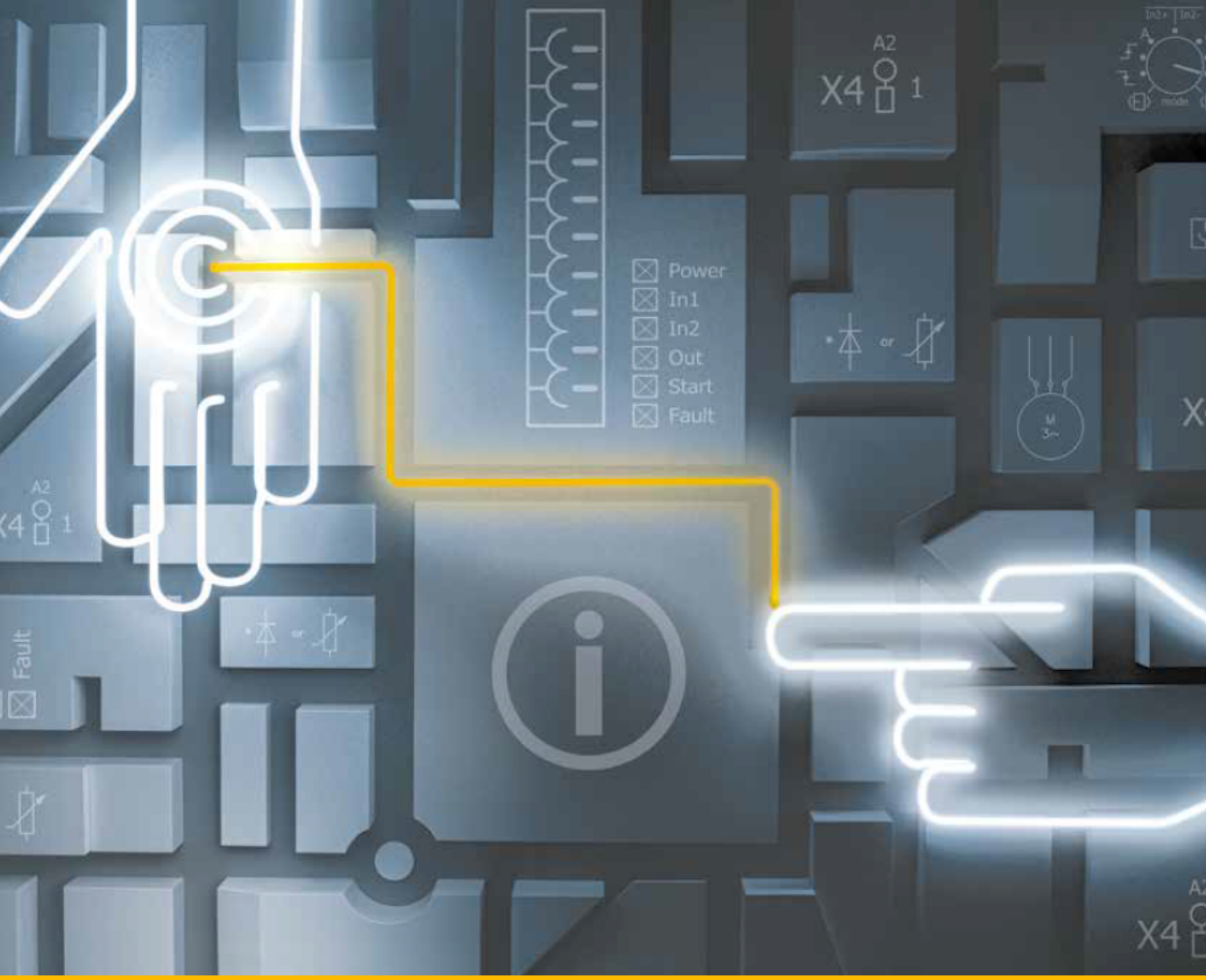


Series connection safety switch

PILZ
THE SPIRIT OF SAFETY

System Description-1006503-EN-01
- PSEN sensor technology




This document is the original document.

Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

1 Introduction

1.1 Definition of symbols

Information that is particularly important is identified as follows:

DANGER!

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.

WARNING!

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.

CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.

NOTICE

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.

INFORMATION

This gives advice on applications and provides information on special features.

2 Overview

This system description describes how safety switches from different PSEN product ranges can be combined in a series connection. The series connection of identical safety switches is described in the respective operating manuals.

Series connections consist of a minimum of 2 and a maximum of 16 safety switches.

2.1 Overview of series connection with SDD (Safety Device Diagnostics)

Safety switch:

- Safety locking device PSENslock "PSEN sl2-G"
- Safety locking device PSENslock "PSEN sl2-D"
- Safety locking device PSENslock "PSEN sl2-I"
- Safety locking device PSENmlock "PSEN ml s"
- Coded safety switches PSENcode "PSEN cs"

Safety switch combinations			Last safety switch	Link
PSEN sl2-G	and/or	PSEN cs	PSEN sl2-G	Safety locking device PSENslock "PSEN sl2-G" – Coded safety switches PSENcode "PSEN cs"
PSEN sl2-D and/or PSEN sl2-I	and/or	PSEN cs	PSEN sl2-D or PSEN sl2-I or PSEN cs	Safety locking device PSENslock "PSEN sl2-D"/"PSEN sl2-I" – Coded safety switches PSENcode "PSEN cs"
PSEN ml s	and/or	PSEN cs	PSEN ml s	Safety locking device PSENmlock "PSEN ml s" – Coded safety switches PSENcode "PSEN cs"

2.2 Overview of series connection without SDD (Safety Device Diagnostics)

Safety switch:

- Safety locking device PSENslock "PSEN sl2-G"
- Safety locking device PSENslock "PSEN sl2-D"
- Safety locking device PSENslock "PSEN sl2-I"
- Safety locking device PSENmlock "PSEN ml s"
- Coded safety switches PSENcode "PSEN cs"

Safety switch combinations			Last safety switch	Link
PSEN sl2-G	and/or	PSEN cs	PSEN sl2-G	Safety locking device PSENslock "PSEN sl2-G" – Coded safety switches PSENcode "PSEN cs"
PSEN sl2-D and/or PSEN sl2-I	and/or	PSEN cs	PSEN sl2-D or PSEN sl2-I or PSEN cs	Safety locking device PSENslock "PSEN sl2-D"/"PSEN sl2-I" – Coded safety switches PSEN-code "PSEN cs"
PSEN ml s	and/or	PSEN cs	PSEN ml s	Safety locking device PSENmlock "PSEN ml s" – Coded safety switches PSENcode "PSEN cs"

3 Safety

3.1 Intended use

This system description is used to illustrate combinable safety switches, which may be connected in series up to a specified maximum number.

3.1.1 Application conditions

NOTICE

EMC-compliant electrical installation

The product is designed for use in an industrial environment. The product may cause interference if installed in other environments. If installed in other environments, measures should be taken to comply with the applicable standards and directives for the respective installation site with regard to interference.

3.1.2 Use of qualified personnel

Product installation, assembly, programming, commissioning, operation, decommissioning and maintenance may only be carried out by competent persons.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required.

In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, regulations, directives and standards.

It is the company's responsibility only to employ personnel who

- Are familiar with the basic regulations concerning health and safety / accident prevention,
- Have read and understood the section on "Safety" in this description and
- Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.1.3 Improper use

The following is deemed improper use in particular:

- Any component, technical or electrical modification to the product
- Use of the product outside the areas described in this document.
- Use of the product outside the technical details (see Technical Details).

3.2 Safety regulations

3.2.1 Additional documents that apply

Please read and take note of the following documents:

- The system description of the automation system PSS 4000 (1001467)

- The operating manual for the relevant configurable safe small controller PNOZmulti 2, e.g.
  - PNOZ m B0
  - PNOZ m B0.1
  - PNOZ m B1
- The operating manual for the modular safety relay myPNOZ (1005377)
- The operating manual for the relevant fieldbus module, e.g.
  - SDD ES EIP
  - SDD ES ETH
  - SDD ES PROFINET
- The operating manuals for the relevant safety switches, e.g.
  - PSEN sl2-G
  - PSEN cs
  - PSEN ml s
- The operating manuals for the relevant plug-in connectors, adapters and connection cables, e.g.
  - PSEN ml Y junction M12
  - PSEN ml end adapter
  - PSEN cable

3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if

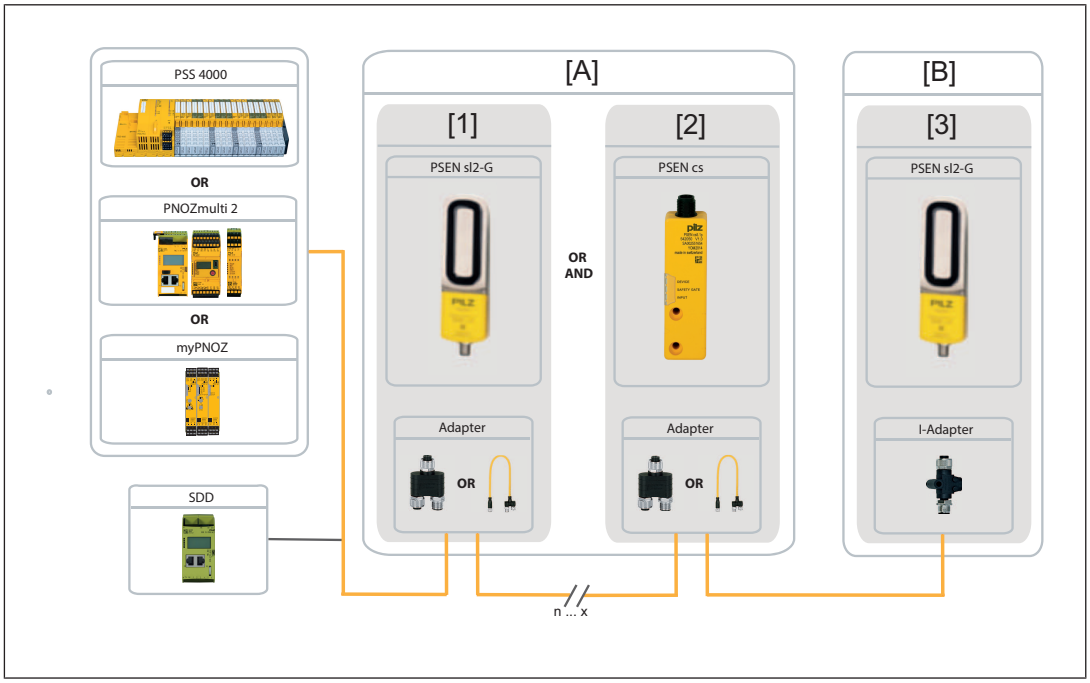
- The product was used contrary to the purpose for which it is intended,
- damage can be attributed to not having followed the guidelines in the operating manual,
- Operating personnel are not suitably qualified,
- Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

3.2.3 Disposal

- In safety-related applications, please comply with the mission time T_M stated in the safety-related characteristic data.
- When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

4 Series connections with SDD

4.1 Safety locking device PSENslock "PSEN sl2-G" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN sl2-G	Safety switch/actuator	Order reference
	PSEN ml Y junction M12	Y-adapter	570486
	or		
	Adapter/SL/M12-8SMX/ M12-8SFX/M12-12SF/PT	Y-adapter with cable	6N000030
[2]	PSEN cs	Unit/Safety switch/actuator	Order reference
	PSEN Y junction M12 SENSOR	Y-adapter	540315
	or		
	PSEN Y junction M12-M12/ M12 PIGTAIL	Y-adapter with cable	540338
[3]	PSEN sl2-G	Safety switch/actuator	Order reference
	PSEN ml end adapter	Termination adapter	570487

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals

and

- One SDD fieldbus module
- Only the specified adapters and connection cables are used.
- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

A maximum of 16 safety switches may be connected in the series connection.

- [A] A maximum of 15 safety switches may be connected in series in any combination, consisting of PSEN sl2-G [1] and/or PSEN cs [2]. The following maximum number of units may not be exceeded
  - PSEN sl2-G maximum 4 pieces
- [B] The PSEN sl2-G must be connected as the last safety switch in the series connection

Procedure

1. Connect a safety switch PSEN sl2-G [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN sl2-G [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
   The maximum number of safety switches PSEN sl2-G [1] must not be exceeded, see "Combination options".
3. Connect the PSEN sl2-G [3] as the last safety switch in the series connection. Use the specified I-adapter [3] for this.

4.1.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- 30 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

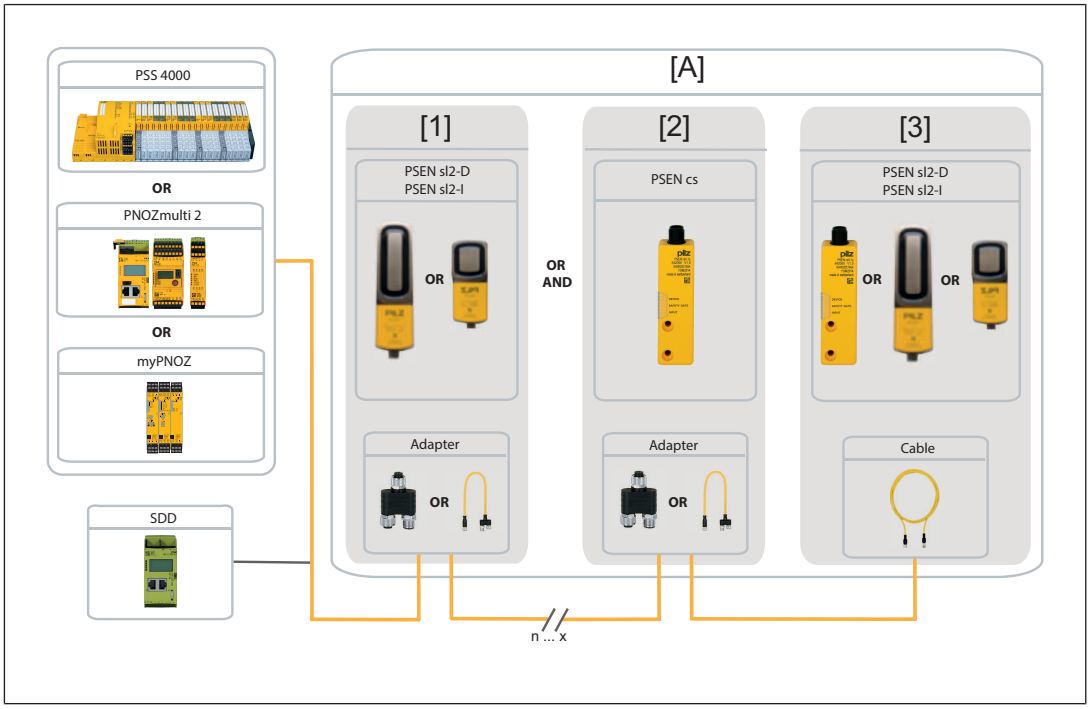
4.1.2 Function check

1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENslock/PSENcode is connected.
3. Set safety input S31 to High (24 V) via the evaluation device.
4. Activate guard locking for all PSENslock devices via the SDD fieldbus module.

   If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENslock/ PSENcode outputs 12 and 22.
5. Deactivate guard locking for all PSENslock devices via the SDD fieldbus module.

   The gates and flaps can be opened again.
6. Set safety input S31 to Low (0 V) via the evaluation device.

4.2 Safety locking device PSENslock "PSEN sl2-D"/"PSEN sl2-I" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN sl2-D/PSEN sl2-I	Safety switch/actuator	Order reference
	PSEN Y junction M12 SENSOR	Y-adapter	540315
	or		
	PSEN Y junction M12-M12/ M12 PIGTAIL	Y-adapter with cable	540338
[2]	PSEN cs	Safety switch/actuator	Order reference
	PSEN Y junction M12 SENSOR	Y-adapter	540315
	or		
	PSEN Y junction M12-M12/ M12 PIGTAIL	Y-adapter with cable	540338
[3]	PSEN sl2-D/PSEN sl2-I	Unit/Safety switch/actuator	Order reference
	PSEN cable	Connection cable	Order reference

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals

and

- One SDD fieldbus module
- Only the specified adapters and connection cables are used.
- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

- [A] A maximum of 16 safety switches may be connected in series in any combination, consisting of PSEN sl2-D, PSEN sl2-I and/or PSEN cs. The following maximum number of units may not be exceeded
  - PSEN sl2-DL maximum 4 pieces
  - PSEN sl2-DM maximum 6 pieces
  - PSEN sl2-IL maximum 4 pieces
  - PSEN sl2-IM maximum 6 pieces

Procedure

1. Connect a safety switch PSEN sl2-D or PSEN sl2-I [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN sl2-D or PSEN sl2-I [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
   The maximum number of safety switches PSEN sl2-D and/or PSEN sl2-I [1] must not be exceeded, see "Combination options".
3. Connect the PSEN sl2-D or PSEN sl2-I or PSEN cs [3] as the last safety switch in the series connection. Use the connection cable [3] for this.

4.2.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- PSEN sl2-DM: 150 m
- PSEN sl2-DL: 30 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

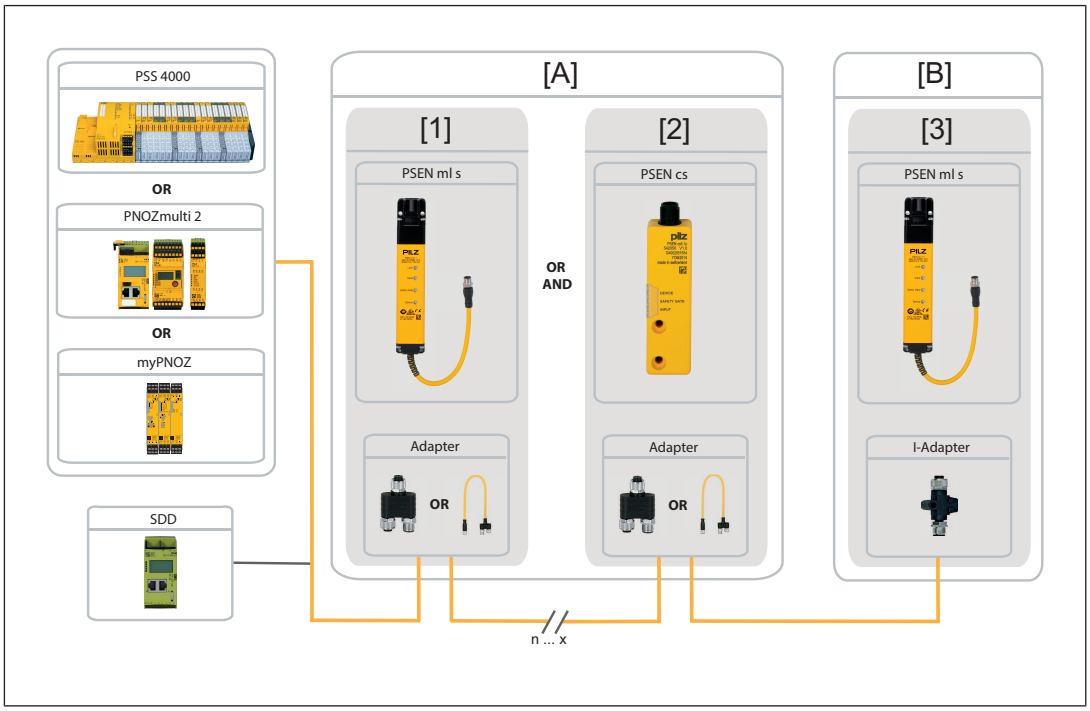
4.2.2 Function check

1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENslock/PSENcode is connected.
3. Activate guard locking for all PSENslock devices via the SDD fieldbus module.

   If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENslock/ PSENcode outputs 12 and 22.
4. Deactivate guard locking for all PSENslock devices via the SDD fieldbus module.

   The gates and flaps can be opened again.

4.3 Safety locking device PSENmlock "PSEN ml s" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN ml s	Unit/Safety switch/actuator	Order reference
	PSEN ml Y junction M12	Y-adapter	570486
	or		
	Adapter/SL/M12-8SMX/ M12-8SFX/M12-12SF/PT	Y-adapter with cable	6N000030
[2]	PSEN cs	Unit/Safety switch/actuator	Order reference
	PSEN Y junction M12 SENSOR	Plug-in connector, Y-adapter	540315
	or		
	PSEN Y junction M12-M12/ M12 PIGTAIL	Y-adapter with cable	540338
[3]	PSEN ml s	Unit/Safety switch/actuator	Order reference
	PSEN ml end adapter	Termination adapter	570487

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals

and

- One SDD fieldbus module
- Only the specified adapters and connection cables are used.
- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

A maximum of 16 safety switches may be connected in the series connection.

- [A] A maximum of 15 safety switches may be connected in series in any combination, consisting of PSEN ml s [1] and/or PSEN cs [2].
- [B] The PSEN ml s must be connected as the last safety switch in the series connection.

Procedure

1. Connect a safety switch PSEN ml s [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN ml s [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
3. Connect the PSEN ml s [3] as the last safety switch in the series connection. Use the specified I-adapter [3] for this.

4.3.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- 50 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

4.3.2 Function check

1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENmlock/PSENcode is connected.
3. Set safety input S31 and S41 to High (24 V) via the evaluation device.
4. Activate guard locking for all PSENmlock devices via the SDD fieldbus module.

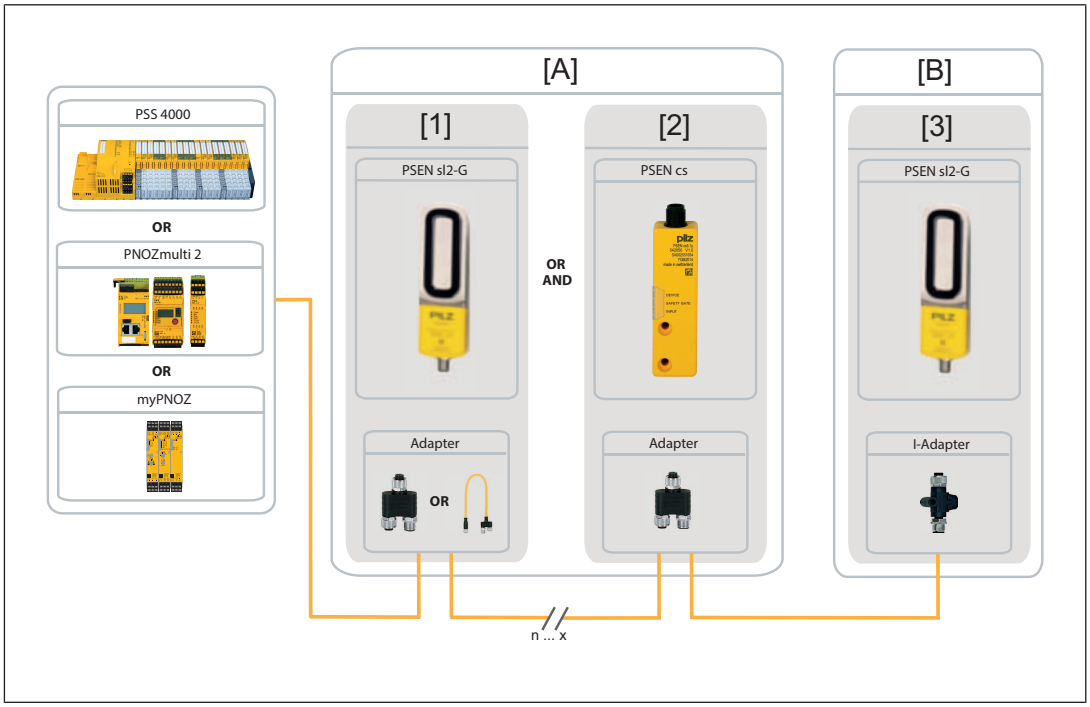
If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENmlock/ PSENcode outputs 12 and 22.

5. Set safety input S31 and S41 to Low (0 V) via the evaluation device.
6. Deactivate guard locking for all PSENmlock devices via the SDD fieldbus module.
7. Set safety input S31 and S41 to High (24 V) via the evaluation device.
8. Activate guard locking for all PSENmlock devices via the SDD fieldbus module.
9. Set safety input S31 and S41 to Low (0 V) via the evaluation device.

   The gates and flaps can be opened again.

5 Series connections without SDD

5.1 Safety locking device PSENslock "PSEN sl2-G" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN sl2-G	Safety switch/actuator	Order reference
	PSEN ml Y junction M12	Y-adapter	570486
	or		
	Adapter/SL/M12-8SMX/ M12-8SFX/M12-12SF/PT	Y-adapter with cable	6N000030
[2]	PSEN cs	Unit/Safety switch/actuator	Order reference
	PSEN ml / PSEN cs Y junction M12	Y-adapter	570489
[3]	PSEN sl2-G	Safety switch/actuator	Order reference
	PSEN ml end adapter	Termination adapter	570487

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals
- Only the specified adapters and connection cables are used.
- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

A maximum of 16 safety switches may be connected in the series connection.

- [A] A maximum of 15 safety switches may be connected in series in any combination, consisting of PSEN sl2-G [1] and/or PSEN cs [2]. The following maximum number of units may not be exceeded
  - PSEN sl2-G maximum 4 pieces
- [B] The PSEN sl2-G must be connected as the last safety switch in the series connection.

Procedure

1. Connect a safety switch PSEN sl2-G [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN sl2-G [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
   The maximum number of safety switches PSEN sl2-G [1] must not be exceeded, see "Combination options".
3. Connect the PSEN sl2-G [3] as the last safety switch in the series connection. Use the specified I-adapter [3] for this.

5.1.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- 30 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

5.1.2 Function check

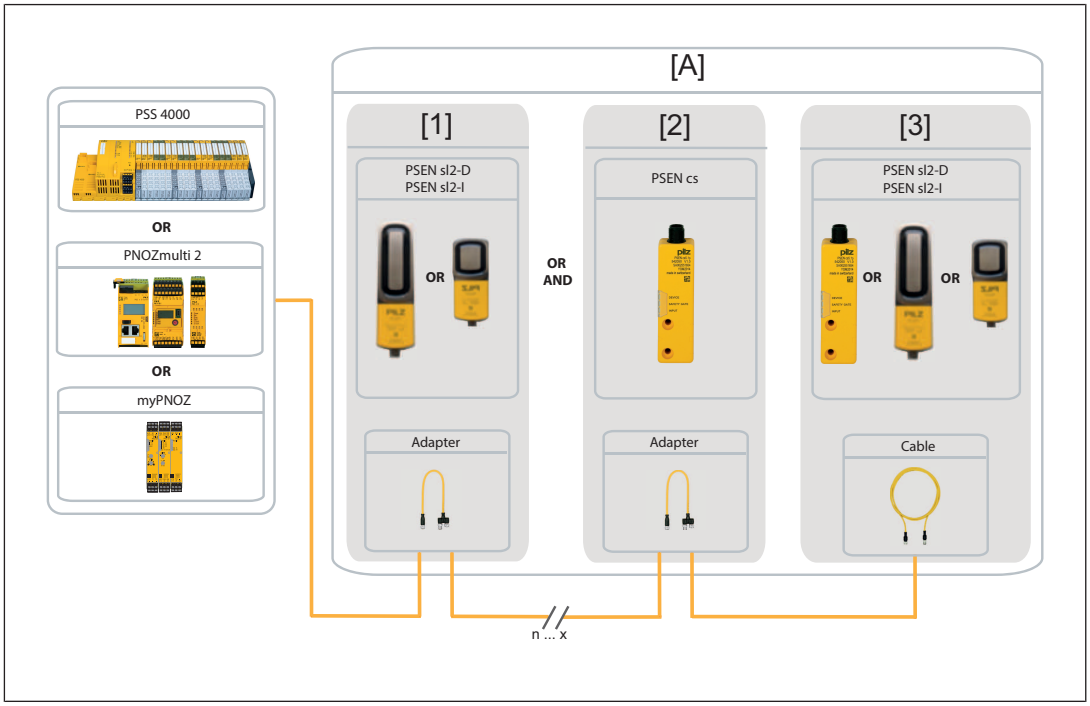
1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENslock/PSENcode is connected.
3. Set safety input S31 to High (24 V) via the evaluation device.

If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENslock/ PSENcode outputs 12 and 22.

4. Set safety input S31 to Low (0 V) via the evaluation device.

   The gates and flaps can be opened again.

5.2 Safety locking device PSENslock "PSEN sl2-D"/"PSEN sl2-I" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN sl2-D/PSEN sl2-I	Unit/Safety switch/actuator	Order reference
	PSEN sl2 PR Y junction	Y-adapter with cable	6N000029
[2]	PSEN cs	Unit/Safety switch/actuator	Order reference
	PSEN sl2 PR Y junction	Y-adapter with cable	6N000029
[3]	PSEN sl2-D/PSEN sl2-I	Unit/Safety switch/actuator	Order reference
	PSEN cable	Connection cable	Order reference

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals
- Only the specified adapters and connection cables are used.
- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

- [A] A maximum of 16 safety switches may be connected in series in any combination, consisting of PSEN sl2-D, PSEN sl2-I and/or PSEN cs. The following maximum number of units may not be exceeded
  - PSEN sl2-DL maximum 4 pieces
  - PSEN sl2-DM maximum 6 pieces
  - PSEN sl2-IL maximum 4 pieces
  - PSEN sl2-IM maximum 6 pieces

Procedure

1. Connect a safety switch PSEN sl2-D or PSEN sl2-I [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN sl2-D or PSEN sl2-I [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
   The maximum number of safety switches PSEN sl2-D and/or PSEN sl2-I [1] must not be exceeded, see "Combination options".
3. Connect the PSEN sl2-D or PSEN sl2-I or PSEN cs [3] as the last safety switch in the series connection. Use the connection cable [3] for this.

5.2.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- PSEN sl2-DM: 185 m
- PSEN sl2-DL: 30 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

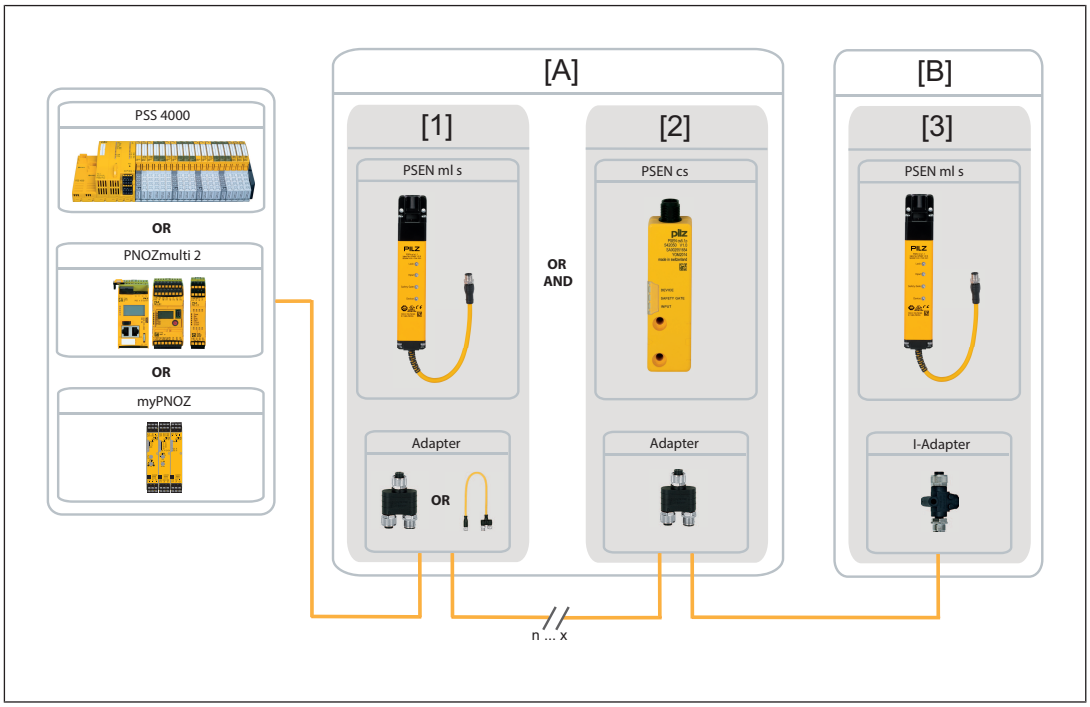
5.2.2 Function check

1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENslock/PSENcode is connected.
3. Set safety input 31/Y1 to High (24 V) via the evaluation device.

   If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENslock/PSENcode outputs 12 and 22.

4. Set safety input 31/Y1 to Low (0 V) via the evaluation device.
   The gates and flaps can be opened again.

5.3 Safety locking device PSENmlock "PSEN ml s" – Coded safety switches PSENcode "PSEN cs"



Position	Product type	Features	Product ID
[1]	PSEN ml s	Unit/Safety switch/actuator	Order reference
	PSEN ml/PSEN cs Y junction M12	Plug-in connector, Y-adapter	570486
	or		
	Adapter/SL/M12-8SMX/ M12-8SFX/M12-12SF/PT	Y-adapter with cable	6N000030
[2]	PSEN cs	Unit/Safety switch/actuator	Order reference
	PSEN ml/PSEN cs Y junction M12	Y-adapter	570489
[3]	PSEN ml s	Unit/Safety switch/actuator	Order reference
	PSEN ml end adapter	Termination adapter	570487

Prerequisite

- An automation system PSS 4000

or

- A small controller from the Pilz range of configurable safe small controllers PNOZmulti

or

- A modular safety relay myPNOZ

or

- A suitable evaluation device, which meets the safety switch requirements; these are described in the respective operating manuals
- Only the specified adapters and connection cables are used.

- Cable lengths to and between the safety switches should be kept as short as possible. Cable lengths have a direct influence on the correct function of the series connection.

Combination options

A maximum of 16 safety switches may be connected in the series connection.

- [A] A maximum of 15 safety switches may be connected in series in any combination, consisting of PSEN ml s [1] and/or PSEN cs [2]. The following maximum number of units may not be exceeded
  - PSEN ml s maximum 6 pieces
- [B] The PSEN ml s must be connected as the last safety switch in the series connection.

Procedure

1. Connect a safety switch PSEN ml s [1] to a suitable control system, see "Prerequisite". Use the specified adapter [1] for this.

   or

   Connect a safety switch PSEN cs [2] to a suitable control system, see "Prerequisite". Use the adapter [2] for this.
2. Connect up to 14 additional safety switches PSEN ml s [1] and/or PSEN cs [2] in series, in any combination. Use the specified adapters [1], [2].
3. Connect the PSEN ml s [3] as the last safety switch in the series connection. Use the specified I-adapter [3] for this.

5.3.1 Notes on the length of the connection cable

The maximum length of the connection cable depends on the voltage drop on the cables to the safety switch. The level of voltage drop is determined by:

- the cable resistance
- the current of the device
- the current load of the outputs

The maximum total length of the connection cable is:

- 120 m

Suitable connection cables for connecting the safety switches can be found with the corresponding products under "Accessories" in the Pilz "E-Shop": www.pilz.com

5.3.2 Function check

1. Ensure that the series connection is set up as shown above. Comply with the information in the operating manuals for the individual components.
2. Close all gates and flaps to which a PSENmlock/PSENcode is connected.
3. Set safety input S31 and S41 to High (24 V) via the evaluation device.

   If the test is successful, a high signal (24 V) will be present at both safety inputs on the evaluation device, e.g. In1, In2. The high signal (24 V) comes from the PSENmlock/ PSENcode outputs 12 and 22.

   Information on "Activation of safety inputs S31 and S41 (solenoid operation)" can be found in the relevant PSENmlock operating manual.

4. Set safety input S31 and S41 to Low (0 V) via the evaluation device.
5. Set safety input S31 and S41 to High (24 V) via the evaluation device.
6. Set safety input S31 and S41 to Low (0 V) via the evaluation device.
   The gates and flaps can be opened again.

6 Order reference

6.1 Coded safety switches PSENcode "PSEN cs"

6.1.1 PSEN cs1

Product type	Features	Product ID
PSEN cs1.1p / PSEN cs1.1 1 Unit	Coded safety switch PSENcode, with safety switch and actuator, 8-pin M12 male connector, series connection, large design	540000
PSEN cs1.13p / PSEN cs1.1 / ATEX 1 unit	Coded safety switch PSENcode, with safety switch and actuator, ATEX certificate, 8-pin M12 male connector, series connection, large design, incl. 1 pair CABLE/M12/CLIP for securing 1 M12 plug-in connector	540005
PSEN cs1.1p 1 switch	Safety switch, coded, for coded safety switch PSENcode, 8-pin M12 male connector, series connection, large design	540050
PSEN cs1.1 1 actuator	Actuator, coded, for coded safety switches PSENcode	540080

6.1.2 PSEN cs2

Product type	Features	Product ID
PSEN cs2.1p / PSEN cs2.1 1Unit	Coded safety switch PSENcode, fully coded, with safety switch and actuator, 8-pin M12 male connector, series connection, large design	540100
PSEN cs2.13p / PSEN cs2.1 / ATEX	Coded safety switch PSENcode, fully coded, with safety switch and actuator, ATEX certificate, 8-pin M12 male connector, series connection, large design, incl. 1 pair CABLE/M12/CLIP for securing 1 M12 plug-in connector	540105
PSEN cs2.1p 1 switch	Safety switch, fully coded, for coded safety switch PSENcode, 8-pin M12 male connector, series connection, large design	540150
PSEN cs2.2p / PSEN cs2.1 1 Unit	Coded safety switch PSENcode, uniquely fully coded, with safety switch and actuator, 8-pin M12 male connector, series connection, large design	540200

Product type	Features	Product ID
PSEN cs2.1 1 actuator	Actuator, coded, for coded safety switches PSENcode	540180

6.1.3 PSEN cs3

Product type	Features	Product ID
PSEN cs3.1 M12/8-0.15m/PSEN cs3.1 1Unit	Coded safety switch PSENcode, with safety switch and actuator, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541009
PSEN cs3.1 M12/8-1.5m/PSEN cs3.1 1unit	Coded safety switch PSENcode, with safety switch and actuator, 8-pin M12 male connector, 1.5 m cable, series connection, compact design	541014
PSEN cs3.1 M12/8-0.15m 1switch	Safety switch, coded, for coded safety switch PSENcode, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541059
PSEN cs3.1 M12/8-1.5m 1switch	Safety switch, coded, for coded safety switch PSENcode, 8-pin M12 male connector, 1.5 m cable, series connection, compact design	541064
PSEN cs3.1 1actuator	Actuator, coded, for coded safety switch PSENcode	541080
PSEN cs3.1 low profile glue 1 actuator	Actuator, coded, for coded safety switch PSENcode, adhesive	541087
PSEN cs3.1 low profile screw 1 actuator	Actuator, coded, for coded safety switch PSENcode, with screw, adhesive	541088

6.1.4 PSEN cs4

Product type	Features	Product ID
PSEN cs4.1 M12/8-0.15m/PSEN cs4.1 1Unit	Coded safety switch PSENcode, fully coded, with safety switch and actuator, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541109
PSEN cs4.1 M12/8-1.5m/PSEN cs4.1 1unit	Coded safety switch PSENcode, fully coded, with safety switch and actuator, 8-pin M12 male connector, 1.5 m cable, series connection, compact design	541114
PSEN cs4.1 M12/8-0.15m 1switch	Safety switch, fully coded, for coded safety switch PSENcode, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541159
PSEN cs4.2 M12/8-0.15m/PSEN cs4.1 1Unit	Coded safety switch PSENcode, uniquely fully coded, with safety switch and actuator, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541209
PSEN cs4.2 M12/8-0.15m 1switch	Safety switch, uniquely fully coded, for coded safety switch PSENcode, 8-pin M12 male connector, 0.15 m cable, series connection, compact design	541259
PSEN cs4.1 1 actuator	Actuator, fully coded, for coded safety switch PSENcode	541180

Product type	Features	Product ID
PSEN cs4.1 low profile glue 1 actuator	Actuator, fully coded, for coded safety switch PSENcode, adhesive	541187
PSEN cs4.1 low profile screw 1 actuator	Actuator, fully coded, for coded safety switch PSENcode, with screw, adhesive	541188

6.1.5 PSEN cs5

Product type	Features	Product ID
PSEN cs5.13 M12/8/ PSEN cs5.13 M12 EX 1u	Coded safety switch PSENcode, with safety switch and actuator, ATEX certificate, 8-pin M12 male connector, series connection, large design, incl. 1 pair CABLE/M12/CLIP for securing 1 M12 plug-in connector	542005
PSEN cs5.1 M12/8/ PSEN cs5.1 M12 1unit	Coded safety switch PSENcode, with safety switch and actuator, 8-pin M12 male connector, series connection, long design	542009
PSEN cs5.11 M12/8/ PSEN cs5.11 M12 1unit	Coded safety switch PSENcode, with safety switch and actuator, magnetic latching, 8-pin M12 male connector, series connection, long design	542011
PSEN cs5.11 M12/8 1switch	Safety switch, coded, for coded safety switch PSENcode, magnetic latching, 8-pin M12 male connector, series connection, long design	542051
PSEN cs5.13 M12/8 EX 1switch	Safety switch, coded, for coded safety switch PSENcode, ATEX certificate, 8-pin M12 male connector, series connection, large design	542055
PSEN cs5.1 M12/8 1switch	Safety switch, coded, for coded safety switch PSENcode, 8-pin M12 male connector, series connection, long design	542059
PSEN cs5.1 1actuator	Actuator, coded, for coded safety switch PSENcode	542080
PSEN cs5.11 M12 1actuator	Actuator, coded, for coded safety switch PSENcode, magnetic latching	542081
PSEN cs5.1 M12 1actuator	Actuator, coded, for coded safety switch PSENcode	542083
PSEN cs5.13 M12 EX 1actuator	Actuator, coded, for coded safety switch PSENcode, ATEX certificate	542085
PSEN cs5.1 low profile glue 1 actuator	Actuator, coded, for coded safety switch PSENcode, adhesive	542087
PSEN cs5.1 low profile screw 1 actuator	Actuator, coded, for coded safety switch PSENcode, with screw, adhesive	542088

6.1.6 PSEN cs6

Product type	Features	Product ID
PSEN cs6.1 M12/8/ PSEN cs6.1 M12 1unit	Coded safety switch PSENcode, fully coded, with safety switch and actuator, 8-pin M12 male connector, series connection, long design	542109
PSEN cs6.11 M12/8/ PSEN cs6.11 M12 1unit	Coded safety switch PSENcode, fully coded, with safety switch and actuator, magnetic latching, 8-pin M12 male connector, series connection, long design	542111
PSEN cs6.11 M12/8 1switch	Safety switch, fully coded, for coded safety switch PSENcode, magnetic latching, 8-pin M12 male connector, series connection, long design	542151
PSEN cs6.1 M12/8 1switch	Safety switch, fully coded, for coded safety switch PSENcode, 8-pin M12 male connector, series connection, long design	542159
PSEN cs6.2 M12/8/ PSEN cs6.1 M12 1unit	Coded safety switch PSENcode, uniquely fully coded, with safety switch and actuator, 8-pin M12 male connector, series connection, long design	542209
PSEN cs6.21 M12/8/ PSEN cs6.11 M12 1unit	Coded safety switch PSENcode, uniquely fully coded, with safety switch and actuator, magnetic latching, 8-pin M12 male connector, series connection, long design	542211
PSEN cs6.21 M12/8 1switch	Safety switch, uniquely fully coded, for coded safety switch PSENcode, magnetic latching, 8-pin M12 male connector, series connection, long design	542251
PSEN cs6.2 M12/8 1switch	Safety switch, uniquely fully coded, for coded safety switch PSENcode, 8-pin M12 male connector, series connection, long design	542259
PSEN cs6.1 1actuator	Actuator, fully coded, for coded safety switch PSENcode	542180
PSEN cs6.11 M12 1actuator	Actuator, fully coded, for coded safety switch PSENcode, magnetic latching	542181
PSEN cs6.1 M12 1actuator	Actuator, fully coded, for coded safety switch PSENcode	542183
PSEN cs6.1 low profile glue 1 actuator	Actuator, fully coded, for coded safety switch PSENcode, without screw	542187
PSEN cs6.1 low profile screw 1 actuator	Actuator, fully coded, for coded safety switch PSENcode, with screw, adhesive	542188

6.2 Safety locking device PSENslock (8-pin) "PSEN sl2-D"/"PSEN sl2-I"

6.2.1 Safety switch with magnetic force (F1max.) 1000 N

Product type	Features	Product ID
PSEN sl2-DM1-P switch	Safety switch, with electromagnetic guard locking, coded, for safety locking device PSENslock2, guard locking for process protection, holding force 1000 N, 8-pin M12 male connector, series connection	6N000001
PSEN sl2-DM2-P switch	Safety switch, with electromagnetic guard locking, fully coded, for safety locking device PSENslock2, guard locking for process protection, holding force 1000 N, 8-pin M12 male connector, series connection	6N000002
PSEN sl2-DM3-P switch	Safety switch, with electromagnetic guard locking, uniquely coded, for safety locking device PSENslock2, guard locking for process protection, holding force 1000 N, 8-pin M12 male connector, series connection	6N000003
PSEN sl2-IM1-P switch	Safety switch with electromagnetic guard locking, coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 1000 N, 8-pin M12 male connector, series connection	6N000019
PSEN sl2-IM2-P switch	Safety switch with electromagnetic guard locking, fully coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 1000 N, 8-pin M12 male connector, series connection	6N000020
PSEN sl2-IM3-P switch	Safety switch with electromagnetic guard locking, uniquely coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 1000 N, 8-pin M12 male connector, series connection	6N000021
PSEN sl2-DM1-P WD switch	Safety switch, with electromagnetic guard locking, coded, for safety locking device PSENslock2, guard locking for process protection, holding force 1000 N, 8-pin M12 male connector, series connection	6N000032
PSEN sl2-DM3-P WD switch	Safety switch with electromagnetic guard locking, uniquely coded, for safety locking device PSENslock2, guard locking for process protection, holding force 750 N, 8-pin M12 male connector, series connection	6N000033

Product type	Features	Product ID
PSEN sl2-IM1-P WD switch	Safety switch with electromagnetic guard locking, coded, for safety locking device PSENslock2, guard locking for process protection, safety outputs that switch independently from guard locking, holding force 750 N, 8-pin M12 male connector, series connection	6N000034

6.2.2 Actuator with magnetic force (F1max.) 1000 N

Product type	Features	Product ID
PSEN sl2-M-AL actuator	Actuator for safety guard locking device PSENslock2, base plate of aluminium, for holding force 1000 N	6N000025
PSEN sl2-M-VA actuator	Actuator for safety guard locking device PSENslock2, base plate of stainless steel, for holding force 1000 N	6N000028

6.2.3 Safety switch with magnetic force (F1max.) 2000 N

Product type	Features	Product ID
PSEN sl2-DL1-P switch	Safety switch, with electromagnetic guard locking, coded, for safety locking device PSENslock2, guard locking for process protection, holding force 2000 N, 8-pin M12 male connector, series connection	6N000004
PSEN sl2-DL2-P switch	Safety switch, with electromagnetic guard locking, fully coded, for safety locking device PSENslock2, guard locking for process protection, holding force 2000 N, 8-pin M12 male connector, series connection	6N000005
PSEN sl2-DL3-P switch	Safety switch, with electromagnetic guard locking, uniquely coded, for safety locking device PSENslock2, guard locking for process protection, holding force 2000 N, 8-pin M12 male connector, series connection	6N000006
PSEN sl2-IL1-P switch	Safety switch with electromagnetic guard locking, coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 2000 N, 8-pin M12 male connector, series connection	6N000022
PSEN sl2-IL2-P switch	Safety switch with electromagnetic guard locking, fully coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 2000 N, 8-pin M12 male connector, series connection	6N000023
PSEN sl2-IL3-P switch	Safety switch with electromagnetic guard locking, uniquely coded, for safety guard locking device PSENslock2, guard locking for process protection, guard locking-independent safety outputs, holding force 2000 N, 8-pin M12 male connector, series connection	6N000024

6.2.4 Actuator with magnetic force (F1max.) 2000 N

Product type	Features	Product ID
PSEN sl2-L-AL actuator	Actuator for safety guard locking device PSENslock2, base plate of aluminium, for holding force 2000 N	6N000026
PSEN sl2-L-VA actuator	Actuator for safety guard locking device PSENslock2, base plate of stainless steel, for holding force 2000 N	6N000027

6.3 Safety locking device PSENslock "PSEN sl2-G"

6.3.1 Safety switch

Product type	Features	Product ID
PSEN sl2-GL1-S switch	Safety switch, with electromagnetic guard locking, coded, for safety locking device PSENslock2, safe guard locking for personnel protection, holding force 2000 N, 12-pin M12 male connector, series connection	6N000007
PSEN sl2-GL2-S switch	Safety switch, with electromagnetic guard locking, fully coded, for safety locking device PSENslock2, safe guard locking for personnel protection, holding force 2000 N, 12-pin M12 male connector, series connection	6N000008
PSEN sl2-GL3-S switch	Safety switch, with electromagnetic guard locking, uniquely coded, for safety locking device PSENslock2, safe guard locking for personnel protection, holding force 2000 N, 12-pin M12 male connector, series connection	6N000009

6.3.2 Actuator

Product type	Features	Product ID
PSEN sl2-L-AL actuator	Actuator for safety guard locking device PSENslock2, base plate of aluminium, for holding force 2000 N	6N000026
PSEN sl2-L-VA actuator	Actuator for safety guard locking device PSENslock2, base plate of stainless steel, for holding force 2000 N	6N000027

6.4 Safety locking device PSENmlock "PSEN ml s"

6.4.1 Safety switch

Product type	Features	Product ID
PSEN ml s 1.1 switch	Safety switch, coded, for safety guard locking device PSENmlock, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570407
PSEN ml s 2.1 switch	Safety switch, fully coded, for safety guard locking device PSENmlock, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570409
PSEN ml s 2.2 switch	Safety switch, uniquely coded, for safety guard locking device PSENmlock, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570411
PSEN ml sa 1.1 switch	Safety switch, coded, for safety guard locking device PSENmlock, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570431
PSEN ml sa 2.1 switch	Safety switch, fully coded, for safety guard locking device PSENmlock, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570433
PSEN ml sa 2.2switch	Safety switch, uniquely coded, for safety guard locking device PSENmlock, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570435

6.4.2 Actuator

Product type	Features	Product ID
PSEN ml 1.1 actuator	Actuator, coded, for safety guard locking device PSENmlock	570480
PSEN ml 2.1 actuator	Actuator, fully coded, for safety guard locking device PSENmlock	570481
PSEN ml 1.1 round actuator	Actuator with rounded head, coded, for safety locking device PSENmlock	570482
PSEN ml 2.1 round actuator	Actuator with rounded head, fully coded, for safety locking device PSENmlock	570483

6.4.3 Safety locking device (safety switch and round actuator)

Product type	Features	Product ID
PSEN ml s 1.1 unit r	Safety guard locking device PSENmlock, coded, with safety switch and actuator with rounded head, with guard locking, 12-pin M12 male connector, 0.23 m cable, series connection	570436

6.4.4 Safety locking device (safety switch and actuator)

Product type	Features	Product ID
PSEN ml s 1.1 unit	Safety guard locking device PSENmlock, coded, with safety switch and actuator, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570406
PSEN ml s 2.1 unit	Safety guard locking device PSENmlock, fully coded, with safety switch and actuator, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570408
PSEN ml s 2.2 unit	Safety guard locking device PSENmlock, uniquely coded, with safety switch and actuator, with guard locking, with power reset, 12-pin M12 male connector, 0.23 m cable, series connection	570410
PSEN ml sa 1.1 unit	Safety guard locking device PSENmlock, coded, with safety switch and actuator, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570430
PSEN ml sa 2.1 unit	Safety guard locking device PSENmlock, fully coded, with safety switch and actuator, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570432
PSEN ml sa 2.2 unit	Safety guard locking device PSENmlock, uniquely coded, with safety switch and actuator, with guard locking, with automatic reset, 12-pin M12 male connector, 0.23 m cable, series connection	570434

6.5 Connection cable PSEN cable

Product type	Features	Product ID
PSEN cable M12-8sf M12-8sm, 0.5m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 0.5 m	540345
PSEN cable M12-8sf M12-8sm, 1m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 1 m	540346
PSEN cable M12-8sf M12-8sm, 1.5m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 1.5 m	540347
PSEN cable M12-8sf M12-8sm, 2m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 2 m	540340
PSEN cable M12-8sf M12-8sm, 5m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 5 m	540341
PSEN cable M12-8sf M12-8sm, 10m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 10 m	540342
PSEN cable M12-8sf M12-8sm, 20m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 20 m	540343
PSEN cable M12-8sf M12-8sm, 30m	Connection cable, 8 x 0.25 mm², PUR, yellow RAL1003, drag chain-compatible, 8-pin, straight M12 socket to straight M12 plug, A-coded, cable length: 30 m	540344

Support

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