

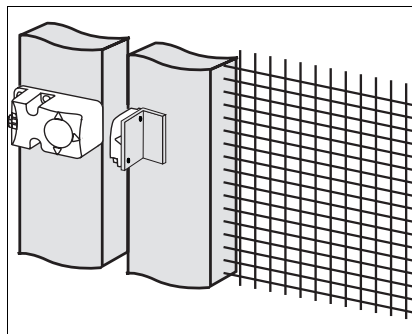
- ▶ Assured release distance s_{ar} : This is the distance from the sensing face, beyond which the absence of the specified target is correctly detected under all specified environmental conditions, manufacturing tolerances **and internal component faults**.



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



Example 1: Concealed installation with 4 mm aluminium, visual contact between actuator and safety switch



Example 2: Installation with actuator on a 4 mm aluminium bracket and the safety switch flush on to aluminium

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.

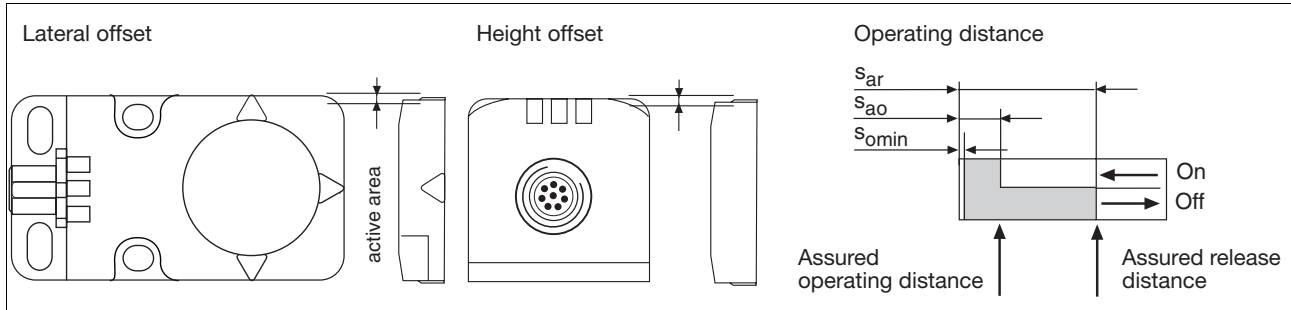
Lateral and vertical offset:

The operating 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. Operating 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").

Description

PSENcode

1.1

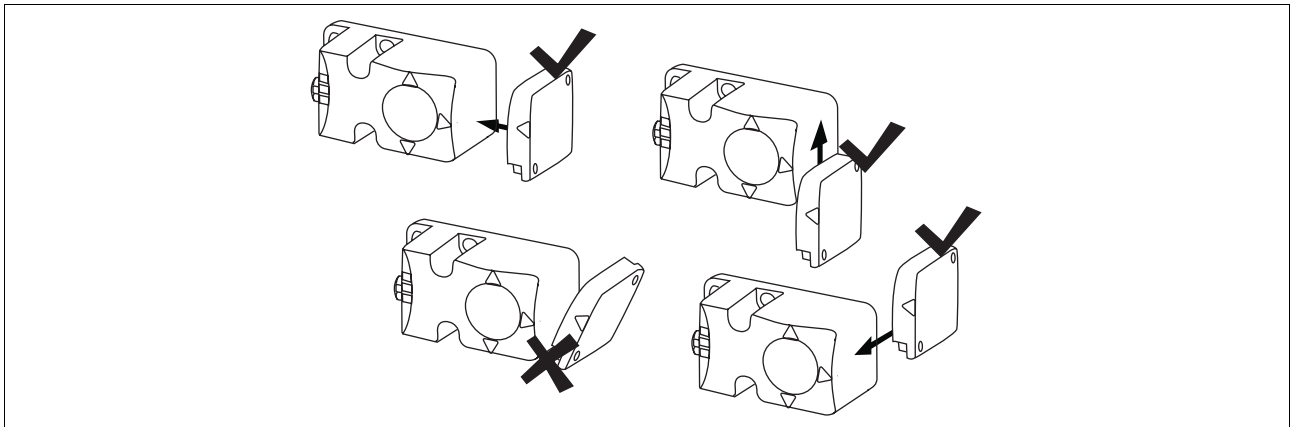


Actuator's direction of movement

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.



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 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 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 auxiliary output, e.g. with a PLC.

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 the chapter entitled “Chemical resistance”.

Description

PSEncode

Cable with connector

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

Category

PSEncode safety switches have a dual-channel structure. They are classified as PDF-M in accordance with EN 60947-3 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.

Safety

Safety

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Safety Safety

1.2

Safety assessment

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 (see "Technical details").
- ▶ Do not open the housing or make any unauthorised modifications.
- ▶ Failure to comply with the safety requirements will render the guarantee invalid.

Intended use

The units' intended use depends on the individual unit and is therefore explained in the chapter entitled "Units".

Safety
Safety

Installation and adjustment

Installation and adjustment

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Installation and adjustment

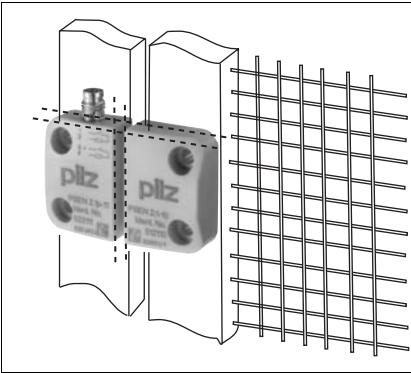
PSENmag

1.3

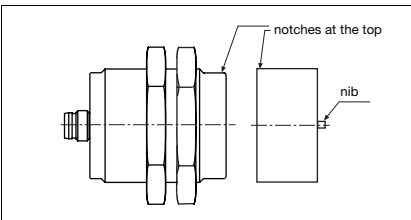
Installation position

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. Operating distances may deviate if other arrangements are used.

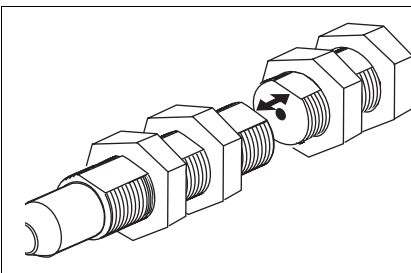
Further information about the operating distances and the maximum permitted lateral and vertical offset can be found in the chapters entitled "Description" and "Units".



On units with a round M30 design, make sure that the two notches are exactly opposite each other. A nib on the actuator prevents it twisting.



On units with a round M12 design, make sure that the two bevelled surfaces are exactly opposite each other.



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 operating 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. Messing).

Round design:

- ▶ Secure the safety switch using the M30 or M12 nuts provided. The torque setting for the nuts is max. 300 Ncm.

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 operating distance stated in the technical details.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ Some safety switches have an LED. There are 2 types:
 - The LED lights when the contacts are unoperated (safety de-

vice 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.

- (PSEN with round M12 design only): The LED lights when the contacts are operated (safety device closed). The LED goes out when the contacts are unoperated.

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 "Units".

Installing the interfaces PSEN i1 and PSEN ix1

- ▶ 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.
- ▶ Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Installation accessories

Spacer for safety switch in square design

If the safety switch and actuator are installed on to ferromagnetic material, the operating distances may vary. In this case, use the spacer available under order number 534 310 (see chapter entitled "Accessories").

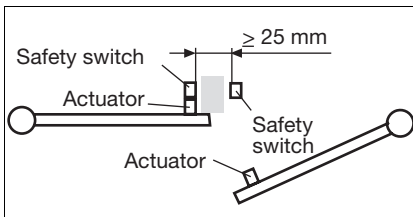
Bracket for safety switch in square design

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 (see chapter entitled "Accessories").

Installation and adjustment PSENmag

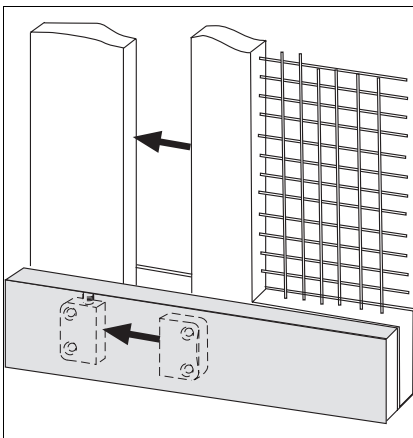
Swing gates

On swing gates the safety switch must be positioned on the closed edge. The distance between the two systems comprising safety switch and actuator must be at least 25 mm.



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.



Installation and adjustment

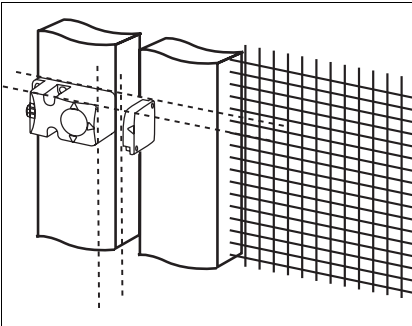
PSENcode

1.3

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. Operating distances may deviate if other arrangements are used.

Further information about the operating distances and the maximum permitted lateral and vertical offset can be found in the chapters entitled "Description" and "Units".



Installation guidelines

- ▶ If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating 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 a limit stop

Attachment

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

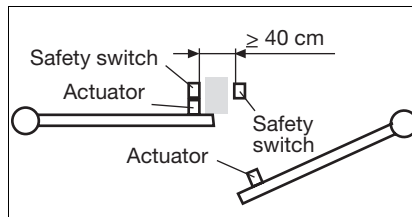
The actuator should be secured permanently to guarantee security against manipulation.

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 operating distance stated in the technical details.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The "Safetygate" LED on the safety switch illuminates yellow when the actuator is in the response range (guard closed, safety switch and actuator adjusted).

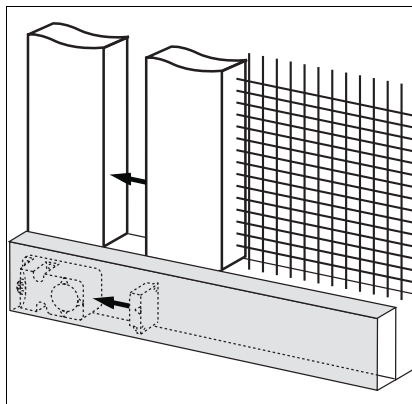
Swing gates

On swing gates the safety switch must be positioned on the closed edge. The distance between the two systems comprising safety switch and actuator must be at least 40 cm.



Concealed installation

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



Installation and adjustment
PSENcode

Wiring

Wiring

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Wiring 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.
- ▶ 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.
- ▶ Calculation of the max. cable runs l_{\max} in the input circuit:
 $R_{l_{\max}}$ = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

Permitted evaluation devices

Operation of the safety switches is only approved in conjunction with certain evaluation devices.

The permitted evaluation devices and the way in which they are connected are unit-specific and are described for each device in the chapter entitled "Units".

Wiring

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.
- ▶ 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.

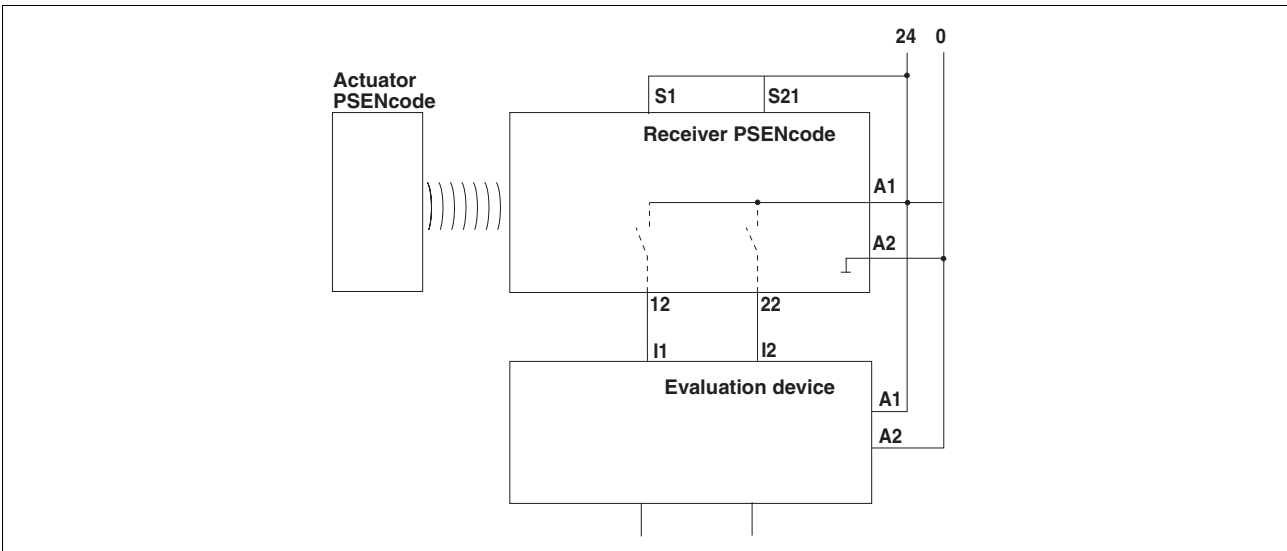
- ▶ Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

Connection examples

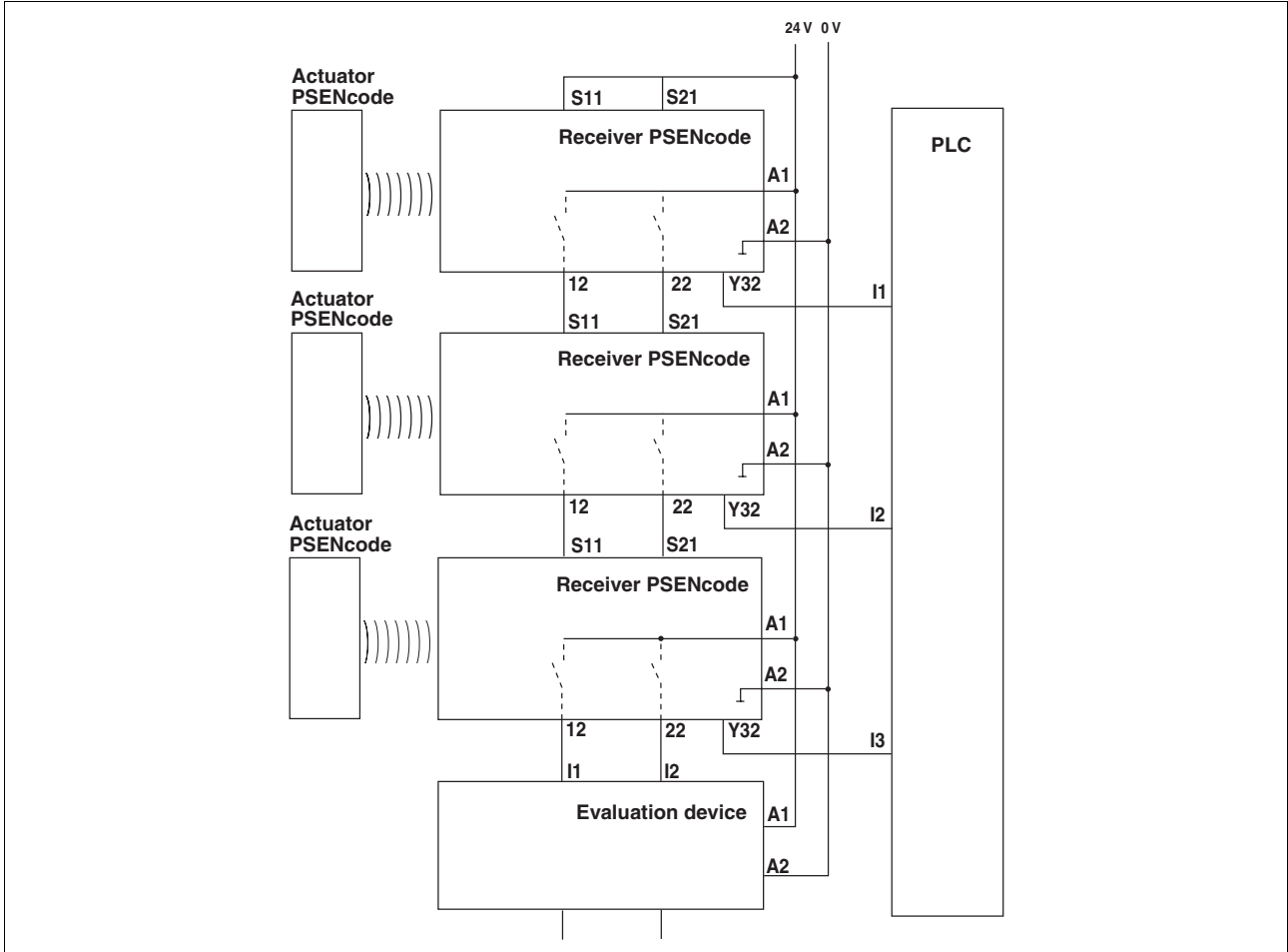
Single connection



Wiring

PSENcode

Series connection



Permitted evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.

The connection to the permitted Pilz evaluation devices is described for each device in the chapter entitled "Units".

Wiring PSENcode

Diagnostics

Diagnostics

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Diagnosics

PSENcode

Status indicator

During operation, 3 LEDs indicate the operating status and the unit's fault statuses:

- ▶ "POWER/Fault" LED illuminates green: The unit is ready for operation
- ▶ "Safetygate" LED illuminates yellow: Actuator is in the response range

- ▶ "Input" LED illuminates yellow: Input circuits are closed or a HIGH signal is present

Error

Fault conditions are indicated by flashing the LEDs. Some errors are displayed through periodic flashing (see table); 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 of the "Input" or "Safetygate" 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.

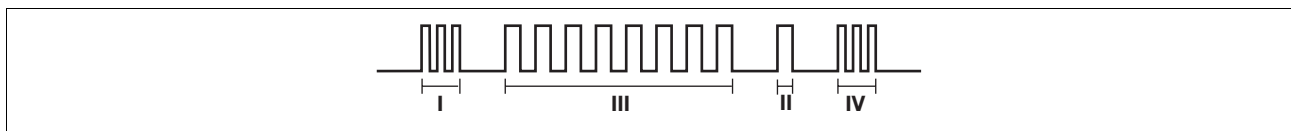
1.5

LED	Error	Remedy
LEDs unlit	Supply voltage is missing, too low, wrongly connected	Connect 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
"Safetygate" 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:
- ▶ "Safetygate" or "Input" LED flashes 8 times, briefly
 - ▶ 3 times, briefly
 - ▶ Pause
 - ▶ 8 times for one second each
 - ▶ Break
 - ▶ Once for one second



I Code for error message

II Code for 1st digit

III Code for 2nd digit

IV Repetition of code for error message

Error code decimal	Number of flashes	Description	Remedy
1,4,1	3x short – 1x long – 4x long – 1x long – 3x short	At least one of the two safety outputs 12 and 22 have voltage applied during system run-up	Check the wiring of terminals 12 and 22, rectify the wiring error

Diagnostics

PSENcode

Error code decimal	Number of flashes	Description	Remedy
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 12 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

Chemical resistance

Chemical resistance

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Chemical resistance

Chemical resistance

Chemical resistance of the housing material

- ▶ PSENmag safety switch
- ▶ PSENmag actuator
- ▶ PSEncode safety switch

The resistance values listed here are only standard values and may be fun-

damentally 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	Resistance to	Resistance level
Acetaldehyde (ethanal)	A	Potassium carbonate (potash)	A
Acetic anhydride	A	Potassium nitrate (potash nitre)	A
Acetone	B	Potassium manganate 10 %	A
Ethanol (acetaldehyde)	A	Carbolic acid (phenol)	C
Ethanol (ethyl alcohol, spirit)	A	Castor oil	A
Ether (diethyl)	A	Kerosene	A
Ethyl acetate (acetic ether, acetic ester)	B	Silicic acid	A
Ethyl ether (ether, diethyl)	A	Carbonic acid (carbon dioxide)	A
Ethyl alcohol (ethanol, spirit)	A	Carbon tetrachloride (tetrachloromethane)	A
Ethyl chloride (chloroethane)	A	Nitrohydrochloric acid (HNO ₃ /HCl)	C
Ethylene chloride (1,2 dichloroethane)	C	Copper nitrate, aqueous	A
Ethylene glycol (glycol, 1,2 ethanediol)	A	Blue vitriol (copper sulphate)	A
Ethylene glycol (cellosolve)	A	Laughing gas (nitric oxide)	A
Caustic potash (potassium hydroxide)	B	Lanolin (wool fat)	A
Caustic soda (sodium hydroxide)	B	Linseed oil	A
Allyl alcohol (2 propene 1-cl)	A	Lighting gas	A
Aluminium hydroxide	A	Magnesium carbonate	A
Aluminium nitrate	A	Magnesium nitrate	A
Formic acid	A	Magnesium sulphate (Epsom salts)	A
Aminobenzene (aniline)	A	Seawater	A
Ammonia (aqueous) (liquid ammonia)	A	Menthol	A
Ammonia 30%	A	Methanal (formaldehyde)	A
Ammonium chloride (salmiac)	A	Methane (pit gas, natural gas)	A
Ammonium hydroxide (aqueous ammonia)	A	Methanol (methane alcohol, wood spirit)	A
Ammonium bicarbonate (sal volatile)	A	Methyl acetate	A
Ammonium nitrate (fertiliser)	A	Methane alcohol	A
Ammonium phosphate (fertiliser)	A	Methyl ethyl ketone	A
Amyl alcohol (pentanol, pentyl alcohol)	A	Methylbenzoyl (toluene)	A
Anethole	A	Methylcellosolve (methyl glycol)	A
Aniline (aminobenzene)	A	Methylchloride	D
Argon	A	Methylchloroform (trichloroethylene, chloroethene)	A
Barium chloride	A	Methylene chloride (dichloromethane)	D
Barium sulphate (baryte)	A	Methyl glycol (methyl cellosolve)	A
Barium sulphide	A	Mineral oils	A
Benzaldehyde (bitter almond oil)	A	Monochloroacetic acid (chlorobenzoyl)	A
Benzine, lead-free	A	Myristil alcohol (myristic alcohol)	A
Benzine, super	A	Naphtha / crude oil	A
Benzoic acid	A	Naphthalene (mineral oil)	A
Benzol	A	Sodium bicarbonate	A
Benzyl alcohol (phenylcarbinol)	A	Sodium bisulphate	A
Benzyl chloride (d-chlorotoluene)	A	Sodium borate	A
Javel water (12.5% Cl ₂)	A	Sodium chloride (salt)	A
Borax	A	Sodium hydroxide (caustic soda, sodium hydroxide)	B
Boric acid	A	Sodium hypochlorite (javel water)	A
Brake fluid (DIN 53521)	A	Sodium carbonate	A

Chemical resistance

Chemical resistance

Resistance to	Resistance level	Resistance to	Resistance level
Butane, liquid	A	Sodium nitrate (Chile salpêtre)	A
Butanol (butyl alcohol)	B	Sodium sulphate (mirabilite)	A
Butanone-2	A	Sodium sulphide	A
Butyl acetate	A	Sodium borate (borax)	A
Butyl alcohol (butanol)	B	Caustic soda (sodium hydroxide)	B
Butyl glycol	A	Nickel sulphate	A
Butyl glycol ether	A	Nitrating acid	B
Calcium carbonate (chalk)	A	Nitrobenzoyl (mirbane)	D
Calcium chloride, aqueous	A	Octane	A
Calcium hydroxide	B	Oleic acid	A
Calcium hypochlorite (bleaching powder)	A	Oleum (fuming sulphuric acid)	C
Calcium sulphate (gypsum)	A	Ozone	A
Cellulose acetate	A	Paraffin	A
Cetyl alcohol (1 hexadecanol)	A	Pentanol (pentyl alcohol, amyl alcohol)	A
Chlorobenzoyl	A	Perchloroethylene (tetrachloroethylene)	A
Chloroform (trichloromethane)	B	Perchloric acid	A
Chloroethene (trichloroethene)	A	Petroleum, kerosene	A
Hydrochloric acid	A	Phenol (carbolic acid)	C
Chromic acid 50 %	A	Phenylcarbinol (benzyl carbinol)	A
Chromic acid anhydride (chromium trioxide)	A	Phosphoric acid	A
Citric acid	A	Polyglycol	A
Cyclohexanol (hexalin)	A	Propanol (propyl alcohol)	A
Dextrin	A	Propanone (acetone)	B
Diacetone alcohol (Pyranon, Dial, DA)	A	Propyl alcohol	A
Diethyl ether (ether)	A	Mercury	A
Dibutyl ether (butyl ether)	A	Castor oil	A
Dibutylphthalate	A	Crude oil	A
Dibutylsebacate	A	Nitric acid	A
Dichloroethane	C	Nitric acid, concentrated (aqua fortis)	B
Dichloroethylene	B	Nitric acid, fuming	B
Dichloromethane (methylene chloride)	D	Hydrochloric acid, concentrated	A
Dimethyl ether	A	Hydrochloric acid 10 %	A
Dimethylbenzoyl (xylol)	A	Oxygen	A
Dimethyl formamide DMF	B	Sulphur	A
Propanone (acetone)	B	Sulphur ether (diethyl)	A
Dioxan	A	Sulphur chloride (disulphur dichloride)	C
Pure acetic acid (100% acetic acid)	A	Sulphurdichloride	C
Natural gas	A	Sulphur dioxide (sulphuric acid)	B
Vinegar (wine vinegar)	A	Sulphuric acid 10%	A
Acetic ester	B	Sulphuric acid 60%	B
Acetic anhydride	A	Sulphuric acid 95%	C
Acetic ether	B	Sulphuric acid, fuming (oleum)	C
Butyl acetate	A	Sulphur trioxide	C
Methyl acetate	A	Hydrogen sulphide	C
Fat (salad oil)	A	Silver nitrate	A
Fat, mineral	A	Silicone oil	A
Fatty acids above C6	A	Soda, aqueous (sodium carbonate)	A
Fluosilicic acid (hydrofluosilicic acid)	B	Salad oil/fat	A
Hydrofluoric acid	B	Spirits	A
Hydrofluoric acid	B	Stearyl alcohol (1-octadecanol)	A
Formaldehyde (formalin) (methanal)	A	Nitrogen	A
Formamide	A	Styrene (vinylbenzene, phenylethylene)	C
Freon 11 (fluorotrichloromethane)	A	Turpentine oil	A
Freon 12 (dichlorodifluoromethane)	A	Tetrachloroethylene (perchloroethylene)	A
Freon 22 (chlorodifluoromethane)	A	Carbon tetrachloride (tetrachloromethane)	A
Freon 113 (trichlorofluoroethane)	A	Tetrachloromethane (carbon tetrachloride)	A

Chemical resistance

Chemical resistance

Resistance to	Resistance level	Resistance to	Resistance level
Furfuryl alcohol (furfuryl aldehyde, furfural)	A	Tetrahydrofurane (diethylene oxide, tetrahydrofuran)	A
Gasoline	A	Tetrahydronaphthalene (tetralin)	A
Glucose (grape sugar)	A	Toluene (methylbenzoyl)	A
Glycerin /glycerol	A	Trichloroethylene (chloroethene)	A
Glycol (ethylene glycol)	A	Trichloroethylene (trichloroethene)	A
Heptane	A	Trichloromethane (chloroform)	B
Hexahydrobenzene (cyclohexane)	A	Perchloric acid	A
Hexalin (cyclohexanol)	A	Urine	A
Hexane	A	Vaseline oil	A
Isopropanol (persprit)	A	Vinylidene chloride (dichloroethylene)	B
Javel water (sodium hypochloride)	A	Water, spring water	A
Potassium chloride (sylvine)	A	Water, carbonated	A
Potassium hydroxide (caustic potash, caustic potash solution)	B	Hydrogen peroxide	A
Potassium hypochloride	A	Xylol (dimethylbenzoyl)	A
Potassium hypochloride	A	Citric acid	A

1.6

Chemical resistance

Chemical resistance

Chemical resistance of the housing material:

- ▶ Actuator, PSENcode

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	Resistance to	Resistance level
Acetaldehyde (ethanal)	B	Carbonic acid (carbon dioxide)	A
Acetic anhydride	A	Carbon tetrachloride (tetrachloromethane)	C
Acetone	B	Nitrohydrochloric acid (HNO ₃ /HCl)	C
Ethanol (acetaldehyde)	A	Copper nitrate, aqueous	A
Ethanol (ethyl alcohol, spirit)	A	Blue vitriol (copper sulphate)	A
Ether (diethyl)	A	Laughing gas (nitric oxide)	A
Ethyl acetate (acetic ether, acetic ester)	B	Lanolin (wool fat)	A
Ethyl ether (ether, diethyl)	A	Linseed oil	A
Ethyl alcohol (ethanol, spirit)	A	Lighting gas	A
Ethyl chloride (chloroethane)	B	Magnesium carbonate	A
Ethylene chloride (1,2 dichloroethane)	B	Magnesium nitrate	A
Ethylene glycol (glycol, 1,2 ethanediol)	A	Magnesium sulphate (Epsom salts)	A
Ethylene glycol (cellosolve)	A	Seawater	A
Caustic potash (potassium hydroxide)	B	Menthol	A
Caustic soda (sodium hydroxide)	B	Methanal (formaldehyde)	B
Allyl alcohol (2 propene 1-cl)	A	Methane (pit gas, natural gas)	A
Aluminium hydroxide	A	Methanol (methane alcohol, wood spirit)	A
Aluminium nitrate	A	Methyl acetate	B
Formic acid	C	Methane alcohol	A
Aminobenzene (aniline)	B	Methyl ethyl ketone	B
Ammonia (aqueous) (liquid ammonia)	A	Methylbenzoyl (toluene)	B
Ammonia 30%	A	Methylcellosolve (methyl glycol)	A
Ammonium chloride (salmiac)	A	Methylchloride	C
Ammonium hydroxide (aqueous ammonia)	A	Methylchloroform (trichloroethylene, chloroethene)	C
Ammonium bicarbonate (sal volatile)	A	Methylene chloride (dichloromethane)	C
Ammonium nitrate (fertiliser)	A	Methyl glycol (methyl cellosolve)	A
Ammonium phosphate (fertiliser)	A	Mineral oils	A
Amyl alcohol (pentanol, pentyl alcohol)	A	Monochloroacetic acid (chlorobenzoyl)	C
Anethole	A	Myristil alcohol (myristic alcohol)	A
Aniline (aminobenzene)	B	Naphtha / crude oil	A
Argon	A	Naphthalene (mineral oil)	A
Barium chloride	A	Sodium bicarbonate	A
Barium sulphate (baryte)	A	Sodium bisulphate	A
Barium sulphide	A	Sodium borate	A
Benzaldehyde (bitter almond oil)	B	Sodium chloride (salt)	A
Benzine, lead-free	A	Sodium hydroxide (caustic soda, sodium hydrate)	B
Benzine, super	A	Sodium hypochlorite (javel water)	A
Benzoic acid	A	Sodium carbonate	A
Benzol	B	Sodium nitrate (Chile salpetre)	A
Benzyl alcohol (phenylcarbinol)	A	Sodium sulphate (mirabilite)	A
Benzyl chloride (d-chlorotoluene)	A	Sodium sulphide	A
Javel water (12.5% Cl ₂)	A	Sodium borate (borax)	A
Borax	A	Caustic soda (sodium hydroxide)	B
Boric acid	A	Nickel sulphate	A
Brake fluid (DIN 53521)	A	Nitrating acid	B
Butane, liquid	A	Nitrobenzoyl (mirbane)	B

Chemical resistance

Chemical resistance

Resistance to	Resistance level	Resistance to	Resistance level
Butanol (butyl alcohol)	A	Octane	A
Butanone-2	A	Oleic acid	A
Butyl acetate	B	Oleum (fuming sulphuric acid)	C
Butyl alcohol (butanol)	A	Ozone	A
Butyl glycol	A	Paraffin	A
Butyl glycol ether	A	Pentanol (pentyl alcohol, amyl alcohol)	A
Calcium carbonate (chalk)	A	Perchloroethylene (tetrachloroethylene)	C
Calcium chloride, aqueous	A	Perchloric acid	C
Calcium hydroxide	B	Petroleum, kerosene	A
Calcium hypochlorite (bleaching powder)	A	Phenol (carbolic acid)	B
Calcium sulphate (gypsum)	A	Phenylcarbinol (benzyl carbinol)	A
Cellulose acetate	A	Phosphoric acid	C
Cetylic alcohol (1 hexadecanol)	A	Polyglycol	A
Chlorobenzoyl	C	Propanol (propyl alcohol)	A
Chloroform (trichloromethane)	C	Propanone (acetone)	B
Chlorothene (trichloroethene)	C	Propyl alcohol	A
Hydrochloric acid	B	Mercury	A
Chromic acid 50 %	B	Castor oil	A
Chromic acid anhydride (chromium trioxide)	A	Crude oil	A
Citric acid	A	Nitric acid	C
Cyclohexanol (hexalin)	A	Nitric acid, concentrated (aqua fortis)	D
Dextrin	A	Nitric acid, fuming	D
Diacetone alcohol (Pyranon, Dial, DA)	A	Hydrochloric acid, concentrated	B
Diethyl ether (ether)	A	Hydrochloric acid 10 %	B
Dibutyl ether (butyl ether)	A	Oxygen	A
Dibutylphthalate	A	Sulphur	A
Dibutylsebacate	A	Sulphuric ether (diethyl)	A
Dichloroethane	C	Sulphur chloride (disulphur dichloride)	C
Dichloroethylene	C	Sulphurdichloride	C
Dichloromethane (methylene chloride)	C	Sulphur dioxide (sulphuric acid)	B
Dimethyl ether	A	Sulphuric acid 10%	B
Dimethylbenzoyl (xylol)	B	Sulphuric acid 60%	C
Dimethyl formamide DMF	B	Sulphuric acid 95%	C
Propanone (acetone)	B	Sulphuric acid, fuming (oleum)	C
Dioxan	B	Sulphur trioxide	C
Pure acetic acid (100% acetic acid)	B	Hydrogen sulphide	C
Natural gas	A	Silver nitrate	A
Vinegar (wine vinegar)	A	Silicone oil	A
Acetic ester	B	Soda, aqueous (sodium carbonate)	A
Acetic anhydride	A	Salad oil/fat	A
Acetic ether	B	Spirits	A
Butyl acetate	B	Stearyl alcohol (1-octadecanol)	A
Methyl acetate	B	Nitrogen	A
Fat (salad oil)	A	Styrene (vinylbenzene, phenylethylene)	B
Fat, mineral	A	Turpentine oil	A
Fatty acids above C6	A	Tetrachloroethylene (perchloroethylene)	C
Fluosilicic acid (hydrofluosilicic acid)	B	Carbon tetrachloride (tetrachloromethane)	C
Hydrofluoric acid	C	Tetrachloromethane (carbon tetrachloride)	C
Hydrofluoric acid	C	Tetrahydrofurane (diethylene oxide, tetramethyloxide)	B
Formaldehyde (formalin) (methanal)	C	Tetrahydronaphthalene (tetralin)	B
Formamide	A	Toluene (methylbenzoyl)	B
Furfurylalcohol (furfuryl aldehyde, furfural)	A	Trichloroethylene (chlorothene)	C
Gasoline	A	Trichloroethylene (trichloroethene)	C
Glucose (grape sugar)	A	Trichloromethane (chloroform)	C
Glycerin /glycerol	A	Perchloric acid	C
Glycol (ethylene glycol)	A	Urine	A

Chemical resistance

Chemical resistance

Resistance to	Resistance level	Resistance to	Resistance level
Heptane	B	Vaseline oil	A
Hexahydrobenzene (cyclohexane)	A	Vinylidene chloride (dichlorethylene)	C
Hexalin (cyclohexanol)	A	Water, spring water	A
Hexane	A	Water, carbonated	A
Isopropanol (persprit)	A	Hydrogen peroxide	A
Javel water (sodium hypochloride)	A	Xylol (dimethylbenzoyl)	B
Potassium chloride (sylvine)	A	Citric acid	A
Potassium hydroxide (caustic potash, caustic potash solution)	A		
Potassium hypochloride	A		
Potassium carbonate (potash)	A		
Potassium nitrate (potash nitre)	A		
Potassium manganate 10 %	A		
Carbolic acid (phenol)	C		
Castor oil	A		
Kerosene	B		
Silicic acid	A		

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Selection guide

Selection guide

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Selection guide

PSENmag Part 1

Type Safety switch	Actuator	Assured operating/ release distance <i>sao</i> / <i>sar</i>	Switch type	Design	LED	Connection
PSEN 1.1p-10	PSEN 1.1-10	3 mm / 19 mm	2 N/O	Square	No	Connector
PSEN 1.1p-12	PSEN 1.1-10	3 mm / 19 mm	2 N/O	Square	No	Connector
PSEN 1.1a-20	PSEN 1.1-10	8 mm / 26 mm	2 N/O	Square	No	Cable, 5 m
PSEN 1.1b-20	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Cable, 10 m
PSEN 1.1p-20	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Connector
PSEN 1.1a-22	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Cable, 5 m
PSEN 1.1b-22	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Cable, 10 m
PSEN 1.1p-22	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Connector
PSEN 1.1b-23 ATEX	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Cable, 10 m
PSEN 1.1p-23 ATEX	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Connector
PSEN 1.1b-25	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Cable, 10 m
PSEN 1.1p-25	PSEN 1.1-20	8 mm / 26 mm	2 N/O	Square	No	Connector
PSEN 1.2p-20	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	Connector
PSEN 1.2p-22	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	Connector
PSEN 1.2p-23 ATEX	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	Connector
PSEN 1.2p-25 ATEX	PSEN 1.2-20	8 mm / 26 mm	2 N/O	Round	No	Connector

Selection guide

PSENmag Part 1

Type Safety switch	Actuator	Evaluation device	Connection to evaluation device	Page
PSEN 1.1p-10	PSEN 1.1-10	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-28
PSEN 1.1p-12	PSEN 1.1-10	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-34
PSEN 1.1a-20	PSEN 1.1-10	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-2
PSEN 1.1b-20	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-2
PSEN 1.1p-20	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-40
PSEN 1.1a-22	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-8
PSEN 1.1b-22	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-8
PSEN 1.1p-22	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-46
PSEN 1.1b-23 ATEX	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-14
PSEN 1.1p-23 ATEX	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-52
PSEN 1.1b-25	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-21
PSEN 1.1p-25	PSEN 1.1-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-59
PSEN 1.2p-20	PSEN 1.2-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-66
PSEN 1.2p-22	PSEN 1.2-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-72
PSEN 1.2p-23 ATEX	PSEN 1.2-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Direct	2.2-78
PSEN 1.2p-25 ATEX	PSEN 1.2-20	PNOZ X, PNOZpower, PNOZsigma, PNOZ-multi, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-85

Selection guide

PSENmag Part 2

Type Safety switch	Actuator	Assured operating/ release distance s_{ao}/s_{ar}	Switch type	Design	LED	Connection
PSEN 2.1p-10	PSEN 2.1-10	3 mm / 19 mm	1 N/C /1 N/O	Square	No	Connector
PSEN 2.1p-11	PSEN 2.1-10	3 mm / 19 mm	1 N/C /1 N/O	Square	yes	Connector
PSEN 2.1a-20	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	No	Cable, 5 m
PSEN 2.1b-20	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	No	Cable, 10 m
PSEN 2.1p-20	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	No	Connector
PSEN 2.1p-21	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	yes	Connector
PSEN 2.1p-24 ATEX	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	yes	Connector
PSEN 2.1b-26 ATEX	PSEN 2.1-20	8 mm / 26 mm	1 N/C /1 N/O	Square	yes	Cable, 10 m
PSEN 2.1p-30	PSEN 2.1-10	6 mm / 25 mm	1 N/C /1 N/O	Square	No	Connector
PSEN 2.1p-31	PSEN 2.1-10	6 mm / 25 mm	1 N/C /1 N/O	Square	yes	Connector
PSEN 2.1p-34 ATEX	PSEN 2.1-10	6 mm / 25 mm	1 N/C /1 N/O	Square	yes	Connector
PSEN 2.2p-20	PSEN 2.2-20	8 mm / 26 mm	1 N/C /1 N/O	Round	No	Connector
PSEN 2.2p-21	PSEN 2.2-20	8 mm / 26 mm	1 N/C /1 N/O	Round	yes	Connector
PSEN 2.2p-24 ATEX	PSEN 2.2-20	8 mm / 26 mm	1 N/C /1 N/O	Round	No	Connector
PSEN ma1.3a-20	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 5 m
PSEN ma1.3b-20	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 10 m
PSEN ma1.3a-22	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 5 m
PSEN ma1.3b-22	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 10 m
PSEN ma1.3b-23 ATEX	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 10 m
PSEN ma1.3b-25 ATEX	PSEN ma1.3-08	8 mm / 15 mm	3 N/O	Round, M12	yes	Cable, 10 m

Selection guide

PSENmag Part 2

Type Safety switch	Actuator	Evaluation device	Connection to evaluation device	Page
PSEN 2.1p-10	PSEN 2.1-10	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-104
PSEN 2.1p-11	PSEN 2.1-10	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-110
PSEN 2.1a-20	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-92
PSEN 2.1b-20	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-92
PSEN 2.1p-20	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-116
PSEN 2.1p-21	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-122
PSEN 2.1p-24 ATEX	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-128
PSEN 2.1b-26 ATEX	PSEN 2.1-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-98
PSEN 2.1p-30	PSEN 2.1-10	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-134
PSEN 2.1p-31	PSEN 2.1-10	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-140
PSEN 2.1p-34 ATEX	PSEN 2.1-10	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-146
PSEN 2.2p-20	PSEN 2.2-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-152
PSEN 2.2p-21	PSEN 2.2-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-158
PSEN 2.2p-24 ATEX	PSEN 2.2-20	PNOZelog, PNOZmulti, PSS with/without SafetyBUS P	Direct or via PSEN i1 interface	2.2-164
PSEN ma1.3a-20	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.2-170
PSEN ma1.3b-20	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.2-170
PSEN ma1.3a-22	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-177
PSEN ma1.3b-22	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-177
PSEN ma1.3b-23 ATEX	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.2-184
PSEN ma1.3b-25 ATEX	PSEN ma1.3-08	PNOZ X, PNOZpower, PNOZsigma, PNOZmulti, PSS with/without SafetyBUS p	Via PSEN ix1 interface	2.2-191

Selection guide

PSENcode

Type Safety switch	Actuator	Operating dis- tances s_{ao}/s_{ar}	Coding	LED
PSEN cs1.1p	PSEN cs1.1	15 mm / 21 mm	Coded	Power / Fault, Safety Gate, Input
PSEN cs1.13p ATEX	PSEN cs1.1	15 mm / 21 mm	Coded	Power / Fault, Safety Gate, Input
PSEN cs2.1p	PSEN cs2.1	15 mm / 21 mm	Fully coded (8 x teachable)	Power / Fault, Safety Gate, Input
PSEN cs2.13p ATEX	PSEN cs2.1	15 mm / 21 mm	Fully coded (8 x teachable)	Power / Fault, Safety Gate, Input
PSEN cs2.2p	PSEN cs2.1	15 mm / 21 mm	Fully coded	Power / Fault, Safety Gate, Input

Selection guide

PSENcode

Type Safety switch	Actuator	Evaluation device	Connection to evaluation de- vice	Page
PSEN cs1.1p	PSEN cs1.1	PNOZ X, PNOZelog, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.3-9
PSEN cs1.13p ATEX	PSEN cs1.1	PNOZ X, PNOZelog, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.3-2
PSEN cs2.1p	PSEN cs2.1	PNOZ X, PNOZelog, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.3-23
PSEN cs2.13p ATEX	PSEN cs2.1	PNOZ X, PNOZelog, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.3-16
PSEN cs2.2p	PSEN cs2.1	PNOZ X, PNOZelog, PNOZmulti, PSS with/without SafetyBUS p	Direct	2.3-30

PSENmag

PSENmag

Contents	Page
PSENmag	
PSEN 1.1a/b-20	2.2-2
PSEN 1.1a/b-22	2.2-8
PSEN 1.1b-23	2.2-14
PSEN 1.1b-25	2.2-21
PSEN 1.1p-10	2.2-28
PSEN 1.1p-12	2.2-34
PSEN 1.1p-20	2.2-40
PSEN 1.1p-22	2.2-46
PSEN 1.1p-23	2.2-52
PSEN 1.1p-25	2.2-59
PSEN 1.2p-20	2.2-66
PSEN 1.2p-22	2.2-72
PSEN 1.2p-23	2.2-78
PSEN 1.2p-25	2.2-85
PSEN 2.1a/b-20	2.2-92
PSEN 2.1b-26	2.2-98
PSEN 2.1p-10	2.2-104
PSEN 2.1p-11	2.2-110
PSEN 2.1p-20	2.2-116
PSEN 2.1p-21	2.2-122
PSEN 2.1p-24	2.2-128
PSEN 2.1p-30	2.2-134
PSEN 2.1p-31	2.2-140
PSEN 2.1p-34	2.2-146
PSEN 2.2p-20	2.2-152
PSEN 2.2p-21	2.2-158
PSEN 2.2p-24	2.2-164
PSEN ma1.3a/b-20	2.2-170
PSEN ma1.3a/b-22	2.2-177
PSEN ma1.3b-23	2.2-184
PSEN ma1.3b-25	2.2-191

PSENmag

PSEN 1.1a/b-20



Unit features



- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1a/b-20
	◆
	◆

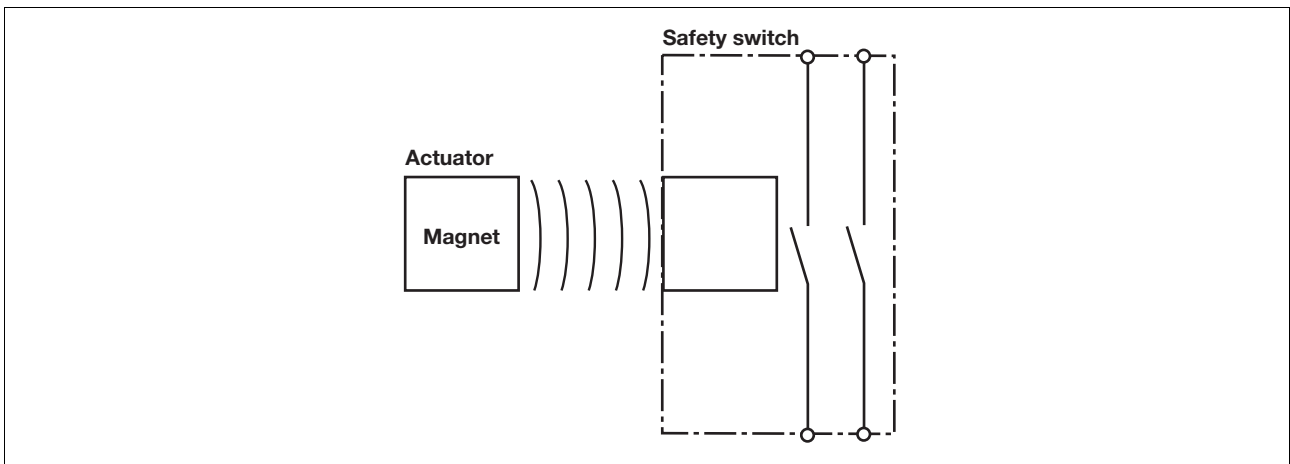
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 1,1-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

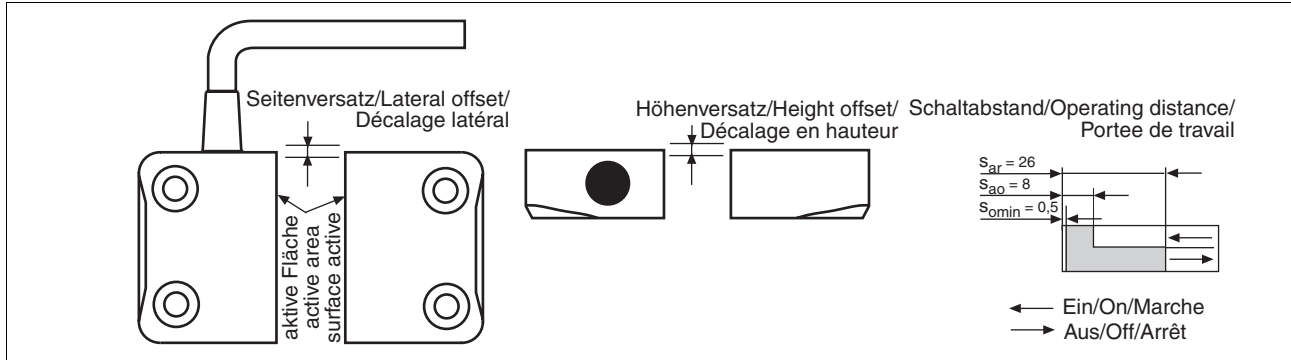
Block diagram



PSENmag

PSEN 1.1a/b-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

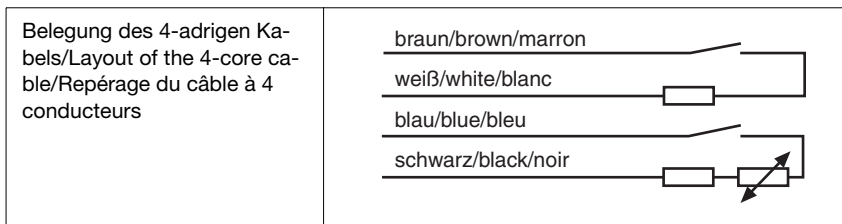
- When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).

- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

The safety switch is shown in an unoperated condition.



PSENmag

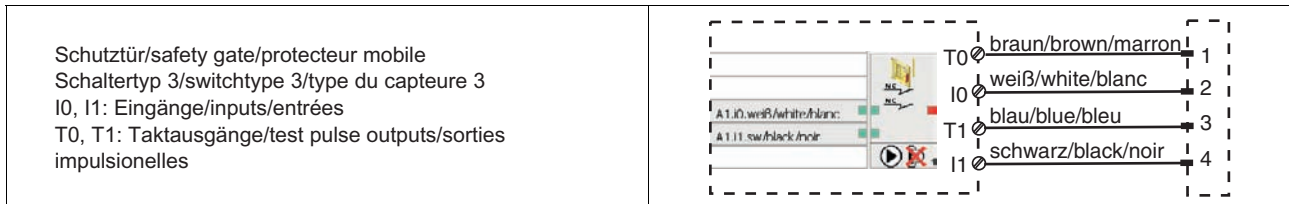
PSEN 1.1a/b-20

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

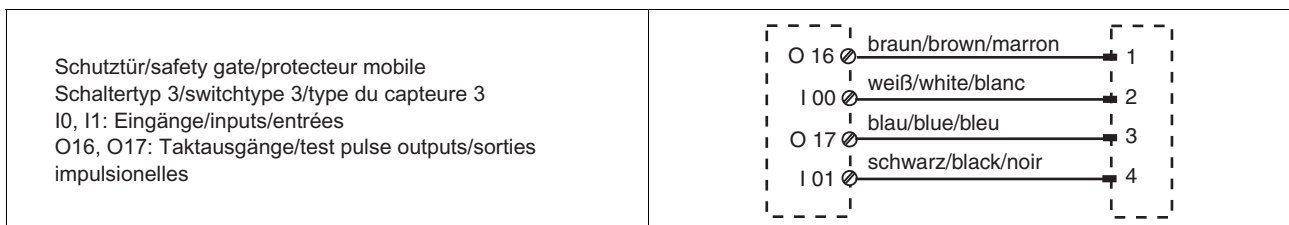
<table border="0"> <tr> <td>PNOZ p1p</td> <td>PNOZ X2C</td> <td>PNOZ e1p</td> </tr> <tr> <td>PNOZ p1vp</td> <td>PNOZ X2.1C</td> <td>PNOZ e1.1p</td> </tr> <tr> <td>PNOZ X2/X2P</td> <td>(nur 24 V DC/</td> <td>PNOZ e1vp</td> </tr> <tr> <td>PNOZ X2.1</td> <td>24 V DC only/</td> <td>PNOZ e6.1p</td> </tr> <tr> <td>(nur 24 V DC/</td> <td>24 V DC seulement)</td> <td>PNOZ e6vp</td> </tr> <tr> <td>24 V DC only/</td> <td>PNOZ X4/X8P</td> <td>PNOZ s3</td> </tr> <tr> <td>24 V DC seulement)</td> <td>PNOZ X9/X9P</td> <td>PNOZ s4</td> </tr> <tr> <td>PNOZ X2.3P</td> <td>PNOZ X10/X10.1</td> <td>PNOZ s5</td> </tr> <tr> <td>PNOZ X2.7P</td> <td>PNOZ X10.11P</td> <td></td> </tr> <tr> <td>PNOZ X2.8P/X2.9P</td> <td>PNOZ Ex</td> <td></td> </tr> </table>	PNOZ p1p	PNOZ X2C	PNOZ e1p	PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p	PNOZ X2/X2P	(nur 24 V DC/	PNOZ e1vp	PNOZ X2.1	24 V DC only/	PNOZ e6.1p	(nur 24 V DC/	24 V DC seulement)	PNOZ e6vp	24 V DC only/	PNOZ X4/X8P	PNOZ s3	24 V DC seulement)	PNOZ X9/X9P	PNOZ s4	PNOZ X2.3P	PNOZ X10/X10.1	PNOZ s5	PNOZ X2.7P	PNOZ X10.11P		PNOZ X2.8P/X2.9P	PNOZ Ex		
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PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p																													
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PNOZ X2.1	24 V DC only/	PNOZ e6.1p																													
(nur 24 V DC/	24 V DC seulement)	PNOZ e6vp																													
24 V DC only/	PNOZ X4/X8P	PNOZ s3																													
24 V DC seulement)	PNOZ X9/X9P	PNOZ s4																													
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PNOZ X2.8P/X2.9P	PNOZ Ex																														
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<table border="0"> <tr> <td>PNOZ 11</td> <td>PNOZ X3.1</td> <td>PNOZ X3.10P</td> </tr> <tr> <td>PNOZ 16</td> <td>PNOZ X3P</td> <td>PNOZ XV2</td> </tr> <tr> <td>PNOZ X11P</td> <td>PNOZ X2.5P</td> <td>PNOZ XV2P</td> </tr> <tr> <td>PNOZ X13</td> <td>PNOZ X3</td> <td>PNOZ XV3</td> </tr> <tr> <td></td> <td></td> <td>PNOZ XV3P</td> </tr> </table>	PNOZ 11	PNOZ X3.1	PNOZ X3.10P	PNOZ 16	PNOZ X3P	PNOZ XV2	PNOZ X11P	PNOZ X2.5P	PNOZ XV2P	PNOZ X13	PNOZ X3	PNOZ XV3			PNOZ XV3P																
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PNOZ 16	PNOZ X3P	PNOZ XV2																													
PNOZ X11P	PNOZ X2.5P	PNOZ XV2P																													
PNOZ X13	PNOZ X3	PNOZ XV3																													
		PNOZ XV3P																													
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>																															
<p>PMUT X1P</p>																															
<p>PNOZ e5.11p</p>																															

PSENmag PSEN 1.1a/b-20

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

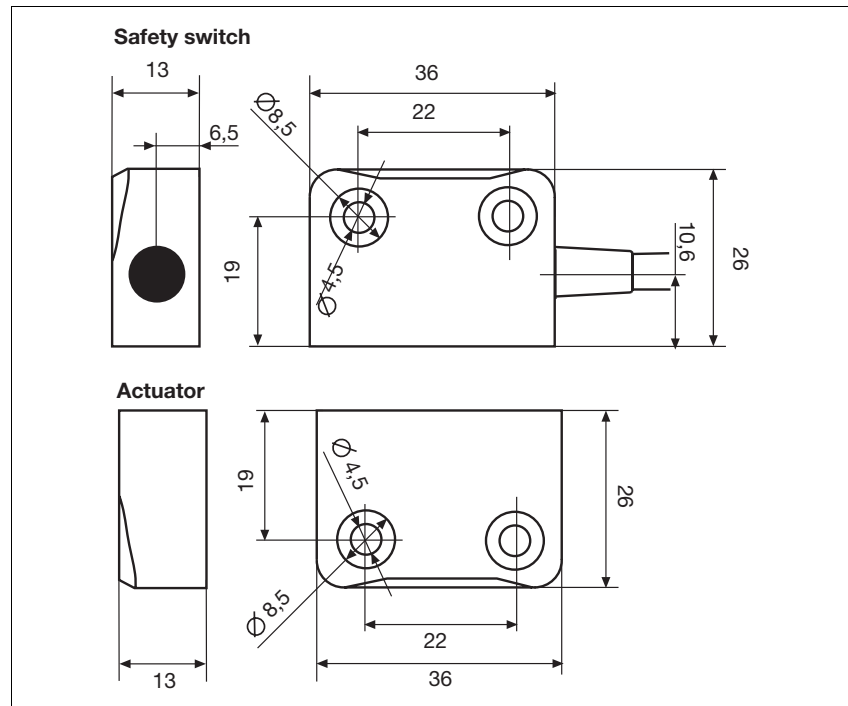
PSENmag

PSEN 1.1a/b-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable Order no.: 504227 5m cable Order no.: 504226
Cable	LiYY 4 x 0,25 mm²
Protection type	IP69K
Housing material	PBT

PSENmag PSEN 1.1a/b-20

Technical details	
Dimensions	
Safety switch	
Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	150 g Order no.: 504226
	320 g Order no.: 504227
Actuator	17 g

The standards current on **2006-12** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN 1.1a-20	1/1	magnetic	Safety switch/actuator	504 226
PSEN 1.1a-20 (switch)	1	magnetic	Safety switch	524 126
PSEN 1.1b-20	1/1	magnetic	Safety switch/actuator	504 227
PSEN 1.1b-20 (switch)	1	magnetic	Safety switch	524 127
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1a/b-22



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description



The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,1-20** and its approved evaluation devices.

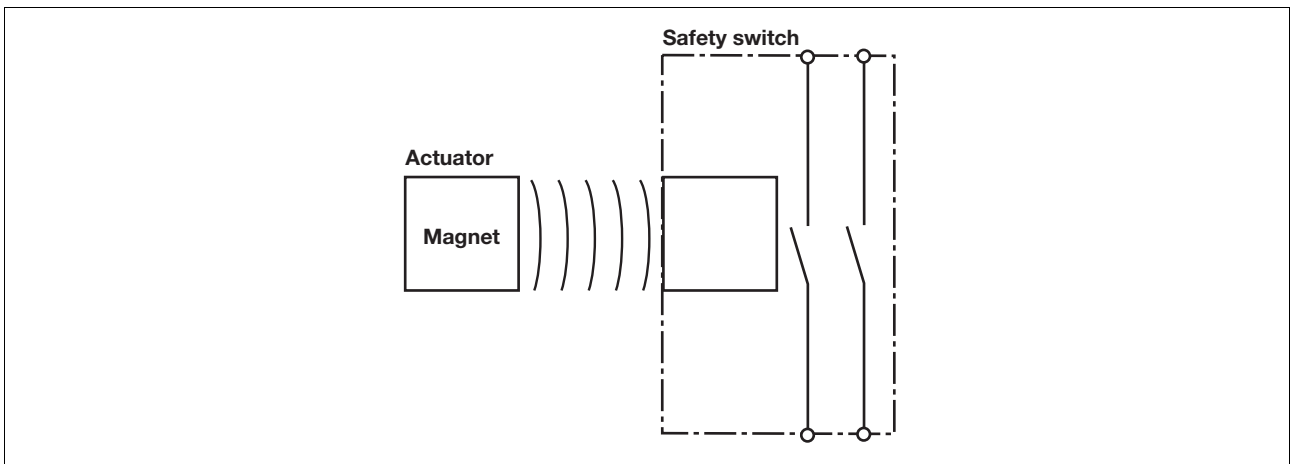
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1a/b-22
	◆
	◆

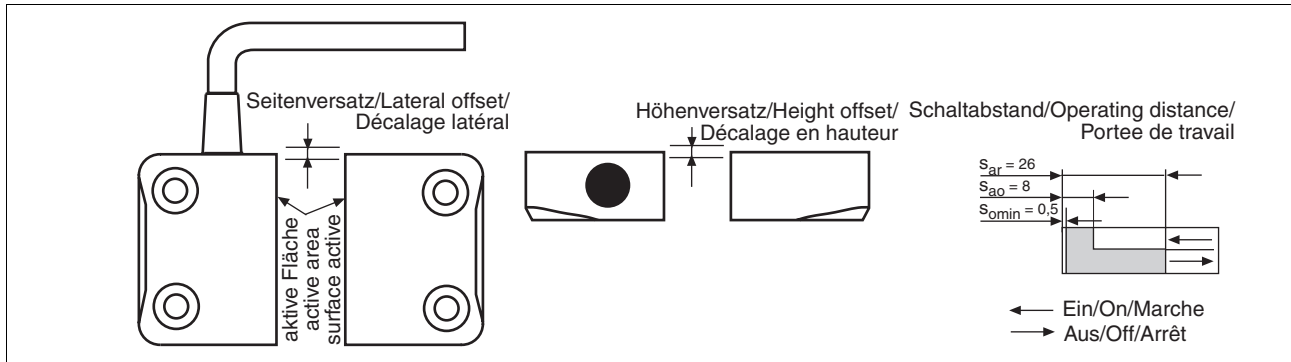
Block diagram



PSENmag

PSEN 1.1a/b-22

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

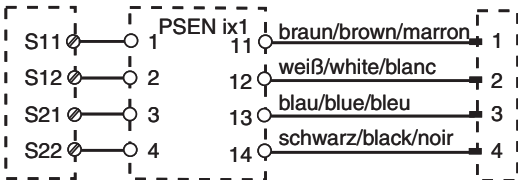
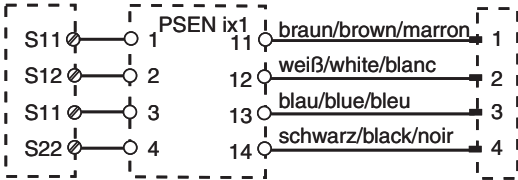
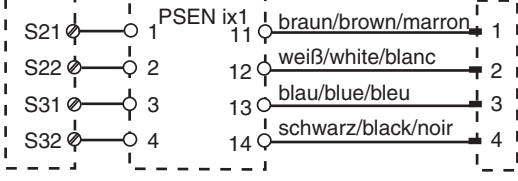
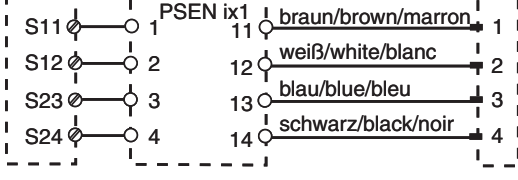
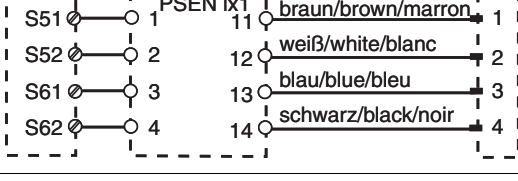
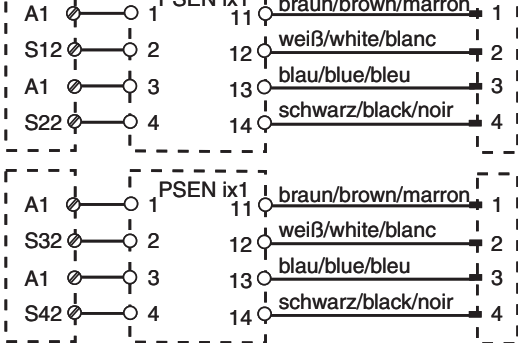
The safety switch is shown in an unoperated condition.

Belegung des 4-adrigen Kabels/Layout of the 4-core cable/ Repérage du câble à 4 conducteurs	braun/brown/marron	
	weiß/white/blanc	
	blau/blue/bleu	
	schwarz/black/noir	

PSENmag

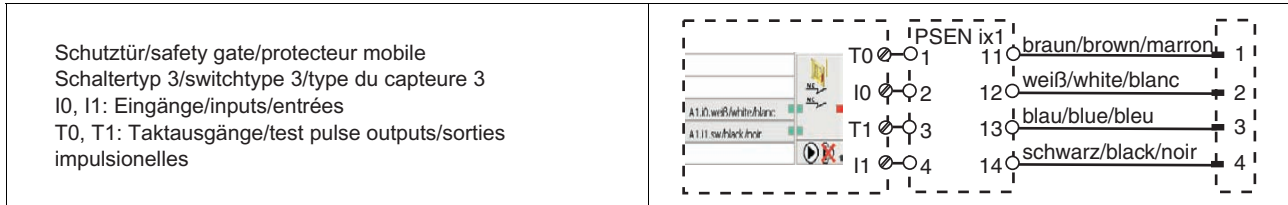
PSEN 1.1a/b-22

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

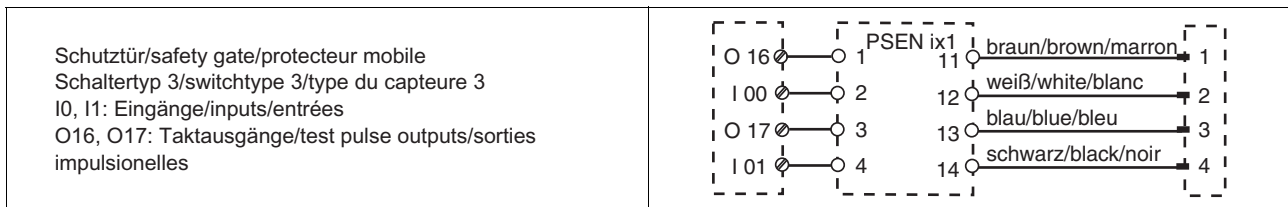
<p>PNOZ p1p PNOZ p1vp PNOZ X2/X2P PNOZ X2.1 (nur 24 V DC/ 24 V DC only/ 24 V DC seulement) PNOZ X2.3P PNOZ X2.7P PNOZ X2.8P/X2.9P</p>	<p>PNOZ X2C PNOZ X2.1C (nur 24 V DC/ 24 V DC seulement) PNOZ X4/X8P PNOZ X9/X9P PNOZ X10/X10.1 PNOZ X10.11P PNOZ Ex</p>	<p>PNOZ e1p PNOZ e1.1p PNOZ e1vp PNOZ e6.1p PNOZ s3 PNOZ s4 PNOZ s5</p>	
<p>PNOZ X5 PNOZ X5J</p>			
<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13</p>	<p>PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3</p>	<p>PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>			
<p>PMUT X1P</p>			
<p>PNOZ e5.11p</p>			

PSENmag PSEN 1.1a/b-22

► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

Installation

- The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- 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. Messing).
- The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- 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

Adjustment

- The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

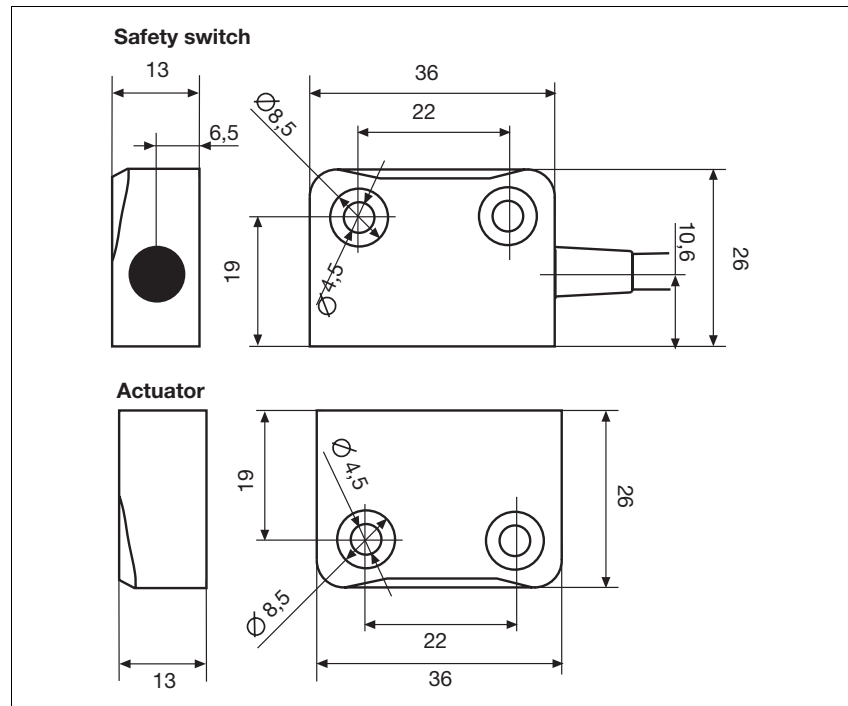
PSENmag

PSEN 1.1a/b-22

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable Order no.: 504229 5m cable Order no.: 504228
Cable	LiYY 4 x 0,25 mm²
Protection type	IP69K
Housing material	PBT

PSENmag

PSEN 1.1a/b-22

Technical details	
Dimensions	
Safety switch	
Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	150 g Order no.: 504228
	320 g Order no.: 504229
Actuator	17 g

The standards current on **2006-12** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN 1.1a-22	1/1	magnetic	Safety switch/actuator	504 228
PSEN 1.1a-22 (switch)	1	magnetic	Safety switch	524 128
PSEN 1.1b-22	1/1	magnetic	Safety switch/actuator	504 229
PSEN 1.1b-22 (switch)	1	magnetic	Safety switch	524 129
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1b-23



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ Safety switch with cable (10 m)
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

The safety switch should only be connected to the evaluation devices listed under "Connections".

Function description

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.

Unit description



The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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).

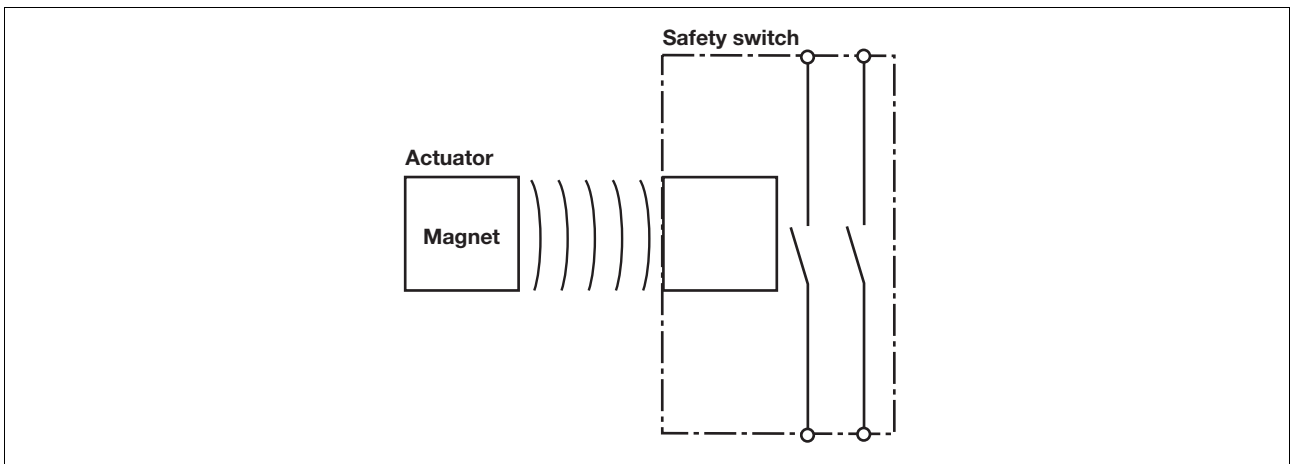
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 1,1-20** or and its approved evaluation devices.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1b-23
	◆
	◆

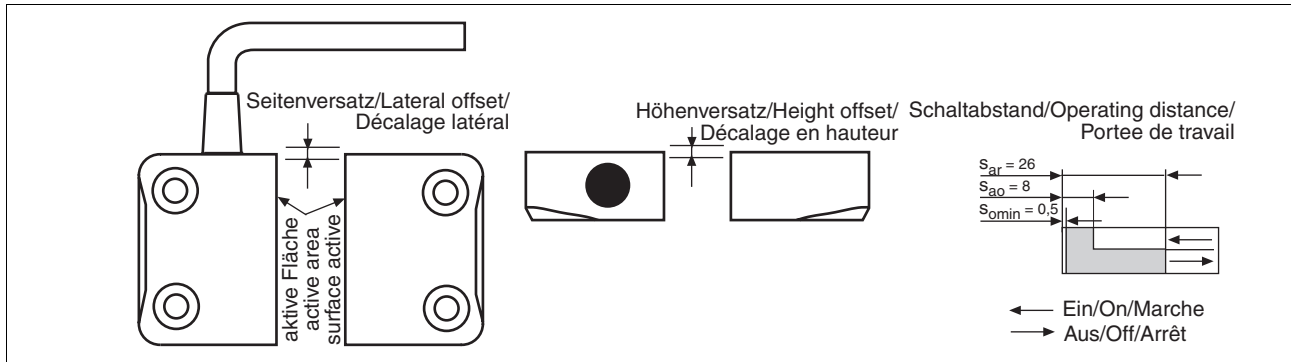
Block diagram



PSENmag

PSEN 1.1b-23

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

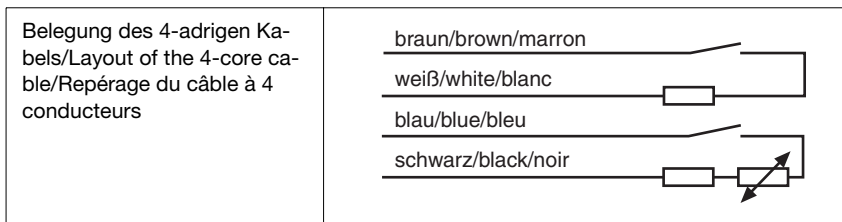
- When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).

- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

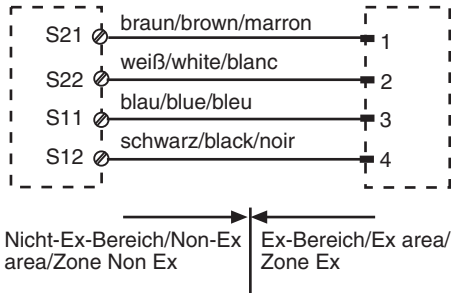
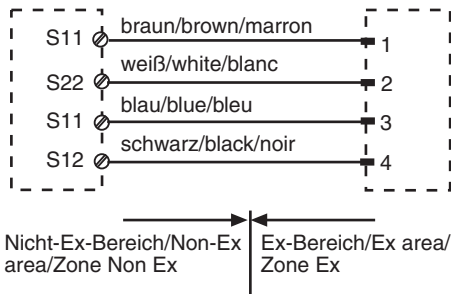
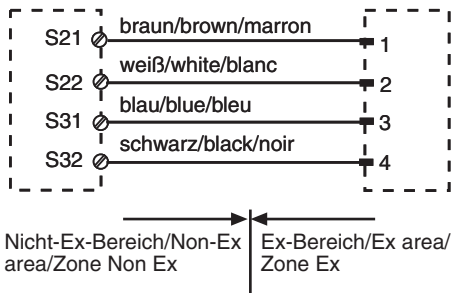
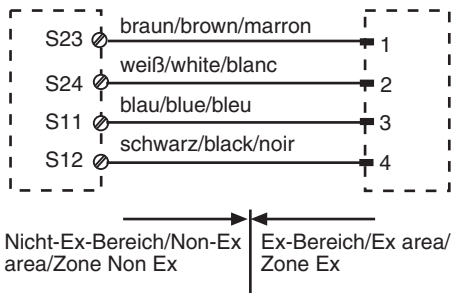
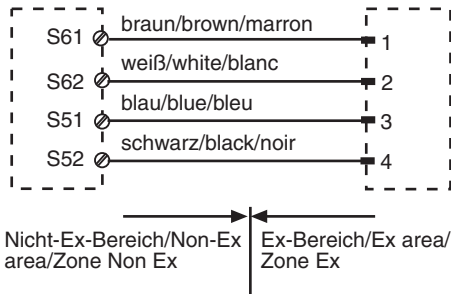
Connections

The safety switch is shown in an unoperated condition.



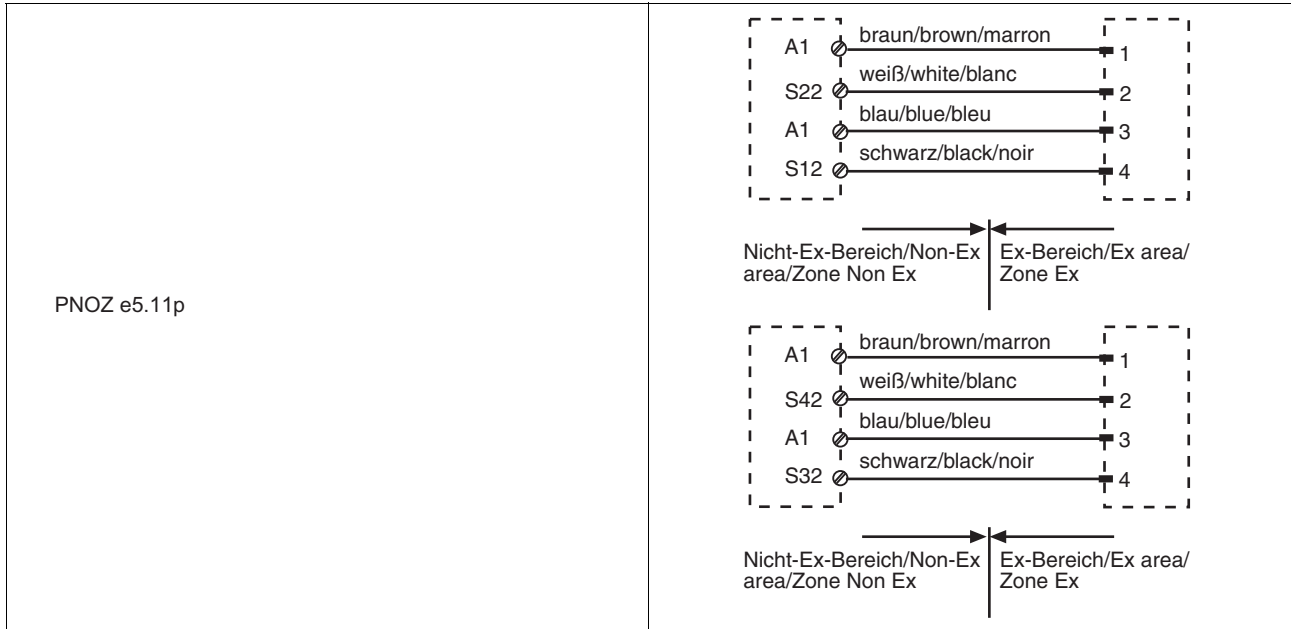
PSENmag PSEN 1.1b-23

- ▶ Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

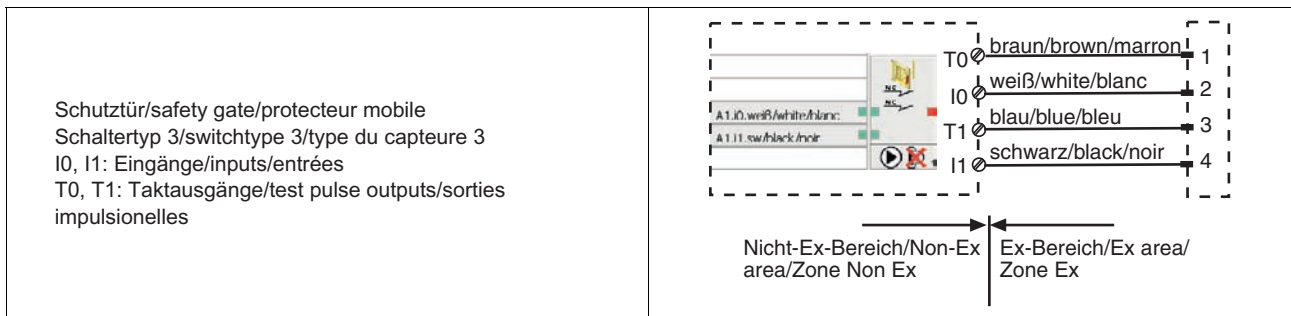
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ X2.1 24 V DC only/ (nur 24 V DC/ 24 V DC only/ 24 V DC seulement) PNOZ X4/X8P PNOZ s3 PNOZ X2.3P PNOZ X10/X10.1 PNOZ s4 PNOZ X2.7P PNOZ X10.11P PNOZ s5 PNOZ X2.8P/X2.9P PNOZ Ex</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	

PSENmag

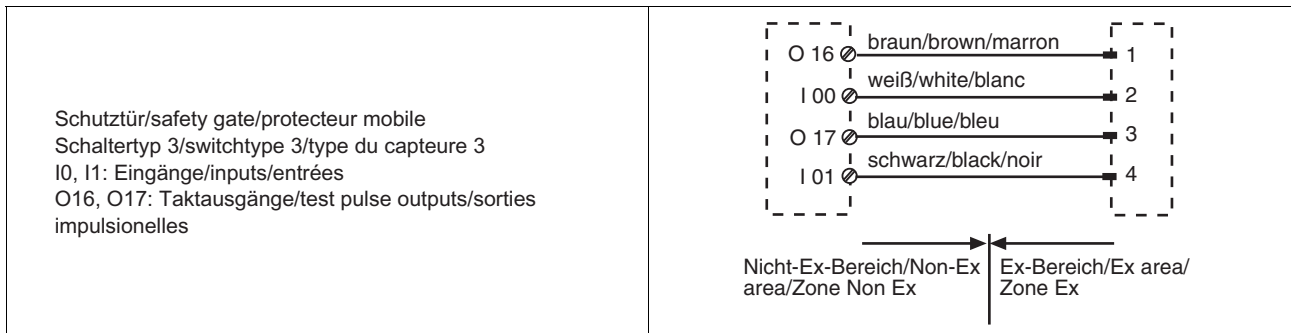
PSEN 1.1b-23



► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 1.1b-23

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

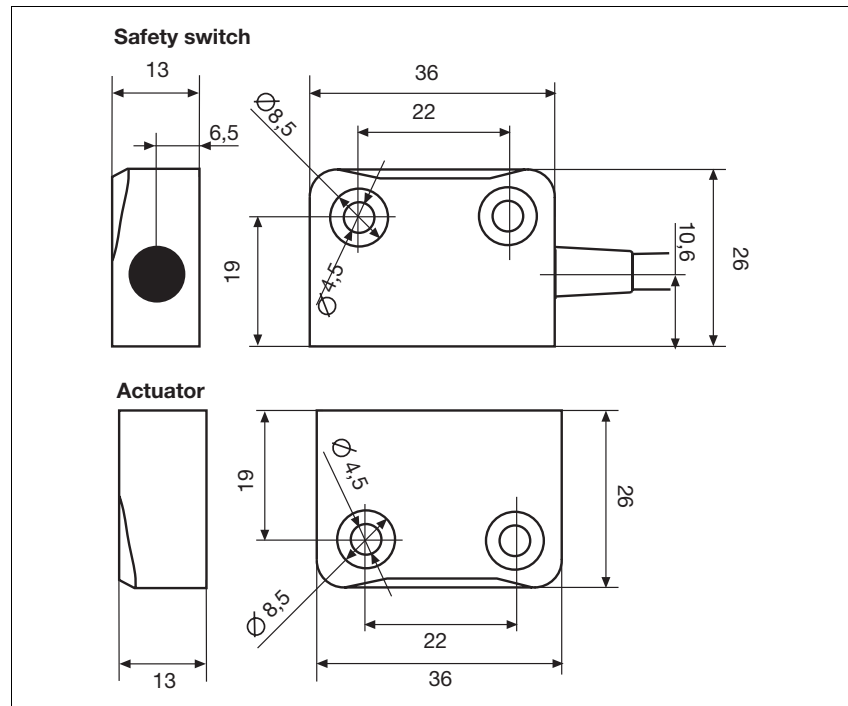
PSENmag

PSEN 1.1b-23

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



2.2

Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable
Cable	LiYY 4 x 0,25 mm ²
Protection type	IP69K
Housing material	PBT

PSENmag

PSEN 1.1b-23

Technical details

Dimensions	
Safety switch	
Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	320 g
Actuator	17 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1-b-23	1/1	magnetic	Safety switch/actuator	504 250
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1b-25



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ Safety switch with cable (10 m)
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

only be connected to the evaluation devices listed under "Connections".

Function description

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.

Unit description



The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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).

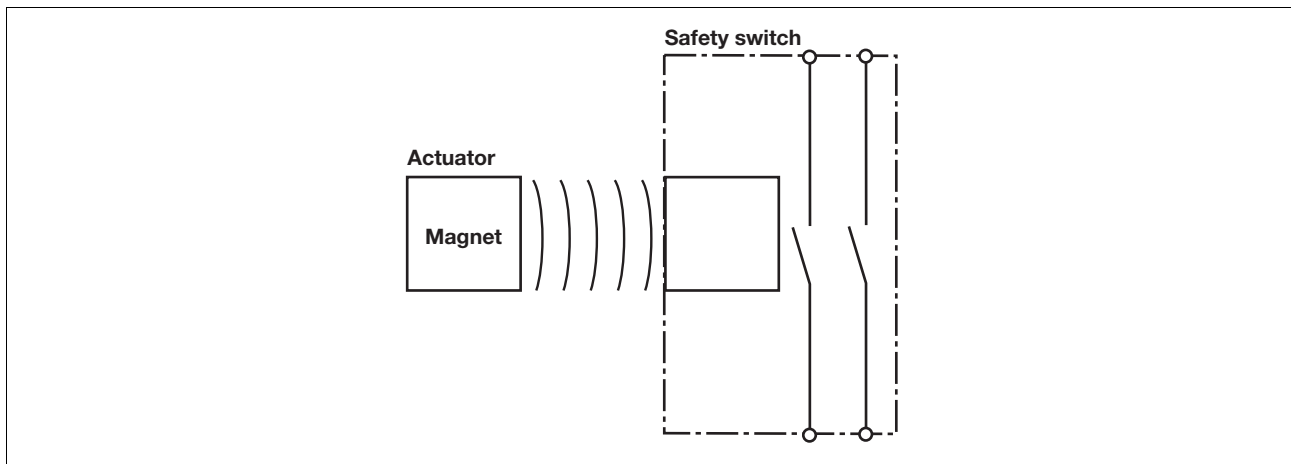
The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,1-20** and its approved evaluation devices. The safety switch should

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

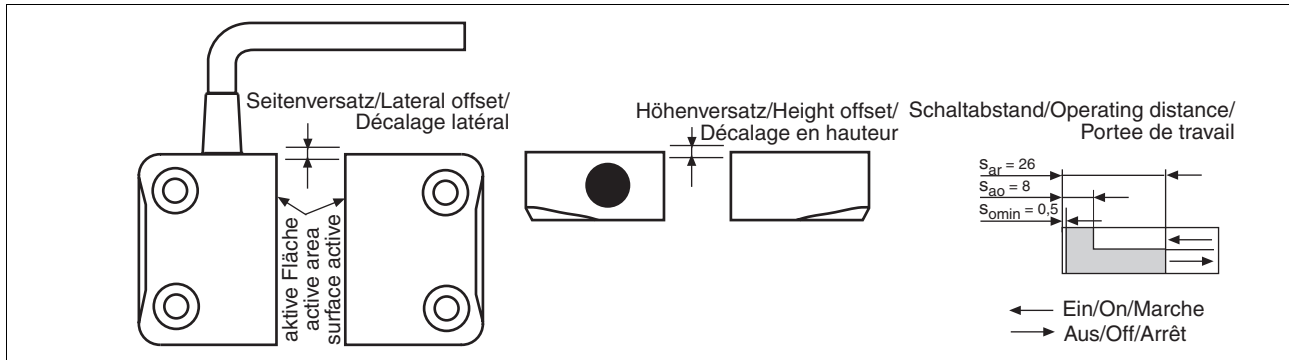
PSEN 1.1b-25	
	◆
	◆

Block diagram



PSENmag PSEN 1.1b-25

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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
The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs l_{max} in the input circuit:
$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

 R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km
- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).
- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

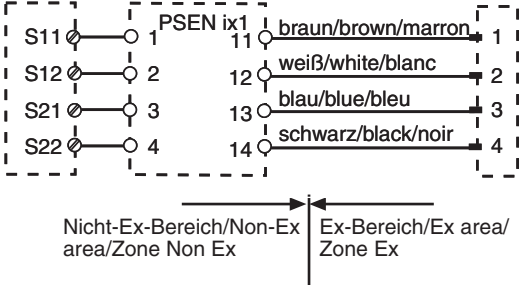
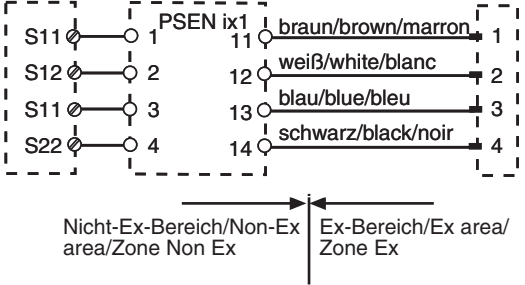
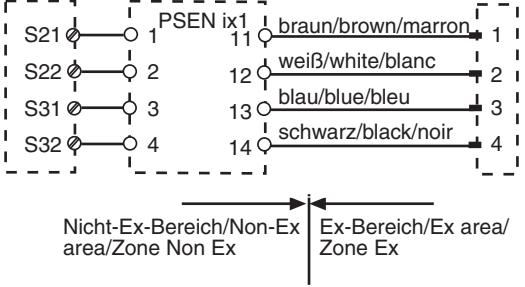
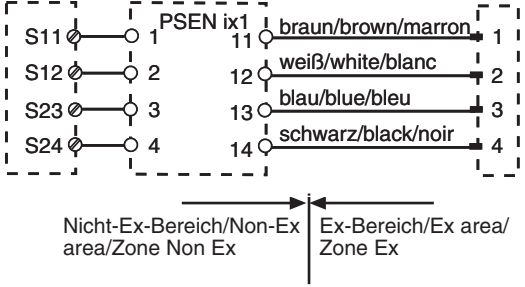
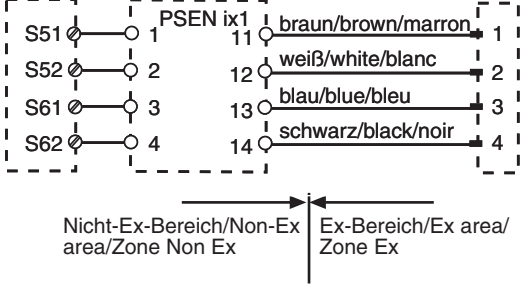
Connections

The safety switch is shown in an unoperated condition.

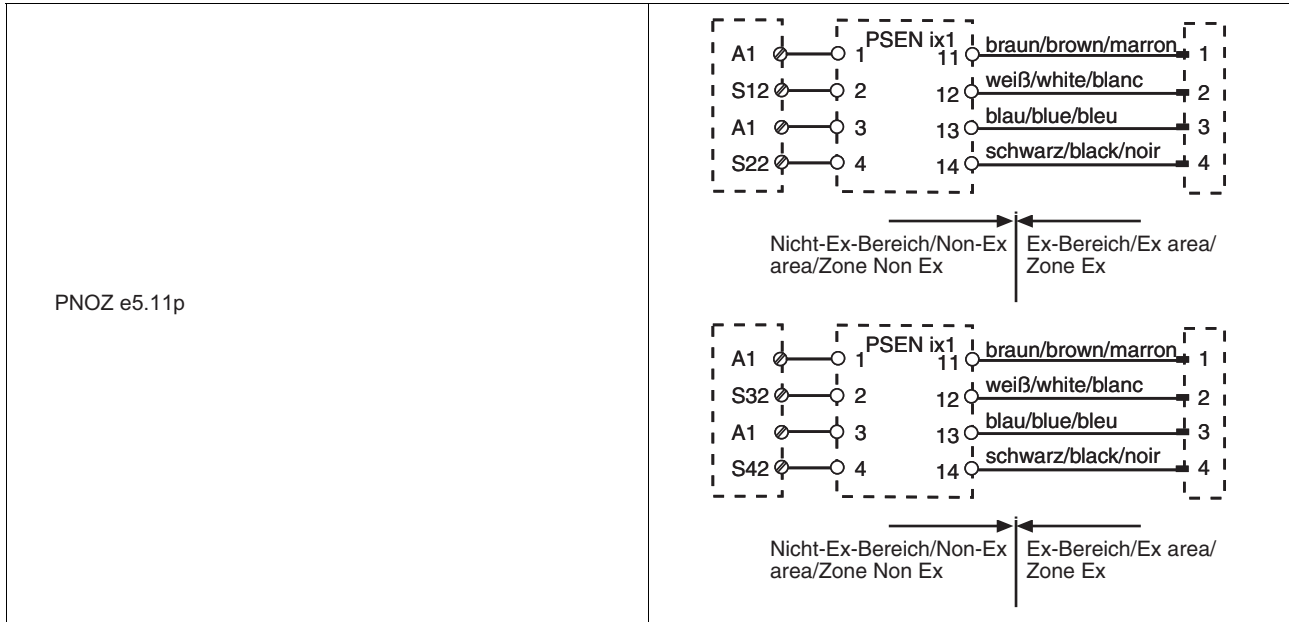
Belegung des 4-adrigen Kabels/Layout of the 4-core cable/ Repérage du câble à 4 conducteurs	braun/brown/marron	
	weiß/white/blanc	
	blau/blue/bleu	
	schwarz/black/noir	

PSENmag PSEN 1.1b-25

- ▶ Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

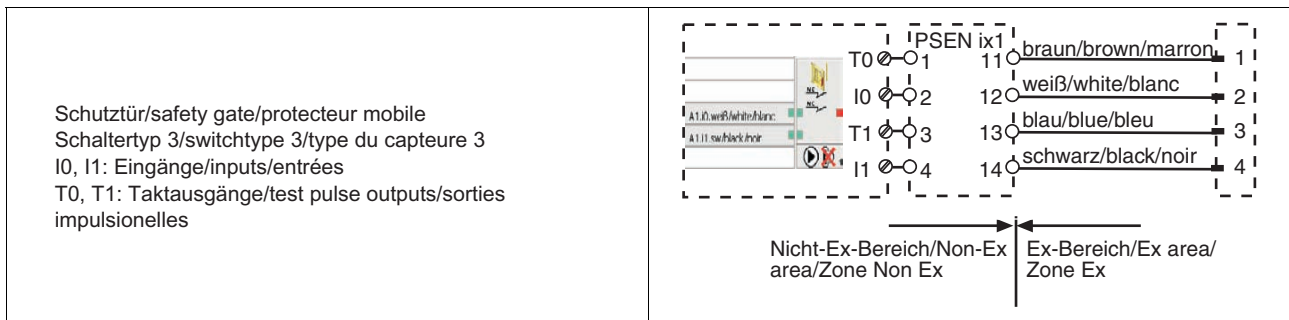
<p>PNOZ p1p PNOZ p1vp PNOZ X2/X2P PNOZ X2.1 (nur 24 V DC/ 24 V DC seulement) PNOZ X2.3P PNOZ X2.7P PNOZ X2.8P/X2.9P</p> <p>PNOZ X2C PNOZ X2.1C (nur 24 V DC/ 24 V DC seulement) PNOZ X4/X8P PNOZ X9/X9P PNOZ X10/X10.1 PNOZ X10.11P PNOZ Ex</p> <p>PNOZ e1p PNOZ e1.1p PNOZ e1vp PNOZ e6.1p PNOZ e6vp PNOZ s3 PNOZ s4 PNOZ s5</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13</p> <p>PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3</p> <p>PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	

PSENmag PSEN 1.1b-25

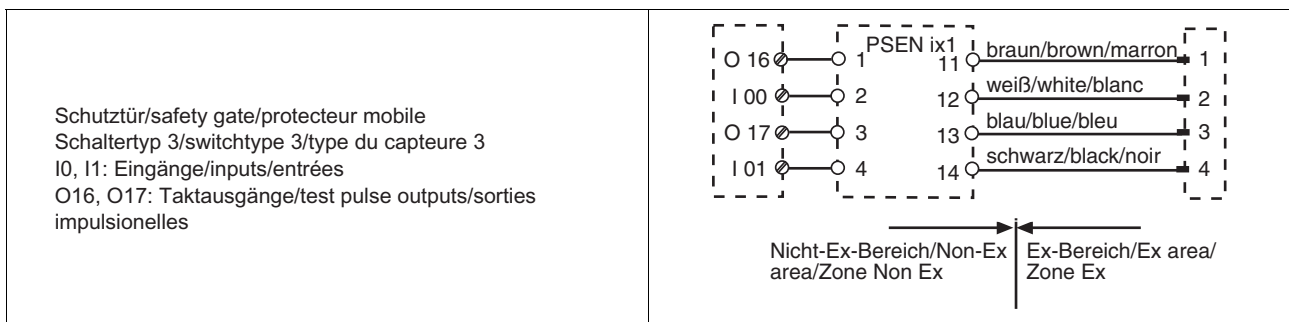


► Connection to PNOZmulti

2.2



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 1.1b-25

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

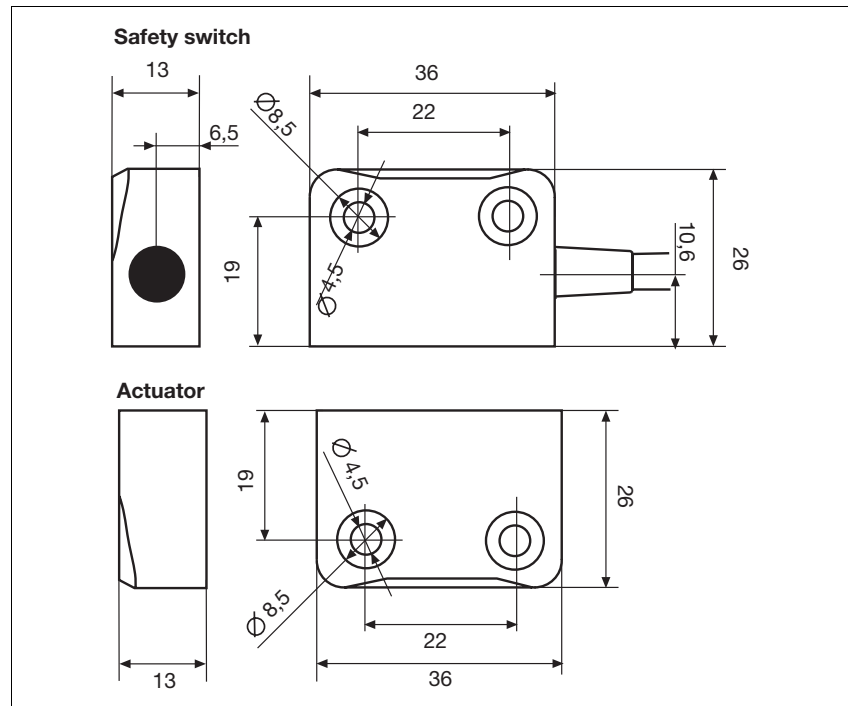
PSENmag

PSEN 1.1b-25

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable
Cable	LiYY 4 x 0,25 mm ²
Protection type	IP69K
Housing material	PBT

PSENmag

PSEN 1.1b-25

Technical details

Dimensions	
Safety switch	
Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	320 g
Actuator	17 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1-b-25	1	magnetic	Safety switch/actuator	504 251
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1p-10



Unit features

- ▶ The actuator **PSEN 1,1-10** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **3 mm**
- ▶ Assured release distance: **19 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

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.

Unit description

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 1,1-10** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

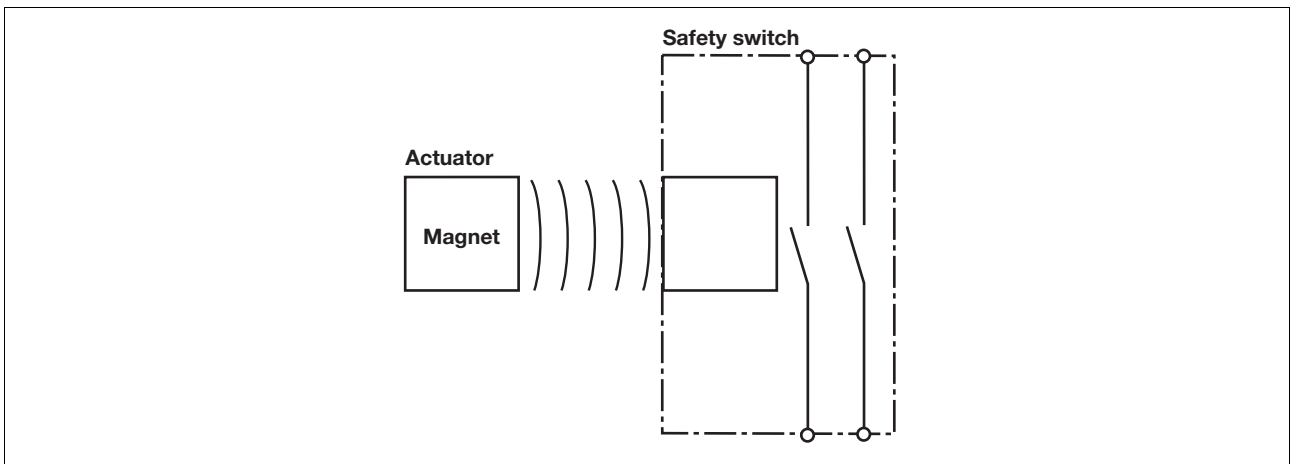
Approvals

	PSEN 1.1p-10
	◆
	◆

Function description

If the actuator is within the response range, the magnets switch the reed

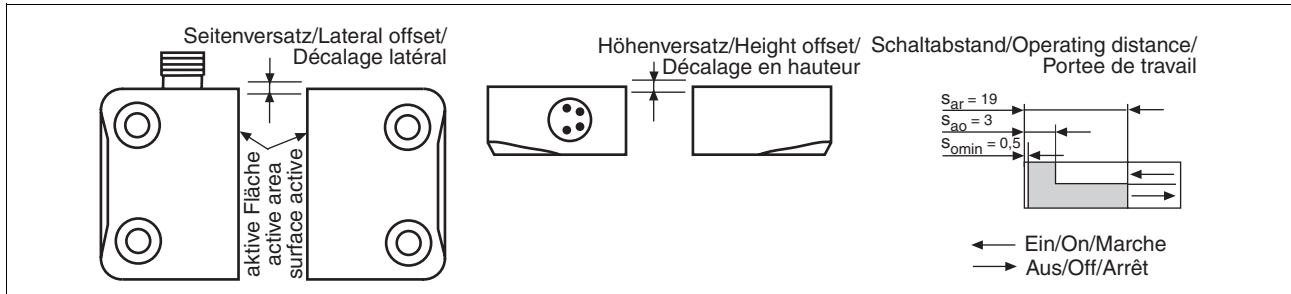
Block diagram



PSENmag

PSEN 1.1p-10

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	1,5	2,0	2,5	3,0
Seitenversatz/Lateral offset/Décalage latéral	1,0	2,5	2,5	2,0	1,5	1,5
	1,5	2,0	2,0	2,0	1,0	1,0
	2,0	2,0	1,5	1,5	1,0	0,5
	2,5	1,5	1,0	0,5	-	-
	3,0	0,5	0,5	-	-	-

- Assured release distance S_{ar} :
Max. 19 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20° C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

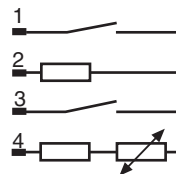
- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
 - For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE


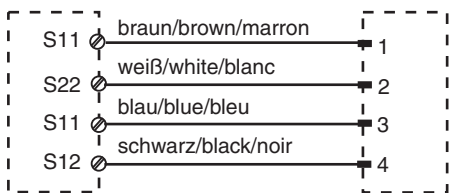
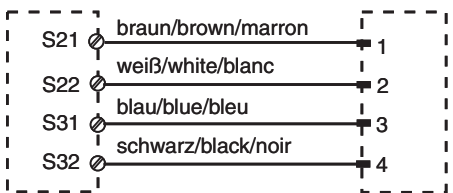
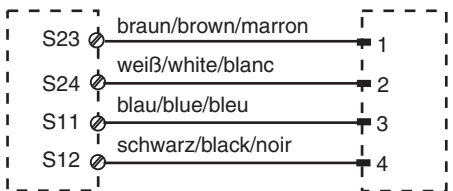
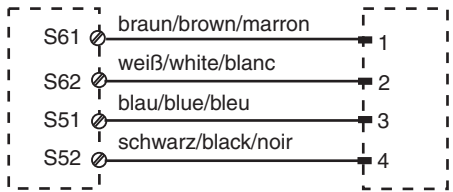
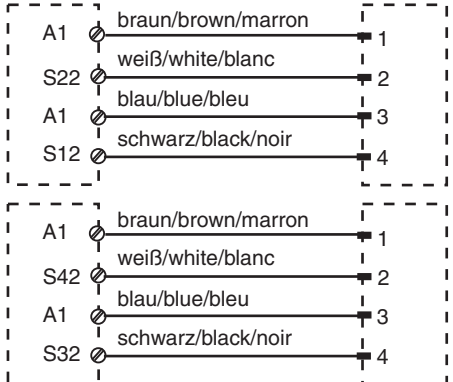
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Belegung des 4-pol. M8-Stiftsteckers/Assignment of the 4-pin M8 male connector/Repérage du connecteur mâle M8 à 4 pôles



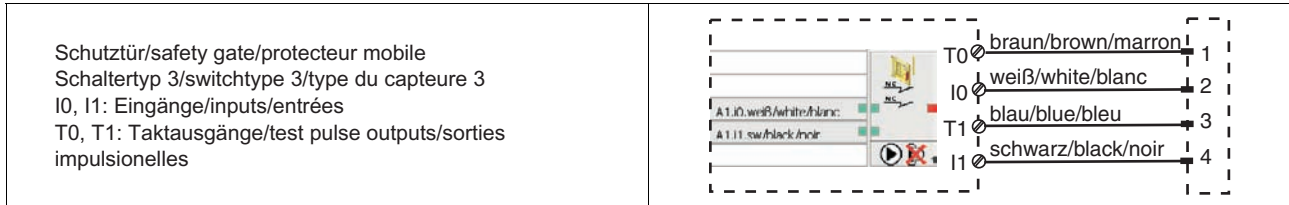
PSENmag PSEN 1.1p-10

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

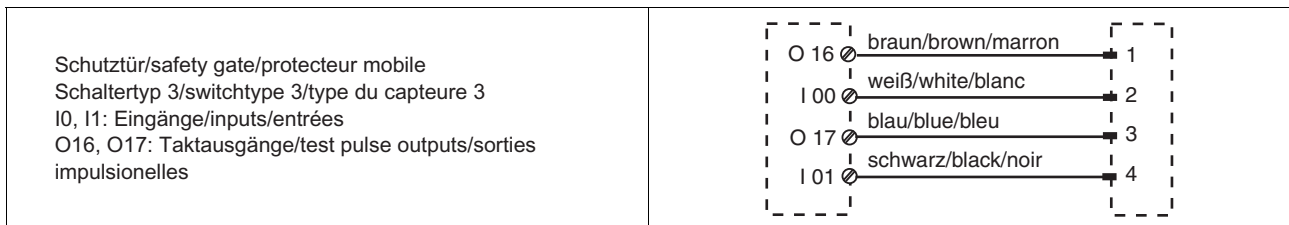
<table border="0"> <tr> <td>PNOZ p1p</td> <td>PNOZ X2C</td> <td>PNOZ e1p</td> </tr> <tr> <td>PNOZ p1vp</td> <td>PNOZ X2.1C</td> <td>PNOZ e1.1p</td> </tr> <tr> <td>PNOZ X2/X2P</td> <td>(nur 24 V DC/ 24 V DC only/</td> <td>PNOZ e1vp</td> </tr> <tr> <td>PNOZ X2.1</td> <td>24 V DC seulement)</td> <td>PNOZ e6.1p</td> </tr> <tr> <td>(nur 24 V DC/ 24 V DC only/</td> <td>PNOZ X4/X8P</td> <td>PNOZ s3</td> </tr> <tr> <td>24 V DC seulement)</td> <td>PNOZ X9/X9P</td> <td>PNOZ s4</td> </tr> <tr> <td>PNOZ X2.3P</td> <td>PNOZ X10/X10.1</td> <td>PNOZ s5</td> </tr> <tr> <td>PNOZ X2.7P</td> <td>PNOZ X10.11P</td> <td></td> </tr> <tr> <td>PNOZ X2.8P/X2.9P</td> <td>PNOZ Ex</td> <td></td> </tr> </table>	PNOZ p1p	PNOZ X2C	PNOZ e1p	PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p	PNOZ X2/X2P	(nur 24 V DC/ 24 V DC only/	PNOZ e1vp	PNOZ X2.1	24 V DC seulement)	PNOZ e6.1p	(nur 24 V DC/ 24 V DC only/	PNOZ X4/X8P	PNOZ s3	24 V DC seulement)	PNOZ X9/X9P	PNOZ s4	PNOZ X2.3P	PNOZ X10/X10.1	PNOZ s5	PNOZ X2.7P	PNOZ X10.11P		PNOZ X2.8P/X2.9P	PNOZ Ex		
PNOZ p1p	PNOZ X2C	PNOZ e1p																										
PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p																										
PNOZ X2/X2P	(nur 24 V DC/ 24 V DC only/	PNOZ e1vp																										
PNOZ X2.1	24 V DC seulement)	PNOZ e6.1p																										
(nur 24 V DC/ 24 V DC only/	PNOZ X4/X8P	PNOZ s3																										
24 V DC seulement)	PNOZ X9/X9P	PNOZ s4																										
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PNOZ X2.8P/X2.9P	PNOZ Ex																											
<p>PNOZ X5 PNOZ X5J</p>																												
<table border="0"> <tr> <td>PNOZ 11</td> <td>PNOZ X3.1</td> <td>PNOZ X3.10P</td> </tr> <tr> <td>PNOZ 16</td> <td>PNOZ X3P</td> <td>PNOZ XV2</td> </tr> <tr> <td>PNOZ X11P</td> <td>PNOZ X2.5P</td> <td>PNOZ XV2P</td> </tr> <tr> <td>PNOZ X13</td> <td>PNOZ X3</td> <td>PNOZ XV3</td> </tr> <tr> <td></td> <td></td> <td>PNOZ XV3P</td> </tr> </table>	PNOZ 11	PNOZ X3.1	PNOZ X3.10P	PNOZ 16	PNOZ X3P	PNOZ XV2	PNOZ X11P	PNOZ X2.5P	PNOZ XV2P	PNOZ X13	PNOZ X3	PNOZ XV3			PNOZ XV3P													
PNOZ 11	PNOZ X3.1	PNOZ X3.10P																										
PNOZ 16	PNOZ X3P	PNOZ XV2																										
PNOZ X11P	PNOZ X2.5P	PNOZ XV2P																										
PNOZ X13	PNOZ X3	PNOZ XV3																										
		PNOZ XV3P																										
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>																												
<p>PMUT X1P</p>																												
<p>PNOZ e5.11p</p>																												

PSENmag PSEN 1.1p-10

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with

standard function block SB064 or SB066.

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with a corresponding PSEN 1.1-10 actuator.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

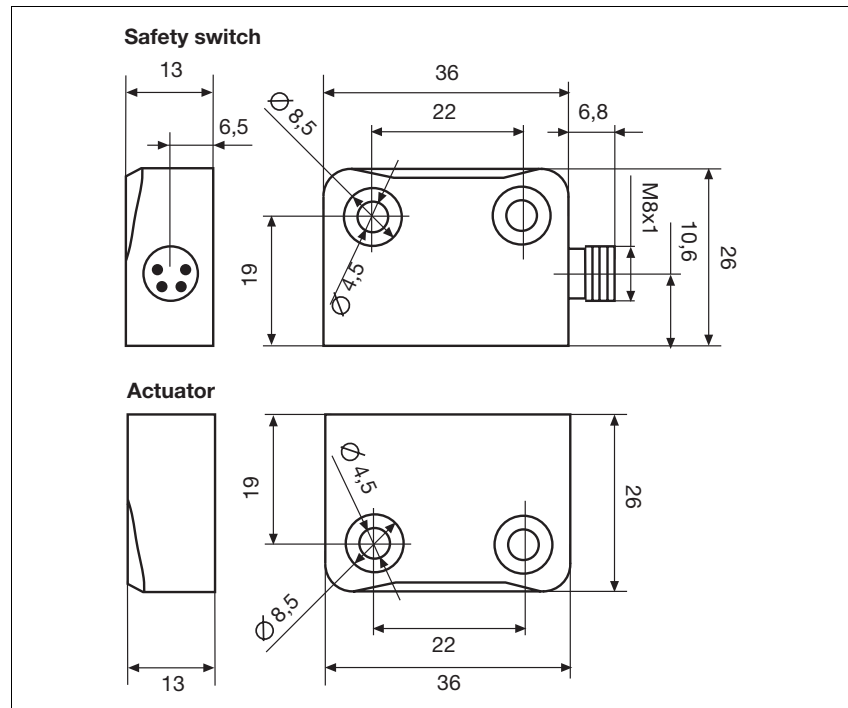
PSENmag

PSEN 1.1p-10

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	3 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	19 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-10
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.1p-10

Technical details

Dimensions

Safety switch

Height	43.0 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	14 g
Actuator	15 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-10	1/1	magnetic	Safety switch/actuator	504 210
PSEN 1.1p-10 (switch)	1	magnetic	Safety switch	524 110
PSEN 1.1-10	1	magnetic	Actuator	514 110

PSENmag

PSEN 1.1p-12



Unit features

- ▶ The actuator **PSEN 1,1-10** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **3 mm**
- ▶ Assured release distance: **19 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,1-10** and its approved evaluation devices.

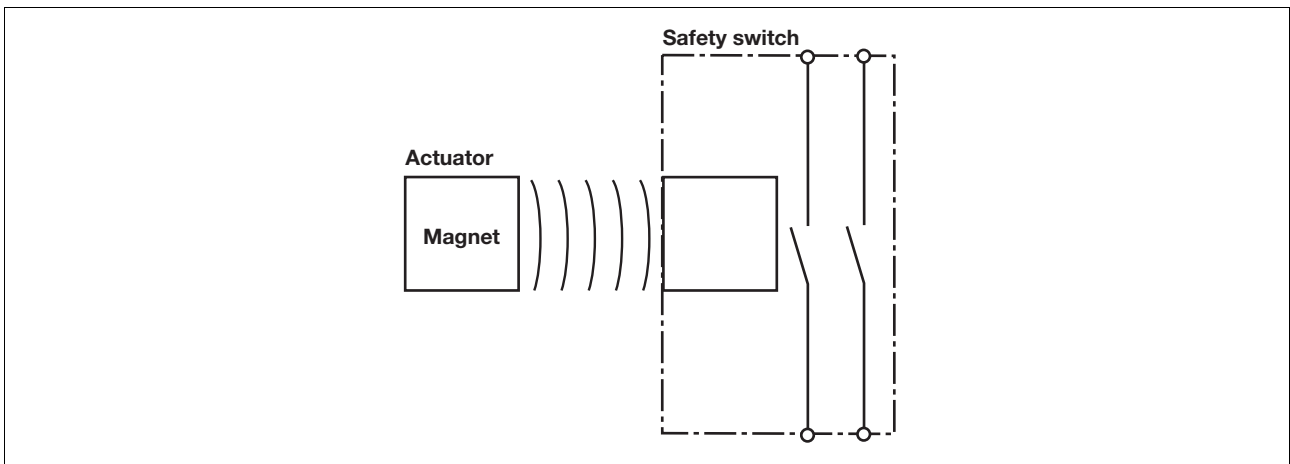
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1p-12
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	◆

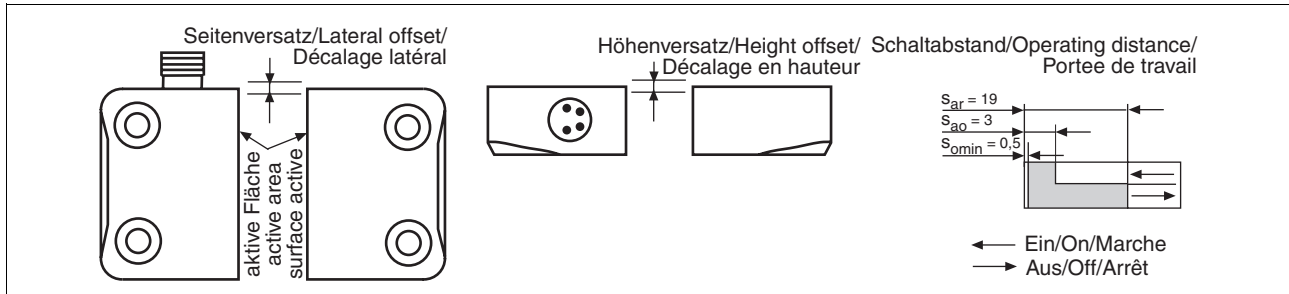
Block diagram



PSENmag

PSEN 1.1p-12

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	1,5	2,0	2,5	3,0
Seitenversatz/Lateral offset/Décalage latéral	1,0	2,5	2,5	2,0	1,5	1,5
	1,5	2,0	2,0	2,0	1,0	1,0
	2,0	2,0	1,5	1,5	1,0	0,5
	2,5	1,5	1,0	0,5	-	-
	3,0	0,5	0,5	-	-	-

- Assured release distance S_{ar} :
Max. 19 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20° C.

Wiring

Please note:

- Information given in the "Technical details" must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

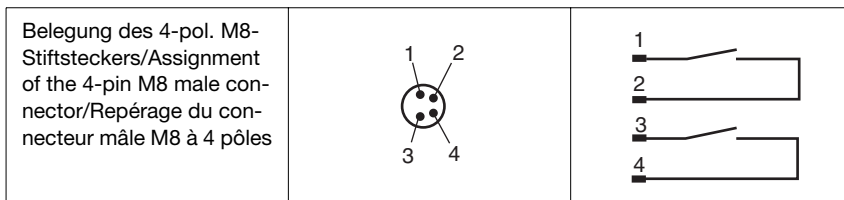
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

NOTICE

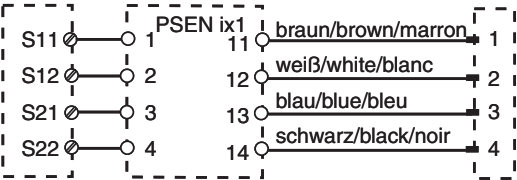
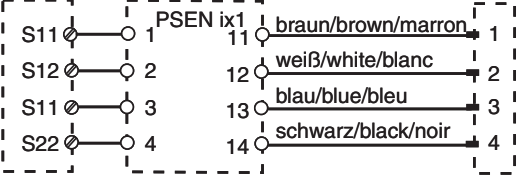
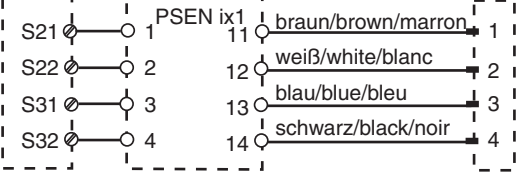
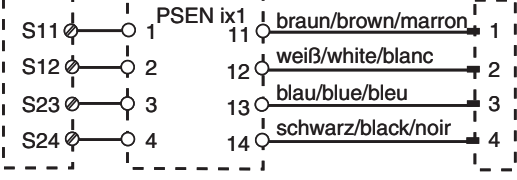
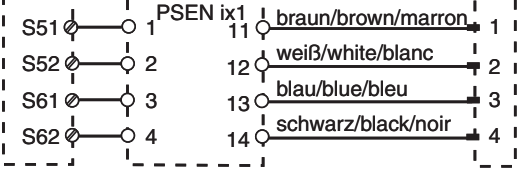
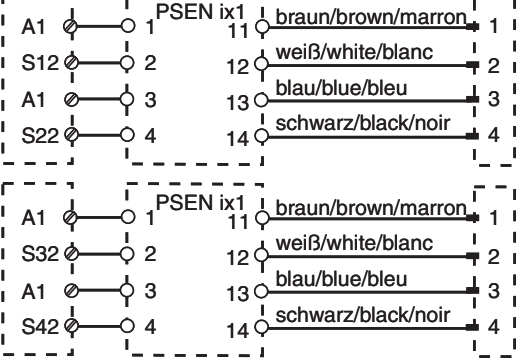
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



PSENmag

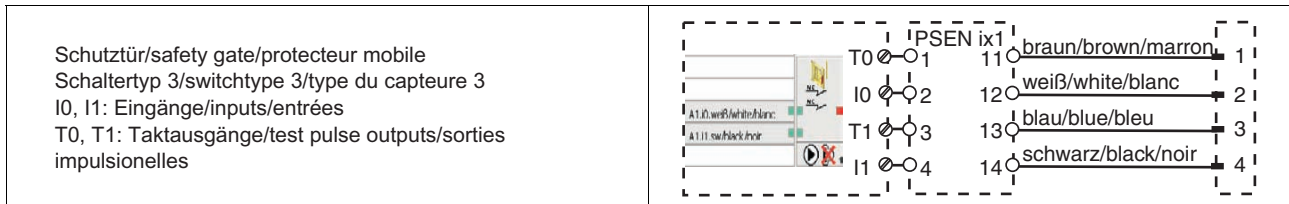
PSEN 1.1p-12

- Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

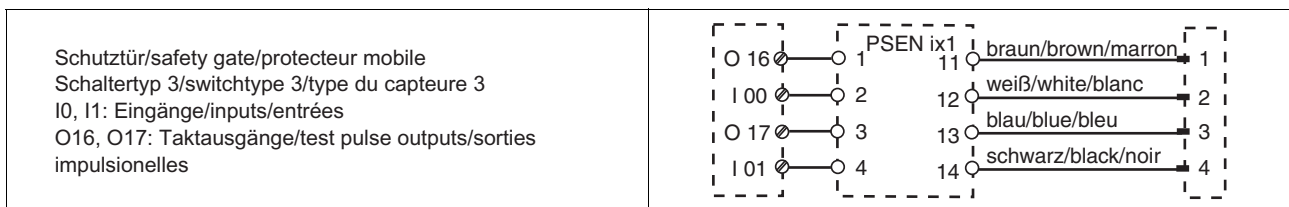
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ e1vp PNOZ X2.1 24 V DC only/ PNOZ e6.1p (nur 24 V DC/ 24 V DC seulement) PNOZ e6vp 24 V DC only/ 24 V DC seulement) PNOZ X4/X8P PNOZ s3 PNOZ X2.3P PNOZ X9/X9P PNOZ s4 PNOZ X2.7P PNOZ X10/X10.1 PNOZ s5 PNOZ X2.8P/X2.9P PNOZ Ex</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

PSENmag PSEN 1.1p-12

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-10**.
- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

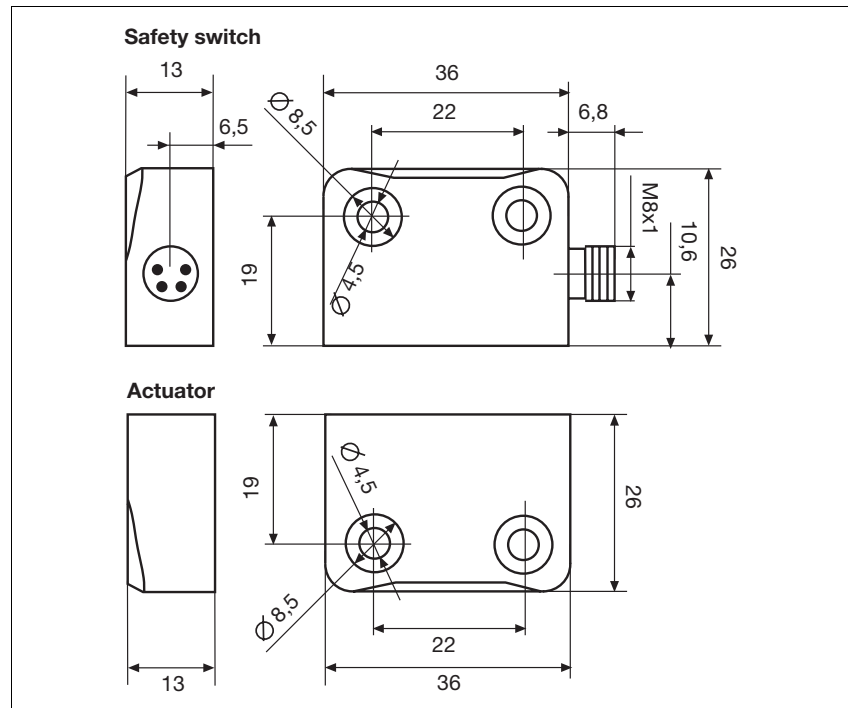
PSENmag

PSEN 1.1p-12

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	3 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	19 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-10
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.1p-12

Technical details

Dimensions

Safety switch

Height	42.8 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	14 g
Actuator	15 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-12	1/1	magnetic	Safety switch/actuator	504 212
PSEN 1.1p-12 (switch)	1	magnetic	Safety switch	524 112
PSEN 1.1-10	1	magnetic	Actuator	514 110

PSENmag PSEN 1.1p-20



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 1,1-20** and its approved evaluation devices.



The safety switch should only be connected to the evaluation devices listed under "Connections".

Function description

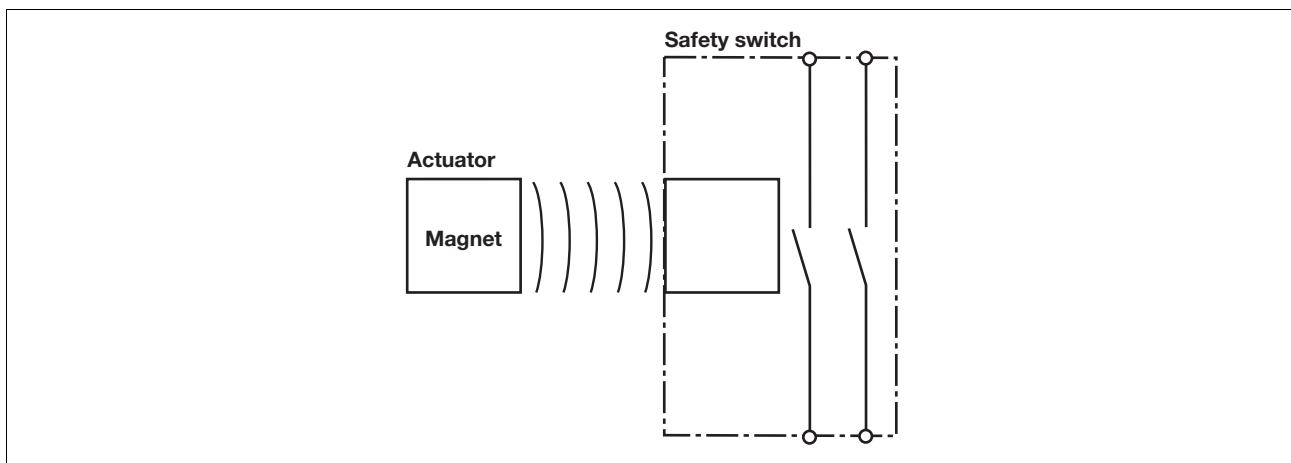
If the actuator is within the response range, the magnets switch the reed

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1p-20
	◆
	◆

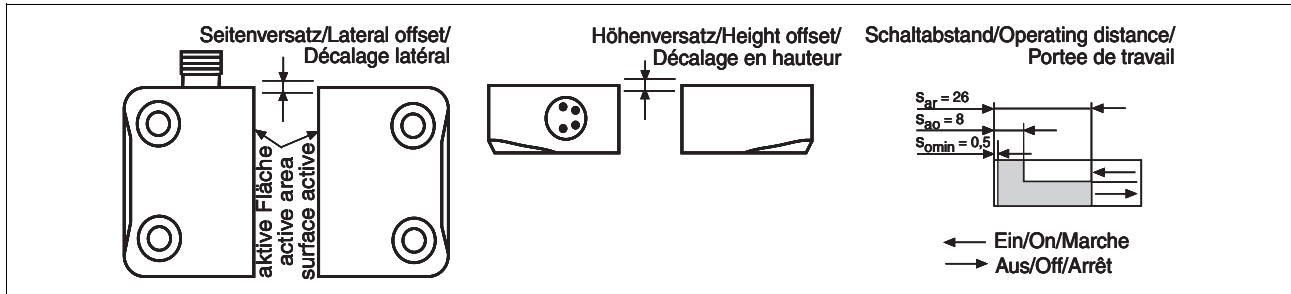
Block diagram



PSENmag

PSEN 1.1p-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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

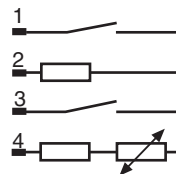
- the requirements of a PDF with designed reliability (PDF-D).
- In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

NOTICE

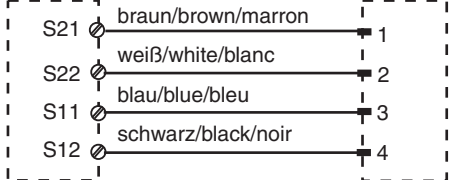
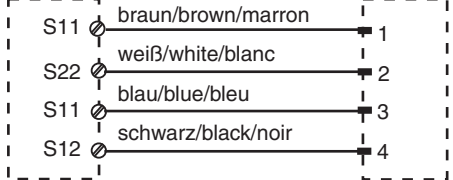
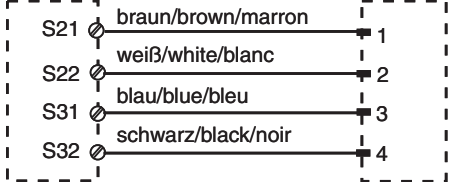
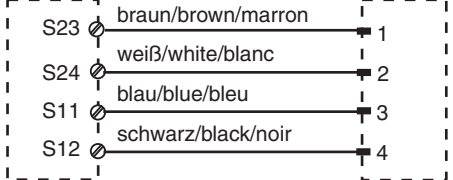
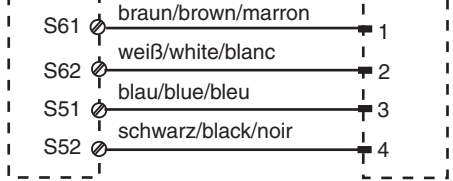
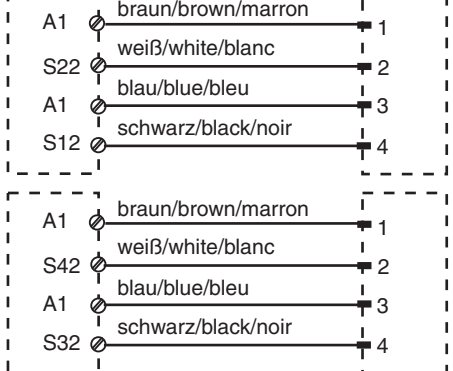
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Belegung des 4-pol. M8-Stiftsteckers/Assignment of the 4-pin M8 male connector/Repérage du connecteur mâle M8 à 4 pôles



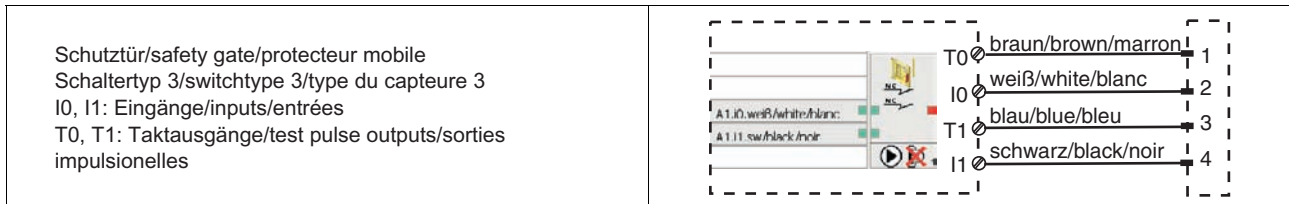
PSENmag PSEN 1.1p-20

- Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

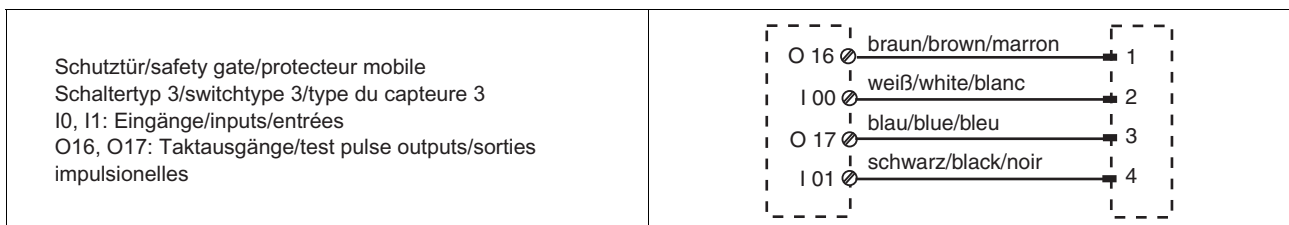
<table border="0"> <tr> <td>PNOZ p1p</td> <td>PNOZ X2C</td> <td>PNOZ e1p</td> </tr> <tr> <td>PNOZ p1vp</td> <td>PNOZ X2.1C</td> <td>PNOZ e1.1p</td> </tr> <tr> <td>PNOZ X2/X2P</td> <td>(nur 24 V DC/</td> <td>PNOZ e1vp</td> </tr> <tr> <td>PNOZ X2.1</td> <td>24 V DC only/</td> <td>PNOZ e6.1p</td> </tr> <tr> <td>(nur 24 V DC/</td> <td>24 V DC seulement)</td> <td>PNOZ e6vp</td> </tr> <tr> <td>24 V DC only/</td> <td>PNOZ X4/X8P</td> <td>PNOZ s3</td> </tr> <tr> <td>24 V DC seulement)</td> <td>PNOZ X9/X9P</td> <td>PNOZ s4</td> </tr> <tr> <td>PNOZ X2.3P</td> <td>PNOZ X10/X10.1</td> <td>PNOZ s5</td> </tr> <tr> <td>PNOZ X2.7P</td> <td>PNOZ X10.11P</td> <td></td> </tr> <tr> <td>PNOZ X2.8P/X2.9P</td> <td>PNOZ Ex</td> <td></td> </tr> </table>	PNOZ p1p	PNOZ X2C	PNOZ e1p	PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p	PNOZ X2/X2P	(nur 24 V DC/	PNOZ e1vp	PNOZ X2.1	24 V DC only/	PNOZ e6.1p	(nur 24 V DC/	24 V DC seulement)	PNOZ e6vp	24 V DC only/	PNOZ X4/X8P	PNOZ s3	24 V DC seulement)	PNOZ X9/X9P	PNOZ s4	PNOZ X2.3P	PNOZ X10/X10.1	PNOZ s5	PNOZ X2.7P	PNOZ X10.11P		PNOZ X2.8P/X2.9P	PNOZ Ex		
PNOZ p1p	PNOZ X2C	PNOZ e1p																													
PNOZ p1vp	PNOZ X2.1C	PNOZ e1.1p																													
PNOZ X2/X2P	(nur 24 V DC/	PNOZ e1vp																													
PNOZ X2.1	24 V DC only/	PNOZ e6.1p																													
(nur 24 V DC/	24 V DC seulement)	PNOZ e6vp																													
24 V DC only/	PNOZ X4/X8P	PNOZ s3																													
24 V DC seulement)	PNOZ X9/X9P	PNOZ s4																													
PNOZ X2.3P	PNOZ X10/X10.1	PNOZ s5																													
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PNOZ X2.8P/X2.9P	PNOZ Ex																														
<p>PNOZ X5 PNOZ X5J</p>																															
<table border="0"> <tr> <td>PNOZ 11</td> <td>PNOZ X3.1</td> <td>PNOZ X3.10P</td> </tr> <tr> <td>PNOZ 16</td> <td>PNOZ X3P</td> <td>PNOZ XV2</td> </tr> <tr> <td>PNOZ X11P</td> <td>PNOZ X2.5P</td> <td>PNOZ XV2P</td> </tr> <tr> <td>PNOZ X13</td> <td>PNOZ X3</td> <td>PNOZ XV3</td> </tr> <tr> <td></td> <td></td> <td>PNOZ XV3P</td> </tr> </table>	PNOZ 11	PNOZ X3.1	PNOZ X3.10P	PNOZ 16	PNOZ X3P	PNOZ XV2	PNOZ X11P	PNOZ X2.5P	PNOZ XV2P	PNOZ X13	PNOZ X3	PNOZ XV3			PNOZ XV3P																
PNOZ 11	PNOZ X3.1	PNOZ X3.10P																													
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PNOZ X11P	PNOZ X2.5P	PNOZ XV2P																													
PNOZ X13	PNOZ X3	PNOZ XV3																													
		PNOZ XV3P																													
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>																															
<p>PMUT X1P</p>																															
<p>PNOZ e5.11p</p>																															

PSENmag PSEN 1.1p-20

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

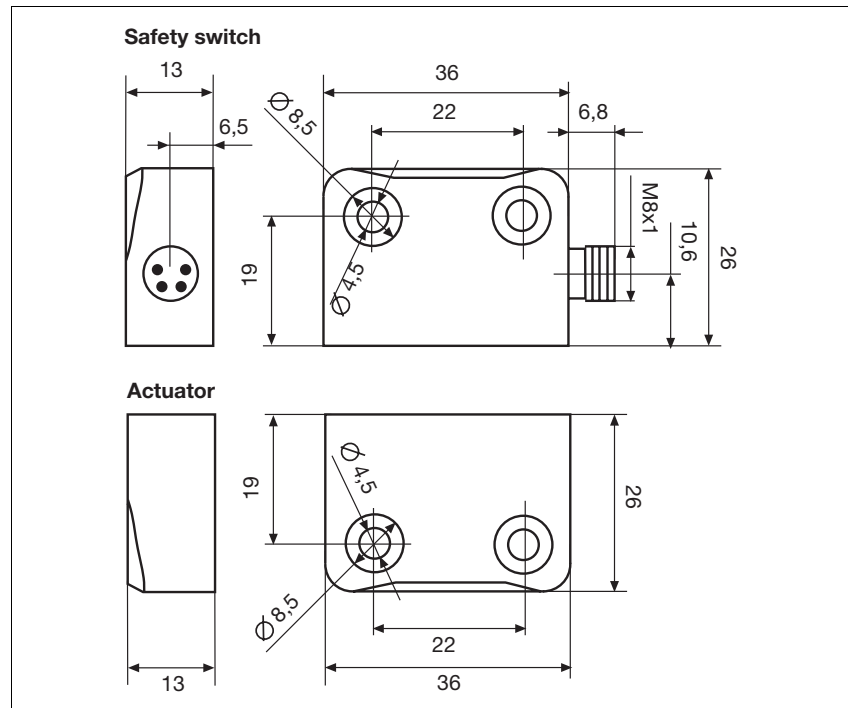
PSENmag

PSEN 1.1p-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Approvals	BG, CE, UL/cUL
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.1p-20

Technical details

Dimensions

Safety switch

Height	42.8 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	14 g
Actuator	17 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-20	1/1	magnetic	Safety switch/actuator	504 220
PSEN 1.1p-20 (switch)	1	magnetic	Safety switch	524 120
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1p-22



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,1-20** and its approved evaluation devices.

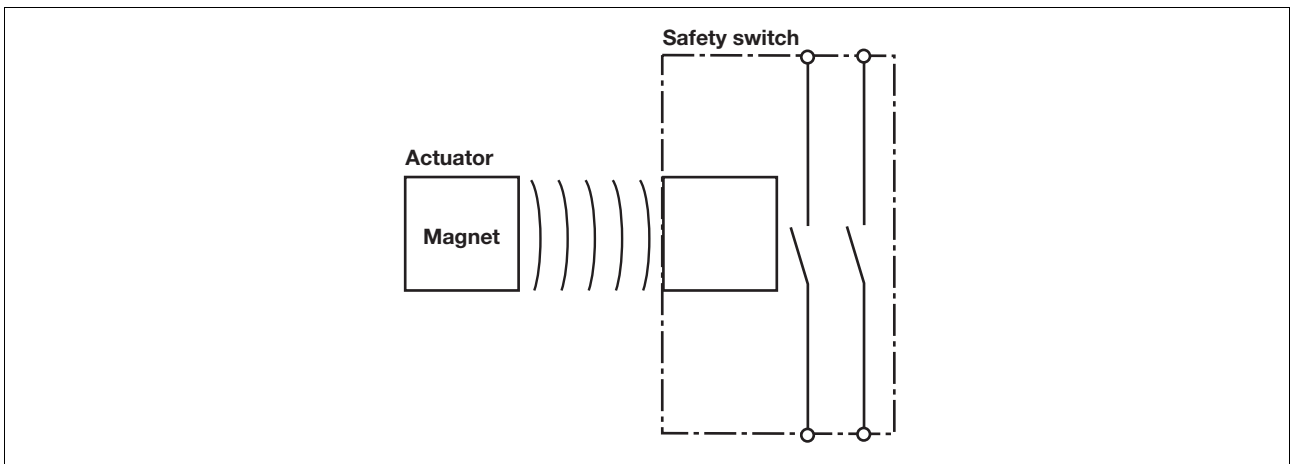
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1p-22
	◆
	◆

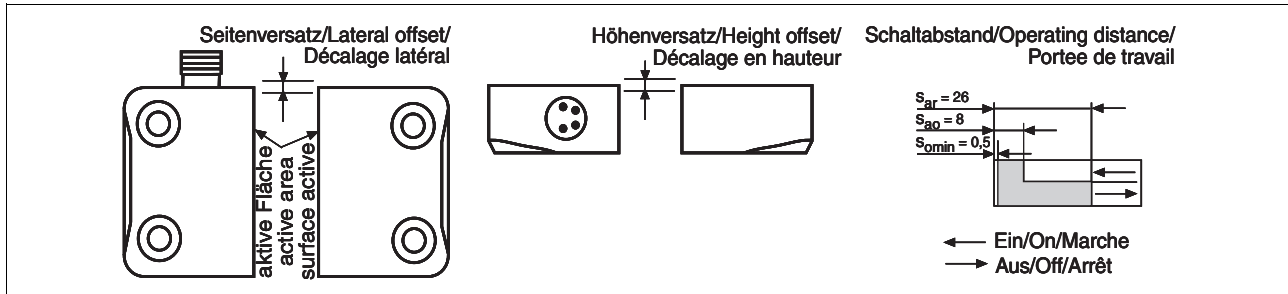
Block diagram



PSENmag

PSEN 1.1p-22

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

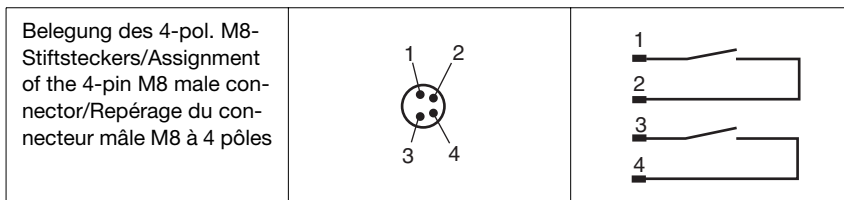
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



PSENmag

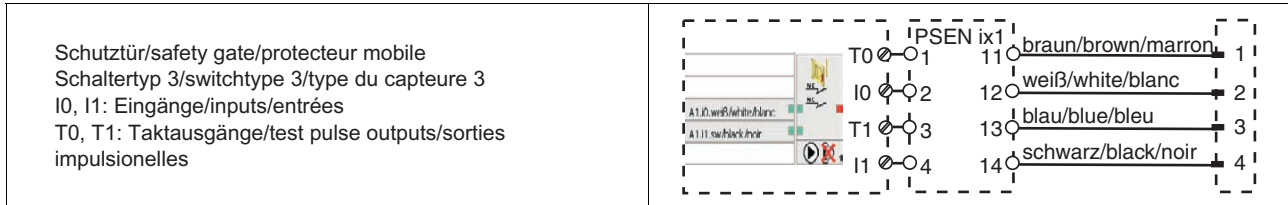
PSEN 1.1p-22

- Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

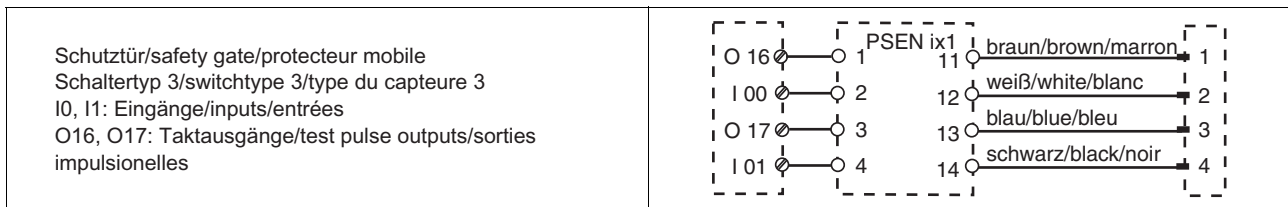
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<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

PSENmag PSEN 1.1p-22

► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

Installation

- The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- 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. Messing).
- The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- 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

Adjustment

- The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

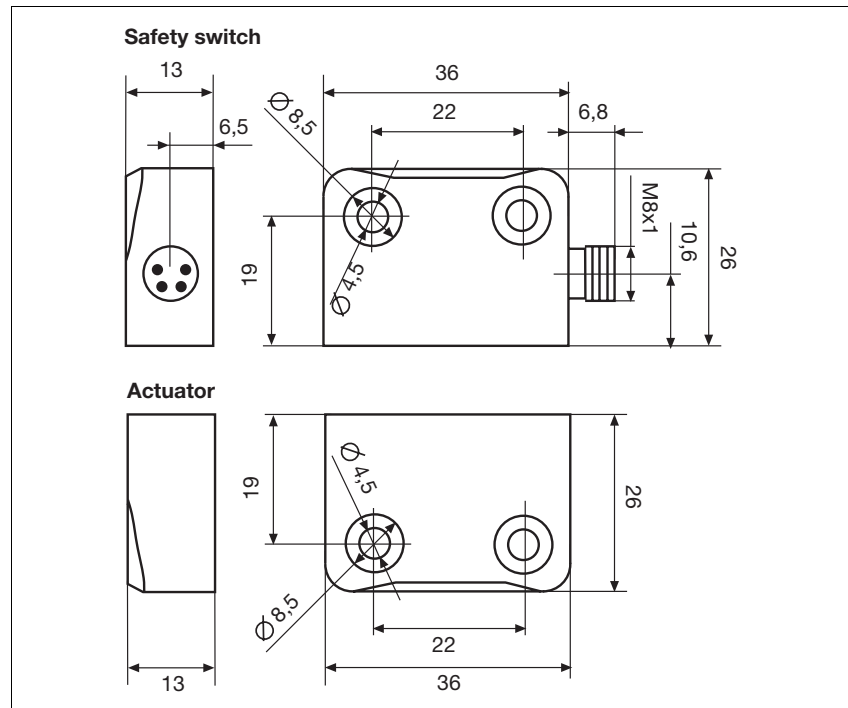
PSENmag

PSEN 1.1p-22

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.1p-22

Technical details

Dimensions

Safety switch

Height	42.8 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	14 g
Actuator	17 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-22	1/1	magnetic	Safety switch/actuator	504 222
PSEN 1.1p-22 (switch)	1	magnetic	Safety switch	524 122
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1p-23



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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 1,1-20** and its approved evaluation devices.

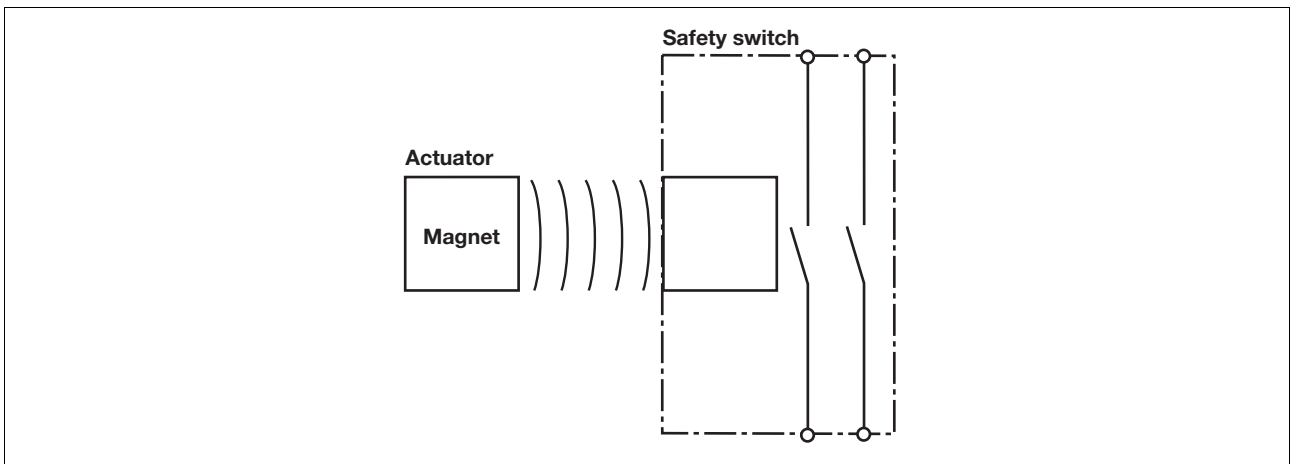
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.1p-23
	◆
	◆

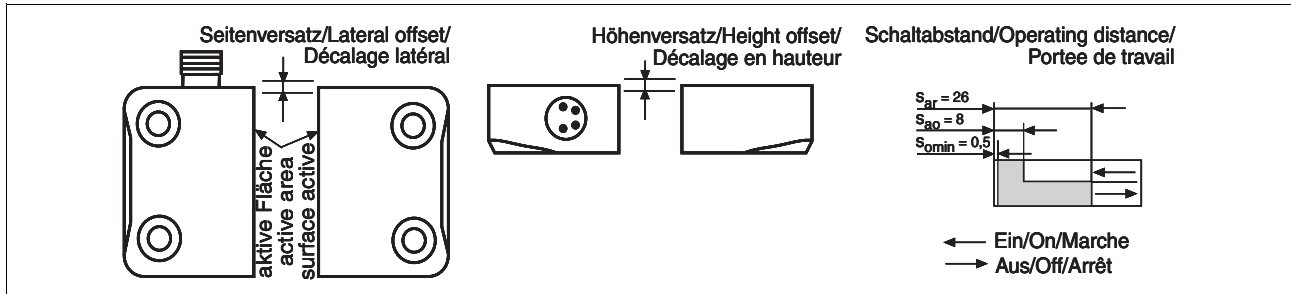
Block diagram



PSENmag

PSEN 1.1p-23

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

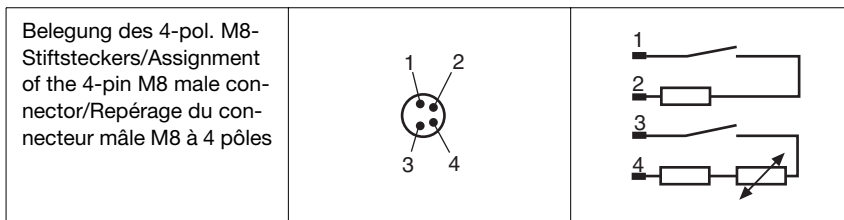
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

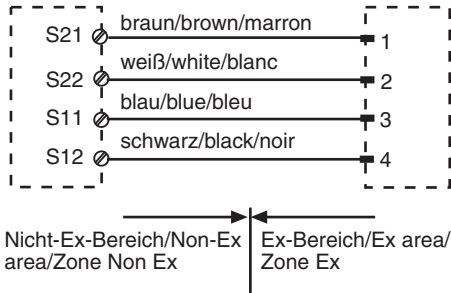
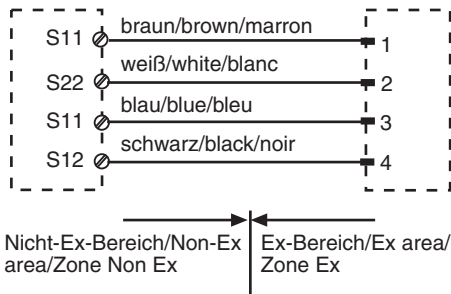
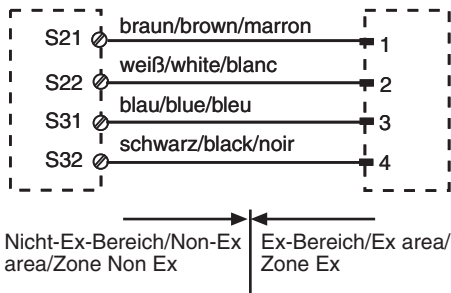
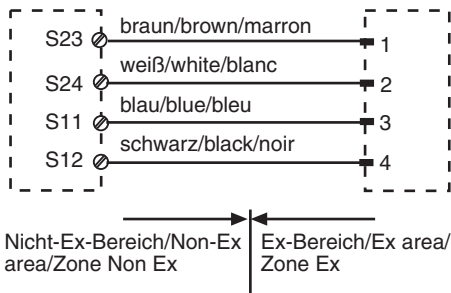
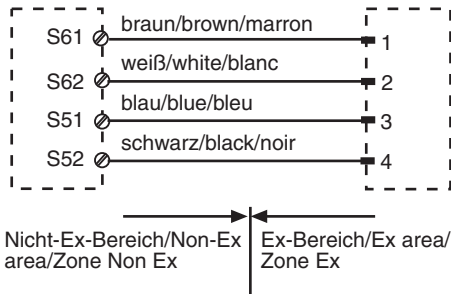
NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



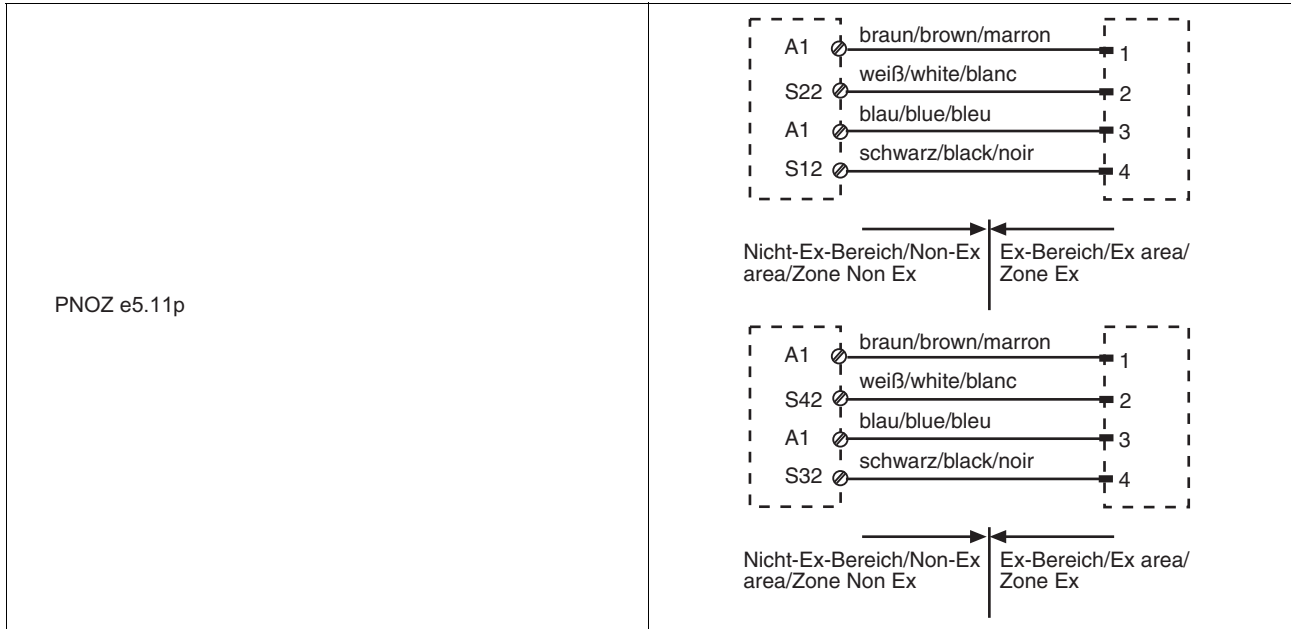
PSENmag PSEN 1.1p-23

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

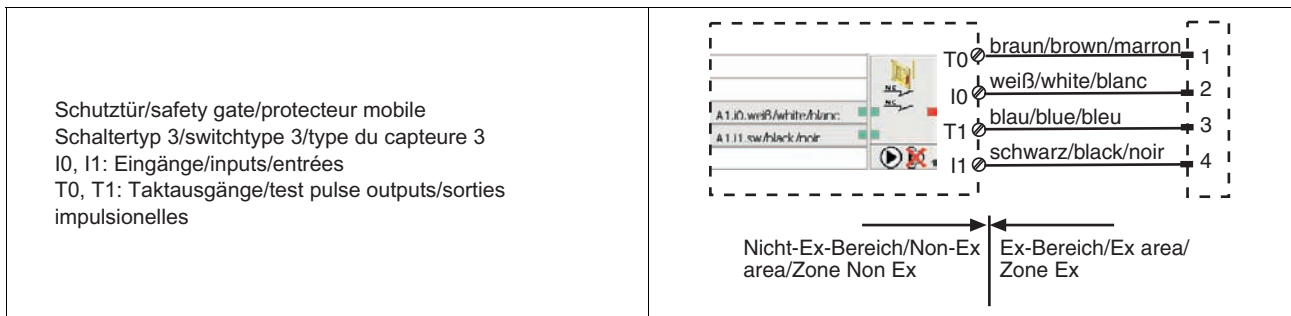
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<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	

PSENmag

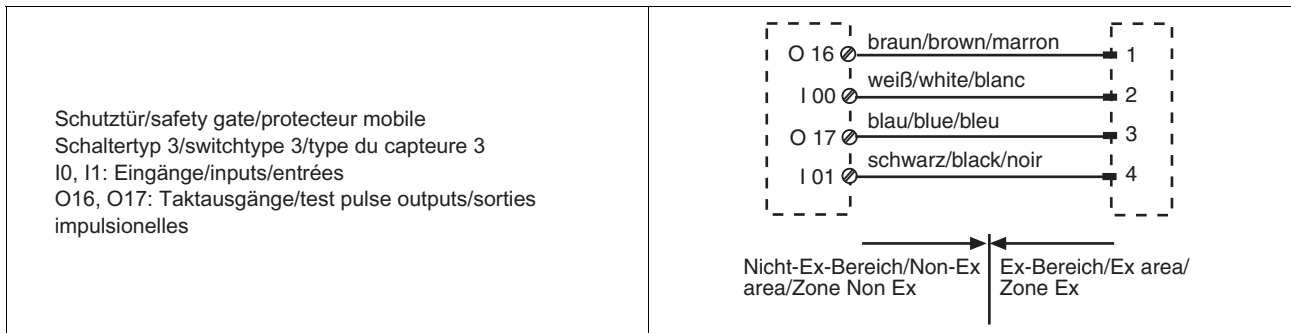
PSEN 1.1p-23



► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 1.1p-23

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

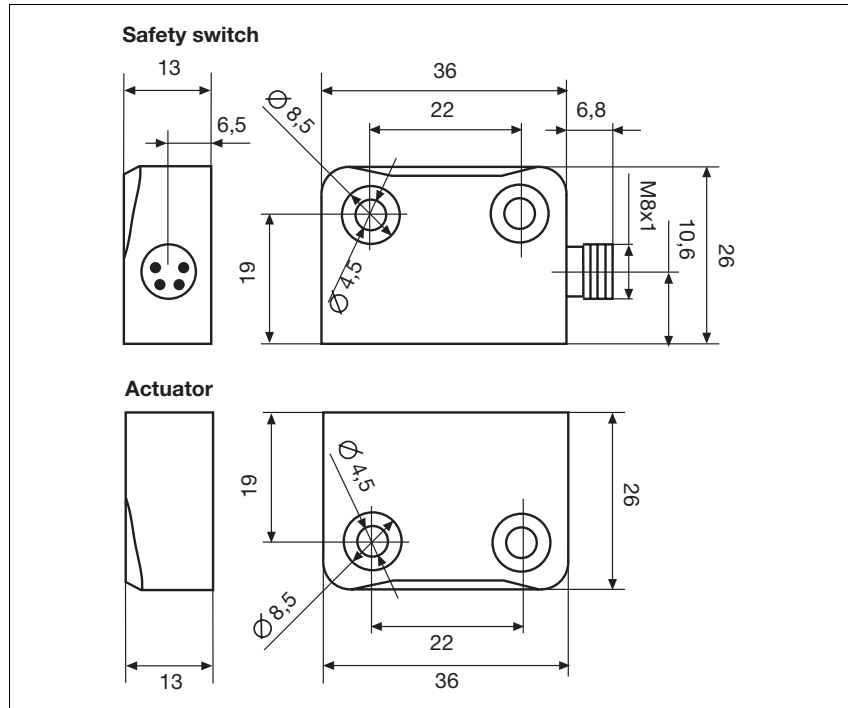
PSENmag

PSEN 1.1p-23

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.1p-23

Technical details

Dimensions

Safety switch

Height	42.8 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	14 g
Actuator	17 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-23	1/1	magnetic	Safety switch/actuator	504 223
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.1p-25



Unit features

- ▶ The actuator **PSEN 1,1-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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).

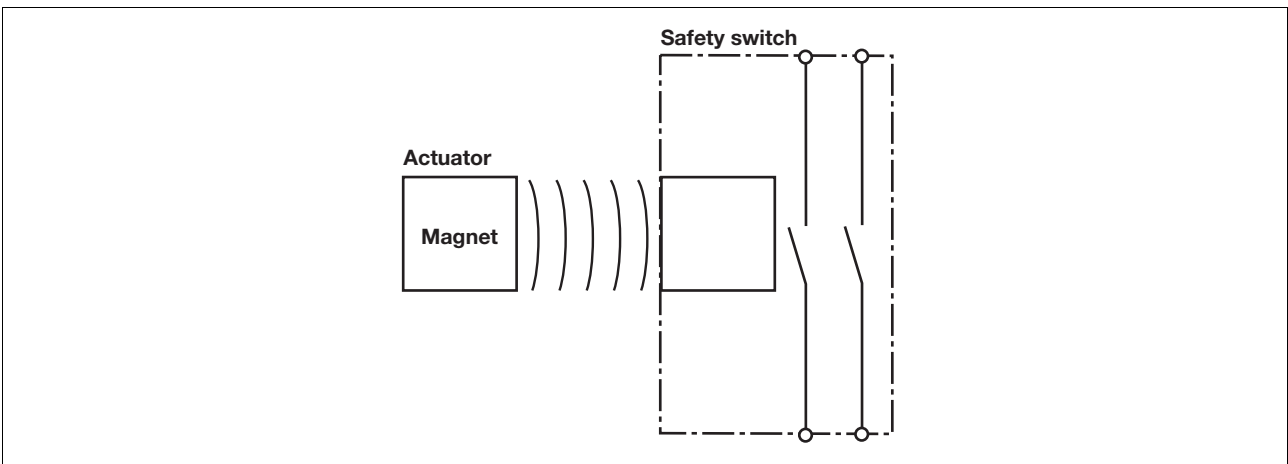
The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,1-20** and its approved evaluation devices. The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

PSEN 1.1p-25	
	◆
	◆

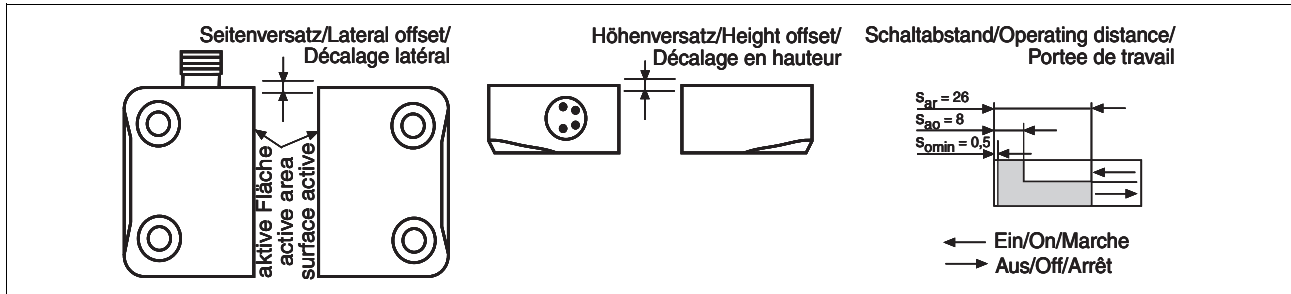
Block diagram



PSENmag

PSEN 1.1p-25

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

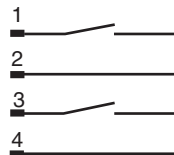
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Belegung des 4-pol. M8-Stiftsteckers/Assignment of the 4-pin M8 male connector/Repérage du connecteur mâle M8 à 4 pôles



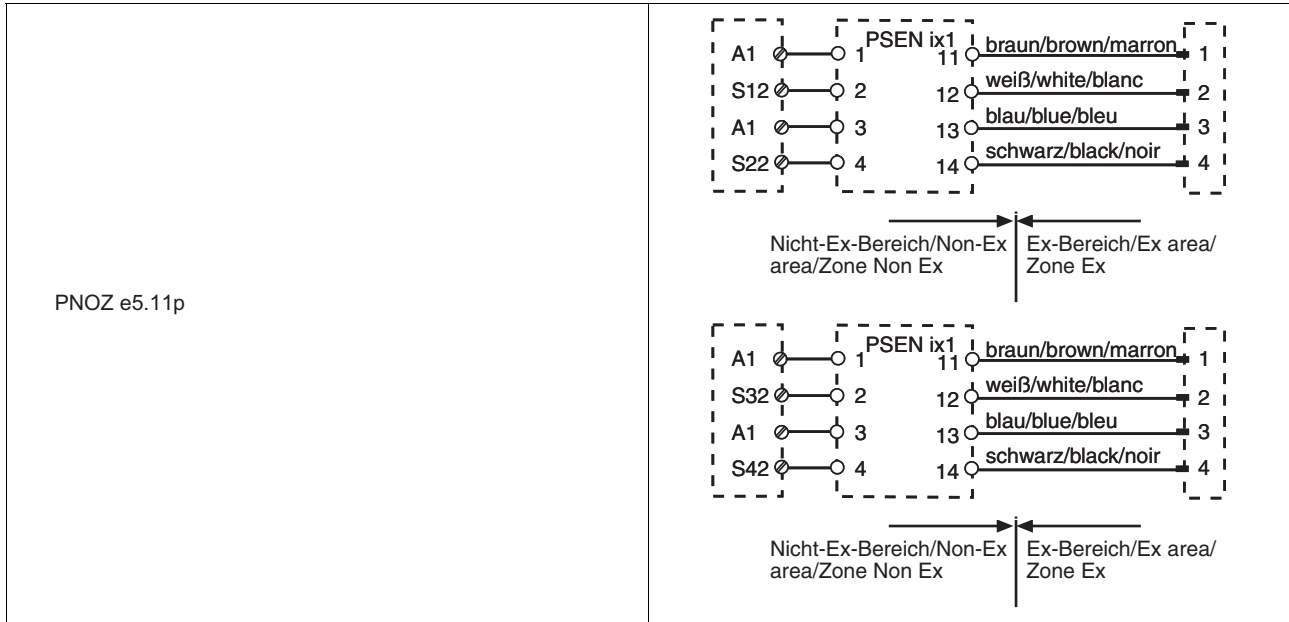
PSENmag

PSEN 1.1p-25

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

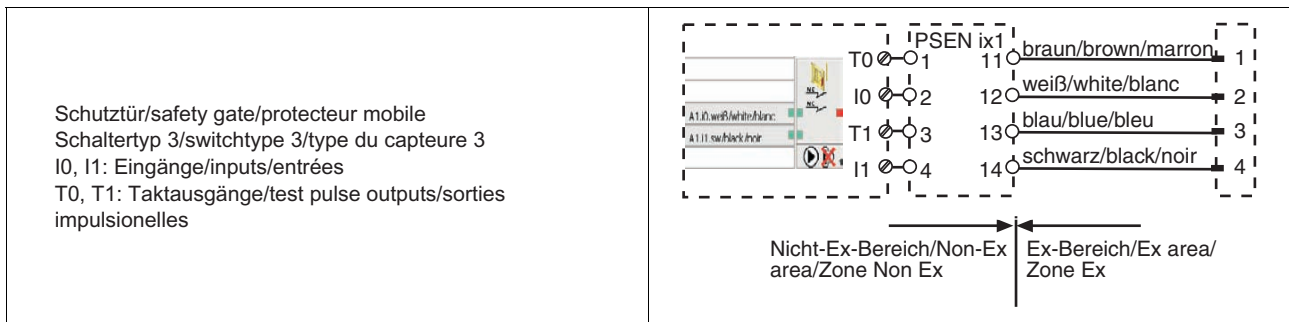
PNOZ p1p PNOZ p1vp PNOZ X2/X2P PNOZ X2.1 (nur 24 V DC/ 24 V DC seulement) PNOZ X4/X8P (nur 24 V DC/ 24 V DC seulement) PNOZ X9/X9P PNOZ X2.3P PNOZ X2.7P PNOZ X2.8P/X2.9P PNOZ Ex	PNOZ X2C PNOZ X2.1C (nur 24 V DC/ 24 V DC seulement) PNOZ X4/X8P PNOZ X9/X9P PNOZ X10/X10.1 PNOZ X10.11P PNOZ Ex	PNOZ e1p PNOZ e1.1p PNOZ e1vp PNOZ e6.1p PNOZ e6vp PNOZ s3 PNOZ s4 PNOZ s5				
PNOZ X5	PNOZ X5J					
PNOZ 11	PNOZ 16	PNOZ X11P	PNOZ X13	PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3	PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P	
PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)						
PMUT X1P						

PSENmag PSEN 1.1p-25

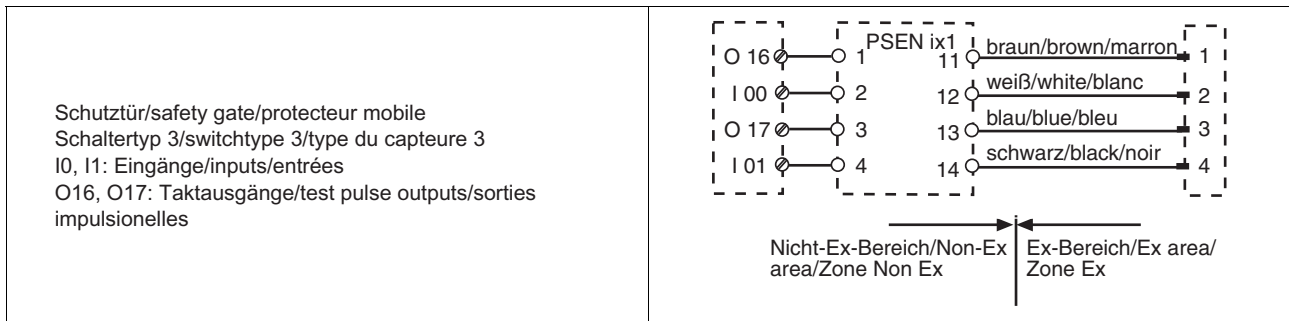


► Connection to PNOZmulti

2.2



► Connection to PSS with and without SafetyBUS p



PSENmag PSEN 1.1p-25

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,1-20**.
- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

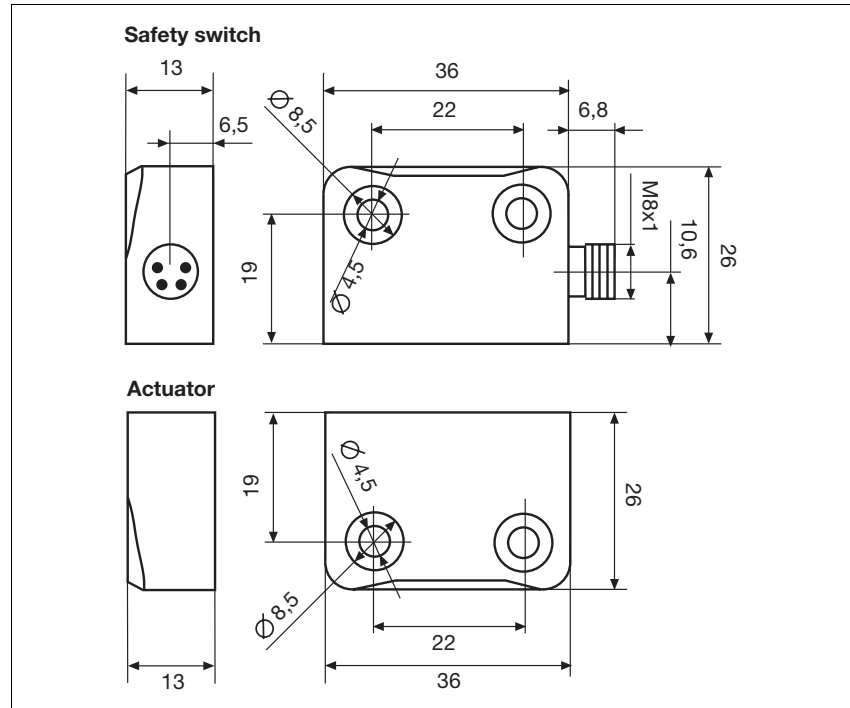
PSENmag

PSEN 1.1p-25

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,1-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

2.2

PSENmag

PSEN 1.1p-25

Technical details

Dimensions

Safety switch

Height **42.8 mm**

Width **26.0 mm**

Depth **13.0 mm**

Actuator

Height **36 mm**

Width **26 mm**

Depth **13 mm**

Weight

Safety switch **14 g**

Actuator **17 g**

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.1p-25	1/1	magnetic	Safety switch/actuator	504 225
PSEN 1.1-20	1	magnetic	Actuator	514 120

PSENmag

PSEN 1.2p-20



Unit features

- ▶ The actuator **PSEN 1,2-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

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.

Unit description

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 1,2-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

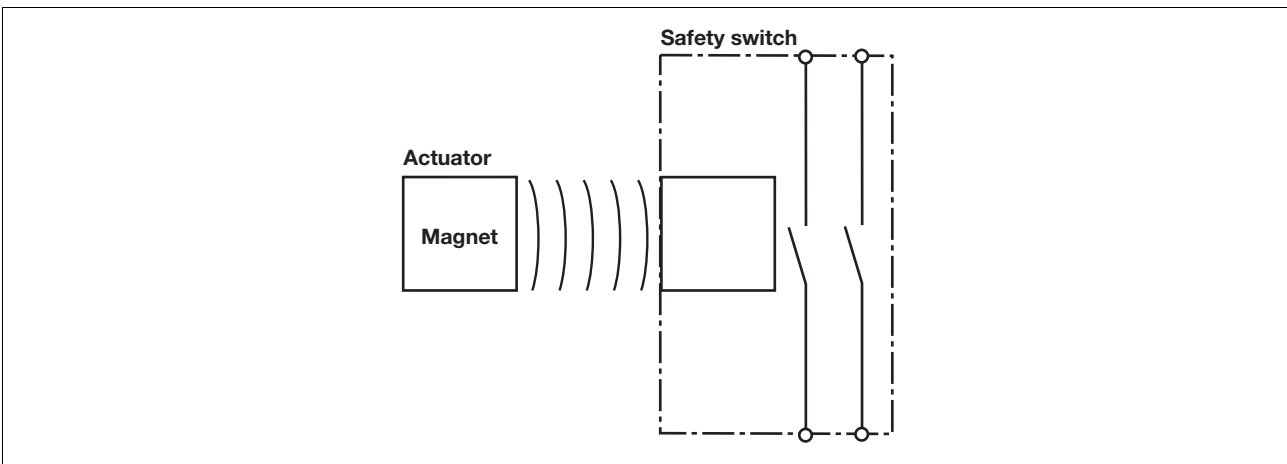
Approvals

	PSEN 1.2p-20
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Function description

If the actuator is within the response range, the magnets switch the reed

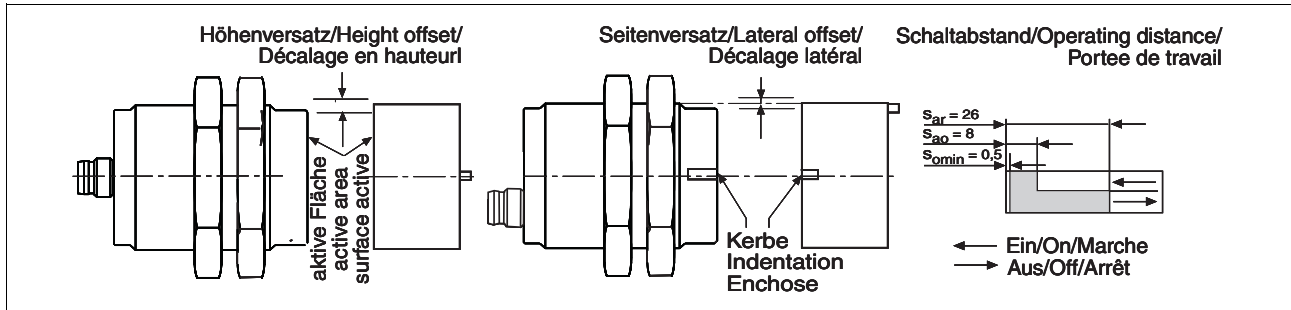
Block diagram



PSENmag

PSEN 1.2p-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

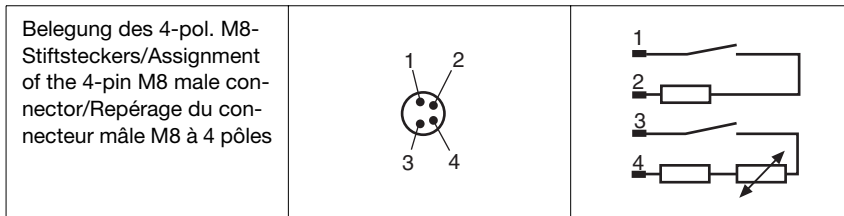
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

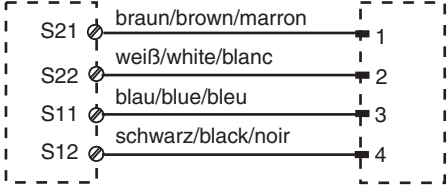
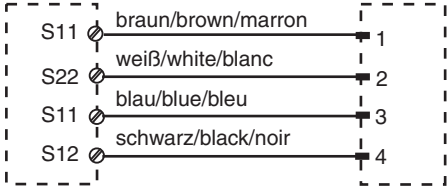
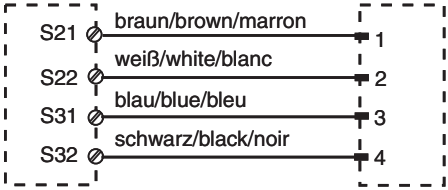
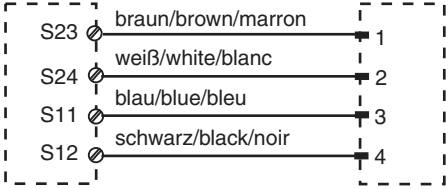
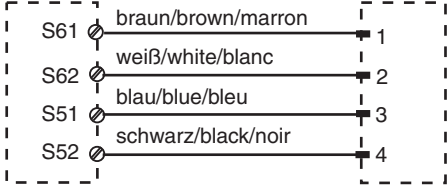
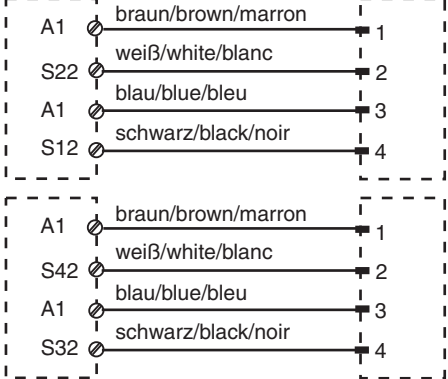
NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



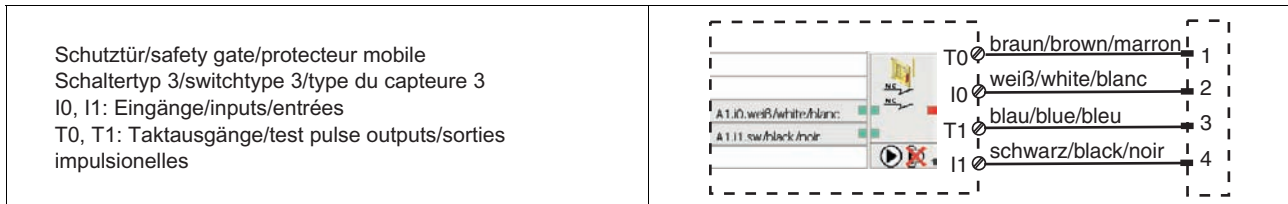
PSENmag PSEN 1.2p-20

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

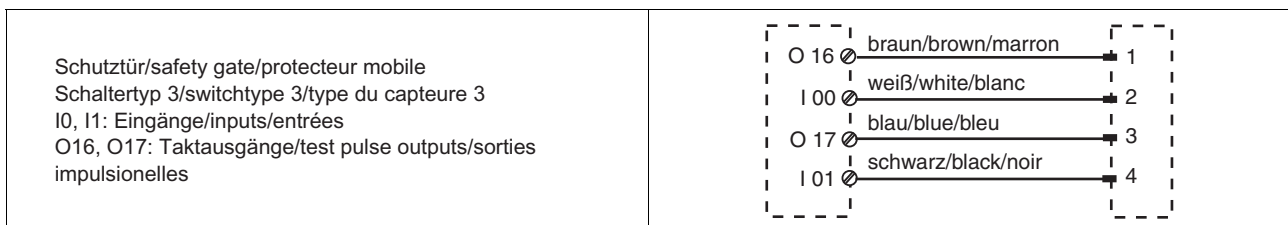
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ X2.1 24 V DC only/ (nur 24 V DC/ 24 V DC only/ 24 V DC seulement) PNOZ X4/X8P PNOZ e6vp PNOZ X2.3P PNOZ X9/X9P PNOZ s3 PNOZ X2.7P PNOZ X10/X10.1 PNOZ s4 PNOZ X2.8P/X2.9P PNOZ X10.11P PNOZ s5 PNOZ Ex</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

PSENmag PSEN 1.2p-20

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

vibration

- Do not use as a limit stop

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,2-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

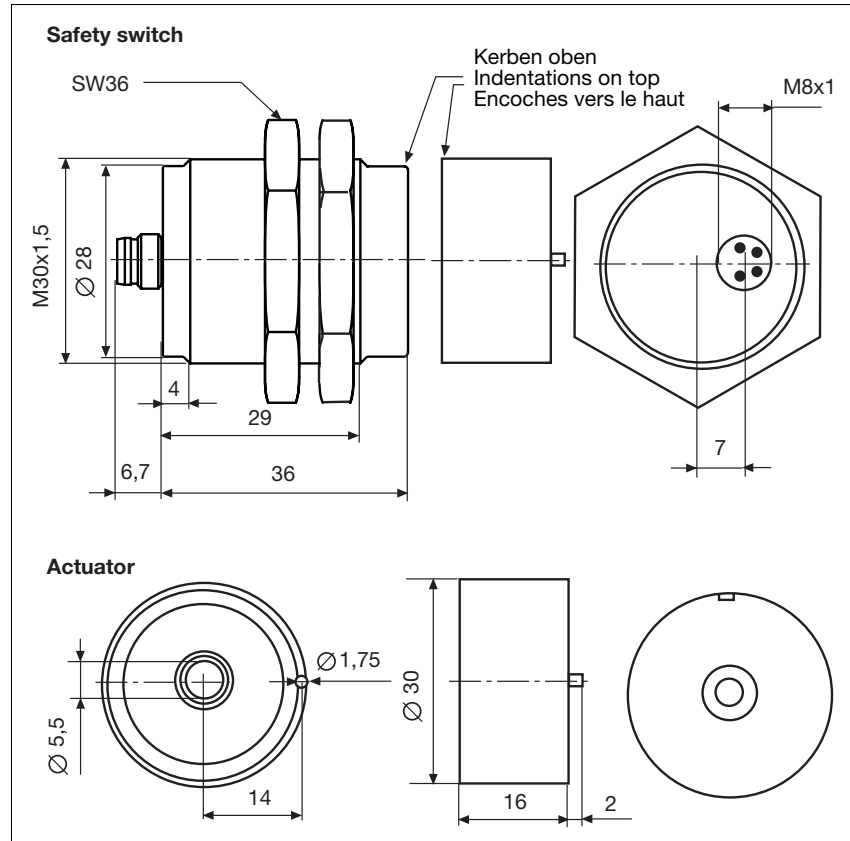
PSENmag

PSEN 1.2p-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,2-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

2.2

PSENmag

PSEN 1.2p-20

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	42.7 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	15 g
Actuator	16 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.2p-20	1/1	magnetic	Safety switch/actuator	505 220
PSEN 1.2p-20 (switch)	1	magnetic	Safety switch	525 120
PSEN 1.2-20	1	magnetic	Actuator	515 120

PSENmag

PSEN 1.2p-22



Unit features

- ▶ The actuator **PSEN 1,2-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,2-20** and its approved evaluation devices.

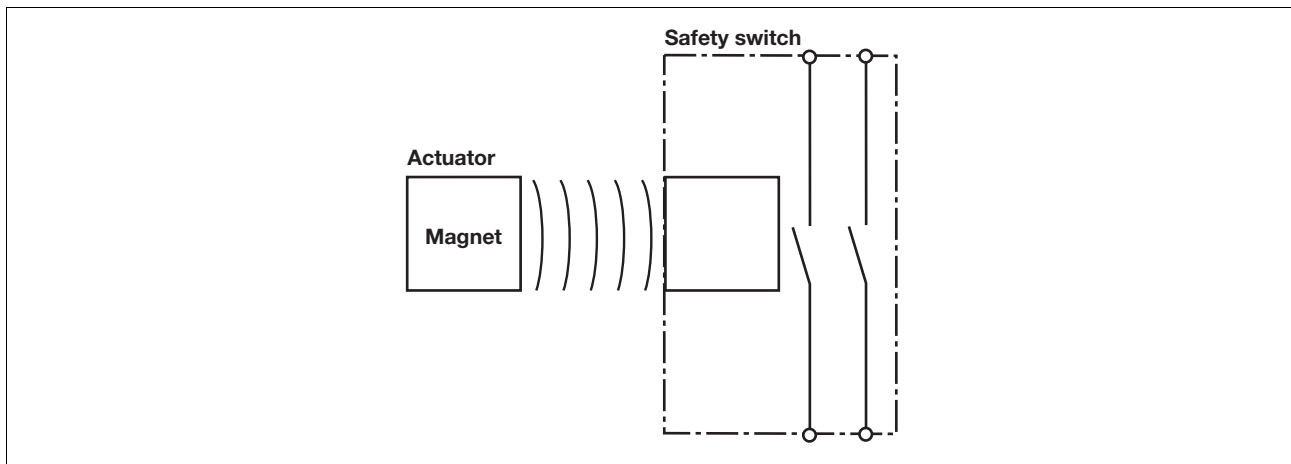
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.2p-22
	◆
	◆

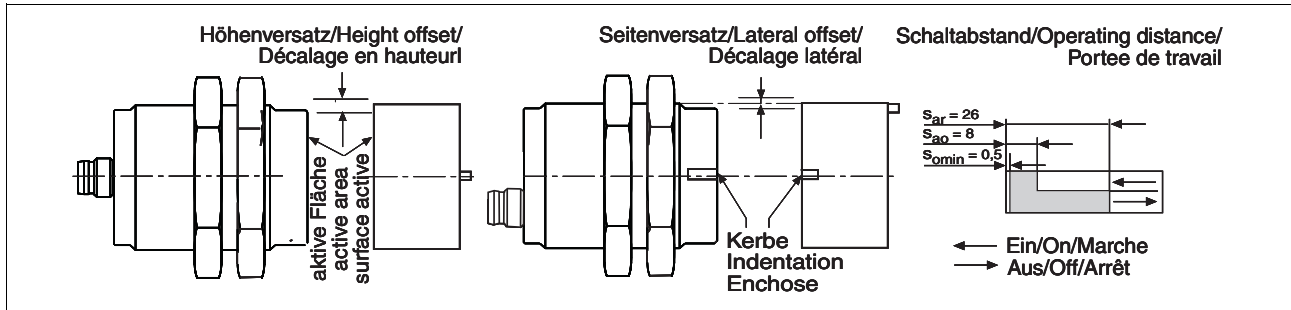
Block diagram



PSENmag

PSEN 1.2p-22

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

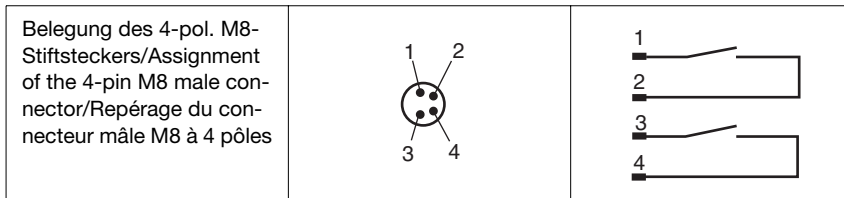
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

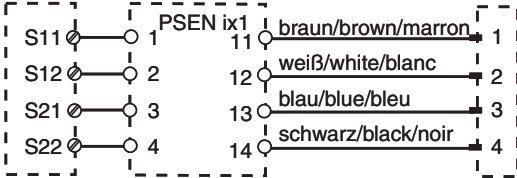
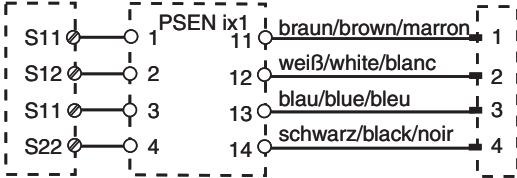
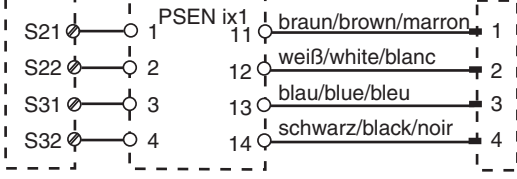
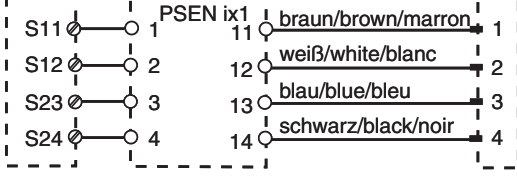
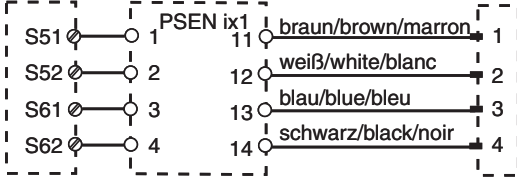
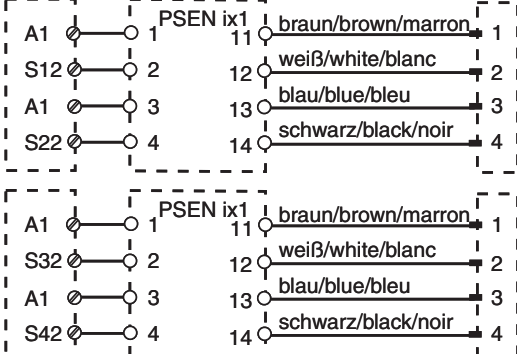
NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



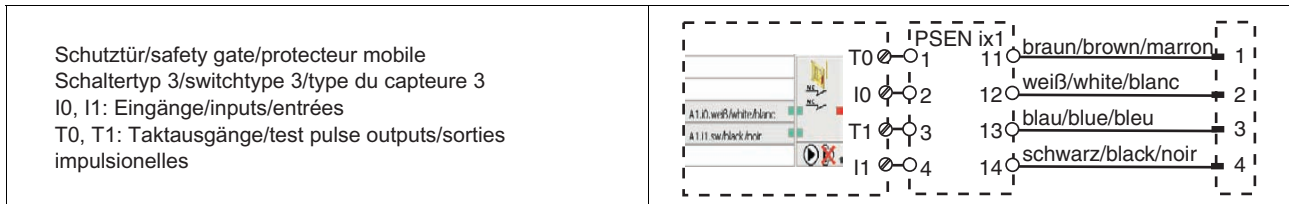
PSENmag PSEN 1.2p-22

► Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

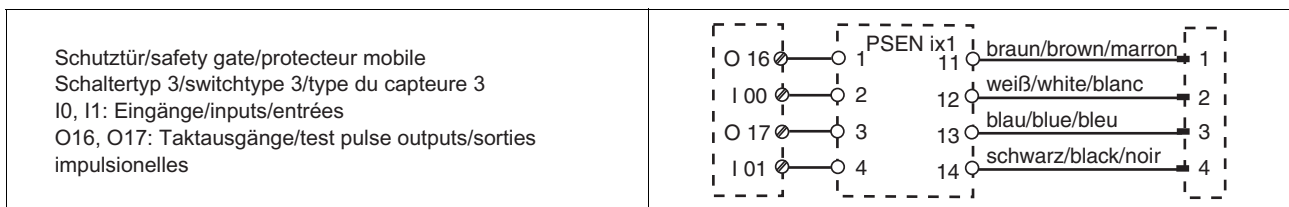
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ e1vp PNOZ X2.1 24 V DC only/ PNOZ e6.1p (nur 24 V DC/ 24 V DC seulement) PNOZ e6vp 24 V DC only/ PNOZ X4/X8P PNOZ s3 24 V DC seulement) PNOZ X9/X9P PNOZ s4 PNOZ X2.3P PNOZ X10/X10.1 PNOZ s5 PNOZ X2.7P PNOZ X10.11P PNOZ X2.8P/X2.9P PNOZ Ex</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

PSENmag PSEN 1.2p-22

▶ Connection to PNOZmulti



▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

– Do not use as a limit stop

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or vibration

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,2-20**.
- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

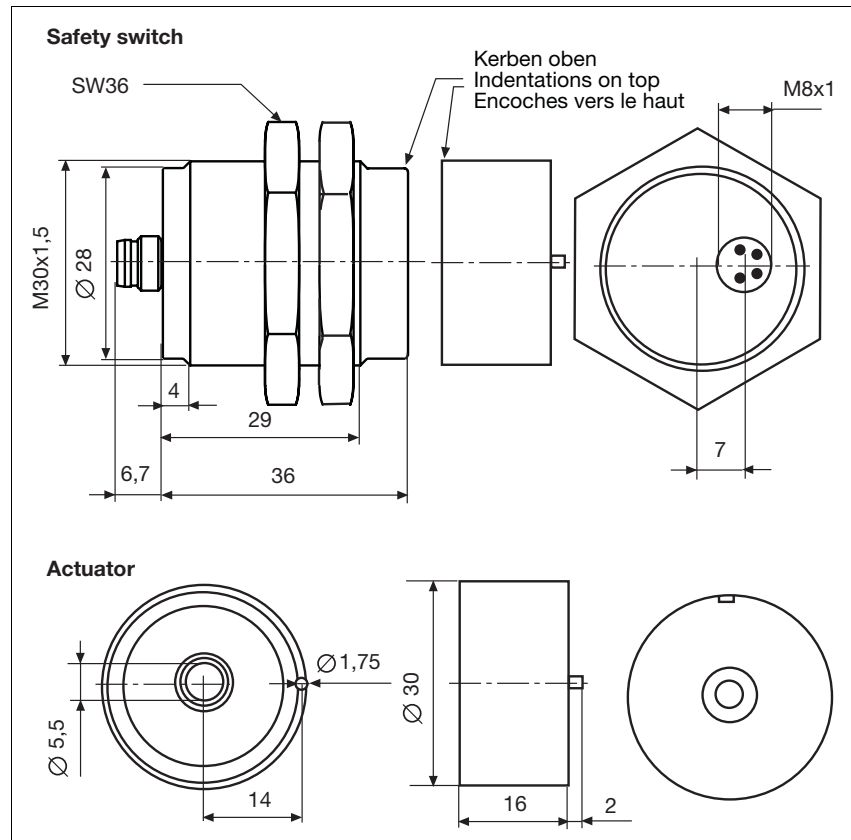
PSENmag

PSEN 1.2p-22

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,2-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.2p-22

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	42.7 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	15 g
Actuator	16 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.2p-22	1/1	magnetic	Safety switch/actuator	505 222
PSEN 1.2p-22 (switch)	1	magnetic	Safety switch	525 122
PSEN 1.2-22	1	magnetic	Actuator	515 120

PSENmag

PSEN 1.2p-23



Unit features

- ▶ The actuator **PSEN 1,2-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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 1,2-20** and its approved evaluation devices.

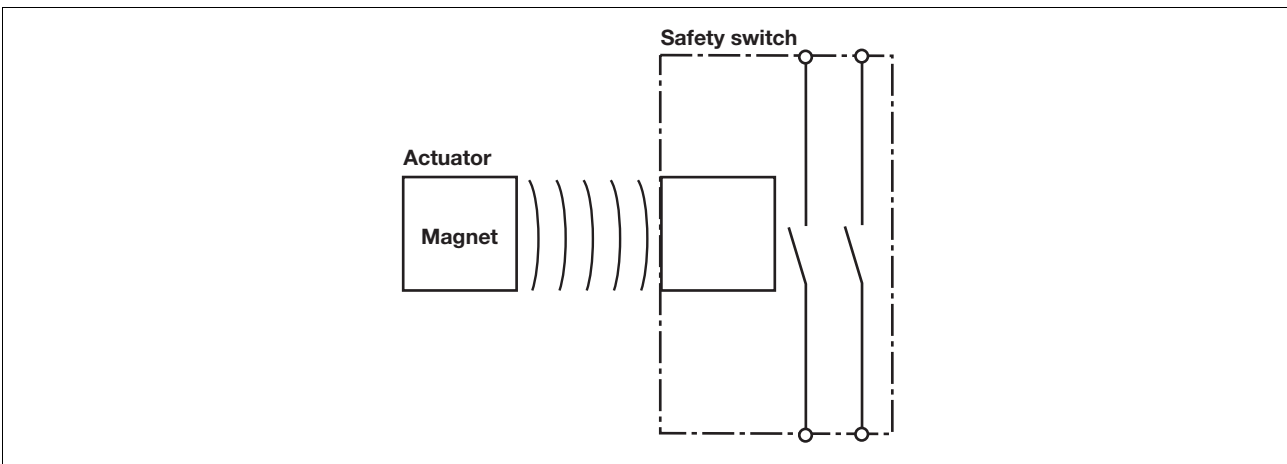
The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.2p-23
	◆
	◆

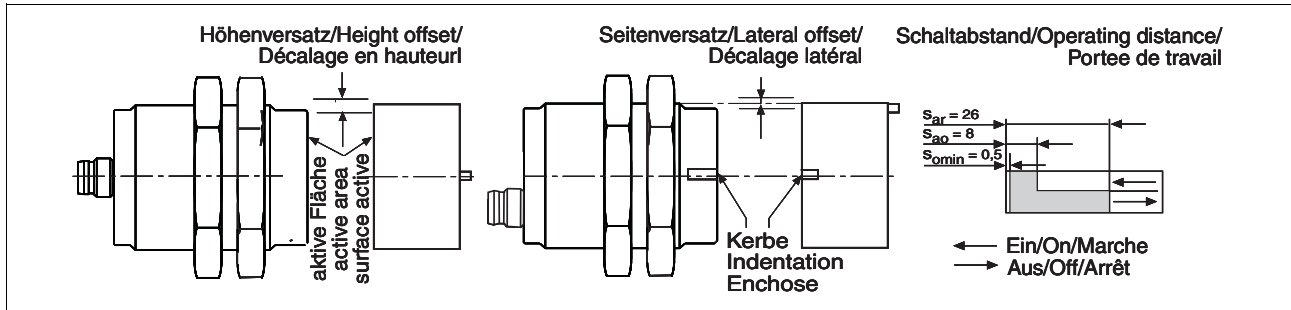
Block diagram



PSENmag

PSEN 1.2p-23

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

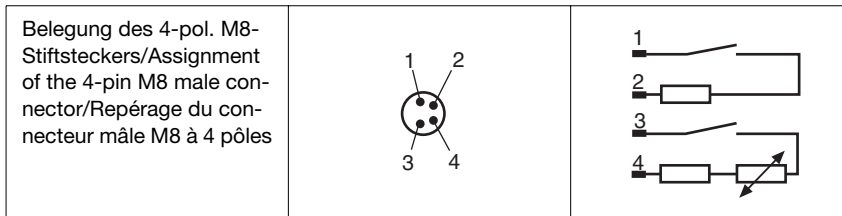
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

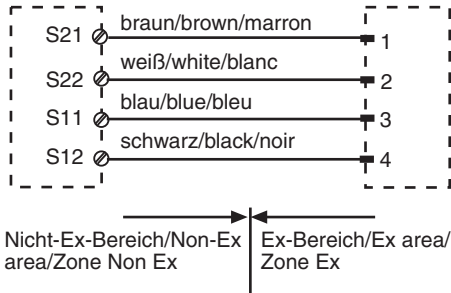
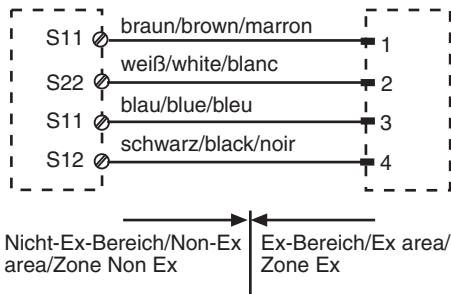
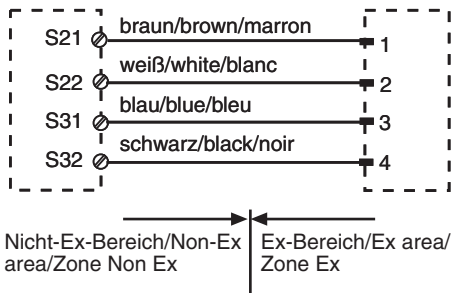
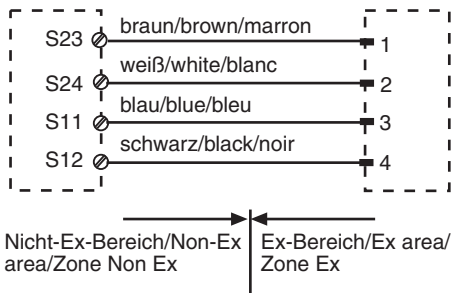
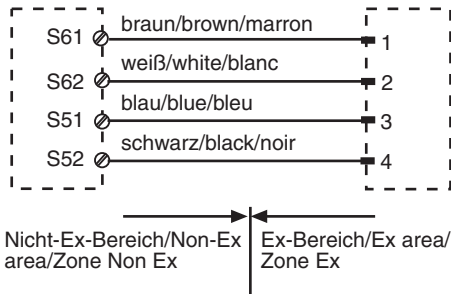
NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.



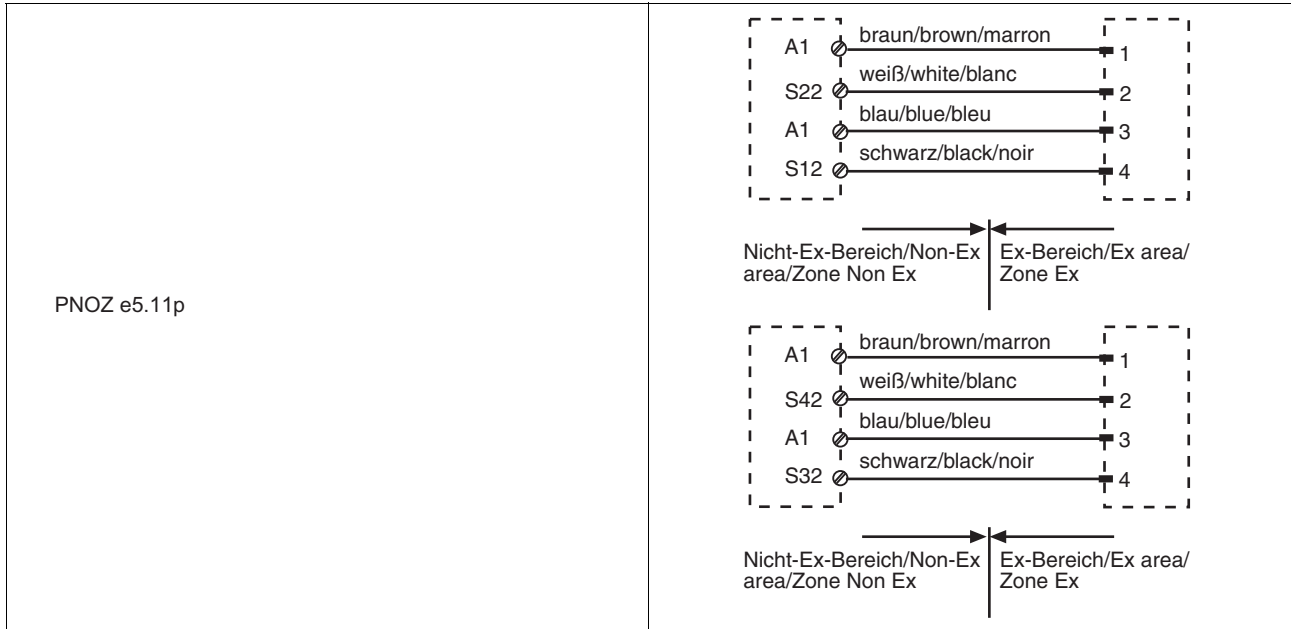
PSENmag PSEN 1.2p-23

- Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

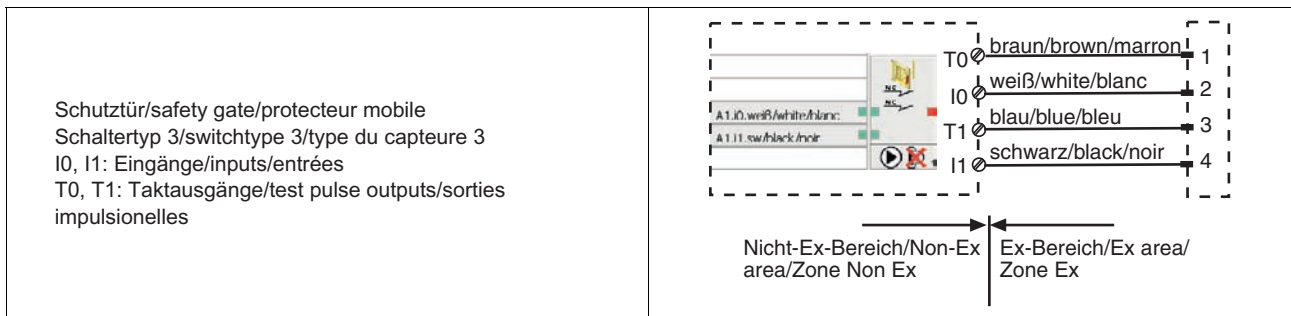
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ X2.1 24 V DC only/ (nur 24 V DC/ 24 V DC only/ 24 V DC seulement) PNOZ X4/X8P PNOZ e6.1p PNOZ X2.3P PNOZ X9/X9P PNOZ e6vp PNOZ X2.7P PNOZ X10/X10.1 PNOZ s3 PNOZ X2.8P/X2.9P PNOZ X10.11P PNOZ s4 PNOZ Ex PNOZ s5</p>	
<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	

PSENmag

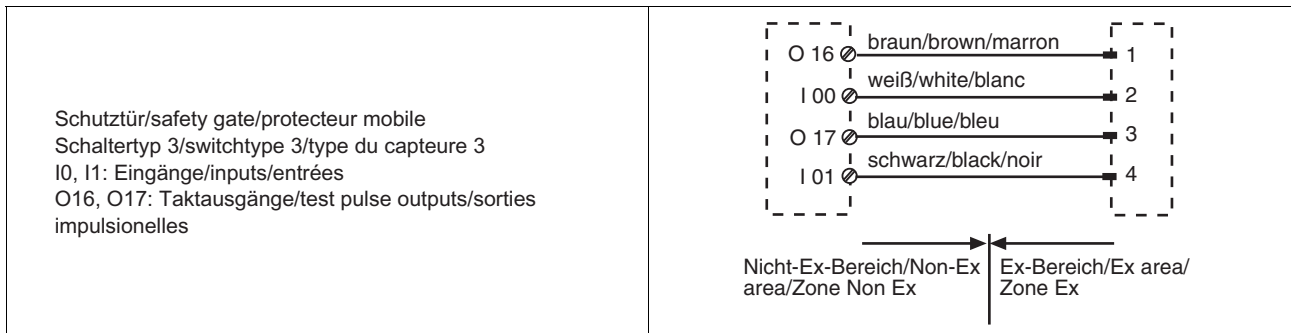
PSEN 1.2p-23



► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 1.2p-23

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,2-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

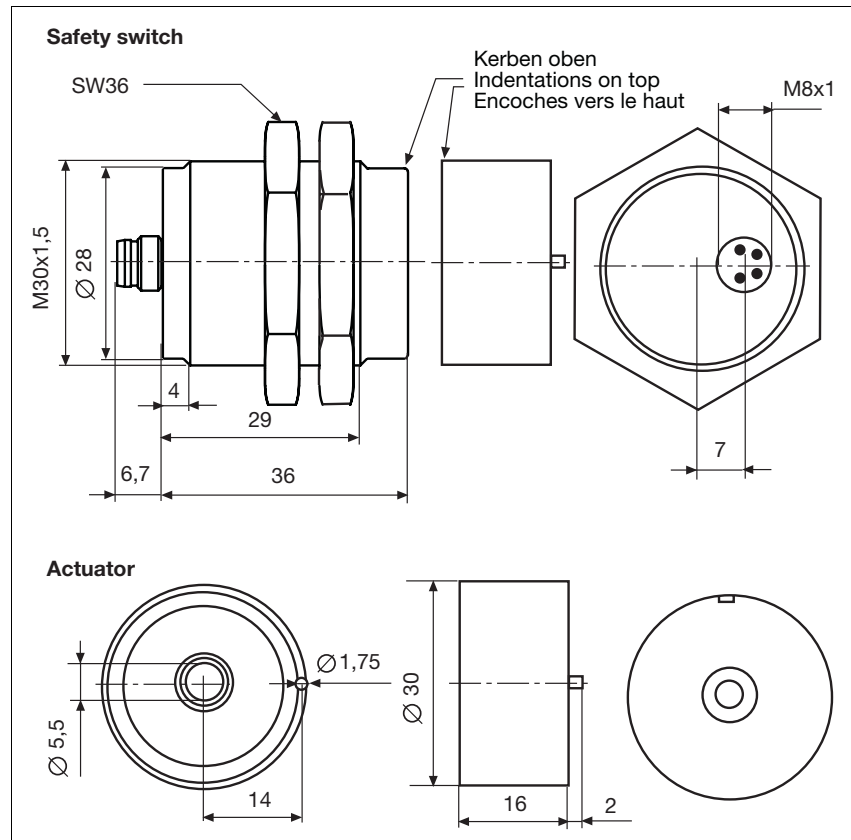
PSENmag

PSEN 1.2p-23

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



2.2

Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,2-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 1.2p-23

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	42.7 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	15 g
Actuator	16 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.2p-23	1/1	magnetic	Safety switch/actuator	505 223
PSEN 1.2-20	1	magnetic	Actuator	515 120

PSENmag

PSEN 1.2p-25



Unit features

- ▶ The actuator **PSEN 1,2-20** belongs to the safety switch
- ▶ 2 reed contacts (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC

Function description

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.

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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).

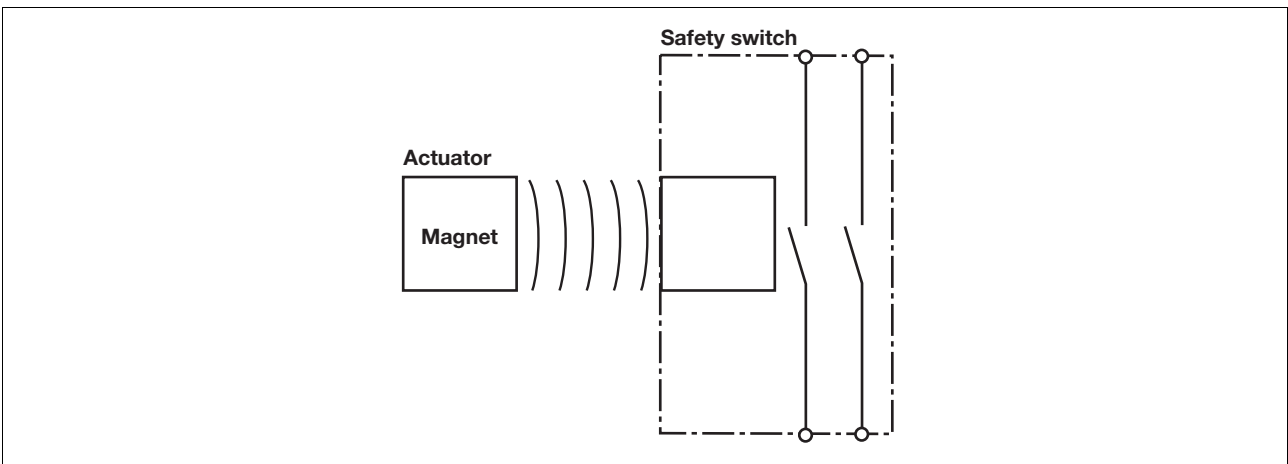
The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN 1,2-20** and its approved evaluation devices. The safety switch should only be connected to the evaluation devices listed under "Connections".

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 1.2p-25
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	◆

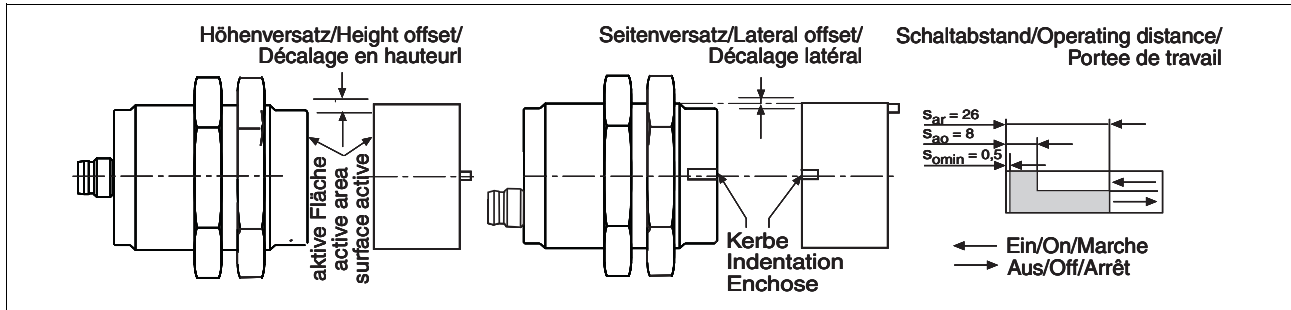
Block diagram



PSENmag

PSEN 1.2p-25

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

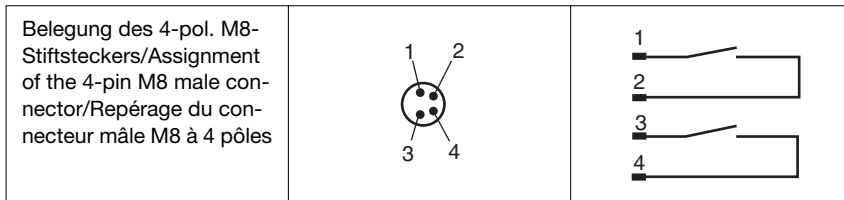
- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

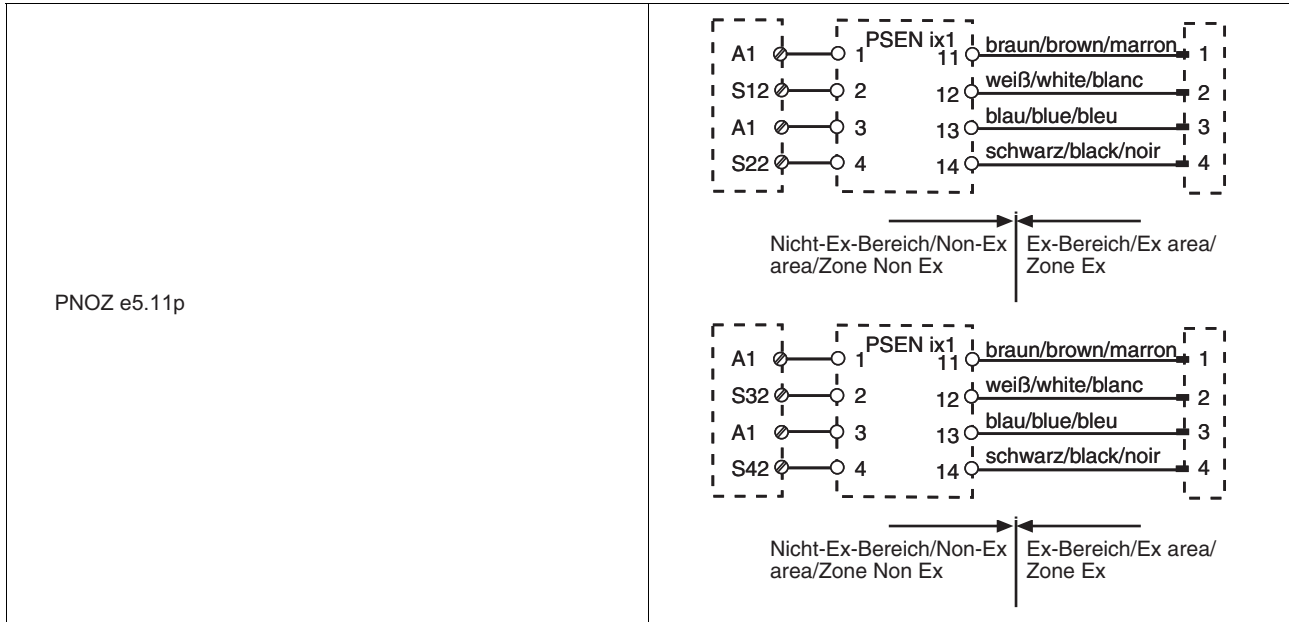


PSENmag PSEN 1.2p-25

- Connection to PNOZ X, PNOZpower, PNOZelog, PNOZsigma

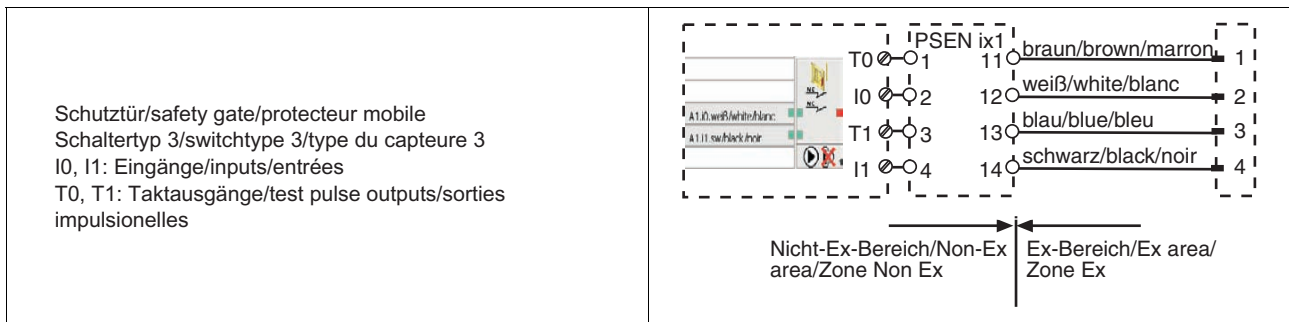
<p>PNOZ p1p PNOZ X2C PNOZ e1p PNOZ p1vp PNOZ X2.1C PNOZ e1.1p PNOZ X2/X2P (nur 24 V DC/ PNOZ e1vp PNOZ X2.1 24 V DC only/ PNOZ e6.1p (nur 24 V DC/ 24 V DC seulement) PNOZ e6vp 24 V DC only/ PNOZ X4/X8P PNOZ s3 24 V DC seulement) PNOZ X9/X9P PNOZ s4 PNOZ X2.3P PNOZ X10/X10.1 PNOZ s5 PNOZ X2.7P PNOZ X10.11P PNOZ X2.8P/X2.9P PNOZ Ex</p>	<p>Nicht-Ex-Bereich/Non-Ex area/Zone Non Ex Ex-Bereich/Ex area/Zone Ex</p>
<p>PNOZ X5 PNOZ X5J</p>	<p>Nicht-Ex-Bereich/Non-Ex area/Zone Non Ex Ex-Bereich/Ex area/Zone Ex</p>
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	<p>Nicht-Ex-Bereich/Non-Ex area/Zone Non Ex Ex-Bereich/Ex area/Zone Ex</p>
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	<p>Nicht-Ex-Bereich/Non-Ex area/Zone Non Ex Ex-Bereich/Ex area/Zone Ex</p>
<p>PMUT X1P</p>	<p>Nicht-Ex-Bereich/Non-Ex area/Zone Non Ex Ex-Bereich/Ex area/Zone Ex</p>

PSENmag PSEN 1.2p-25

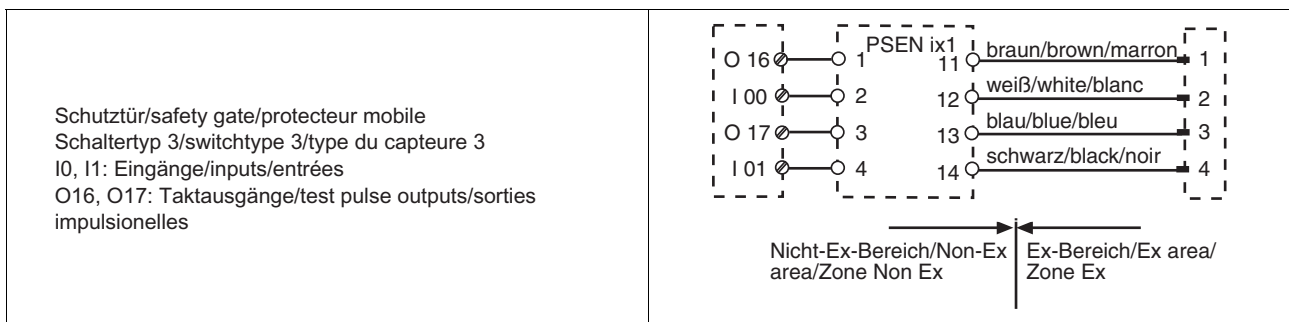


► Connection to PNOZmulti

2.2



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 1.2p-25

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 1,2-20**.
- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

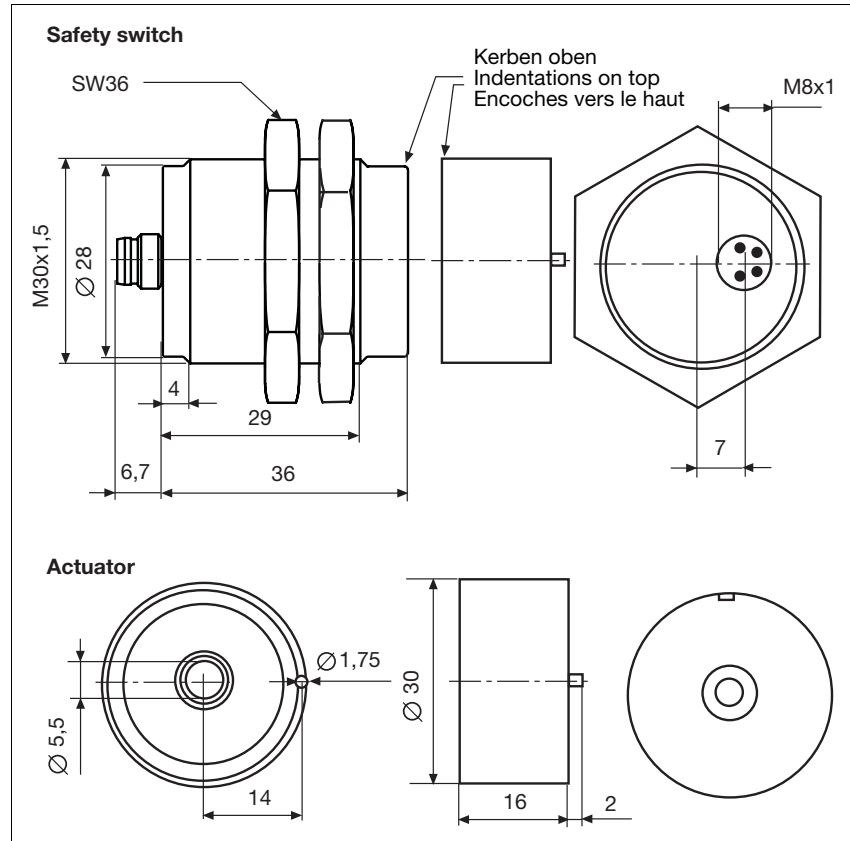
PSENmag

PSEN 1.2p-25

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.50 A
Max. breaking capacity for reed contacts	10.0 W
Max. switch frequency	1 Hz
Actuator	PSEN 1,2-20
Ambient temperature	-10 - 55 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

2.2

PSENmag

PSEN 1.2p-25

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	42.7 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	15 g
Actuator	16 g

The standards current on **2006-12** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 1.2p-25	1/1	magnetic	Safety switch/actuator	505 225
PSEN 1.2-20	1	magnetic	Actuator	515 120

PSENmag

PSEN 2.1a/b-20



Unit features



- ▶ The actuator **PSEN 2,1-20** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1a/b-20
	◆
	◆

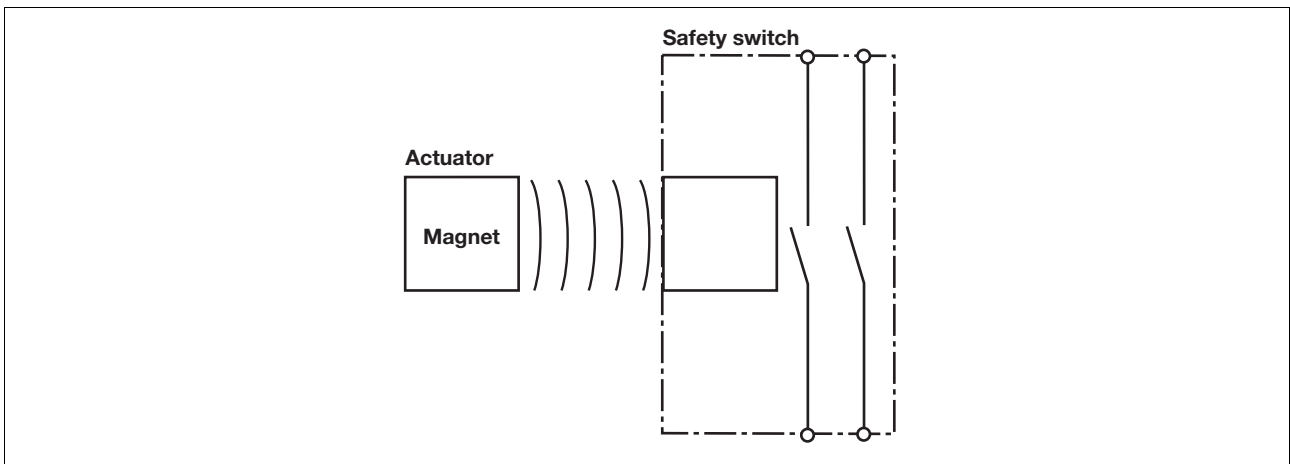
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

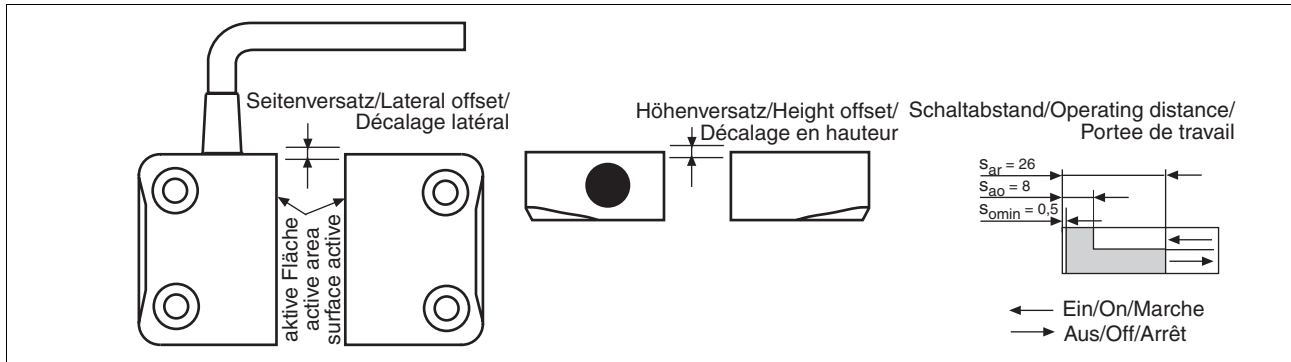
Block diagram



PSENmag

PSEN 2.1a/b-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

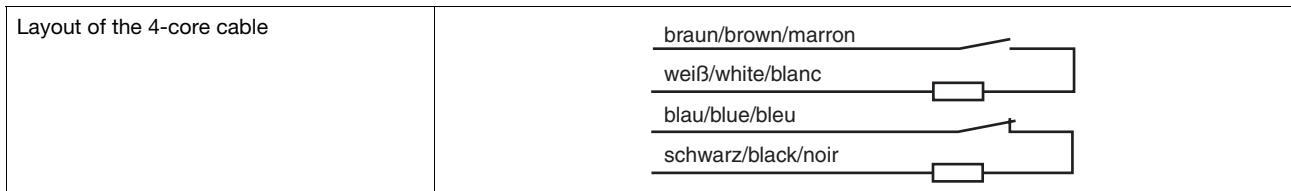
- When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

Connections

The safety switch is shown in an unoperated condition.



PSENmag PSEN 2.1a/b-20

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
--	--

CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag **PSEN 2.1a/b-20**

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

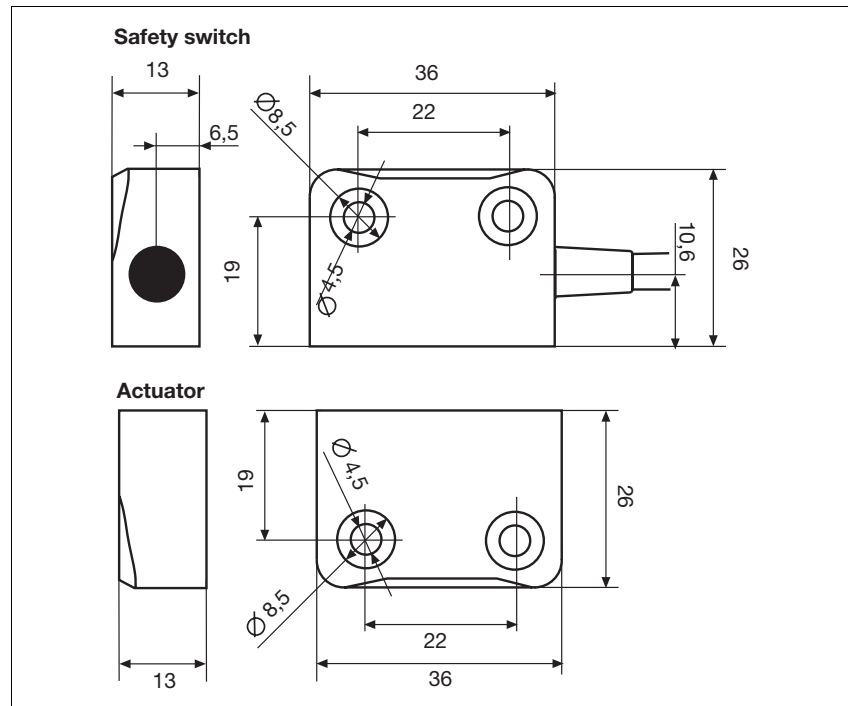
PSENmag

PSEN 2.1a/b-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable Order no.: 502227 5m cable Order no.: 502226
Cable	LiYY 4 x 0,25 mm²
Protection type	IP69K
Housing material	PBT

PSENmag

PSEN 2.1a/b-20

Technical details

Dimensions

Safety switch

Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	150 g Order no.: 502226
	320 g Order no.: 502227
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1a-20	1/1	magnetic	Safety switch/actuator	502 226
PSEN 2.1a-20 (switch)	1	magnetic	Safety switch	522 126
PSEN 2.1b-20	1/1	magnetic	Safety switch/actuator	502 227
PSEN 2.1b-20 (switch)	1	magnetic	Safety switch	522 127
PSEN 2.1-20	1	magnetic	Actuator	512 120

PSENmag

PSEN 2.1b-26



Unit features



- ▶ The actuator **PSEN 2,1-20** belongs to the safety switch
- ▶ Safety switch with cable (10 m)
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1b-26
	◆
	◆

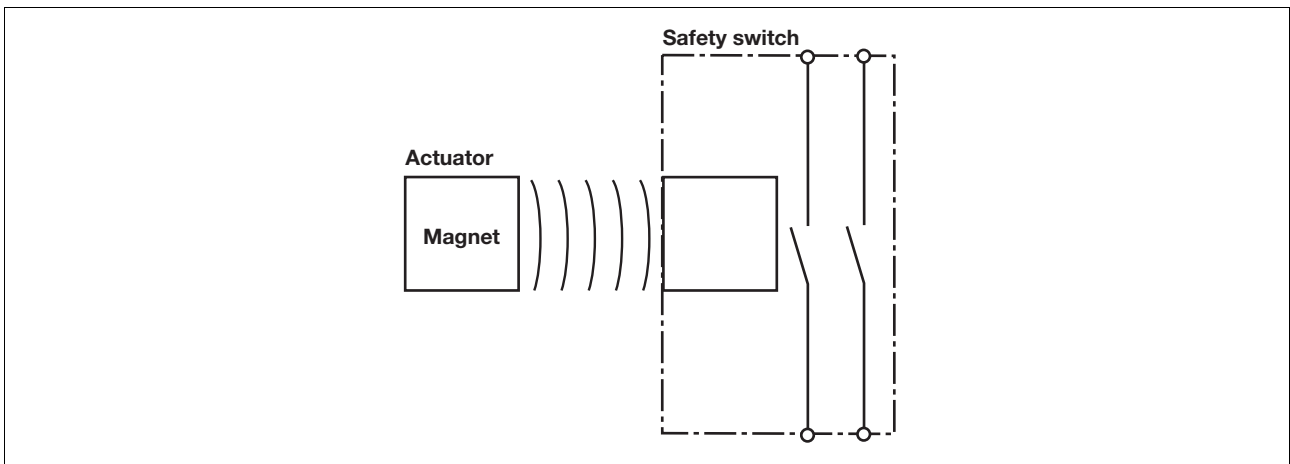
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

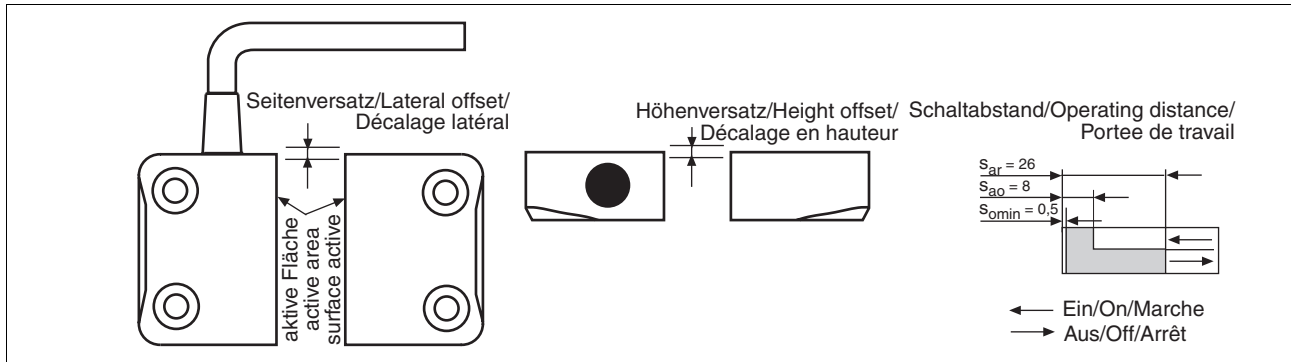
Block diagram



PSENmag

PSEN 2.1b-26

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

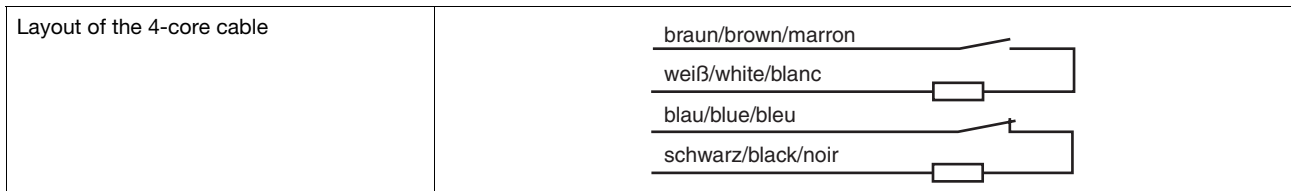
- When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

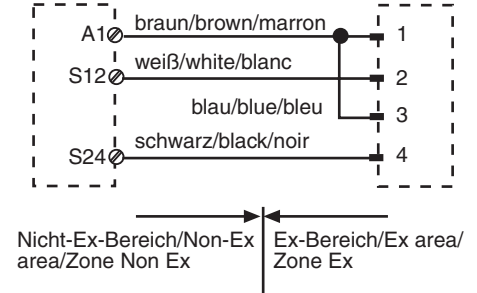
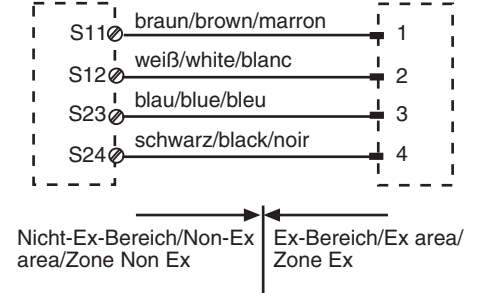
Connections

The safety switch is shown in an unoperated condition.



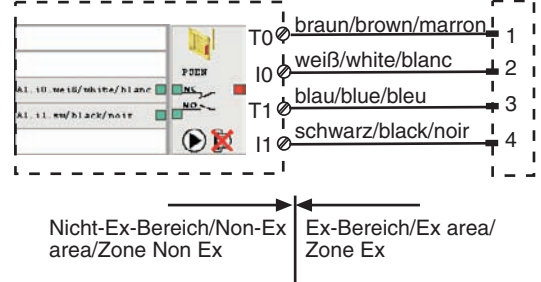
PSENmag PSEN 2.1b-26

► Connection to PNOZelog

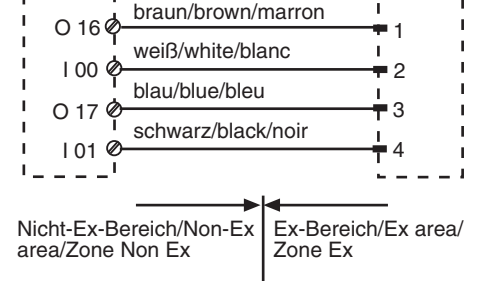
<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>with detection of shorts across contacts PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

2.2

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with

standard function block SB064 or SB066.

PSENmag PSEN 2.1b-26

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

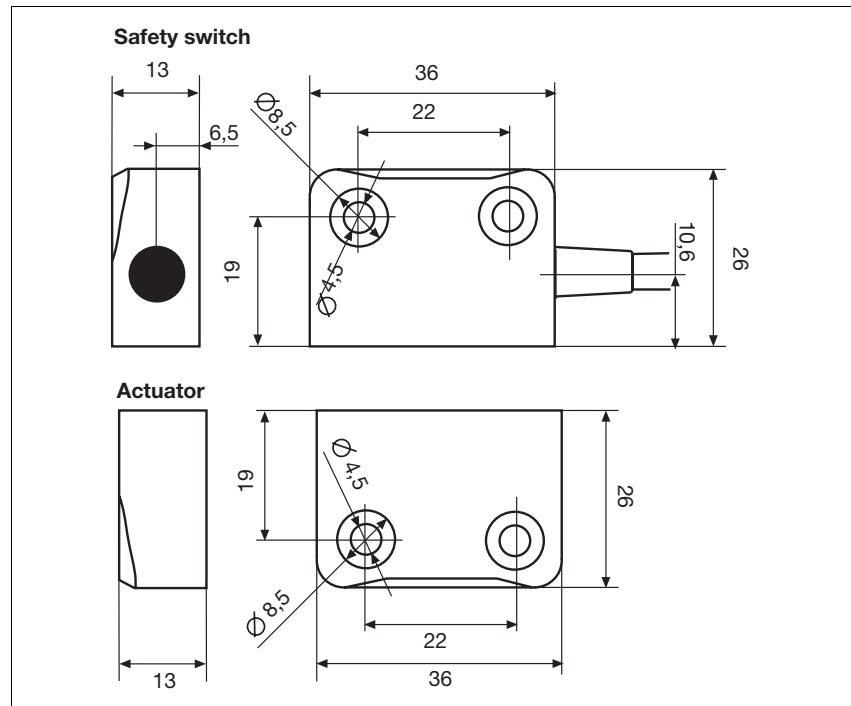
PSENmag

PSEN 2.1b-26

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	10m cable
Cable	LiYY 4 x 0,25 mm²
Protection type	IP69K
Housing material	PBT

PSENmag

PSEN 2.1b-26

Technical details

Dimensions	
Safety switch	
Height	36.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	320 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1b-26	1/1	magnetic	Safety switch/actuator	502 250
PSEN 2.1-20	1	magnetic	Actuator	512 120

PSENmag

PSEN 2.1p-10



Unit features



- ▶ The actuator **PSEN 2,1-10** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **3 mm**
- ▶ Assured release distance: **19 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

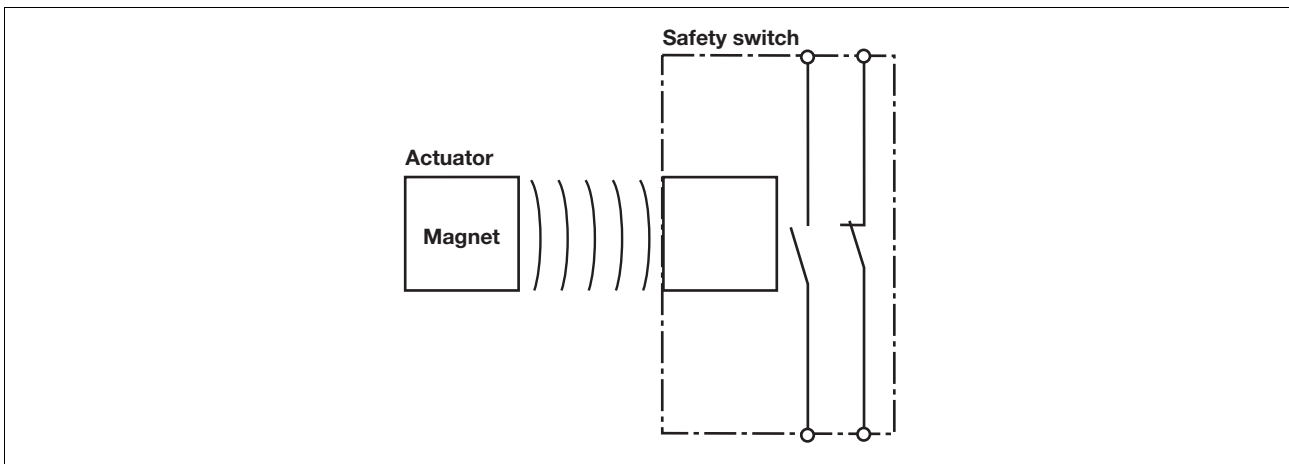
Approvals

	PSEN 2.1p-10
	◆
	◆

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-10** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

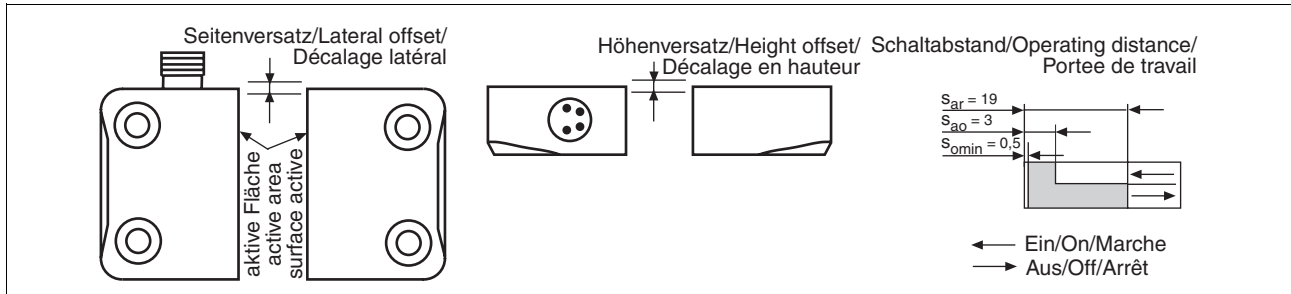
Block diagram



PSENmag

PSEN 2.1p-10

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	1,5	2,0	2,5	3,0
Seitenversatz/Lateral offset/Décalage latéral	1,0	2,5	2,5	2,0	1,5	1,5
	1,5	2,0	2,0	2,0	1,0	1,0
	2,0	2,0	1,5	1,5	1,0	0,5
	2,5	1,5	1,0	0,5	-	-
	3,0	0,5	0,5	-	-	-

- Assured release distance S_{ar} :
Max. 19 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20° C.

Wiring

Please note:

- Information given in the "Technical details" must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

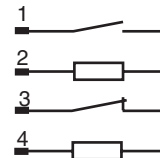
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

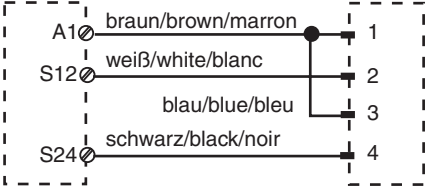
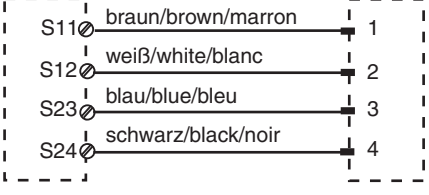
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector

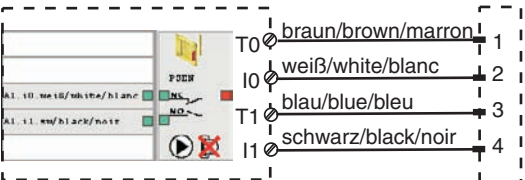


PSENmag PSEN 2.1p-10

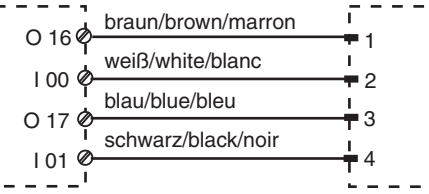
► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
--	--

CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.1p-10

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-10**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

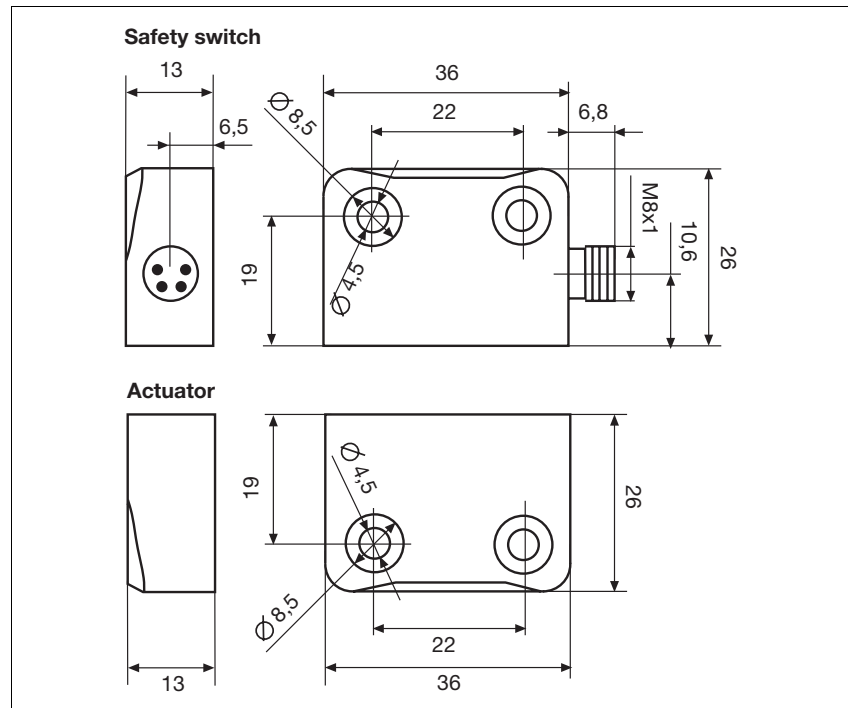
PSENmag

PSEN 2.1p-10

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	3 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	19 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-10
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 2.1p-10

Technical details

Dimensions

Safety switch

Height	42.8 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	15 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-10	1/1	magnetic	Safety switch/actuator	502 210
PSEN 2.1p-10 (switch)	1	magnetic	Safety switch	522 110
PSEN 2.1-10	1	magnetic	Actuator	512 110

PSENmag

PSEN 2.1p-11



Unit features


- ▶ The actuator **PSEN 2,1-10** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **3 mm**
- ▶ Assured release distance: **19 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1p-11	
	◆	
	◆	

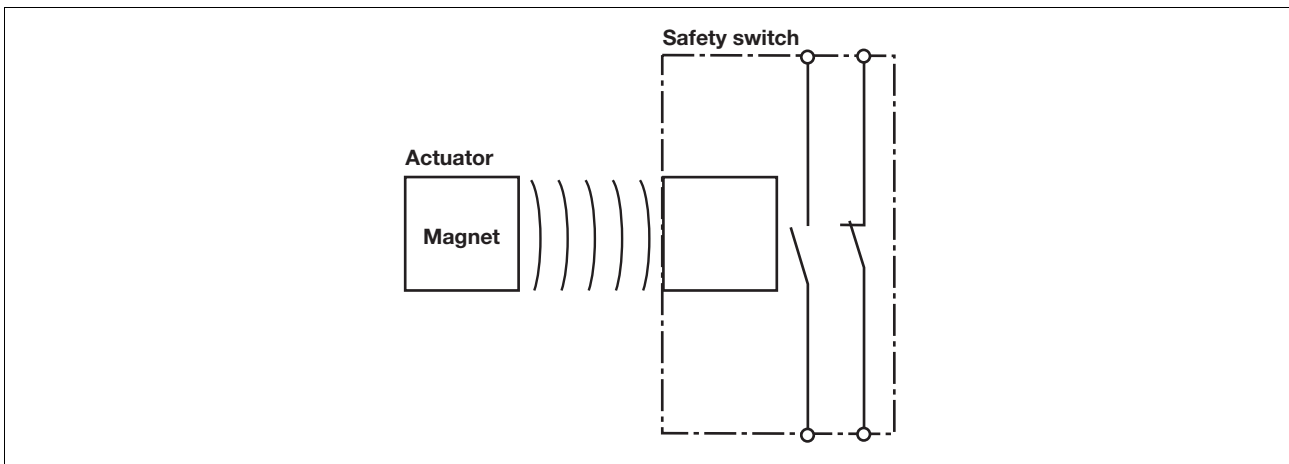
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-10** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

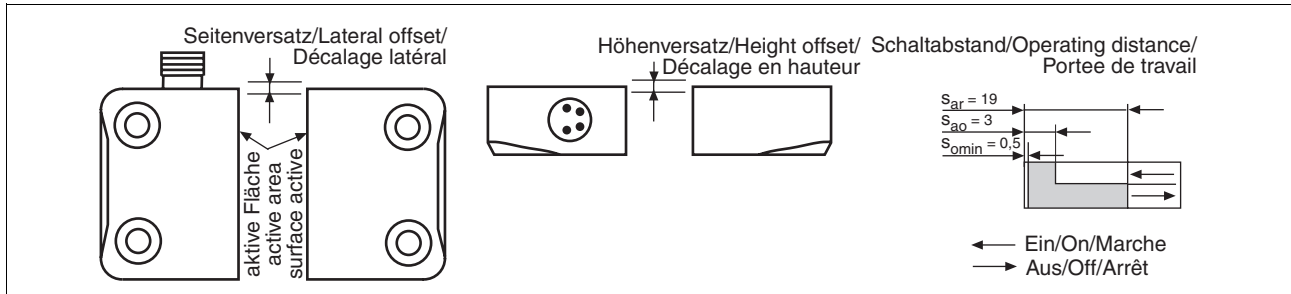
Block diagram



PSENmag

PSEN 2.1p-11

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	1,5	2,0	2,5	3,0
Seitenversatz/Lateral offset/Décalage latéral	1,0	2,5	2,5	2,0	1,5	1,5
	1,5	2,0	2,0	2,0	1,0	1,0
	2,0	2,0	1,5	1,5	1,0	0,5
	2,5	1,5	1,0	0,5	-	-
	3,0	0,5	0,5	-	-	-

- Assured release distance S_{ar} :
Max. 19 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20° C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

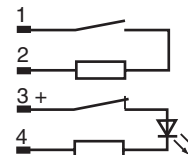
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

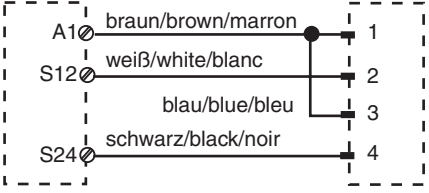
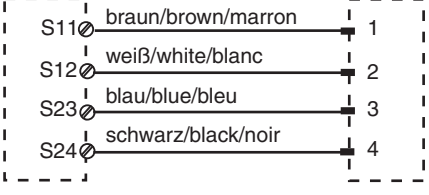
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector

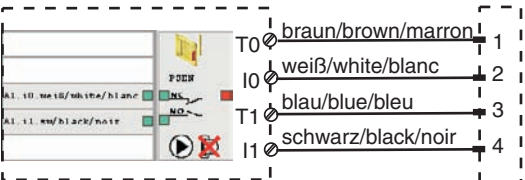


PSENmag PSEN 2.1p-11

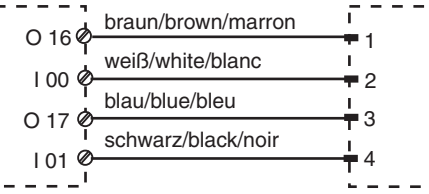
► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.1p-11

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-10**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

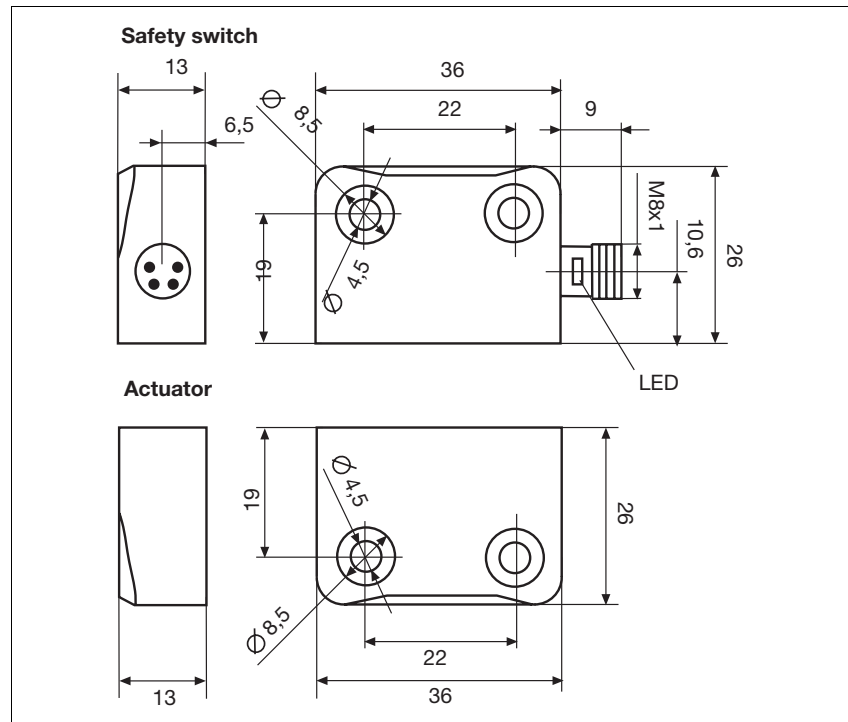
PSENmag

PSEN 2.1p-11

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	3 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	19 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-10
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.1p-11

Technical details

Dimensions

Safety switch

Height	45.0 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	15 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-11	1/1	magnetic	Safety switch/actuator	502 211
PSEN 2.1p-11 (switch)	1	magnetic	Safety switch	522 111
PSEN 2.1-10	1	magnetic	Actuator	512 110

PSENmag

PSEN 2.1p-20



Unit features



- ▶ The actuator **PSEN 2,1-20** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

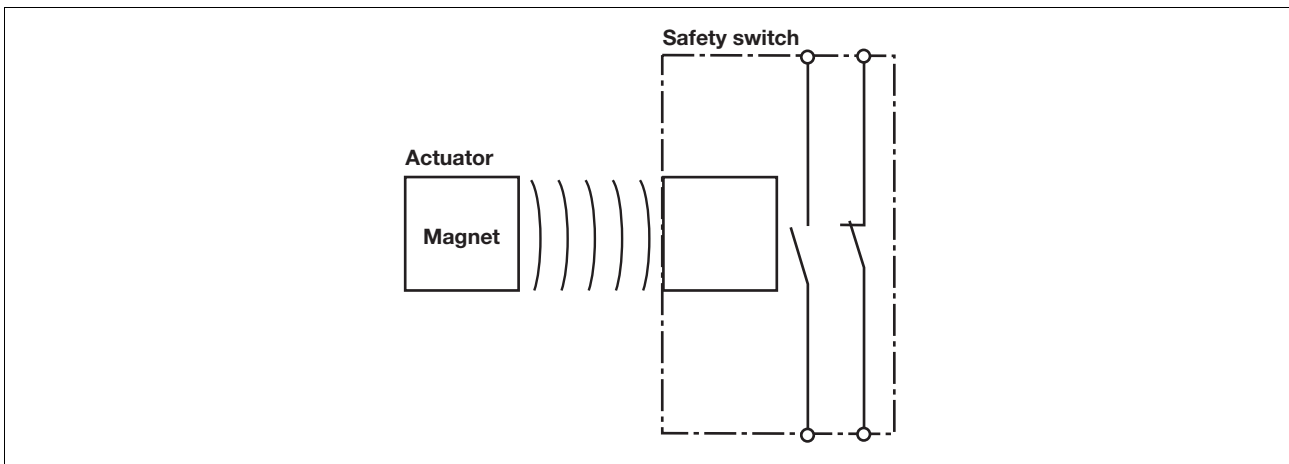
Approvals

	PSEN 2.1p-20	
	◆	
	◆	

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-20** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram

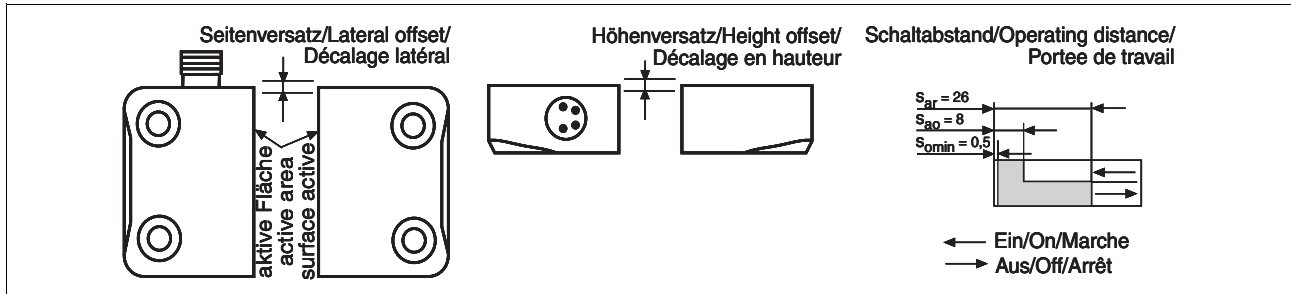


2.2

PSENmag

PSEN 2.1p-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

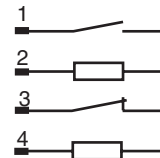
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pitz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



PSENmag PSEN 2.1p-20

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag **PSEN 2.1p-20**

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

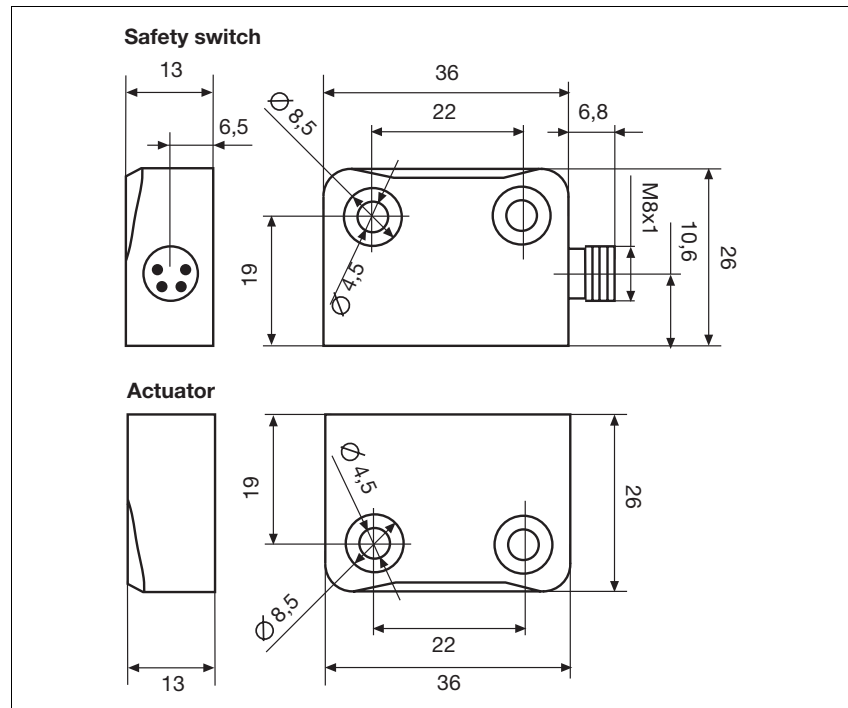
PSENmag

PSEN 2.1p-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 2.1p-20

Technical details

Dimensions

Safety switch

Height **42.8 mm**

Width **26.0 mm**

Depth **13.0 mm**

Actuator

Height **36 mm**

Width **26 mm**

Depth **13 mm**

Weight

Safety switch **15 g**

Actuator **20 g**

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-20	1/1	magnetic	Safety switch/actuator	502 220
PSEN 2.1p-20 (switch)	1	magnetic	Safety switch	522 120
PSEN 2.1-20	1	magnetic	Actuator	512 120

PSENmag

PSEN 2.1p-21



Unit features



- ▶ The actuator **PSEN 2,1-20** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1p-21	
	◆	
	◆	

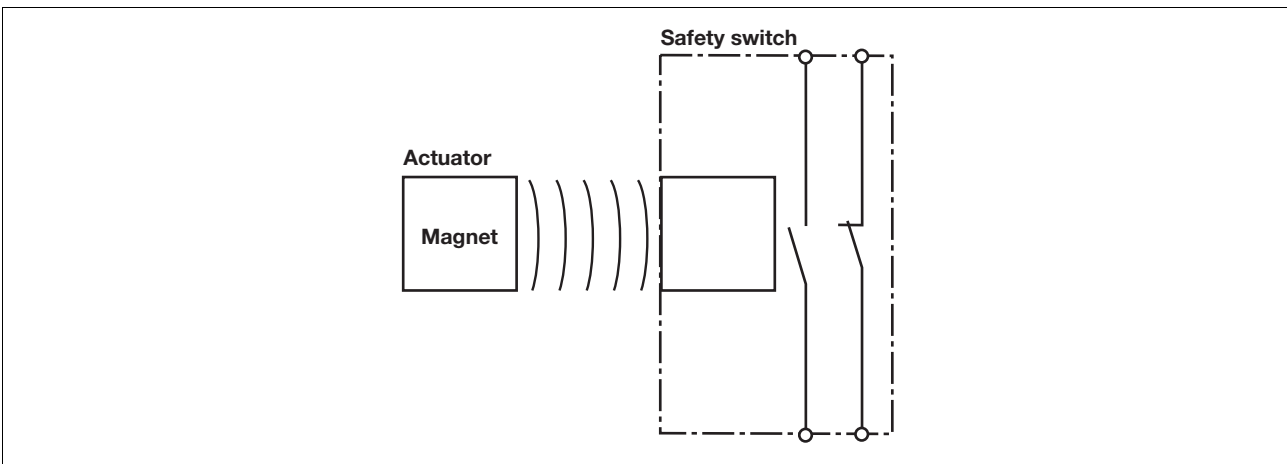
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

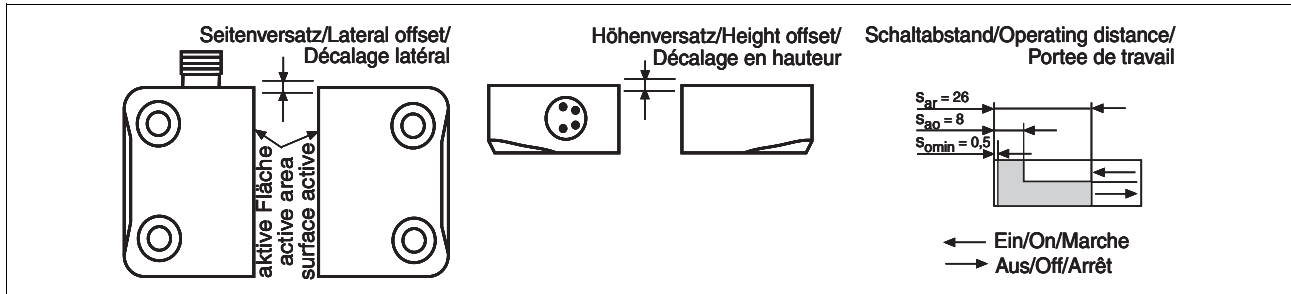
Block diagram



PSENmag

PSEN 2.1p-21

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

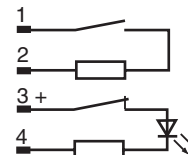
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

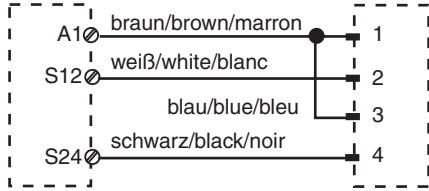
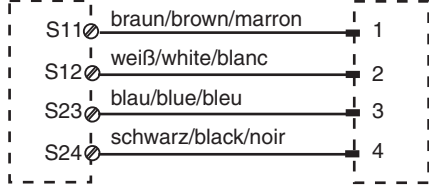
The colour marking for the connection lead only applies for the cable that Pitz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector

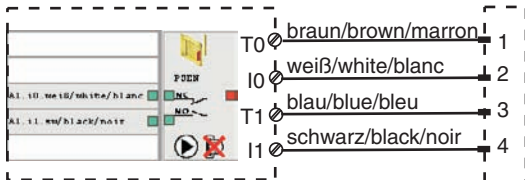


PSENmag PSEN 2.1p-21

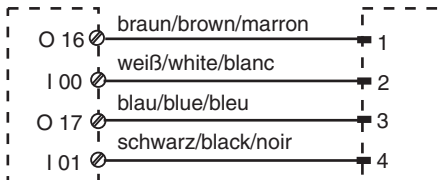
► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
--	--

CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.1p-21

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

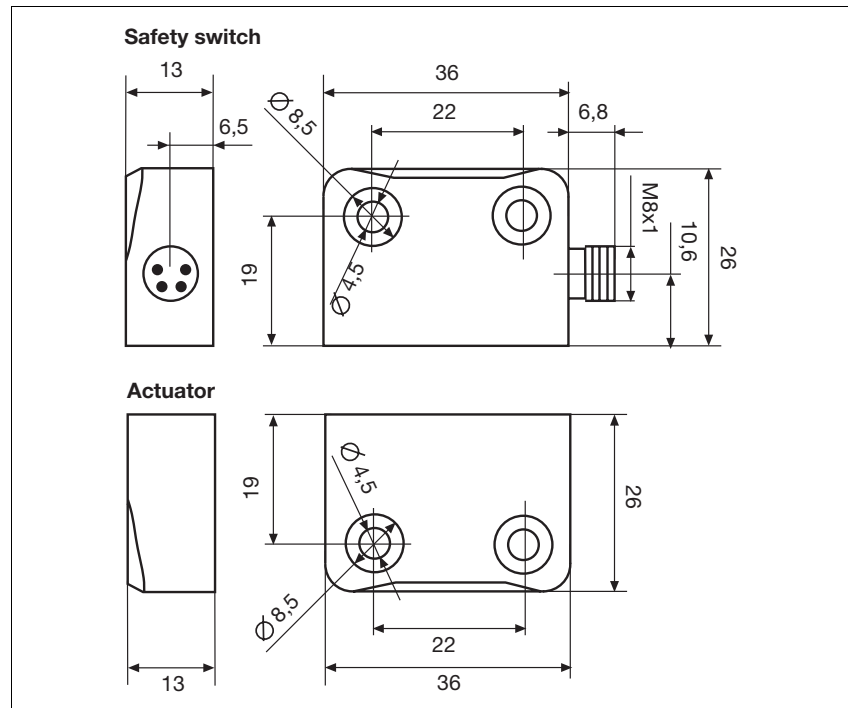
PSENmag

PSEN 2.1p-21

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.1p-21

Technical details

Dimensions

Safety switch

Height	45.0 mm
Width	26.0 mm
Depth	13.0 mm

Actuator

Height	36 mm
Width	26 mm
Depth	13 mm

Weight

Safety switch	15 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-21	1/1	magnetic	Safety switch/actuator	502 221
PSEN 2.1p-21 (switch)	1	magnetic	Safety switch	522 121
PSEN 2.1-20	1	magnetic	Actuator	512 120

PSENmag

PSEN 2.1p-24



Unit features



- ▶ The actuator **PSEN 2,1-20** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **26 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1p-24
	◆
	◆

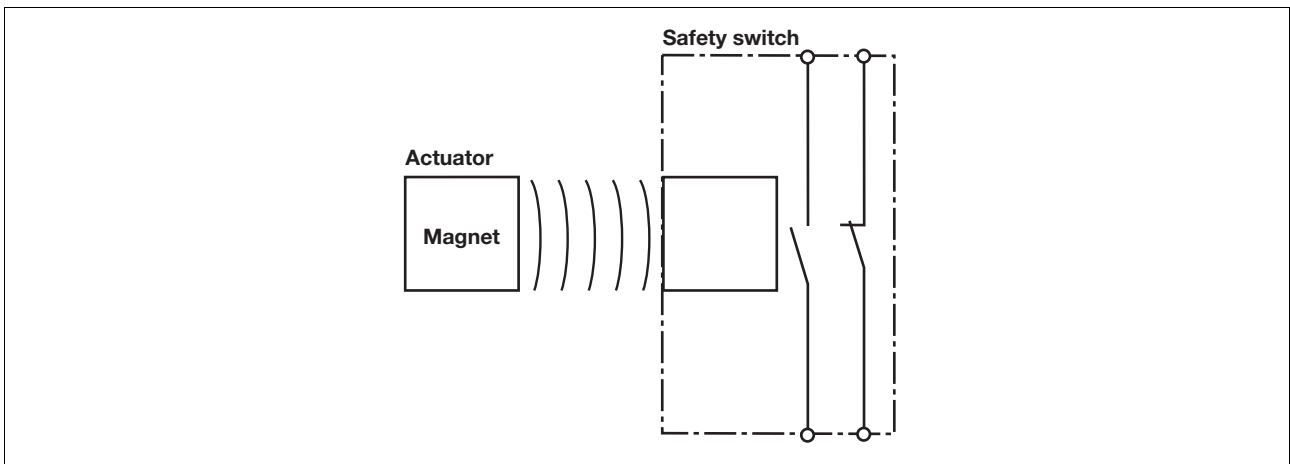
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

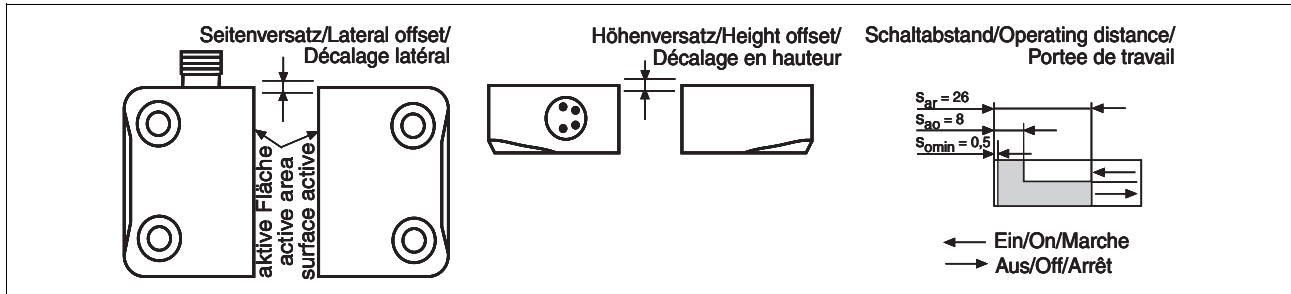
Block diagram



PSENmag

PSEN 2.1p-24

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

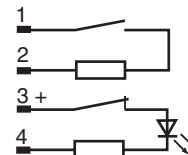
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

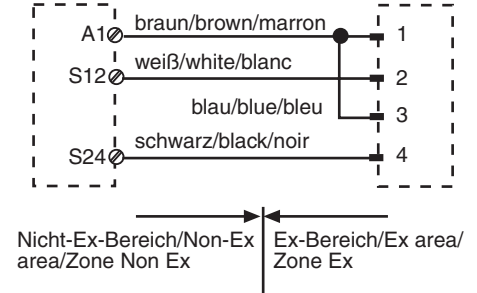
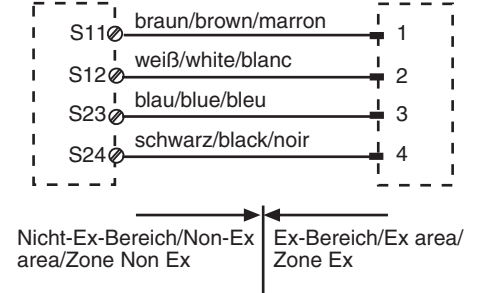
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



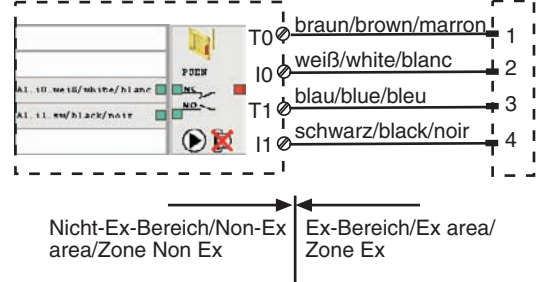
PSENmag PSEN 2.1p-24

► Connection to PNOZelog

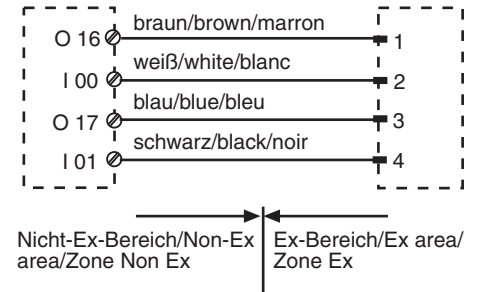
<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>with detection of shorts across contacts PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

2.2

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with

standard function block SB064 or SB066.

PSENmag PSEN 2.1p-24

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

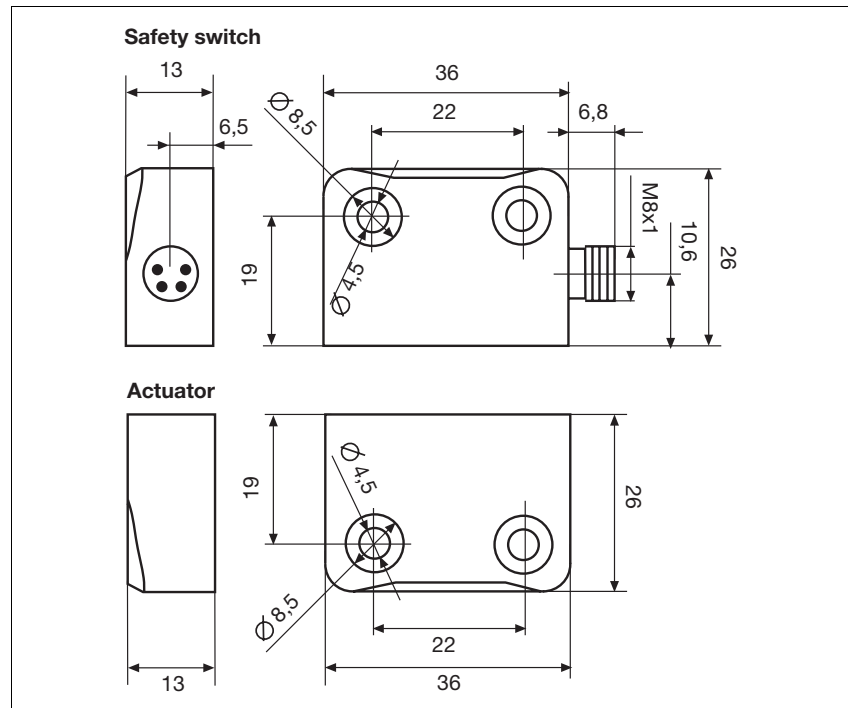
PSENmag

PSEN 2.1p-24

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.1p-24

Technical details

Dimensions

Safety switch

Height **45.0 mm**

Width **26.0 mm**

Depth **13.0 mm**

Actuator

Height **36 mm**

Width **26 mm**

Depth **13 mm**

Weight

Safety switch **15 g**

Actuator **20 g**

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-24	1/1	magnetic	Safety switch/actuator	502 224

PSENmag

PSEN 2.1p-30



Unit features



- ▶ The actuator **PSEN 2,1-10** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **6 mm**
- ▶ Assured release distance: **25 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

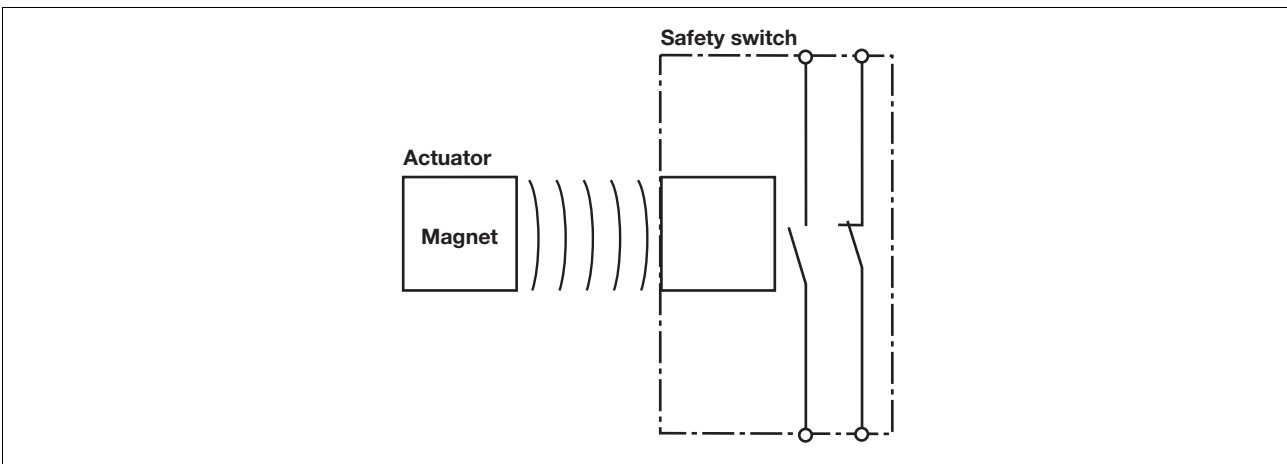
Approvals

	PSEN 2.1p-30
	◆
	◆

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-10** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

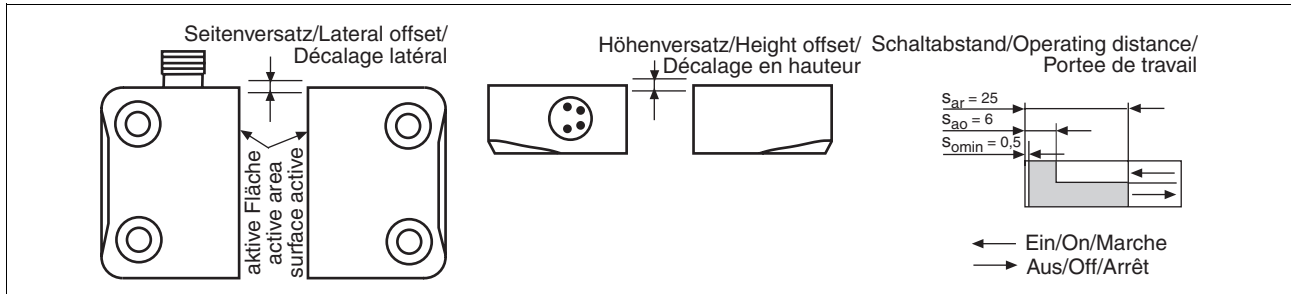
Block diagram



PSENmag

PSEN 2.1p-30

Operating distances



Lateral and vertical offset

Assured operating distance Sao in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_l / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

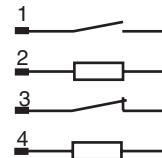
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pitz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



PSENmag PSEN 2.1p-30

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.1p-30

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-10**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

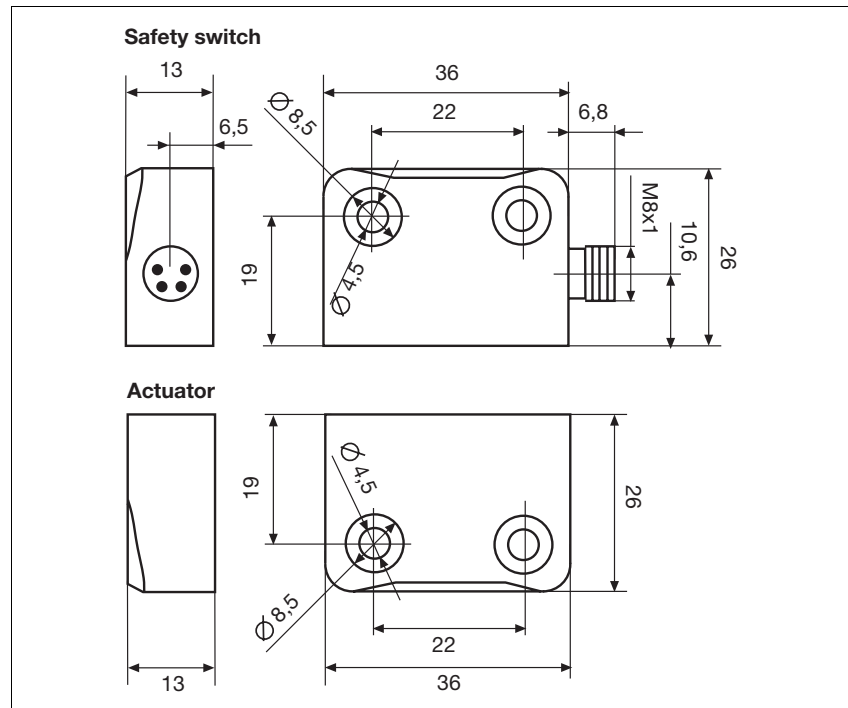
PSENmag

PSEN 2.1p-30

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	6 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	25 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-10
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 2.1p-30

Technical details

Dimensions

Safety switch

Height **42.8 mm**

Width **26.0 mm**

Depth **13.0 mm**

Actuator

Height **36 mm**

Width **26 mm**

Depth **13 mm**

Weight

Safety switch **15 g**

Actuator **20 g**

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-30	1/1	magnetic	Safety switch/actuator	502 230
PSEN 2.1p-30 (switch)	1	magnetic	Safety switch	522 130
PSEN 2.1-10	1	magnetic	Actuator	512 110

PSENmag

PSEN 2.1p-31



Unit features



- ▶ The actuator **PSEN 2,1-10** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **6 mm**
- ▶ Assured release distance: **25 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1p-31	
		◆
		◆

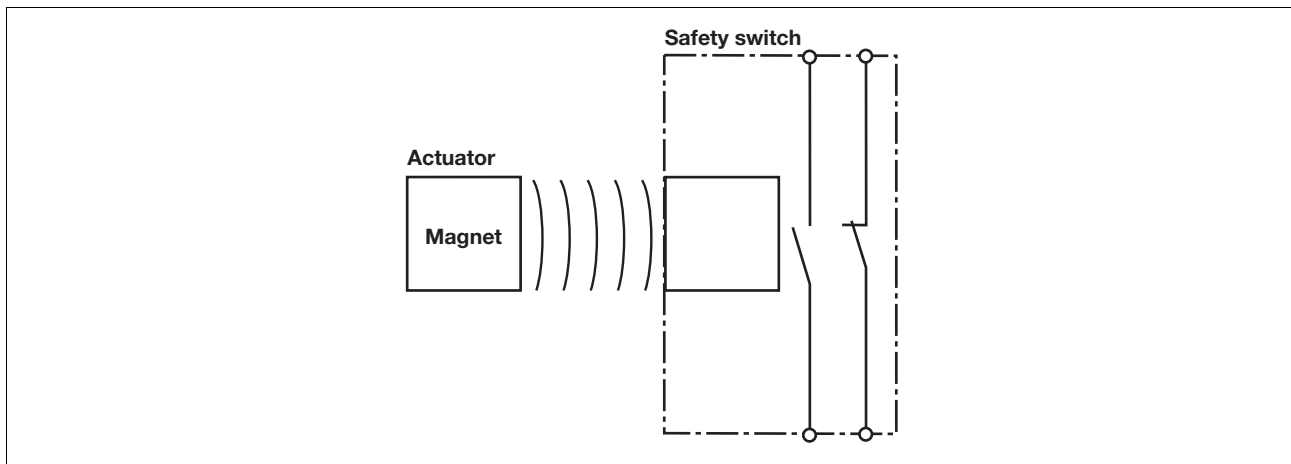
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-10** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram

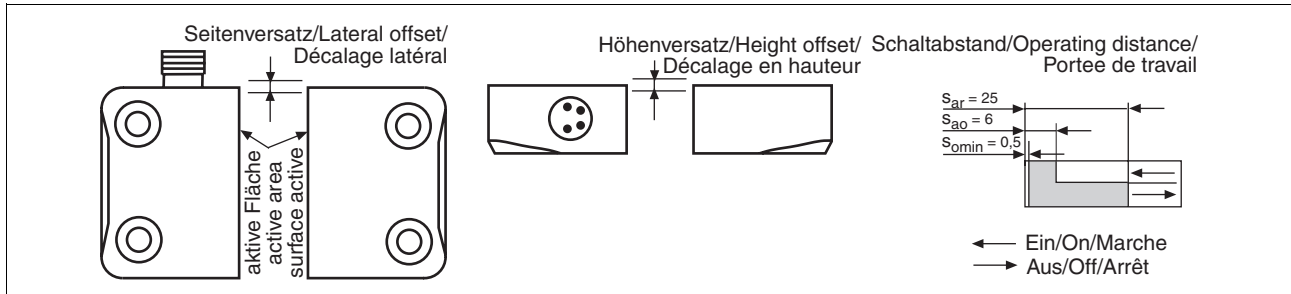


2.2

PSENmag

PSEN 2.1p-31

Operating distances



Lateral and vertical offset

Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

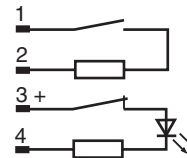
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pitz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



PSENmag PSEN 2.1p-31

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
--	--

CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.1p-31

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-10**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

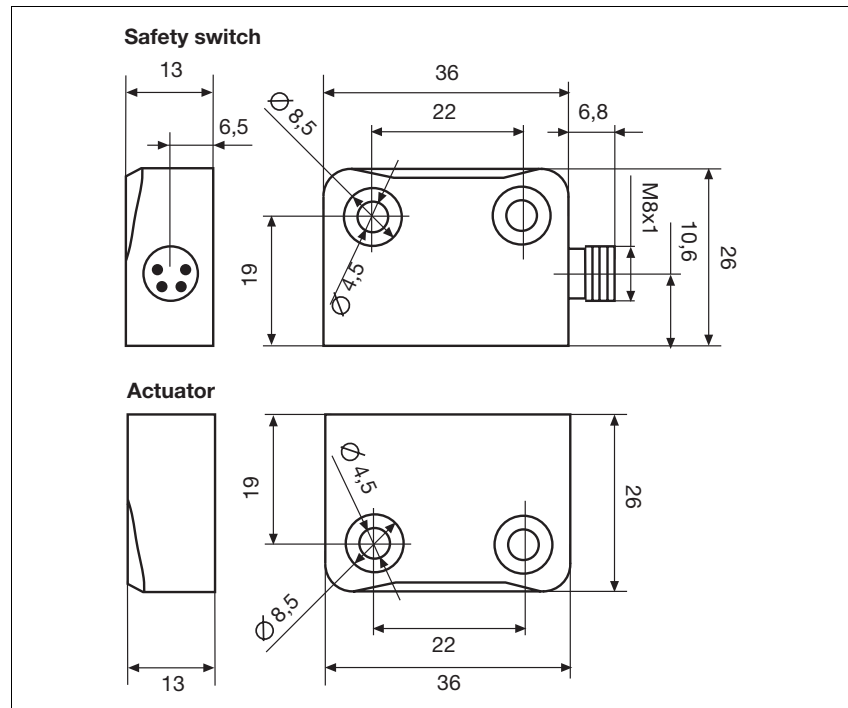
PSENmag

PSEN 2.1p-31

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	6 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	25 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-10
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.1p-31

Technical details

Dimensions

Safety switch

Height **45.0 mm**

Width **26.0 mm**

Depth **13.0 mm**

Actuator

Height **36 mm**

Width **26 mm**

Depth **13 mm**

Weight

Safety switch **15 g**

Actuator **20 g**

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-31	1/1	magnetic	Safety switch/actuator	502 231
PSEN 2.1p-31 (switch)	1	magnetic	Safety switch	522 131
PSEN 2.1-10	1	magnetic	Actuator	512 110

PSENmag

PSEN 2.1p-34



Unit features



- ▶ The actuator **PSEN 2,1-10** belongs to the safety switch
- ▶ 2 reed contacts (1 N/C, 1 N/O)
- ▶ Assured operating distance: **6 mm**
- ▶ Assured release distance: **25 mm**
- ▶ Square design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.1p-34	
	◆	
	◆	

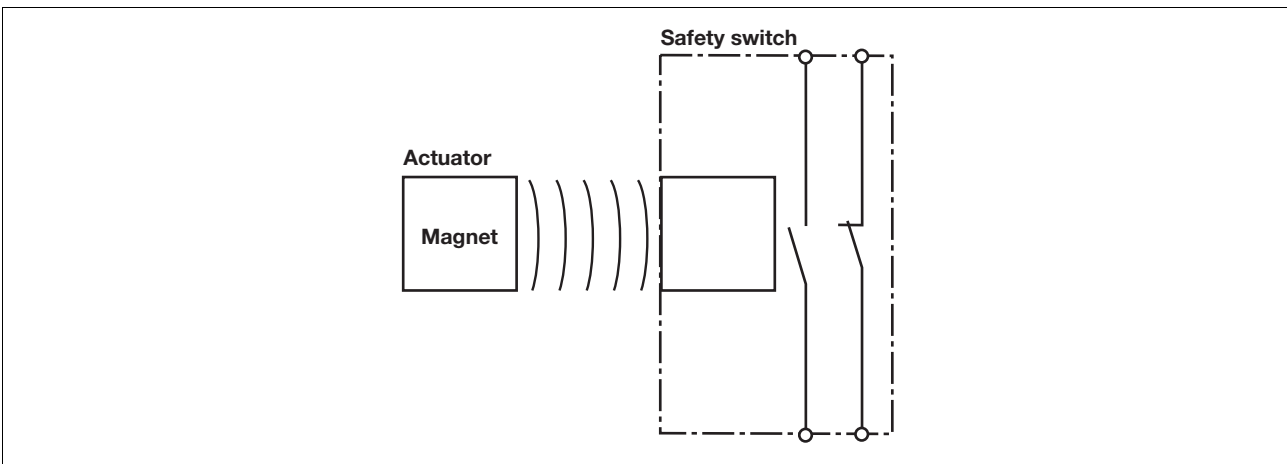
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,1-10** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

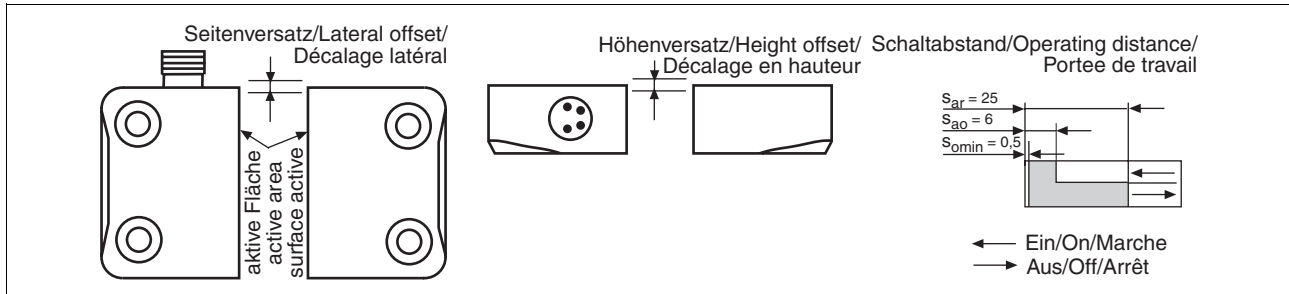
Block diagram



PSENmag

PSEN 2.1p-34

Operating distances



Lateral and vertical offset

Assured operating distance S_{ao} in mm

		Höhenversatz/Height offset/ Décalage en hauteur				
		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_l / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

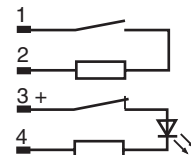
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

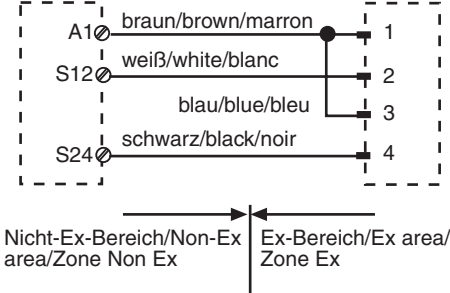
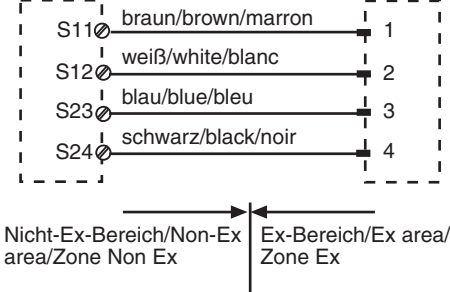
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



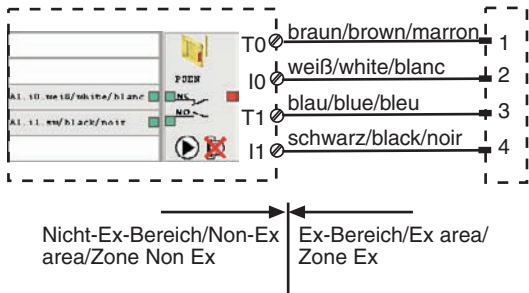
PSENmag PSEN 2.1p-34

► Connection to PNOZelog

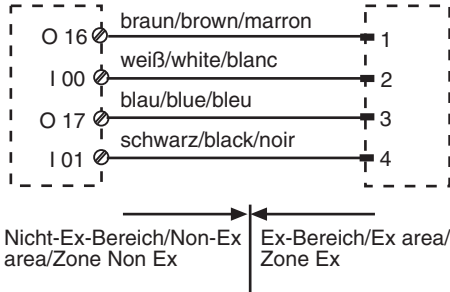
<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>with detection of shorts across contacts PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

2.2

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with

standard function block SB064 or SB066.

PSENmag PSEN 2.1p-34

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected. In this case, use the spacer available under order number 534 310.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,1-10**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

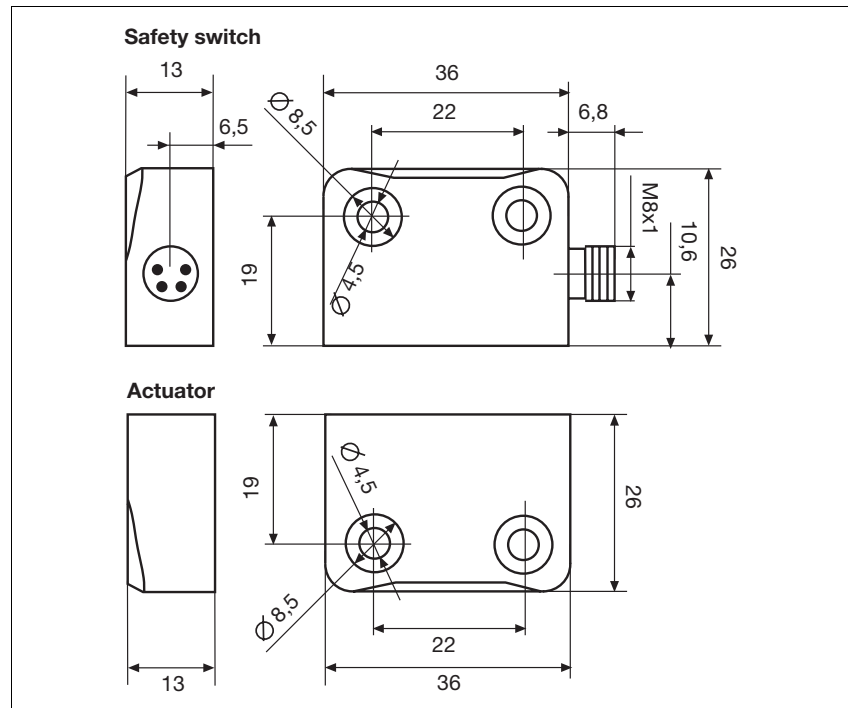
PSENmag

PSEN 2.1p-34

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	6 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	25 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,1-10
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.1p-34

Technical details

Dimensions	
Safety switch	
Height	45.0 mm
Width	26.0 mm
Depth	13.0 mm
Actuator	
Height	36 mm
Width	26 mm
Depth	13 mm
Weight	
Safety switch	15 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.1p-34	1/1	magnetic	Safety switch/actuator	502 234

PSENmag

PSEN 2.2p-20



Unit features

- ▶ The actuator **PSEN 2,2-20** belongs to the safety switch
- ▶ 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 24 VDC
- ▶ Series connection via PSEN i1 interface

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

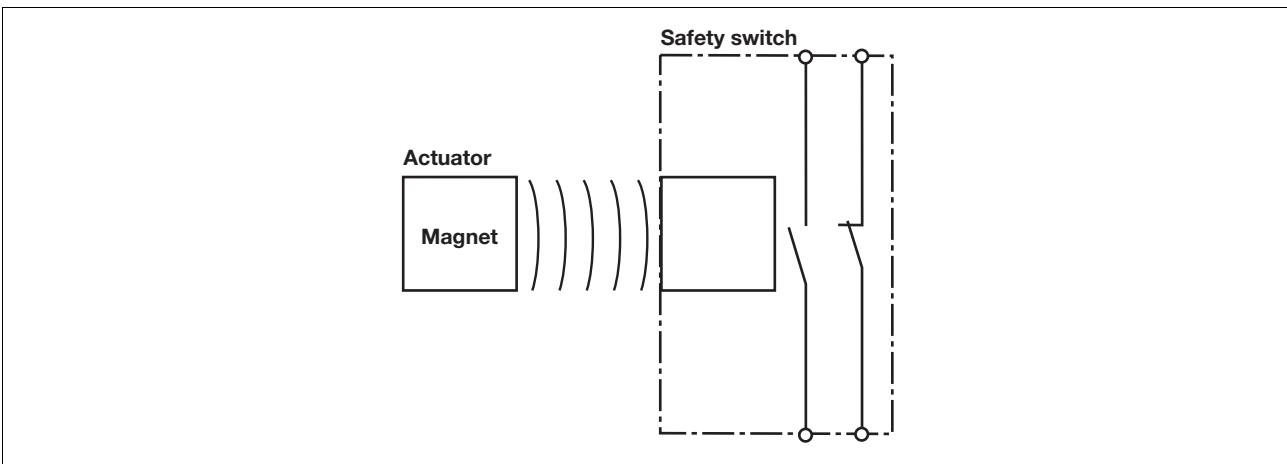
Approvals

	PSEN 2.2p-20
	◆
	◆

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,2-20** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

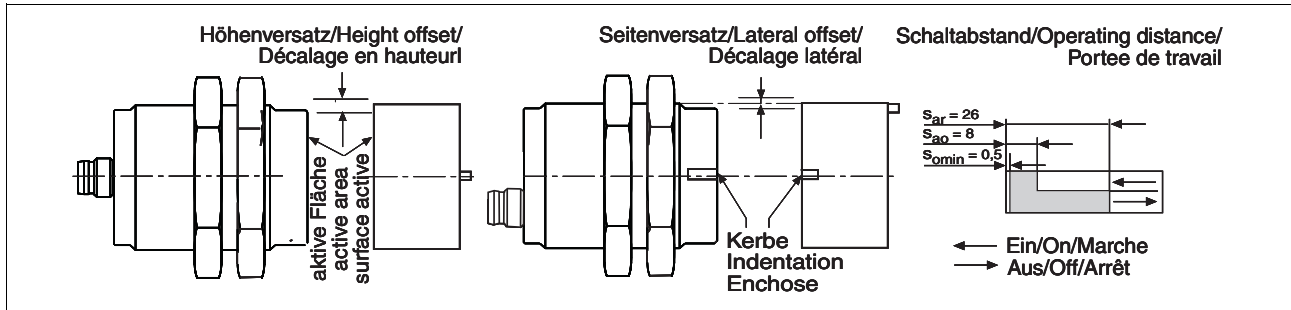
Block diagram



PSENmag

PSEN 2.2p-20

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

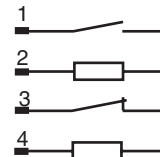
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



PSENmag PSEN 2.2p-20

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN 2.2p-20

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,2-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

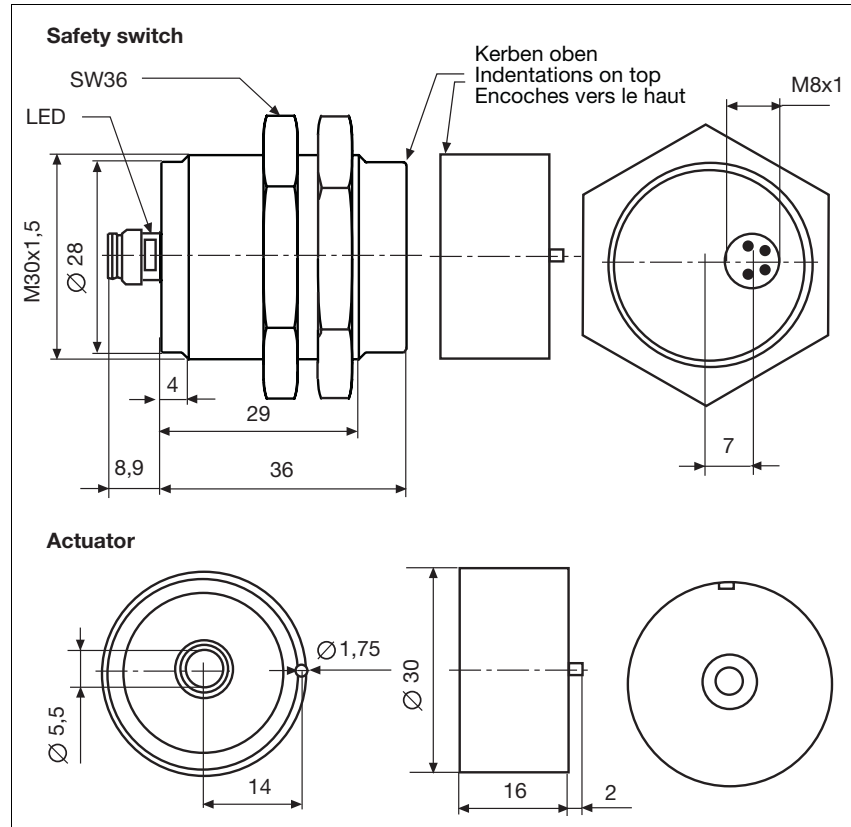
PSENmag

PSEN 2.2p-20

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,2-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm ²
Protection type	IP65, IP67
Housing material	PBT

PSENmag

PSEN 2.2p-20

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	42.7 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	35 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.2p-20	1/1	magnetic	Safety switch/actuator	503 220
PSEN 2.2p-20 (switch)	1	magnetic	Safety switch	523 120
PSEN 2.2-20	1	magnetic	Actuator	513 120

PSENmag

PSEN 2.2p-21



Unit features


- ▶ The actuator **PSEN 2,2-20** belongs to the safety switch
- ▶ 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 24 VDC
- ▶ Series connection via PSEN i1 interface
- ▶ LED to display switch status

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN 2.2p-21
	◆
	◆

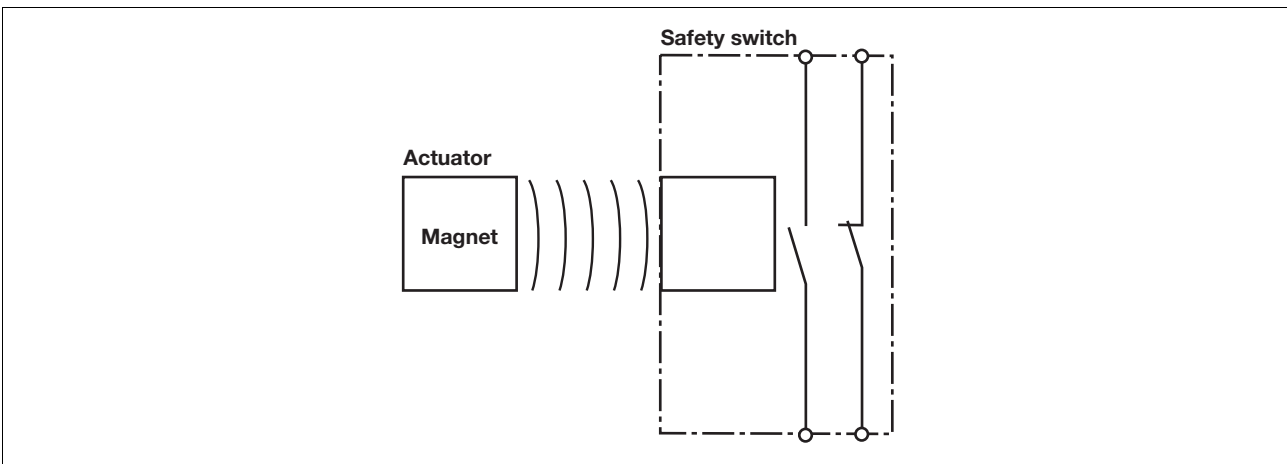
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN 2,2-20** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

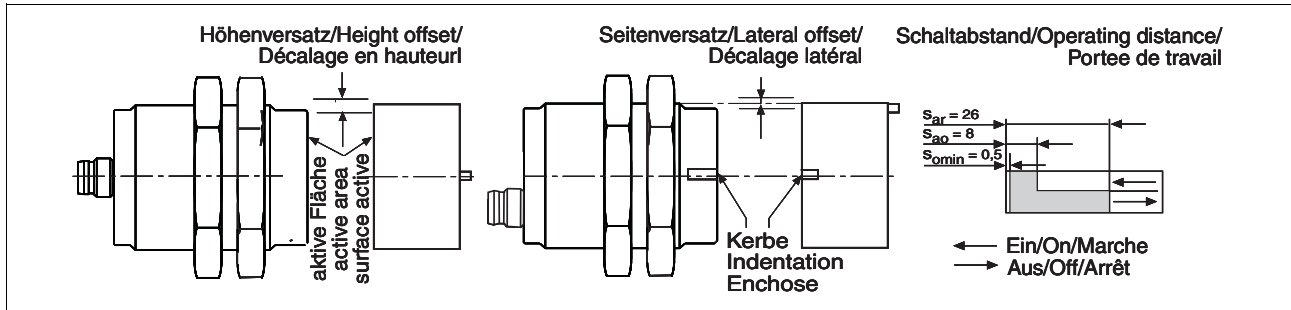
Block diagram



PSENmag

PSEN 2.2p-21

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

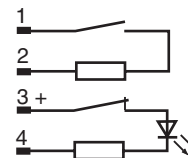
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

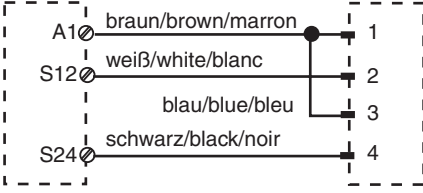
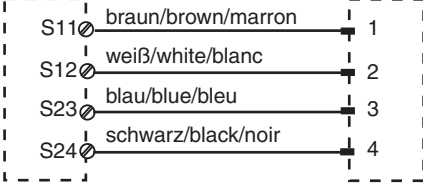
The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector

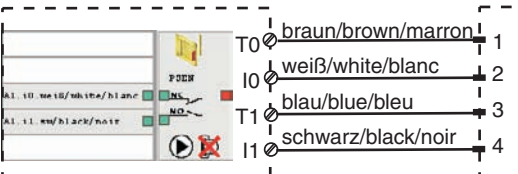


PSENmag PSEN 2.2p-21

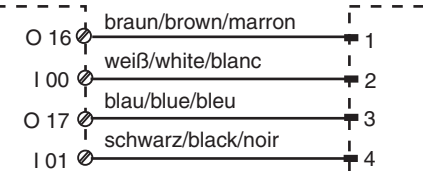
► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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PSENmag PSEN 2.2p-21

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,2-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The LED lights when the reed 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 reed contacts are operated.
- ▶ The stated operating distances (see Technical details) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

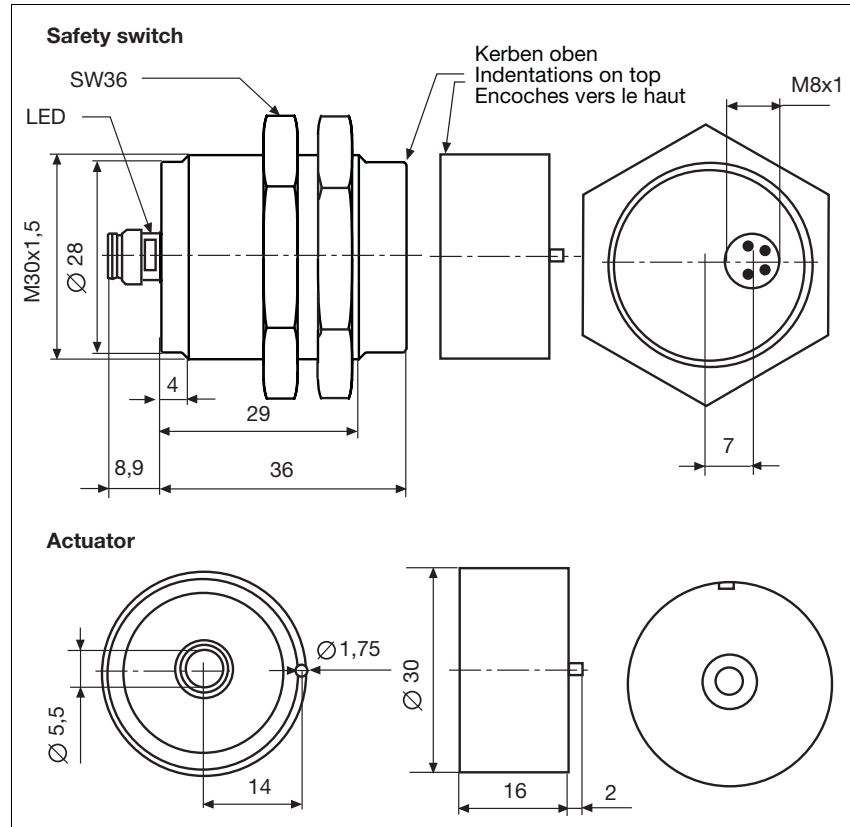
PSENmag

PSEN 2.2p-21

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,2-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

2.2

PSENmag

PSEN 2.2p-21

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	44.9 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	35 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.2p-21	1/1	magnetic	Safety switch/actuator	503 221
PSEN 2.2p-21 (switch)	1	magnetic	Safety switch	523 121
PSEN 2.2-20	1	magnetic	Actuator	513 120

PSENmag

PSEN 2.2p-24



Unit features

- ▶ The actuator **PSEN 2,2-20** belongs to the safety switch
- ▶ 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 24 VDC
- ▶ Series connection via PSEN i1 interface


The safety switch should only be connected to the evaluation devices listed under "Connections".

Function description

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.

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

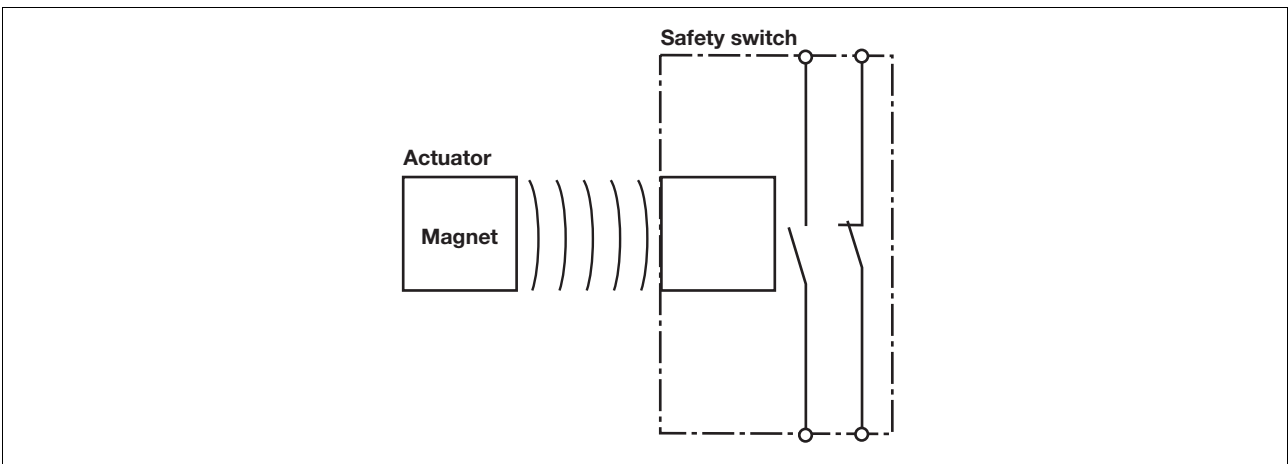
Approvals

	PSEN 2.2p-24
	◆
	◆

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
 The 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 2,2-20** or and its approved evaluation devices.

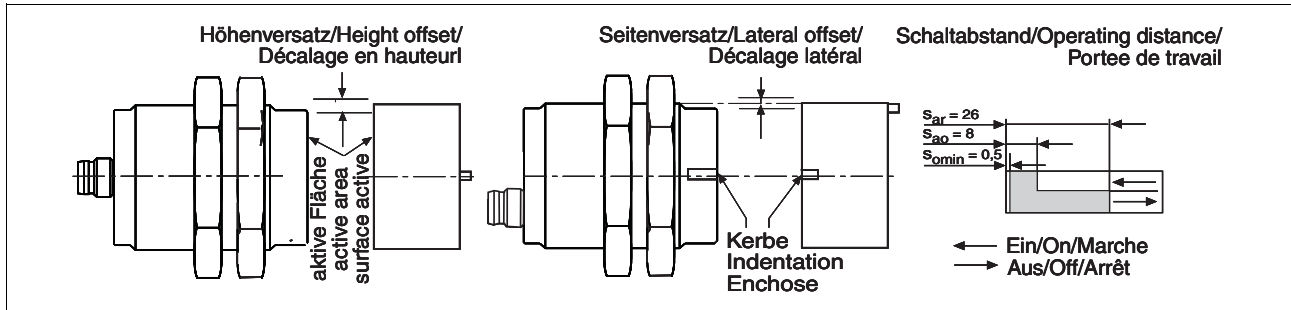
Block diagram



PSENmag

PSEN 2.2p-24

Operating distances



Lateral and vertical offset

- Assured operating distance S_{ao} in mm

Höhenversatz/Height offset/ Décalage en hauteur		1,0	2,0	3,0	4,0	5,0
Seitenversatz/Lateral offset/Décalage latéral	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

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).

- In the following commissioning cases, check the function that detects shorts across contacts:

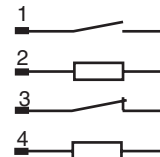
- On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
- On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 Ohms per channel
- For details of how to perform the test for shorts across the contacts, please refer to the operating manual for the relevant evaluation device.

Connections

NOTICE

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory. The safety switch is shown in an unoperated condition.

Assignment of the 4-pin M8 male connector



PSENmag PSEN 2.2p-24

► Connection to PNOZelog

<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>with detection of shorts across contacts PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

2.2

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 2/switchtype 2/type du capteur 2 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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► Connection to PSS with and without SafetyBUS p

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées O16, O17: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with

standard function block SB064 or SB066.

PSENmag **PSEN 2.2p-24**

Installation

- ▶ The unit can be installed in any position. However, the safety switch and actuator must be installed so that the two notches are exactly opposite each other (see diagram: "Operating distances").
- ▶ A nib on the actuator prevents it twisting (see diagram: "Dimensions"). Drill diameter: 2 mm.
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ 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. Messing).
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ 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

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN 2,2-20**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

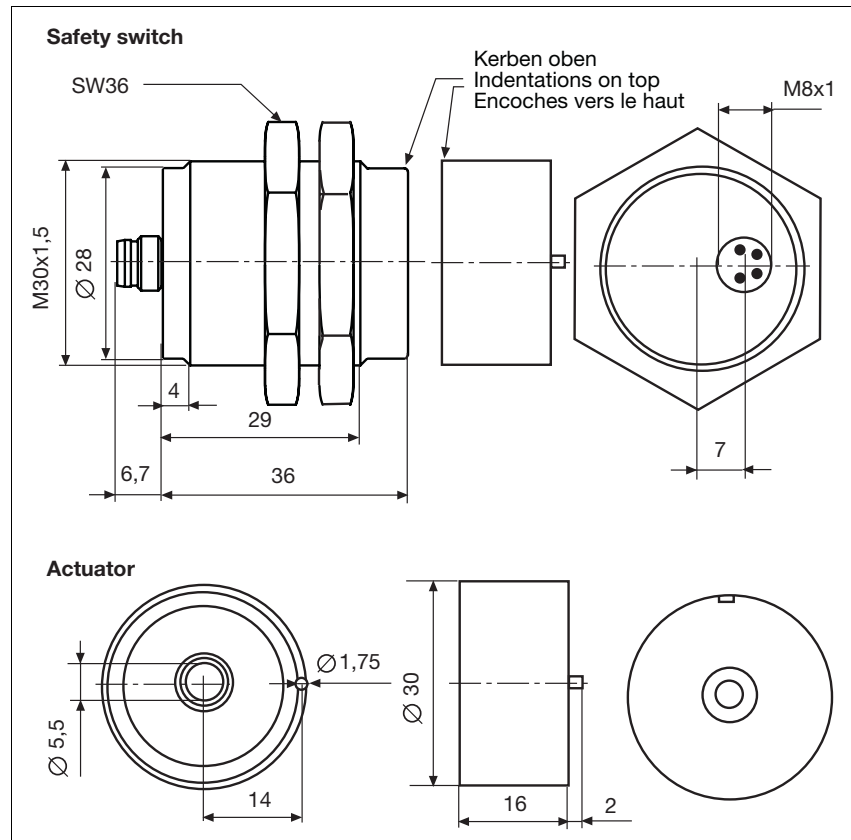
PSENmag

PSEN 2.2p-24

NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Dimensions



Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	26 mm
Switching voltage	24 V
Max. switching current for reed contacts	10.00 mA
Max. breaking capacity for reed contacts	0.3 W
Max. switch frequency	1 Hz
Actuator	PSEN 2,2-20
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M8
Cable	LiYY 4 x 0,25 mm²
Protection type	IP65
Housing material	PBT

PSENmag

PSEN 2.2p-24

Technical details

Dimensions	
Diameter	M30
Safety switch	
Depth	44.9 mm
Actuator	
Depth	16 mm
Weight	
Safety switch	35 g
Actuator	20 g

The standards current on **2007-03** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN 2.2p-24	1/1	magnetic	Safety switch/actuator	503 224

PSENmag PSEN ma1.3a/b-20



Unit features

- ▶ The actuator **PSEN ma1,3-08** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ 1 auxiliary contact (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **15 mm**
- ▶ Safety switch and actuator with M12 round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ LED to display switch status

Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3



Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

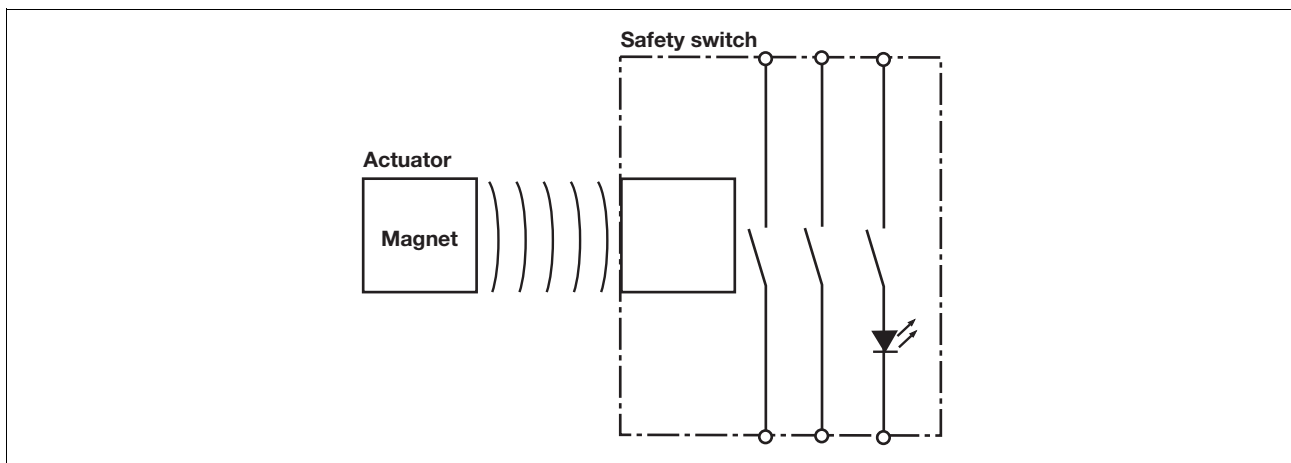
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN ma1,3-08** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

Approvals

	PSEN ma1.3a/b-20
	Pending
	Pending

Block diagram



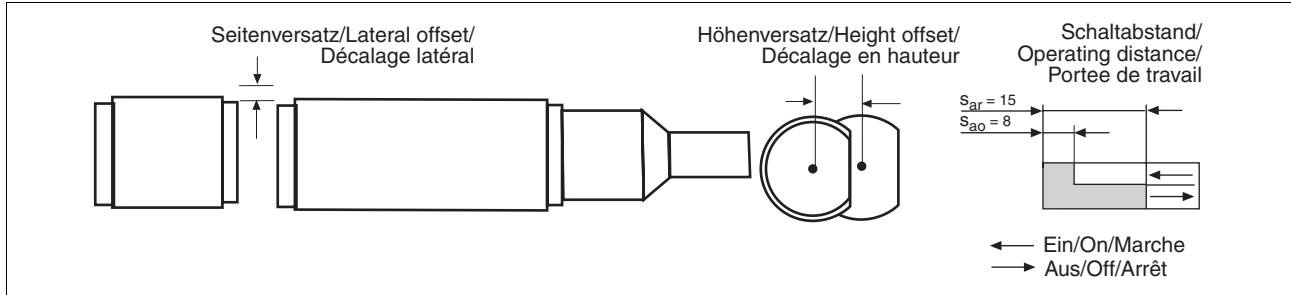
Function description

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.

PSENmag

PSEN ma1.3a/b-20

Operating distances



Lateral and vertical offset

with M12 actuator

- ▶ Assured operating distance S_{ao} in mm:

		Vertical offset		
Lateral offset	0	2	4	
	0	8,0	7,0	5,5
2	7,0	6,0	4,0	
4	6,0	5,0	3,0	

- ▶ Assured release distance S_{ar} :
Max. 15 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Calculation of the max. cable runs l_{max} in the input circuit:

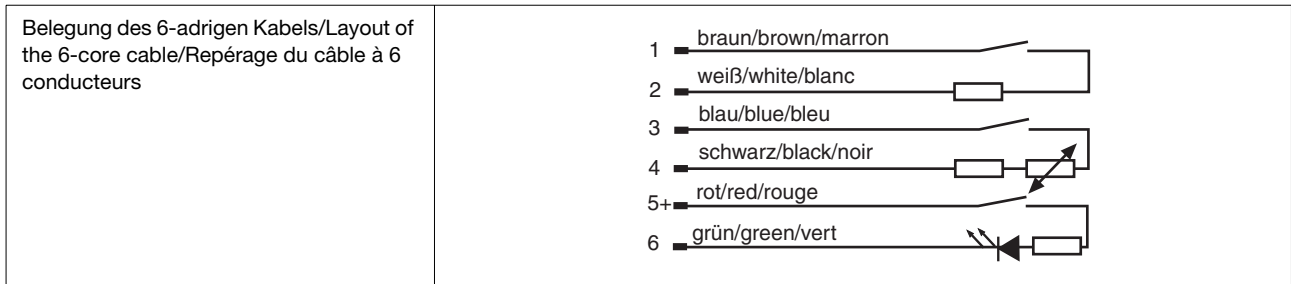
$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

- ▶ R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km
- ▶ When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).
- ▶ In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

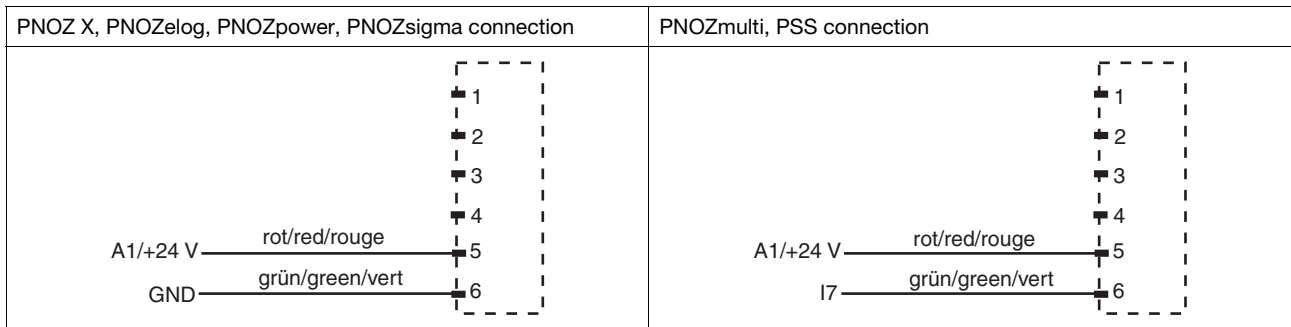
PSENmag PSEN ma1.3a/b-20

Connections

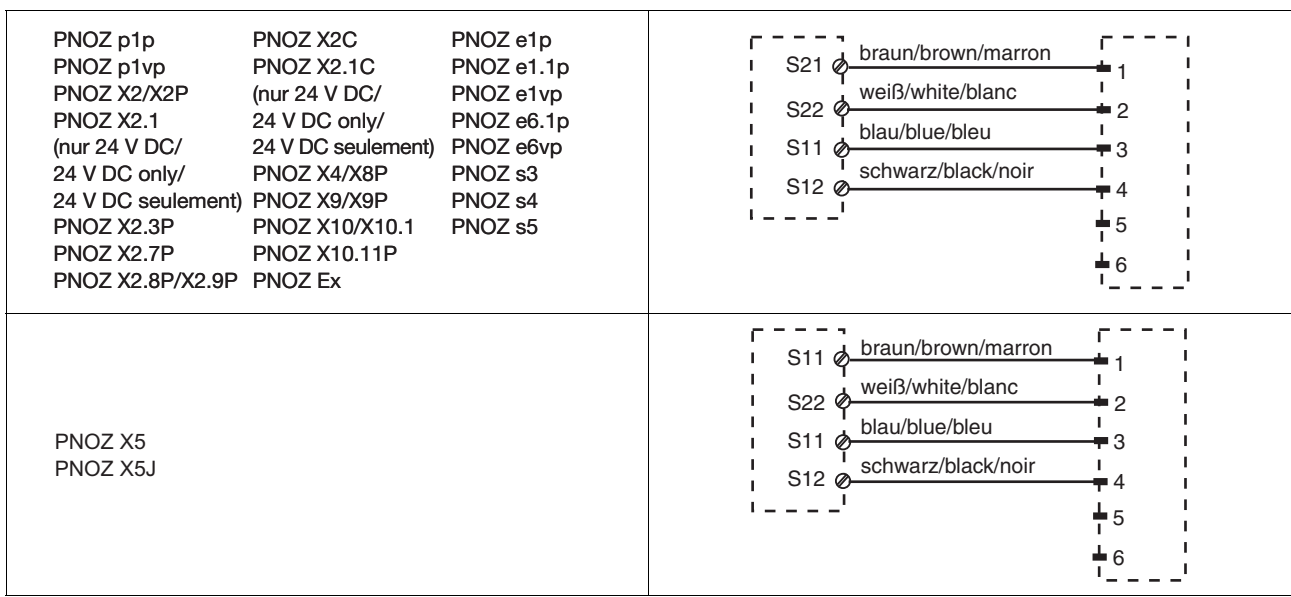
The safety switch is shown in an unoperated condition.



▶ Auxiliary contact with LED connection

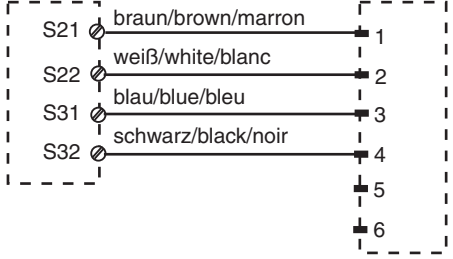
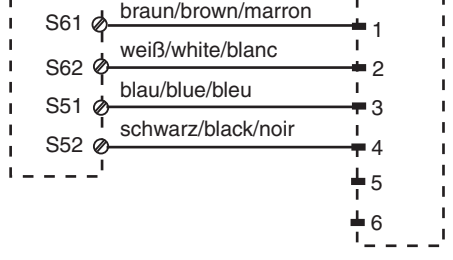
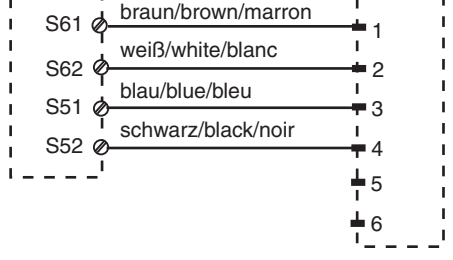
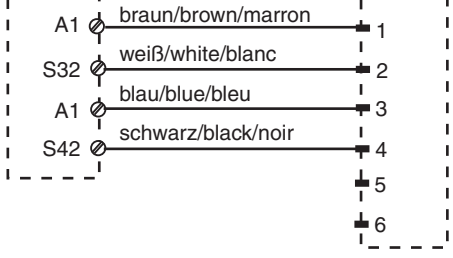


▶ Connection to PNOZ X, PNOZelog, PNOZpower, PNOZsigma

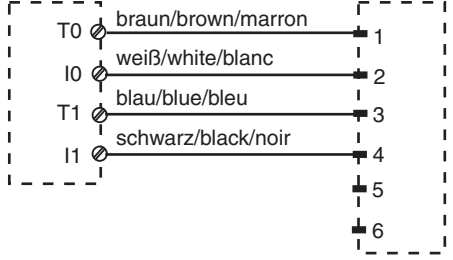


2.2

PSENmag PSEN ma1.3a/b-20

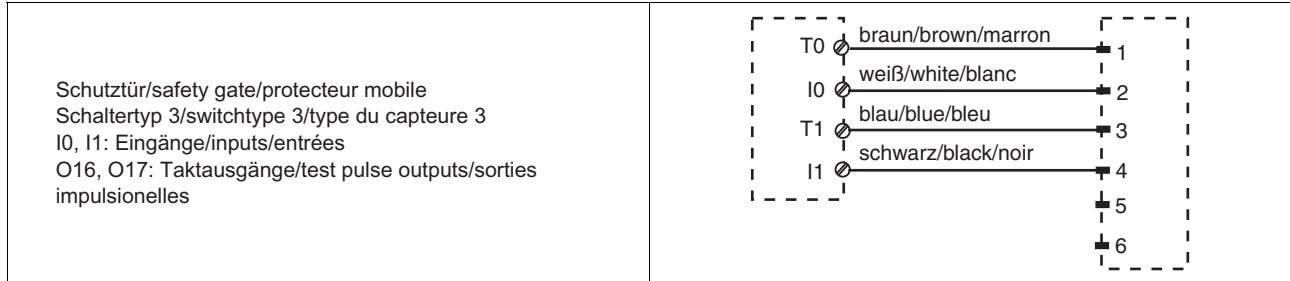
<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13</p> <p>PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3</p> <p>PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionnelles</p>	
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PSENmag PSEN ma1.3a/b-20

- ▶ Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN ma1.3a/b-20

Installation

- ▶ When installing make sure you comply with the requirements of DIN EN 1088
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or

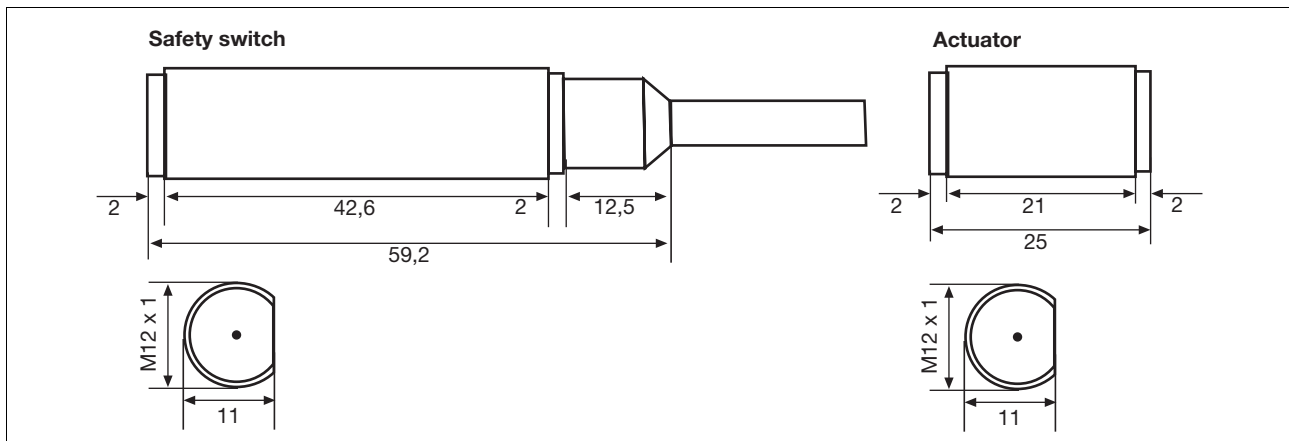
vibration

- Do not use as a limit stop
- For fixed wiring only
- ▶ The unit can be installed in any position. The safety switch and actuator must be installed so that the bevelled surfaces face each other precisely.
- ▶ The safety switch and actuator should only be secured using M12 nuts made of non-magnetic material (e.g. Messing). Torque setting max. 300 Ncm.

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN ma1,3-08**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions in mm



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the op-

erating instructions supplied with the unit.

Technical details	
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	15 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.20 A
Max. switching current for auxiliary contacts	10 mA
Max. breaking capacity for reed contacts	5.0 W
Max. switch frequency	1 Hz
Actuator	PSEN ma1,3-08
Ambient temperature	-25 - 70 °C

PSENmag

PSEN ma1.3a/b-20

Technical details	
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Shock stress	30 g , 11 ms
Connection type	10m cable Order no.: 506222 5m cable Order no.: 506220
Cable	LiYY 6 x 0,25 mm²
Protection type	IP69K
Housing material	PBT
Dimensions	
Diameter	M12
Safety switch	
Depth	59.2 mm
Actuator	
Depth	25 mm
Weight	
Safety switch	220 g Order no.: 506220 430 g Order no.: 506222
Actuator	10 g

The standards current on **2007-03** apply.



Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN ma1.3a-20	1/1	magnetic	Safety switch/actuator M12	506 220
PSEN ma1.3a-20 (switch)	1	magnetic	Safety switch	526 120
PSEN ma1.3b-20	1/1	magnetic	Safety switch/actuator M12	506 222
PSEN ma1.3b-20 (switch)	1	magnetic	Safety switch	526 122
PSEN ma1.3-08	1	magnetic	Actuator M12	516 120

PSENmag PSEN ma1.3a/b-22



Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN ma1.3a/b-22
	Pending
	Pending

Unit features

- ▶ The actuator **PSEN ma1,3-08** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ 1 auxiliary contact (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **15 mm**
- ▶ Safety switch and actuator with M12 round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ LED to display switch status

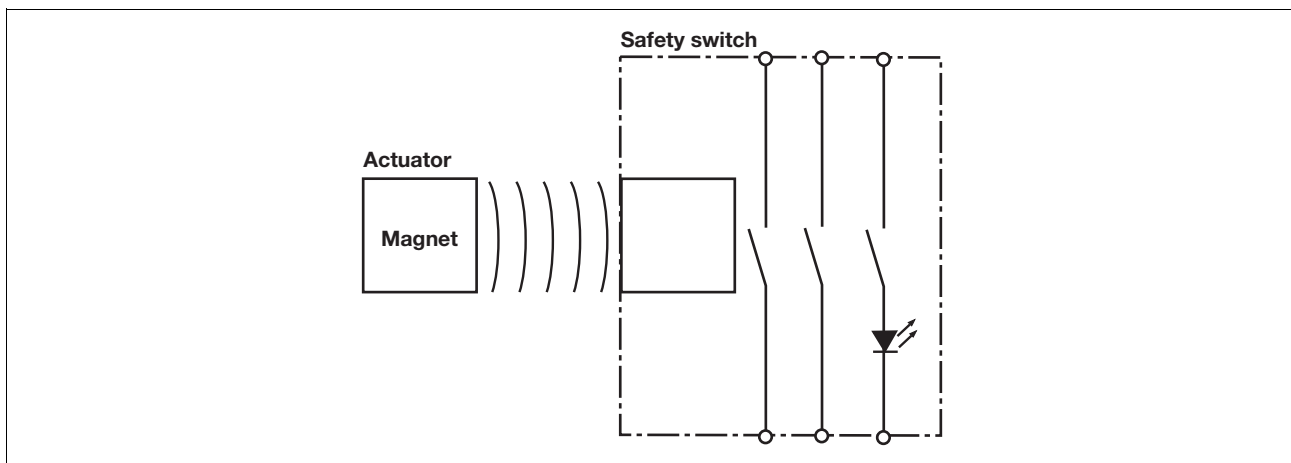
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the PSEN ix1 interface, the actuator **PSEN ma1,3-08** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



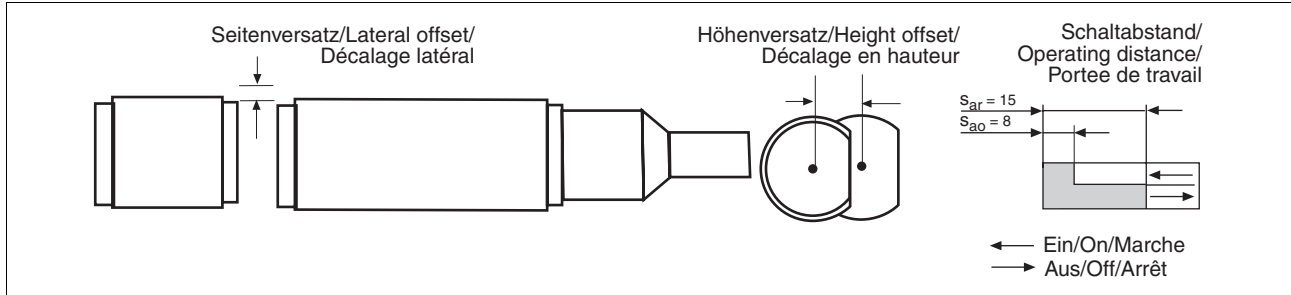
Function description

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.

PSENmag

PSEN ma1.3a/b-22

Operating distances



Lateral and vertical offset

with M12 actuator

- ▶ Assured operating distance S_{ao} in mm:

		Vertical offset		
Lateral offset	0	2	4	
	0	8,0	7,0	5,5
	2	7,0	6,0	4,0
	4	6,0	5,0	3,0

- ▶ Assured release distance S_{ar} :
Max. 15 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

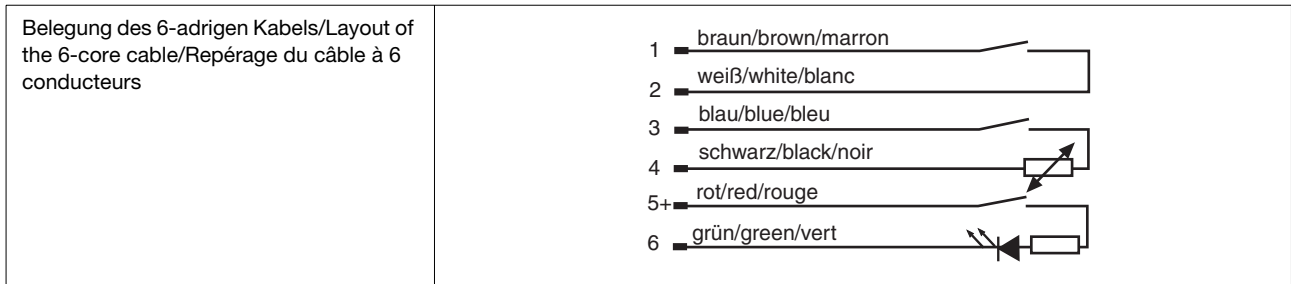
- ▶ When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).
- ▶ In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

2.2

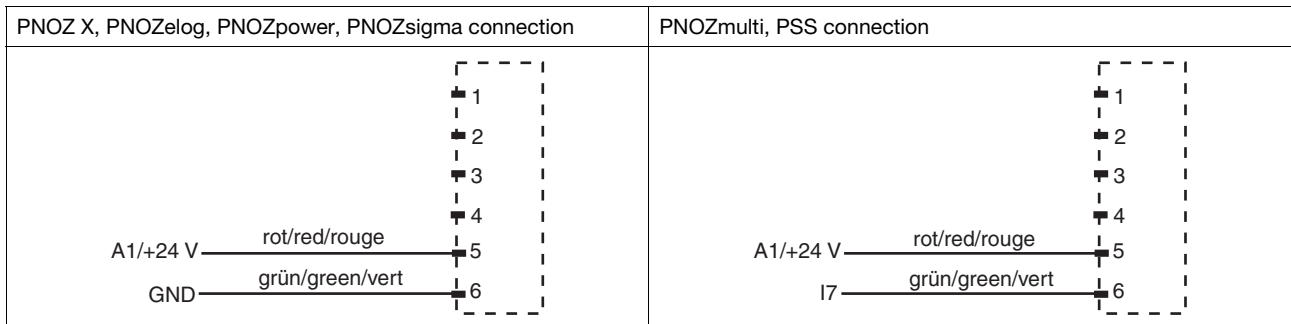
PSENmag PSEN ma1.3a/b-22

Connections

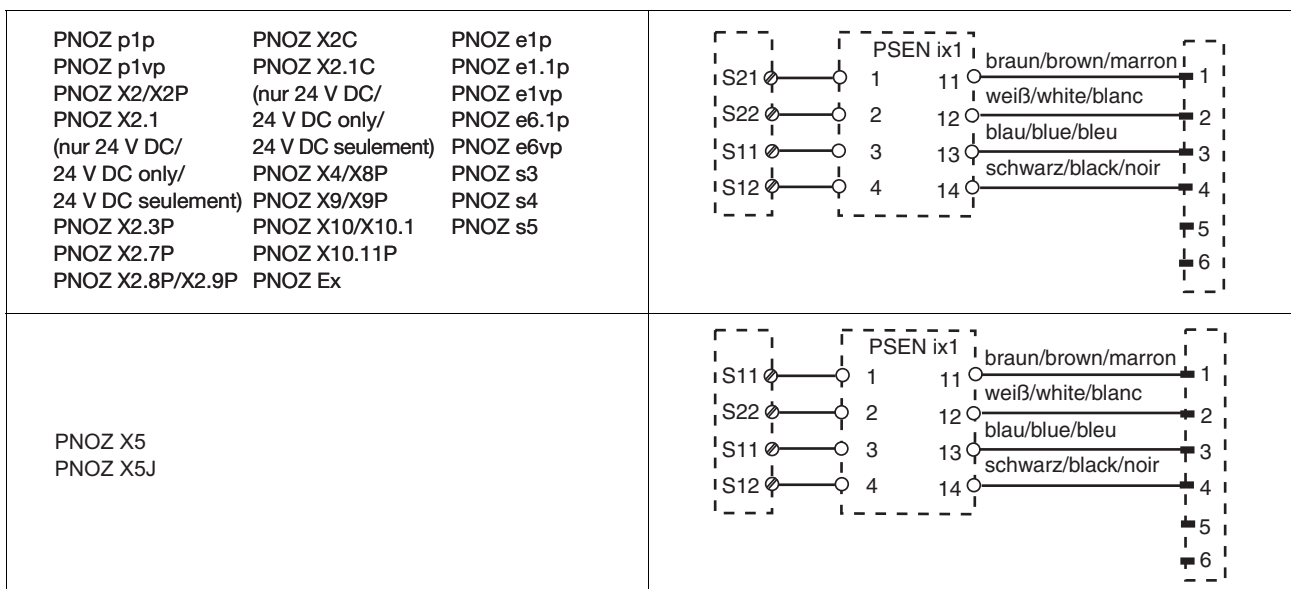
The safety switch is shown in an unoperated condition.



- ▶ Auxiliary contact with LED connection



- ▶ Connection to PNOZ X, PNOZelog, PNOZpower, PNOZsigma



PSENmag PSEN ma1.3a/b-22

<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13</p> <p>PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3</p> <p>PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	
<p>PNOZ e5.11p</p>	

2.2

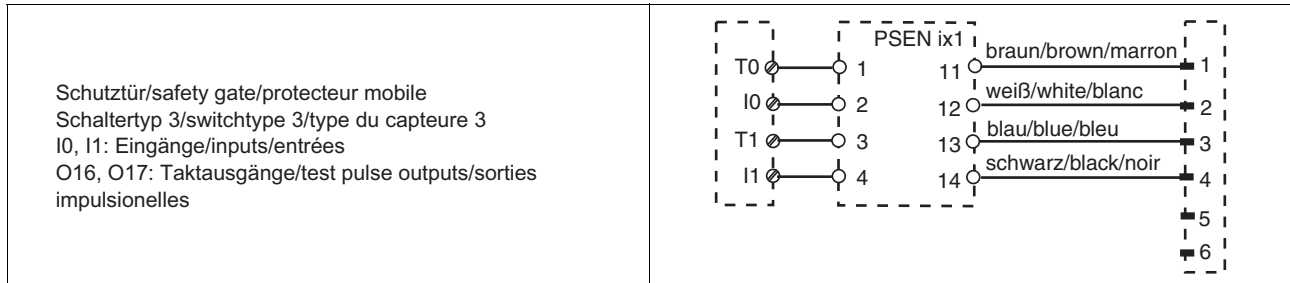
► Connection to PNOZmulti

<p>Schutztür/safety gate/protecteur mobile Schaltertyp 3/switchtype 3/type du capteur 3 I0, I1: Eingänge/inputs/entrées T0, T1: Taktausgänge/test pulse outputs/sorties impulsionelles</p>	
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PSENmag

PSEN ma1.3a/b-22

- Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN ma1.3a/b-22

Installation

- ▶ When installing make sure you comply with the requirements of DIN EN 1088
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or vibration

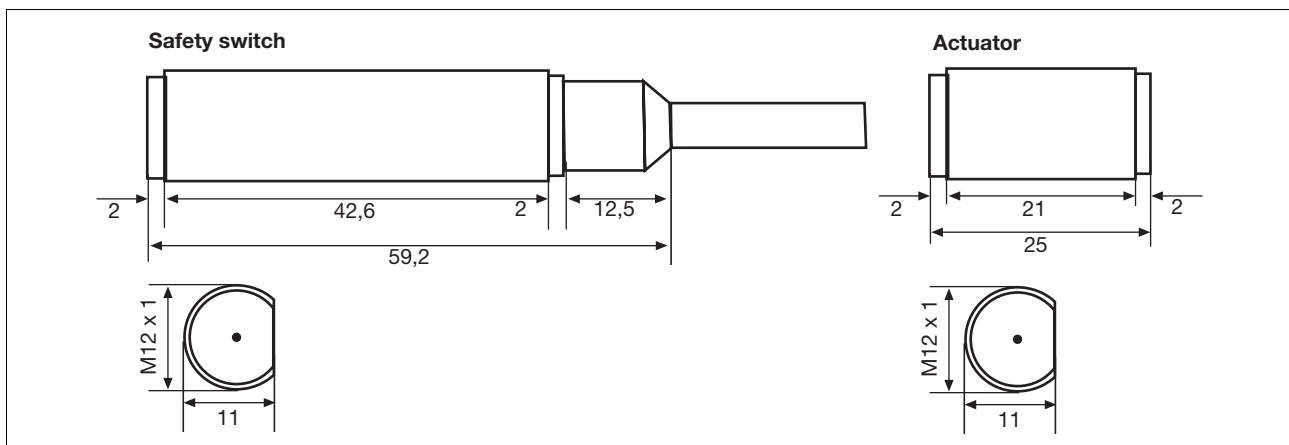
- Do not use as a limit stop
- For fixed wiring only
- ▶ The unit can be installed in any position. The safety switch and actuator must be installed so that the bevelled surfaces face each other precisely.
- ▶ The safety switch and actuator should only be secured using M12 nuts made of non-magnetic material (e.g. Messing). Torque setting max. 300 Ncm.

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN ma1,3-08**.

- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions in mm



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the op-

erating instructions supplied with the unit.

Technical details

Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	15 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.20 A
Max. switching current for auxiliary contacts	10 mA
Max. breaking capacity for reed contacts	5.0 W
Max. switch frequency	1 Hz
Actuator	PSEN ma1,3-08
Ambient temperature	-25 - 70 °C

PSENmag PSEN ma1.3a/b-22

Technical details	
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Shock stress	30 g , 11 ms
Connection type	10m cable Order no.: 506223 5m cable Order no.: 506221
Cable	LiYY 6 x 0,25 mm²
Protection type	IP69K
Housing material	PBT
Dimensions	
Diameter	M12
Safety switch	
Depth	59.2 mm
Actuator	
Depth	25 mm
Weight	
Safety switch	220 g Order no.: 506221 430 g Order no.: 506223
Actuator	10 g

The standards current on **2007-03** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN ma1.3a-22	1/1	magnetic	Safety switch/actuator M12	506 221
PSEN ma1.3a-22 (switch)	1	magnetic	Safety switch	526 121
PSEN ma1.3b-22	1/1	magnetic	Safety switch/actuator M12	506 223
PSEN ma1.3b-22 (switch)	1	magnetic	Safety switch	526 123
PSEN ma1.3-08	1	magnetic	Actuator M12	516 120



PSENmag

PSEN ma1.3b-23



Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN ma1.3b-23
	Pending
	Pending

Unit features

- ▶ The actuator **PSEN ma1,3-08** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ 1 auxiliary contact (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **15 mm**
- ▶ Safety switch and actuator with M12 round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ LED to display switch status

actuator **PSEN ma1,3-08** and its approved evaluation devices. The safety switch should only be connected to the evaluation devices listed under "Connections".

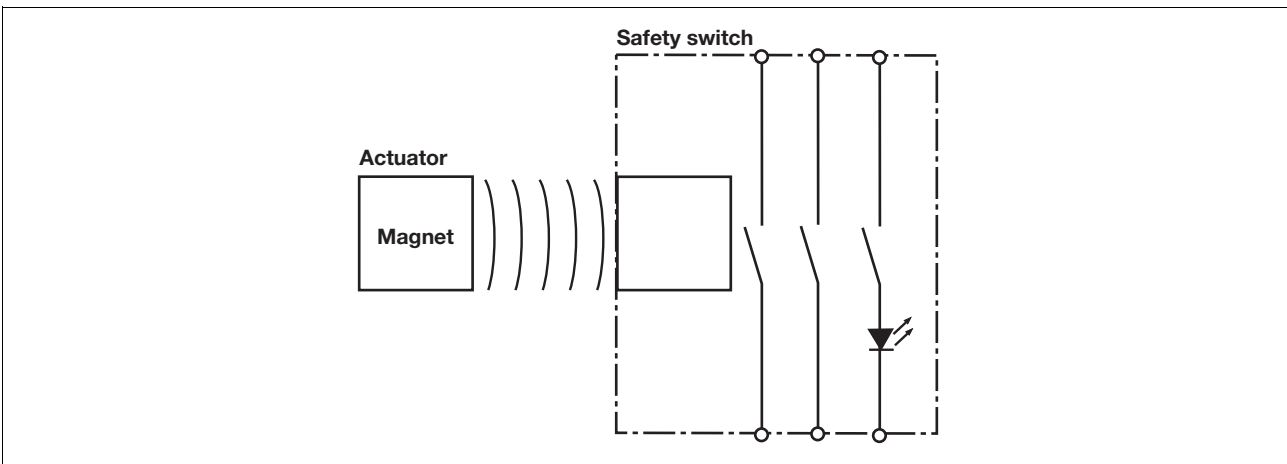
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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

Block diagram



Function description

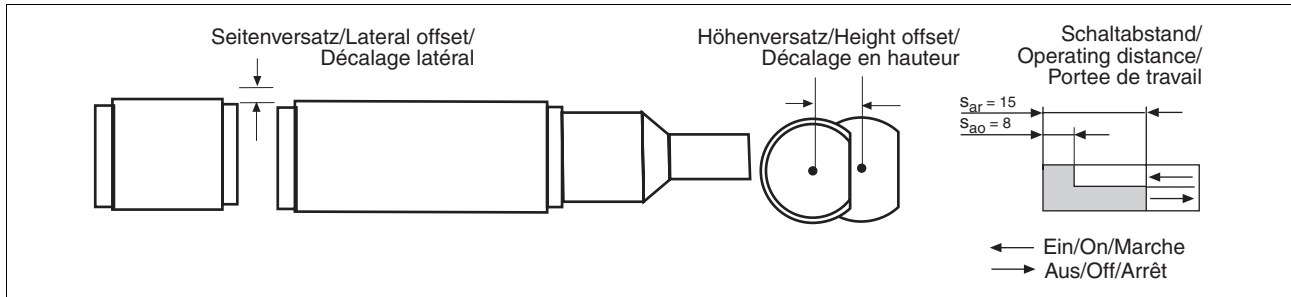
If the actuator is within the response range, the magnets switch the reed contacts on the safety switch. If the actuator is outside the response range (safety gate open), the reed contacts on the safety switch will switch.

2.2

PSENmag

PSEN ma1.3b-23

Operating distances



Lateral and vertical offset

with M12 actuator

- ▶ Assured operating distance S_{ao} in mm:

		Vertical offset		
Lateral offset	0	2	4	
	0	8,0	7,0	5,5
	2	7,0	6,0	4,0
	4	6,0	5,0	3,0

- ▶ Assured release distance S_{ar} :
Max. 15 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Calculation of the max. cable runs l_{max} in the input circuit:

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

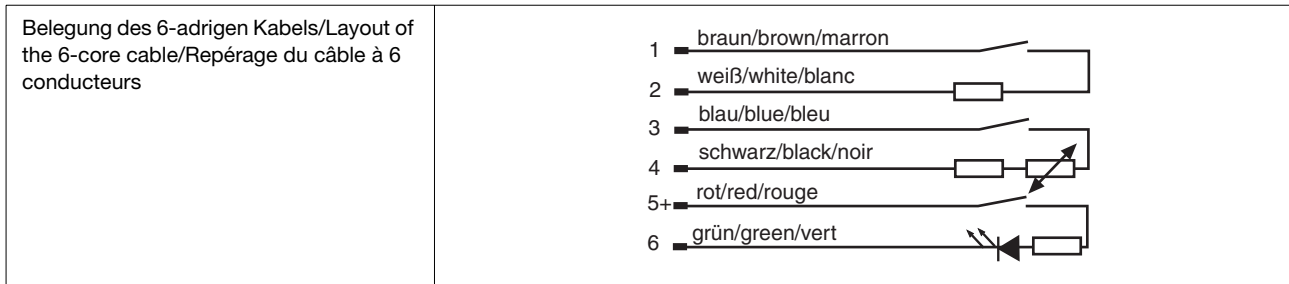
R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

- ▶ When using evaluation devices with delay-on de-energisation contacts, please note:
 - 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).
- ▶ In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

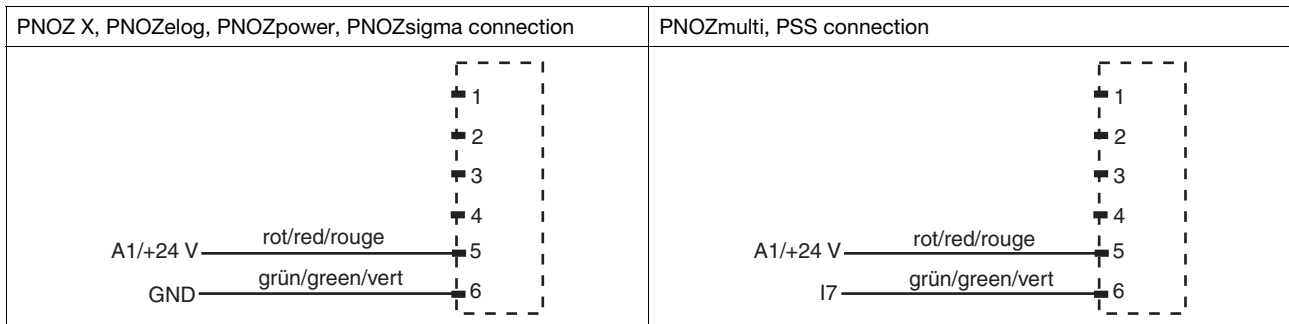
PSENmag PSEN ma1.3b-23

Connections

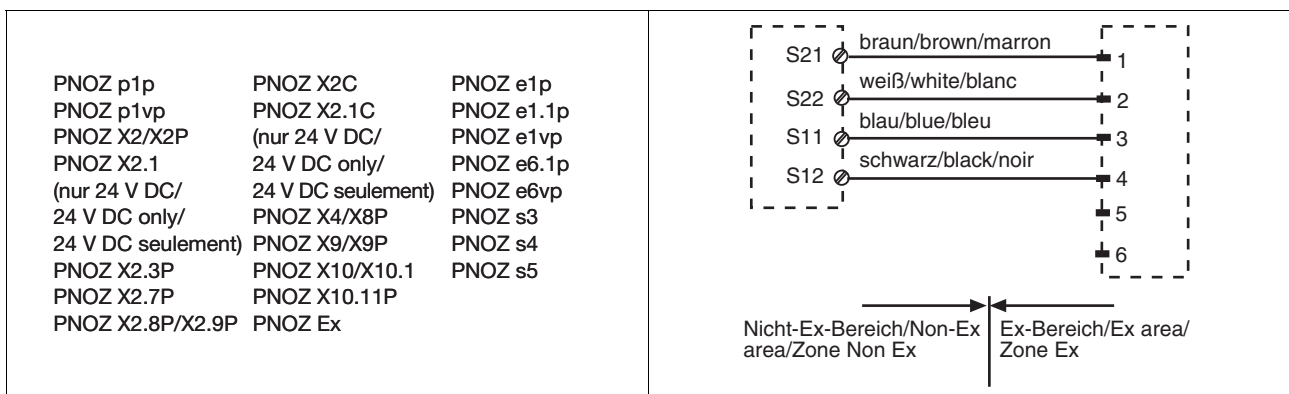
The safety switch is shown in an unoperated condition.



▶ Auxiliary contact with LED connection



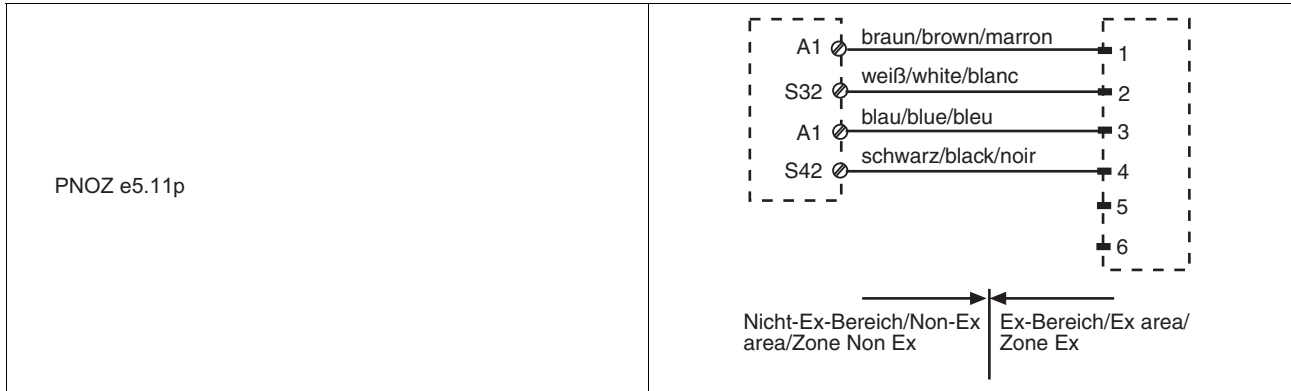
▶ Connection to PNOZ X, PNOZelog, PNOZpower, PNOZsigma



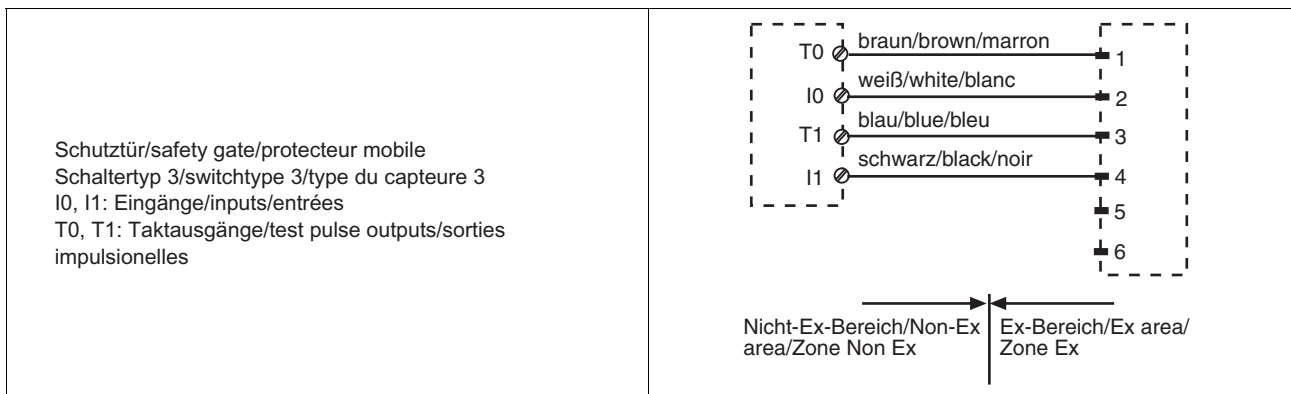
PSENmag PSEN ma1.3b-23

<p>PNOZ X5 PNOZ X5J</p>	<p>Wiring diagram for PNOZ X5 showing sensor connections (S11, S22, S11, S12) and color coding (braun, weiß, blau, schwarz) for terminals 1-4. The diagram is divided into Nicht-Ex-Bereich (Zone Non Ex) and Ex-Bereich (Zone Ex).</p>
<p>PNOZ 11 PNOZ X3.1 PNOZ X3.10P PNOZ 16 PNOZ X3P PNOZ XV2 PNOZ X11P PNOZ X2.5P PNOZ XV2P PNOZ X13 PNOZ X3 PNOZ XV3 PNOZ XV3P</p>	<p>Wiring diagram for various PNOZ units showing sensor connections (S21, S22, S31, S32) and color coding (braun, weiß, blau, schwarz) for terminals 1-4. The diagram is divided into Nicht-Ex-Bereich (Zone Non Ex) and Ex-Bereich (Zone Ex).</p>
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	<p>Wiring diagram for PNOZ X6 showing sensor connections (S61, S62, S51, S52) and color coding (braun, weiß, blau, schwarz) for terminals 1-4. The diagram is divided into Nicht-Ex-Bereich (Zone Non Ex) and Ex-Bereich (Zone Ex).</p>
<p>PMUT X1P</p>	<p>Wiring diagram for PMUT X1P showing sensor connections (S61, S62, S51, S52) and color coding (braun, weiß, blau, schwarz) for terminals 1-4. The diagram is divided into Nicht-Ex-Bereich (Zone Non Ex) and Ex-Bereich (Zone Ex).</p>

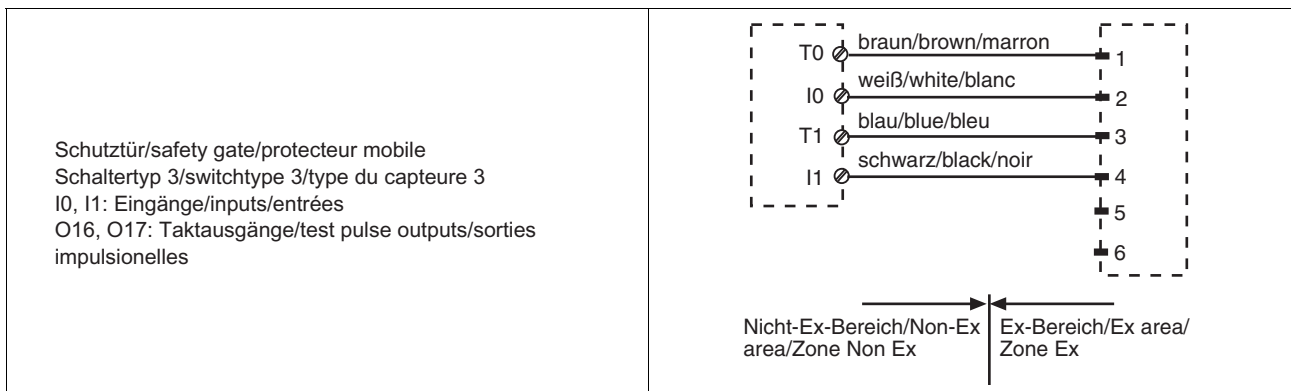
PSENmag PSEN ma1.3b-23



► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

2.2

PSENmag PSEN ma1.3b-23

Installation

- ▶ When installing make sure you comply with the requirements of DIN EN 1088
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or

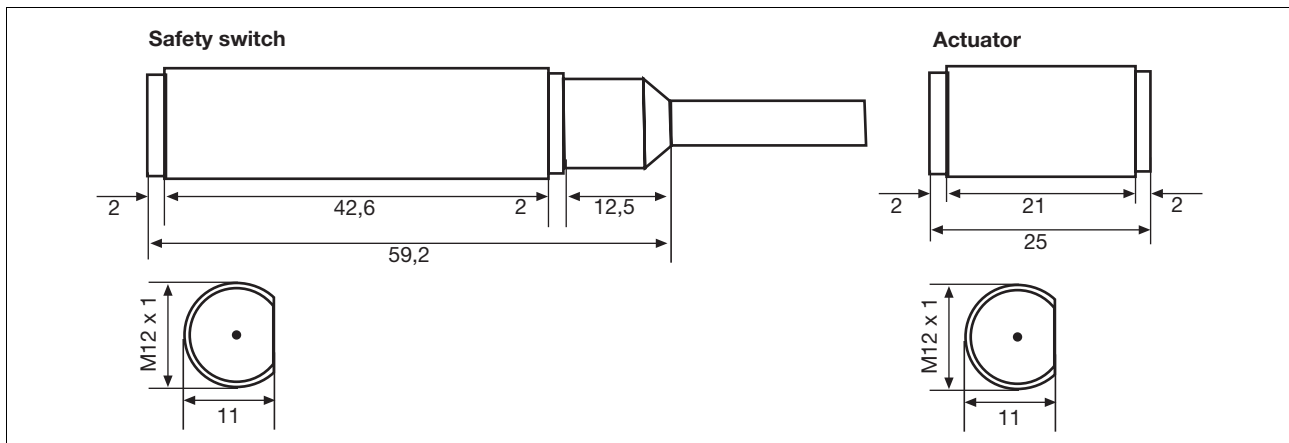
vibration

- Do not use as a limit stop
- For fixed wiring only
- ▶ The unit can be installed in any position. The safety switch and actuator must be installed so that the bevelled surfaces face each other precisely.
- ▶ The safety switch and actuator should only be secured using M12 nuts made of non-magnetic material (e.g. Messing). Torque setting max. 300 Ncm.

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN ma1,3-08**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions in mm



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the op-

erating instructions supplied with the unit.

Technical details	
ATEX category	II 3GD Eex nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	15 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.20 A
Max. switching current for auxiliary contacts	10 mA
Max. breaking capacity for reed contacts	5.0 W
Max. switch frequency	1 Hz
Actuator	PSEN ma1,3-08
Ambient temperature	-25 - 70 °C

PSENmag

PSEN ma1.3b-23

Technical details	
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Shock stress	30 g , 11 ms
Connection type	10m cable
Cable	LiYY 6 x 0,25 mm²
Protection type	IP69K
Housing material	PBT
Dimensions	
Diameter	M12
Safety switch	
Depth	59.2 mm
Actuator	
Depth	25 mm
Weight	
Safety switch	430 g
Actuator	10 g

The standards current on **2007-03** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN ma1.3a-23	1/1	magnetic	Safety switch/actuator M12	506 224



PSENmag

PSEN ma1.3b-25



Magnetic safety switches for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN ma1.3b-25
	Pending
	Pending

Unit features

- ▶ The actuator **PSEN ma1,3-08** belongs to the safety switch
- ▶ Safety switch with cable (5 m/ 10 m)
- ▶ 2 reed contacts (N/O)
- ▶ 1 auxiliary contact (N/O)
- ▶ Assured operating distance: **8 mm**
- ▶ Assured release distance: **15 mm**
- ▶ Safety switch and actuator with M12 round design
- ▶ Works magnetically
- ▶ Switching voltage 24 VDC
- ▶ LED to display switch status

Unit description

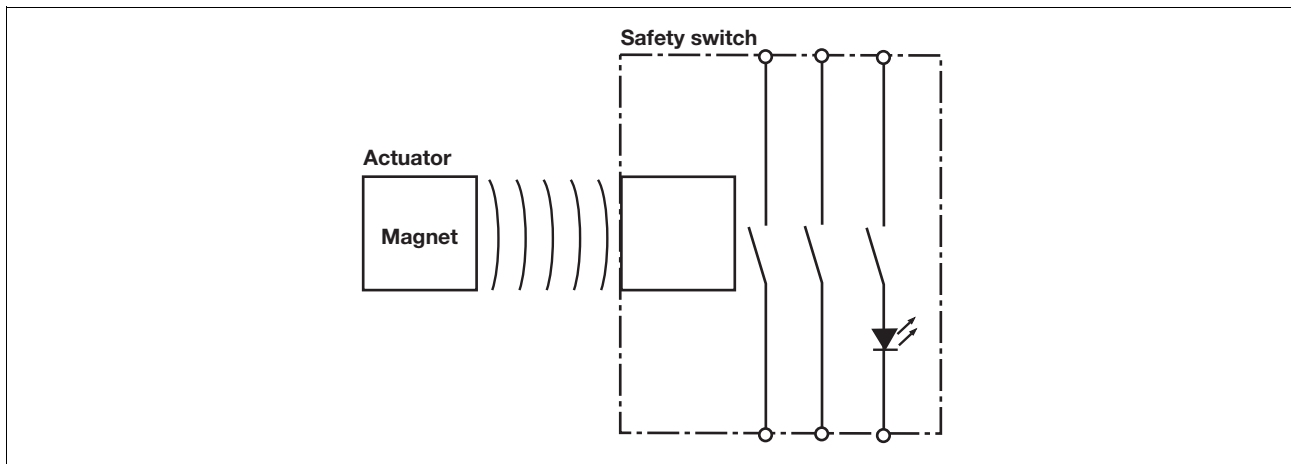
The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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 actuator **PSEN**

ma1,3-08 and its approved evaluation devices. The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



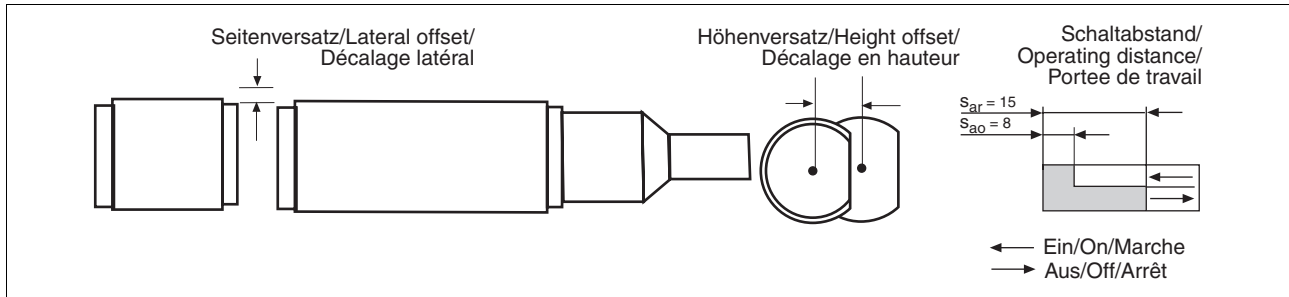
Function description

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.

PSENmag

PSEN ma1.3b-25

Operating distances



Lateral and vertical offset

with M12 actuator

- ▶ Assured operating distance S_{ao} in mm:

		Vertical offset		
Lateral offset	0	2	4	
	0	8,0	7,0	5,5
	2	7,0	6,0	4,0
	4	6,0	5,0	3,0

- ▶ Assured release distance S_{ar} :
Max. 15 mm with all vertical and lateral offsets

The stated values are valid at a temperature of 20 °C.

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Calculation of the max. cable runs l_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see Technical details)
 R_l / km = cable resistance/km

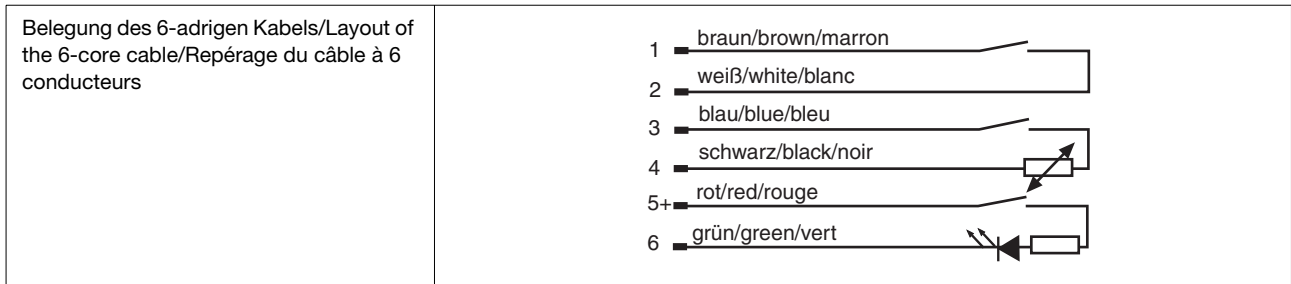
- ▶ When using evaluation devices with delay-on de-energisation contacts, please note:
 - Delay time ≤ 30 s: Delay-on de-energisation contacts satisfy the requirements of category 3 in accordance with EN 954-1 and the requirements of a PDF with single-fault tolerance (PDF-S).
 - Delay time ≥ 30 s: Delay-on 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).
- ▶ In the following commissioning cases, check the function that detects shorts across contacts:
 - On evaluation devices with DC supply voltage: Overall cable resistance ≥ 15 Ohms per channel
 - On evaluation devices with AC supply voltage: Overall cable resistance ≥ 25 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.

2.2

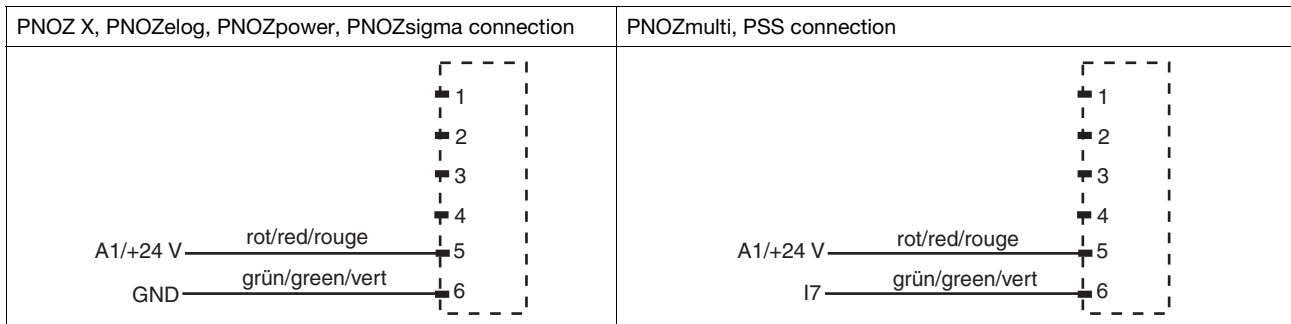
PSENmag PSEN ma1.3b-25

Connections

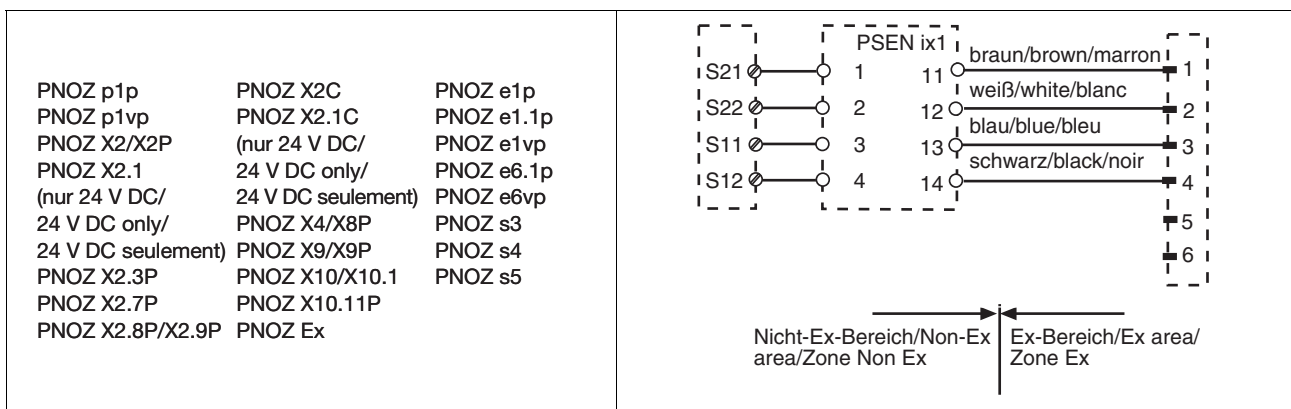
The safety switch is shown in an unoperated condition.



- ▶ Auxiliary contact with LED connection

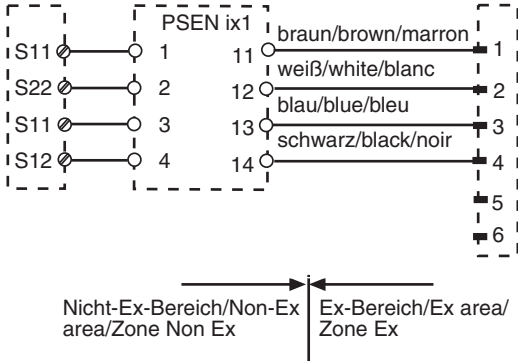
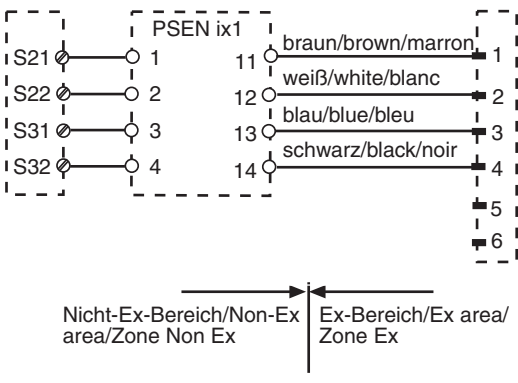
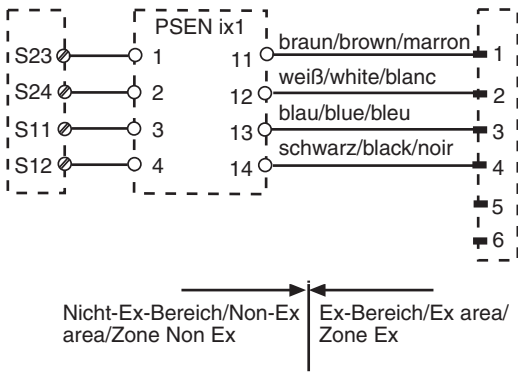
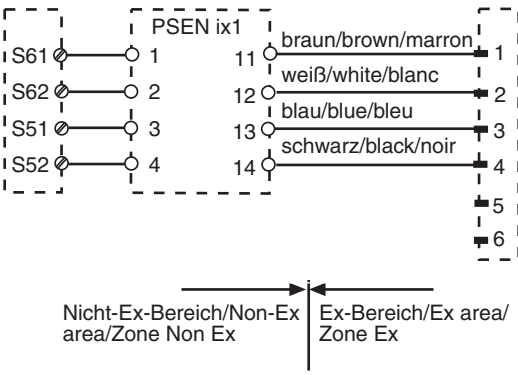


- ▶ Connection to PNOZ X, PNOZelog, PNOZpower, PNOZsigma

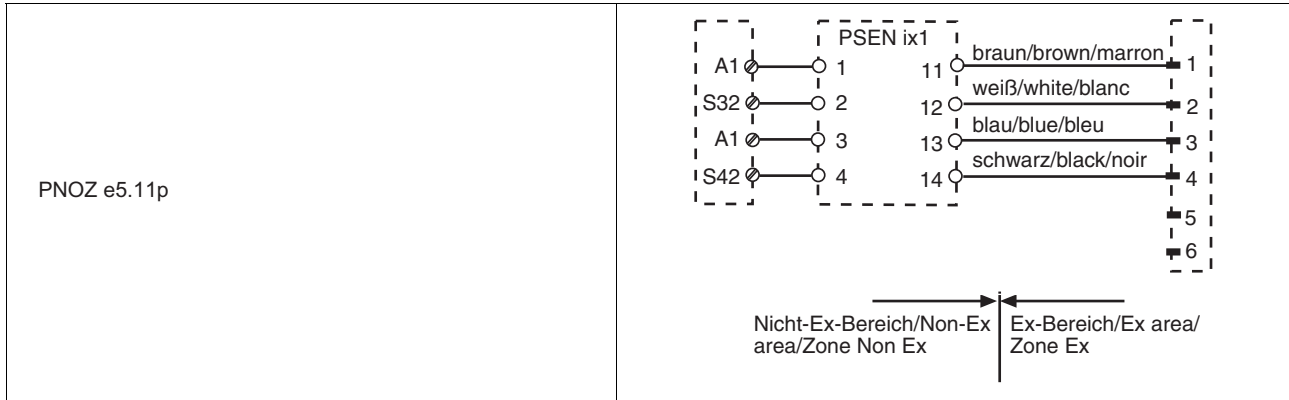


PSENmag

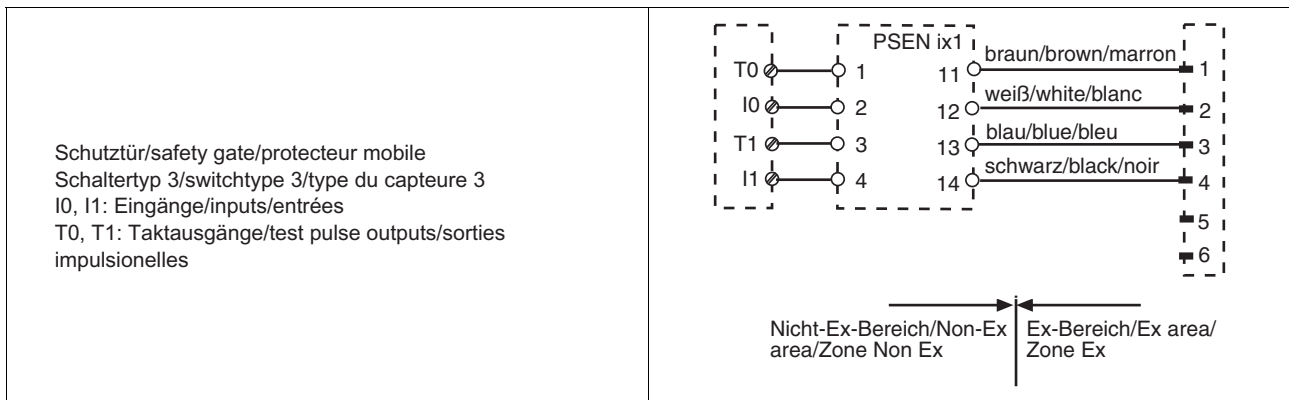
PSEN ma1.3b-25

<p>PNOZ X5 PNOZ X5J</p>	
<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13</p> <p>PNOZ X3.1 PNOZ X3P PNOZ X2.5P PNOZ X3</p> <p>PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>	
<p>PNOZ X6 (mit Brücke/with link/avec pontage Y3-Y4)</p>	
<p>PMUT X1P</p>	

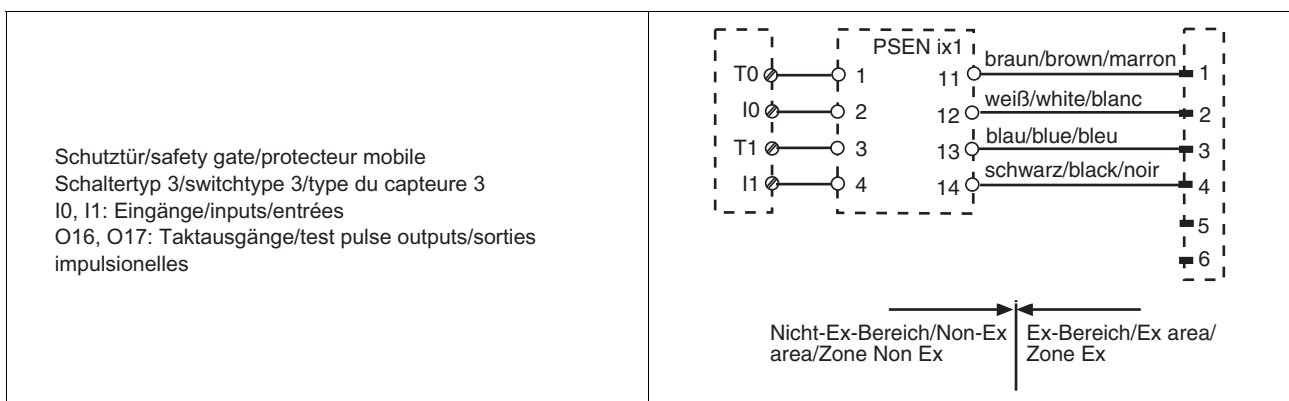
PSENmag PSEN ma1.3b-25



► Connection to PNOZmulti



► Connection to PSS with and without SafetyBUS p



CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENmag PSEN ma1.3b-25

Installation

- ▶ When installing make sure you comply with the requirements of DIN EN 1088
- ▶ If possible, do not install the safety switch and actuator on to ferromagnetic material. Changes to the operating distances are to be expected.
- ▶ The distance between two systems comprising safety switch and actuator must be at least 25 mm.
- ▶ Safety switch and actuator
 - Keep away from iron swarf
 - Do not expose to strong magnetic fields
 - Do not expose to heavy shock or vibration

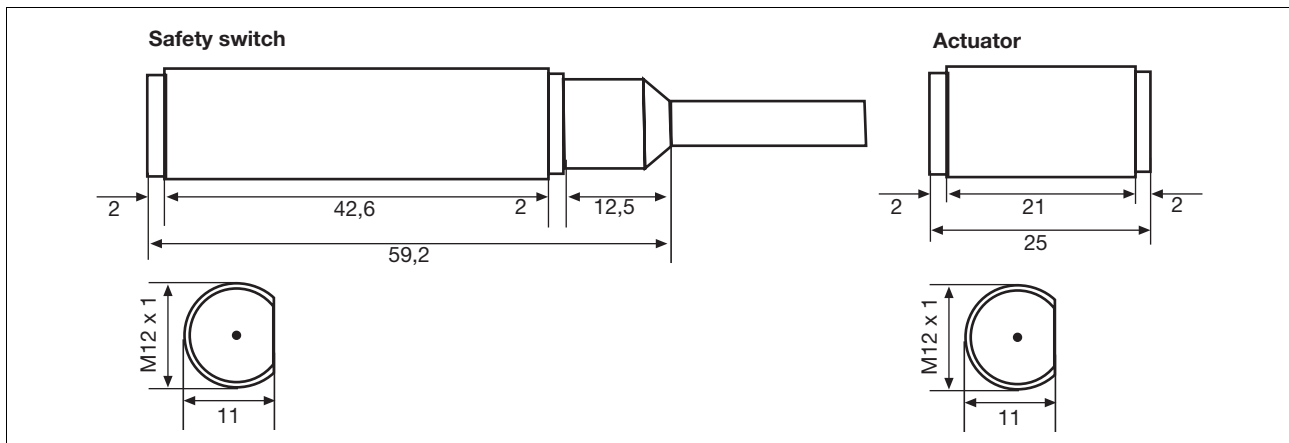
- Do not use as a limit stop
- For fixed wiring only
- ▶ The unit can be installed in any position. The safety switch and actuator must be installed so that the bevelled surfaces face each other precisely.
- ▶ The safety switch and actuator should only be secured using M12 nuts made of non-magnetic material (e.g. Messing). Torque setting max. 300 Ncm.

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN ma1,3-08**.

- ▶ Always test the function with the PSEN ix1 interface and one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions in mm



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the op-

erating instructions supplied with the unit.

Technical details

ATEX category	II 3GD Eex nC IIC T6
Switching distances	
Assured operating distance S_{ao}	8 mm
Min. operating distance S_{omin}	0.5 mm
Assured release distance S_{ar}	15 mm
Switching voltage	24 V
Max. switching current for reed contacts	0.20 A
Max. switching current for auxiliary contacts	10 mA
Max. breaking capacity for reed contacts	5.0 W
Max. switch frequency	1 Hz
Actuator	PSEN ma1,3-08
Ambient temperature	-25 - 70 °C

PSENmag PSEN ma1.3b-25

Technical details	
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Shock stress	30 g , 11 ms
Connection type	10m cable
Cable	LiYY 6 x 0,25 mm²
Protection type	IP69K
Housing material	PBT
Dimensions	
Diameter	M12
Safety switch	
Depth	59.2 mm
Actuator	
Depth	25 mm
Weight	
Safety switch	430 g
Actuator	10 g

The standards current on **2007-03** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN ma1.3a-25	1/1	magnetic	Safety switch/actuator M12	506 225

PSENmag
PSEN ma1.3b-25

PSENcode

PSENcode

Contents	Page
PSENcode	
PSEN cs1.13p	2.3-2
PSEN cs1.1p	2.3-9
PSEN cs2.13p	2.3-16
PSEN cs2.1p	2.3-23
PSEN cs2.2p	2.3-30



PSENcode

PSEN cs1.13p



Coded safety switch for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN cs1.13p
	◆
	◆

Unit features

- ▶ For applications up to Category 4 of EN 954-1
- ▶ Transponder technology
- ▶ Coded actuator:
The actuator has electronic coding. The safety switch only reacts to the actuator PSEN cs1.1.
- ▶ Assured operating distance: 15 mm
- ▶ Typical operating distance: 21 mm
- ▶ Release distance: 32 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 for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- ▶ 5 actuation directions
- ▶ Switching voltage 24 VDC

Unit description

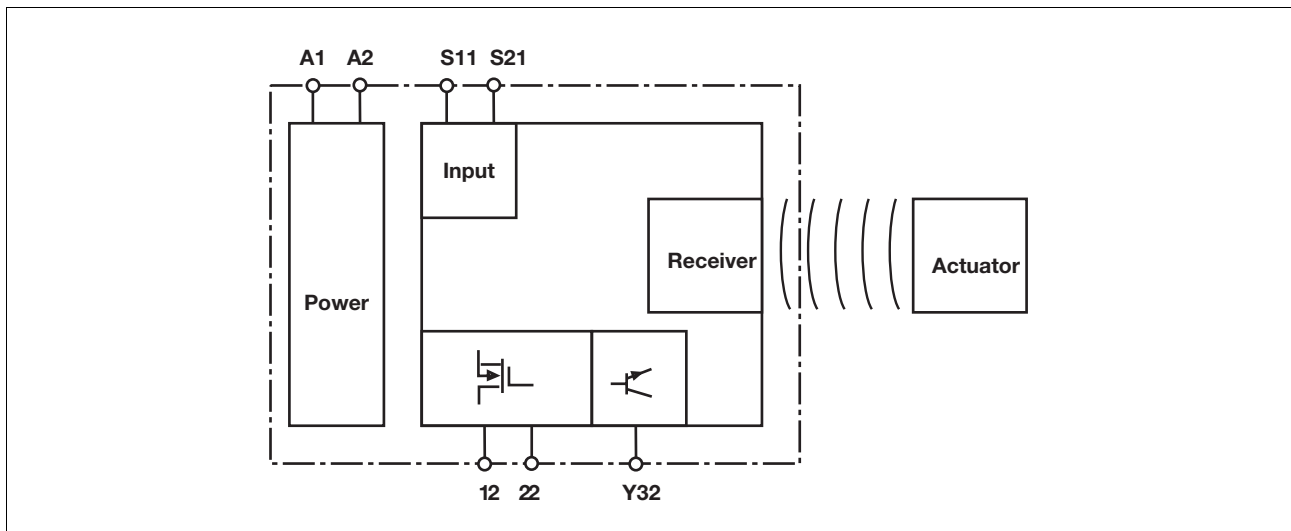
The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The 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 cs1,1** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



PSENcode

PSEN cs1.13p

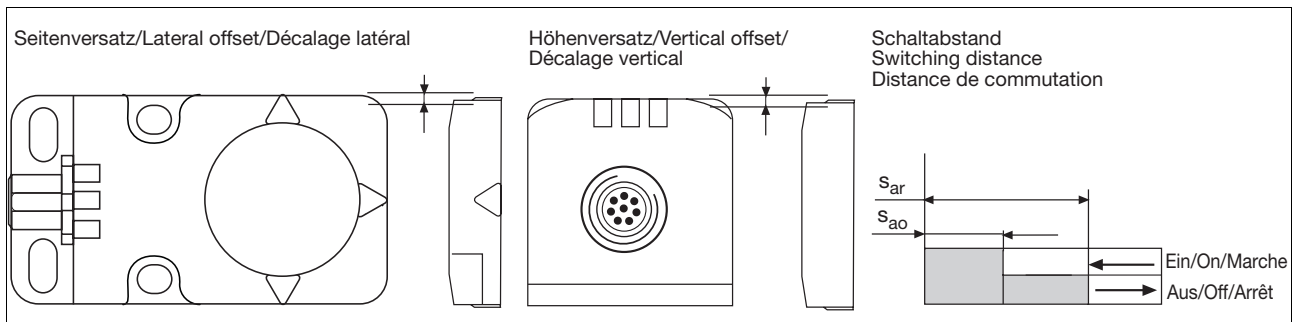
Function description

- ▶ If the 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 conduct.

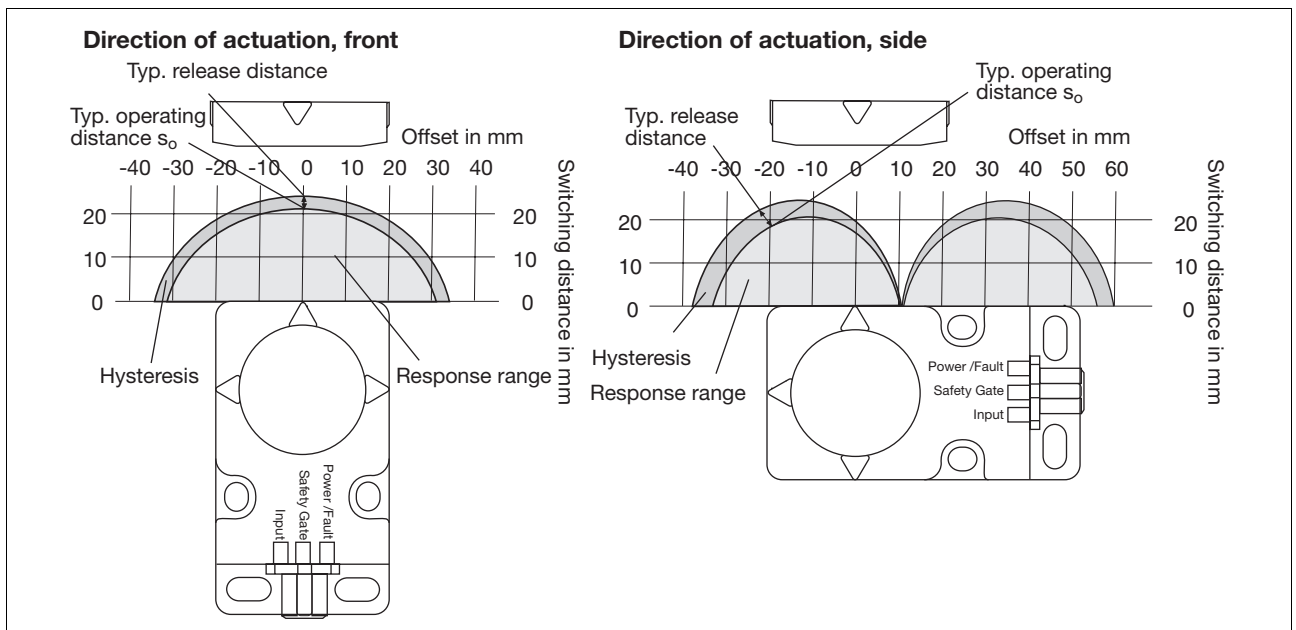
- ▶ If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety contacts 12 and 22 and signal output Y32 are blocked.
- ▶ If the shutdown occurs via the inputs, reactivation of the outputs is

only possible after both safety inputs have been locked simultaneously (partial operation lock).

Operating distances

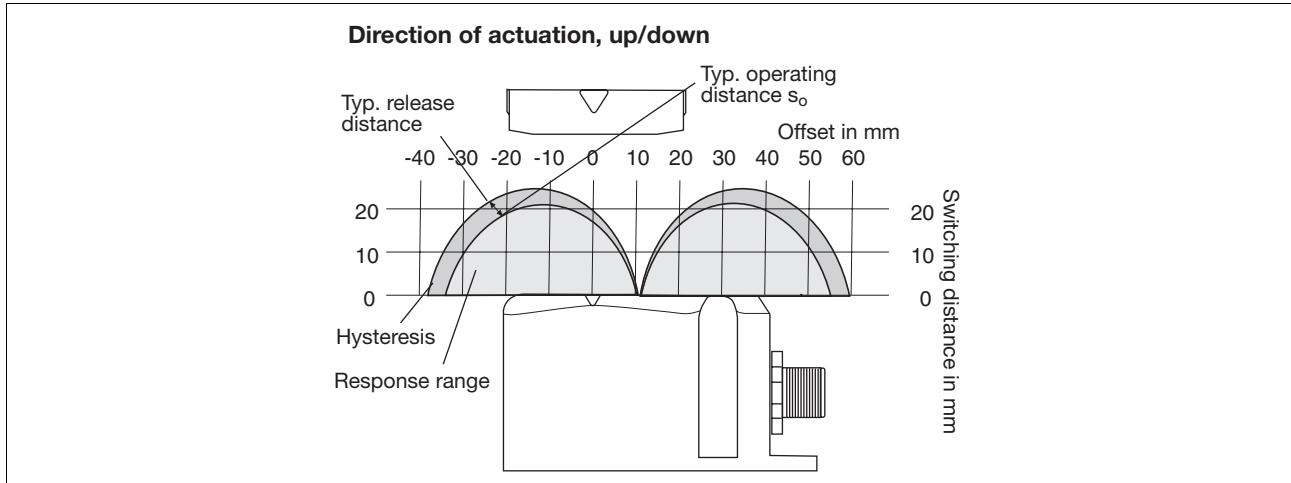


Lateral and vertical offset



PSENcode

PSEN cs1.13p



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

Wiring

Please note:

- Information given in the "Technical details" must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:
 $R_{I_{max}}$ = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km
 (See example in the chapter entitled "Wiring".)

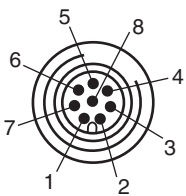
2.3

Connections

Terminal assignment

NOTICE

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

Assignment of the 8-pin M12 male connector		PIN	Function	Terminal designation	Cable colour
	1:	Input, channel 2			White
	2:	+24 U_B		S21	Brown
	3:	Output, channel1		A1	Green
	4:	Output, channel2		12	Yellow
	5:	Auxiliary output		22	Grey
	6:	Input, channel 1		Y32	Pink
	7:	0 V U_B		S11	Blue
	8:	Not connected		A2	Red

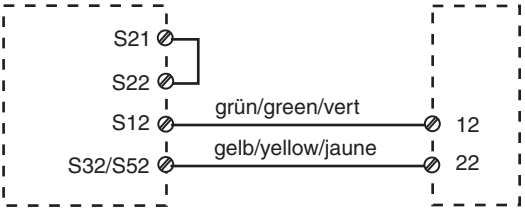

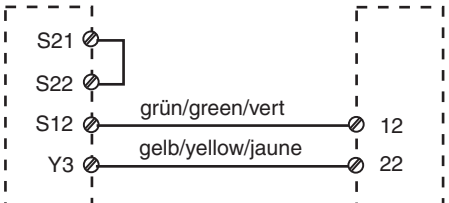

Connection to evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.

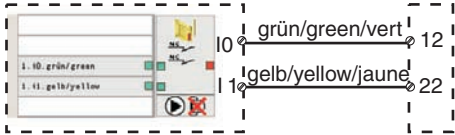
The connection to the permitted Pilz evaluation devices is described in the following section.

PSENcode PSEN cs1.13p

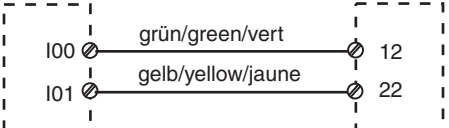
- ▶ Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

PNOZ X2.7P, PNOZ X2.8P PNOZ X3P, PSEN 3.10P PNOZ X4 PNOZ XV1P PNOZ XV3P, PNOZ XV3.1P PNOZ X8P PNOZ X9, PNOZ X9P PNOZ p1p PNOZ p1vp	
PNOZ X2.9P PNOZ X5, PNOZ X6 PNOZ e1P, PNOZ e1.1p, PNOZ e1vp PNOZ e5.11p, PNOZ e5.13p PNOZ e6.1p, PNOZ e6vp PNOZ s3, PNOZ s4, PNOZ s5	
PNOZ X10.1P PNOZ X10.11P	
PMUT X1P	

- ▶ Connection to PNOZmulti

All PNOZmulti	
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- ▶ Connection to PSS with and without SafetyBUS p

All PSS	
---------	--

CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENcode

PSEN cs1.13p

Installation

► The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating distances, as changes to the typical values can be expected (for a typical installation with operating distances, see the section entitled "Installation").

CAUTION!
If you install the safety switch non-flush within electrically or magnetically

conductive material, the value for the assured release distance s_{ar} can also change.

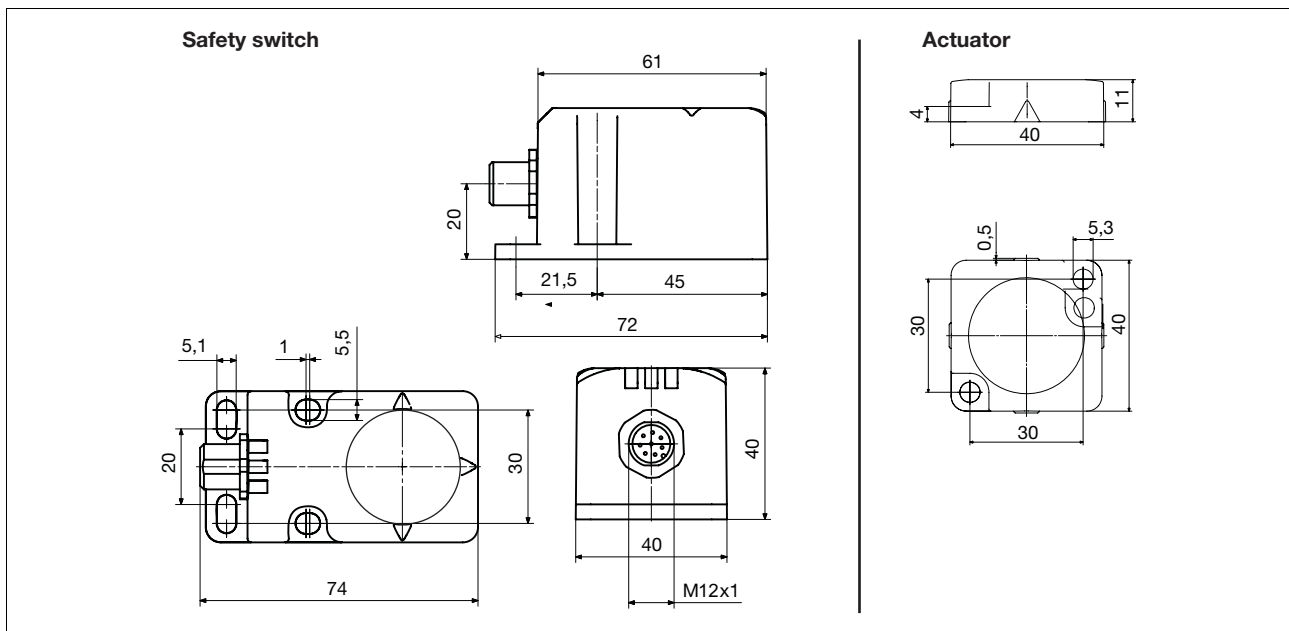
- Safety switches and actuators should only be secured using M5 screws with a flat head (e.g. M5 cheese-head or pan head screws).
 - Torque setting max. 1 Nm.
 - The distance between two transponder systems must be at least 40 cm.
- Safety switch and actuator
- Do not expose to heavy shock or vibration
 - Do not use as a limit stop

Adjustment

- The safety switch may only be used with the corresponding actuator **PSEN cs1,1**.
- Always test the function with one of the approved evaluation devices.
- The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions

Left: Safety switch dimensions / right: Actuator dimensions



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Technical details

ATEX category

II 3GD EEx nC IIC T6

PSENcode

PSEN cs1.13p

Technical details	
Switching distances	
Assured operating distance S_{ao}	15 mm
Typical switching distance S_o	21.0 mm
Release distance S_r	32 mm
Assured release distance S_{ar}	40 mm
Hysteresis typ.	3 mm
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C
Supply voltage U_B DC	24 V
Voltage tolerance	-20 %/+20 %
Power consumption at U_B DC	2.0 W
Max. inrush current at U_B	0.12 A
Switching current per output	500 mA
Breaking capacity per output	12 W
Max. switch frequency	3 Hz
Number of output contacts	
Safety outputs	2
Signal outputs	1
Supply interruption before deenergisation	20.0 ms
Switch-on delay	
after applying U_B	1 s
Input typ.	13 ms
Input max.	20 ms
Actuator typ.	45 ms
Actuator max.	100 ms
Delay-on de-energisation	
Input typ.	15 ms
Input max.	20 ms
	30 ms
	260 ms
Test pulses, safety outputs	300 µs
Simultaneity, channel 1 and 2	
	∞
Max. overall cable resistance R_{lmax} in the input circuit	1000 Ohm
Max. line capacitance at the safety outputs	
No-load, PNOZ with relay contacts	40 nF
PNOZmulti, PNOZelog, PSS .	70 nF
Actuator	PSEN cs1,1
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M12
Cable	LiYY 8 x 0,25 mm ²
Protection type	IP67
Housing material	PBT

PSENcode

PSEN cs1.13p

Technical details

Dimensions	
Safety switch	
Height	75.0 mm
Width	40.0 mm
Depth	40.0 mm
Actuator	
Height	11 mm
Width	40 mm
Depth	40 mm
Weight	
Safety switch	125 g
Actuator	20 g

The standards current on **2007-02** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN cs1.13p	1/1	Transponder technology	Safety switch/actuator	540 005
PSEN cs1.1	1	Transponder technology	Actuator	540 080

PSENcode

PSEN cs1.1p



Coded safety switch for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN cs1.1p
	◆
	◆

Unit features

- ▶ For applications up to Category 4 of EN 954-1
- ▶ Transponder technology
- ▶ Coded actuator: The actuator has electronic coding. The safety switch only reacts to the actuator PSEN cs1.1.
- ▶ Assured operating distance: 15 mm
- ▶ Typical operating distance: 21 mm
- ▶ Release distance: 32 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 for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- ▶ 5 actuation directions
- ▶ Switching voltage 24 VDC

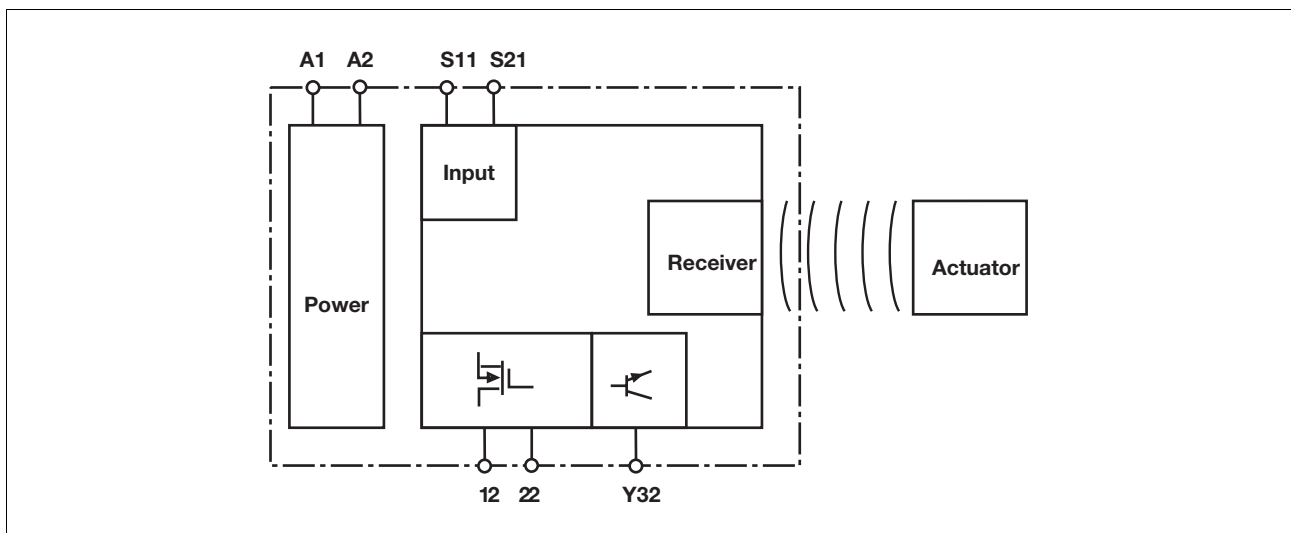
Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN cs1,1** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



PSENcode

PSEN cs1.1p

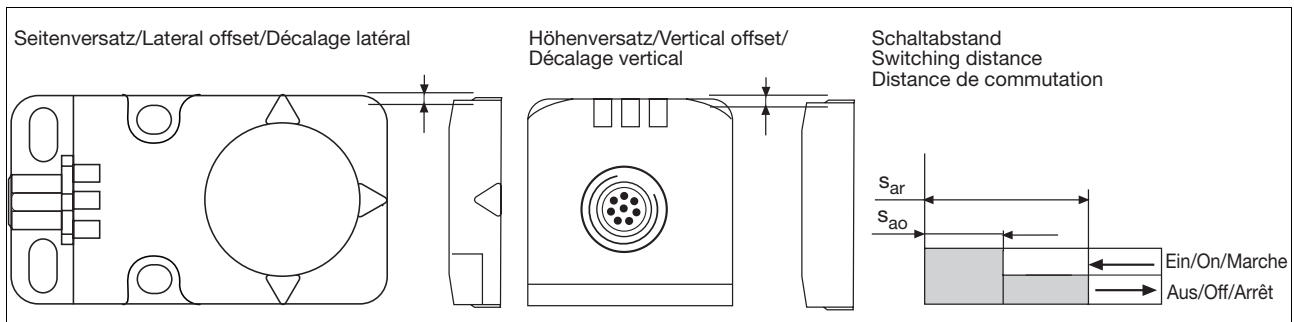
Function description

▶ If the 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 conduct.

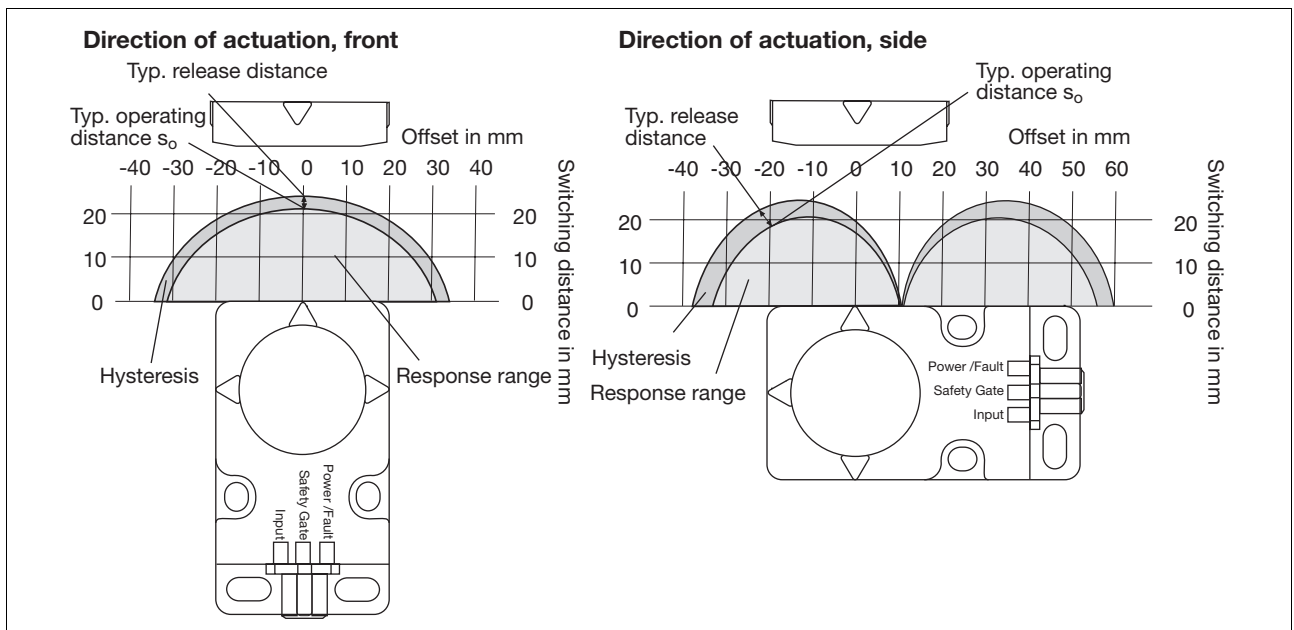
- ▶ If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety contacts 12 and 22 and signal output Y32 are blocked.
- ▶ If the shutdown occurs via the inputs, reactivation of the outputs is

only possible after both safety inputs have been locked simultaneously (partial operation lock).

Operating distances

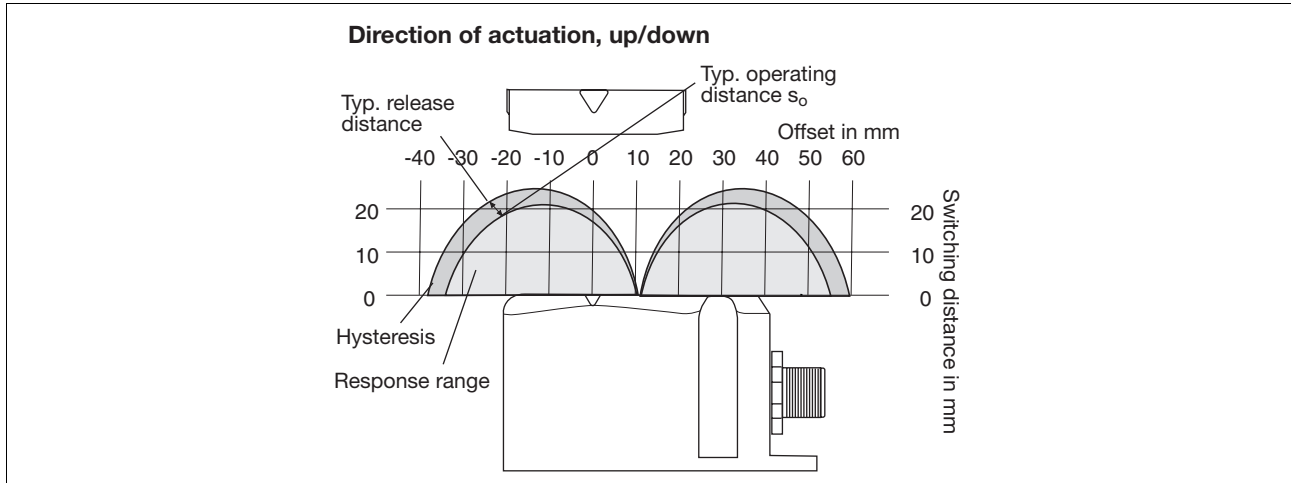


Lateral and vertical offset



PSENcode

PSEN cs1.1p



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

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:
 R_{lmax} = max. overall cable resistance (see Technical details)

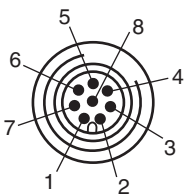
R_l / km = cable resistance/km
 (See example in the chapter entitled “Wiring”.)

Connections

Terminal assignment

NOTICE

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

Assignment of the 8-pin M12 male connector		PIN	Function	Terminal designation	Cable colour
	1:	Input, channel 2			White
	2:	+24 U _B		S21	Brown
	3:	Output, channel1		A1	Green
	4:	Output, channel2		12	Yellow
	5:	Auxiliary output		22	Grey
	6:	Input, channel 1		Y32	Pink
	7:	0 V U _B		S11	Blue
	8:	Not connected		A2	Red

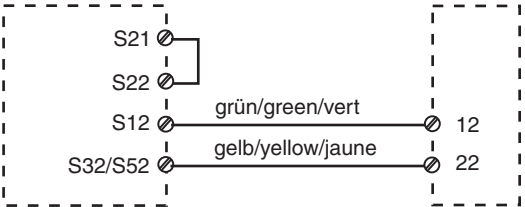
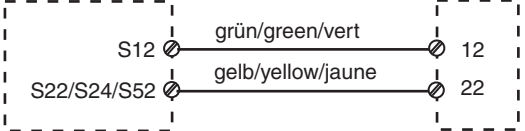


Connection to evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.

The connection to the permitted Pilz evaluation devices is described in the following section.


PSENcode PSEN cs1.1p

- ▶ Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

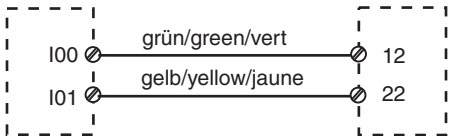
<p>PNOZ X2.7P, PNOZ X2.8P PNOZ X3P, PSEN 3.10P PNOZ X4 PNOZ XV1P PNOZ XV3P, PNOZ XV3.1P PNOZ X8P PNOZ X9, PNOZ X9P PNOZ p1p PNOZ p1vp</p>	
<p>PNOZ X2.9P PNOZ X5, PNOZ X6 PNOZ e1P, PNOZ e1.1p, PNOZ e1vp PNOZ e5.11p, PNOZ e5.13p PNOZ e6.1p, PNOZ e6vp PNOZ s3, PNOZ s4, PNOZ s5</p>	
<p>PNOZ X10.1P PNOZ X10.11P</p>	
<p>PMUT X1P</p>	

2.3

- ▶ Connection to PNOZmulti

<p>All PNOZmulti</p>	
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- ▶ Connection to PSS with and without SafetyBUS p

<p>All PSS</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENcode PSEN cs1.1p

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating distances, as changes to the typical values can be expected (for a typical installation with operating distances, see the section entitled "Installation").

CAUTION!

If you install the safety switch non-flush within electrically or magnetically

conductive material, the value for the assured release distance s_{ar} can also change.

- ▶ 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.

Safety switch and actuator

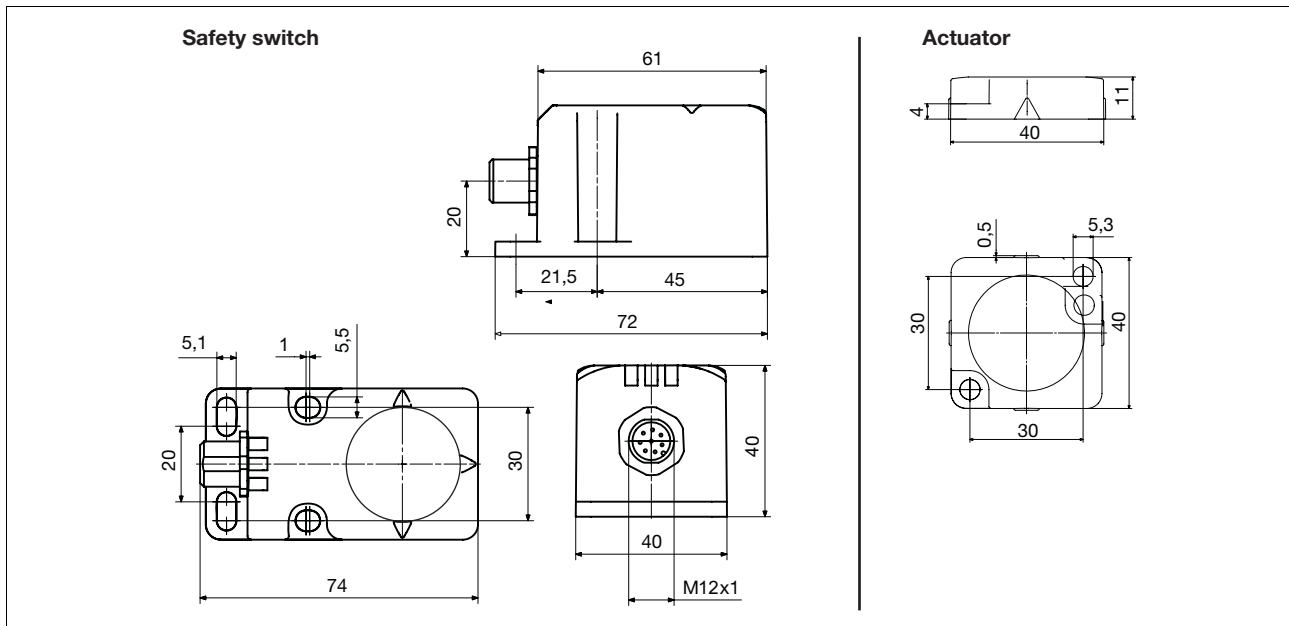
- ▶ Do not expose to heavy shock or vibration
- ▶ Do not use as a limit stop

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN cs1,1**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions

Left: Safety switch dimensions / right: Actuator dimensions



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSENcode

PSEN cs1.1p

Technical details

Switching distances	
Assured operating distance S_{ao}	15 mm
Typical switching distance S_o	21.0 mm
Release distance S_r	32 mm
Assured release distance S_{ar}	40 mm
Hysteresis typ.	3 mm
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C
Supply voltage U_B DC	24 V
Voltage tolerance	-20 %/+20 %
Power consumption at U_B DC	2.0 W
Max. inrush current at U_B	0.12 A
Switching current per output	500 mA
Breaking capacity per output	12 W
Max. switch frequency	3 Hz
Number of output contacts	
Safety outputs	2
Signal outputs	1
Supply interruption before deenergisation	20.0 ms
Switch-on delay	
after applying U_B	1 s
Input typ.	13 ms
Input max.	20 ms
Actuator typ.	45 ms
Actuator max.	100 ms
Delay-on de-energisation	
Input typ.	15 ms
Input max.	20 ms
	30 ms
	260 ms
Test pulses, safety outputs	300 µs
Simultaneity, channel 1 and 2	∞
Max. overall cable resistance R_{lmax} in the input circuit	1000 Ohm
Max. line capacitance at the safety outputs	
No-load, PNOZ with relay contacts	40 nF
PNOZmulti, PNOZelog, PSS .	70 nF
Actuator	PSEN cs1,1
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M12
Cable	LiYY 8 x 0,25 mm²
Protection type	IP67
Housing material	PBT

PSENcode

PSEN cs1.1p

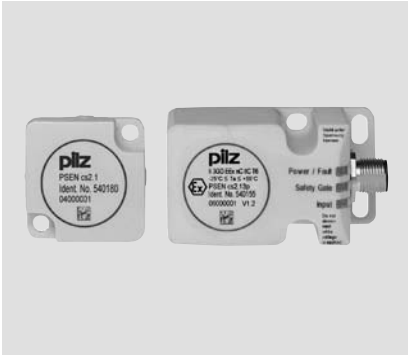
Technical details	
Dimensions	
Safety switch	
Height	75.0 mm
Width	40.0 mm
Depth	40.0 mm
Actuator	
Height	11 mm
Width	40 mm
Depth	40 mm
Weight	
Safety switch	125 g
Actuator	20 g

The standards current on **2007-02** apply.

Order reference				
Type	Quantity	Operation	Features	Order no.
PSEN cs1.1p	1/1	Transponder technology	Safety switch/actuator	540 000
PSEN cs1.1p (switch)	1	Transponder technology	Safety switch	540 050
PSEN cs1.1	1	Transponder technology	Actuator	540 080



PSENcode

PSEN cs2.13p



Coded safety switch for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN cs2.13p
	◆
	◆

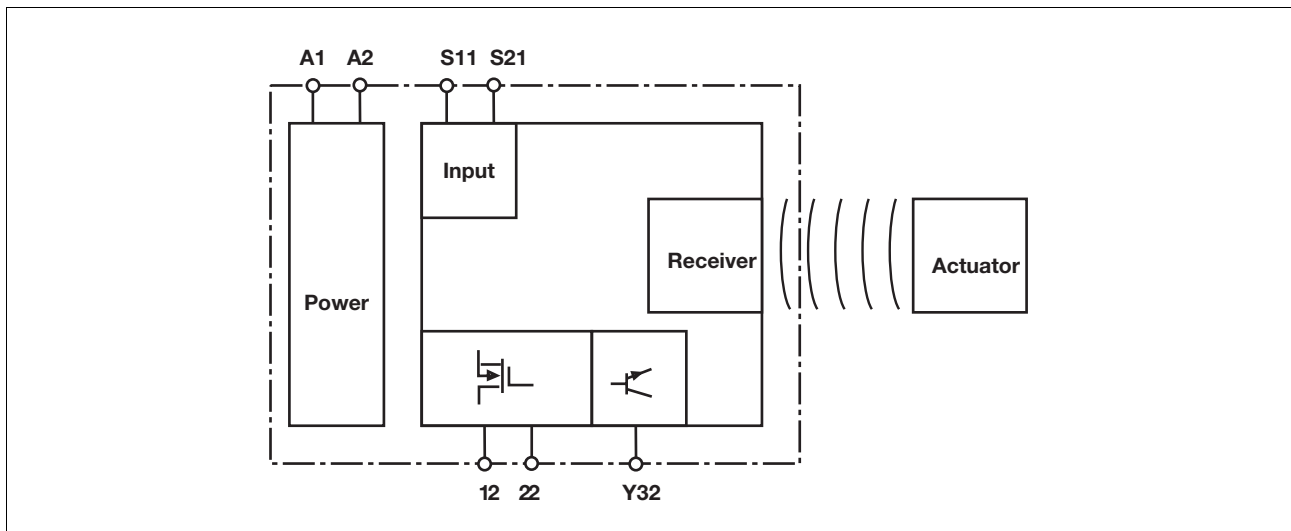
Unit features

- ▶ 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: 32 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 for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- ▶ 5 actuation directions
- ▶ Switching voltage 24 VDC

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN cs2,1** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



PSENcode

PSEN cs2.13p

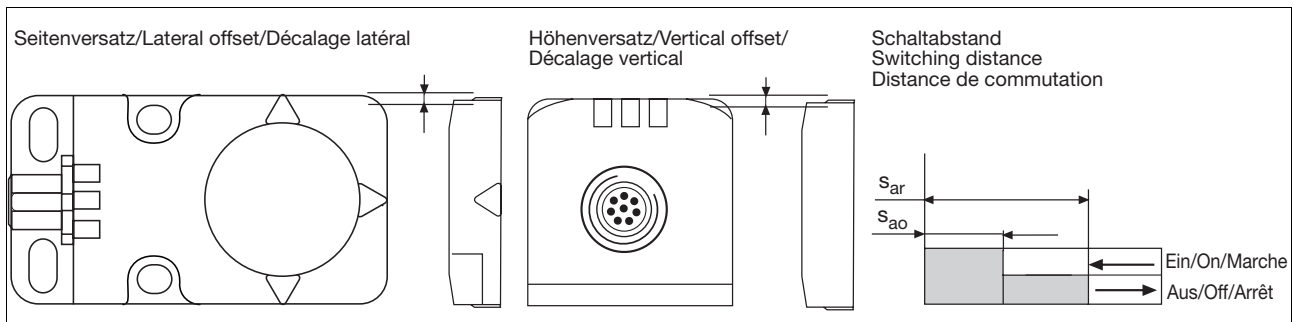
Function description

- ▶ If the 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 conduct.

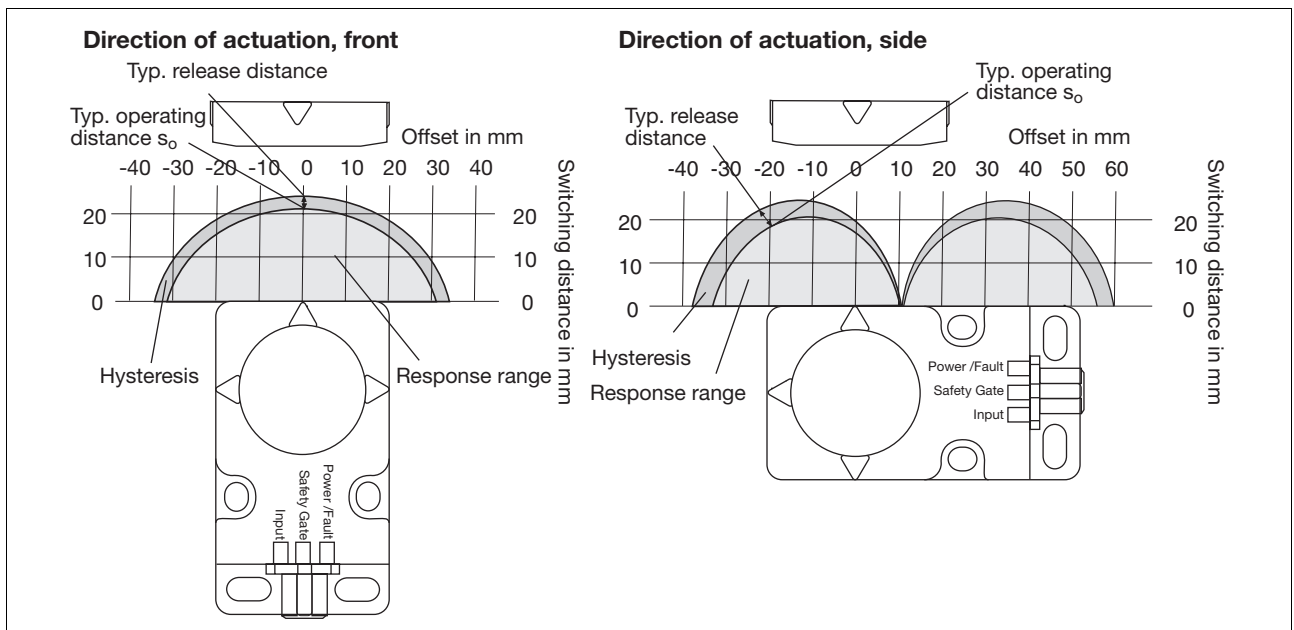
- ▶ If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety contacts 12 and 22 and signal output Y32 are blocked.
- ▶ If the shutdown occurs via the inputs, reactivation of the outputs is

only possible after both safety inputs have been locked simultaneously (partial operation lock).

Operating distances

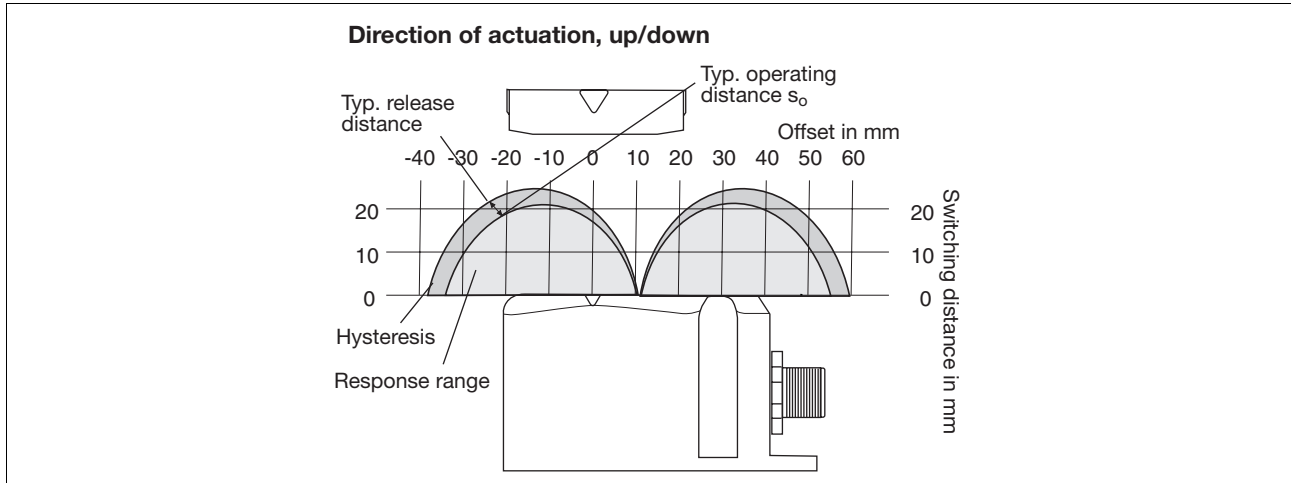


Lateral and vertical offset



PSENcode

PSEN cs2.13p



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

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:
 $R_{I_{max}}$ = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km
(See example in the chapter entitled “Wiring”.)

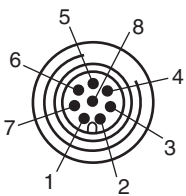
2.3

Connections

Terminal assignment

NOTICE

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

Assignment of the 8-pin M12 male connector		PIN	Function	Terminal designation	Cable colour
		1:	Input, channel 2	S21	White
		2:	+24 U_B	A1	Brown
		3:	Output, channel1	12	Green
		4:	Output, channel2	22	Yellow
		5:	Auxiliary output	Y32	Grey
		6:	Input, channel 1	S11	Pink
		7:	0 V U_B	A2	Blue
		8:	Not connected		Red

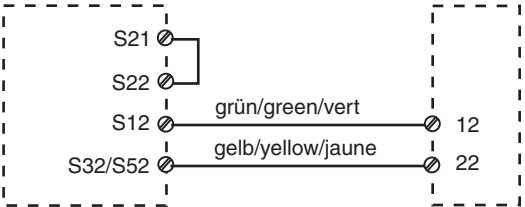
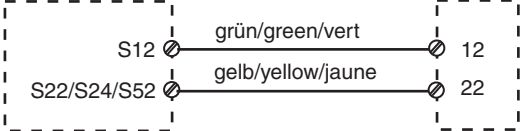
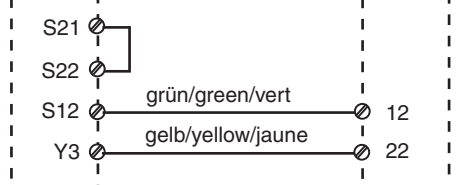

Connection to evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.

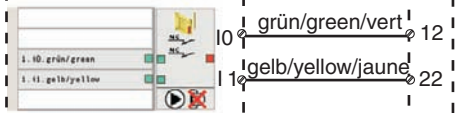
The connection to the permitted Pilz evaluation devices is described in the following section.

PSENcode PSEN cs2.13p

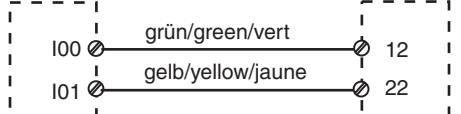
- ▶ Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

<p>PNOZ X2.7P, PNOZ X2.8P PNOZ X3P, PSEN 3.10P PNOZ X4 PNOZ XV1P PNOZ XV3P, PNOZ XV3.1P PNOZ X8P PNOZ X9, PNOZ X9P PNOZ p1p PNOZ p1vp</p>	
<p>PNOZ X2.9P PNOZ X5, PNOZ X6 PNOZ e1P, PNOZ e1.1p, PNOZ e1vp PNOZ e5.11p, PNOZ e5.13p PNOZ e6.1p, PNOZ e6vp PNOZ s3, PNOZ s4, PNOZ s5</p>	
<p>PNOZ X10.1P PNOZ X10.11P</p>	
<p>PMUT X1P</p>	

- ▶ Connection to PNOZmulti

<p>All PNOZmulti</p>	
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- ▶ Connection to PSS with and without SafetyBUS p

<p>All PSS</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENcode PSEN cs2.13p

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating distances, as changes to the typical values can be expected (for a typical installation with operating distances, see the section entitled "Installation").

CAUTION!

If you install the safety switch non-flush within electrically or magnetically conductive material, the value for the assured release distance s_{ar} can also change.

- ▶ 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.

Safety switch and actuator

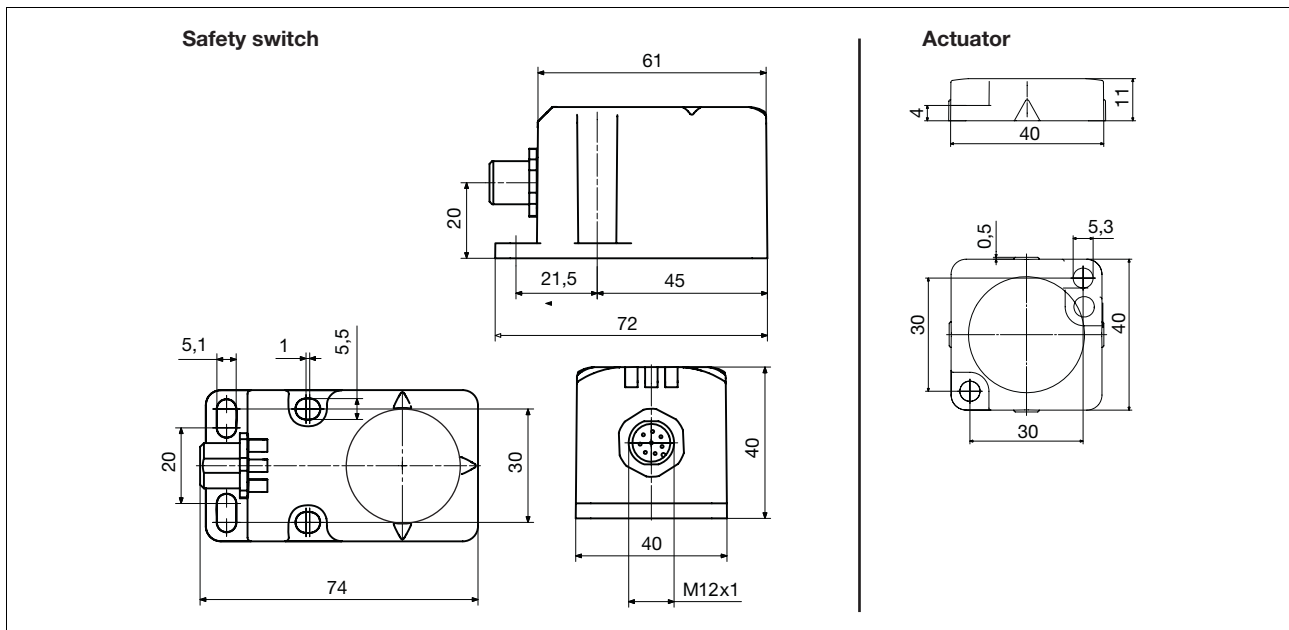
- ▶ Do not expose to heavy shock or vibration
- ▶ Do not use as a limit stop

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN cs2.1**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions

Left: Safety switch dimensions / right: Actuator dimensions



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSENcode

PSEN cs2.13p

Technical details	
ATEX category	II 3GD EEx nC IIC T6
Switching distances	
Assured operating distance S_{ao}	15 mm
Typical switching distance S_o	21.0 mm
Release distance S_r	32 mm
Assured release distance S_{ar}	40 mm
Hysteresis typ.	3 mm
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C
Supply voltage U_B DC	24 V
Voltage tolerance	-20 %/+20 %
Power consumption at U_B DC	2.0 W
Max. inrush current at U_B	0.12 A
Switching current per output	500 mA
Breaking capacity per output	12 W
Max. switch frequency	3 Hz
Number of output contacts	
Safety outputs	2
Signal outputs	1
Supply interruption before deenergisation	20.0 ms
Switch-on delay after applying U_B	1 s
Input typ.	13 ms
Input max.	20 ms
Actuator typ.	45 ms
Actuator max.	100 ms
Delay-on de-energisation	
Input typ.	15 ms
Input max.	20 ms
	30 ms
	260 ms
Test pulses, safety outputs	300 µs
Simultaneity, channel 1 and 2	∞
Max. overall cable resistance R_{lmax} in the input circuit	1000 Ohm
Max. line capacitance at the safety outputs	
No-load, PNOZ with relay contacts	40 nF
PNOZmulti, PNOZelog, PSS .	70 nF
Actuator	PSEN cs2,1
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M12
Cable	LiYY 8 x 0,25 mm²
Protection type	IP67
Housing material	PBT

PSENcode PSEN cs2.13p

Technical details

Dimensions

Safety switch

Height	75.0 mm
Width	40.0 mm
Depth	40.0 mm

Actuator

Height	11 mm
Width	40 mm
Depth	40 mm

Weight

Safety switch	125 g
Actuator	20 g

The standards current on **2007-02** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN cs2.13p	1/1	Transponder technology	Safety switch/actuator	540 105
PSEN cs2.1	1	Transponder technology	Actuator	540 180



PSENcode

PSEN cs2.1p



Coded safety switch for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN cs2.1p
	◆
	◆

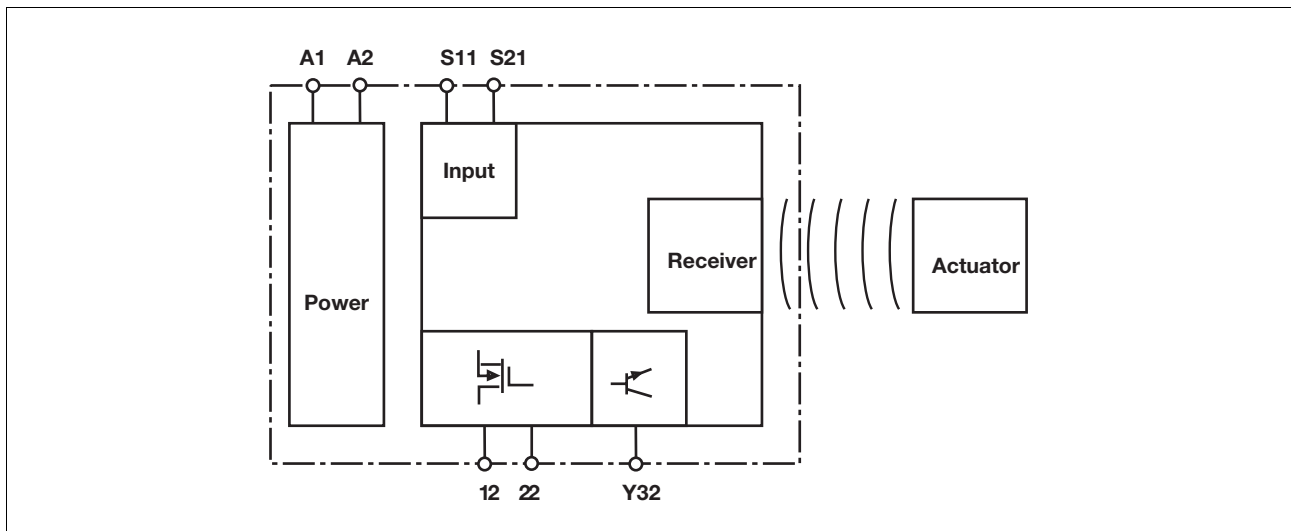
Unit features

- ▶ 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: 32 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 for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- ▶ 5 actuation directions
- ▶ Switching voltage 24 VDC

Unit description

The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.
The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN cs2,1** and its approved evaluation devices.
The safety switch should only be connected to the evaluation devices listed under "Connections".

Block diagram



PSENcode

PSEN cs2.1p

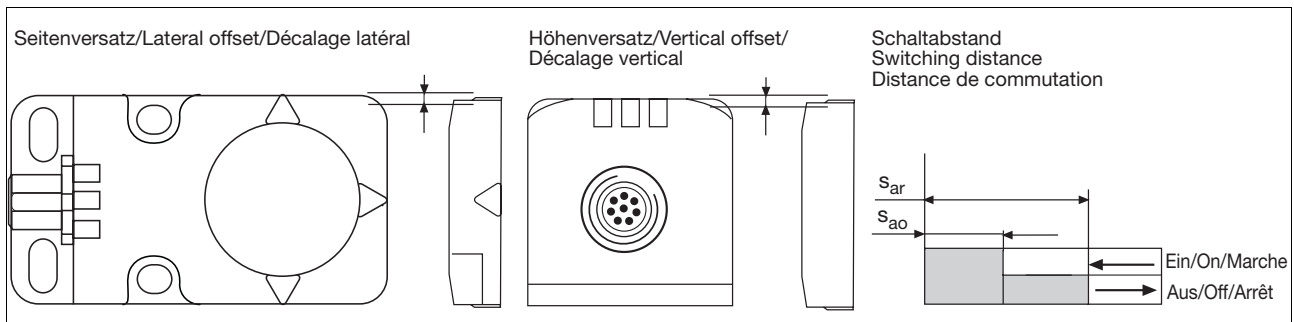
Function description

▶ If the 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 conduct.

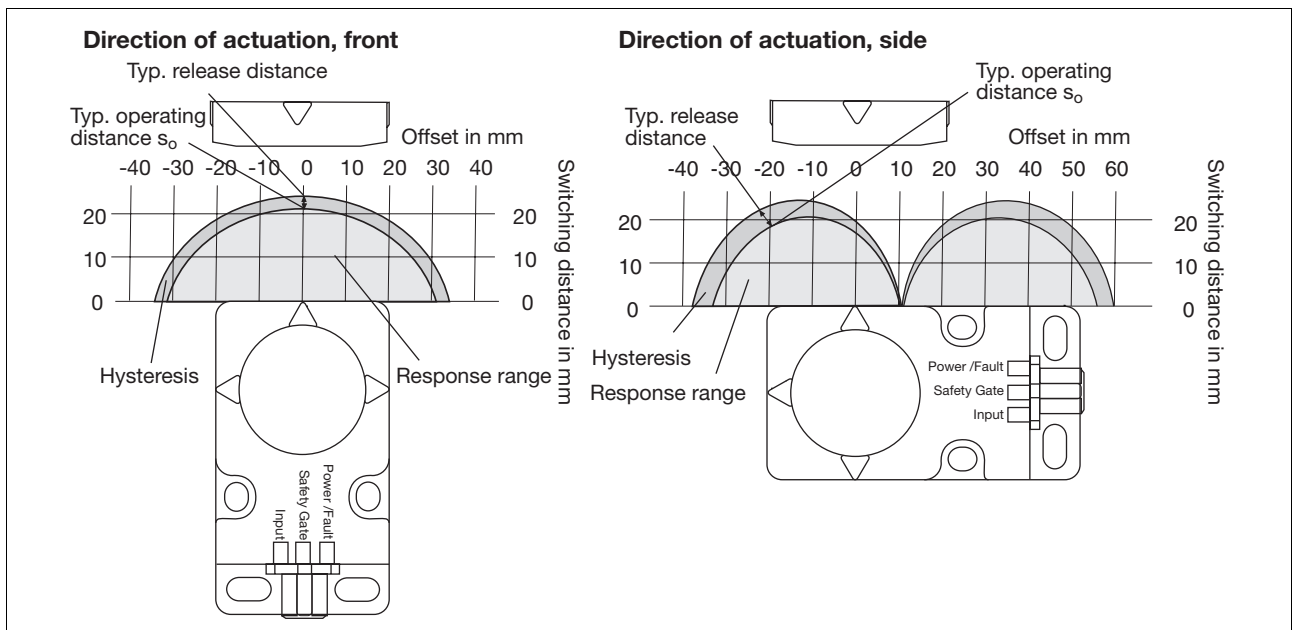
- ▶ If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety contacts 12 and 22 and signal output Y32 are blocked.
- ▶ If the shutdown occurs via the inputs, reactivation of the outputs is

only possible after both safety inputs have been locked simultaneously (partial operation lock).

Operating distances

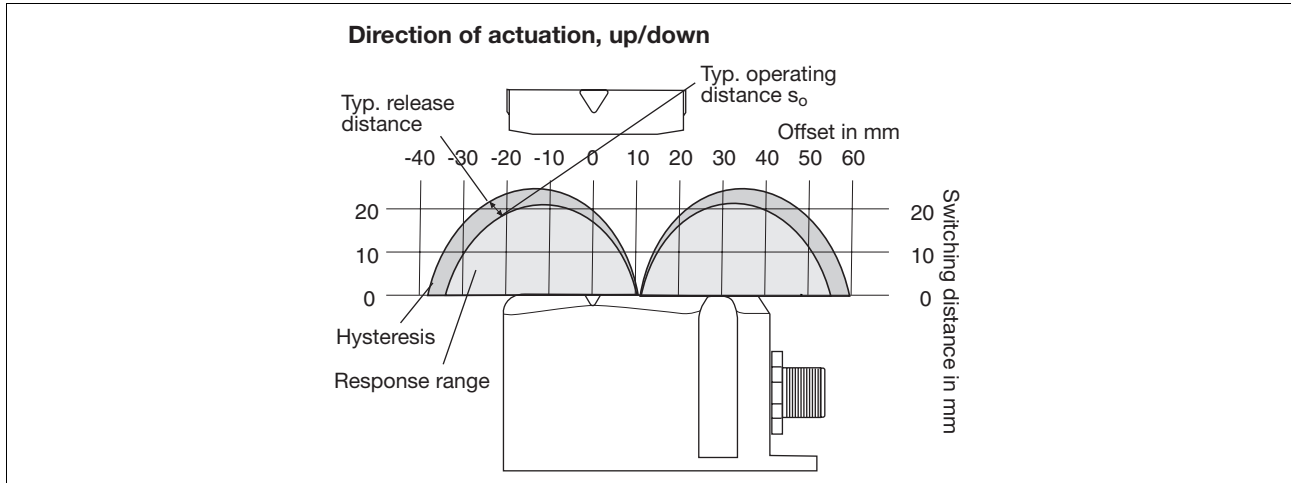


Lateral and vertical offset



PSENcode

PSEN cs2.1p



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

Wiring

Please note:

- Information given in the “Technical details” must be followed.

- Calculation of the max. cable runs I_{max} in the input circuit:
 $R_{I_{max}}$ = max. overall cable resistance (see Technical details)

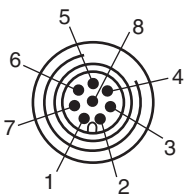
R_l / km = cable resistance/km
 (See example in the chapter entitled “Wiring”.)

Connections

Terminal assignment

NOTICE

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

Assignment of the 8-pin M12 male connector		PIN	Function	Terminal designation	Cable colour
	1:	Input, channel 2			White
	2:	+24 U_B		S21	Brown
	3:	Output, channel1		A1	Green
	4:	Output, channel2		12	Yellow
	5:	Auxiliary output		22	Grey
	6:	Input, channel 1		Y32	Pink
	7:	0 V U_B		S11	Blue
	8:	Not connected		A2	Red

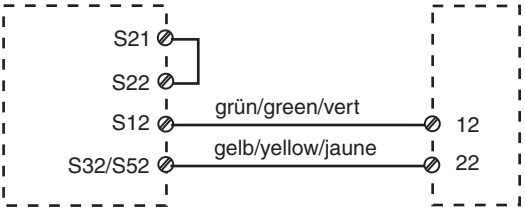
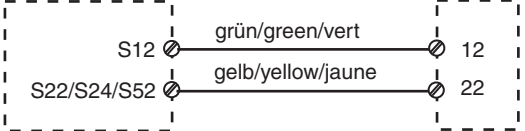
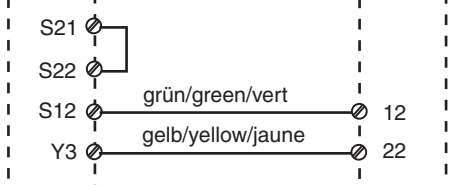
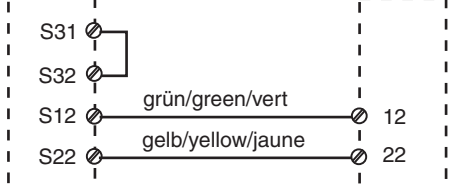
Connection to evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.

The connection to the permitted Pilz evaluation devices is described in the following section.


PSENcode PSEN cs2.1p

- ▶ Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

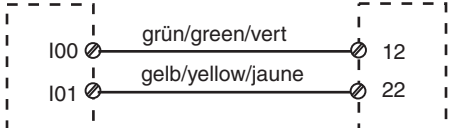
<p>PNOZ X2.7P, PNOZ X2.8P PNOZ X3P, PSEN 3.10P PNOZ X4 PNOZ XV1P PNOZ XV3P, PNOZ XV3.1P PNOZ X8P PNOZ X9, PNOZ X9P PNOZ p1p PNOZ p1vp</p>	
<p>PNOZ X2.9P PNOZ X5, PNOZ X6 PNOZ e1P, PNOZ e1.1p, PNOZ e1vp PNOZ e5.11p, PNOZ e5.13p PNOZ e6.1p, PNOZ e6vp PNOZ s3, PNOZ s4, PNOZ s5</p>	
<p>PNOZ X10.1P PNOZ X10.11P</p>	
<p>PMUT X1P</p>	

2.3

- ▶ Connection to PNOZmulti

<p>All PNOZmulti</p>	
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- ▶ Connection to PSS with and without SafetyBUS p

<p>All PSS</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENcode PSEN cs2.1p

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating distances, as changes to the typical values can be expected (for a typical installation with operating distances, see the section entitled "Installation").

CAUTION!

If you install the safety switch non-flush within electrically or magnetically

conductive material, the value for the assured release distance s_{ar} can also change.

- ▶ 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.

Safety switch and actuator

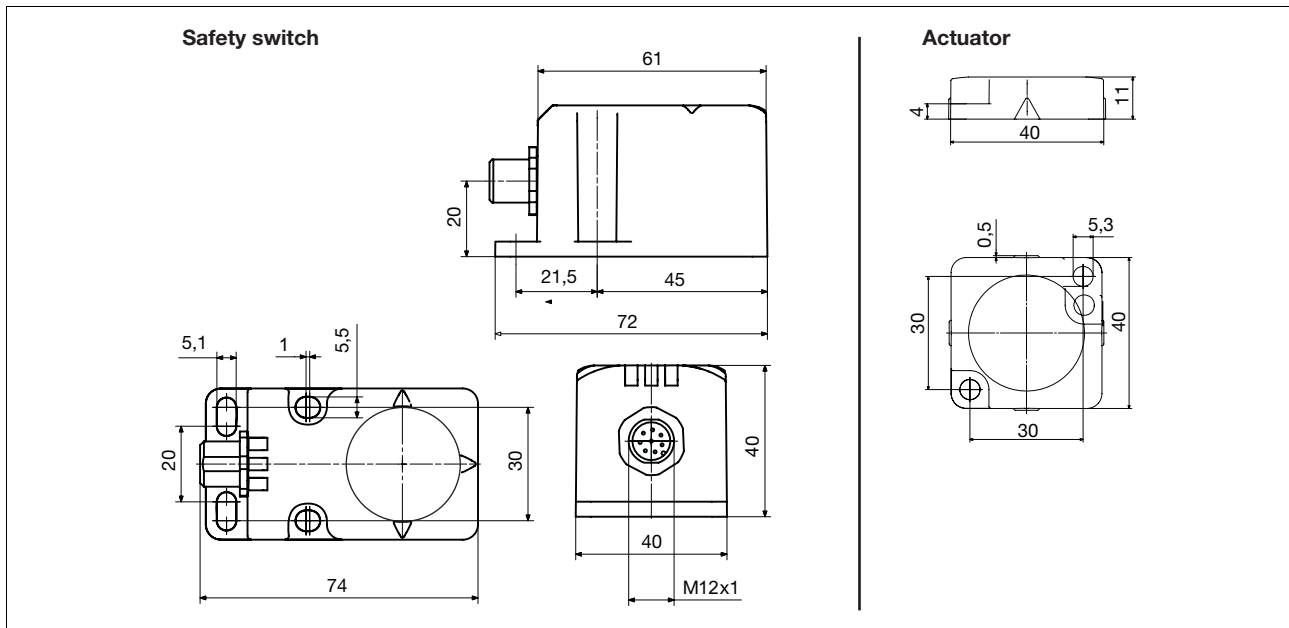
- ▶ Do not expose to heavy shock or vibration
- ▶ Do not use as a limit stop

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN cs2.1**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions

Left: Safety switch dimensions / right: Actuator dimensions



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSENcode

PSEN cs2.1p

Technical details	
Switching distances	
Assured operating distance S_{ao}	15 mm
Typical switching distance S_o	21.0 mm
Release distance S_r	32 mm
Assured release distance S_{ar}	40 mm
Hysteresis typ.	3 mm
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C
Supply voltage U_B DC	24 V
Voltage tolerance	-20 %/+20 %
Power consumption at U_B DC	2.0 W
Max. inrush current at U_B	0.12 A
Switching current per output	500 mA
Breaking capacity per output	12 W
Max. switch frequency	3 Hz
Number of output contacts	
Safety outputs	2
Signal outputs	1
Supply interruption before deenergisation	20.0 ms
Switch-on delay	
after applying U_B	1 s
Input typ.	13 ms
Input max.	20 ms
Actuator typ.	45 ms
Actuator max.	100 ms
Delay-on de-energisation	
Input typ.	15 ms
Input max.	20 ms
	30 ms
	260 ms
Test pulses, safety outputs	300 µs
Simultaneity, channel 1 and 2	∞
Max. overall cable resistance R_{lmax} in the input circuit	1000 Ohm
Max. line capacitance at the safety outputs	
No-load, PNOZ with relay contacts	40 nF
PNOZmulti, PNOZelog, PSS .	70 nF
Actuator	PSEN cs2,1
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M12
Cable	LiYY 8 x 0,25 mm ²
Protection type	IP67
Housing material	PBT

PSENcode

PSEN cs2.1p

Technical details

Dimensions

Safety switch

Height	75.0 mm
Width	40.0 mm
Depth	40.0 mm

Actuator

Height	11 mm
Width	40 mm
Depth	40 mm

Weight

Safety switch	125 g
Actuator	20 g

The standards current on **2007-02** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN cs2.1p	1/1	Transponder technology	Safety switch/actuator	540 100
PSEN cs2.1p (switch)	1	Transponder technology	Safety switch	540 150
PSEN cs2.1	1	Transponder technology	Actuator	540 180



PSENcode

PSEN cs2.2p



Coded safety switch for monitoring the position of movable guards in accordance with EN 60947-5-3

Approvals

	PSEN cs2.2p
	◆
	◆

Unit 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.
- ▶ Assured operating distance: 15 mm
- ▶ Typical operating distance: 21 mm
- ▶ Release distance: 32 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 for:
 - Status, actuator
 - Status, inputs
 - Supply voltage/fault
- ▶ 5 actuation directions
- ▶ Switching voltage 24 VDC

Unit description

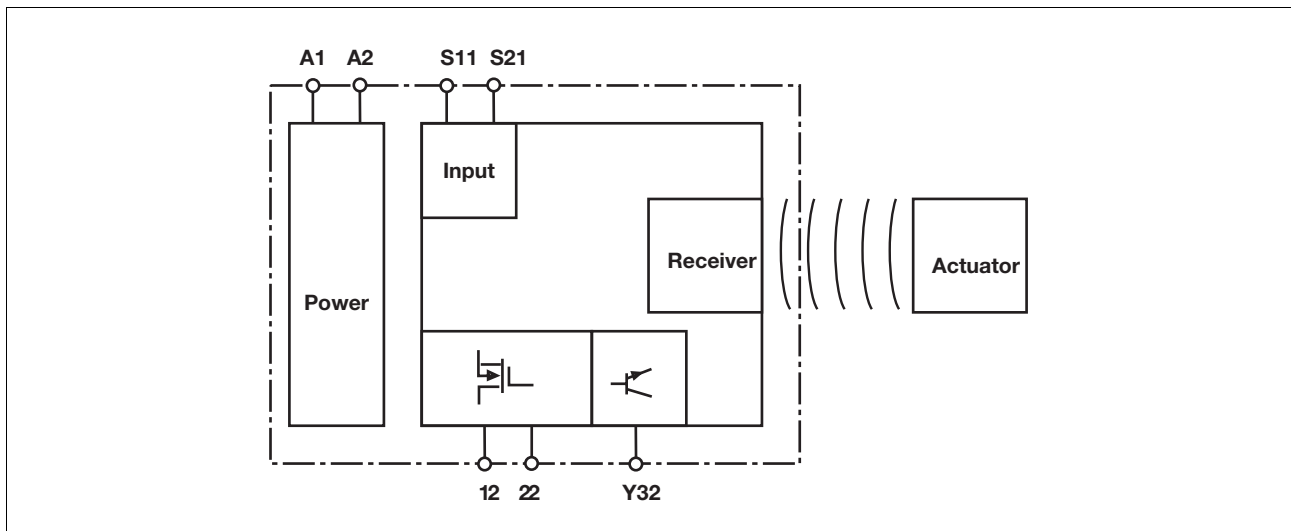
The safety switch meets the requirements of EN 60204-1 and IEC 60204-1.

The safety switch only complies with EN 60947-5-3 in conjunction with the actuator **PSEN cs2,1** and its approved evaluation devices.

The safety switch should only be connected to the evaluation devices listed under "Connections".

2.3

Block diagram



PSENcode

PSEN cs2.2p

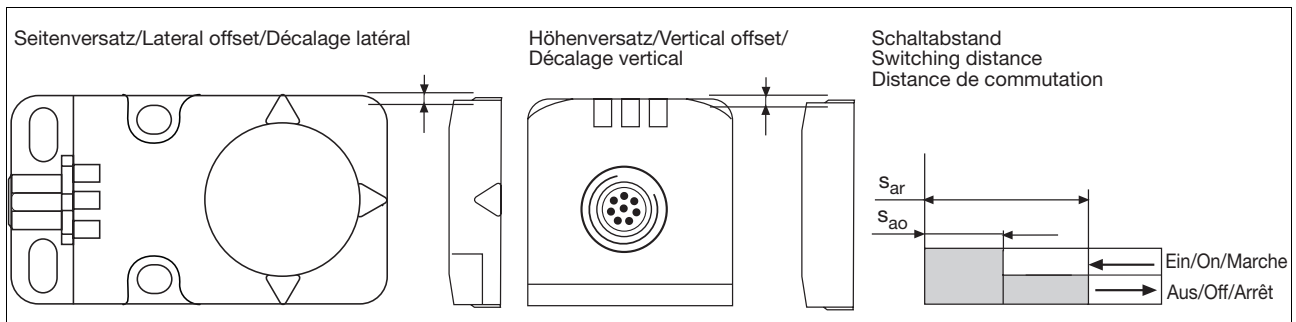
Function description

- ▶ If the 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 conduct.

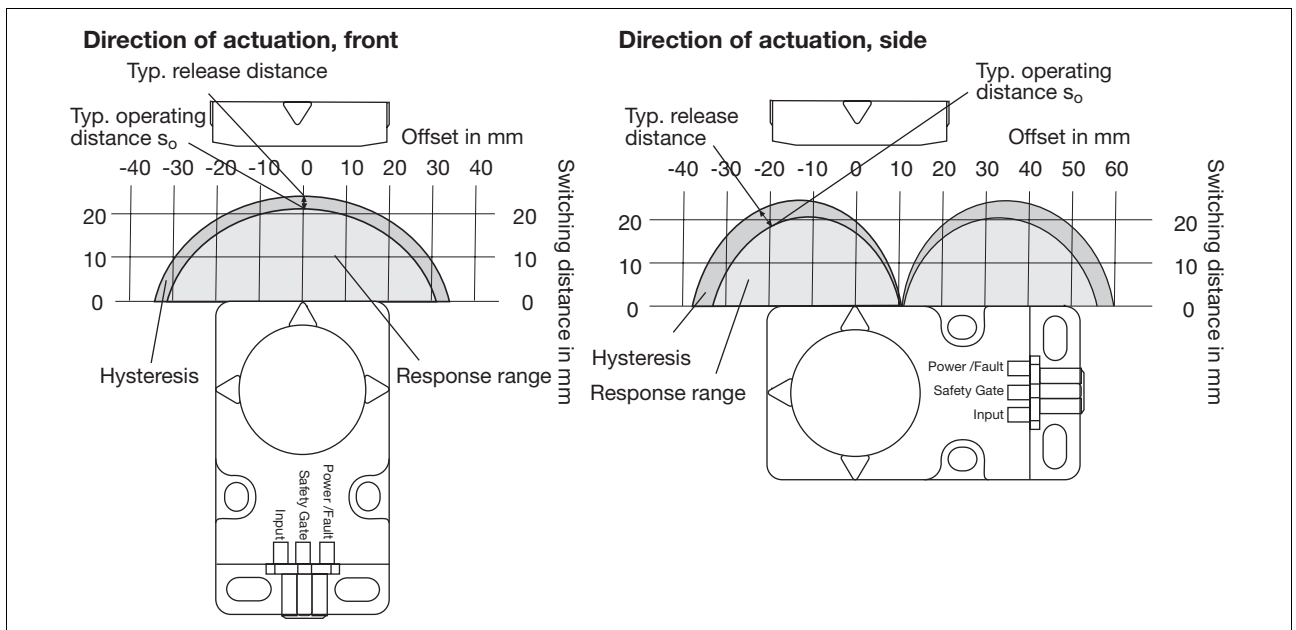
- ▶ If the actuator is not within the response range (open safety gate) or the input circuits are not closed, safety contacts 12 and 22 and signal output Y32 are blocked.
- ▶ If the shutdown occurs via the inputs, reactivation of the outputs is

only possible after both safety inputs have been locked simultaneously (partial operation lock).

Operating distances

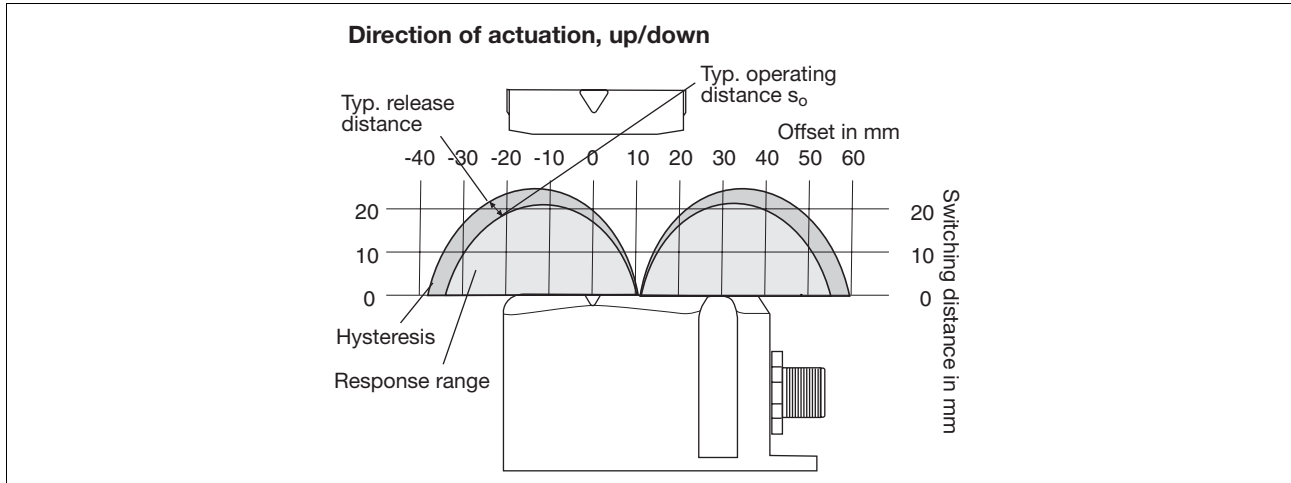


Lateral and vertical offset



PSENcode

PSEN cs2.2p



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

Wiring

Please note:

- Information given in the "Technical details" must be followed.

- Calculation of the max. cable runs l_{max} in the input circuit:
 R_{lmax} = max. overall cable resistance (see Technical details)

R_l / km = cable resistance/km
 (See example in the chapter entitled "Wiring".)

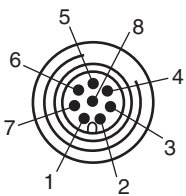
2.3

Connections

Terminal assignment

NOTICE

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

Assignment of the 8-pin M12 male connector		PIN	Function	Terminal designation	Cable colour
	1:	Input, channel 2			White
	2:	+24 U_B		S21	Brown
	3:	Output, channel1		A1	Green
	4:	Output, channel2		12	Yellow
	5:	Auxiliary output		22	Grey
	6:	Input, channel 1		Y32	Pink
	7:	0 V U_B		S11	Blue
	8:	Not connected		A2	Red

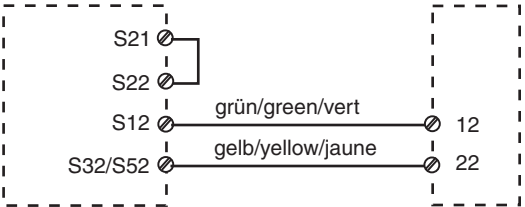
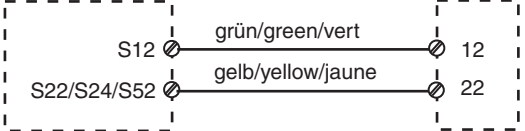


Connection to evaluation devices

The safety switches can be connected with all permitted positive switching dual-channel evaluation devices without detection of shorts.


The connection to the permitted Pilz evaluation devices is described in the following section.

PSENcode PSEN cs2.2p

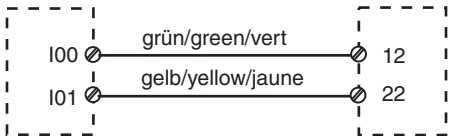
- ▶ Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

<p>PNOZ X2.7P, PNOZ X2.8P PNOZ X3P, PSEN 3.10P PNOZ X4 PNOZ XV1P PNOZ XV3P, PNOZ XV3.1P PNOZ X8P PNOZ X9, PNOZ X9P PNOZ p1p PNOZ p1vp</p>	
<p>PNOZ X2.9P PNOZ X5, PNOZ X6 PNOZ e1P, PNOZ e1.1p, PNOZ e1vp PNOZ e5.11p, PNOZ e5.13p PNOZ e6.1p, PNOZ e6vp PNOZ s3, PNOZ s4, PNOZ s5</p>	
<p>PNOZ X10.1P PNOZ X10.11P</p>	
<p>PMUT X1P</p>	

- ▶ Connection to PNOZmulti

<p>All PNOZmulti</p>	
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- ▶ Connection to PSS with and without SafetyBUS p

<p>All PSS</p>	
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CAUTION!

The safety switches may only be operated on a PSS in conjunction with standard function block SB064 or SB066.

PSENcode PSEN cs2.2p

Installation

- ▶ The unit can be installed in any position. However, safety switches and actuators must be positioned opposite each other in parallel:
- ▶ If you install safety switches and actuators in the vicinity of electrically or magnetically conductive material, check the operating distances, as changes to the typical values can be expected (for a typical installation with operating distances, see the section entitled "Installation").

CAUTION!

If you install the safety switch non-flush within electrically or magnetically

conductive material, the value for the assured release distance s_{ar} can also change.

- ▶ 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.

Safety switch and actuator

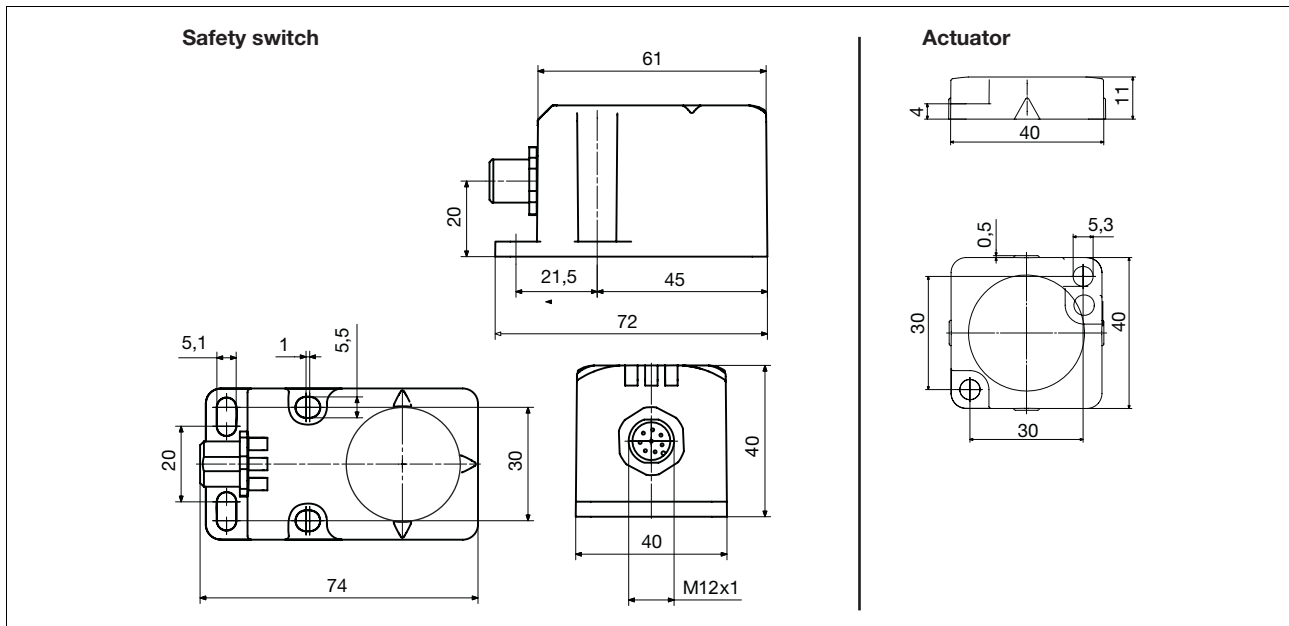
- ▶ Do not expose to heavy shock or vibration
- ▶ Do not use as a limit stop

Adjustment

- ▶ The safety switch may only be used with the corresponding actuator **PSEN cs2,1**.
- ▶ Always test the function with one of the approved evaluation devices.
- ▶ The stated operating 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. Note the maximum permitted lateral and vertical offset (see "Operating distances" and "Max. lateral and vertical offset").

Dimensions

Left: Safety switch dimensions / right: Actuator dimensions



NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSENcode

PSEN cs2.2p

Technical details	
Switching distances	
Assured operating distance S_{ao}	15 mm
Typical switching distance S_o	21.0 mm
Release distance S_r	32 mm
Assured release distance S_{ar}	40 mm
Hysteresis typ.	3 mm
Change of switching distance with fluctuations in temperature	+/-0.01mm/°C
Supply voltage U_B DC	24 V
Voltage tolerance	-20 %/+20 %
Power consumption at U_B DC	2.0 W
Max. inrush current at U_B	0.12 A
Switching current per output	500 mA
Breaking capacity per output	12 W
Max. switch frequency	3 Hz
Number of output contacts	
Safety outputs	2
Signal outputs	1
Supply interruption before deenergisation	20.0 ms
Switch-on delay	
after applying U_B	1 s
Input typ.	13 ms
Input max.	20 ms
Actuator typ.	45 ms
Actuator max.	100 ms
Delay-on de-energisation	
Input typ.	15 ms
Input max.	20 ms
	30 ms
	260 ms
Test pulses, safety outputs	300 µs
Simultaneity, channel 1 and 2	∞
Max. overall cable resistance R_{lmax} in the input circuit	1000 Ohm
Max. line capacitance at the safety outputs	
No-load, PNOZ with relay contacts	40 nF
PNOZmulti, PNOZelog, PSS .	70 nF
Actuator	PSEN cs2,1
Ambient temperature	-25 - 70 °C
Vibration to EN 60947-5-2	
Frequency	10 - 55 Hz
Amplitude	1.00 mm
Shock stress	30 g , 11 ms
Connection type	M12
Cable	LiYY 8 x 0,25 mm ²
Protection type	IP67
Housing material	PBT

PSENcode

PSEN cs2.2p

Technical details

Dimensions

Safety switch

Height **75.0 mm**

Width **40.0 mm**

Depth **40.0 mm**

Actuator

Height **11 mm**

Width **40 mm**

Depth **40 mm**

Weight

Safety switch **125 g**

Actuator **20 g**

The standards current on **2007-02** apply.

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN cs2.2p	1/1	Transponder technology	Safety switch/actuator	540 200
PSEN cs2.1	1	Transponder technology	Actuator	540 180

PSENcode

PSEN cs2.2p

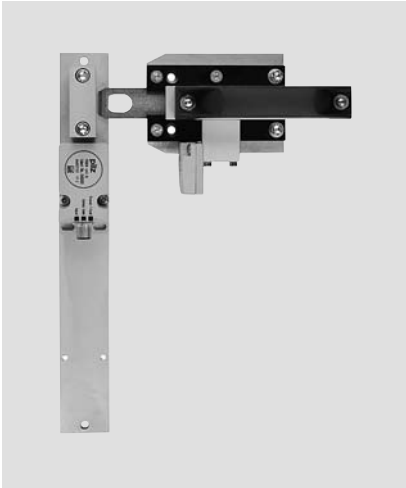
PSENbolt

PSENbolt

Contents	Page
PSENbolt	
PSEN b1	2.4-2

PSENbolt

PSEN b1



Bolt for mechanical guard locking on movable protective devices in accordance with EN ISO 12100-2 and EN 1008 in conjunction with the safety switches PSENmech or PSENcode.

Approvals

Unit features

The bolt can only be used as an interlock in conjunction with a safety switch of type PSENcode or PSENmech.

- ▶ The bolt can be used with the following safety switches:

PSENcode

Non-contact magnetic coded safety switch

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

PSENmech

Mechanical safety switch with separate actuator and guard locking device

- ▶ PSEN me1

Unit description

The bolt is used for mechanical guard locking in accordance with EN ISO 12100-2 and EN 1008. It is designed for use as an interlock in conjunction with a PSENcode or PSENmech safety switch.

- ▶ The bolt may **not** be used on its own as a safety component to avoid hazardous plant or machine statuses.
- ▶ The bolt is suitable for right and left hinged gates.
- ▶ A padlock may also be installed on the bolt slot in order to prevent unauthorised opening and closing of the bolt.
- ▶ The bolt is suitable for installing on standard aluminium profiles and machine enclosures.

The bolt consists of

- ▶ a gate plate including bolt and handle, which is attached to the safety gate and
- ▶ a frame plate, which is attached to the safety gate frame

Function description

The PSENcode or PSENmech type actuator is installed on the gate plate using an adapter; the corresponding safety switch is installed on the frame plate. If the operator opens the safety gate, the safety switch is actuated simultaneously.

PSENbolt PSEN b1

Installation

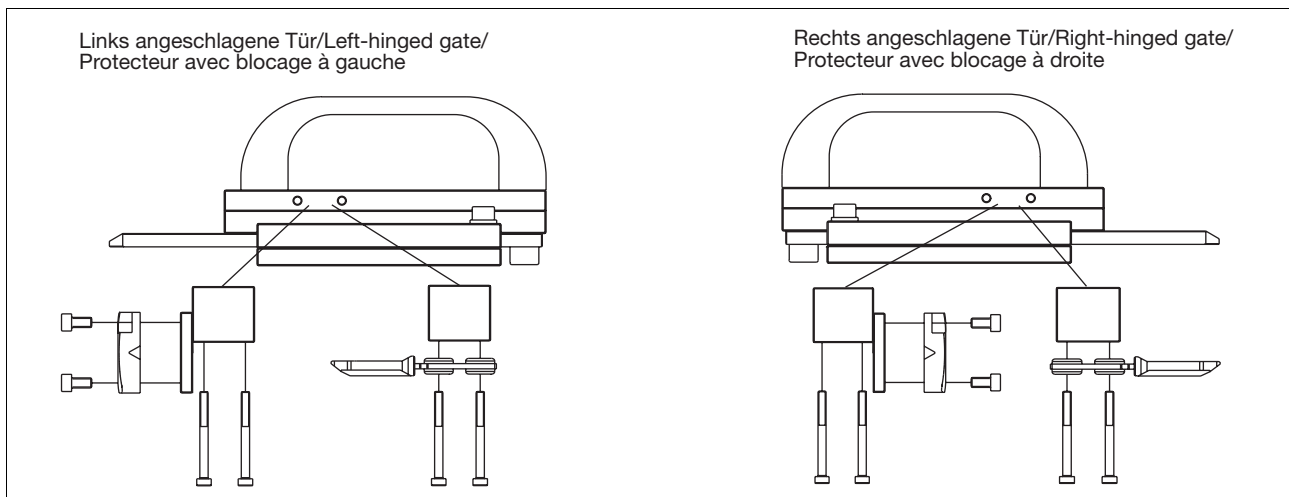
CAUTION!

Do not install the bolt until you have read and understood the operating instructions for the safety switches

PSENcode or PSENmech! Pay particular attention to the information on operating distances and installation. The technical details must be adhered to.

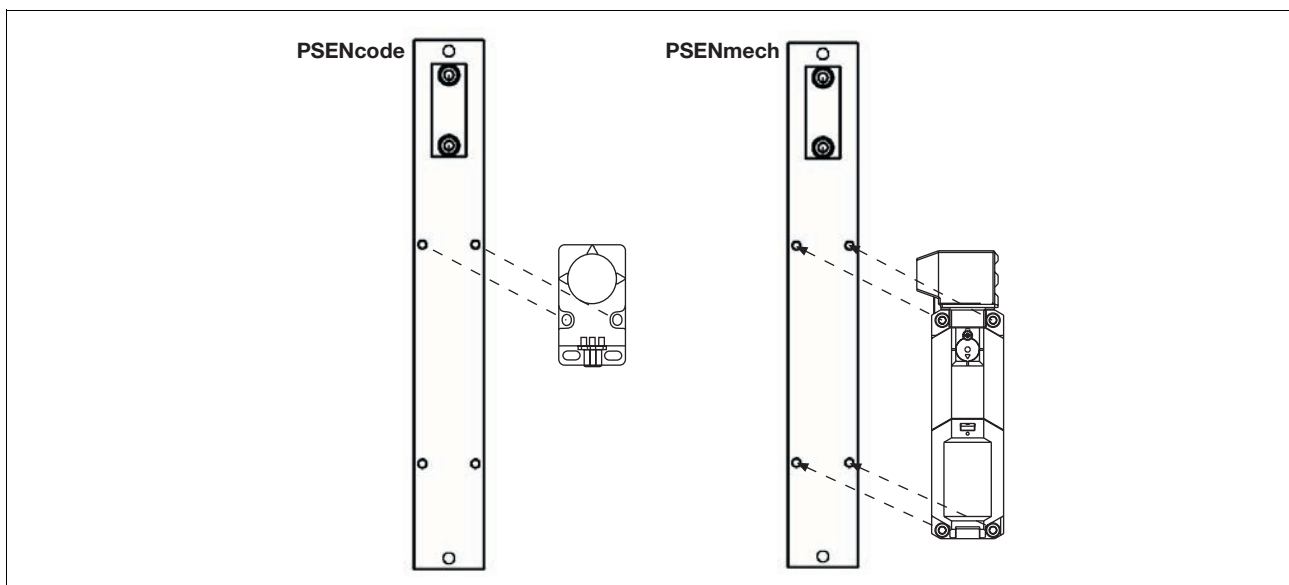
Installing the actuator

- ▶ Install the actuator on to the adapter.
- ▶ Install the adapter on to the actuator using the two M4 screws on the gate plate.



Installing the safety switch

Install the safety switch using the screws (M6) on the frame plate.



INFORMATION

Please note the following when installing the PSENmech safety switch:
The actuator should be aligned for a

left or right hinged gate prior to installation!

PSEnbolt

PSEN b1

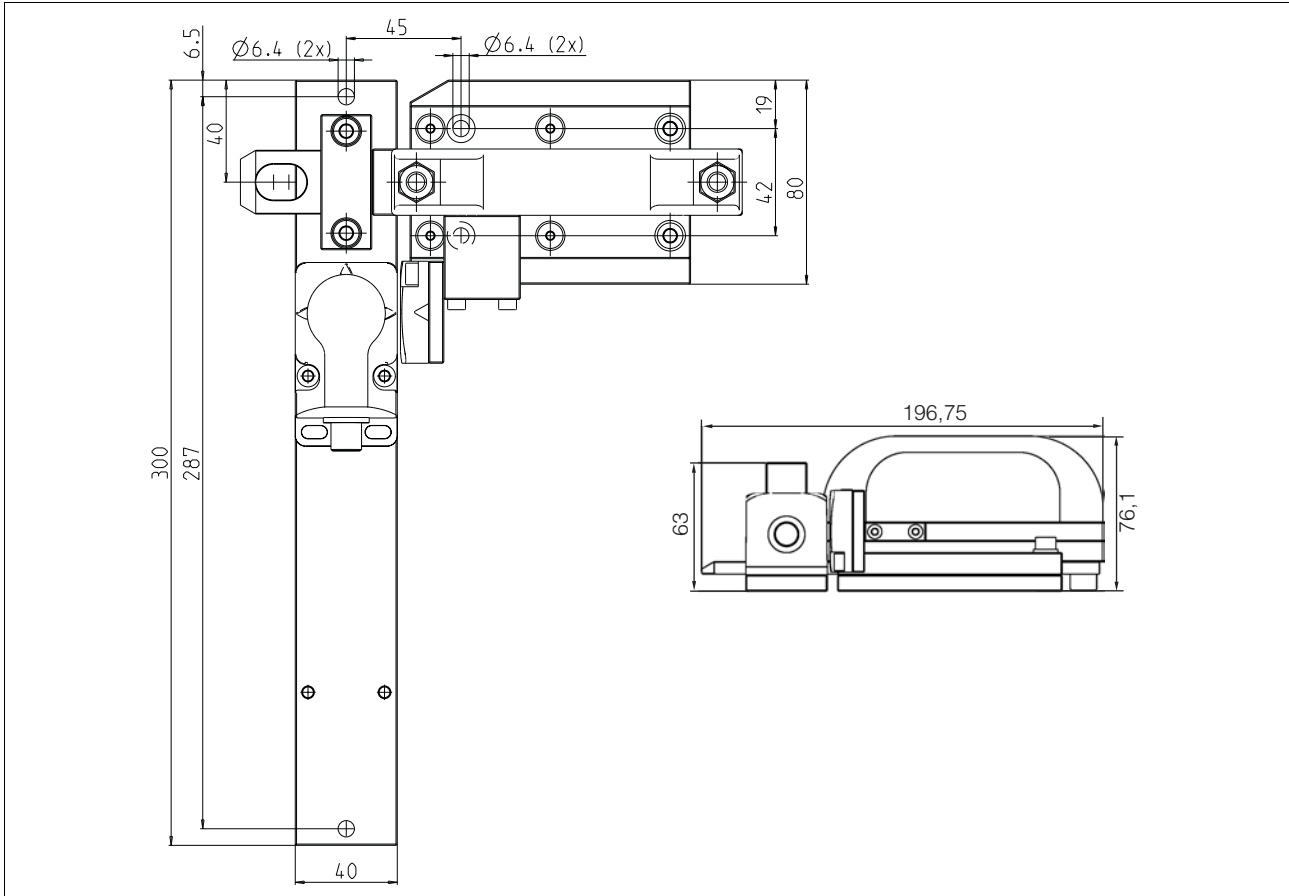
Installing the gate plate and frame plate

INFORMATION

Installation is only possible when the bolt is open!
During installation make sure that:

- ▶ The installation surface on the gate and gate frame is flat.
- ▶ The gate plate and frame plate are installed level with the top edge.

Dimensions



2.4

Technical details

Material	Aluminium, galvanised steel, plastic
Dimensions L x W x H	300 x 196 x 76.1 mm
Weight	1220 g

Order reference

Type	Quantity	Operation	Features	Order no.
PSEN b1	1	Mechanical	Bolt	540 010

PSENbolt
PSEN b1

Contents	Page
Applications	
Safety assessments	3.0-2
Safety gate and E-STOP, Category 4, EN 954-1	3.0-3
Override safety gate with enable switch, Category 4, EN 954-1	3.0-7
Machine hoods with 2 x 3 safety switches, Category 3, EN 954-1	3.0-13

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 1997-08).

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.

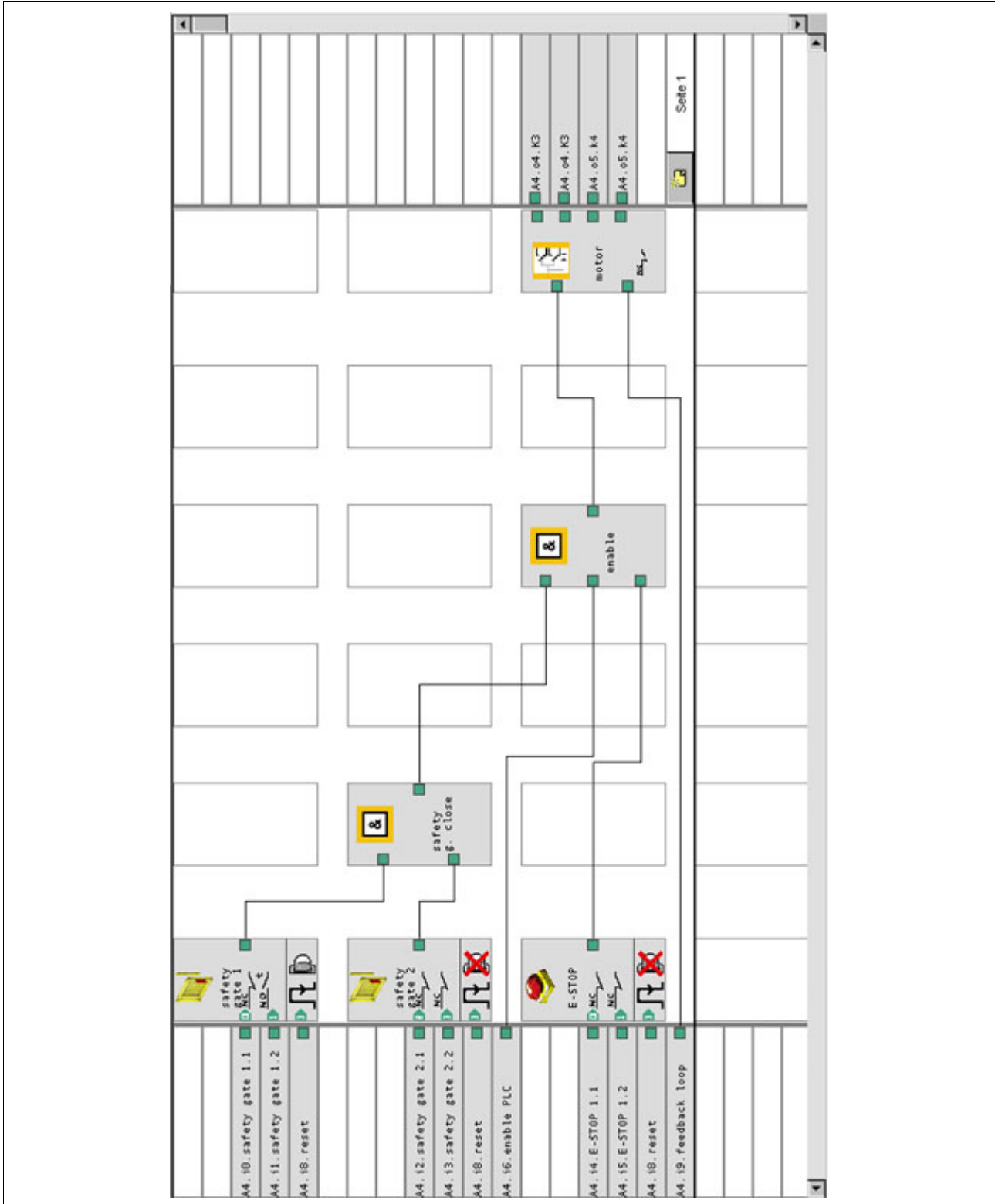
Pilz units

Number	Type	Features	Order no.
1	PNOZ m1p	24 VDC	773 100
1	PSEN 2.1p-10/PSEN 2.1-10		502 210

Configuration

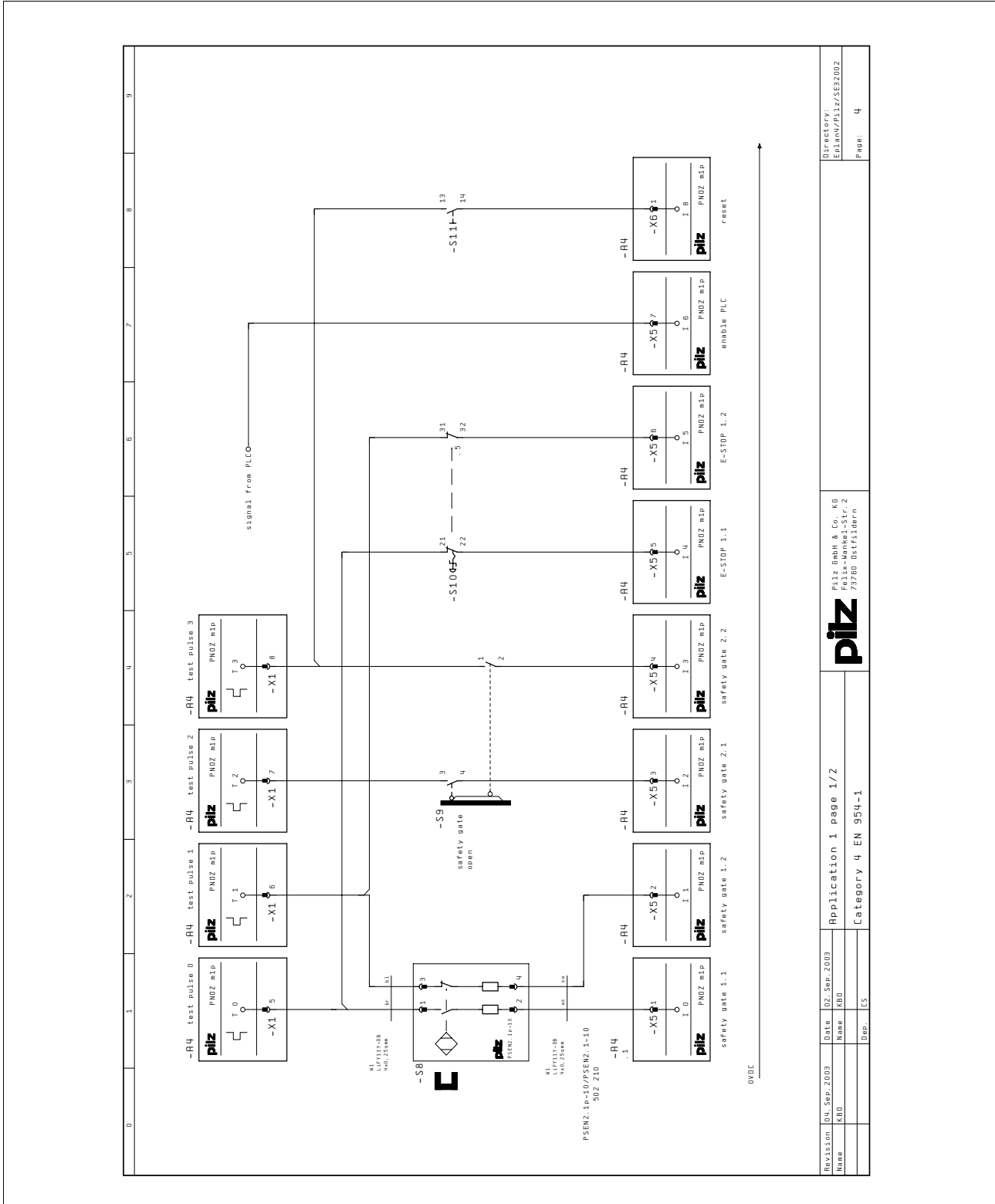
- ▶ Safety gate 1
 - Switch type 2 with simultaneity monitoring (N/C - N/O)
 - Detection of shorts between contacts (A4.i0 - test pulse 0, A4.i1 - test pulse 1)
 - Monitored reset (A4.i8 - test pulse 3)
 - Start-up test
- ▶ Safety gate 2
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (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

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

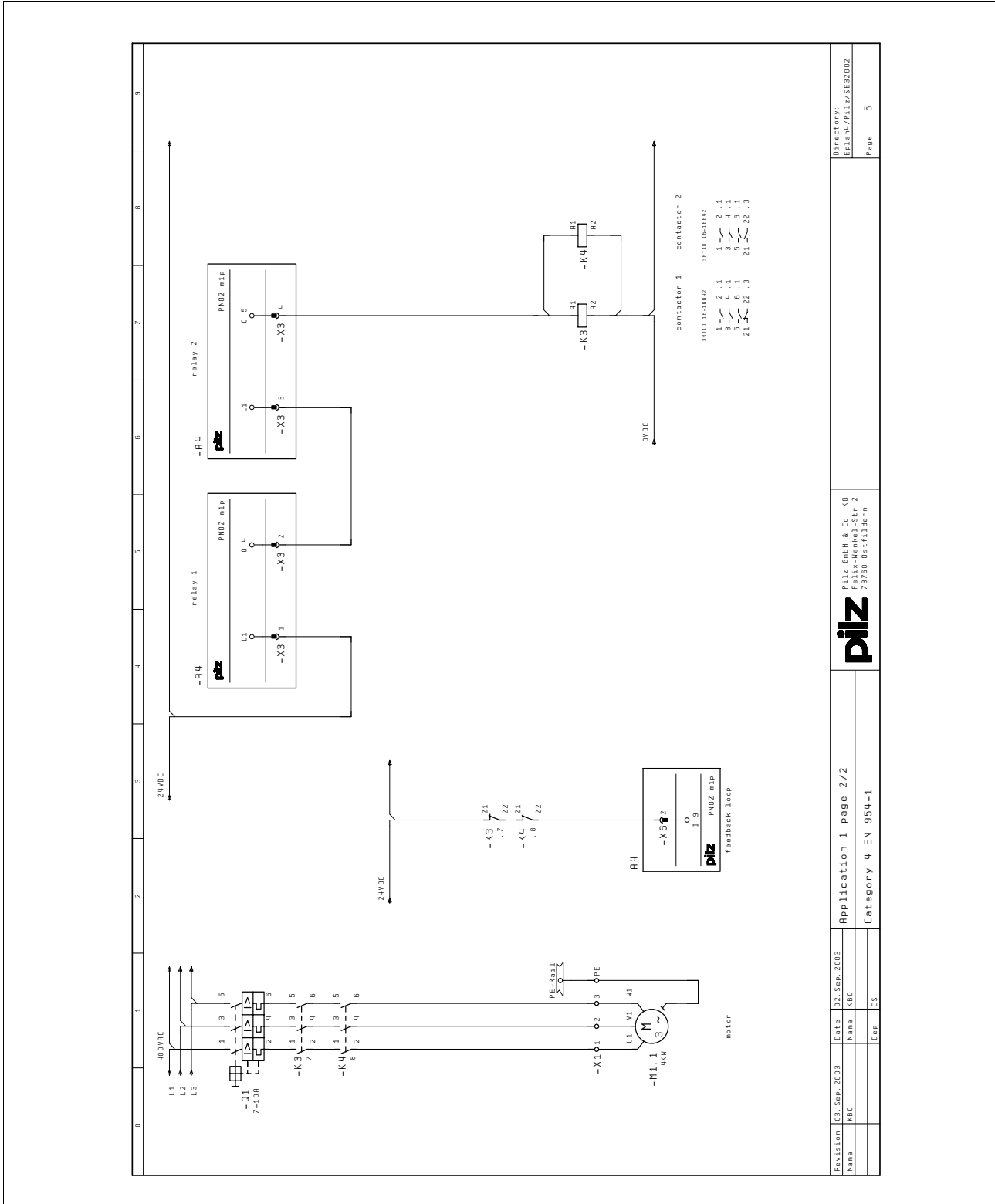


3.0

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



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



Revision	03_Sep_2003	Date	02_Sep_2003	Application 1	page 2/2	Pilz GmbH & Co. KG Friedrichstr. 2 73760 Ostfildern	Directory: Eplan/Pilz/SE32/02
Name	KEB	Name	KEB	Category 4	EN 954-1		Page: 5
Dep.	CS	Dep.	CS				

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

Features

- ▶ 1 E-STOP button
- ▶ 1 safety gate with safety switch PSEN 2.1p-10
- ▶ 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.

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 pre-

vented 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

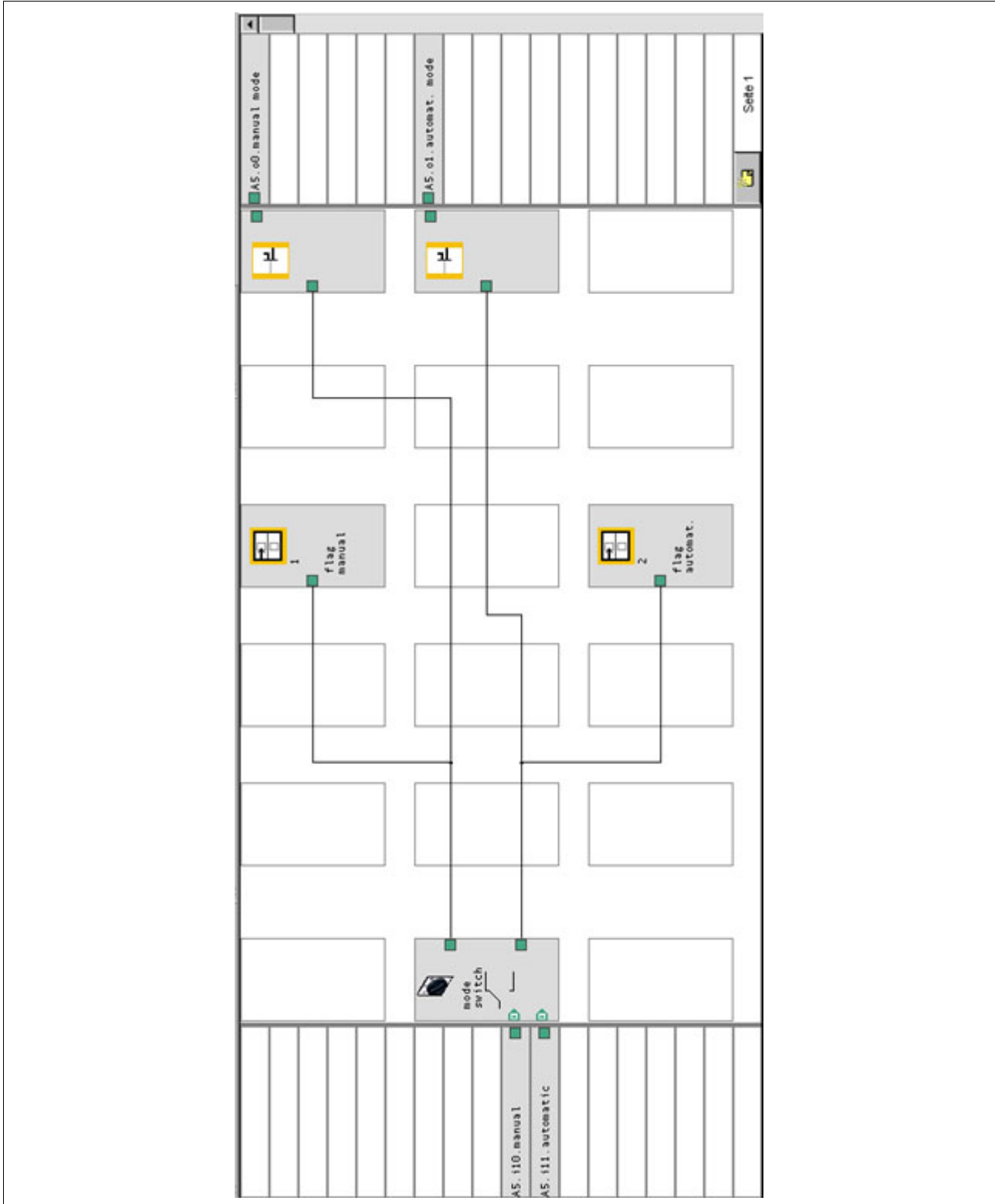
Number	Type	Features	Order no.
1	PNOZ m1p	24 VDC	773 100
1	PSEN 2.1p-10/PSEN 2.1-10		502 210

Configuration

- ▶ Operating mode selector switch
 - Switch type 9
 - Detection of shorts between contacts (A5.i10 - test pulse 0, A5.i11 - test pulse 0)
- ▶ 2 connection points
 - 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

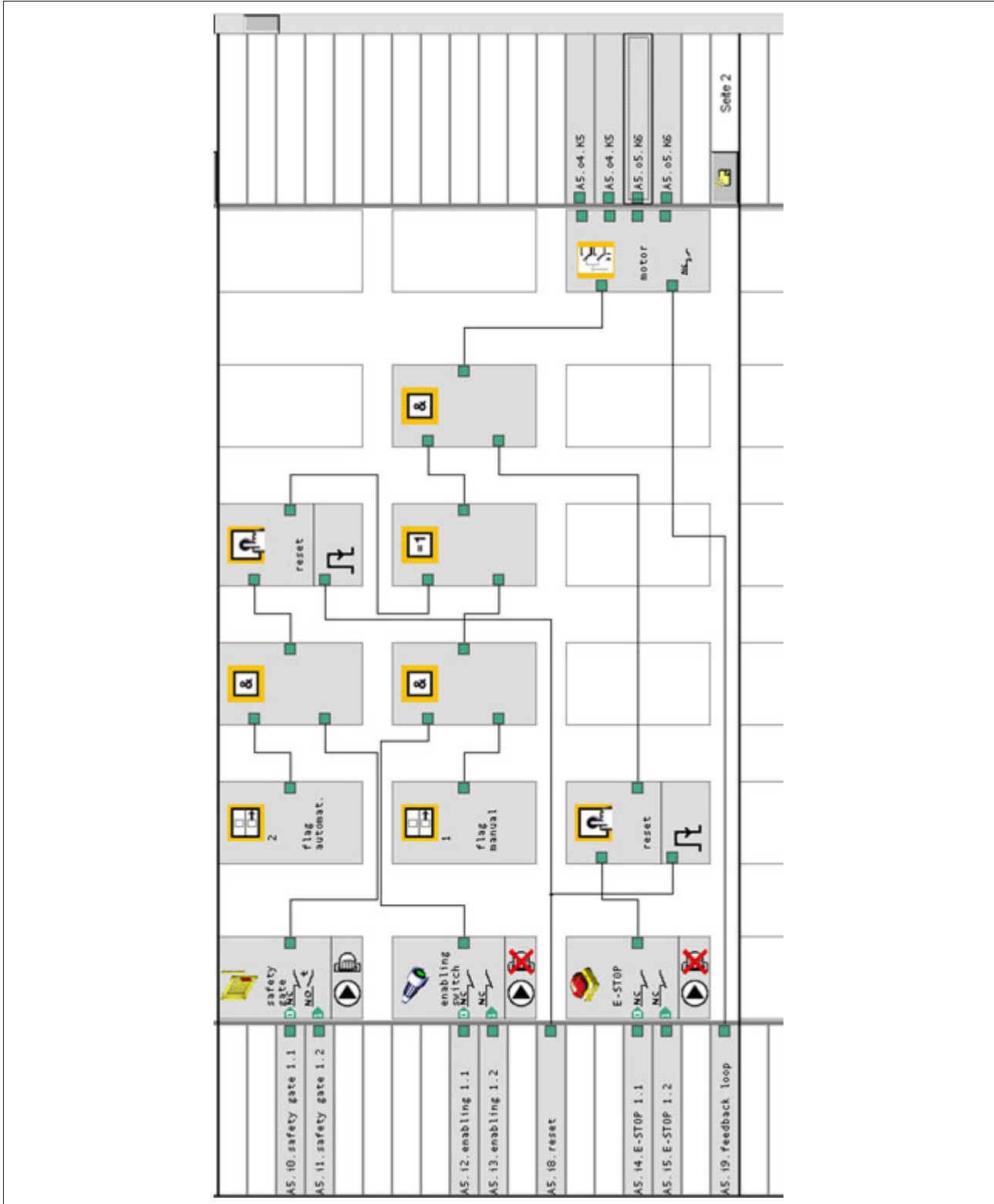
- ▶ Safety gate 1
 - Switch type 2 with simultaneity monitoring (N/C - N/O)
 - Detection of shorts between contacts (A5.i0 - test pulse 0, A5.i1 - test pulse 1)
 - Automatic reset
 - Start-up test
- ▶ Enable switch
 - Switch type 3 (2 N/C)
 - Detection of shorts between contacts (A5.i2 - test pulse 0, 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 points
 - 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

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

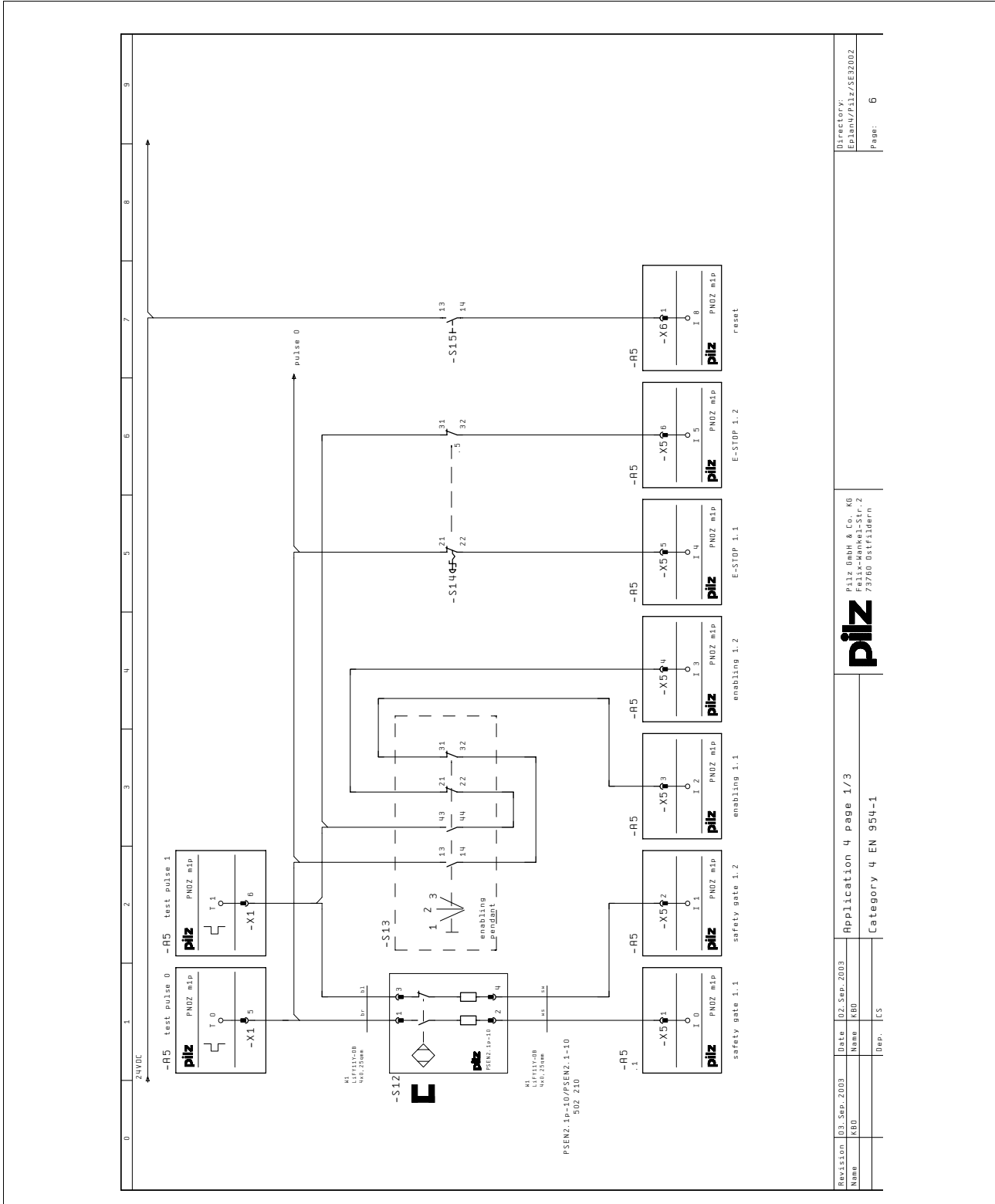


3.0

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



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



Directory:
Eplan/Pitz/SE3202
Page: 6

Pitz GmbH & Co. KG
Felix-Wankel-Str. 2
73700 Ostfildern

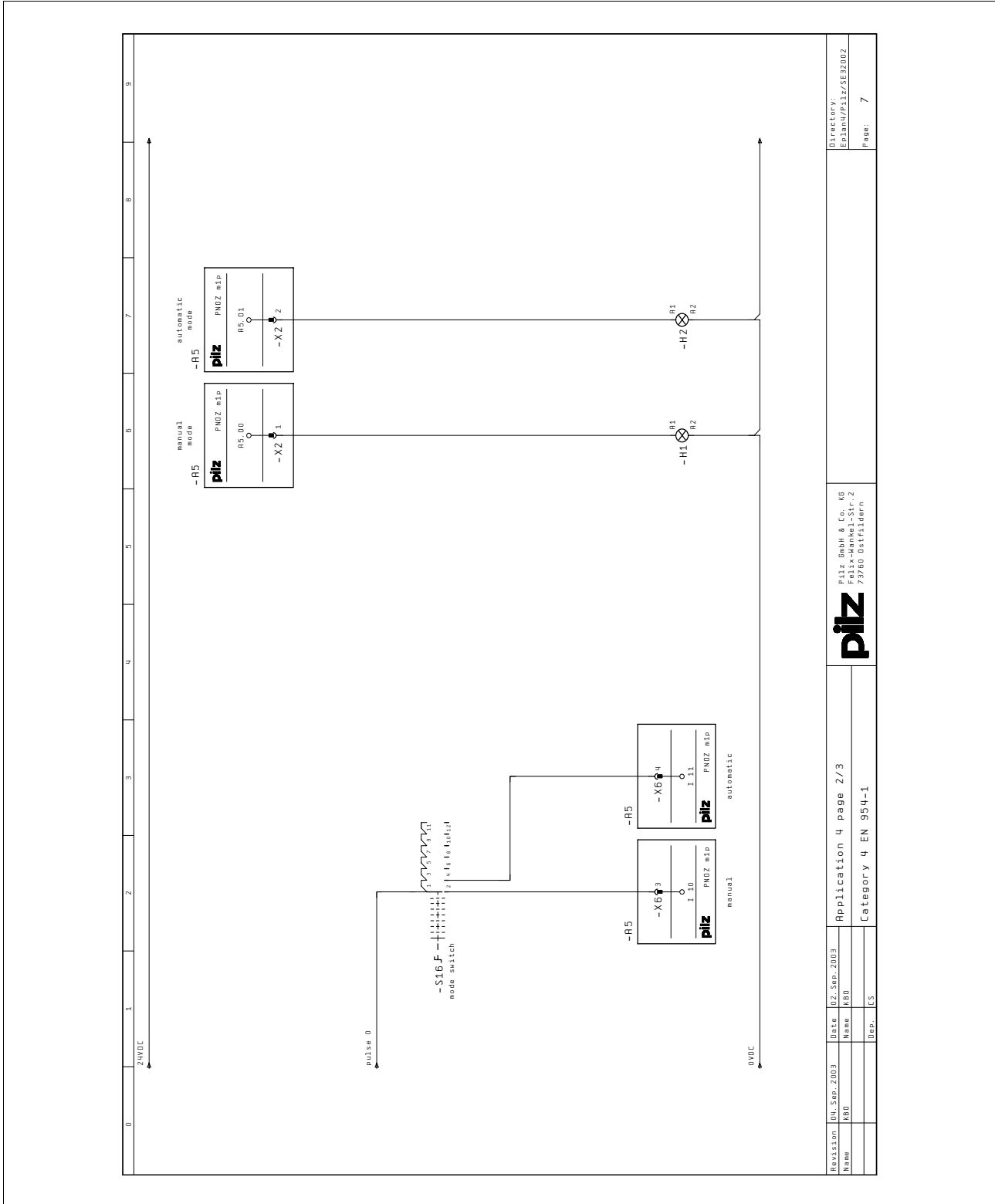


Application 4 page 1/3
Category 4 EN 954-1

Revision	Date
03. Sep. 2003	02. Sep. 2003
KBD	KBD
Dep.	CS

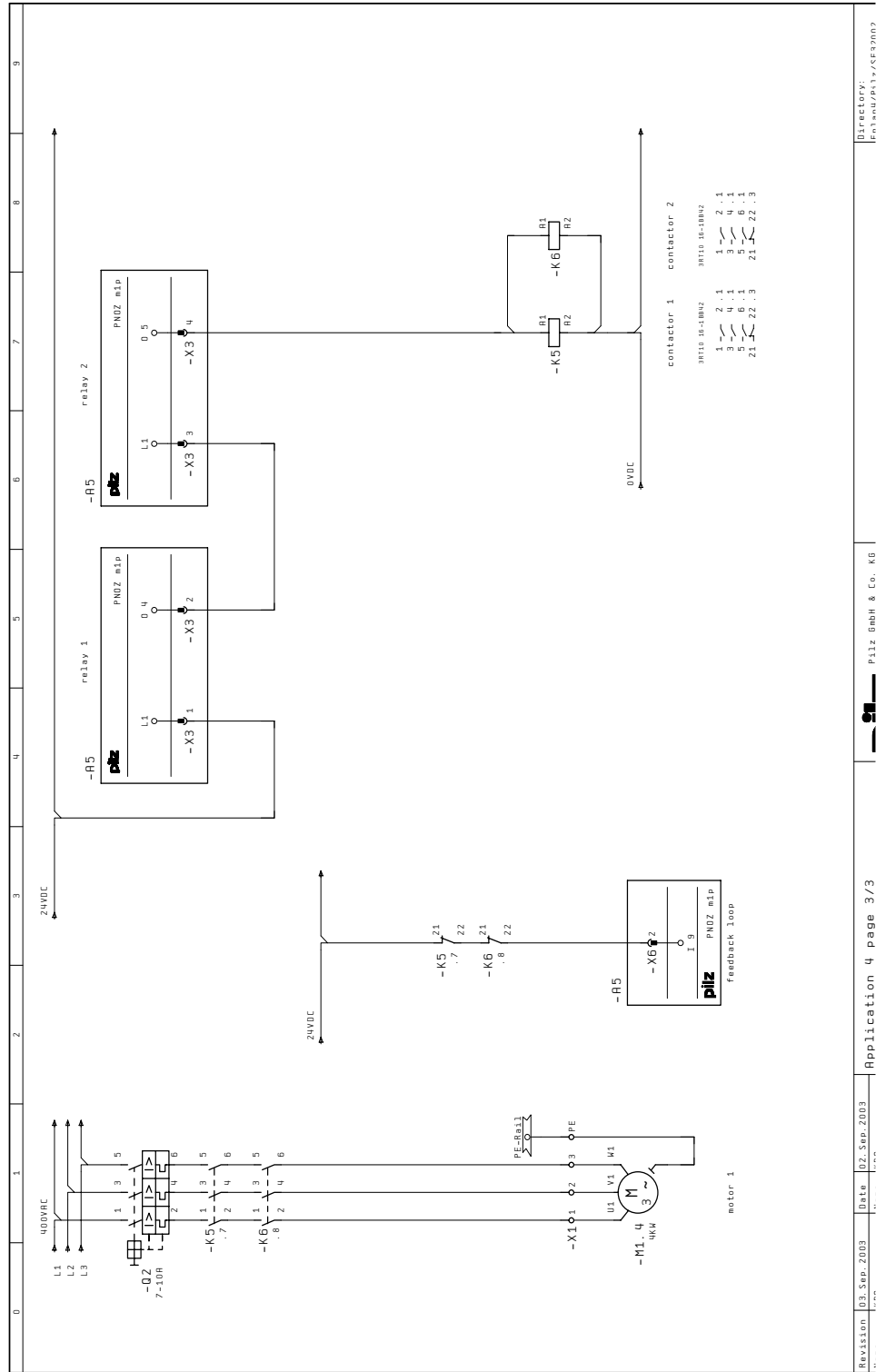
3.0

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



Revision	DL Sep. 2003	Date	02. Sep. 2003	Application 4 page 2/3	Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern	Directory: EP100/P11Z/SE2002
Name	KBD	Name	KBD	Category 4 EN 954-1	pilz	Page: 7
		Dep.	CS			

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



Directory:
[Path]/PILZ/SE/3002

Pilz GmbH & Co. KG

Application 4 page 3/3

Revision: 03.Sep.2003 Date: 02.Sep.2003

Machine hoods with 2 x 3 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 safety switches 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 in-

put 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 a 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).

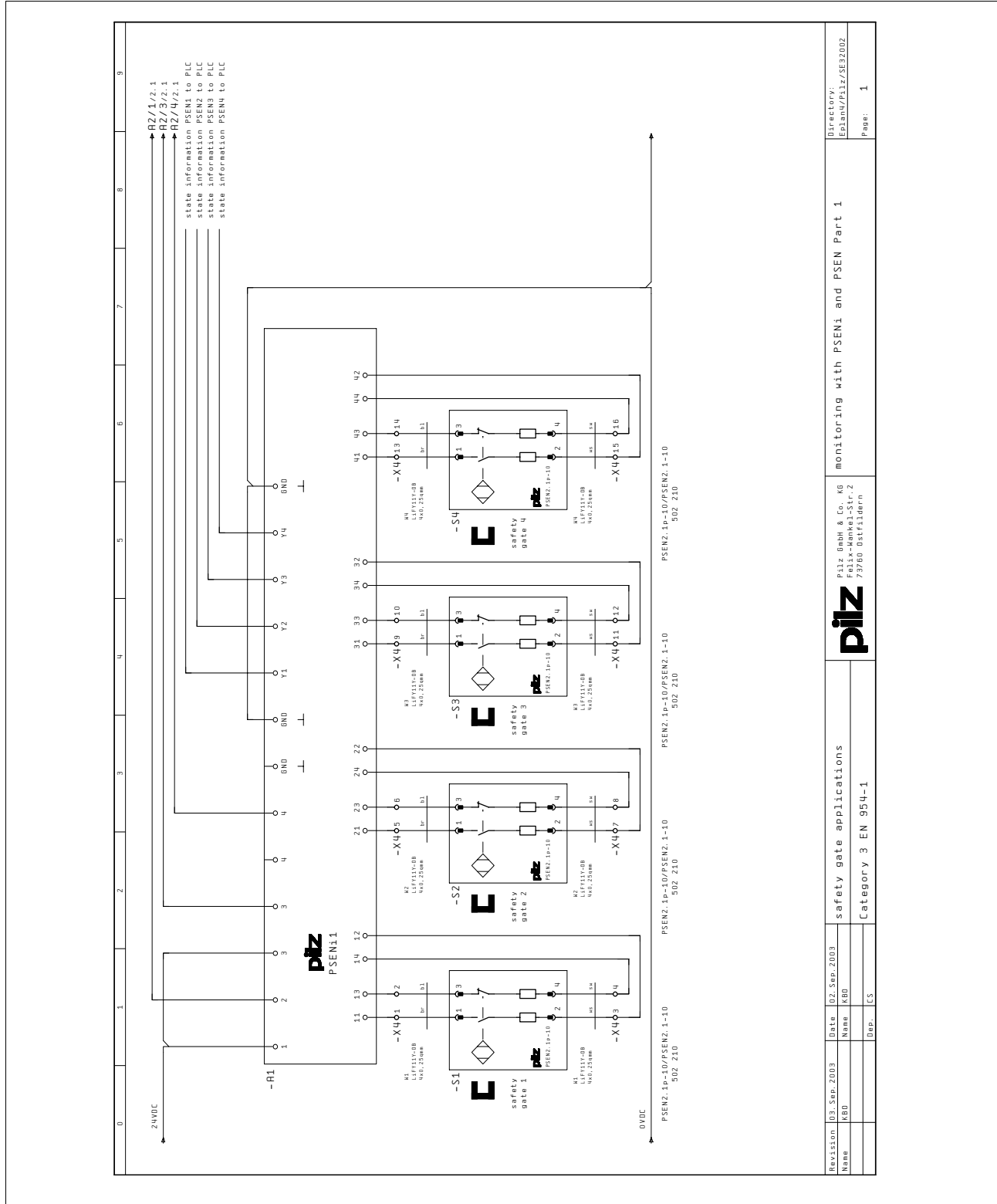
Safety assessment

- ▶ 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.
- ▶ 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 no.
1	PNOZ e3.1p	24 VDC	773 100
6	PSEN 2.1p-10/PSEN 2.1-10		502 210
2	PSEN i1		535 110

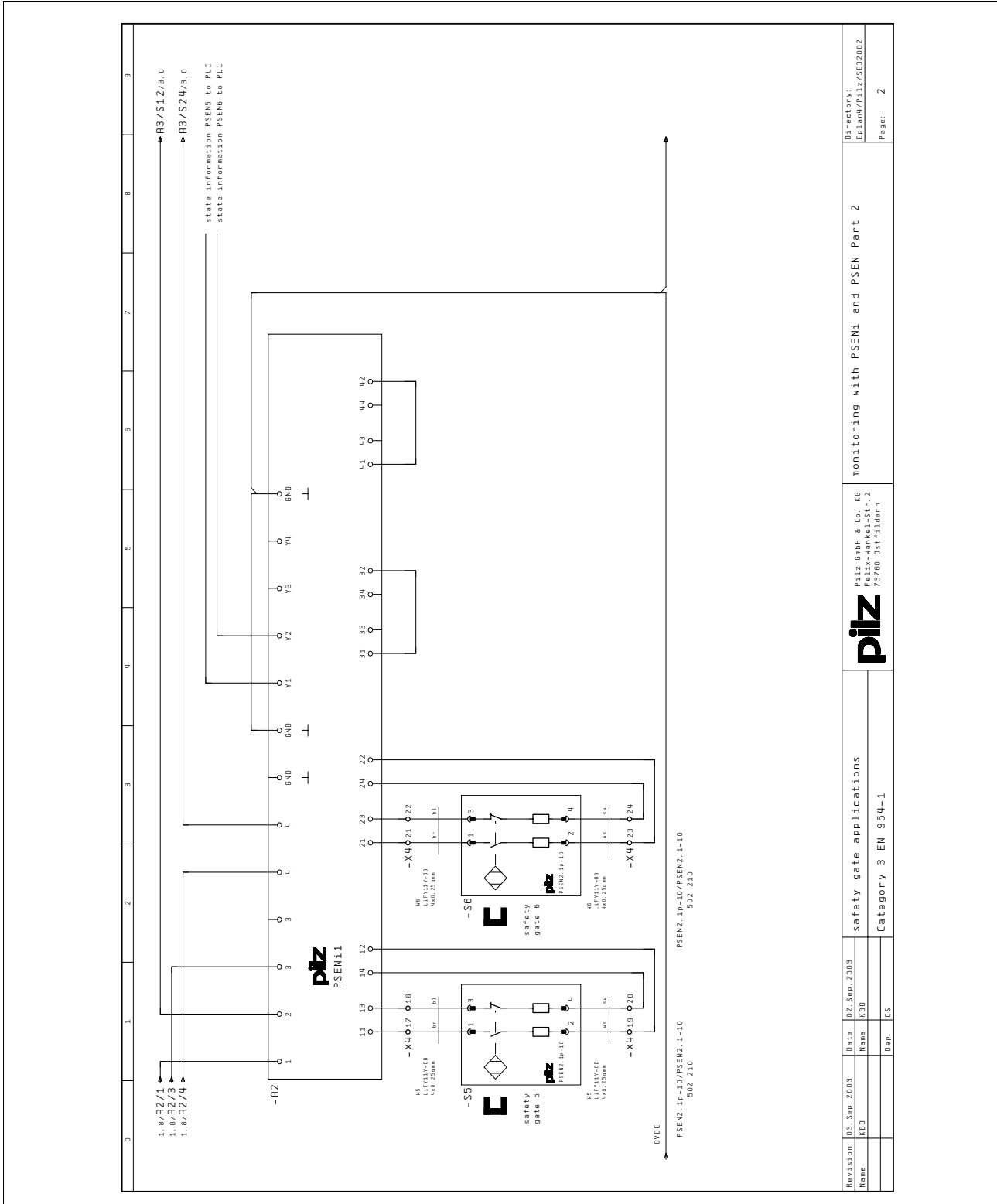
Machine hoods with 2 x 3 safety switches, Category 3, EN 954-1



Revision	02_Sep_2003	Date	02_Sep_2003	pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern		Directory: Epland/pilz/SE32002
Name	KBD	Name	KBD	monitoring with PSEN1 and PSEN Part 1		Page: 1
		Bar.	CS	Category 3 EN 954-1		

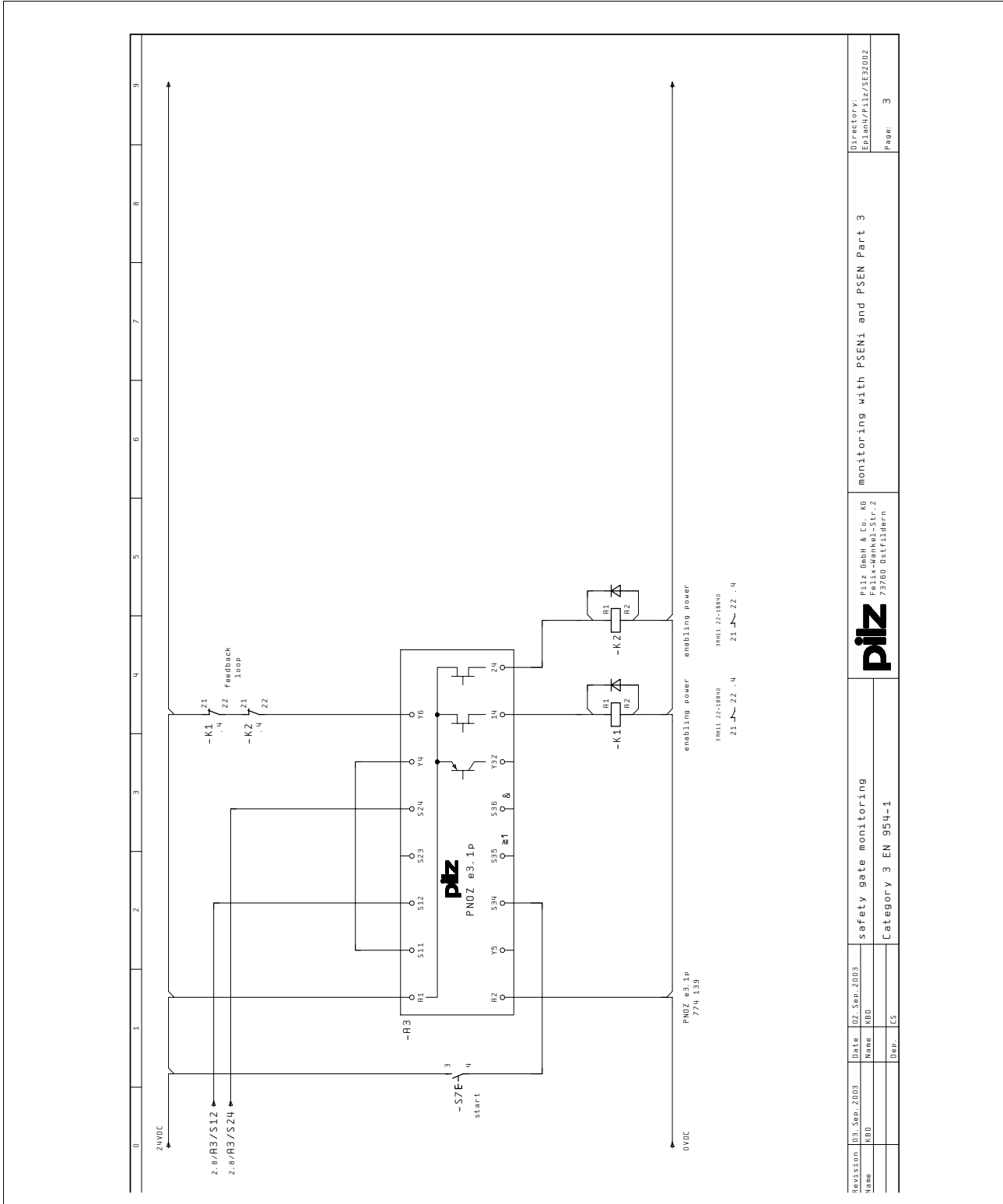
3.0

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



Revision	D31.Sep.2003	Date	02.Sep.2003	safety gate applications		pilz		monitoring with PSEni and PSEN Part 2		Directory:
Name	KBD	Name	KBD	Category 3 EN 954-1		pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern		Eplan/P11z/SE3202		Page:
		Dep.	CS	Category 3 EN 954-1		73760 Ostfildern		2		

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



3.0

Revision	03.Sep.2003	Date	02.Sep.2003	safety gate monitoring		Pilz GmbH & Co. KG Felix-Wankel-Str. 2 73760 Ostfildern		Directory: Eplan/Pilz/EE3202
Name	KBD	Name	KBD	Category 3 EN 954-1		monitoring with PSEN1 and PSEN Part 3		Page: 3
Dep.	CS	Dep.	CS					

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




Contents	Page
Accessories	
PSEN i1	4.0-2
PSEN ix1	4.0-9
Installation accessories PSENmag	4.0-18
Cable	4.0-20

PSEN i1



Interface for connecting and evaluating one or more safety switches or position switches on safety gate monitors or programmable safety and control systems.

Approvals

	PSEN i1
	◆
	◆
	◆

Unit features

- ▶ Ability to connect max. 4 safety switches from the PSEN 2 series or max. 4 position switches with N/C / N/O combination
- ▶ Status indicators for the switch status of the N/C circuits of the connected sensors
- ▶ 4 diagnostic outputs to display or evaluate the switch status of the N/C circuits via external LEDs or a PLC

Unit description

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)
 - ▶ PSS compact programmable safety and control systems
 - ▶ Modular PSS programmable safety and control systems with appropriate 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.

Function description

The PSEN i1 switches the 4 N/C circuits of the connected safety sensors/ position switches in parallel and the 4 N/O circuits in series. A status indicator lights when the N/O circuit is closed.

When using

- ▶ PNOZ e3.1p and PNOZ e3vp, a max. 12 safety switches/position switches can be connected by linking max. 3 PSEN i1 in series.
- ▶ A compact PSS programmable safety and control system, a modular PSS programmable safety and control system with centralised input module or a SafetyBUS p-compatible PSS with decentralised input module, a max. 6 safety switches/position switches can be connected by linking max. 2 PSEN i1 in series.

Preparing for operation

- ▶ Connect the supply voltage:
 - Terminal **A1** : +24 VDC
 - Terminal **A2**: 0 V
- ▶ Connect the units from the PNOZ X or PNOZpower series. Please refer to the operating manual for the relevant units.
- ▶ Connect the PSEN i1 to one of the named safety relays, as stated in the following table.
- ▶ Connect the safety switches/position switches to the PSEN i1.

NOTICE

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

When connecting more than 4 safety switches/position switches: Connect PNOZ i1 in series (see diagram: "Series connection of PSEN"). After the second PSEN i1, link Y8-Y9.

CAUTION!

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

PSEN i1

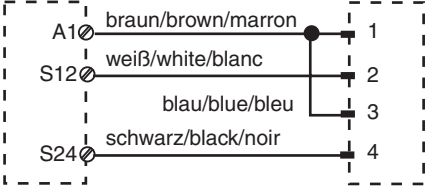
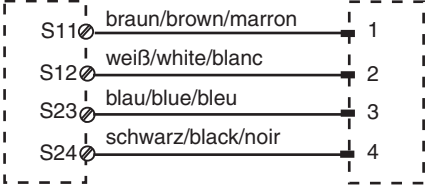
Connection to evaluation devices

- ▶ Establish the operating mode on the safety gate monitor (e.g. with/without detection of shorts across contacts) through the wiring of the input circuit.

Connection to PNOZelog

Connection to PNOZelog

- ▶ Connect the PSEN i1 to one of the named safety gate monitors.

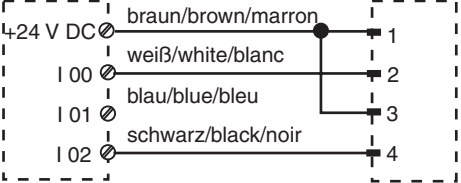
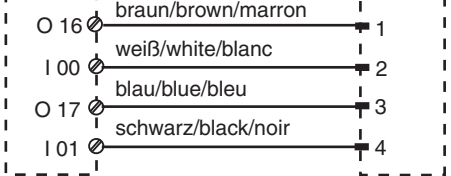
<p>ohne Querschlusserkennung/without detection of shorts across contacts/sans détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	
<p>mit Querschlusserkennung/with detection of shorts across contacts/avec détection des courts-circuits entre les canaux PNOZ e3.1p PNOZ e3vp 10 s PNOZ e3vp 300 s</p>	

Connection to PSS

- ▶ Connect the PSEN i1 to
 - the inputs (compact PSS)
 - the inputs on the centralised input module (modular PSS)

- the inputs on the decentralised input module (SafetyBUS p)
- ▶ Use the test pulse outputs to detect shorts across the contacts.

Connection to PSS with and without SafetyBUS p

<p>without detection of shorts across contacts Safety gate, Switch type 3 I0, I1, I02: PSS inputs</p>	
<p>with detection of shorts across contacts Safety gate, Switch type 3 I0, I1: PSS inputs O16, O17: Test pulse outputs</p>	

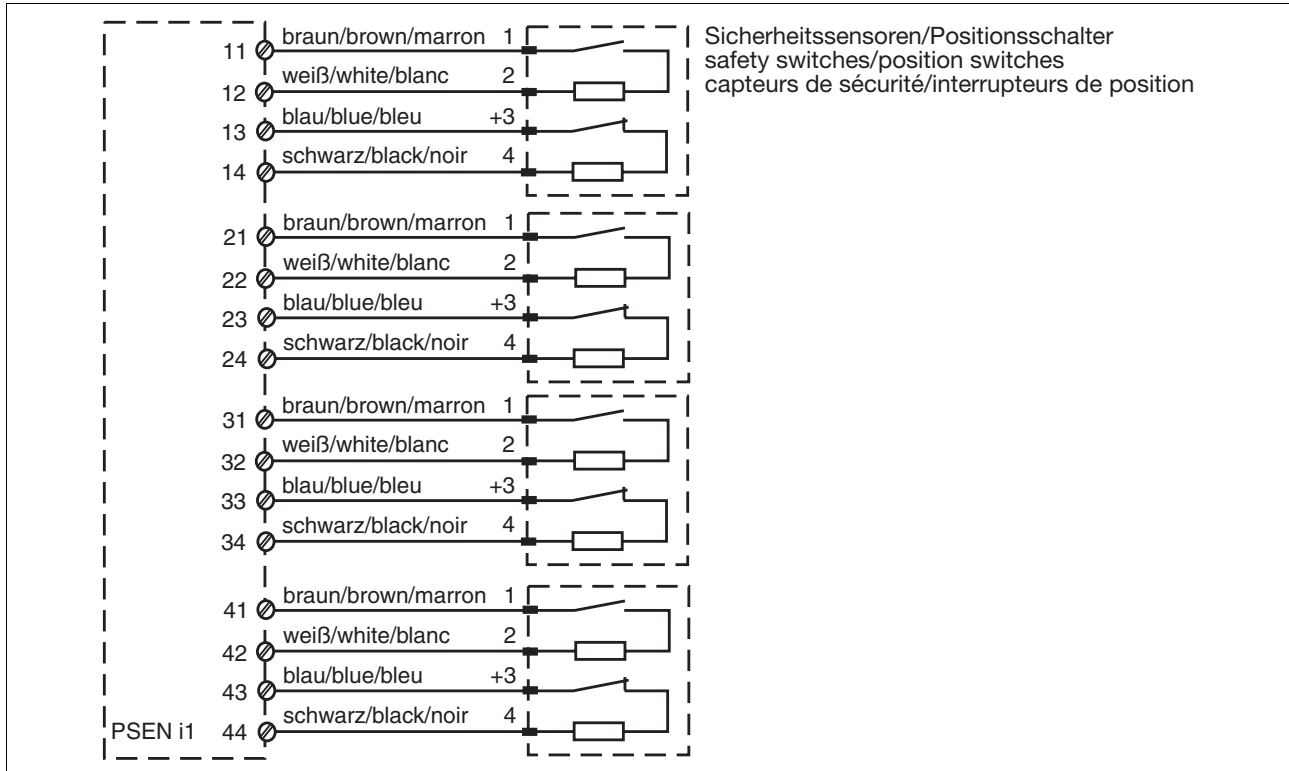
Connecting several safety switches/position switches/E-STOP switches

- ▶ Connect the safety sensors/position switches to the PSEN i1.

NOTICE

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

PSEN i1



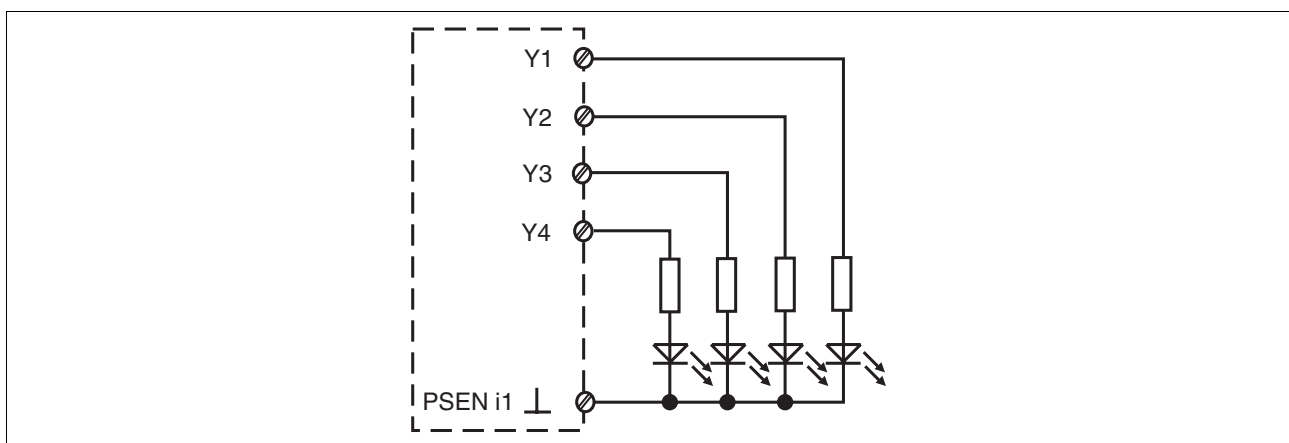
Connecting the diagnostic outputs

► If required, connect the diagnostic outputs Y1 ... Y4 on the PSEN i1.

When connecting the diagnostic outputs to a PLC, please note: use the op-

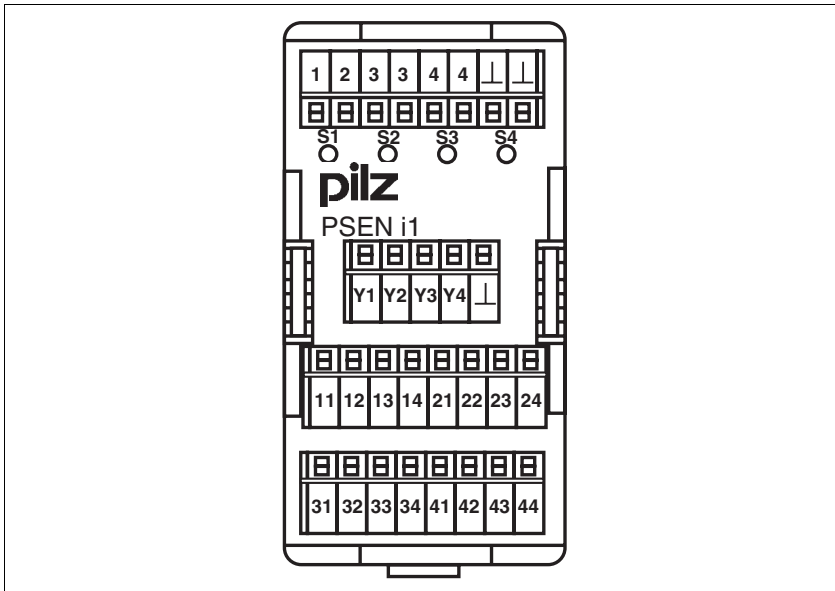
erating mode **without** detection of shorts across contacts.

INFORMATION



PSEN i1

Terminal configuration



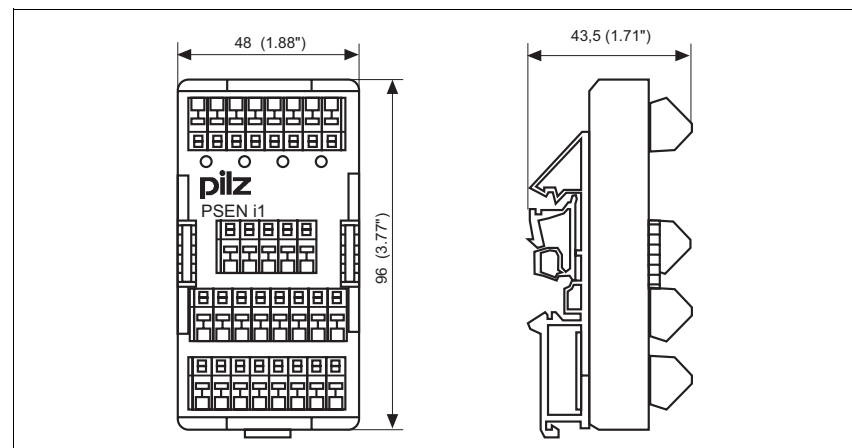
Installation

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.
- ▶ Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions



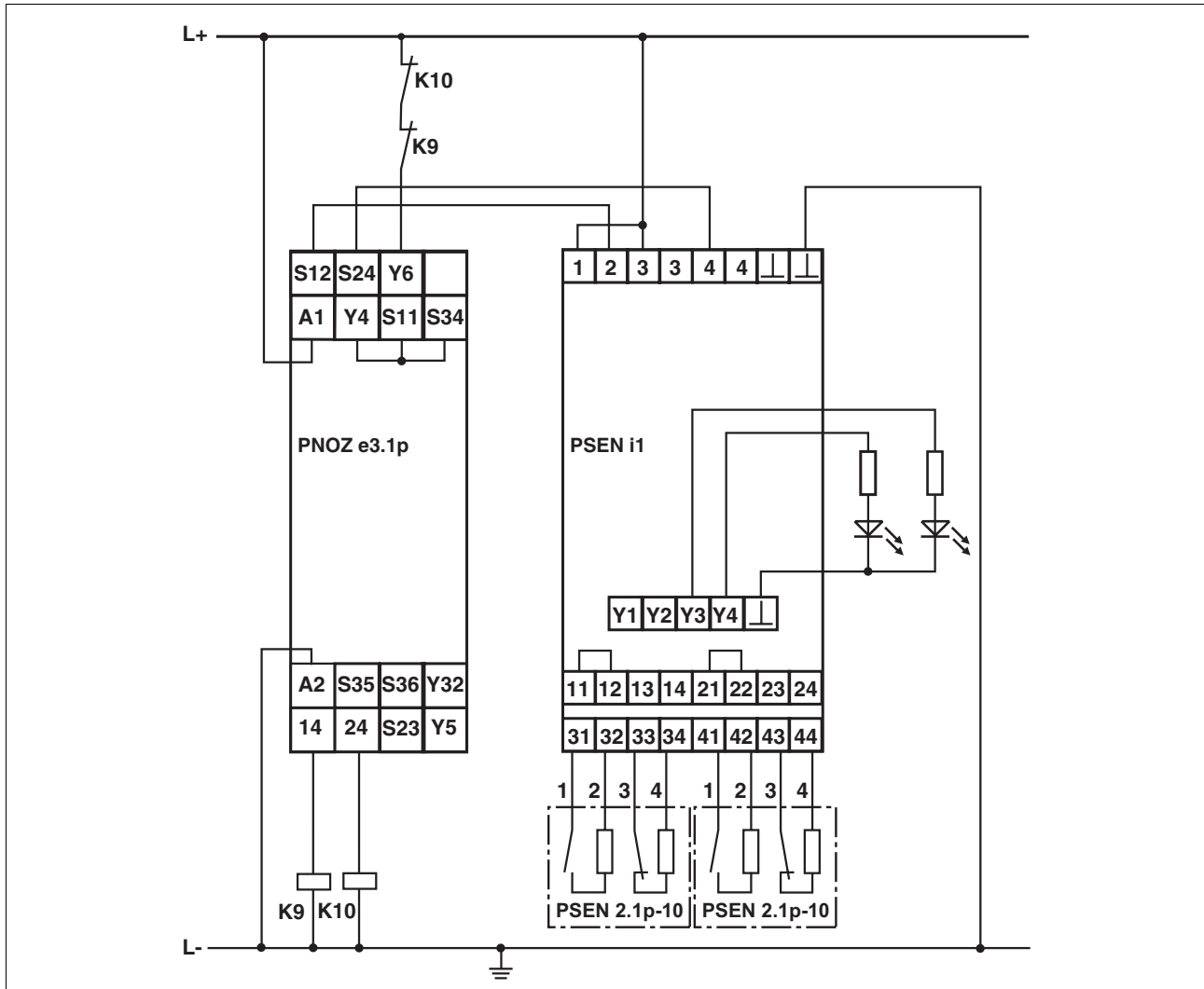
NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSEN i1

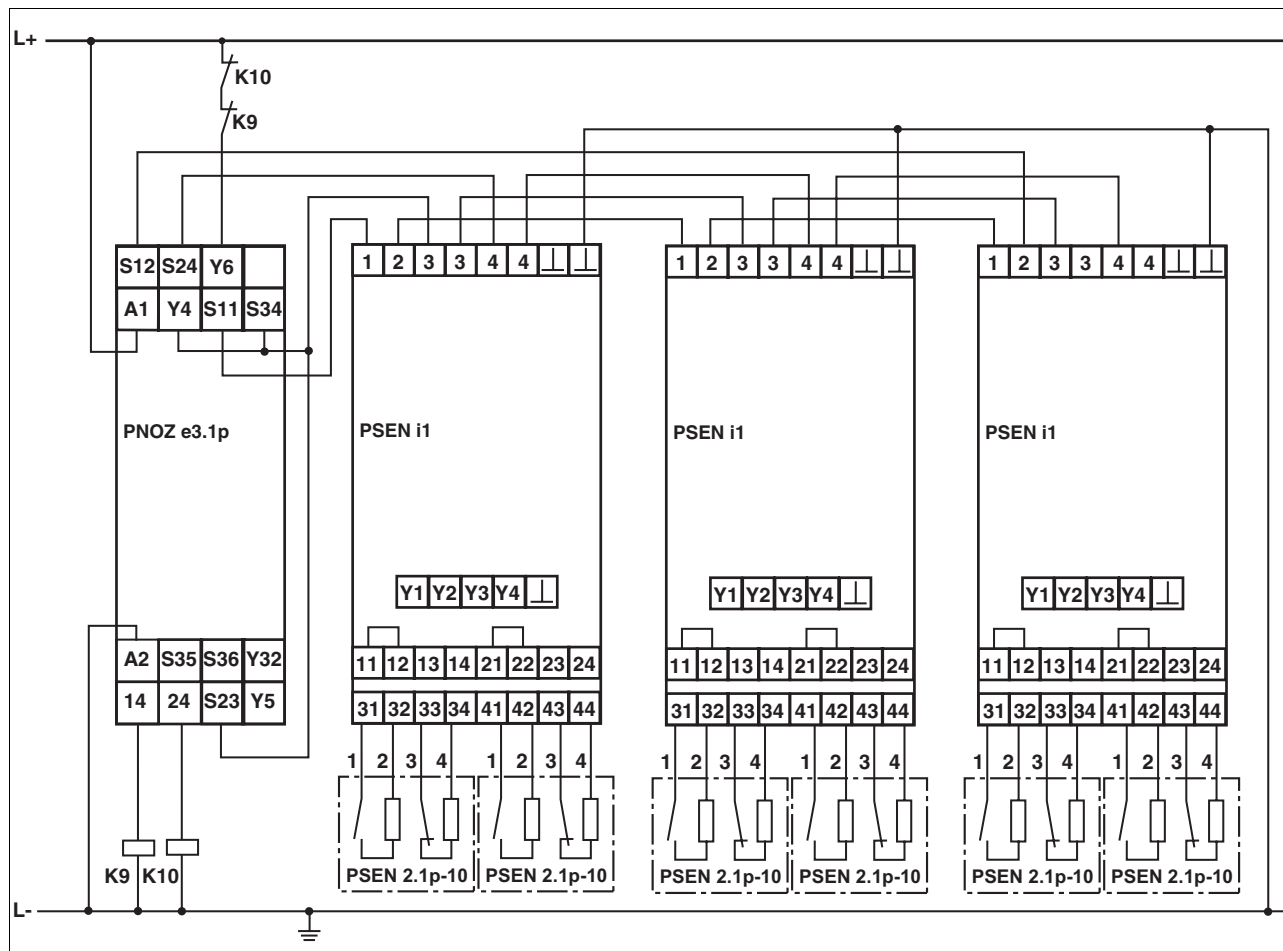
Connection examples

- Evaluation (PNOZ x3) of 4 safety switches



- 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

PSEN i1



4.0

Technical details

Supply voltage	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	24 V / 50 mA
Airgap creepage	DIN VDE 0110-1
Climatic 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 area (e.g. control cabinet)	IP54
Housing	IP20
Terminals	IP20
Connection type	Spring-loaded terminals

PSEN i1

Technical details

Cross section of external conductors

1 core flexible 0,08 ... 2.5 mm²

2 cores, same cross section

Flexible with crimp connectors, no plastic sleeve 0,08 ... 1 mm²

flexible, without crimp connectors or with TWIN crimp connectors 0,08 ... 1.5 mm²

Housing material

Housing PA 6 UL 94-HB

Base PA 66 UL 94-V2

Dimensions

Height 96 mm

Width 48 mm

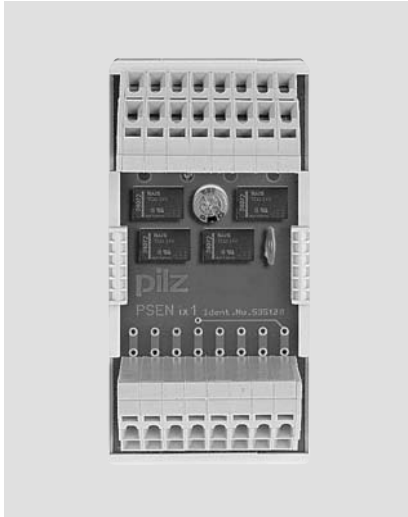
Depth 43.5 mm

Weight 90 g

Order reference


Type	Quantity	Features	Order no.
PSEN ix1	1	Interface	535 120

PSEN ix1



Interface for connecting and evaluating one or more safety switches or position switches on PNOZ safety relays or programmable safety and control systems.

Approvals

	PSEN ix1
	◆

Unit features

- ▶ Max. of 13 PSEN ix1 units can be connected in series
- ▶ Connection option for:
 - Max. 50 safety switches/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 PLC

Unit description

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:

- ▶ PSENmag safety switches: (see chapter entitled "Connections")
- ▶ Position switch with N/O / N/O combination
- ▶ E-STOP button with N/C / N/C combination

The PSEN ix1 may only be connected to evaluation devices listed in the table in the chapter entitled "Connections".

NOTICE

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

Function description

The PSEN ix1 connects the safety switches/position switches in series.

Preparing for operation

- ▶ Connect the supply voltage:
 - Terminal **A1** : +24 VDC
 - Terminal **A2**: 0 V
- ▶ Connect the units from the PNOZ X or PNOZpower series. Please refer to the operating manual for the relevant units.
- ▶ Connect the PSEN ix1 to one of the named safety relays, as stated in the following table.
- ▶ Connect the safety switches/position switches to the PSEN ix1.

NOTICE

When connecting fewer than 4 safety switches/position switches to a PSEN ix1, please note: Link out the free N/O contacts.

When connecting more than 4 safety switches/position switches: connect PNOZ ix1 in series (see diagram: "Series connection of PSEN"). After the second PSEN ix1, link Y8-Y9.

CAUTION!

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

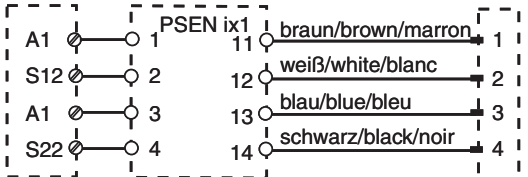
PSEN ix1

Connection to evaluation device

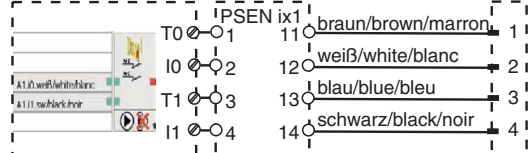
- Connection to PNOZ X, PNOZpower, PNOZsigma, PNOZelog

<p>PNOZ p1p PNOZ p1vp PNOZ X2/X2P PNOZ X2.1 (nur 24 V DC) PNOZ X2.3P PNOZ X2.7P PNOZ X2.8P/X2.9P PNOZ X2C PNOZ X2.1C (nur 24 V DC) PNOZ X4/X8P</p> <p>PNOZ X9/X9P PNOZ X10/X10.1 PNOZ X10.11P PNOZ Ex PNOZ e1p PNOZ e1.1p PNOZ e1vp PNOZ e6.1p PNOZ 6vp PNOZ s3 PNOZ s4 PNOZ s5</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
<p>PNOZ X5 PNOZ X5J</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
<p>PNOZ 11 PNOZ 16 PNOZ X11P PNOZ X13 PNOZ X3.1 PNOZ X3P PNOZ X2.5P</p> <p>PNOZ X3 PNOZ X3.10P PNOZ XV2 PNOZ XV2P PNOZ XV3 PNOZ XV3P</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
<p>PNOZ X6 (mit Brücke Y3-Y4)</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
<p>PMUT X1P</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>

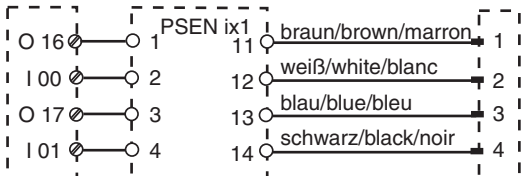
PSEN ix1

<p>PNOZ e5.11p</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
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► Connection to PNOZmulti

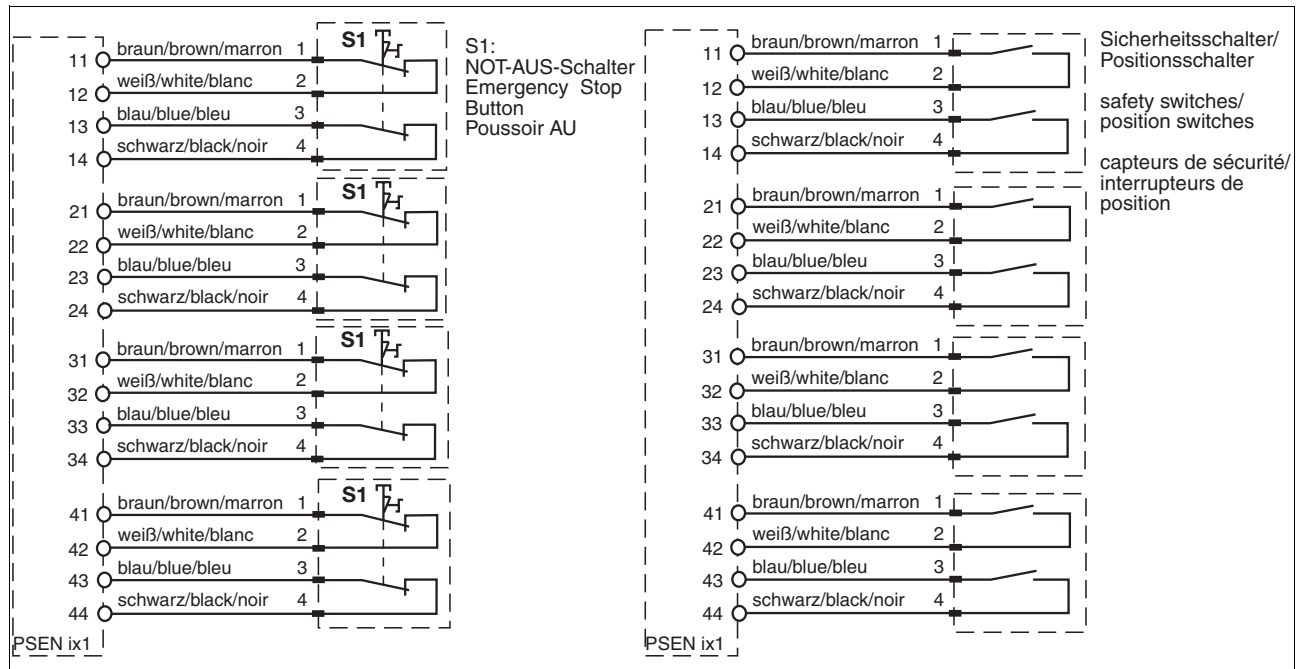
<p>Schutztür, Schaltertyp 3 I0, I1: Eingänge T0, T1: Taktausgänge</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
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► Connection to PSS with and without SafetyBUS p

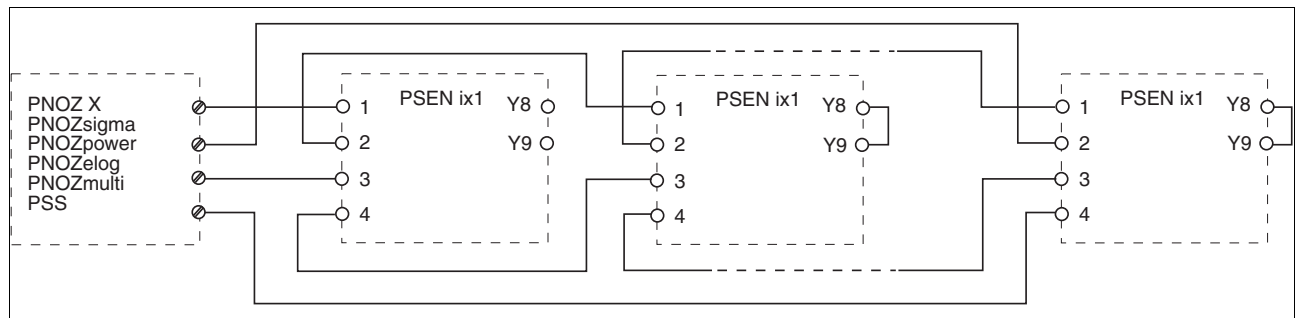
<p>Schutztür, Schaltertyp 3 I0, I1: Eingänge einer PSS O16, O17: Taktausgänge</p>		<p>PSEN 1.1p-12 PSEN 1.1p-22 PSEN 1.1a/b-22 PSEN 1.1b-25 PSEN 1.1p-25 PSEN 1.2p-22 PSEN 1.2p-25</p>
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PSEN ix1

Connecting several safety switches/position switches/E-STOP switches



Series connection of PSEN ix1



NOTICE

After the second unit connected in series, link Y8-Y9.

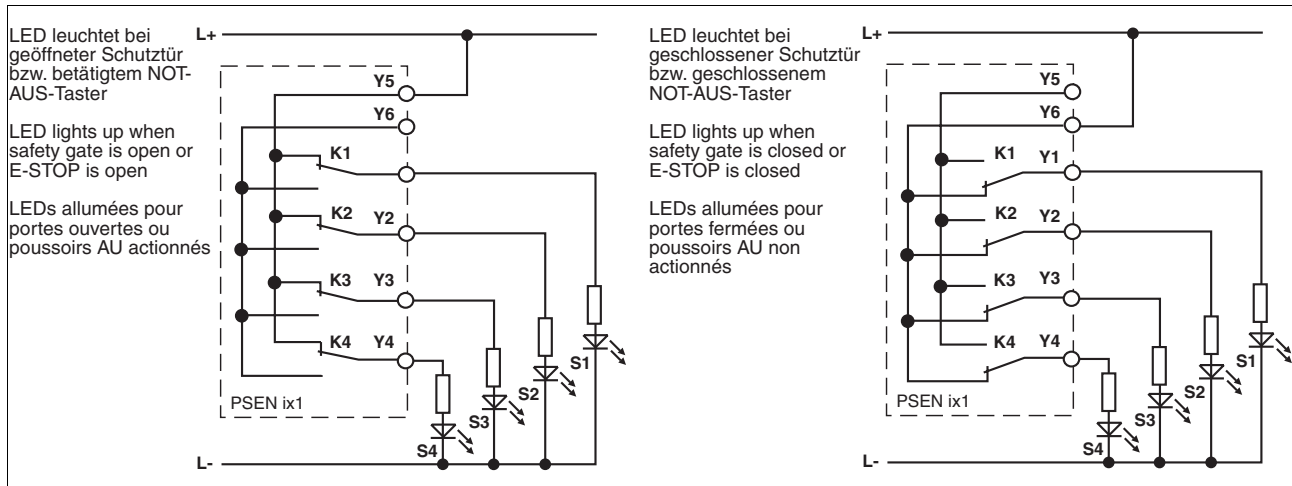
PSEN ix1

Connecting the diagnostic outputs

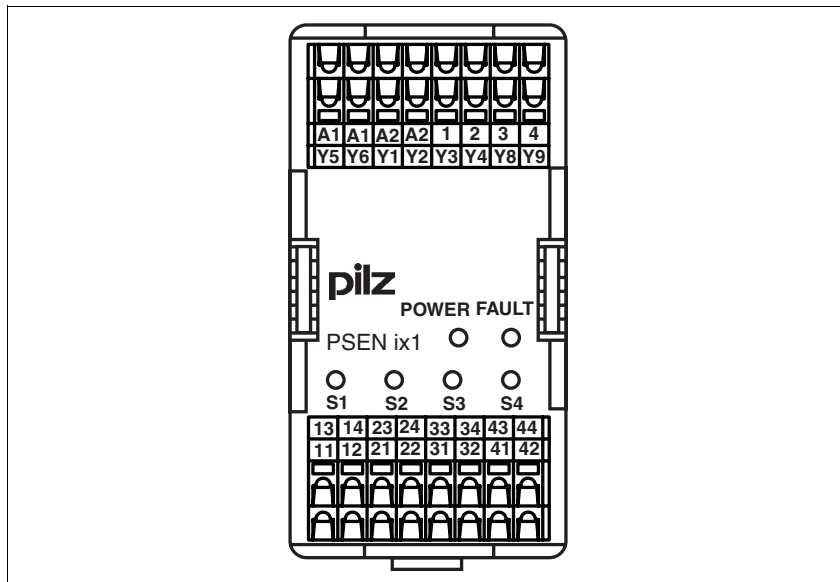
- ▶ If required, connect the diagnostic outputs Y1 ... Y6 of the PSEN ix1.

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.



Terminal configuration



Installation

CAUTION!

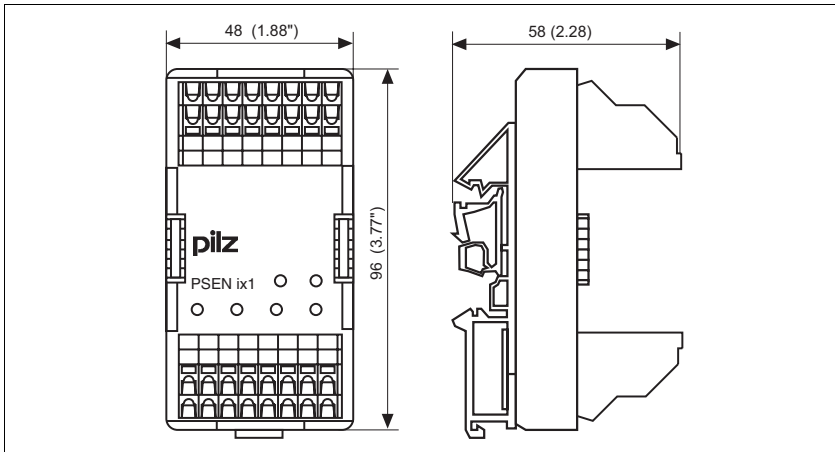
The unit should be installed in a control cabinet with a protection type of at least IP54.

- ▶ Use the notch on the rear of the unit to attach it to a DIN rail.

- ▶ Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

PSEN ix1

Dimensions



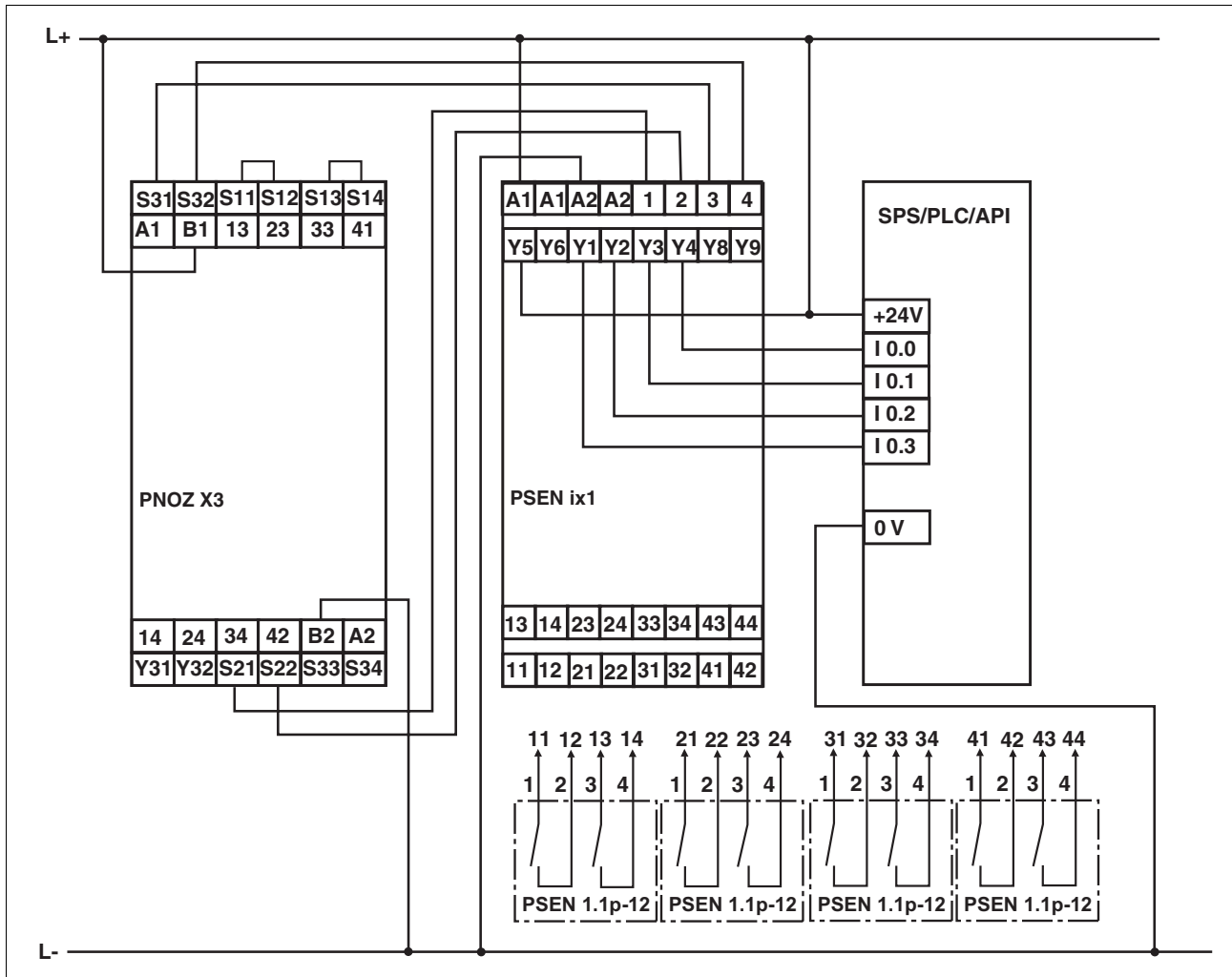
NOTICE

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

PSEN ix1

Connection examples

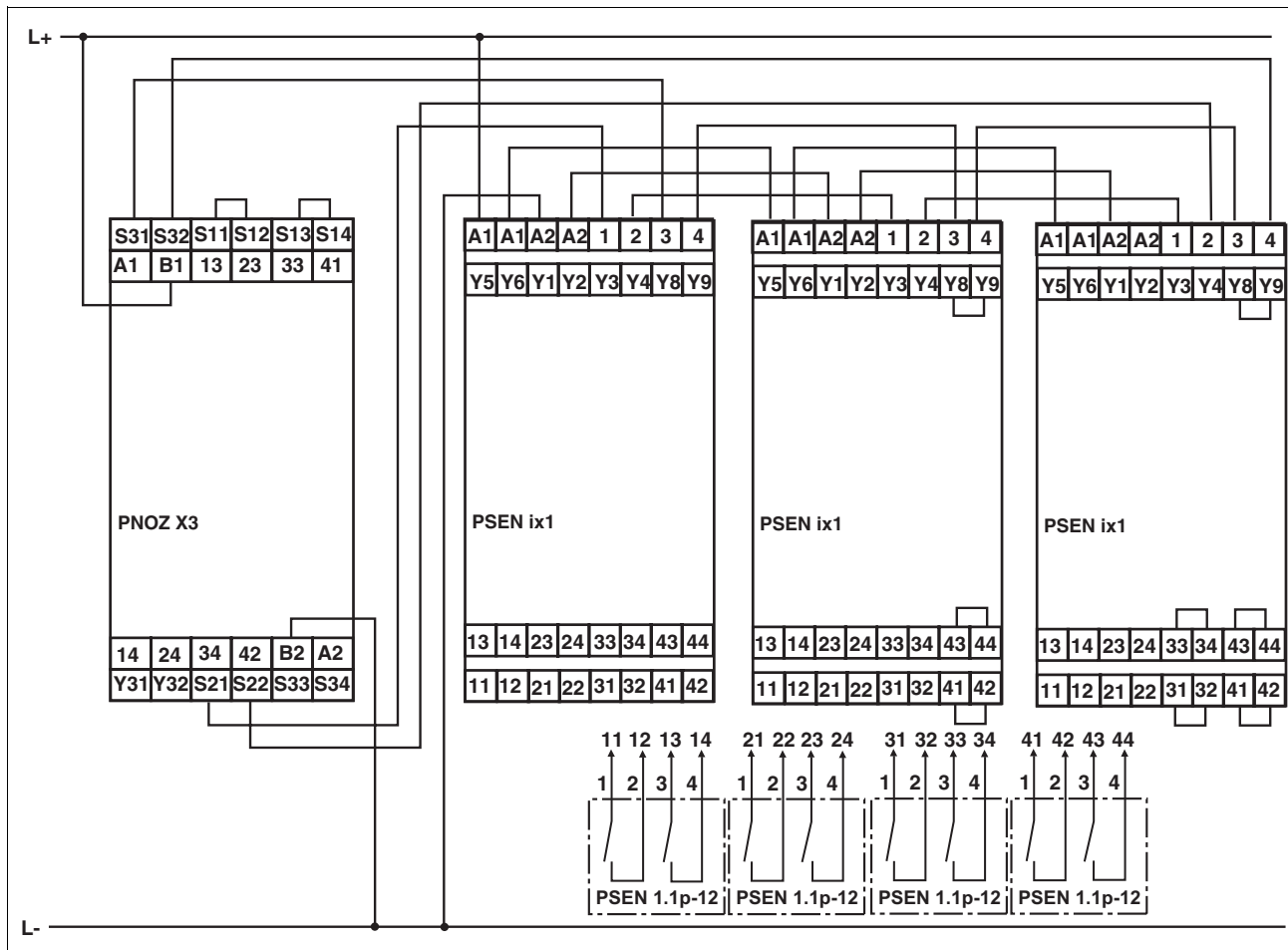
- Evaluation (PNOZ x3) of 4 safety switches



PSEN ix1

- Evaluation (PNOZ x3) of 9 safety switches via 3 PSEN ix1 units connected in series. With a series con-

nection, link Y8-Y9 after the second PSEN ix1



Technical details

Supply voltage	24 VDC
Voltage tolerance	80 ... 125 %
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	24 V / 500 mA
Airgap creepage	DIN VDE 0110-1
Climatic 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°

PSEN ix1

Technical details	
Protection type	
Mounting area (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 cores, 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	
Height	96 mm
Width	48 mm
Depth	58 mm
Weight	100 g

The standards current on 2007-02 apply.

Order reference			
Type	Quantity	Features	Order no.
PSEN ix1	1	Interface	535 120

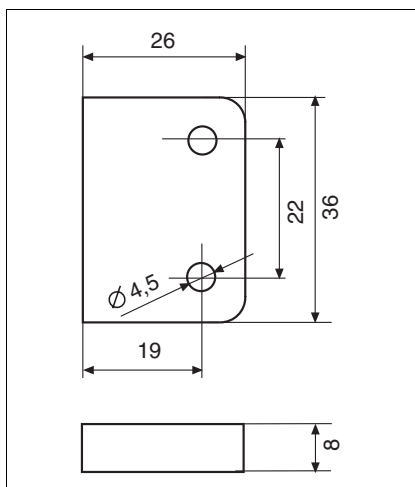
Montagezubehör PSEnMag

Spacer for PSEnMag safety switches:

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

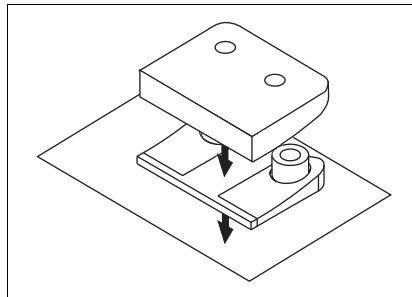


Reverse spacer for PSEnMag safety switches:

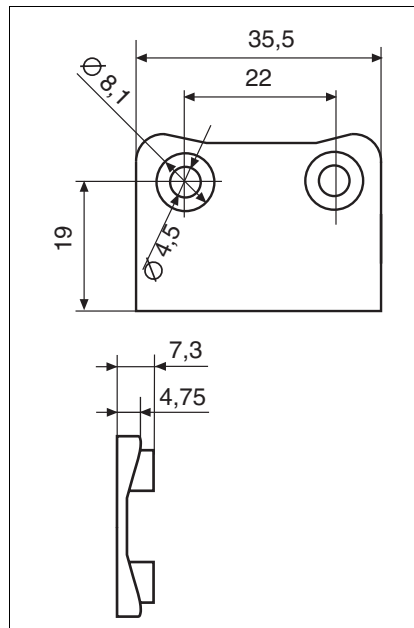
PSEn reverse spacer

Description

If a safety switch is to be installed with the front on the assembly area, the reverse spacer ensures that the safety switch can be installed flush with the assembly area. The reverse spacer is suitable for safety switches with a square design.



Dimensions

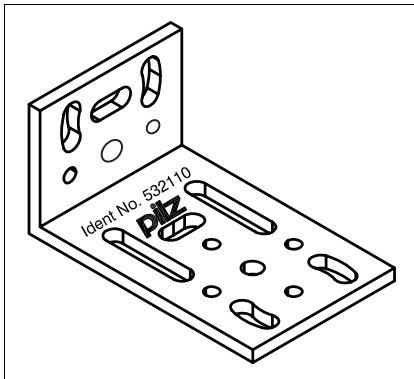


Montagezubehör PSENmag

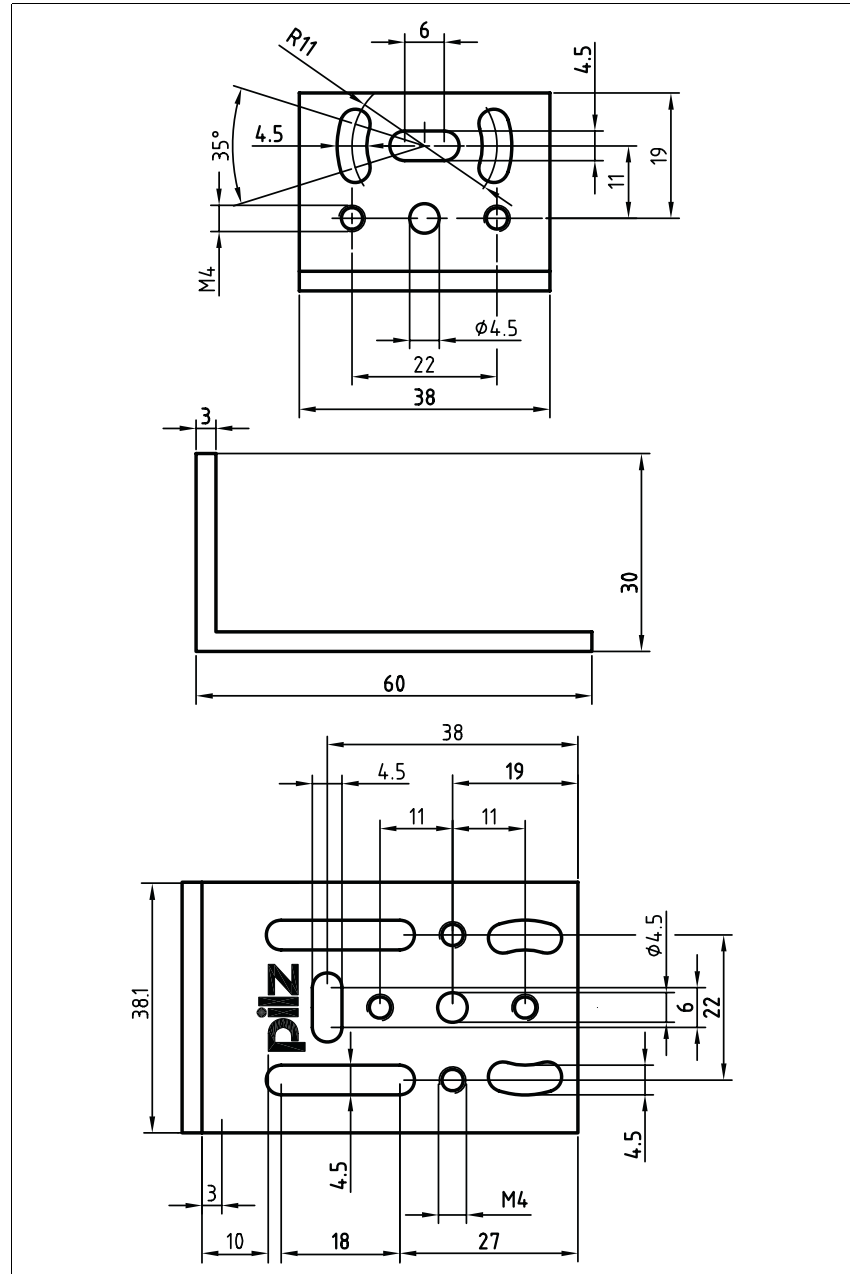
Bracket for PSENmag safety switch

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:



Order reference

Type	Quantity	Operation	Features	Order no.
Spacer	10		for PSENmag	534 310
Mounting bracket	1		for PSENmag	532 110
PSEN reverse spacer	1		for PSENmag	534 320

Cable

Cable for PSENmag safety switch

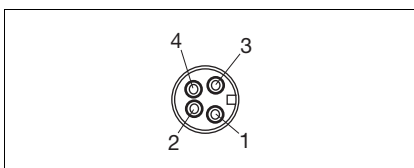
Description:

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

Features:

- ▶ Straight or angled connector 4-pin M8x1 female connector
- ▶ Screw-on, with lock
- ▶ Cable runs: 2, 5, 10, 30 m

Plug connection:



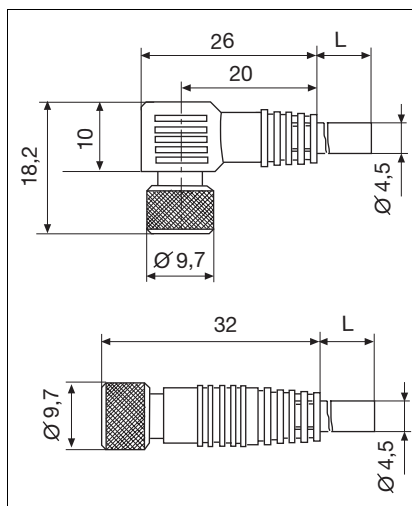
Colour marking on the cable ends:

- 1 = brown
- 2 = white

3 = blue

4 = black

Dimensions in mm



Cable for PSENcode safety switch

Description

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

Features:

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

Order reference

Type	Quantity	Operation	Features	Order no.
2 m cable M8 with angled plug	1		Length 2 m	533 110
5 m cable M8 with angled plug	1		Length 5 m	533 120
10 m cable M8 with angled plug	1		Length 10 m	533 130
30 m cable M8 with angled plug	1		Length 30 m	533 140
2 m cable M8 with straight plug	1		Length 2 m	533 111
5 m cable M8 with straight plug	1		Length 5 m	533 121
10 m cable M8 with straight plug	1		Length 10 m	533 131
30 m cable M8 with straight plug	1		Length 30 m	533 141
3 m cable M12 with angled plug	1		Length 3 m	540 322
5 m cable M12 with angled plug	1		Length 5 m	540 323
10 m cable M12 with angled plug	1		Length 10 m	540 324
3 m cable M12 with straight plug	1		Length 3 m	540 319
5 m cable M12 with straight plug	1		Length 5 m	540 320
10 m cable M12 with straight plug	1		Length 10 m	540 321

Order reference



5.0

5.0-0

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	Alphabetically by type 5.1-2
	Numerically by order number 5.1-4

Units

Alphabetically by type

Type	Quantity	Operation	Features	Order no.	Page
PSEN 1.1-10	1	magnetic	Actuator	514 110	2.2-30
PSEN 1.1-20	1	magnetic	Actuator	514 120	2.2-2
PSEN 1.1a-20	1/1	magnetic	Safety switch/actuator	504 226	2.2-2
PSEN 1.1a-20 (switch)	1	magnetic	Safety switch	524 126	2.2-2
PSEN 1.1a-22	1/1	magnetic	Safety switch/actuator	504 228	2.2-8
PSEN 1.1a-22 (switch)	1	magnetic	Safety switch	524 128	2.2-8
PSEN 1.1b-20	1/1	magnetic	Safety switch/actuator	504 227	2.2-2
PSEN 1.1b-20 (switch)	1	magnetic	Safety switch	524 127	2.2-2
PSEN 1.1b-22	1/1	magnetic	Safety switch/actuator	504 229	2.2-8
PSEN 1.1b-22 (switch)	1	magnetic	Safety switch	524 129	2.2-8
PSEN 1.1-b-23	1/1	magnetic	Safety switch/actuator	504 250	2.2-14
PSEN 1.1-b-25	1	magnetic	Safety switch/actuator	504 251	2.2-22
PSEN 1.1p-10	1/1	magnetic	Safety switch/actuator	504 210	2.2-30
PSEN 1.1p-10 (switch)	1	magnetic	Safety switch	524 110	2.2-30
PSEN 1.1p-12	1/1	magnetic	Safety switch/actuator	504 212	2.2-36
PSEN 1.1p-12 (switch)	1	magnetic	Safety switch	524 112	2.2-36
PSEN 1.1p-20	1/1	magnetic	Safety switch/actuator	504 220	2.2-42
PSEN 1.1p-20 (switch)	1	magnetic	Safety switch	524 120	2.2-42
PSEN 1.1p-22	1/1	magnetic	Safety switch/actuator	504 222	2.2-48
PSEN 1.1p-22 (switch)	1	magnetic	Safety switch	524 122	2.2-48
PSEN 1.1p-23	1/1	magnetic	Safety switch/actuator	504 223	2.2-54
PSEN 1.1p-25	1/1	magnetic	Safety switch/actuator	504 225	2.2-62
PSEN 1.2-20	1	magnetic	Actuator	515 120	2.2-70
PSEN 1.2-22	1	magnetic	Actuator	515 120	2.2-76
PSEN 1.2p-20	1/1	magnetic	Safety switch/actuator	505 220	2.2-70
PSEN 1.2p-20 (switch)	1	magnetic	Safety switch	525 120	2.2-70
PSEN 1.2p-22	1/1	magnetic	Safety switch/actuator	505 222	2.2-76
PSEN 1.2p-22 (switch)	1	magnetic	Safety switch	525 122	2.2-76
PSEN 1.2p-23	1/1	magnetic	Safety switch/actuator	505 223	2.2-82
PSEN 1.2p-25	1/1	magnetic	Safety switch/actuator	505 225	2.2-90
PSEN 2.1-10	1	magnetic	Actuator	512 110	2.2-110
PSEN 2.1-20	1	magnetic	Actuator	512 120	2.2-98
PSEN 2.1a-20	1/1	magnetic	Safety switch/actuator	502 226	2.2-98
PSEN 2.1a-20 (switch)	1	magnetic	Safety switch	522 126	2.2-98
PSEN 2.1b-20	1/1	magnetic	Safety switch/actuator	502 227	2.2-98
PSEN 2.1b-20 (switch)	1	magnetic	Safety switch	522 127	2.2-98
PSEN 2.1b-26	1/1	magnetic	Safety switch/actuator	502 250	2.2-104
PSEN 2.1p-10	1/1	magnetic	Safety switch/actuator	502 210	2.2-110
PSEN 2.1p-10 (switch)	1	magnetic	Safety switch	522 110	2.2-110
PSEN 2.1p-11	1/1	magnetic	Safety switch/actuator	502 211	2.2-116
PSEN 2.1p-11 (switch)	1	magnetic	Safety switch	522 111	2.2-116
PSEN 2.1p-20	1/1	magnetic	Safety switch/actuator	502 220	2.2-122
PSEN 2.1p-20 (switch)	1	magnetic	Safety switch	522 120	2.2-122
PSEN 2.1p-21	1/1	magnetic	Safety switch/actuator	502 221	2.2-128
PSEN 2.1p-21 (switch)	1	magnetic	Safety switch	522 121	2.2-128
PSEN 2.1p-24	1/1	magnetic	Safety switch/actuator	502 224	2.2-134
PSEN 2.1p-30	1/1	magnetic	Safety switch/actuator	502 230	2.2-140
PSEN 2.1p-30 (switch)	1	magnetic	Safety switch	522 130	2.2-140
PSEN 2.1p-31	1/1	magnetic	Safety switch/actuator	502 231	2.2-146
PSEN 2.1p-31 (switch)	1	magnetic	Safety switch	522 131	2.2-146
PSEN 2.1p-34	1/1	magnetic	Safety switch/actuator	502 234	2.2-152
PSEN 2.2-20	1	magnetic	Actuator	513 120	2.2-158
PSEN 2.2p-20	1/1	magnetic	Safety switch/actuator	503 220	2.2-158
PSEN 2.2p-20 (switch)	1	magnetic	Safety switch	523 120	2.2-158

Units

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PSEN 2.2p-21	1/1	magnetic	Safety switch/actuator	503 221	2.2-164
PSEN 2.2p-21 (switch)	1	magnetic	Safety switch	523 121	2.2-164
PSEN 2.2p-24	1/1	magnetic	Safety switch/actuator	503 224	2.2-170
PSEN b1	1	Mechanical	Bolt	540 010	2.4-2
PSEN cs1.1	1	Transponder technology	Actuator	540 080	2.3-9
PSEN cs1.13p	1/1	Transponder technology	Safety switch/actuator	540 005	2.3-2
PSEN cs1.1p	1/1	Transponder technology	Safety switch/actuator	540 000	2.3-9
PSEN cs1.1p (switch)	1	Transponder technology	Safety switch	540 050	2.3-9
PSEN cs2.1	1	Transponder technology	Actuator	540 180	2.3-23
PSEN cs2.13p	1/1	Transponder technology	Safety switch/actuator	540 105	2.3-16
PSEN cs2.1p	1/1	Transponder technology	Safety switch/actuator	540 100	2.3-23
PSEN cs2.1p (switch)	1	Transponder technology	Safety switch	540 150	2.3-23
PSEN cs2.2p	1/1	Transponder technology	Safety switch/actuator	540 200	2.3-30
PSEN ma1.3-08	1	magnetic	Actuator M12	516 120	2.2-176
PSEN ma1.3a-20	1/1	magnetic	Safety switch/actuator M12	506 220	2.2-176
PSEN ma1.3a-20 (switch)	1	magnetic	Safety switch	526 120	2.2-176
PSEN ma1.3a-22	1/1	magnetic	Safety switch/actuator M12	506 221	2.2-184
PSEN ma1.3a-22 (switch)	1	magnetic	Safety switch	526 121	2.2-184
PSEN ma1.3a-23	1/1	magnetic	Safety switch/actuator M12	506 224	2.2-192
PSEN ma1.3a-25	1/1	magnetic	Safety switch/actuator M12	506 225	2.2-201
PSEN ma1.3b-20	1/1	magnetic	Safety switch/actuator M12	506 222	2.2-176
PSEN ma1.3b-20 (switch)	1	magnetic	Safety switch	526 122	2.2-176
PSEN ma1.3b-22	1/1	magnetic	Safety switch/actuator M12	506 223	2.2-184
PSEN ma1.3b-22 (switch)	1	magnetic	Safety switch	526 123	2.2-184

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502 210	PSEN 2.1p-10	1/1	magnetic	Safety switch/actuator	2.2-110
502 211	PSEN 2.1p-11	1/1	magnetic	Safety switch/actuator	2.2-116
502 220	PSEN 2.1p-20	1/1	magnetic	Safety switch/actuator	2.2-122
502 221	PSEN 2.1p-21	1/1	magnetic	Safety switch/actuator	2.2-128
502 224	PSEN 2.1p-24	1/1	magnetic	Safety switch/actuator	2.2-134
502 226	PSEN 2.1a-20	1/1	magnetic	Safety switch/actuator	2.2-98
502 227	PSEN 2.1b-20	1/1	magnetic	Safety switch/actuator	2.2-98
502 230	PSEN 2.1p-30	1/1	magnetic	Safety switch/actuator	2.2-140
502 231	PSEN 2.1p-31	1/1	magnetic	Safety switch/actuator	2.2-146
502 234	PSEN 2.1p-34	1/1	magnetic	Safety switch/actuator	2.2-152
502 250	PSEN 2.1b-26	1/1	magnetic	Safety switch/actuator	2.2-104
503 220	PSEN 2.2p-20	1/1	magnetic	Safety switch/actuator	2.2-158
503 221	PSEN 2.2p-21	1/1	magnetic	Safety switch/actuator	2.2-164
503 224	PSEN 2.2p-24	1/1	magnetic	Safety switch/actuator	2.2-170
504 210	PSEN 1.1p-10	1/1	magnetic	Safety switch/actuator	2.2-30
504 212	PSEN 1.1p-12	1/1	magnetic	Safety switch/actuator	2.2-36
504 220	PSEN 1.1p-20	1/1	magnetic	Safety switch/actuator	2.2-42
504 222	PSEN 1.1p-22	1/1	magnetic	Safety switch/actuator	2.2-48
504 223	PSEN 1.1p-23	1/1	magnetic	Safety switch/actuator	2.2-54
504 225	PSEN 1.1p-25	1/1	magnetic	Safety switch/actuator	2.2-62
504 226	PSEN 1.1a-20	1/1	magnetic	Safety switch/actuator	2.2-2
504 227	PSEN 1.1b-20	1/1	magnetic	Safety switch/actuator	2.2-2
504 228	PSEN 1.1a-22	1/1	magnetic	Safety switch/actuator	2.2-8
504 229	PSEN 1.1b-22	1/1	magnetic	Safety switch/actuator	2.2-8
504 250	PSEN 1.1-b-23	1/1	magnetic	Safety switch/actuator	2.2-14
504 251	PSEN 1.1-b-25	1	magnetic	Safety switch/actuator	2.2-22
505 220	PSEN 1.2p-20	1/1	magnetic	Safety switch/actuator	2.2-70
505 222	PSEN 1.2p-22	1/1	magnetic	Safety switch/actuator	2.2-76
505 223	PSEN 1.2p-23	1/1	magnetic	Safety switch/actuator	2.2-82
505 225	PSEN 1.2p-25	1/1	magnetic	Safety switch/actuator	2.2-90
506 220	PSEN ma1.3a-20	1/1	magnetic	Safety switch/actuator M12	2.2-176
506 221	PSEN ma1.3a-22	1/1	magnetic	Safety switch/actuator M12	2.2-184
506 222	PSEN ma1.3b-20	1/1	magnetic	Safety switch/actuator M12	2.2-176
506 223	PSEN ma1.3b-22	1/1	magnetic	Safety switch/actuator M12	2.2-184
506 224	PSEN ma1.3a-23	1/1	magnetic	Safety switch/actuator M12	2.2-192
506 225	PSEN ma1.3a-25	1/1	magnetic	Safety switch/actuator M12	2.2-201
512 110	PSEN 2.1-10	1	magnetic	Actuator	2.2-110
512 120	PSEN 2.1-20	1	magnetic	Actuator	2.2-98
513 120	PSEN 2.2-20	1	magnetic	Actuator	2.2-158
513 120	PSEN 2.2-20	1	magnetic	Actuator	2.2-164
514 110	PSEN 1.1-10	1	magnetic	Actuator	2.2-30
514 120	PSEN 1.1-20	1	magnetic	Actuator	2.2-2
515 120	PSEN 1.2-20	1	magnetic	Actuator	2.2-70
516 120	PSEN ma1.3-08	1	magnetic	Actuator M12	2.2-176
522 110	PSEN 2.1p-10 (switch)	1	magnetic	Safety switch	2.2-110
522 111	PSEN 2.1p-11 (switch)	1	magnetic	Safety switch	2.2-116
522 120	PSEN 2.1p-20 (switch)	1	magnetic	Safety switch	2.2-122
522 121	PSEN 2.1p-21 (switch)	1	magnetic	Safety switch	2.2-128
522 126	PSEN 2.1a-20 (switch)	1	magnetic	Safety switch	2.2-98
522 127	PSEN 2.1b-20 (switch)	1	magnetic	Safety switch	2.2-98
522 130	PSEN 2.1p-30 (switch)	1	magnetic	Safety switch	2.2-140
522 131	PSEN 2.1p-31 (switch)	1	magnetic	Safety switch	2.2-146
523 120	PSEN 2.2p-20 (switch)	1	magnetic	Safety switch	2.2-158
523 121	PSEN 2.2p-21 (switch)	1	magnetic	Safety switch	2.2-164

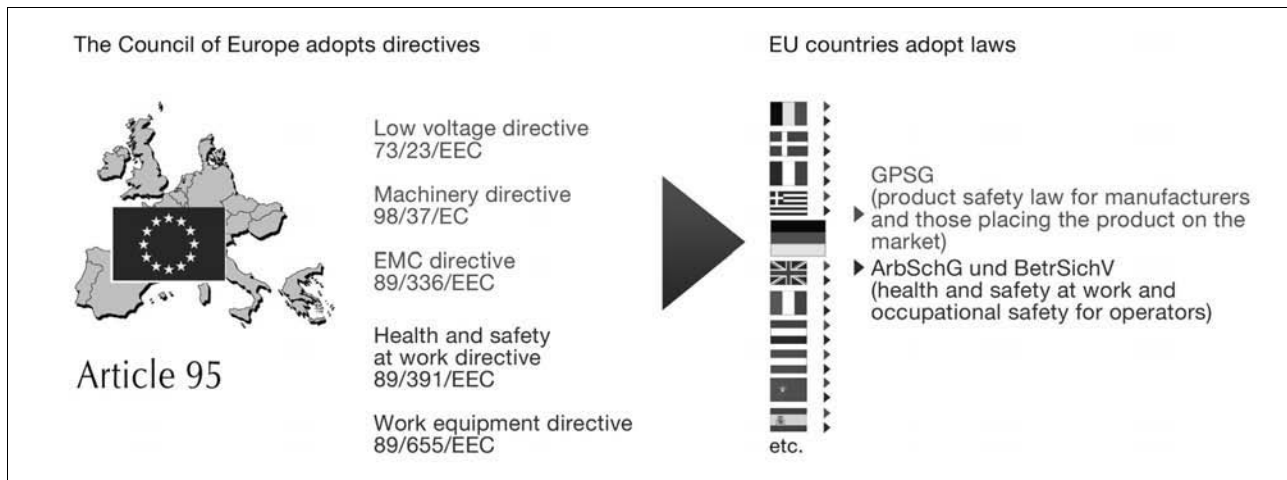
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524 110	PSEN 1.1p-10 (switch)	1	magnetic	Safety switch	2.2-30
524 112	PSEN 1.1p-12 (switch)	1	magnetic	Safety switch	2.2-36
524 120	PSEN 1.1p-20 (switch)	1	magnetic	Safety switch	2.2-42
524 122	PSEN 1.1p-22 (switch)	1	magnetic	Safety switch	2.2-48
524 126	PSEN 1.1a-20 (switch)	1	magnetic	Safety switch	2.2-2
524 127	PSEN 1.1b-20 (switch)	1	magnetic	Safety switch	2.2-2
524 128	PSEN 1.1a-22 (switch)	1	magnetic	Safety switch	2.2-8
524 129	PSEN 1.1b-22 (switch)	1	magnetic	Safety switch	2.2-8
525 120	PSEN 1.2p-20 (switch)	1	magnetic	Safety switch	2.2-70
525 122	PSEN 1.2p-22 (switch)	1	magnetic	Safety switch	2.2-76
526 120	PSEN ma1.3a-20 (switch)	1	magnetic	Safety switch	2.2-176
526 121	PSEN ma1.3a-22 (switch)	1	magnetic	Safety switch	2.2-184
526 122	PSEN ma1.3b-20 (switch)	1	magnetic	Safety switch	2.2-176
526 123	PSEN ma1.3b-22 (switch)	1	magnetic	Safety switch	2.2-184
540 000	PSEN cs1.1p	1/1	Transponder technology	Safety switch/actuator	2.3-9
540 005	PSEN cs1.13p	1/1	Transponder technology	Safety switch/actuator	2.3-2
540 010	PSEN b1	1	Mechanical	Bolt	2.4-2
540 050	PSEN cs1.1p (switch)	1	Transponder technology	Safety switch	2.3-9
540 080	PSEN cs1.1	1	Transponder technology	Actuator	2.3-9
540 100	PSEN cs2.1p	1/1	Transponder technology	Safety switch/actuator	2.3-23
540 105	PSEN cs2.13p	1/1	Transponder technology	Safety switch/actuator	2.3-16
540 150	PSEN cs2.1p (switch)	1	Transponder technology	Safety switch	2.3-23
540 180	PSEN cs2.1	1	Transponder technology	Actuator	2.3-23
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European directives and position of the standards in Europe



Incorporation of the directives into domestic law (using Germany as an example)

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 is the first piece of European legislation to take into account the approach towards harmonisation of a common single 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

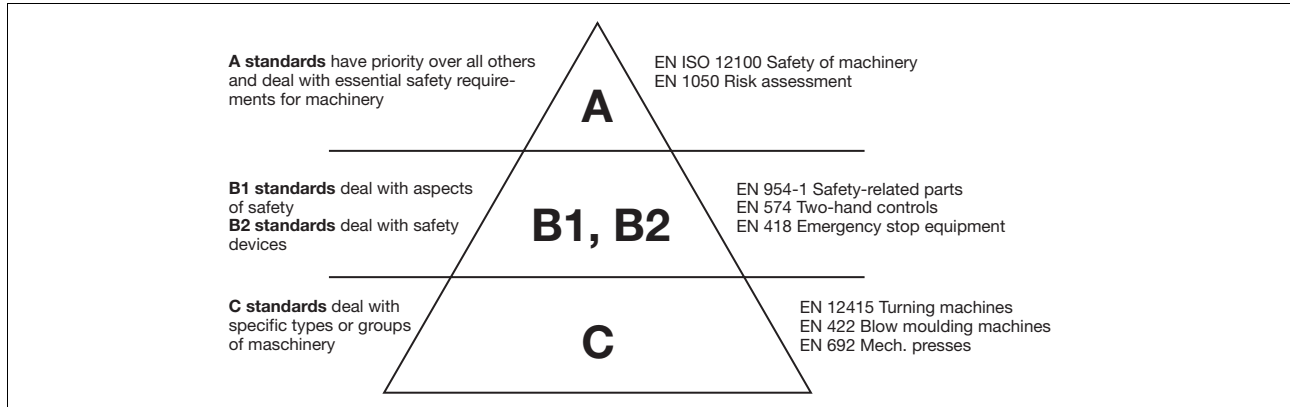
The directives are addressed to member states, who are obliged to incorporate the European directives into domestic law. In Germany this is normally achieved through the device safety law.

Position of the standards in Europe

The legal status of standards is constantly under discussion. Inside Europe, i.e. within the scope of the European directives that are subject to the CE-making 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.

European directives and position of the standards in Europe



Standards pyramid

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. 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, un-

less 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.

Risk assessment

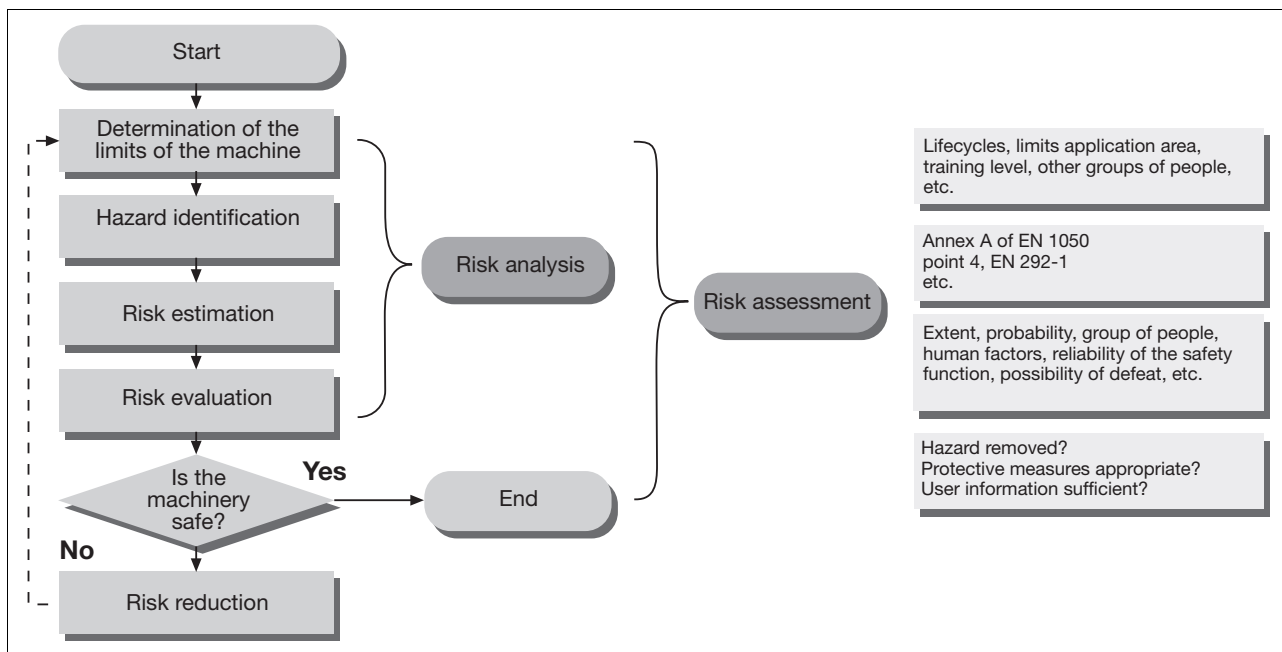
Risk assessment

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.



Iterative process in accordance with EN 1050

Legal regulations outside Europe and standards for functional safety

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 also still come across the NFPA (National Fire Protection Association), which developed NFPA 79 as a counterpart to EN 60204-1, for example. OSHA standards can be compared with the European directives. Unlike the European directives, 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.

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.

Risk parameters and categories in accordance with EN 954-1

Risk parameters

S = Severity of injury:

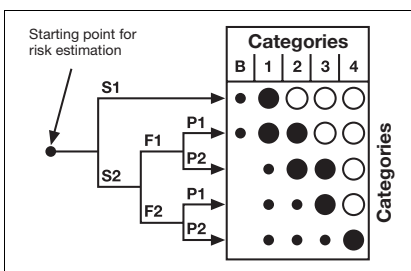
- 1 = Slight (normally reversible) injury
- 2 = Serious (normally irreversible) injury including death

F = Frequency and/or exposure time to the hazard:?

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

P = Possibility of avoiding the hazard:

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



Risk graph from EN 954

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: The occurrence of a fault 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.

The initiation of this check may be automatic or manual. 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. The system behaviour allows the occurrence of a fault to lead to the loss of the safety function between checks; the loss of the safety function is detected by the check.

Category 3

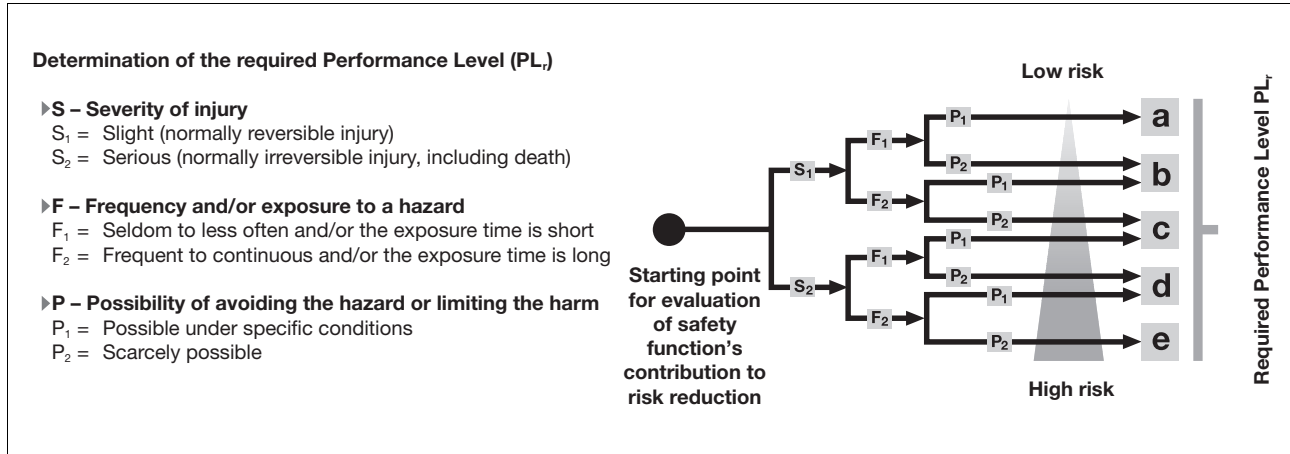
Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to the loss of the safety function. Whenever reasonably practicable, the single fault shall be detected at or before the next demand upon the safety function.

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.

Safety-related parts of control systems - General principles for design in accordance with EN ISO 13849-1



Safety-related parts of control systems – General principles for design in accordance with EN ISO 13849-1

As the successor standard to EN 954-1, EN ISO 13849-1 is based on the familiar categories. Equally, it examines complete safety functions, including all the components involved in their design. EN ISO 13849-1 goes beyond the qualitative approach of EN 954-1 to include a quantitative assessment of the safety functions. A performance level (PL) is used for this, building upon the categories.

Components/devices require the following safety parameters:

- ▶ Category (structural requirement)
- ▶ PL: Performance level
- ▶ MTTFd: Mean time to dangerous failure Mean Time To Dangerous Failure)
- ▶ DC: Diagnostic coverage Diagnostic Coverage)
- ▶ CCF: Common cause failure Common Cause Failure)

The standard describes how to calculate the performance level (PL) for safety-related parts of control systems, based on designated architectures. EN ISO 13849-1 refers any deviations to IEC 61508.

Risk assessment in accordance with EN ISO 13849-1

Risk assessment is an iterative process, i.e. it will need to be carried out more than once. The risk must be estimated and the performance level defined for each hazard on which the risk is to be reduced through control measures. The risk is estimated through consideration of the severity of injury (S), the frequency and duration of exposure to the hazard (F) and the possibility of avoiding or limiting the harm (P).

Parameters S, F and P are used on the risk graph to determine the required performance level (PL_r) for a safety function. The selection of parameters is no different to the procedure used in EN 954-1 (1996). However, the result is no longer a category but a PL.

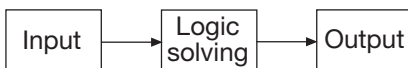
Safety-related parts of control systems - General principles for design in accordance with EN ISO 13849-1

Performance level

The performance level (PL) classifies 5 levels of probability of failure. The table shows the relationship between PL and the probability of dangerous failure per hour (PFHD).

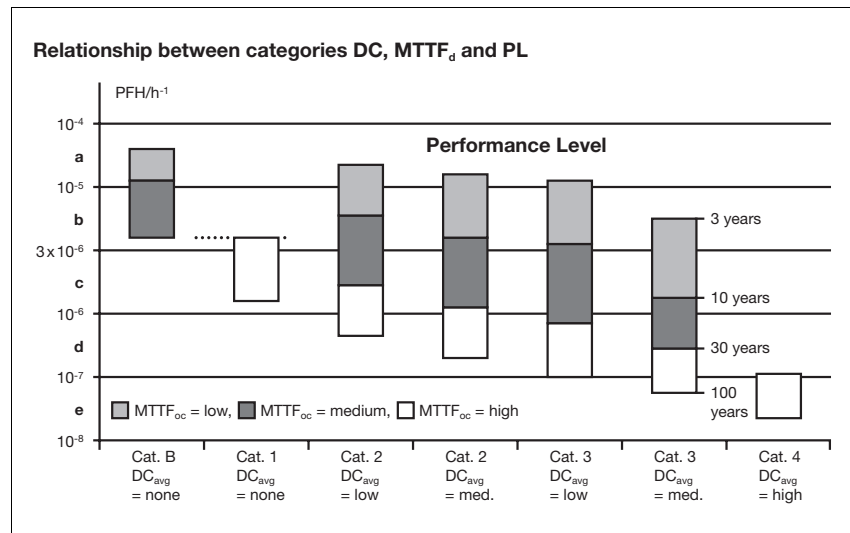
Performance Levels (PL) in accordance with EN ISO 13849-1	Probability of a dangerous failure per hour [1/h]
a	$10^{-5} < PFH < 10^{-4}$
b	$3 \times 10^{-6} < PFH < 10^{-5}$
c	$10^{-6} < PFH < 3 \times 10^{-6}$
d	$10^{-7} < PFH < 10^{-6}$
e	$10^{-8} < PFH < 10^{-7}$

Once the required PL has been established, the PL achieved by the safety function (SRP/CL) is calculated. To do this the SRP/CL can be divided into logical blocks, such as input, logic solving and output for example.



When using a designated architecture or an architecture of similar structure, the achieved PL can be calculated graphically using the bar chart. To do this the architecture of the SRP/CL is divided into categories. $MTTF_D$ and DC_{avg} are also required. From Category 2 onwards, the CCF will also need to be examined. A component's $MTTF_D$ value is usually provided by the manufacturer. The standard provides tables and check lists for calculating the other values.

It is also possible to calculate the achieved PL of an SRP/CL. The probability of dangerous failure of all the blocks that combine to form the safety function is added up:



6.1

$$PFH_{System} = PFH_{Input} + PFH_{Logic} + PFH_{Output}$$

The PL achieved by an SRP/CL must be at least as high as the PL required by the safety function. If this condition is not met, the safety function must be implemented differently.

Functional safety and legal position of EN/IEC 61508

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.

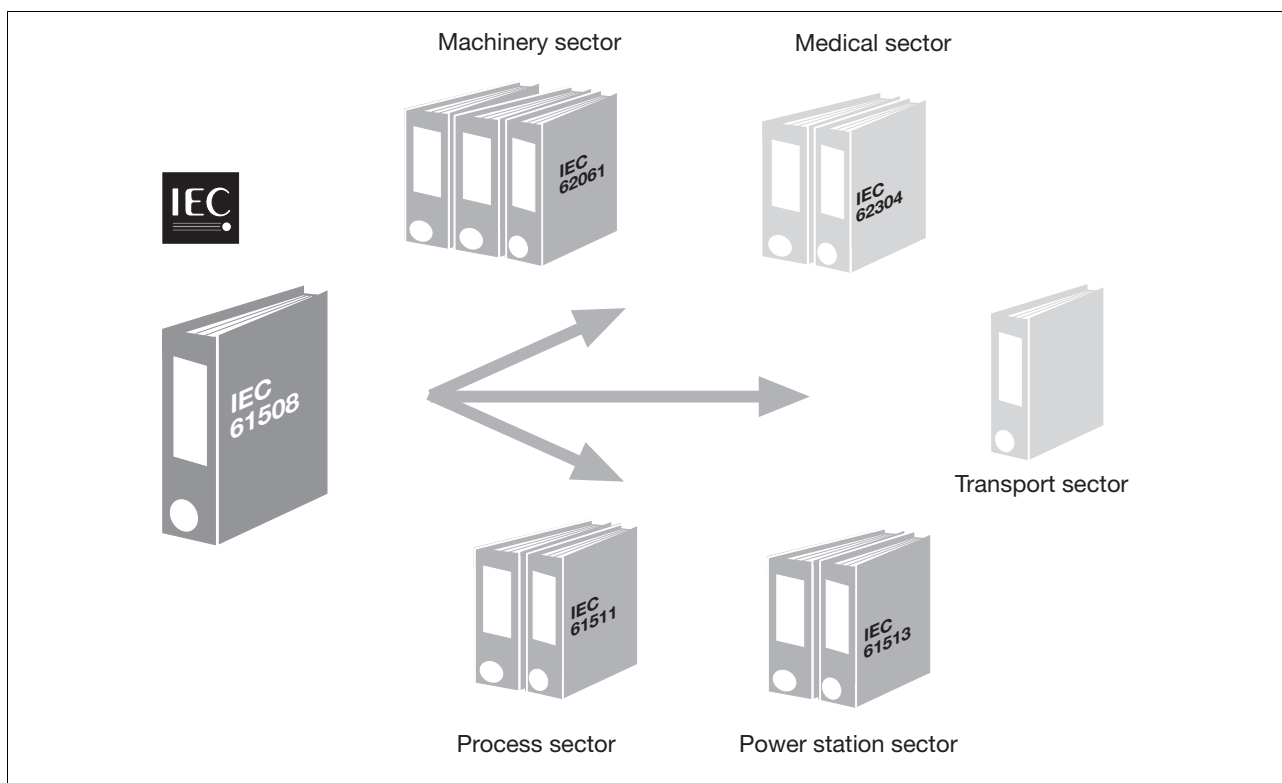
One of the main tasks of EN/IEC 61508 is to serve as a basis for the development of application-oriented standards. Standards' committees are

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 EN/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": so 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.



Sector standards from EN/IEC 61508

Functional safety in accordance with EN/IEC 62061

Risk assessment and determination of required Safety Integrity Level (SIL)												
Consequences	S	Class CI					Frequency and duration	Fr	Probability of hzd. event		Avoidance	
		3-4	5-7	8-10	11-13	14-15			Pr	Pr	P	
Death, losing an eye or arm	4	SIL 2	SIL 2	SIL 2	SIL 3	SIL 3	≤ 1 hour	5	Very high	5		
Permanent, losing fingers	3		OM	SIL 1	SIL 2	SIL 3	> 1 h – ≤ 1 day	5	Likely	4		
Reversible, medical attention	2			OM	SIL 1	SIL 2	> 1 day – ≤ 2 wks	4	Possible	3	Impossible	5
Reversible, first aid	1				OM	SIL 1	> 2 wks – ≤ 1 year	3	Rarely	2	Possible	3
							> 1 year	2	Negligible	1	Likely	1

☐ AM = Other measures recommended

Functional safety of safety-related electrical, electronic and programmable electronic control systems in accordance with EN/IEC 62061

EN/IEC 62061 represents a sector-specific standard under EN/IEC 61508. It describes the implementation of safety-related electrical control systems on machinery and

examines the overall lifecycle from the concept phase through to decommissioning. Quantitative and qualitative examinations of the safety functions form the basis.

Risk estimation is an iterative process, i.e. it will need to be carried out more than once. The risk must be assessed and the SIL defined for each hazard on which the risk is to be reduced through

control measures. The risk is estimated through consideration of the severity of injury (Se), the frequency and duration of exposure to the hazard (Fr), probability of occurrence of a hazardous event (Pr) and the possibility of avoiding or limiting the harm (Av). The required SIL is assigned using the table above, where $CI = Fr + Pr + Av$.

Functional safety in accordance with EN/IEC 62061

Safety Integrity Level (SIL) in accordance with EN IEC 62061	Probability of a dangerous failure per hour [1/h]
No special safety requirement	$10^{-5} < PFH < 10^{-4}$
1 (1 failure in 100 000 h)	$3 \times 10^{-6} < PFH < 10^{-5}$
1 (1 failure in 100 000 h)	$10^{-6} < PFH < 3 \times 10^{-6}$
2 (1 failure in 1 000 000 h)	$10^{-7} < PFH < 10^{-6}$
3 (1 failure in 10 000 000 h)	$10^{-8} < PFH < 10^{-7}$

SIL assignment

The safety integrity level (SIL) classifies three levels of probability of failure. The table shows the relationship between SIL and the probability of dangerous failure per hour (PFH_D).

The SRECS (safety-related electrical control system) is divided into subsystems. The subsystems are assigned to actual devices.

The probability of a dangerous failure is calculated by adding the probabilities of failure of all the subsystems of the SRECS:

$$PFH_D = PFH_{D1} + \dots + PFH_{Dn}$$

The selection or design of the SRECS must always meet the following minimum requirements:

Requirements for hardware safety integrity, comprising

- ▶ Architectural constraints for hardware safety integrity
- ▶ Requirements for the probability of dangerous random hardware failures

plus requirements for systematic safety integrity, comprising

- ▶ Requirements for avoidance of failures and
- ▶ Requirements for the control of systematic failures.

The following parameters are required in assessing hardware safety integrity:

λ_D : Dangerous failure rate

T1: Proof test
T2: Diagnostic test interval
DC: Diagnostic coverage
 β : Common cause failure

The calculated probability of failure (PFH_D) of each SRECS must be less than the probability of failure required by the safety function. The required probability of failure, depending on the SIL, can be taken from the table. If this condition is not met, the safety function must be implemented differently.

The achieved SIL can only be as high as the lowest SILCL (SIL Claim Limit) of a subsystem involved in performing the safety function.

Safe failure fraction (SFF)	Hardware fault tolerance 0	Hardware fault tolerance 1	Hardware fault tolerance 2
< 60 %	Not allowed	SIL 1	SIL 2
60 % – < 90 %	SIL 1	SIL 2	SIL 3
90 % – < 99 %	SIL 2	SIL 3	SIL 3
99 %	SIL 3	SIL 3	SIL 3



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