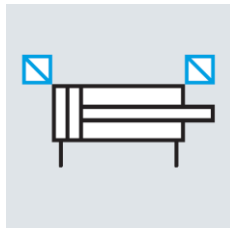


Safety Subfunctions Pneumatics

SCA – Safe Cam

Up to Category 3, up to PL e

Circuit



Our effort – your advantage

Our effort for the preparation of these documents

and your saved time 6 h

Free of charge for you.

Title Safety Subfunctions Pneumatics - Circuit
Version 1.10
Document number 100625
Original German
Author Festo
Date 2026-10-20

Legal Notice

In the following, the “Festo SE & Co. KG” is designated as “Festo”.

This document is not binding. This document outlines a possible solution for a sample application and makes no claim of completeness, especially with regard to configuration and equipment, as well as any eventualities for your actual application. This document is not a customised solution, it merely offers assistance with typical task assignments.

The values stated in this document are partly assumptions and assessments which do not replace a detailed examination based on ISO 13849, IEC 61508, IEC 62061 and/or IEC 61511.

The actual characteristic values that can be obtained (especially PL, PFH_D, category, DC, MTTF_D, CCF, SIL, HFT, PFH, PFD) depend on the components used, as well as their conditions of use in the actual application.

This document does not relieve you of the obligation to carry out a risk assessment and validation for your specific application and to ensure compliance with all requirements yourself, in particular the Machinery Directive 2006/42/EC (to be applied until 20 Jan. 2027) or the Machinery Regulation (EU) 2023/1230 (to be applied from 20 Jan. 2027). As the user, you are solely responsible for your specific use case and for the proper operation of the products described in this context.

Festo does not accept any liability for damages arising from the use of any incorrect or incomplete information contained in this documentation or any information missing therefrom. This equally applies to defects resulting from improper handling of devices and modules. In addition, all liability, with the exception of intent or gross negligence on the part of Festo, for damages arising due to non-adherence of the specifications of the EC Machinery Directive 2006/42/EC (to be applied until 20 Jan. 2027) or the Machinery Regulation (EU) 2023/1230 (to be applied from 20 Jan. 2027) is also rejected.

The information in this document is in no way intended as a substitute for the operating instructions of the respective manufacturers or the design and testing of the application by the user. The operating instructions for products from Festo can be found at www.festo.com. Users of this document must themselves verify that all the functions described herein also work correctly in the application. Even after examining this document and using the specifications contained herein, users are nevertheless solely responsible for their own application.

Otherwise, all stipulations concerning liability included in the terms and conditions of delivery, payment and use of software from Festo, which can be found at www.festo.com and can be supplied on request, apply.

This document is only suitable for persons with sufficient expertise for machine safety based on ISO 12100, ISO 13849, IEC 61508, IEC 62061 and IEC 61511. In addition, the following qualifications are required in the project team:

- Specialist in pneumatics
- Specialist in electrical engineering
- Specialist for the programming of control systems and safety switching devices

Copyright Notice

This documentation is the intellectual property of Festo, which also holds the exclusive copyright. Any modification of the content, duplication or reprinting of this documentation, as well as distribution to third parties, is only permissible with the express consent of Festo.

Festo reserves the right to make modifications to this document in whole or in part. All brand and product names are trademarks or registered trademarks of their respective owners.

© Festo SE & Co. KG, D - 73734 Esslingen, 2026

Internet: <https://www.festo.com>

Table of Contents

1	General	4
1.1	Purpose of this document.....	4
1.2	General notes	4
1.3	Notes on safety-related characteristics of the subcircuit	4
2	Circuit	5
3	Suitable Products for Proximity Switch B1	6
4	Suitable Products for Proximity Switch B2	7
5	Used Literature	8
5.1	Cited Documents from Festo.....	8
5.2	Standards	8
5.3	Legal Regulations	8
6	Information about the Document	9
6.1	General Information.....	9
6.2	Revision History.....	9
6.3	Approval/Release of the Document	9
6.4	Period of Validity	9

1 General

1.1 Purpose of this document

- This document presents a possible example circuit for the SCA safety subfunction (Safe Cam) up to Category 3 and up to PL e.
- The key characteristics of the components relevant to implementing the safety subfunction are listed.
- Suitable Festo products are specified based on these characteristics.

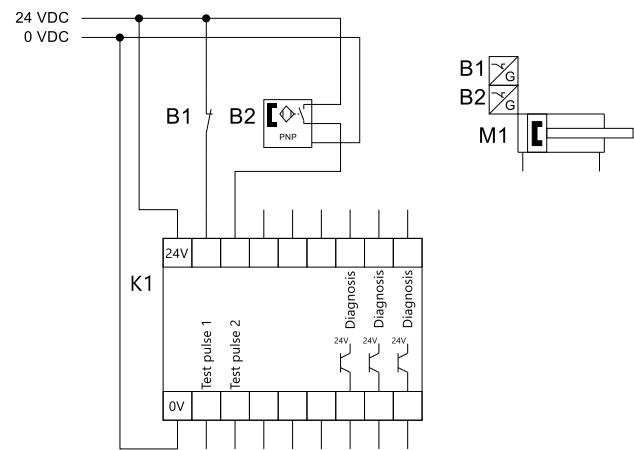
1.2 General notes

- The circuit shown is a schematic circuit and cannot be complete due to the need for clarity and the scope of the document. It is a recommendation and does not exclude other options.
- The abbreviations used for the safety sub-functions are based on the definitions in VDMA 24584 for pneumatics. The definitions used by Festo and important notes are provided in document [↗ 100586 SCA – Safe Position Monitoring](#).
- The requirements specified here for the components are minimum requirements. They must be supplemented by the requirements of the specific application.
- In the product lists included here, which contain recommendations for suitable products, we have verified the specified requirements for the pneumatic and electrical circuits. However, if additional information becomes available, for example through product monitoring, this data may be updated at any time. Therefore, before final implementation, the data in the data sheets available online must be checked to determine whether any changes have been made.
- The user must verify whether a recommended product is suitable for a particular application and confirm this in the technical documentation.
- For the SISTEMA project file for this circuit, the document [↗ 100395 Notes on SISTEMA Project Files](#) must be taken into account.

1.3 Notes on safety-related characteristics of the subcircuit

- The SCA safety sub-function monitors a position or a position range. If this position is left, an appropriate safety sub-function (stop function or PUS) is activated to bring the application into a safe state. This stop function or PUS is not part of the scope of the SCA safety sub-function and not part of this document.
- The SCA safety subfunction monitors a position or position range. When this position is left, a suitable safety sub-function – either a stop function or PUS – is activated to bring the application to a safe state. This stop function or PUS is not part of the SCA safety subfunction.
- In safety subfunctions with a two-channel architecture for the safety circuit – Category 3 in this case – a single fault does not result in failure of the safety subfunction.
- Measures for failures due to common cause failures (CCF) must be assessed depending on the application. Recommendations for possible measures are provided in document [↗ 100399 Recommendations for Implementing Measures Against Common Cause Failures \(CCF\)](#).
- For two-channel sensing, diversity through different technologies is recommended, for example, SMT (magneto resistive) and SME (reed switch).
- An MTTF value should be specified for electronic proximity switches, and a B₁₀ value should be specified for electromechanical proximity switches.
- The calculation of the MTTF_D value from the B₁₀ value is included in the SISTEMA project file. The B₁₀ value and actuation rate must be adjusted according to the valves used and the application.
- The mounting should be positively locked and protected against tampering. For this purpose, the [↗ SAMH-S](#) mounting kit, for example, may be used.

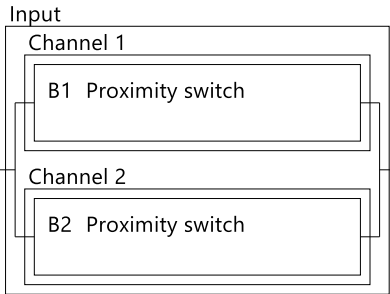
2 Circuit



Safety subfunctions and Block diagrams

Input Proximity switch

SCA - Safe Cam: up to category 3, up to PL e can be reached



B1, B2
Proximity switch
Diagnostic coverage DC=90%
Cross-monitoring of input signals with dynamic testing
Short circuits may go undetected.
(estimate according ISO 13849-1, table E.1)

Parts list

Pos....	Identifi...	Description
1	B1	Proximity switch
2	B2	Proximity switch
3	K1	Safety switching device
4	M1	Double-acting drive

3 Suitable Products for Proximity Switch B1

- Based on the following features, other suitable proximity switches from Festo can also be selected using the features in the data sheets available online.
- Depending on the application, it must be evaluated whether this list of features needs to be added.

Feature	Value
Product category	Proximity sensor
Measured variable	Position
Measuring principle	Magnetic reed
Switching output	Contact
Switching element function	NO (normally open)
Operational voltage range DC	The maximum permissible operating voltage must be ≥ 30 V
B ₁₀ value	Specified
Relevant basic safety principles	Confirmed
Relevant well-tried safety principles	Confirmed

Other values for the features may be possible and must be considered separately.

Note: These proximity sensors were selected as examples from different series and sizes.

No.	Material	★	Designation/Type (Sorting ↑)	Link Data Sheet	Link Datasheet Product Reliability
1.	543872		Proximity sensor SME-8M-ZS-24V-K-2,5-OE Notes - The SME proximity switches do not contain embedded software. - The SME proximity switches are suitable for power supplies with test pulses.	↗	↗

★ Core product range

4 Suitable Products for Proximity Switch B2

- Based on the following features, other suitable proximity switches from Festo can also be selected using the features in the data sheets available online.
- Depending on the application, it must be evaluated whether this list of features needs to be added.

Feature	Value
Product category	Proximity sensor
Measured variable	Position
Measuring principle	Magneto-resistive
Switching output	PNP
Switching element function	NO (normally open)
Operational voltage range DC	The maximum permissible operating voltage must be ≥ 30 V
MTTF value	Specified
Relevant basic safety principles	Confirmed
Relevant well-tried safety principles	Confirmed

Other values for the features may be possible and must be considered separately.

Note: These proximity sensors were selected as examples from different series and sizes.

No.	Material	★	Designation/Type (Sorting ↑)	Link Data Sheet	Link Datasheet Product Reliability
1.	574336	★	Proximity sensor SMT-8M-A-PS-24V-E-5,0-OE Notes - The SMT proximity switches do not contain embedded software. - The SMT proximity switches are not suitable for power supplies with test pulses.	↗	↗

★ Core product range

5 Used Literature

5.1 Cited Documents from Festo

- [1] [100395 Notes on Sistema project files](#)
- [2] [100396 Notes on features of directional control valves](#)
- [3] [100586 SCA – Safe Position Monitoring](#)

5.2 Standards

- [4] DIN EN ISO 4414:2011-04 – Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414:2010); German version EN ISO 4414:2010
- [5] ISO 5598:2020-01 – Fluid power systems and components - Vocabulary
- [6] DIN EN ISO 12100:2011-03 - Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010); German version EN ISO 12100:2010
- [7] DIN EN ISO 13849-1:2023-12 – Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2023); German version EN ISO 13849-1:2023
- [8] DIN EN ISO 13849-2:2013-02 – Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2012); German version EN ISO 13849-2:2012
- [9] VDMA 24584:2022-06 – Safety functions of regulated and unregulated (fluid) mechanical systems; German Version
- [10] DIN EN 61508:2011-02 - Functional safety of electrical/electronic/programmable electronic safety-related systems (IEC 61508:2010); German version EN 61508:2010
- [11] DIN EN 61508-4:2011-02 - Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 4: Definitions and abbreviations (IEC 61508-4:2010); German version EN 61508-4:2010
- [12] DIN EN 61511:2019-02 - Functional safety - Safety instrumented systems for the process industry sector - (IEC 61511:2016); German version EN 61511:2017
- [13] DIN EN IEC 62061:2023-02 - Safety of machinery - Functional safety of safety-related control systems (IEC 62061:2021); German version EN IEC 62061:2021

5.3 Legal Regulations

- [14] Machinery Directive: Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- [15] Machinery Regulation: Regulation (EU) 2023/1230 of the European Parliament and of the Council of 14 June 2023 on machinery and repealing Directive 2006/42/EC of the European Parliament and of the Council and Council Directive 73/361/EEC

6 Information about the Document

6.1 General Information

Document Number	100625
Safety Subfunction	SCA – Safe Cam
Category	Up to Category 3
PL	Up to PL e

6.2 Revision History

Ver.	Date	Ed.	Chapter	Description of Change/Impact
1.10	2026-10-20	JKHL	All	Creation of document

6.3 Approval/Release of the Document

Role	Signature
Release	 Digital signiert von Jürgen Kühnle DN: cn=Jürgen Kühnle, gn=Jürgen Kühnle, c=DE, Germany, l=DE, Germany, o=Festo SE & Co. KG, ou=SC-OTP e=juergen.kuehnle@festo.com Grund: Freigabe dieses Dokuments Ort: Esslingen Datum: 2026-10-20 08:17+02:00

6.4 Period of Validity

Document is valid until 2031-10-20 or until one of the documents used or the required relevant base are changed.



Do you have any questions about this Application Note?

You are welcome to send us your questions via the contact form.



Are you looking for Safety Application Notes with solution examples for the most important safety sub-functions in pneumatics?

We regularly expand our collection of documents in the Support Portal.



Do you want to get a general overview of machine and system safety?

We have compiled information on machine and functional safety in our guide.

Download the guide.



Do you need further support?

We also offer services for machine safety

- Risk assessment
- Safety concept
- Circuit design
- Verification / validation



You can request a quotation via the contact form.

Do you need training or further education?

At Festo Didactic you will find training courses on machine safety, functional safety and CE marking.



Request a quote for training or workshop.

