

Detecting Devices

SIRIUS 3SE5/3SF1 Position Switches

Configuration Manual · 05/2012



Industrial Controls

Answers for industry.

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Industrial Controls

Detecting devices SIRIUS 3SE5/3SF1 position switches

Configuration Manual

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Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Purpose of this documentation

This manual describes the many possible uses of SIRIUS detection devices for monitoring motion sequences or protective devices.

General information will be provided about the principal of operation, selection, and installation of mechanical position switches and safety switches to enable their reliable operation.

1.2 Target group

This documentation contains information for the following target groups:

- Decision makers
- Technologists
- Project planning engineers
- Commissioning engineers

1.3 Required knowledge

A general knowledge of the following areas is needed in order to understand this documentation:

- Low-voltage controls and distribution
- Digital circuit logic
- Automation technology
- AS-Interface
- ATEX
- Safety technology

1.4 History

The following editions of this documentation have been published to date. The changes apply in comparison to the previous version:

Edition	Comment/change
07 / 2010	First edition
05 / 2012	Product range expanded; technical data and operating travel diagrams updated

1.5 Latest information and correction sheet

Up-to-the-minute information

For further assistance, contact:

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Selection data and ordering data

You can find additional information on mechanical position switches and safety switches on the Internet in the Industry Mall (www.siemens.com/industrial-controls/mall).

Here, you have access to

- Catalogs/brochures (www.siemens.com/industrial-controls/catalogs)
- Online configuration (www.siemens.com/industrial-controls/configurators)

Correction sheet

A correction sheet (Page 258) is included at the end of the manual. Please use it to record your suggestions for improvements, additions and corrections, and return the sheet to us. This will help us to improve the next edition of the manual.

Safety notes

Important note

The products described here were developed to perform safety-oriented functions as part of an overall installation or machine. A complete safety-oriented system generally features sensors, evaluation units, signaling units, and reliable shutdown concepts. It is the responsibility of the manufacturer to ensure that a system or machine is functioning properly as a whole. Siemens AG, its regional offices, and associated companies (hereinafter referred to as "Siemens") cannot guarantee all the properties of an overall installation or machine that has not been designed by Siemens. Nor can Siemens assume liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the Siemens general terms of supply are to be derived or inferred from the following description.

DANGER

Hazardous voltage. Will cause death or serious injury.

Electric shock.

Non-metallic enclosures do not provide grounding between conduit unions. Proper grounding between conduit unions must be established by using grounding bushings and jumper wires.

WARNING

Possible inaccurate signal.

Personal injury or property damage can occur.

If the original actuator is not used, this may result in a defect on the module and the switch may no longer be able to lock or unlock.

Only use the designated actuator for the appropriate safety switch.

CAUTION

The functionality of the switch cannot be ensured in the event of incorrect installation.

Incorrect installation will destroy the actuator head.

Install the position switch and actuator in such a way that the actuator can move into the actuator head without large lateral forces. Do not use position switches as an end stop.

General description

3.1 Application areas

Mechanical position switches are used to detect (end) positions of moving machine and plant parts. Mechanical safety switches are used to protect personnel and machinery in manufacturing and processing lines.

The following are typical application areas for position switches:

- Protective devices
- Manufacturing and assembly lines
- Packaging systems and luggage sorting systems
- Elevators and conveyor systems
- Automatically controlled machines and robots

3.2 Failure rates

Using the B10 value, the failure rate of a position switch is calculated according to the following formula:

$$\lambda = [0.1 \times C / B10]$$

$$\lambda_D = [0.1 \times C / B10_d]$$

λ = Total failure rate of a position switch

λ_D = Failure rate of dangerous failures

C = Operating cycle per hour

$B10_d$ = B10 / Proportion of dangerous failures

SN 31920 standard

The B10 value for devices subject to wear is expressed in the number of switching cycles. This is the number of switching cycles at which during a lifetime test, 10% of the test objects have failed (or: number of operating cycles after which 10% of the devices have failed).

Note

Refer to the respective data sheet for the B10 value and the proportion of dangerous failures.

3.3 Overview of position switches in open-type and compact design

Position switch	Open-type	Compact design with connector		Compact design with molded cable	
	3SE5250	3SE5413--1EB1	3SE5423--1EB1	3SE5413--1EA	3SE5423--1EA
					
Enclosure					
Plastic	✓	—			
Metal	—	✓			
Dimensions (W x H x D) in mm					
	30 x 48.5 x 20	30 x 50 x 16	40 x 50 x 16	30 x 50 x 16	40 x 50 x 16
Degree of protection	IP10 or IP20	IP67			
Standards	IEC 60947-5-1				
Mounting and operating points according to standard	EN 50047	EN 50047	EN 50041	EN 50047	EN 50041
Certifications and approvals	UL, CSA, CE (except 3SE5250-0MC05 and 3SE5250-0PC05)	CE, C  US, GOST			
Contact blocks					
2 slow-action contacts	1 NO + 1 NC	—			
2 snap-action contacts	1 NO + 1 NC	1 NO + 1 NC			
2 snap-action contacts, short stroke	1 NO + 1 NC	—			
2 snap-action contacts with 2 x 2 mm contact spacing	1 NO + 1 NC	—			
3 slow-action contacts	2 NO + 1 NC 1 NO + 2 NC	—			
3 slow-action contacts with make-before-break	1 NO + 2 NC	—			
3 snap-action contacts	1 NO + 2 NC	—			
Special features					
Increased anti-corrosion protection	—	✓			

3.3 Overview of position switches in open-type and compact design

Position switch	Open-type	Compact design with connector		Compact design with molded cable	
	3SE5250	3SE5413--1EB1	3SE5423--1EB1	3SE5413--1EA.	3SE5423--1EA.
Technical data					
Actuating speed v	0.1 mm/s to 1.5 m/s (snap-action contact) 0.4 mm/s to 1.5 m/s (slow-action contact)	0.05 mm/s to 2 m/s			
Ambient temperature	-25 °C to +85 °C				
Connections					
M12 connector, 5-pin	—	✓		—	
Molded cable, 5-pin	—	—		✓	
Actuator					
Rounded plunger	✓	✓			
Roller plunger	—	✓			
Twist lever	—	✓			



Available for delivery



Not available

3.3 Overview of position switches in open-type and compact design

3SE54... complete units in compact design	Enclosure width mm
• 2 snap-action contacts 1 NO + 1 NC	
• Degree of protection IP67	
• with connecting cable or M12 plug connector	
Rounded plunger	
• Standard mounting	
- with 2 m cable 5 x 0.75 mm ²	30 40
- with 5 m cable 5 x 0.75 mm ²	30
- with M12 plug connector	30 40
• with M12x1 central fixing	
- with 2 m cable 5 x 0.75 mm ²	30 40
• with external seal	
- with 2 m cable 5 x 0.75 mm ²	30 40
Roller plunger	
• Standard mounting	
- with 2 m cable 5 x 0.75 mm ²	30 40
- with 5 m cable 5 x 0.75 mm ²	30
- with M12 plug connector	30 40
• with M12 x 1 central fixing	
- with 2 m cable 5 x 0.75 mm ²	30 40
• Actuator head rotated 90°	
- with 2 m cable 5 x 0.75 mm ²	30 40
Twist lever	
• Standard mounting	
- with 2 m cable 5 x 0.75 mm ²	30 40
- with 5 m cable 5 x 0.75 mm ²	30
- with M12 plug connector	30 40

3.4 Overview of mechanical position switches

	Mechanical position switches						XL enclosure
	3SE523.	3SE521.	3SE524.	3SE511.	3SE513.	3SE512.	3SE516.
							
Enclosure							
Plastic	✓	—	✓	—	✓	—	—
Metal	—	✓	—	✓	—	✓	✓
Dimensions (W x H x D) in mm							
	31 x 68 x 33		50 x 53 x 33	40 x 78 x 38		56 x 78 x 38	56 x 100 x 27
Degree of protection	IP65	IP66/67	IP66/67	IP66/67		IP66/67	IP66/67
Standards	IEC 60947-5-1						
Mounting and operating points according to standard	EN 50047		EN 50047	EN 50041		EN 50041	EN 50041
Certifications and approvals	CE, UL, CSA, CCC, VDE, TÜV, GOST (3SE513. no UL, CSA, CCC)						
Contact blocks	1			1		2	
Slow-action contacts	1 NO + 1 NC			1 NO + 1 NC		2x (1 NO + 1 NC)	
Snap-action contacts	1 NO + 1 NC			1 NO + 1 NC		2x (1 NO + 1 NC)	
Snap-action contacts, short-stroke	1 NO + 1 NC			1 NO + 1 NC		—	
Snap-action contacts with 2 x 2 mm operating distance	1 NO + 1 NC			1 NO + 1 NC		—	
Slow-action contacts	1 NO + 2 NC 2 NO + 1 NC			1 NO + 2 NC 2 NO + 1 NC		—	
Snap-action contacts	1 NO + 2 NC			1 NO + 2 NC		—	
Slow-action contacts with make-before-break	1 NO + 2 NC			1 NO + 2 NC		2x (1 NO + 2 NC)	

	Mechanical position switches						XL enclosure
	3SE523.	3SE521.	3SE524.	3SE511.	3SE513.	3SE512.	3SE516.
Slow-action contacts with make-before-break and slow-action contacts	—			—			1x (1 NO + 2 NC) 1x (1 NO + 1 NC)
Special features							
LED display	✓			✓			—
Increased anti-corrosion protection	✓			✓			✓
Protection against explosion (ATEX)	—	—	—	✓	—	✓	—

✓

Available for delivery

—

Not available

	Mechanical position switches						XL enclosure
	3SE523.	3SE521.	3SE524.	3SE511.	3SE513.	3SE512.	3SE516.
Technical data							
Connections							
Cable entry	1 x (M20 x 1.5)		2 x (M20 x 1.5)	1 x (M20 x 1.5)		3 x (M20 x 1.5)	3 x (M20 x 1.5)
M12 connector, 4-, 5-, or 8-pin	✓		✓	✓		✓	—
Connector, 6-pin + PE	—		—	✓		✓	—
Actuator							
Plain plunger	—	✓	—	✓			✓
Rounded plunger	✓			✓			✓
Roller plunger	✓			✓			✓
Roller lever	✓			✓			✓
Angular roller lever	✓			✓			✓
Spring rod	✓			✓			✓
Twist lever	✓			✓			✓
Adjustable-length twist lever and rod lever	✓			✓			✓
Fork lever	✓			✓			✓

✓

Available for delivery

—

Not available

3.5 Overview of safety switches

	Safety switches with separate actuation				Safety switches with tumbler
	3SE5212-..V40 3SE5232-..V40	3SE5242-..V40	3SE5112-..V10 3SE5132-..V20	3SE5122-..V10	3SE5322-..S... 3SE5312-..S...
					
Enclosure					
Plastic (1)	✓	✓	✓	—	✓
Metal (2)	✓	—	✓	✓	✓
Dimensions (W x H x D) in mm					
	31 x 68 x 33	50 x 53 x 33	40 x 78 x 38	56 x 78 x 38	54 x 185 x 44
Degree of protection	(1) IP65 (2) IP66/67	(1) IP66/67	(2) IP66/67		(1)(2) IP66/67
Standards	IEC 60947-5-1				
Mounting according to standard	EN 50047		EN 50041		EN 1088
Certifications and approvals	CE, UL, CSA, CCC, VDE, TÜV, GOST (3SE513. no UL, CSA, CCC)				
2 slow-action contacts	1 NO + 1 NC				—
2 snap-action contacts	—				—
3 slow-action contacts	1 NO + 2 NC				—
3 snap-action contacts	—				—
6 slow-action contacts	—				2 x (1 NO + 2 NC)
LED display	✓				✓
Increased anti-corrosion protection	—				—
Protection against explosion (ATEX)	—	—	✓ (except 3SE5132)		—
Insulation voltage U _i	400 V				250 V
Conventional thermal current I _{the}	6 A				6 A
Cable routing	1 x (M20 x 1.5)	2 x (M20 x 1.5)	1 x (M20 x 1.5)	3 x (M20 x 1.5)	3 x (M20 x 1.5)
M12 connector, 4-pin or 5-pin	✓				—

	Safety switches with separate actuation				Safety switches with tumbler
	3SE5212-..V40 3SE5232-..V40	3SE5242-..V40	3SE5112-..V10 3SE5132-..V20	3SE5122-..V10	3SE5322-.S... 3SE5312-.S...
Connector, 6-pin + PE	—	✓	—	✓	—
Separate actuation	✓				✓



Available for delivery



Not available

3.6 Overview of mechanical safety switches for AS-Interface

	Mechanical safety switches with separate actuation				Safety switches with tumbler
	3SF1214 3SF1234	3SF1244	3SF1114	3SF1124	3SF13.4
					
Enclosure					
Plastic (1)	✓	✓	—	—	✓
Metal (2)	✓	—	✓	✓	✓
Dimensions (W x H x D) in mm					
	31 x 68 x 33	50 x 53 x 33	40 x 78 x 38	56 x 78 x 38	54 x 85 x 44
Degree of protection	IP65	IP66/67	IP66/67		IP66/67
Standards	IEC 60947-5-1				
Mounting according to standard	EN 50047		EN 50041		EN 1088
Certifications and approvals	CE, UL, CSA, CCC, VDE, TÜV, GOST				
2 slow-action contacts	1 NO + 1 NC				—
2 snap-action contacts	—				—
3 slow-action contacts	1 NO + 2 NC				—
3 snap-action contacts	—				—
6 slow-action contacts	—				2 x (1 NO + 2 NC)
LED display	✓				✓
Increased anti-corrosion protection	—				—
Protection against explosion (ATEX)	—		✓		—
ASIsafe integrated	✓				✓



Available for delivery



Not available

3.6 Overview of mechanical safety switches for AS-Interface

	Mechanical safety switches with separate actuation				Safety switches with tumbler
	3SF1214 3SF1234	3SF1244	3SF1114	3SF1124	3SF13.4
Technical data					
Rated insulation voltage U _i	400 V				250 V
Conventional thermal current I _{the}	6 A				6 A
Cable routing	1 x (M20 x 1.5)	2 x (M20 x 1.5)	1 x (M20 x 1.5)	3 x (M20 x 1.5)	3 x (M20 x 1.5)
M12 connector, 4-pin or 5-pin	✓				—
Connector, 6-pin + PE	—		✓		—
AS-Interface	✓				✓
Separate actuation	✓				✓



Available for delivery



Not available

3.7 Overview of hinge switches

	Hinge switches			
	3SE5232-0.U2.	3SE5212-0.U2.	3SE5112-0.U2.	3SE5132-0.U2.
				
Enclosure				
Plastic	✓	—	—	✓
Metal	—	✓	✓	—
Dimensions (W x H x D) in mm	31 x 68 x 33	31 x 68 x 33	40 x 78 x 38	40 x 78 x 38
Degree of protection	IP65	IP66/67	IP66/67	IP66/67
Standards	IEC 60947-5-1			
Mounting and operating points according to standard	EN 50047	EN 50047	EN 50041	EN 50041
Certifications and approvals	CE, UL, CSA, CCC, VDE, TÜV, GOST			CE, TÜV, VDE, GOST
2 snap-action contacts	1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC
3 snap-action contacts	1 NO + 2 NC	1 NO + 2 NC	1 NO + 2 NC	1 NO + 2 NC
Increased anti-corrosion protection	✓	✓	✓	✓
Protection against explosion (ATEX)	—	—	✓	—
Insulation voltage U _i	400 V	400 V	400 V	400 V
Cable routing	1 x (M20 x 1.5)	1 x (M20 x 1.5)	1 x (M20 x 1.5)	1 x (M20 x 1.5)
With hollow or solid shaft	✓	✓	✓	✓



Available for delivery



Not available

3.8 Features of position switches

3.8.1 Basic function

Mechanical position switches and mechanical safety switches for safety-related applications ensure safe interruption of a circuit when required. For example, actuators are safely switched off by actuating the position switch, thereby preventing injuries to persons and damage to machines. The mechanical position switches and mechanical safety switches implement the safe shutdown without any action on the part of the machine control system, e.g., PLC.

3.8.2 Electromechanical sensors

Due to certain mechanical advantages, position switches are used in automatic control systems and in many other applications under a variety of service conditions.

They transmit information to the control system on the following:

- Presence/absence of objects
- Running-past of an object
- Position of an object
- End position of an object
- Status of protective doors

Electrical features

- Electrically isolated auxiliary switch
- Very high switching capacity when switching low currents and, depending on the version, a high level of fail-safe operation
- High short-circuit strength in combination with the assigned backup fuse
- Absolute protection against electromagnetic interference
- High operating voltage permitted

Mechanical features

- Positively-driven actuation of the normally closed auxiliary switch (positive opening operation ⊕)
- High level of resistance in industrial environment (tests according to standardized and special ambient conditions)
- Operating point repeatability up to 0.05 mm

3.8.3 Contact element variance

Variants: 1 NO + 1 NC, 1 NO + 2 NC, 2 NO + 1 NC, make-before-break

The 3-pin contact block increases the safety through redundant switch-off and additional signaling. Additional available space is not required compared to 2-pin contact blocks.

Snap-action contacts

- Simultaneous switching of all contacts irrespective of the actuating speed
- Operating point independent of actuating speed $v_{\min} = 0.1 \text{ mm/s}$
- No contact erosion
- Hysteresis is approximately 30% to 40% of the operating travel

The hysteresis describes the difference between the operating point and reset point in the case of snap-action contacts.

Snap-action contacts, short-stroke

Improved precision through reduced actuator travel.

Snap-action contacts 2 x 2 mm

Operating distance for elevator industry enables simultaneous switch-off and signaling.

Slow-action contacts

- Travel difference (current-free pause, make-before-break) between normally open contact and normally closed contact.
- The normally closed contact always opens first before the normally open contact closes.
- Switching time dependent on the actuating speed
Actuating speed $v_{\min} = 0.4 \text{ mm/s}$. The operating speed is identical or proportional to the actuating speed.
- Operating point dependent on contact erosion/aging
- No hysteresis

Slow-action contact with make-before-break

This variant is used to introduce a second function to a sequential control system.

One of the two normally closed contacts opens first.

The second normally closed contact only opens once the normally open contact is closed.

Gold contacts

Used for applications with low currents, low switching frequency, corrosive vapors/atmospheres.

Contact reliability

The new contact blocks guarantee a very high level of contact reliability. This is also the case when the devices are required to switch low currents and voltages, such as 1 mA at 5 V DC.

Positive opening operation ➞

The contacts with normally closed function are opened reliably by means of a positively-driven actuating plunger mechanism. This is referred to as a positive opening operation.

IEC 60947-5-1 and DIN EN 60947-5-1 require positive opening of normally closed contacts for operator protection and stipulate use of the marking ➞.

Positive opening travel

A manufacturer-specified minimum travel that ensures that all main contacts are in open position when the operator control element is in the position corresponding to the open position of the switching device.

Positive opening position switches with slow-action function, snap-action function, and slow-action function with make-before-break

On actuation, the positive opening normally closed contact opens and reaches its positive opening point in a defined manner. On reset (closing of protective device), the contact closes at the same point (no hysteresis) in the case of slow-action contacts.

When using switches with slow-action contacts, you should observe the manufacturer's specifications with respect to operating travel diagrams and actuator travel. The installation of switches must ensure their complete mechanical actuation such that the necessary positive opening travel is achieved.

Position switches with snap-action contacting are recommended in the case of very slow actuating speeds and for applications in which the contacts are to switch with almost no delay. If the snap-action contact block fails, the positive opening operation ➞ is initiated by a deflection mechanism.

Recognition features for safety switches

The yellow covers on switches with separate actuation with and without tumbler, hinge switches, and AS-Interface indicate that the switch is a safety switch.

For mechanical position switches with positive opening operation ➞, you can replace the turquoise cover with a yellow cover to enable visual recognition of the position switch as a safety switch.

Overtravel

The overtravel enables actuation of the actuator head to the end stop without damaging the contact block. The overtravel provides a certain "extra travel" by means of an additional spring. The positive opening operation is ensured by a so-called overtravel plunger.

3.8.4 Order number structure

The order number of a position switch has the following structure:

1 ... 4	5	6	7	8	9	10	11 12	13 14 15 16
3SE5								
3SF1								

Digit		Digit	
3SE5 1 ... 4	Mechanical position switch Mechanical safety switch	8	LED display
3SF1 1 ... 4	Mechanical safety switch for AS-Interface	9	Contact variants 1 contact block, except 3SE516 2 contact blocks, 3SE516 only
5	0 = Spare parts/modules 1 = Design according to EN 50041 2 = Design according to EN 50047 3 = Separate actuator with tumbler 4 = Compact design	10	Actuator type
6	Enclosure design	11 - 12	Actuator variant (plastic/metal)
7	Device connection	13 - 16	Various variant descriptions

3.8.5 Selection of 3SE position switches

Position switches are used to detect the position of moving machine parts, doors, objects, etc. and to convert the position to electrical signals, which are then processed in control systems.

Position switches are differentiated as follows:

- Position switches **without** separate actuation
- Position switches **with** separate actuation

The position switches without separate actuation are available in four variants. They differ in their dimensions, technical data, and possible uses.

Enclosure	Enclosure width	Degree of protection
Open-type	30 mm	IP10 (3-pin) IP20 (2-pin)
Plastic	31 mm	IP65
	40 mm/50 mm	IP66/IP67
Metal	31 mm	IP66/IP67
	40 mm	
	56 mm/56 mm XL	
Compact design, metal	30 mm	IP67
	40 mm	

The position switches with separate actuation are differentiated as follows:

Enclosure	Enclosure width	Degree of protection
Position switches with separate actuator without tumbler		
Plastic	31 mm	IP65
	40 mm/50 mm	IP66/IP67
Metal	31 mm, 40 mm, 56 mm	IP66/IP67
Position switches with separate actuator with tumbler		
Plastic/metal	54 mm	IP66/IP67

The actuator is triple coded to prevent it from being manipulated easily.

Note

The dimensions and drilling dimensions of the 30 mm, 31 mm, and 50 mm-wide enclosures are according to EN 50047.

The dimensions and drilling dimensions of the 40 mm and 56 mm-wide enclosures are according to EN 50041.

3.8.6 Online configuration

3.8.6.1 Use of the online configurator

The online Configurator (www.siemens.com/industrial-controls/configurators) enables you to select and order the appropriate position switch as well as generate a complete set of product documentation.

- Product data sheet
- Dimension drawings
- Operating travel diagram
- CAD data in 2-D and 3-D model images
- Ordering data
- Product photo

The configurator allows you to select which position switch out of the comprehensive product range best suits the requirements of each application.

3.8.6.2 Application of the online configurator

Configuration via direct entry

To configure a position switch, proceed as follows:

1. Open the overview page of Configurators (www.siemens.com/industrial-controls/configurators)
2. In the drop-down list box "Select a configurator", select "3SE5/3SF1 Position Switches".
3. If you already know the order number for a device and you only need a data sheet or the CAD data for this device, you can enter the order number in the corresponding fields under "Input complete unit", "Input basic switch", "Input operating mechanism", or "Input actuator".

Input complete unit:	3S	Start
Input basic switch:	3S	
Input operating mechanism:	3S	
Input actuator:	3S	Start

"Input complete unit:"

Note

Direct entry

For safety switches with separate actuator with or without tumbler, you can enter **only** the basic switch directly with the order number. The actuator must be selected in the selection menu.

Configuration via selection

To configure a position switch, proceed as follows:

1. Open the overview page of Configurators (www.siemens.com/industrial-controls/configurators)
2. In the drop-down list box "Select a configurator", select "3SE5/3SF1 Position Switches".
3. Click "Start".

Industrial Controls

Product Information **Configurators**

Select a configurator 3SE5/3SF1 Position Switches

3SE5/3SF1 Position Switches

There is a lot of information out there. And to ensure correct and precise recording of all available data, reliable devices are required.

The new generation of 3SE5/3SF1 position switches is characterized by modern design, innovative technology and simple installation.

The configurator allows easy selection of the best device for each application from this comprehensive range of position switches.

For example, if you already know the order data for a device, and simply require a data sheet or the CAD data, just enter the order number into the appropriate field (direct input complete or components) and you will receive the desired information.

Start

4. Select the device type (e.g. standard position switch).
5. Select "Position Switch > Configuration of Switches".
6. Select the desired features.

7. Once you have specified all values, a CAD preview is generated.

Position Switch

Part list | **Result** | Documents | CAD

Print | Export as Excel

Name	Order number	Properties
Position Switch		Device type: Standard position switch AS-i connection: without AS-i Special requirements: Without
Configuration of Switches		Enclosure: Plastic 31 mm EN 50047 Device connection: M12 connector Pin configuration: M12 connector, 5-pole: PIN1=terminal21, PIN2=22, PIN3=13, PIN4=14, PIN5=ground LED LED Display: 24 V DC Contacts: Slow-action contacts 1NO/1NC Contact material: Silver alloy Type of operating mechanism: Roller plunger Operating mechanism material: Metal Actuator design: Stainless steel roller EN 50041, form C Designs: 2 LEDs 24 V DC, yellow + green, with M12 connector 5-pole PIN assignment: 1NC/1NO: PIN1=21, PIN2=22, PIN3=13, PIN4=14, PIN5= ground LED, LED green to 13, LED yellow to 14
Basic Switch	3SE5234-1BC05-1AF3	
Operating mechanism	3SE5000-0AD02	



8. To finish the configuration, click the "Display technical data & order" button.

9. Following configuration, you have the following options:

- "Part list" tab - Shows a listing of your selection, which you can display and print out automatically on an Excel spreadsheet for documentation purposes.
- "Result" tab - Shows your selection.
- "Documents" tab - Here, you can download and print the product data sheet in PDF format.
- "CAD" tab - Shows the CAD representation of the selection as a surface model, wire frame model, or 3-D applet and enables you to download the bitmap, dimension drawing, or 3-D model.

Ordering

After the configuration is complete, it is possible to order the switch directly in the online Catalog and Ordering System.

- Click the "Next" button to go to the ordering dialog where you can place your selection in the shopping cart.
Here, you can also generate an Excel spreadsheet containing the ordering data and/or print the displayed list.

Note

Registration not possible

To place an order, you must have logged in at Siemens Industry Automation
www.siemens.com/industrial-controls/mall (www.siemens.com/industrial-controls/mall)
beforehand.

Position switches, safety switches, and hinge switches

4

No matter what the requirements, SIRIUS position switches can be used in practically any situation in day-to-day industrial operations. The following features make this possible:

- Modular structure
- Uniform structure
- Structure with many different variants available
- Wide variety of actuators

Standardized designs and functions make it easy to select the appropriate switch and ensure simple, efficient storage, installation, and wiring.

Together with fail-safe evaluation units, such as 3TK28, ASIsafe or SIMATIC and SINUMERIK units, you can achieve Category 4 according to ISO 13849-1 (EN 954-1).

Position switches are actuated by bars, cams, endstops, cam disks, etc. and provide control commands for the further

- sequence of the switch program,
- manufacturing sequence, and
- processing sequence.

A variety of device series with different contact versions are available for carrying out various control tasks.

- Position switches in open-type design (Page 39)
- Position switches in compact design (Page 45)
- Mechanical position switches (Page 55) with plastic enclosure/with metal enclosure
- Mechanical safety switches (Page 154)
- Mechanical safety switches with separate actuation (Page 163)
- Mechanical safety switches with tumbler (Page 173)
- Hinge switches (Page 186)
- Mechanical position switches for explosion protection (Page 194)
- 3SF1 mechanical safety switches for AS-Interface (Page 202)

A variety of actuators are available for the various approach and actuation situations to enable an optimum solution. The different enclosure designs enable the most favorable conditions for installing and removing devices and the ideal electrical cable entry. The 3SE5 position switches guarantee operational reliability of controls by virtue of their design, materials, and manufacture.

Chlorinated rubber membrane

All enclosure variants have an integrated chlorinated rubber membrane for a high level of operational reliability in low-temperature and corrosive environments (dust, moisture).

4.1 Position switches in open-type design

The position switches in open-type design with degree of protection IP10 (3 contacts), IP20 (2 contacts), IP40 (contact chamber) are designed for the following:

- Use as auxiliary switches in cabinets
- Larger enclosures
- Locations not influenced by dust and moisture

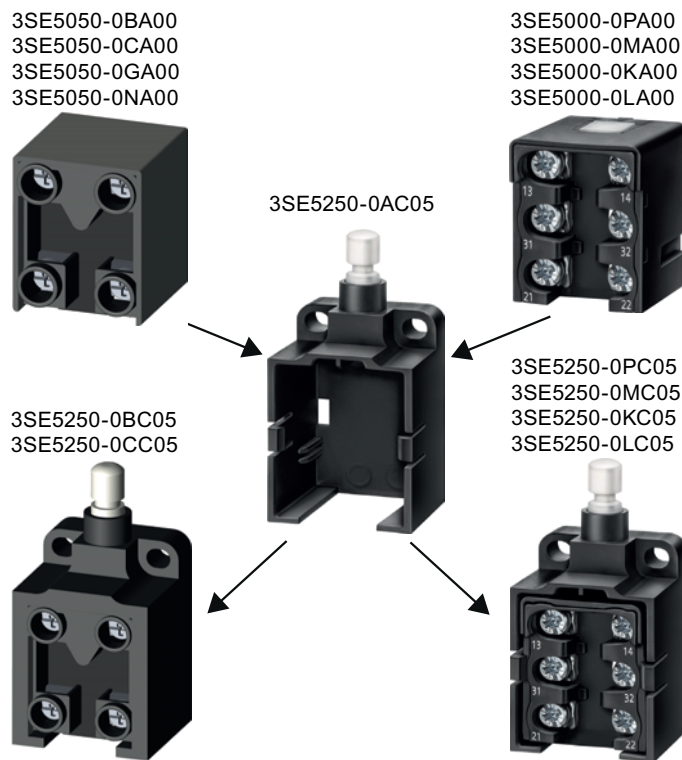


Their compact design makes these switches particularly suitable for use in confined conditions. The mounting dimensions and operating points comply with EN 50047. The switches are equipped with two or three contacts:

- Snap-action contact
- Slow-action contact
- Slow-action contact with make-before-break

The travel is 6 mm. The empty enclosure can be equipped with any of the contact block variants.

4.1 Position switches in open-type design



WARNING

Risk of injury or death.

Use only the contact block with order number 3SE5050-.... as a 2-pin open-type position switch.

The 2-pin contact blocks with order numbers 3SE5000-.... and 3SE5060-.... must not be used as open-type position switches.

4.1.1 Technical data for position switches in open-type design

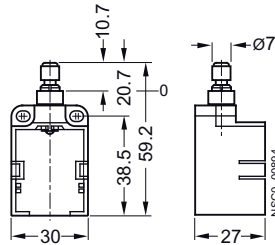
		3SE5250-0MC05 3SE5250-0PC05	3SE5250-0KC05 3SE5250-0LC05	3SE5250-0BC05 3SE5250-0CC05
Width of the sensor	mm	30		
material of the housing		plastic, open-type		
Insulation voltage rated value	V	250	400	
Degree of pollution		class 3		
Impulse voltage resistance rated value	V	4000	6000	
Thermal current	A	6		
Operating current				
• at AC-15				
– at 24 V rated value	A	6		
– at 125 V rated value	A	6		
– at 230 V rated value	A	1.5		6
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	0.55		
– at 230 V rated value	A	0.27		
Continuous current				
• of the slow DIAZED fuse link	A	6		
• of the quick DIAZED fuse link	A	6	10	
• of the C characteristic circuit breaker	A	1		2
Mechanical operating cycles as operating time typical		15000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		
• at AC-15 at 230 V typical		100000		
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Actuating speed minimum	mm/s	0.4		0.1
Actuating speed maximum	m/s	1.5		
Repeat accuracy	mm	0.05		
Design of the switching function		positive opening		
Resistance against vibration		0.35 mm / 5g		

4.1 Position switches in open-type design

		3SE5250-0MC05 3SE5250-0PC05	3SE5250-0KC05 3SE5250-0LC05	3SE5250-0BC05 3SE5250-0CC05
Resistance against shock		30g / 11 ms		
Ambient temperature				
• during operating	°C	-25 ... +85		
• during storage	°C	-40 ... +90		
Design of the operating mechanism		teflon plunger		
Protection class IP		IP10		IP20
Built in orientation		any		
Switching capacity apparent power		5 V DC, 1 mA		
Type of the connectable conductor cross-section		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• finely stranded				
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• for AWG conductors				
– solid		1x (20 ... 16), 2x (20 ... 18)		
– stranded		1x (20 ... 16), 2x (20 ... 18)		

4.1.2 Dimension drawings and operating travel diagrams for position switches in open-type design

3SE5250-0.C05

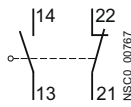
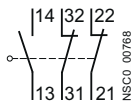
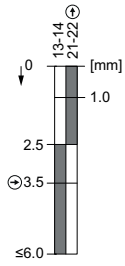
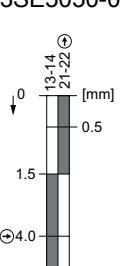
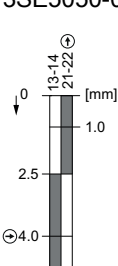
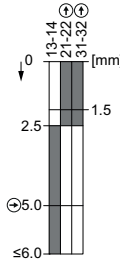


$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$F \geq 9 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Actuation in travel direction			
3SE5250-0BC05 	3SE5250-0KC05 	3SE5250-0PC05 	3SE5250-0MC05

4.1 Position switches in open-type design

Snap-action contacts			
1 NO + 1 NC 		1 NO + 2 NC 	
Code number 11		Code number 12	
Actuation in travel direction			
3SE5250-0CC05 	3SE5250-0AC05 + 3SE5050-0NA00 ¹⁾  Short stroke	3SE5250-0AC05 + 3SE5050-0GA00 ¹⁾  Operating distance 2 x 2 mm	3SE5250-0LC05 
¹ Empty enclosure and contact blocks must be ordered separately.			

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

4.2 Position switches in compact design

4.2.1 General description

Enclosure sizes

The 3SE54 position switches in compact design are available as complete units in two enclosure sizes:

- Enclosure series 3SE5413 conforms to EU standards and has a 30 mm-wide enclosure. The fastening holes are spaced 20 mm apart.
- The enclosure series 3SE5423 conforms to requirements of the U.S. market and has a 40 mm-wide enclosure. The fastening holes are spaced 25 mm apart.

Position switches with molded cable or connector have the following advantages:

- Compact design (small enclosure sizes)
- Metal enclosure
- Simple multi-switch configuration
- Degree of protection IP67
- Large selection of actuators

Applications

- Lifting means
- Door monitoring (e.g., on trains)
- Construction machinery
- Elevators
- Mechanical equipment

Devices are offered with

- 2 m cable (3SE54.-1EA2)
- 5 m cable (3SE54.-1EA5)
- Variants with M12 connector (3SE54.-1EB1)

Switch variants with molded cable or connector - 30 mm enclosure width

3SE5413



Switch variants with molded cable or connector - 40 mm enclosure width

3SE5423



4.2.2 Technical data of position switches in compact design

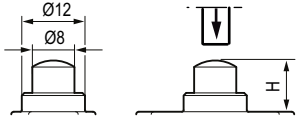
		3SE54.3-0CP..-.... 3SE54.3-0CN..-....	3SE54.3-0CD..-....	3SE54.3-0CC..-....
Width of the sensor	mm	30 ¹⁾		
material of the housing		metal		
Insulation voltage rated value	V	400		
Degree of pollution		3		
Impulse voltage resistance rated value	kV	4		
Operating voltage for AC rated value	V	240		
Thermal current	A	10		
Operating current				
• at AC-15 at 125 V rated value	A	6		
• at AC-15 at 230 V rated value	A	3		
• at DC-13 at 125 V rated value	A	0.55		
• at DC-13 at 230 V rated value	A	0.27		
Continuous current				
• of the slow DIAZED fuse link	A	10		
• of the quick DIAZED fuse link	A	10		
• of the C characteristic circuit breaker	A	3		
Mechanical operating cycles as operating time typical		5000000		10000000
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		500000		
• at AC-15 at 230 V typical		100000		
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		1800		
Actuating speed minimum	mm/s	0.05		
Actuating speed maximum	m/s	2		
Minimum actuating force in activation direction	N	—	15	20
Minimum actuating force in activation direction	N·m	0.2	—	
Repeat accuracy	mm	0.05		
Resistance against vibration		0.35 mm / 5g		0,35 mm / 5g
Resistance against shock		30g / 11 ms		

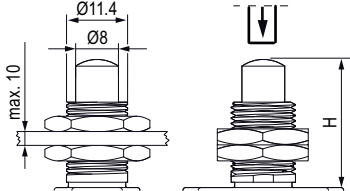
4.2 Position switches in compact design

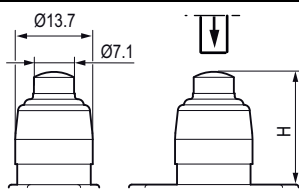
		3SE54.3-0CP..-.... 3SE54.3-0CN..-....	3SE54.3-0CD..-....	3SE54.3-0CC..-....
Ambient temperature				
• during operating	°C	-25 ... +85	-25 ... +85	
• during storage		-25 ... +85		
Protection class IP		IP67		
mounting position		any		

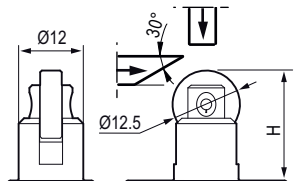
1) 3SE5413 = 30 mm / 3SE5423 = 40 mm

4.2.3 Actuator heads for position switches in compact design with molded cable

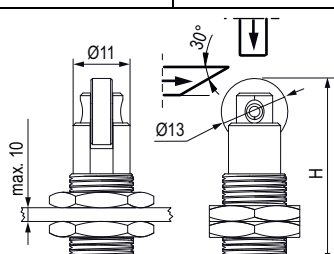
	3SE5413-0CC20-....	3SE5423-0CC20-....
H	9.8 mm	7.5 mm
		

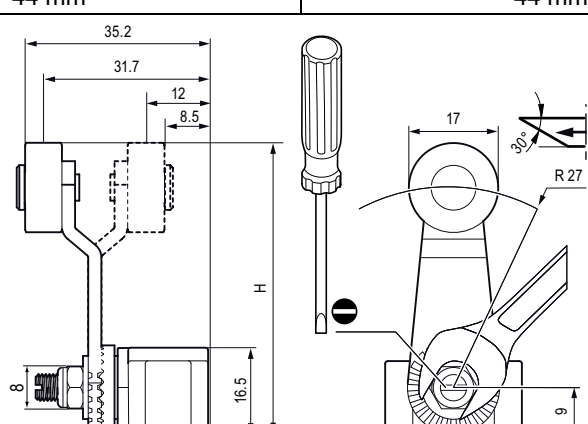
	3SE5413-0CC21-....	3SE5423-0CC21-....
H	24 mm	24 mm
		

	3SE5413-0CC22-....	3SE5423-0CC22-....
H	19.8 mm	16.7 mm
		

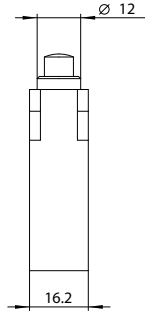
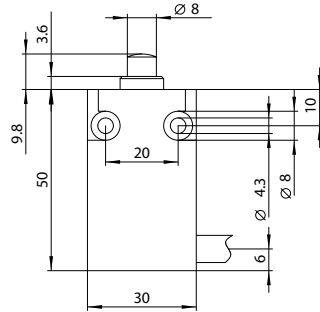
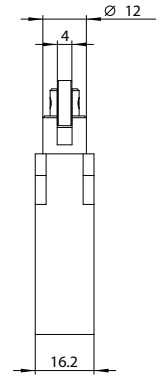
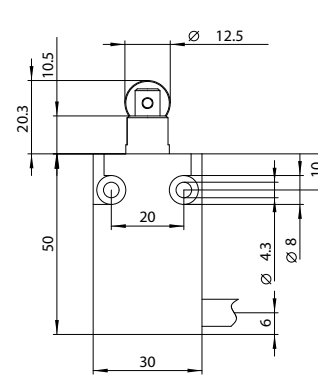
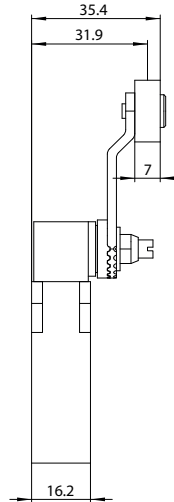
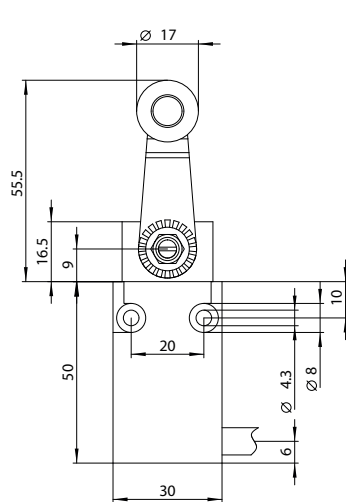
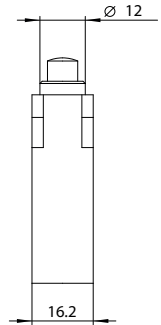
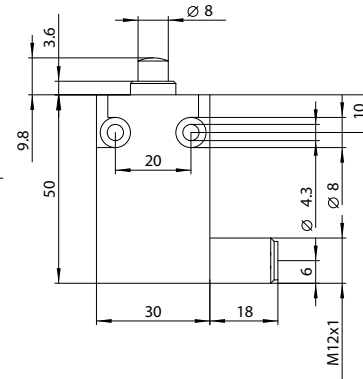
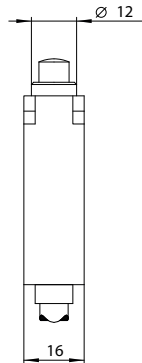
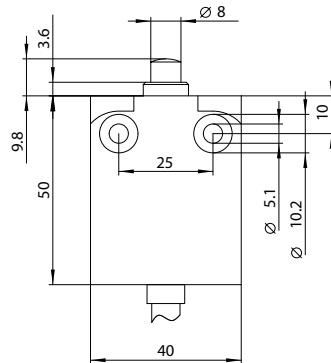
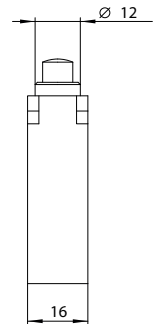
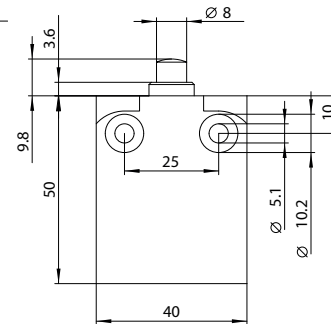
	3SE5413-0CD20-....	3SE5423-0CD20-....
	3SE5413-0CD23-....	3SE5423-0CD23-....
H	20.3 mm	20.3 mm
		

4.2 Position switches in compact design

	3SE5413-0CD21-....	3SE5423-0CD21-....
H	35 mm	35 mm
		

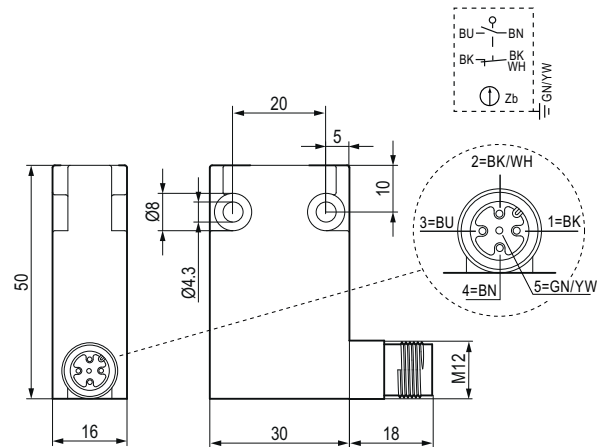
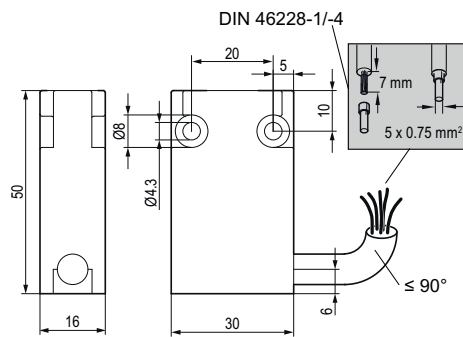
	3SE5413-0CN20-....	3SE5423-0CN20-....
H	44 mm	44 mm
		

4.2.4 Dimension drawings and operating travel diagrams for position switches in compact design

3SE5413-0CC20-1EA2**3SE5413-0CD20-1EA2****3SE5413-0CN20-1EA2****3SE5413-0CC20-1EB1****3SE5423-0CC20-1EA2****3SE5423-0CC20-1EB2**

3SE5413-.....-1EA.

3SE5413-.....-1EB1



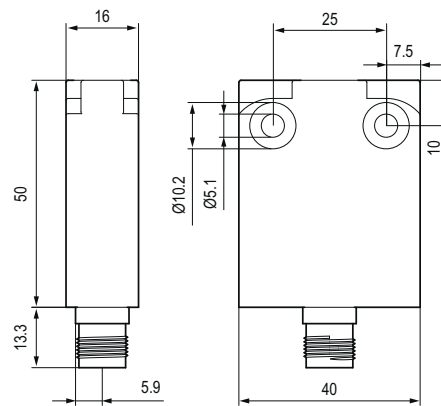
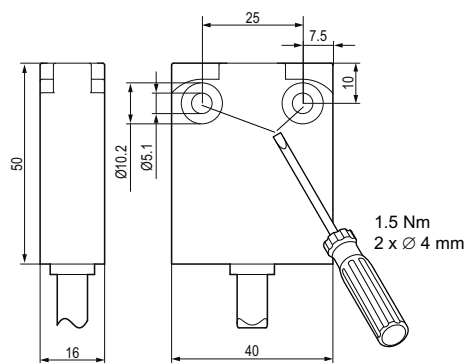
BK = black
WH = white

BU = blue
YW = yellow

BN = brown
GN = green

3SE5423-.....-1EA.

3SE5423-.....-1EB1



Compact design 3SE54.3-0CC2.

Snap-action contacts		
1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11
Actuation in travel direction		
3SE54.3-0CC2.	3SE54.3-0CD2.	3SE54.3-0CN2.

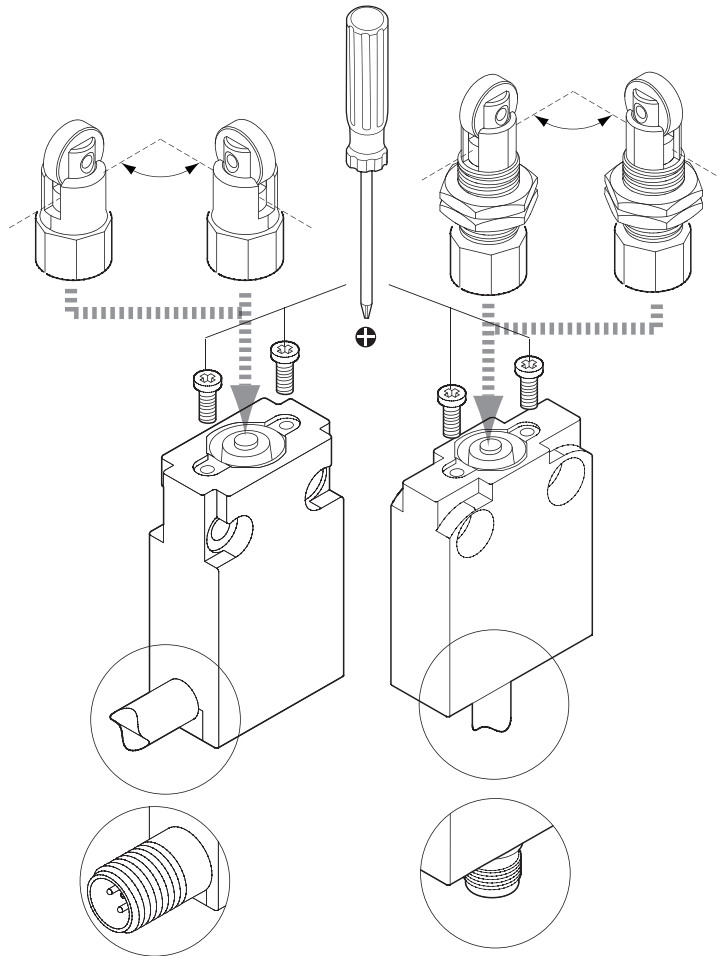
- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
- Contact element closed
- Contact element open
- ≤ Maximum actuator travel

BK = black
WH = white

BU = blue
YW = yellow

BN = brown
GN = green

4.2.5 Rotating the actuator head



4.3 Mechanical position switches

4.3.1 General description

Plastic enclosure

The enclosure for these position switches is made of glass fiber-reinforced, flame-resistant plastic that is resistant to shock, impact, and drill oils. The cover is fastened with a captive screw. The cable entry features one M20 x 1.5 thread.

Note

In the case of position switches with integrated contact block, the bottom of the enclosure contains drill holes that enable mounting with M4 cylinder head screws.

Operating points, enclosure dimensions, and mounting dimensions for the 3SE52.. position switches, together with the respective actuators, conform to DIN EN 50047. The "Protective insulation" protective measure is achieved through the use of the plastic enclosure, thereby making connection of a protective conductor unnecessary. The enclosure is protected against ingress of dust and water jets from any direction. The contact pieces are pressed into the bottom of the enclosure (integrated) or a contact block is inserted inside an enclosure (replaceable). When the cover is open, the contact chamber is additionally covered to protect against ingress of foreign objects. The contact pieces are visible. Contact version 1 NO + 1 NC, 1 NO + 2 NC, and 2 NO + 1 NC.

The position switches are supplied with snap-action contacts, slow-action contacts, and slow-action contacts with make-before-break.

Enclosure widths 31 mm, 40 mm, and 50 mm are available.



3SE5132-.....



3SE5232-.....



3SE5242-.....

In addition, different actuator variants are available. These can be attached to the rounded plunger (basic switch), which is affixed to the position switch enclosure (basic version). All actuators can be subsequently mounted onto the position switch enclosure or replaced with other actuator variants.

Metal enclosure

The position switch with metal enclosure consists of the three parts: basic enclosure, contact block, and actuator. The contact blocks are inserted inside the enclosure.

All contact blocks have a black plastic enclosure that holds the fixed contact pieces and the SIGUT terminals (captive screws).

The contact blocks can be used in standard enclosures with 2 or 3 contacts.



3SE5212-.....

3SE5112-.....

3SE5122-.....

3SE5162-.....

The enclosures, together with the corresponding actuators, conform to the standard position switches according to DIN EN 50041 or DIN EN 50047. The metal enclosures are corrosion-resistant and insensitive to impact, shock, and hot cuttings.

The 40 mm wide enclosures satisfy degree of protection IP66/IP67 (complete touch protection/protection against harmful water in case of immersion). The standard enclosure is equipped with a choice of two diagonally arranged round holes or oblong holes for mounting purposes. The wide enclosure has oblong holes arranged on the left and right sides of the actuator. These enable an adjustment of the operating point during installation, if this adjustment cannot be made by means of the actuating element.

The 56 mm wide enclosure is provided with three threaded holes and the 31 mm and 40 mm wide enclosures with an M20 x 1.5 threaded hole for cable entry. The wide enclosure has more connection options because it also has a larger connection compartment.

The enclosure has a terminal for the protective conductor connection.

Modular system

The 3SE5 series is a modular system, consisting of the basic switch in various sizes and an actuator, which must be ordered separately. The modular switch design allows the user to choose the appropriate solution from a wide selection of options and to assemble it himself. The short delivery times for the modules ensures a high level of plant availability.

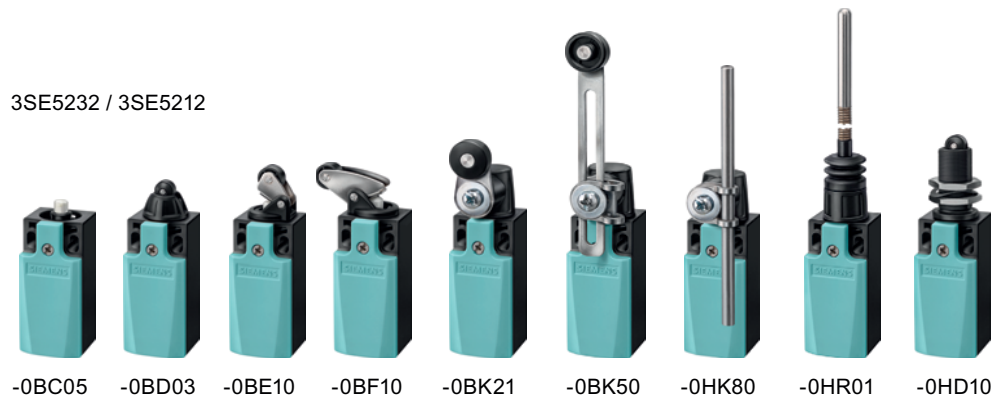


Examples of possible selections in the modular system

4.3.2 Complete units

Frequently requested position switch variants in standard enclosures are offered as complete units.

Enclosure width 31 mm - plastic/metal

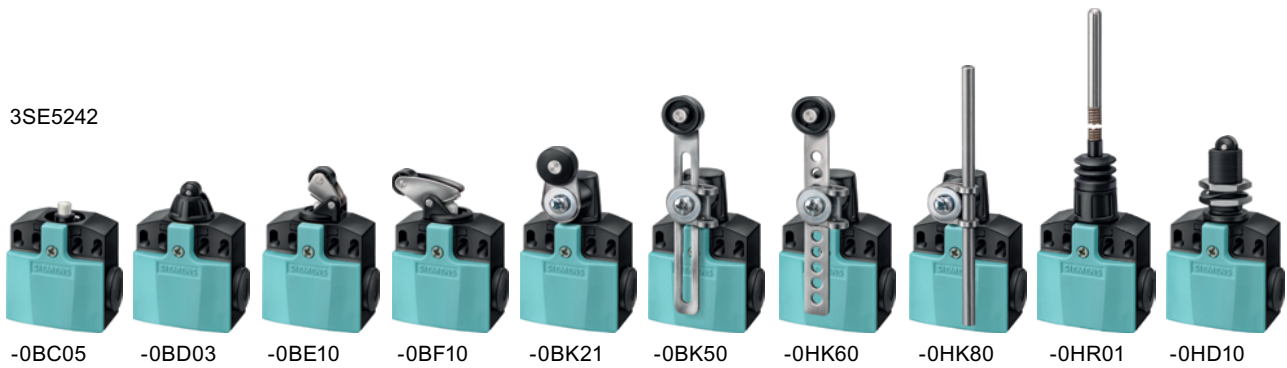


Enclosure width 40 mm - plastic/metal



Enclosure width 50 mm - plastic

3SE5242



Enclosure width 56 mm - metal

3SE5122



XL enclosure 56 mm - metal

3SE5162



4.3.3 Optional LED displays

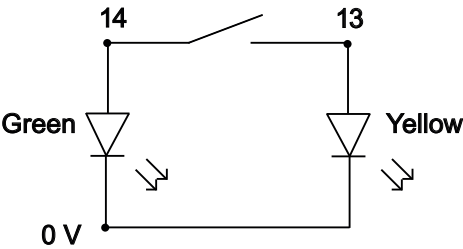


All enclosure variants (except XL enclosure) can be supplied with an LED display.

LED connection

Operating diagram

24 V DC
230 V AC



LED display

3 LEDs on the front panel indicate the switch position of the protective device.

LED	No voltage	Voltage applied	Contact closed

Note

Modified LED function in case of rotation

Note that if the LEDs are rotated 180°, their function is modified. Safety contacts (NC) must not be queried by means of LEDs. The cable must be contacted using a commercially available terminal.

4.3.4 Enclosure

Enclosure cover

- The standard color of the enclosure covers with and without LED display is turquoise.
- These can be replaced with yellow covers with and without LED displays, which are available for all enclosure sizes (except XL enclosure).
- All LED enclosure covers are available for both plastic and metal enclosures.

Enclosure sizes

The 3SE5 switches are available for delivery in eight different enclosure sizes:

- Position switches in open-type design, IP20 or IP10
- Position switches in compact design
- Plastic enclosure/metal enclosure according to EN 50047, 31 mm wide, 1 cable entry, IP65/IP66/IP67
- Plastic enclosure, 50 mm wide, 2 cable entries, IP66/IP67
- Plastic enclosure/metal enclosure according to EN 50041, 40 mm wide, 1 cable entry, IP66/IP67
- Metal enclosure, 56 mm wide and XL enclosure, 3 cable entries, IP66/IP67

Enclosure versions

All enclosure variants have an integrated chlorinated rubber membrane for a high level of operational reliability in environments with low temperatures, dust, moisture, and corrosive vapors.

With the enclosures, you can choose a basic switch from a wide range of options:

- With integrated contact block for 31 mm plastic switches, or with replaceable contact blocks including two or three contacts, available as slow-action contacts, snap-action contacts, and slow-action contacts with make-before-break
- With optional LED display
- With assembled M12 plug connector, 4-pin, 5-pin, or 8-pin (available as an accessory for self-assembly for the wide enclosure)
- With plug connector 6-pin + PE for metal enclosures
- With increased anti-corrosion protection
- Variants for operating temperatures down to -40 °C (-1AJ0)
- Metal enclosure for explosion protection (ATEX)
- AS-Interface version with integrated ASIsafe electronics for all enclosure types

Actuator variants

The following actuator variants are available for delivery:

- Plain plunger
- Rounded plunger
- Roller plunger
- Roller lever
- Angular roller lever
- Spring rod
- Twist lever
- Adjustable-length twist lever
- Rod lever
- Fork lever

The driving rollers are available in different materials and diameters.

4.3.5 Actuators and their actuation

There are currently 10 different actuator solutions available to satisfy a wide range of approach requirements.

These are distinguished by the following:

- The permissible type and direction of approach
- The actuating speed
- The actuating element design
- The favorable material pairing

All position switches operate independently of their position.

A position switch must be actuated for at least 0.1 s to ensure that the control command is forwarded reliably. The speed of the actuating element is designated as v (in m/s); the length l (in mm) of the actuating element is then calculated as $l \geq 0.1 \cdot v$. The same values apply with respect to the service life and switching frequency as for the contact block. All actuators are available for all enclosure sizes (3SE51, 3SE52). In the case of lateral actuation, the approach angle and trailing angle of the actuating element must be the same. The position switch must not be used as a mechanical endstop of a moving machine part under any circumstances. The actuators with central fixing M18 x 1 enable fast assembly and simple adjustment.

Possible uses

All actuators can be used for safety switches.

Exceptions:

- Spring rod
- Rod lever
- Adjustable-length twist lever with oblong hole without latching

The following actuator types are available:

- Plastic actuators for enclosure widths 31 mm and 50 mm according to EN 50047/40 mm according to EN 50041.
- Metal actuators for enclosure widths 40 mm and 56 mm according to EN 50041.
- All actuator heads can be rotated in 22.5 ° increments.

The actuator types have the same functionality, but different applications (see Application examples (Page 221))

4.3 Mechanical position switches

4.3.5.1 Plain plunger/rounded plunger



3SE5000-0AB01
Plain plunger



3SE5000-0AC02
Rounded plunger

3SE5000-	0AB01	0AC02	0AC02-1AJ0	0AC03	0AC03-1AJ0
For position switch	3SE51/52	3SE51/52	3SE51	3SE5132	3SE5132
According to standard	EN 50041	EN 50041	EN 50041	EN 50041	EN 50041
Actuator head	Plastic	Metal	Metal	Plastic	Plastic
Stainless steel plunger	✓	✓	✓	—	—
Plastic plunger	—	—	—	✓	✓
Approach direction	In travel direction	In travel direction	In travel direction	In travel direction	In travel direction
Approach velocity $v_{\max}$	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Overtravel	—	3 mm	3 mm	—	3 mm
Special features	—	—	Functional at -40 °C	—	Functional at -40 °C

Note

Some rounded plungers and roller plungers have a 3 mm overtravel and thus a longer actuator travel than other actuators.

Actuation in the travel direction has a positive effect on the service life because neither lateral forces nor friction occurs in this case.

4.3.5.2 Roller plunger



3SE5000-0AD02



3SE5000-0AD03 / 3SE5000-0AD04

3SE5000-	0AD02	0AD03	0AD04	0AD05	0AD06
For position switch	3SE51/52	3SE51/52	3SE51/52	3SE5132	3SE5132
According to standard	EN 50041	EN 50047	EN 50047	EN 50041	EN 50041
Actuator head	Metal	Plastic	Plastic	Plastic	Plastic
Stainless steel roller	✓	—	✓	—	✓
Plastic roller	—	✓	—	✓	—
Roller Ø	13 mm	10 mm	10 mm	13 mm	13 mm
Approach direction with switching bar	Perpendicular to the travel axis	Perpendicular to the travel axis	Perpendicular to the travel axis	Perpendicular to the travel axis	Perpendicular to the travel axis
Approach velocity v_{max}	1 m/s	1 m/s	1 m/s	1 m/s	1 m/s
Overtravel	3 mm	—	—	—	—
Special features				Functional at -40 °C (0AD05-1AJ0 only)	

The roller plunger is recommended in the case of lateral actuation and a relatively long overtravel distance.

Note

Some rounded plungers and roller plungers have a 3 mm overtravel and thus a longer actuator travel than other actuators.

4.3.5.3 Roller plunger for central fixing



3SE5000-0AD10 / 3SE5000-0AD11

- Rapid installation
- Easy adjustment

3SE5000-	0AD10	0AD11
For position switch	3SE51/52	3SE51/52
According to standard	EN 50047	EN 50047
Actuator head	Plastic	Plastic
Stainless steel roller	—	✓
Plastic roller	✓	—
Roller Ø	10 mm	10 mm
Approach direction	Perpendicular to the travel axis	Perpendicular to the travel axis
Approach velocity $v_{\max}$	1 m/s	1 m/s
Special features	• With thread M18 x 1 • Minimum actuation force in actuation direction 18 N	

4.3.5.4 Roller lever



3SE5000-0AE1.



3SE5000-0AE0.

3SE5000-	0AE10 / 0AE01	0AE11 / 0AE02	0AE12 / 0AE03	0AE13 / 0AE04	0AE05
For position switch	3SE51/52	3SE51/52	3SE51/52	3SE51/52	3SE5132
According to standard	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50041
Actuator head	Plastic/metal				Plastic
Stainless steel lever	—	—	✓	✓	—
Metal lever	✓	✓	—	—	✓
Stainless steel roller	—	✓	—	✓	—
Plastic roller	✓	—	✓	—	✓
Roller Ø	13 mm / 22 mm	13 mm / 22 mm	13 mm / 22 mm	13 mm / 22 mm	22 mm
Approach direction only from	Right	Right	Right	Right	Right
Approach velocity $v_{\max}$	1 m/s	2.5 m/s	1 m/s	2.5 m/s	1 m/s

Because the actuator is equipped with a plastic or stainless steel roller, it is especially well-suited for actuating elements made of finely-ground steel in the form of cams, bars, or cam discs without additional lubrication.

4.3 Mechanical position switches

4.3.5.5 Angular roller lever



3SE5000-0AF1.



3SE5000-0AF0.

3SE5000-	0AF01 / 0AF10	0AF02 / 0AF11	0AF03 / 0AF12	0AF04 / 0AF13	0AF05
For position switch	3SE51/52	3SE51/52	3SE51/52	3SE51/52	3SE5132
According to standard	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50047 / EN 50041	EN 50041
Actuator head	Plastic/metal				Plastic
Metal lever	✓	✓	—	—	✓
Stainless steel lever	—	—	✓	✓	—
Plastic roller	✓	—	✓	—	✓
Stainless steel roller	—	✓	—	✓	—
Roller Ø	22 mm / 13 mm	22 mm / 13 mm	22 mm / 13 mm	22 mm / 13 mm	22 mm
Approach direction only from	Below	Below	Below	Below	Below
Approach velocity $v_{\max}$	1 m/s	2.5 m/s	1 m/s	2.5 m/s	1 m/s

The angular roller lever is characterized by:

- Actuation elements made of finely-ground steel in the form of cams, bars, or cam disks
- A very long mechanical service life

4.3.5.6 Spring rod



3SE5000-0AR01

! WARNING

Risk of injury or death.

Spring rod actuators must not be used for safety circuits.

Note

The spring rod is only suitable for switches with snap-action contacts.

3SE5000-	0AR01	0AR02	0AR03	0AR04
For position switch	3SE51/52	3SE51/52	3SE51/52	3SE51/52
According to standard	—	—	—	—
Actuator head	Plastic	Plastic	Plastic	Plastic
Stainless steel plunger	—	✓	—	—
Plastic plunger	✓	—	✓	✓
Plunger length	50 mm	50 mm	10 mm	50 mm
Spring length	50 mm	50 mm	23.5 mm	150 mm
Total length	142.5 mm	142.5 mm	76 mm	242.5 mm
Approach direction	From all directions	From all directions	From all directions	From all directions
Approach velocity $v_{\max}$	1 m/s	1 m/s	1 m/s	1 m/s
Special features	• Only suitable for switches with snap-action contacts • No positive opening operation			

The spring rod can then be used in cases where the direction of actuation changes constantly.

4.3 Mechanical position switches

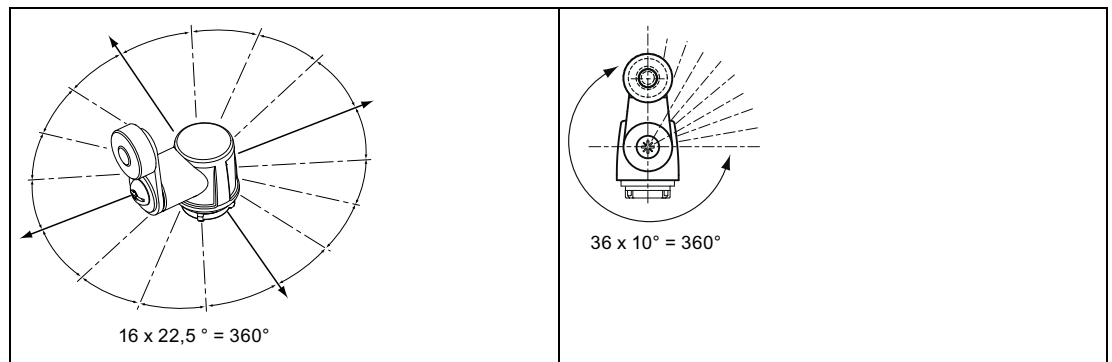
4.3.5.7 Part-turn actuators with lever

Because they are available in many different variations, position switches with twist lever and rod lever are all-purpose switches. They are less sensitive to environmental influences than other actuators (for example, oils run past on the side). The arrangement of actuator and shaft seal make twist levers and rod levers especially insensitive to heavy exposure to dirt, grinding dust, or coarse-grained material.

				
Actuator heads			3SE5000-0AK00 3SE5000-0AH00 3SE5000-0AJ00	
+	+	+	+	+
	 (No positive opening operation)		 (No positive opening operation)	
3SE5000-0AA0./1./2./3.	3SE5000-0AA5.	3SE5000-0AA6.	3SE5000-0AA8.	3SE5000-0AT0.
Twist lever	Twist lever, adjustable-length	Twist lever, adjustable-length, with pre-drilled holes	Rod lever	Fork lever

All actuators can be subsequently mounted onto the position switch enclosure or replaced with other actuator variants. In addition, they can be offset in 16x 22.5 ° increments.

The part-turn actuators offer right, left, or right/left direction of operation by default and can be offset from 10° to 10° on the actuator shaft.

**Note****Conversion of actuator head possible.**

The actuator head can be converted to right-operating and/or left-operating (see Changing the actuator head (Page 85)).

Special features:

- Different materials of
 - Metal
 - Plastic
 - Stainless steel (important for anti-corrosion protection)
- Different rollers made of
 - Plastic
 - Metal
 - Stainless steel
 - Rubber
- Different roller diameters
- Rollers with ball bearing
- Various lever lengths
- High approach velocity ($v = 1.5 \text{ m/s}$)
- Many possible approaches
- Insensitive to
 - Oil
 - Grinding dust
 - Dirt
 - Coarse-grained material
- Twist lever (maximum approach angle = maximum trailing angle)

4.3 Mechanical position switches

- The rod lever or adjustable-length twist lever is intended for cases where an actuating element with approach angle and trailing angle is not possible for technological reasons (e.g., packages, bottles, etc.)
- 10 ° offset of part-turn actuators possible

4.3.5.8 Twist lever



3SE5000-0AA2./3. - Straight lever



3SE5000-0AA0./1. - Offset lever

3SE5000-	0AA01 / 0AA15 / 0AA24	0AA21	0AA03 / 0AA23	0AA05 / 0AA25	0AA07	0AA24 / 0AA26
For position switch	3SE51 / 3SE51 / 3SE51/52	3SE52	3SE51 / 3SE52	3SE51 / 3SE52	3SE51	3SE51/52
According to standard	EN 50041	EN 50047	EN 50041 / EN 50047	EN 50041 / EN 50047	EN 50041	EN 50041
Metal lever	✓	✓	✓	✓	✓	✓
Stainless steel lever	—	—	—	—	—	—
Lever length	27 mm / 35 mm / 30 mm	21 mm	27 mm / 21 mm	27 mm / 21 mm	27 mm	30 mm
Plastic roller	✓	✓	—	✓	✓	✓
Stainless steel roller	—	—	—	—	—	—
Ball bearing roller	—	—	✓	—	—	—
Rubber roller	—	—	—	—	—	—
Roller Ø	19 mm	19 mm	19 mm	30 mm	50 mm	19 mm/ 30 mm
Approach direction	From left and right					
Approach velocity V _{max}	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	3SE5000-0AA01-1AJ0 functional at -40 °C	3SE5000-0AA21-1AJ0 functional at -40 °C	—	—	3SE5000-0AA31-1AJ00 functional at -40 °C	Roller mounted inversely ¹⁾

¹⁾ Roller rotated 180°, mounted on the rear of the lever

4.3 Mechanical position switches

3SE5000-	0AA08	0AA02 / 0AA22	0AA11	0AA12 / 0AA31 / 0AA32	0AA04
For position switch	3SE51	3SE51 / 3SE52	3SE51	3SE51 / 3SE52 / 3SE52	3SE51
According to standard	EN 50041	EN 50041 / EN 50047	EN 50041	EN 50041 / EN 50047 / EN 50047	EN 50041
Metal lever	✓	✓	—	—	✓
Stainless steel lever	—	—	✓	✓	—
Lever length	27 mm	27 mm / 21 mm	27 mm	27 mm / 21 mm / 21 mm	27 mm
Plastic roller	—	—	✓	—	2x
Stainless steel roller	—	✓	—	✓	—
Ball bearing roller	—	—	—	—	—
Rubber roller	✓	—	—	—	—
Roller Ø	50 mm	19 mm	19 mm	19 mm	19 mm
Approach direction	From left and right				
Approach velocity $v_{\max}$	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	—	—	3SE5000-0AA11-1AJ0 functional at -40 °C	—	—

Twist lever (maximum approach angle = maximum trailing angle)

4.3.5.9 Adjustable-length twist lever with oblong hole

Because they are available in many different variations, position switches with adjustable-length twist levers are all-purpose switches. They are less sensitive to environmental influences than other actuators (for example, oils run past on the side). The arrangement of actuator and shaft seal make twist levers especially insensitive to heavy exposure to dirt, grinding dust, or coarse-grained material.



3SE5000-0AA5.

3SE5000-	0AA50	0AA51	0AA52	0AA53	0AA55	0AA56	0AA57	0AA58
For position switch	3SE51/52							
According to standard	EN 50047 / EN 50041							
Stainless steel lever	—	—	✓	✓	—	—	—	—
Metal lever	✓	✓	—	—	✓	✓	✓	✓
Lever length	100 mm	100 mm	100 mm	100 mm	100 mm	146 mm	100 mm	100 mm
Stainless steel roller	—	✓	—	✓	—	—	—	—
Plastic roller	✓	—	✓	—	✓	✓	✓	—
Rubber roller	—	—	—	—	—	—	—	✓
Roller Ø	19 mm	19 mm	19 mm	19 mm	30 mm	22 mm	50 mm	50 mm
Approach direction from	left and right							
Approach velocity v_{max}	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	—	—	With stainless steel clamp	With stainless steel clamp	—	—	—	—

CAUTION

Switch function can be impaired.

The actuators with adjustable-length twist lever without pre-drilled holes are not suitable for safety circuits.

4.3 Mechanical position switches

The adjustable-length twist lever is intended for cases where an actuating element with approach angle and trailing angle is not possible for technological reasons (e.g., packages, bottles, etc.).

4.3.5.10 Adjustable-length twist lever with pre-drilled holes

Because they are available in many different variations, position switches with adjustable-length twist levers are all-purpose switches. They are less sensitive to environmental influences than other actuators (for example, oils run past on the side). The arrangement of actuator and shaft seal make twist levers especially insensitive to heavy exposure to dirt, grinding dust, or coarse-grained material.



3SE5000-0AA6.

3SE5000-	0AA60	0AA61	0AA62 / 0AA64	0AA63	0AA67	0AA68
For position switch	3SE51/52	3SE51/52	3SE51/52	3SE51/52	3SE51/52	3SE51/52
According to standard	EN50047 / EN50041					
Stainless steel lever	—	—	✓	✓	—	—
Metal lever	✓	✓	—	—	✓	✓
Lever length	100 mm	100 mm	100 mm	100 mm	100 mm	100 mm
Stainless steel roller	—	✓	—	✓	—	—
Plastic roller	✓	—	✓	—	✓	—
Rubber roller	—	—	—	—	—	✓
Roller Ø	19 mm	19 mm	19 mm	19 mm	50 mm	50 mm
Approach direction from	left and right					
Approach velocity v_{max}	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	3SE5000-0AA60-1AJ0 functional at -40 °C	—	3SE5000-0AA62-1AJ0 functional at -40 °C	With stainless steel clamp	—	—
	—	—	3SE5000-0AA62 with stainless steel clamp	—	—	—

The adjustable-length twist lever is intended for cases where an actuating element with approach angle and trailing angle is not possible for technological reasons (e.g., packages, bottles, etc.).

4.3.5.11 Rod lever

Because they are available in many different variations, position switches with rod levers are all-purpose switches. They are less sensitive to environmental influences than other actuators (for example, oils run past on the side). The arrangement of actuator and shaft seal make rod levers especially insensitive to heavy exposure to dirt, grinding dust, or coarse-grained material.



3SE5000-0AA80



3SE5000-0AA81



3SE5000-0AA82

3SE5000-	0AA80	0AA81	0AA82	0AA83
For position switch	3SE51 / 3SE52	3SE51 / 3SE52	3SE51 / 3SE52	3SE51 / 3SE52
According to standard	EN 50041 / EN 50047	EN 50041 / EN 50047	EN 50041 / EN 50047	EN 50041 / EN 50047
Aluminum rod	✓	—	—	—
Plastic rod	—	—	✓	✓
Spring rod	—	✓	—	—
Length	200 mm	200 mm	200 mm	330 mm
Rod Ø	6 mm	6 mm	6 mm	6 mm
Approach direction from	left and right	left and right	left and right	left and right
Approach velocity $v_{\max}$	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	With clamp	With clamp	With clamp	With clamp

**CAUTION**

Switch function can be impaired.

The actuator with rod lever is not suitable for safety circuits.

The rod lever is intended for cases where an actuating element with approach angle and trailing angle is not possible for technological reasons (e.g., packages, bottles, etc.).

4.3.5.12 Fork lever



3SE5000-0AT0.

3SE5000-	0AT01	0AT02	0AT03	0AT04
For position switch	3SE51	3SE51	3SE51	3SE51
For actuator head	3SE5000-0AT10	3SE5000-0AT10	3SE5000-0AT10	3SE5000-0AT10
According to standard	EN 50041	EN 50041	EN 50041	EN 50041
2 x metal lever	✓	✓	—	—
2 x stainless steel lever	—	—	✓	✓
Plastic roller	✓	—	—	✓
Stainless steel roller	—	✓	✓	—
Roller Ø	19 mm	19 mm	19 mm	19 mm
Approach direction from	left and right			
Approach velocity $v_{\max}$	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s
Special features	• Can be operated in two directions • Latching actuator • For reciprocating movements			

Note

The fork lever latches after actuation and must be reset.

4.3.6 Combinations

Any enclosure can be combined with any available actuator.

The following contact blocks can be interchanged:

	2-pin	3-pin	3-pin with make-before-break
• With snap-action function	1 NO + 1 NC	1 NO + 2 NC	—
• With slow-action function	1 NO + 1 NC	1 NO + 2 NC 2 NO + 1 NC	—
• With slow-action function with make-before-break	—	—	1 NO + 2 NC

Contact blocks

- Slow-action contacts (1 NO + 1 NC), (1 NO + 2 NC), (2 NO + 1 NC)
- Slow-action contacts with make-before-break
- Snap-action contacts (1 NO + 1 NC), + (1 NO + 2 NC)
 - 2 x 2 mm operating distance (1 NO + 1 NC)
 - Short stroke (1 NO + 1 NC)
The short-stroke element (1 NO + 1 NC) improves the switching accuracy through a reduced actuator travel.
 - Gold contacts

Covers

The covers can be replaced.

Cover colors

The standard cover color is turquoise.

Yellow covers are also available in order to make the safety switch stand out visually.

Plastic enclosures can only be used with plastic covers and metal enclosures only with metal covers.

4.3.7 Contact blocks

Replaceable 2-pin and 3-pin contact blocks for all enclosure sizes.



The 3-pin contact block (1 normally open contact + 2 normally closed contacts or 2 normally open contacts + 1 normally closed contact) in three contact versions (snap-action, slow-action, and slow-action with make-before-break) is available for all enclosure types. It offers additional safety through redundant switch-off (2 normally closed contacts) with simultaneous signaling (1 normally open contact). It requires the same installation space as the 2-pin contact block.

4.3.8 Accessories and spare parts

To enable fast replacement of highly-utilized devices with standard enclosure, e.g., in automatic manufacturing lines, a quick-release device and plug connector are offered.

4.3.8.1 Quick-release device for enclosure width 40 mm

3SY3110 - Intermediate plate with screws



4.3 Mechanical position switches

3SY3027 - Base plate with locking lever



4.3.8.2 Plug-in connections for connecting thread M20 x 1.5

3SY3131 - Plug connector (6-pin + PE), for M20 x 1.5



For maximum 250 V, 10 A
with connecting cable 0.75 mm², plastic, degree of protection IP65, ambient temperature -40 to +90 °C

3SY3136 - Cable box (6-pin + PE)



With connection compartment (can be pre-assembled), plastic, degree of protection IP65

3SY3127 - Plug connector (4-pin), M12 for M20 × 1.5, fixed



For maximum 250 V, 4 A, $U_{imp} = 2500$ V

With 4 connecting cables 0.25 mm², plastic, degree of protection IP67, ambient temperature -40 to +85 °C

3SY3128 - Plug connector (5-pin), M12 for M20 × 1.5, fixed



For maximum 125 V, 4 A, $U_{imp} = 1500$ V

with 5 connecting cables 0.25 mm², plastic, degree of protection IP67, ambient temperature -40 to +85 °C

3SY3134 - Plug connector (8-pin), M12 for M20 × 1.5, fixed, metal version



For maximum 30 V, 2 A, $U_{imp} = 800$ V

with 8 connecting cables 0.25 mm², metal, degree of protection IP67, ambient temperature -40 to +85 °C

4.3 Mechanical position switches

4.3.8.3 Cable gland

The following cable gland can be used:

Cable gland M20 x 1.5



Plastic
3SX9926

CAUTION

The seal that comes with the cable gland must be used.
--

4.3.8.4 Adapters

For NPT 1/2" thread, a cable entry adapter (M20 x 1.5 to NPT 1/2") made of metal or plastic according to , , and  is available.



Metal
3SX9917



Plastic
3SX9918

4.3.8.5 Protective cover made of plastic



3SE5000-0AC30

Optional accessory for 3SE5 for rounded plunger according to EN 50047



3SE5000-0AC30

Dust cap for basic switch

4.3.9 Changing the actuator head

The actuators can be interchanged.

Possible changes to the method of actuation

- Every actuator can be replaced with any other actuator variant.
- Every actuator can be offset by 22.5° (depending on the actuator adjustment and the enclosure type).
- The twist lever can be offset from 10° to 10° on the actuator shaft, and can be repositioned 180°.

Procedure for changing the direction of operation and replacing the actuator head

1. Unscrew the enclosure cover (1).
2. Rotate the locking plate (2) to the right.

NOTICE
The spring is preloaded and may be lost when changing the actuator head. If this happens the switch will no longer function in the case of part-turn actuators. Keep a firm hold on the actuator head while removing it.

3. Remove the actuator head (3).
4. Insert the new actuator head (3) until it reaches the endstop.
5. Rotate the locking plate (2) to the left.
6. Screw on the enclosure cover (1).
 - **Part-turn actuator 3SE5000-0AH00/AK00/AJ00** is left- and right-operating (factory configuration) (4.1)
 - **Adjusting the actuator head to be left-operating or right-operating only**
Actuating plunger (4) rotated 90° to the left = left-operating (4.2).
Actuating plunger (4) rotated 90° to the right = right-operating (4.3).

4.3 Mechanical position switches

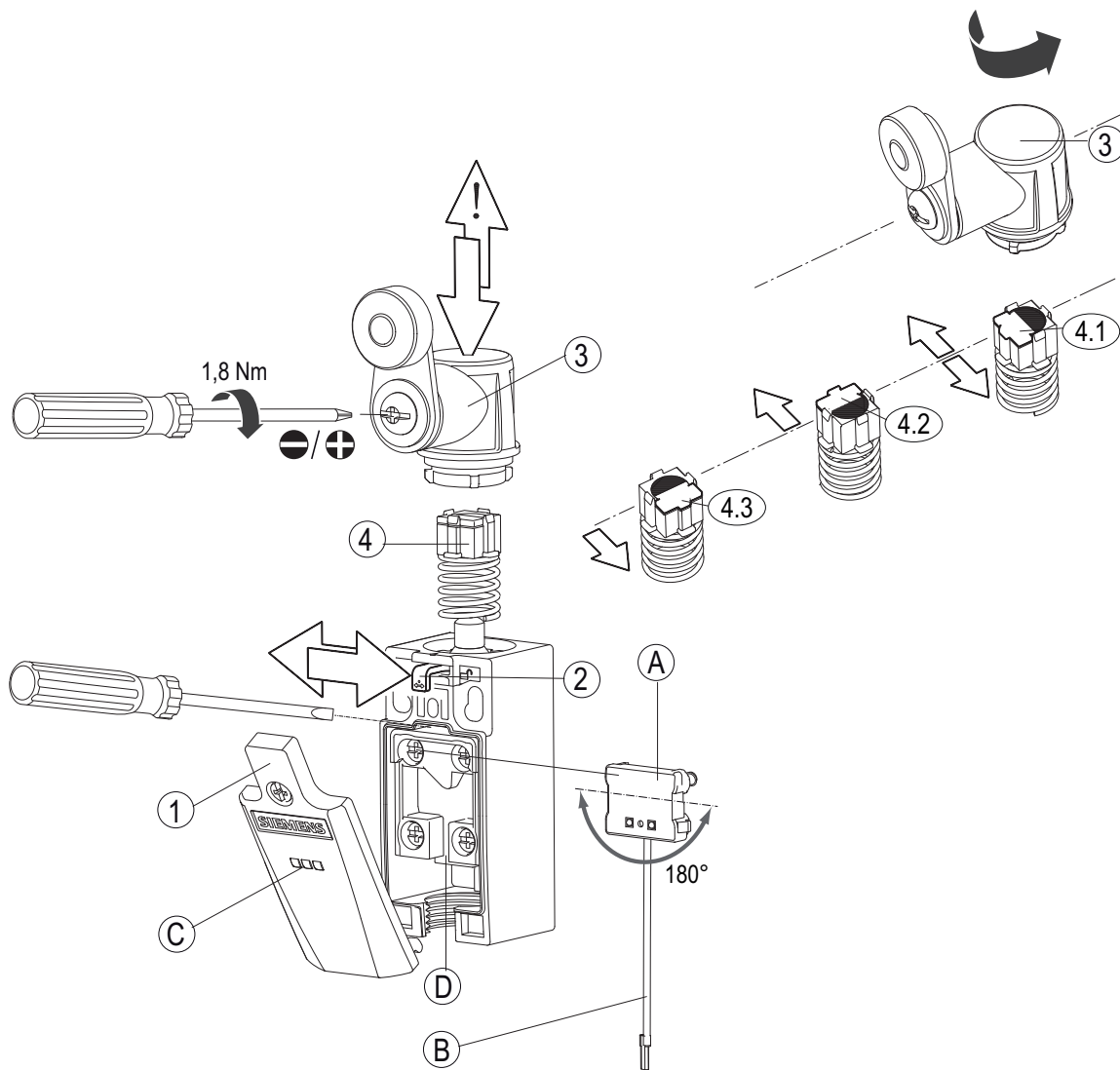


Figure 4-1 Changing the actuator head (example: part-turn actuator)

The actuators and contact blocks can be interchanged with other actuators and contact blocks.

Actuator heads can be quickly replaced through a simple plug-in assembly procedure.



- | | | | |
|-----|--|-----|---------------------------|
| (1) | Open cover | (2) | Actuate the locking lever |
| (3) | Replace the head (can be rotated by $16 \times 22.5^\circ$) | (4) | Lock and close cover |

4.3.10 Quick-connect system

The quick-connect system is used with the 31 mm-wide plastic enclosure.



These position switches have an option for easy and fast wiring. The connecting cable is first connected to the contact block terminals and then routed through a slot in the cable gland opening. This new system allows connections to be made in approximately 20 to 25% less time.

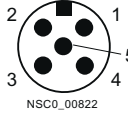
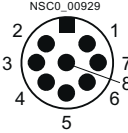
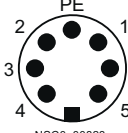
4.3.11 Plug connection

There are various connectors for the device connection:

- Connector M12, 4-pin, plastic
- Connector M12, 5-pin, plastic
- Connector, 6-pin + PE, plastic
- Connector M12, 8-pin, metal

Some of these are available as complete switch variants and some as accessories (Page 81).

4.3.12 Device connector: pin assignment

Plug connector M12, 4-pin	Plug connector M12, 5-pin
3SY3127	3SY3128
	
Plug connector M12, 8-pin	Plug connector, 6-pin + PE Standard DIN 43651 (EN 175201-804)
3SY3134	3SY3131
	

3SE5..4-.....-	1AC4	1AC5	1AE0	1AE1	1AF3	1AF3	1AD4	1AD4
Plug connector M12, 4-, 5-, or 8-pin	3SY3127	3SY3128	3SY3127	3SY3128	3SY3128 (snap action)	3SY3128 (slow action)	3SY3134 (snap action)	3SY3134 (slow action)
Contacts	1 NO + 1 NC	1 NO + 1 NC	2 NC	2 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 2 NC	1 NO + 2 NC
LED	—	—	—	—	2 LED	2 LED	2 LED	2 LED
Pin 1	21	21	21	21	21	21	21	21
Pin 2	22	22	22	22	22	22	22	22
Pin 3	13	13	31	31	13 / LED gn	14 / LED gn	13 / LED gn	14 / LED gn
Pin 4	14	14	32	32	14 / LED ye	13 / LED ye	14 / LED ye	13 / LED ye
Pin 5	—	PE	—	PE	Ground LED	Ground LED	31	31
Pin 6	—	—	—	—	—	—	32	32
Pin 7	—	—	—	—	—	—	Ground LED	Ground LED
Pin 8	—	—	—	—	—	—	PE	PE
PE	—	—	—	—	—	—	—	—

gn = green

ye = yellow

4.3 Mechanical position switches

3SE5..5-.....-	1AD0	1AD1	1AD2	1AD2	1AF2	1AF2
Plug connector, 6-pin + PE	3SY3131	3SY3131	3SY3131 (snap action)	3SY3131 (slow action)	3SY3131 (snap action)	3SY3131 (slow action)
Contacts	1 NO + 1 NC	1 NO + 2 NC	1 NO + 2 NC	1 NO + 2 NC	1 NO + 1 NC	1 NO + 1 NC
LED	—	—	2 LED	2 LED	2 LED	2 LED
Pin 1	21	21	21	21	21	21
Pin 2	22	22	22	22	22	22
Pin 3	13	13	31	31	13 / LED gn	14 / LED gn
Pin 4	14	14	32	32	14 / LED ye	13 / LED ye
Pin 5	—	31	13 / LED gn	14 / LED gn	—	—
Pin 6	—	32	Ground LED	Ground LED	Ground LED	Ground LED
Pin 7	—	—	—	—	—	—
Pin 8	—	—	—	—	—	—
PE	✓	✓	✓	✓	✓	✓

gn = green

ye = yellow

✓ = connected

4.3.13 Technical data for mechanical position switches with thread M20x1.5 without LED

		3SE5212-0M... 3SE5212-0P...	3SE5212-0K... 3SE5212-0L...	3SE5212-0C...	3SE5212-0B...
Width of the sensor	mm	31			
material of the housing		metal			
Insulation voltage rated value	V	250	400		
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	4	6		
Thermal current	A	6			
Operating current					
• at AC-15					
– at 24 V rated value	A	6			
– at 125 V rated value	A	6		8	6
– at 230 V rated value	A	1.5		6	3
• at DC-13					
– at 24 V rated value	A	3		6	3
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	6	10		
• of the C characteristic circuit breaker	A	1		2	
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000			
• at AC-15 at 230 V typical		100000			

4.3 Mechanical position switches

		3SE5212-0M... 3SE5212-0P...	3SE5212-0K... 3SE5212-0L...	3SE5212-0C...	3SE5212-0B...
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			
Ambient temperature					
• during operating	°C	-25 ... +85	-25 ¹⁾ ... +85		-25 ... +85
• during storage		-40 ... +90			
Protection class IP		IP66/IP67			
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			

1) 3SE5212-.....-1AJ0 = -40 °C

		3SE5232-0M... 3SE5232-0P...	3SE5232-0K... 3SE5232-0L...	3SE5232-0B... 3SE5232-0F... 3SE5232-0G... 3SE5232-0H...	3SE5232-0C...
Width of the sensor	mm	31			
material of the housing		plastic			
Insulation voltage rated value	V	250	400		
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	4	6		
Thermal current	A	6			
Operating current					
• at AC-15					
– at 24 V rated value	A	6			
– at 125 V rated value	A	6			
– at 230 V rated value	A	1.5		3	6 ¹⁾
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	6	10		
• of the C characteristic circuit breaker	A	1		2	
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000			
• at AC-15 at 230 V typical		100000			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			

4.3 Mechanical position switches

		3SE5232-0M... 3SE5232-0P...	3SE5232-0K... 3SE5232-0L...	3SE5232-0B... 3SE5232-0F... 3SE5232-0G... 3SE5232-0H...	3SE5232-0C...
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			
Ambient temperature					
• during operating	°C	-25 ... +85	-25 ²⁾ ... +85	-25 ... +85	-25 ²⁾ ... +85
• during storage		-40 ... +90			
Protection class IP		IP65			
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			

1) 3SE5232-0CK31-1AJ0 = 3 A

2) 3SE5232-.....-1AJ0 = -40 °C

		3SE5112-0M... 3SE5112-0P...	3SE5112-0K... 3SE5112-0L...	3SE5112-0C...	3SE5112-0B...
Width of the sensor	mm	40			
material of the housing		metal			
Insulation voltage rated value	V	250	400		
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	4	6		
Thermal current	A	6			
Operating current					
• at AC-15					
– at 24 V rated value	A	6			
– at 125 V rated value	A	6			
– at 230 V rated value	A	1.5		6	3
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	6	10		
• of the C characteristic circuit breaker	A	1			
Mechanical operating cycles as operating time typical		15000000		15000000 ¹⁾	15000000
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		10000000 ²⁾	10000000
• at AC-15 at 230 V typical		100000			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			

4.3 Mechanical position switches

		3SE5112-0M... 3SE5112-0P...	3SE5112-0K... 3SE5112-0L...	3SE5112-0C...	3SE5112-0B...
Ambient temperature					
• during operating	°C	-25 ... +85	-25 ³⁾ ... +85		-25 ... +85
• during storage		-40 ... +90			
Protection class IP		IP66/IP67		IP66/IP67 ⁴⁾	IP66/IP67
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			

1) 3SE5112-0CR01 = 10000000 / 3SE5112-0CT11 = 1000000

2) 3SE5112-0CT11 = 1000000

3) 3SE5112-.....-1AJ0 = -40 °C

4) 3SE5112-0CH8. / 3SE5112-0CR01 = IP65/67

		3SE5132-0M... 3SE5132-0P...	3SE5132-0B... 3SE5132-0C... 3SE5132-0K... 3SE5132-0L...
Width of the sensor	mm	40	
material of the housing		plastic	
Insulation voltage rated value	V	250	400
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	4	6
Thermal current	A	10	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	6	10
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		15000000	15000000 ¹⁾²⁾
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000	
• at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	-25 ³⁾ ... +85
• during storage		-40 ... +90	
Protection class IP		IP66/IP67	IP66/IP67 ⁴⁾
mounting position		any	

4.3 Mechanical position switches

	3SE5132-0M... 3SE5132-0P...	3SE5132-0B... 3SE5132-0C... 3SE5132-0K... 3SE5132-0L...
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

1) 3SE5132-0.J.. / 3SE5132-0.E05 / 3SE5132-0.F05 = 5000000

2) 3SE5132-0LR.. = 10000000

3) 3SE5132-.....-1AJ0 = -40 °C

4) 3SE5132-0LR01 = IP65/67

		3SE5242-0M... 3SE5242-0P...	3SE5242-0K... 3SE5242-0L...	3SE5242-0B... 3SE5242-0F... 3SE5242-0G... 3SE5242-0H...	3SE5242-0C...
Width of the sensor	mm	50			
material of the housing		plastic			
Insulation voltage rated value	V	250	400		
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	4	6		
Thermal current	A	6			
Operating current					
• at AC-15					
– at 24 V rated value	A	6			
– at 125 V rated value	A	6			
– at 230 V rated value	A	1.5		3 ¹⁾	6
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	6	10		
• of the C characteristic circuit breaker	A	1		2	
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000			
• at AC-15 at 230 V typical		100000			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			

4.3 Mechanical position switches

		3SE5242-0M... 3SE5242-0P...	3SE5242-0K... 3SE5242-0L...	3SE5242-0B... 3SE5242-0F... 3SE5242-0G... 3SE5242-0H...	3SE5242-0C...
Ambient temperature					
• during operating	°C	-25 ... +85		-25 ²⁾ ... +85	-25 ... +85
• during storage		-40 ... +90			
Protection class IP		IP66/IP67			
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			

1) 3SE5242-0HC05-1AJ0 / 3SE5242-0HK62-1AJ0 = 6 A

2) 3SE5242-.....-1AJ0 = -40 °C

		3SE5122-0M... 3SE5122-0P...	3SE5122-0K... 3SE5122-0L...	3SE5122-0C...	3SE5122-0B...
Width of the sensor	mm	56			
material of the housing		metal			
Insulation voltage rated value	V	250	400		
Degree of pollution		class 3			
Impulse voltage resistance rated value	V	4000	6000		
Thermal current	A	6			
Operating current					
• at AC-15					
– at 24 V rated value	A	6			
– at 125 V rated value	A	6			
– at 230 V rated value	A	1.5		6	3
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	6	10		
• of the C characteristic circuit breaker	A	1			
Mechanical operating cycles as operating time typical		15000000		15000000 ¹⁾²⁾	15000000
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		10000000 ²⁾	10000000
• at AC-15 at 230 V typical		100000			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			

4.3 Mechanical position switches

		3SE5122-0M... 3SE5122-0P...	3SE5122-0K... 3SE5122-0L...	3SE5122-0C...	3SE5122-0B...
Ambient temperature					
• during operating	°C	-25 ... +85			
• during storage		-40 ... +90 °C			
Protection class IP		IP66/IP67		IP66/IP67 ³⁾	IP66/IP67
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			

1) 3SE5122-0CR01 = 10000000

2) 3SE5122-0CT11 = 1000000

3) 3SE5122-0CH8. / 3SE5122-0CR01 = IP65/67

		3SE5162-0D... 3SE5162-0E...	3SE5162-0B... 3SE5162-0C...
Width of the sensor	mm	56	
material of the housing		metal	
Insulation voltage rated value	V	250	400
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	4	6
Thermal current	A	10	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	8
– at 230 V rated value	A	1.5	6
• at DC-13			
– at 24 V rated value	A	3	6
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	6	10
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		5000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		5000000	
• at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	-25 ¹⁾ ... +85
• during storage	°C	-40 ... +90	
Protection class IP		IP66/IP67	
mounting position		any	

4.3 Mechanical position switches

	3SE5162-0D... 3SE5162-0E...	3SE5162-0B... 3SE5162-0C...
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

1) 3SE5162-.....-1AJ0 = -40 °C

4.3.14 Technical data for mechanical position switches with thread M20x1.5 with LED

		3SE5242-..C05	3SE5232-..C05	3SE5212-..C05
Width of the sensor	mm	50	31	
material of the housing		plastic		metal
Insulation voltage rated value	V	400		
Degree of pollution		class 3		
Impulse voltage resistance rated value	kV	0.8 ¹⁾		
Thermal current	A	6		
Operating current				
• at AC-15				
– at 24 V rated value	A	6		
– at 125 V rated value	A	6		
– at 230 V rated value	A	1.5		
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	0.55		
– at 230 V rated value	A	0.27		
Continuous current				
• of the slow DIAZED fuse link	A	6		
• of the quick DIAZED fuse link	A	10		
• of the C characteristic circuit breaker	A	1		
Mechanical operating cycles as operating time typical		15000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		
• at AC-15 at 230 V typical		100000		
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Repeat accuracy	mm	0.05		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		
Ambient temperature				
• during operating	°C	-25 ... +60		
• during storage		-40 ... +90		

4.3 Mechanical position switches

	3SE5242-..C05	3SE5232-..C05	3SE5212-..C05
Protection class IP	IP66/IP67	IP65	IP66/IP67
mounting position	any		
Switching capacity apparent power	5 V DC, 1 mA		
Type of the connectable conductor cross-section			
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• finely stranded			
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• for AWG conductors			
– solid	1x (20 ... 16), 2x (20 ... 18)		
– stranded	1x (20 ... 16), 2x (20 ... 18)		
Type of voltage of the supply voltage of the optional LED display	DC ²⁾		
Supply voltage of LED	V	24 ³⁾	

1) 3SE52.2-1.C05 = 0,8 kV / 3SE52.2-3.C05 = 4 kV

2) 3SE52.2-1.C05 = DC / 3SE52.2-3.C05 = AC

3) 3SE52.2-1.C05 = 24 V / 3SE52.2-3.C05 = 230 V

		3SE5132-1.A00	3SE5132-3.A00	3SE5112-3.A00	3SE5112-1.A00
Width of the sensor	mm	40			
material of the housing		plastic		metal	
Insulation voltage rated value	V	400			
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	6		4	0.8
Thermal current	A	10		6	
Operating current					
• at AC-15					
– at 24 V rated value	A	6			—
– at 125 V rated value	A	—	6		—
– at 230 V rated value	A	—	1.5		—
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	—	0.55		—
– at 230 V rated value	A	—	0.27		—
Continuous current					
• of the slow DIAZED fuse link	A	6			
• of the quick DIAZED fuse link	A	10			
• of the C characteristic circuit breaker	A	1			
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000			
• at AC-15 at 230 V typical		—	100000		—
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			

4.3 Mechanical position switches

		3SE5132-1.A00	3SE5132-3.A00	3SE5112-3.A00	3SE5112-1.A00
Ambient temperature					
• during operating	°C	-25 ... +60			
• during storage		-40 ... +90			
Protection class IP		IP66/IP67			
mounting position		any			
Switching capacity apparent power		5 V DC, 1 mA			
Type of the connectable conductor cross-section					
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• finely stranded					
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)			
• for AWG conductors					
– solid		1x (20 ... 16), 2x (20 ... 18)			
– stranded		1x (20 ... 16), 2x (20 ... 18)			
Type of voltage of the supply voltage of the optional LED display		DC	AC		DC
Supply voltage of LED	V	24	230		24

		3SE5122-3.A00	3SE5122-1.A00
Width of the sensor	mm	56	
material of the housing		metal	
Insulation voltage rated value	V	400	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	4	0.8
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	—
– at 125 V rated value	A	6	—
– at 230 V rated value	A	3	—
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	—
– at 230 V rated value	A	0.27	—
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		15000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000	
• at AC-15 at 230 V typical		100000	—
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +60	
• during storage		-40 ... +90	
Protection class IP		IP66/IP67	
mounting position		any	
Switching capacity apparent power		5 V DC, 1 mA	

4.3 Mechanical position switches

		3SE5122-3.A00	3SE5122-1.A00
Type of the connectable conductor cross-section			
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded			
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors			
– solid		1x (20 ... 16), 2x (20 ... 18)	
– stranded		1x (20 ... 16), 2x (20 ... 18)	
Type of voltage of the supply voltage of the optional LED display		AC	DC
Supply voltage of LED	V	230	24

4.3.15 Technical data for mechanical position switches with connector without LED

		3SE5214-0KC05-	3SE5214-0LC05-	3SE5214-0BC05-	3SE5214-0CC05-
Width of the sensor	mm	31			
material of the housing		metal			
Insulation voltage rated value	V	125			
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	1.5			
Thermal current	A	4			
Operating current					
• at AC-15					
– at 24 V rated value	A	4			
– at 125 V rated value	A	4			
– at 230 V rated value	A	1.5		3	
• at DC-13					
– at 24 V rated value	A	3			4
– at 125 V rated value	A	0.55			
– at 230 V rated value	A	0.27			
Continuous current					
• of the slow DIAZED fuse link	A	4			
• of the quick DIAZED fuse link	A	4			
• of the C characteristic circuit breaker	A	1		2	
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		—			
• at AC-15 at 230 V typical		100000			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			

4.3 Mechanical position switches

	3SE5214-0KC05-	3SE5214-0LC05-	3SE5214-0BC05-	3SE5214-0CC05-
Resistance against vibration	0.35 mm / 5g			
Resistance against shock	30g / 11 ms			
Ambient temperature				
• during operating °C	-25 ... +85			
• during storage	-40 ... +90			
Protection class IP	IP66/IP67			
mounting position	any			
Switching capacity apparent power	5 V DC, 1 mA			
Design of the electrical connection	M12 plug, fixed			

		3SE5115-0.A00-....	3SE5114-0.C02-....	3SE5114-0.A00-.... 3SE5114-0.D02-.... 3SE5114-0.H01-....
Width of the sensor	mm	40		
material of the housing		metal		
Insulation voltage rated value	V	250		125
Degree of pollution		class 3		
Impulse voltage resistance rated value	V	2500		1500
Thermal current	A	6	4	
Operating current				
• at AC-15				
– at 24 V rated value	A	6	4	
– at 125 V rated value	A	6	4	
– at 230 V rated value	A	1.5 ¹⁾	1.5	—
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	0.55		
– at 230 V rated value	A	0.27		—
Continuous current				
• of the slow DIAZED fuse link	A	6	4	
• of the quick DIAZED fuse link	A	6	4	
• of the C characteristic circuit breaker	A	1		
Mechanical operating cycles as operating time typical		15000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		
• at AC-15 at 230 V typical		100000		—
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Repeat accuracy	mm	0.05		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		
Ambient temperature				
• during operating	°C	-25 ... +85		
• during storage		-40 ... +90 °C		

4.3 Mechanical position switches

	3SE5115-0.A00-....	3SE5114-0.C02-....	3SE5114-0.A00-.... 3SE5114-0.D02-.... 3SE5114-0.H01-....
Protection class IP	IP65	IP67	IP66/IP67
mounting position	any		
Switching capacity apparent power	5 V DC, 1 mA		
Design of the electrical connection	plug, 6-pole + PU, according to EN 43651	M12 plug, fixed	

1) 3SE5115-0CA00-1AD0 = 6 A

4.3.16 Technical data for mechanical position switches with connector with LED

		3SE5234-1CC05-	3SE5234-1BC05-	3SE5214-1CC05-	3SE5214-1BC05-
Width of the sensor	mm	31			
material of the housing		plastic			metal
Insulation voltage rated value	V	125			
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	0.8			
Thermal current	A	6			4
Operating current					
• at AC-15					
– at 24 V rated value	A	—			4
– at 125 V rated value	A	—			4
– at 230 V rated value	A	—			3
• at DC-13					
– at 24 V rated value	A	3			4
– at 125 V rated value	A	—			0.55
– at 230 V rated value	A	—			0.27
Continuous current					
• of the slow DIAZED fuse link	A	6			4
• of the quick DIAZED fuse link	A	10			4
• of the C characteristic circuit breaker	A	2			
Mechanical operating cycles as operating time typical		15000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		—			
• at AC-15 at 230 V typical		—			100000
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Repeat accuracy	mm	0.05			

4.3 Mechanical position switches

		3SE5234-1CC05-	3SE5234-1BC05-	3SE5214-1CC05-	3SE5214-1BC05-	
Resistance against vibration		0.35 mm / 5g				
Resistance against shock		30g / 11 ms				
Ambient temperature						
• during operating	°C					-25 ... +60
• during storage						-40 ... +90
Protection class IP		IP65		IP66/IP67		
mounting position		any				
Switching capacity apparent power		5 V DC, 1 mA				
Design of the electrical connection		M12 plug, fixed				
Type of voltage of the supply voltage of the optional LED display		DC				
Supply voltage of LED	V	24				

		3SE5115-1....-....	3SE5114-1....-....
Width of the sensor	mm	40	
material of the housing		metal	
Insulation voltage rated value	V	250	125 ¹⁾
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	0.8	
Thermal current	A	6	4 ²⁾
Operating current			
• at AC-15			
– at 24 V rated value	A	—	
– at 125 V rated value	A	—	
– at 230 V rated value	A	—	
• at DC-13			
– at 24 V rated value	A	3	3 ²⁾
– at 125 V rated value	A	—	
– at 230 V rated value	A	—	
Continuous current			
• of the slow DIAZED fuse link	A	6	4 ²⁾
• of the quick DIAZED fuse link	A	6	4 ²⁾
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		15000000 ³⁾	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000 ³⁾	
• at AC-15 at 230 V typical		—	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +60	
• during storage		-40 ... +90	
Protection class IP		IP65 ⁴⁾	IP66/IP67
mounting position		any	
Switching capacity apparent power		5 V DC, 1 mA	
Design of the electrical connection		plug, 6-pole + PU, according to EN 43651	M12 plug, fixed

4.3 Mechanical position switches

		3SE5115-1....-....	3SE5114-1....-....
Type of voltage of the supply voltage of the optional LED display		DC	
Supply voltage of LED	V	24	

- 1) 3SE5114-1L..0-1AD4 = 50 V
- 2) 3SE5114-1L..0-1AD4 = 2 A
- 3) 3SE511.-1RV10-1AF. = 1000000
- 4) 3SE5115-1.A00-1AD2 = IP66/67

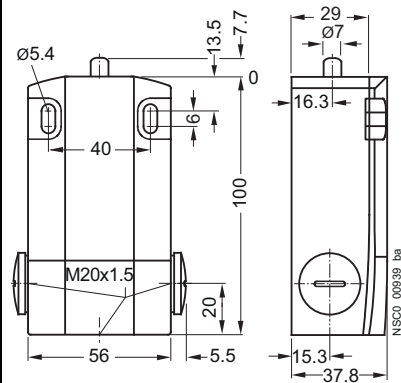
4.3.17 Dimension drawings and operating travel diagrams for mechanical position switches

Basic switch

Enclosure width 31 mm, EN 50047, with connecting thread M20 × 1.5 3SE5232 / 3SE5212	Enclosure width 31 mm, EN 50047, Rear panel with mounting holes 3SE5232/212	Enclosure width 31 mm, EN 50047, with plug connector M12 3SE5234/214
Enclosure width 50 mm, with 2x connecting thread M20 × 1.5 3SE5242	Enclosure width 50 mm, rear panel with mounting holes 3SE5242	Enclosure width 40 mm, EN 50041, with connecting thread M20 × 1.5 3SE5112/132
Enclosure width 40 mm, EN 50041, with plug connector M12 3SE5114/134	Enclosure width 40 mm, EN 50041, with plug connector 6-pin + PE 3SE5115	Enclosure width 56 mm, with 3x connecting thread M20 × 1.5 3SE5122

4.3 Mechanical position switches

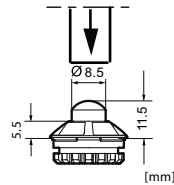
XL enclosure, enclosure width 56 mm, with 3x connecting thread M20 × 1.5
3SE5162



The XL enclosure can only be combined with the following actuator heads:

- 3SE5000-..B..
- 3SE5000-..C..
- 3SE5000-..D..
- 3SE5000-..E..
- 3SE5000-..F..
- 3SE5000-..H..

Plain plunger 3SE5000-0AB01

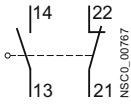
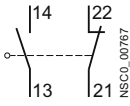
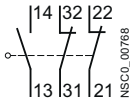
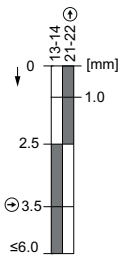
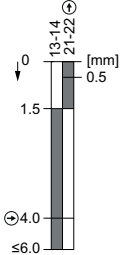
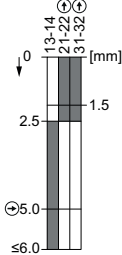


$v \leq 1 \text{ m/s}$ (maximum actuating speed)

$F \geq 20 \text{ N}$ (minimum force demand in actuation direction)

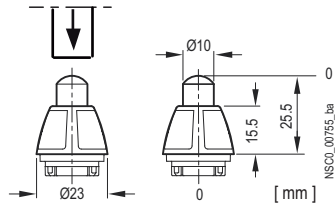
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Actuation in travel direction			
3SE5...-0BB01 	3SE5...-0KB01 	3SE51...-0PB01 	3SE51...-0MB01 ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Actuation in travel direction		
3SE5...-0CB01 3SE5...-0GB01 ^{1) 2)} 3SE5...-0HB01 ¹⁾ 	3SE52...-0NB01 ¹⁾  Short stroke	3SE5...-0LB01 
¹⁾ Cannot be ordered as complete unit ²⁾ Operating distance 2 x 2 mm		

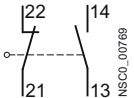
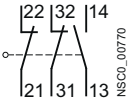
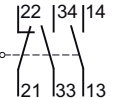
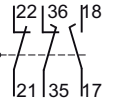
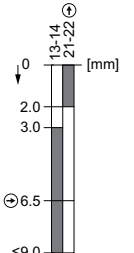
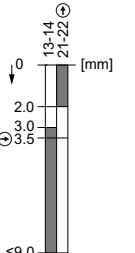
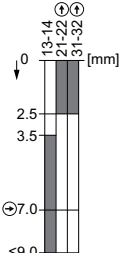
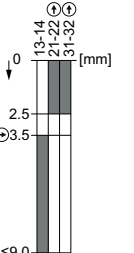
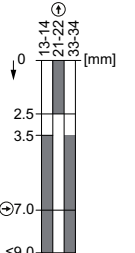
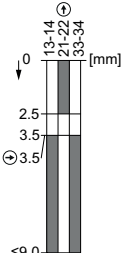
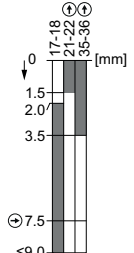
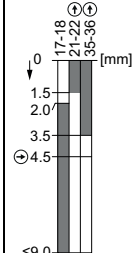
- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

Rounded plunger 3SE5000-0AC02 / -0AC03

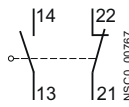
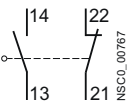
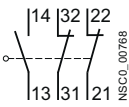
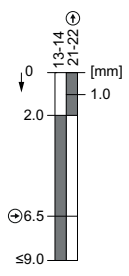
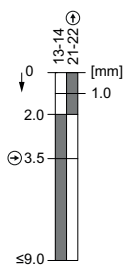
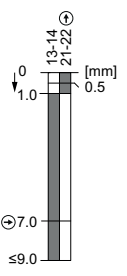
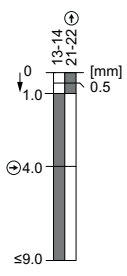
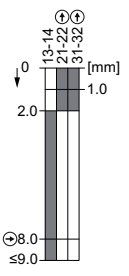
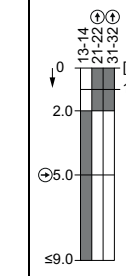


$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$F \geq 20 \text{ N}$ (minimum force demand in actuation direction)

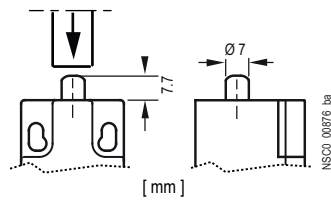
Slow-action contacts			With make-before-break				
1 NO + 1 NC 	1 NO + 2 NC 	2 NO + 1 NC 	1 NO + 2 NC 				
Code number 11	Code number 12	Code number 21	Code number 12				
Actuation in travel direction							
3SE51..							
-0BC02 	-0BC03 	-0KC02 	-0KC03 	-0PC02 	-0PC03 	-0MC02 ¹⁾ 	-0MC03 ¹⁾ 
¹⁾ Cannot be ordered as complete unit							

4.3 Mechanical position switches

Snap-action contacts					
1 NO + 1 NC		1 NO + 1 NC		1 NO + 2 NC	
					
Code number 11		Code number 11		Code number 12	
Actuation in travel direction					
3SE51..					
-0CC02	-0CC03	-0NC02 ¹⁾	-0NC03 ¹⁾	-0LC02	-0LC03
					
		Short stroke	Short stroke		
¹⁾ Cannot be ordered as complete unit					

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

Rounded plunger EN 50047 3SE52...-C05

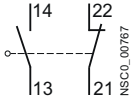
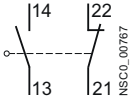
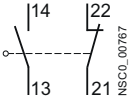
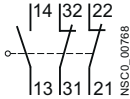
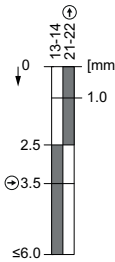
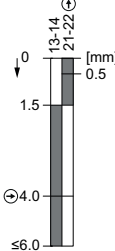
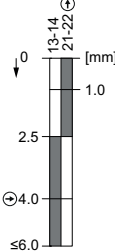
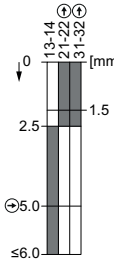


$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$F \geq 20 \text{ N}$ (minimum force demand in actuation direction)

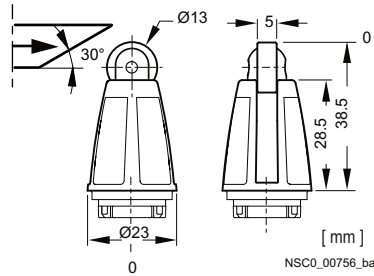
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Actuation in travel direction			
3SE52...-BC05 	3SE52...-KC05 	3SE52...-PC05 	3SE52...-MC05

4.3 Mechanical position switches

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Actuation in travel direction			
3SE52...-CC05 3SE52...-HC05 	3SE52...-FC05  Short stroke integrated	3SE52...-GC05  Operating distance 2 x 2 mm	3SE52...-LC05 

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

Roller plunger 3SE5000-0AD02 / -0AD05 / -0AD06



$v \leq 1 \text{ m/s}$ (maximum actuating speed)

$F \geq 20 \text{ N}$ (minimum force demand in actuation direction)

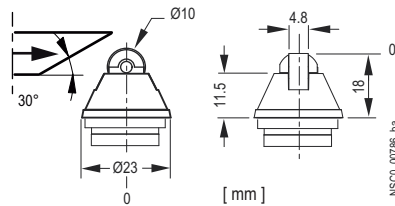
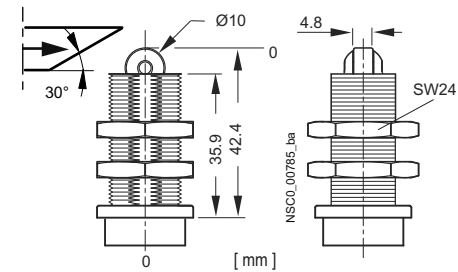
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Lateral actuation			
3SE51...-0BD02 	3SE51...-0KD02 	3SE51...-0PD02 ¹⁾ 	3SE51...-0MD02 ¹⁾
3SE51...-0BD05 3SE51...-0BD06 ¹⁾ 	3SE51...-0KD05 3SE51...-0KD06 ¹⁾ 	3SE51...-0PD05 3SE51...-0PD06 ¹⁾ 	3SE51...-0MD05/06 ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12
Lateral actuation		
3SE51...-0CD02	3SE51...-0ND02 ¹⁾ Short stroke	3SE51...-0LD02
3SE51...-0CD05 3SE51...-0CD06 ¹⁾	3SE51...-0ND05/06 ¹⁾ Short stroke	3SE51...-0LD05 3SE51...-0LD06 ¹⁾
¹⁾ Cannot be ordered as complete unit		

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
- Contact element closed
- Contact element open

Roller plunger

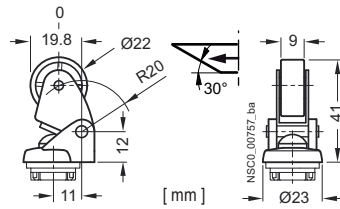
3SE5000-0AD03 / 3SE5000-0AD04
Type C3SE5000-0AD10 / 3SE5000-0AD11
Central fixing $v \leq 1 \text{ m/s}$ (maximum actuating speed) $F \geq 20 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Lateral actuation			
3SE52..-0BD03 3SE52..-0BD04/10/11 ¹⁾ 	3SE52..-0KD03/10 3SE52..-0KD04/11 ¹⁾ 	3SE52..-0PD.. ¹⁾ 	3SE52..-0MD.. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts				
1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 2 NC
Code number 11	Code number 11	Code number 11	Code number 11	Code number 12
Lateral actuation				
3SE52...-0CD03/04/10 3SE52...-0CD11 ¹⁾	3SE52...-0GD.. ¹⁾	3SE52...-0HD03/10 3SE52...-0HD04/11 ¹⁾	3SE52...-0FD03 3SE52...-FD04/10/11 ¹⁾	3SE52...-0LD03 3SE52...-0LD04/10/11 ¹⁾
	Operating distance 2 x 2 mm		Short stroke integrated	
¹⁾ Cannot be ordered as complete unit				

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
- Contact element closed
- Contact element open
- ≤ Maximum actuator travel

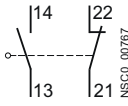
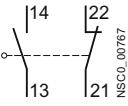
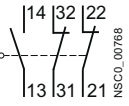
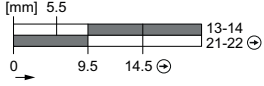
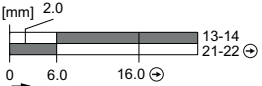
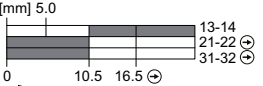
Roller lever 3SE5000-0AE0.

$v \leq 2.5 \text{ m/s}$ (maximum actuating speed)

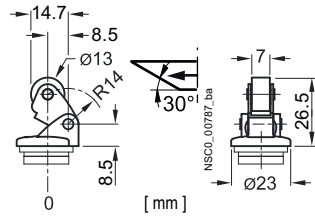
$F \geq 10 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Lateral actuation			
3SE51...-0BE01/05 3SE51...-0BE02/03/04 ¹⁾ 	3SE51...-0KE0. 	3SE51...-0PE0. 	3SE51...-0ME0. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Lateral actuation		
3SE51...-0CE01/02/03/05 3SE51...-0CE04 ¹⁾  Short stroke	3SE51...-0NE0. ¹⁾  Short stroke	3SE51...-0LE01/05 3SE51...-0LE02/03/04 ¹⁾ 
¹⁾ Cannot be ordered as complete unit		

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open

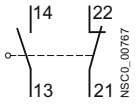
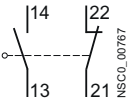
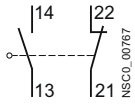
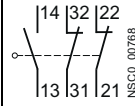
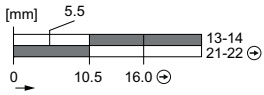
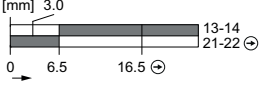
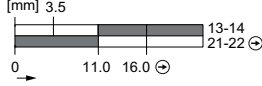
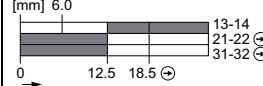
Roller lever 3SE5000-0AE1.

$v \leq 1 \text{ m/s}$ (maximum actuating speed)

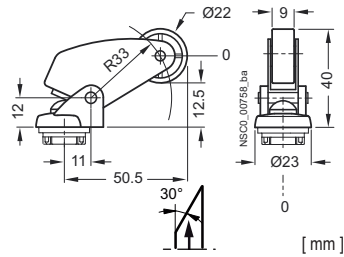
$F \geq 10 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Lateral actuation			
3SE52..-0BE10 3SE52..-0BE11/12/13 ¹⁾ Code number 11	3SE52..-0KE10 3SE52..-0KE11/12/13 ¹⁾ Code number 12	3SE52..-0PE1. ¹⁾ Code number 21	3SE52..-0ME1. ¹⁾ Code number 12
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Lateral actuation			
3SE52...-0CE10/12 3SE52...-0CE11/13 ¹⁾ 3SE52...-0HE10/12 3SE52...-0HE11/13 ¹⁾  Short stroke integrated	3SE52...-0FE1. ¹⁾  Operating distance 2 x 2 mm	3SE52...-0GE1. ¹⁾  Operating distance 2 x 2 mm	3SE52...-0LE10/12 3SE52...-0LE11/13 ¹⁾ 
¹⁾ Cannot be ordered as complete unit			

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open

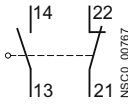
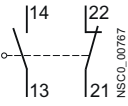
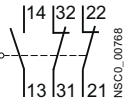
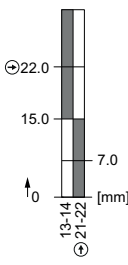
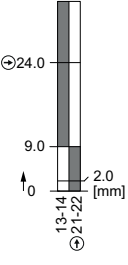
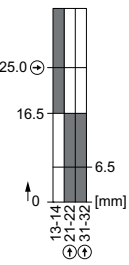
Angular roller lever 3SE5000-0AF0.

$v \leq 2.5 \text{ m/s}$ (maximum actuating speed)

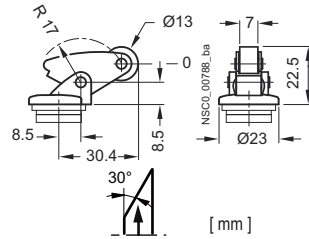
$F \geq 10 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Actuation in travel direction			
3SE51...-0BF01/05 3SE51...-0BF02/03/04 ¹⁾ 	3SE51...-0KF0. ¹⁾ 	3SE51...-0PF01 3SE51...-0PF02/03/04/05 ¹⁾ 	3SE51...-0MF0. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Actuation in travel direction		
3SE51...-OCF01/03/05 3SE51...-OCF02/04 ¹⁾  22.0 15.0 7.0 13-14 21-22 [mm]	3SE51...-ONF0. ¹⁾  24.0 9.0 2.0 [mm] 13-14 21-22 Short stroke	3SE51...-OLF01/05 3SE51...-OLF02/03/04 ¹⁾  25.0 16.5 6.5 13-14 21-22 31-32 [mm]
¹⁾ Cannot be ordered as complete unit		

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open

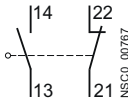
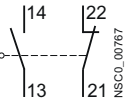
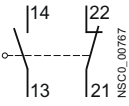
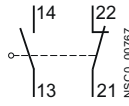
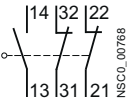
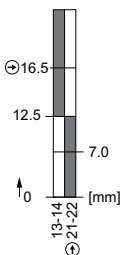
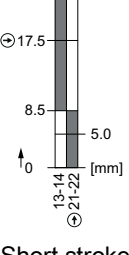
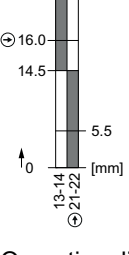
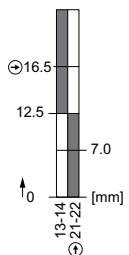
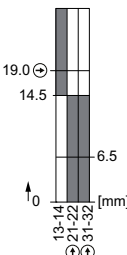
Angular roller lever 3SE5000-0AF1.

$v \leq 1 \text{ m/s}$ (maximum actuating speed)

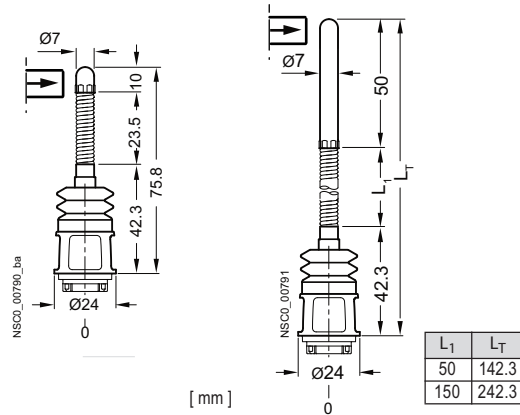
$F \geq 10 \text{ N}$ (minimum force demand in actuation direction)

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Actuation in travel direction			
3SE52...-0BF10 3SE52...-0BF11/12/13 ¹⁾ 	3SE52...-0KF10 3SE52...-0KF11/12/13 ¹⁾ 	3SE52...-0PF1. ¹⁾ 	3SE52...-0MF1. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts				
1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	1 NO + 2 NC
				
Code number 11	Code number 11	Code number 11	Code number 11	Code number 12
Actuation in travel direction				
3SE52...-0CF10 3SE52...-0CF11/12/13 ¹⁾	3SE52...-0FF1. ¹⁾	3SE52...-0GF1. ¹⁾	3SE52...-0HF10 3SE52...-0HF11/12/13 ¹⁾	3SE52...-0LF10 3SE52...-0LF11/12/13 ¹⁾
				
	Short stroke integrated	Operating distance 2 x 2 mm		
¹⁾ Cannot be ordered as complete unit				

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
-  Contact element closed
-  Contact element open

Spring rod 3SE5000-0AR0.

$v \leq 1$ m/s (maximum actuating speed)

$F \geq 9$ N (minimum force demand in actuation direction)

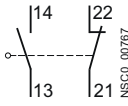
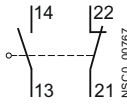
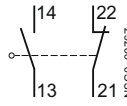
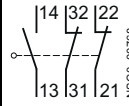
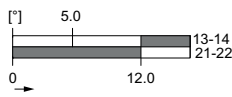
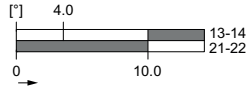
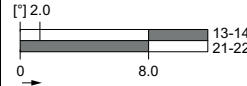
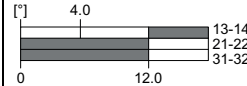
$M \geq 0.25$ Nm (minimum torque in actuation direction)

No positive opening operation

The spring rods can only be used with snap-action contacts.

Snap-action contacts		
1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12
Deflection of spring rod		
3SE51..-0CR01 3SE51..-0CR02/03/04 ¹⁾ 	3SE51..-0NR0. ¹⁾ 	3SE51..-0LR0. 3SE51..-0LR02/03/04 ¹⁾
¹⁾ Cannot be ordered as complete unit		

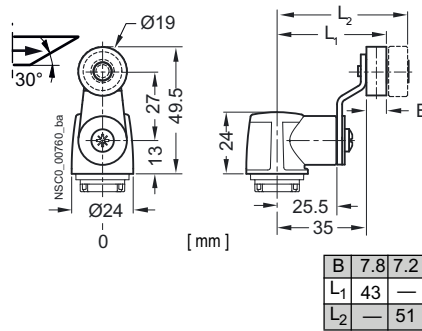
4.3 Mechanical position switches

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection of spring rod			
3SE52...-0CR0. 3SE52...-0GR0. ¹⁾ 3SE52...-0HR0. 	3SE52...-0FR0. ¹⁾  Short stroke integrated	3SE52...-0NR0. ¹⁾  Short stroke	3SE52...-0LR0. 
¹⁾ Cannot be ordered as complete unit			

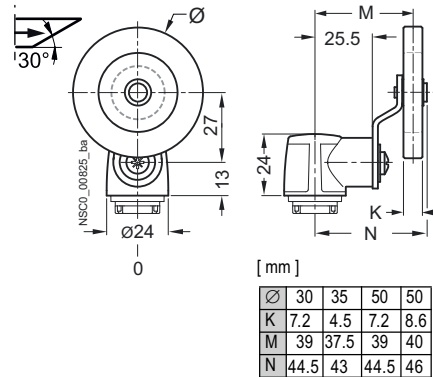
- Direction of actuation
-  Contact element closed
-  Contact element open

Twist lever

3SE5000-0AH00 / 3SE5000-0AJ00
+ 3SE5000-0AA01 / 02 / 03 / 04 / 11 / 12



3SE5000-0AH00
+ 3SE5000-0AA05 / 06 / 07 / 08



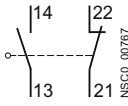
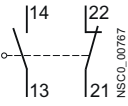
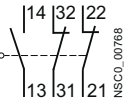
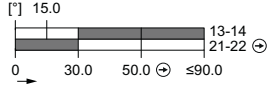
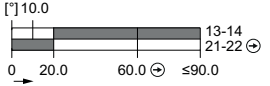
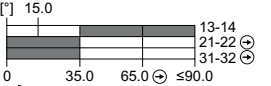
$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$M \geq 0.25 \text{ Nm}$ (minimum torque in actuation direction)

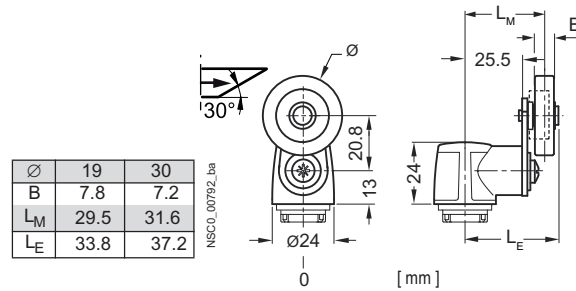
Lever adjustable in increments of 10° , maximum deflection 90°

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE51...-0BH.. 3SE51...-0BJ.. 	3SE51...-0KH.. 3SE51...-0KJ.. 	3SE51...-0PH.. 3SE51...-0PJ.. 	3SE51...-0MH.. ¹⁾ 3SE51...-0MJ.. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation		
3SE51...-0CH.. 3SE51...-0CJ.. 	3SE51...-0NH.. ¹⁾ 3SE51...-0NJ.. ¹⁾  Short stroke	3SE51...-0LH.. 3SE51...-0LJ.. 
¹⁾ Cannot be ordered as complete unit		

Twist lever 3SE5000-0AK00 / 3SE5000-0AA2. / 3.

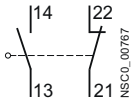
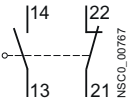
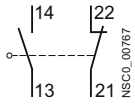
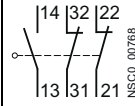
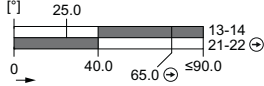
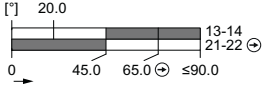
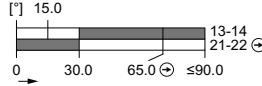
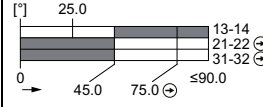


$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$M = 0.25 \text{ Nm}$ (minimum torque in actuation direction)

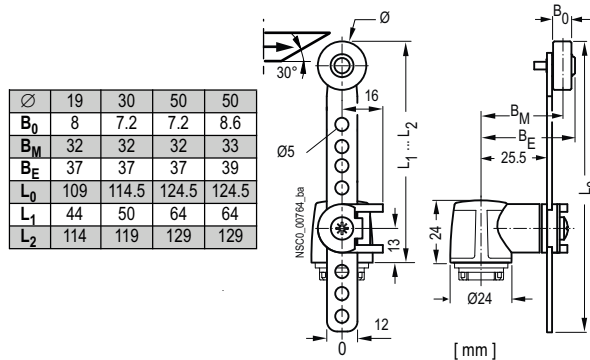
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE52...-0BK2. 3SE52...-0BK3. ¹⁾ 	3SE52...-0KK2. 3SE52...-0KK3. ¹⁾ 	3SE52...-0PK2. ¹⁾ 3SE52...-0PK3. ¹⁾ 	3SE52...-0MK2. ¹⁾ 3SE52...-0MK3. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation			
3SE52...-0CK2. 3SE52...-0HK2.  Operating distance 2 x 2 mm	3SE52...-0GK2. ¹⁾ 3SE52...-0GK3. ¹⁾  Operating distance 2 x 2 mm	3SE52...-0FK2. ¹⁾ 3SE52...-0FK3. ¹⁾  Short stroke integrated	3SE52...-0LK2. 3SE52...-0LK3. ¹⁾ 
¹⁾ Cannot be ordered as complete unit			

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
- Contact element closed
- Contact element open
- ≤ Maximum actuator travel

Adjustable-length twist lever with pre-drilled holes 3SE5000-0AH00 / 3SE5000-0AJ00 + 3SE5000-0AA6.



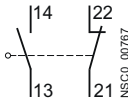
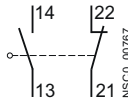
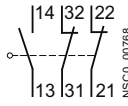
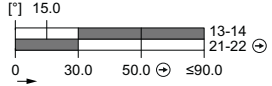
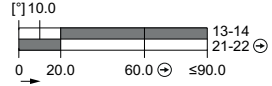
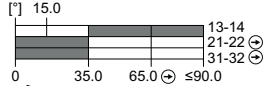
$v \leq 1.0$ m/s (maximum actuating speed)

$M \geq 0.25$ Nm (minimum torque in actuation direction)

Note: Do not use the bottommost drill hole.

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE51...-0BH6. 3SE51...-0BJ6. ¹⁾ 	3SE51...-0KH6. ¹⁾ 3SE51...-0KJ6. ¹⁾ 	3SE51...-0PH6. ¹⁾ 3SE51...-0PJ6. ¹⁾ 	3SE51...-0MH6. ¹⁾ 3SE51...-0MJ6. ¹⁾
¹⁾ Cannot be ordered as complete unit			

4.3 Mechanical position switches

Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation		
3SE51...-0CH6. 3SE51...-0CJ6.  0 30.0 50.0 ⊕ ≤90.0	3SE51...-0NH6. ¹⁾ 3SE51...-0NJ6. ¹⁾  0 20.0 60.0 ⊖ ≤90.0 Short stroke	3SE51...-0LH6. 3SE51...-0LJ6.  0 35.0 65.0 ⊕ ≤90.0
¹⁾ Cannot be ordered as complete unit		

Adjustable-length twist lever with pre-drilled holes 3SE5000AK00 + 3SE5000-0AA6.

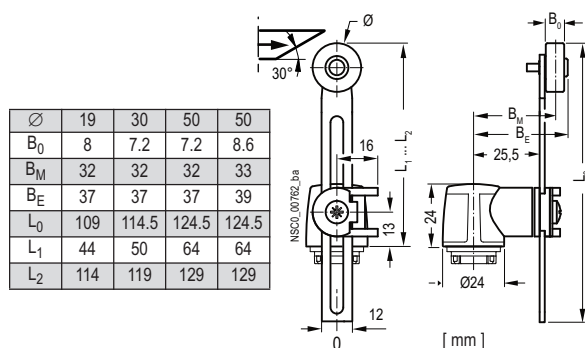
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE52...-0BK6. ¹⁾ 	3SE52...-0KK6. 	3SE52...-0PK6. ¹⁾ 	3SE52...-0MK6. ¹⁾
¹⁾ Cannot be ordered as complete unit			

Snap-action contacts			
1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE52...-0CK6. 3SE52...-0HK6. 	3SE52...-0GK6. ¹⁾ Operating distance 2 x 2 mm	3SE52...-0FK6. ¹⁾ 3SE52...-0NK6. ¹⁾ Short stroke	3SE52...-0LK6.
¹⁾ Cannot be ordered as complete unit			

- ⊕ Positive opening operation according to EN 60947-5-1
 → Direction of actuation
 Contact element closed
 Contact element open
 ≤ Maximum actuator travel

4.3 Mechanical position switches

Adjustable-length twist lever with oblong hole 3SE5000-0AH00 / 3SE5000-0AJ00 + 3SE5000-0AA5.


 $v_{(met)} \leq 1.5 \text{ m/s}$ (maximum actuating speed)

 $v_{(plast)} \leq 1.0 \text{ m/s}$ (maximum actuating speed)

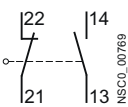
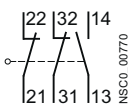
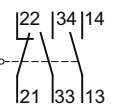
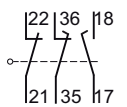
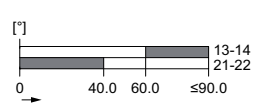
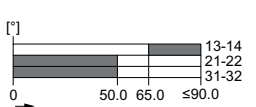
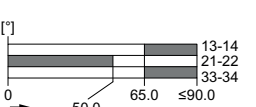
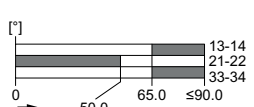
 $M \geq 0.25 \text{ Nm}$ (minimum torque in actuation direction)

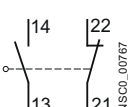
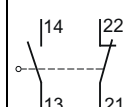
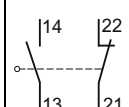
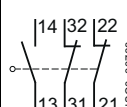
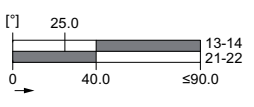
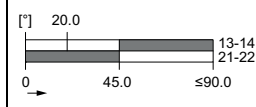
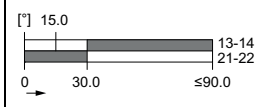
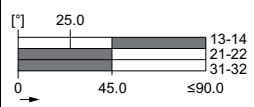
Lever adjustable in increments of 10°, maximum deflection 90°

No positive opening operation

Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE51..-0BH5. 3SE51..-0BJ5. ¹⁾ 	3SE51..-0KH5. ¹⁾ 3SE51..-0KJ5. ¹⁾ 	3SE51..-0PH5. ¹⁾ 3SE51..-0PJ5. ¹⁾ 	3SE51..-0MH5. ¹⁾ 3SE51..-0MJ5. ¹⁾
¹⁾ Cannot be ordered as complete unit			

Adjustable-length twist lever with oblong hole 3SE5000-0AK00 + 3SE5000-0AA5.

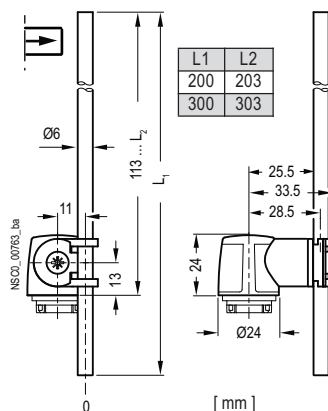
Slow-action contacts			With make-before-break
1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12	2 NO + 1 NC  Code number 21	1 NO + 2 NC  Code number 12
Deflection in direction of rotation			
3SE52...-0BK5. 	3SE51...-0KK5. 	3SE51...-0PK5. ¹⁾ 	3SE51...-0MK5. ¹⁾ 
¹⁾ Cannot be ordered as complete unit			

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation			
3SE52...-0CK5. 3SE52...-0HK5. 	3SE52...-0GK5. ¹⁾  Operating distance 2 x 2 mm	3SE52...-0FK5. ¹⁾ 3SE52...-0NK5. ¹⁾  Short stroke	3SE52...-0LK5. 
¹⁾ Cannot be ordered as complete unit			

- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

4.3 Mechanical position switches

Rod lever made of plastic 3SE5000-0AH00 / 3SE5000-0AJ00 + 3SE5000-0AA80/82



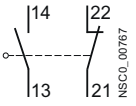
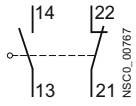
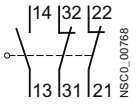
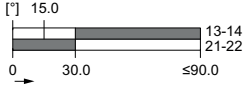
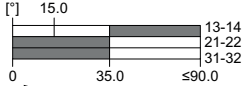
$v_{(plast)} \leq 1.0 \text{ m/s}$ (maximum actuating speed)

$M \geq 0.25 \text{ Nm}$ (minimum torque in actuation direction)

Lever adjustable in increments of 10° , maximum deflection 90°

No positive opening operation

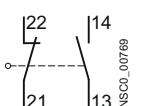
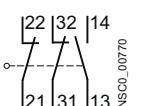
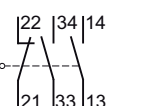
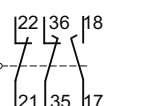
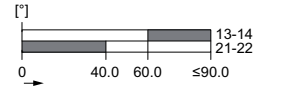
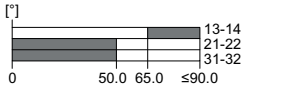
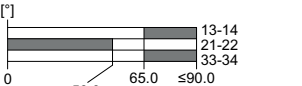
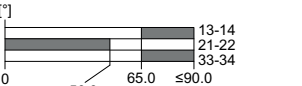
Slow-action contacts			With make-before-break
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12	2 NO + 1 NC Code number 21	1 NO + 2 NC Code number 12
Deflection in direction of rotation			
3SE51...-0BH8. ¹⁾ 3SE51...-0BJ8. ¹⁾ 	3SE51...-0KH8. ¹⁾ 3SE51...-0KJ8. ¹⁾ 	3SE51...-0PH8. ¹⁾ 3SE51...-0PJ8. ¹⁾ 	3SE51...-0MH8. ¹⁾ 3SE51...-0MJ8. ¹⁾
¹⁾ Cannot be ordered as complete unit			

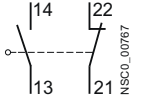
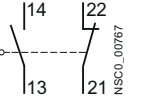
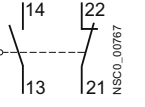
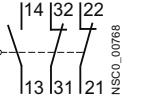
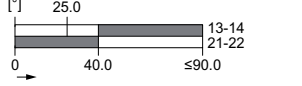
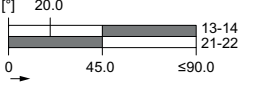
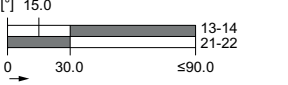
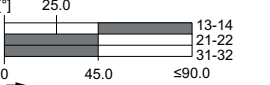
Snap-action contacts		
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation		
3SE51...-0CH8. 3SE51...-0CJ8. 	3SE51...-0NH8. ¹⁾ 3SE51...-0NJ8. ¹⁾  Short stroke	3SE51...-0LH8. 3SE51...-0LJ8. ¹⁾ 
¹⁾ Cannot be ordered as complete unit		

4.3 Mechanical position switches

Rod lever made of metal 3SE5000-0AK00 + 3SE5000-0AA80/82

 $V_{(met)} \leq 1.5 \text{ m/s}$ (maximum actuating speed)

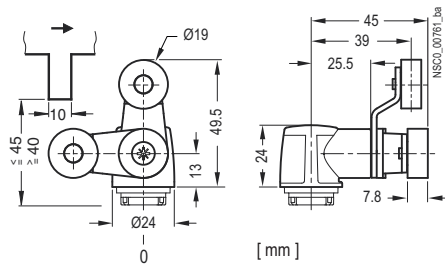
Slow-action contacts			With make-before-break
1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12	2 NO + 1 NC  Code number 21	1 NO + 2 NC  Code number 12
Deflection in direction of rotation			
3SE52...-0BK8. ¹⁾ 	3SE52...-0KK8. ¹⁾ 	3SE52...-0PK8. ¹⁾ 	3SE52...-0MK8. ¹⁾ 
¹⁾ Cannot be ordered as complete unit			

Snap-action contacts			
1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 1 NC  Code number 11	1 NO + 2 NC  Code number 12
Deflection in direction of rotation			
3SE52...-0CK8. ¹⁾ 3SE52...-0HK8. 	3SE52...-0GK8. ¹⁾  Operating distance 2 x 2 mm	3SE52...-0FK8. ¹⁾  Short stroke integrated	3SE52...-0LK8. 
¹⁾ Cannot be ordered as complete unit			

- Direction of actuation
-  Contact element closed
-  Contact element open
- ≤ Maximum actuator travel

Fork lever

3SE5000-0AT1.
+ 3SE5000-0AT0.



$v \leq 1.5 \text{ m/s}$ (maximum actuating speed)

$M \geq 0.25 \text{ Nm}$ (minimum torque in actuation direction)

Lever adjustable in increments of 10° , maximum deflection 90°

The fork levers can only be used with snap-action contacts.

Snap-action contacts	
1 NO + 1 NC Code number 11	1 NO + 2 NC Code number 12
Deflection in direction of rotation	
3SE51...-0CT1.	3SE51...-0LT1. ¹⁾
¹⁾ Cannot be ordered as complete unit	

- ⊕ Positive opening operation according to EN 60947-5-1
- Direction of actuation
- Contact element closed
- Contact element open
- ≤ Maximum actuator travel

4.4 Mechanical safety switches

4.4.1 Application examples

Different switch types can be used depending on the application.

Tamper-proof position switches

Tamper-proof position switches with separate actuator are used for

- Monitoring protective doors

Position switches with tumbler

Position switches with tumbler are used for

- Additional interlock requirements, e.g., in the work zone of a robot system.

Tamper-proof hinge switches

Tamper-proof hinge switches are used for

- Monitoring of hinged doors and flaps, with a fixed positively-locking connection between the switch and door hinge.

4.4.2 Actuator head and actuators

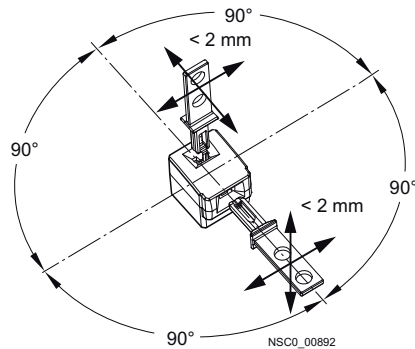
Actuator head

- The actuator head is included in the scope of delivery.
- For actuation from four directions, it can be offset by $4 \times 90^\circ$ (applies only to position switches with separate actuator).
- The switches can also be approached from above.

Actuator

- The actuator is not included in the scope of delivery of the position switches and must be ordered separately.
- You can choose from six variants, depending on the application.
- The actuator is coded. This prevents simple tampering by hand or with tools.

Axial and lateral actuation ($4 \times 90^\circ$)



Minimum force requirement in direction of actuation 30 N (when withdrawing)

4.4.3 Operating travel diagrams for mechanical safety switches

The operating travel diagrams for position switches with separate actuator with and without tumbler are identical.

Slow-action contacts	
1 NO + 1 NC Code number 11	1 NO + 1 NC Code number 12
With lateral/axial actuation	
3SE5...-RV.. 	3SE5...-QV..

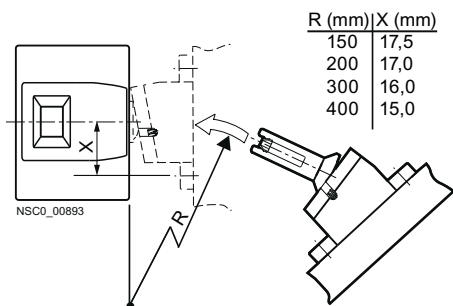
- ⊕ Positive opening operation according to EN 60947-5-1
 - Direction of actuation
 - Contact element closed
 - Contact element open
 - ≥ Minimum actuator travel
- Actuator in actuator head = Normally closed contact is closed

4.4.4 Combinations

Actuator

The actuators for position switches with separate actuator with and without tumbler are identical.

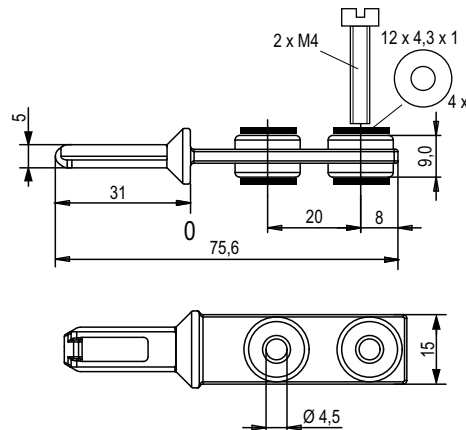
Minimum actuation radius without tumbler	Minimum actuation radius with tumbler
MLFB of actuator	R _{min} [mm]
3SE5000-0AV01	400
3SE5000-0AV02	400
3SE5000-0AV03	400
3SE5000-0AV04	150
3SE5000-0AV05	150
3SE5000-0AV06	150
3SE5000-0AV07	150
3SE5000-0AV07-1AK2	150



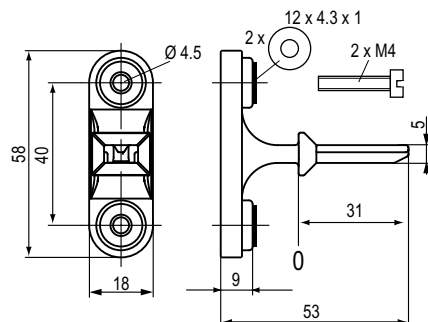
4.4.5 Accessories

The accessories for safety switches with separate actuator with and without tumbler are identical.

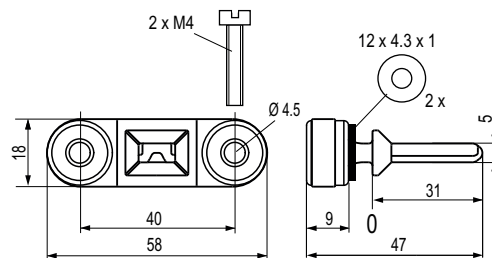
Standard actuator 3SE5000-0AV01



Actuator with vertical mounting 3SE5000-0AV02



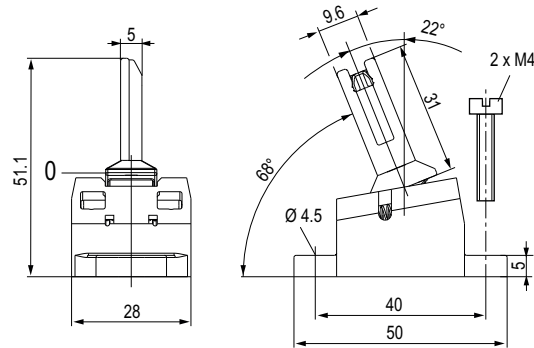
Actuator with horizontal mounting 3SE5000-0AV03



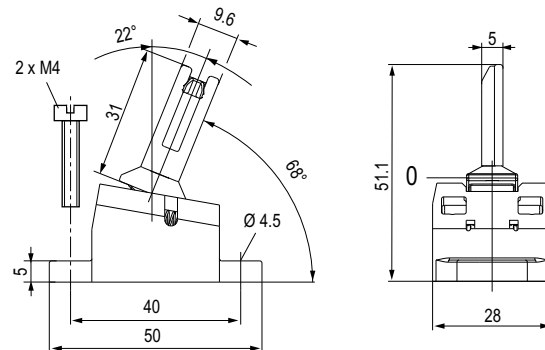
Radius actuator

The position switches with radius actuator are especially well-suited for rotatable protective devices. The movable operating key enables the switch to approach even in the case of small actuating radii. Damage to the switch and actuator as a result of imprecise approaching is avoided.

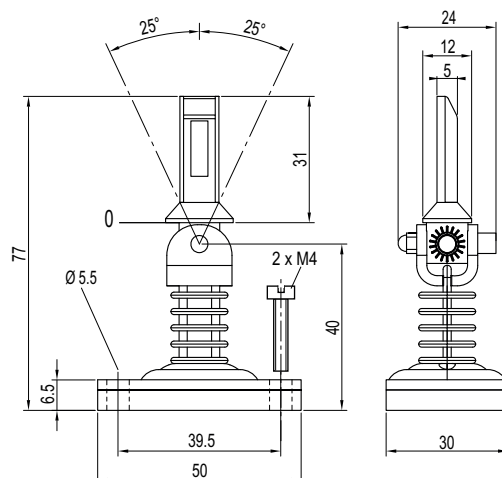
- Approach from left 3SE5000-0AV04



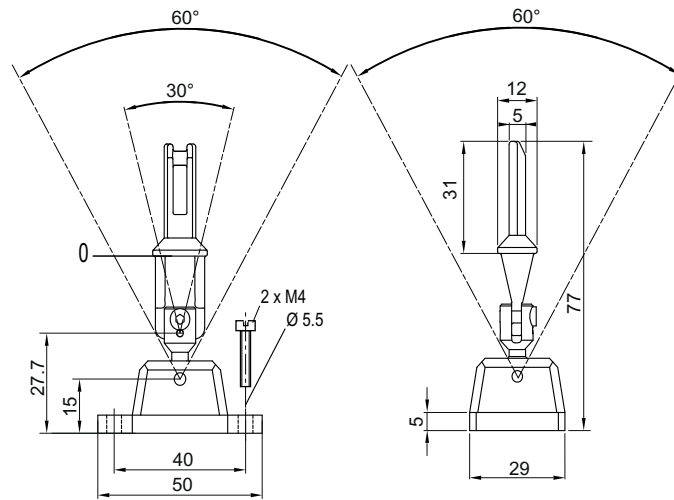
- Approach from right 3SE5000-0AV06



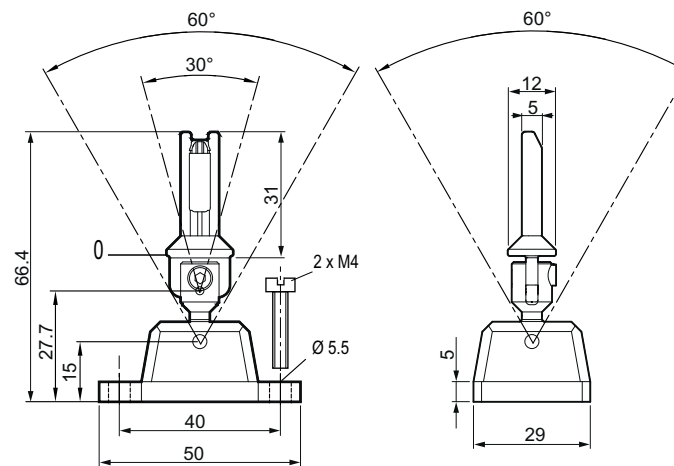
Universal radius actuator 3SE5000-0AV05



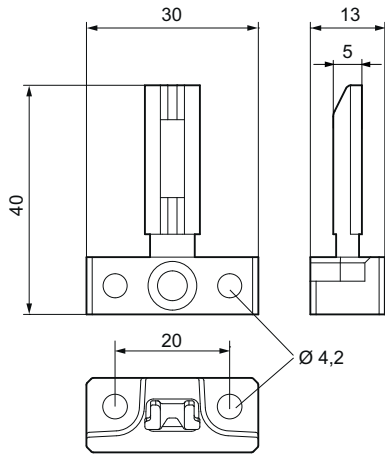
Universal radius actuator Heavy Duty 3SE5000-0AV07



3SE5000-0AV07-1AK2



3SE5000-0AW11

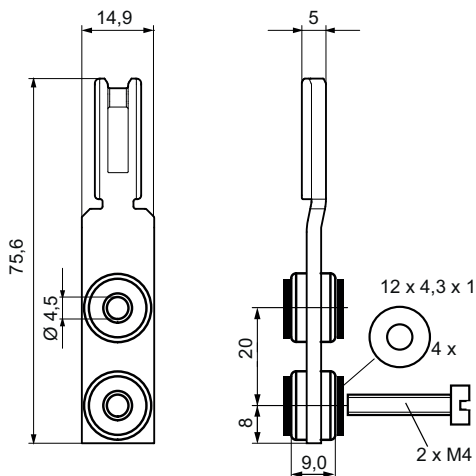


! WARNING

Improper use may cause a risk of death.

Do not use the 3SE5000-0AW11 actuator for the following position switches with tumbler:
3SE5322-..... / 3SE5312-.... and 3SF1324-.... / 3SF1314-....

3SE5000-0AW21



CAUTION

Risk of property damage.

The position switch can be damaged.

To maintain the level of safety, the actuators are permitted to be used only in combination with the associated safety switch. The actuators must be ordered separately.

Assemble the position switch and actuator in such a way that the actuator can move into the actuator head within the insertion tolerances $< 2 \text{ mm}$ (see Actuator head and actuators (Page 154)).

Locking device 3SE5000-0AV08-1AA3

For additional security, a stainless steel lock insert that accommodates up to eight padlocks is offered.

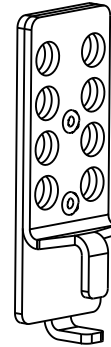
The lock is not included in the scope of delivery.



Lock insert with padlock



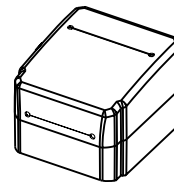
Lock insert, open



Lock insert, closed

Dust cap 3SE5000-0AV08-1AA2

For use in dusty environments, a protective cap is offered that protects the actuator entries of the actuator head from dirt.



Note

Proper attachment of dust cap.

Make sure when attaching the dust cap that its slots are located at the top and front of the actuator head.



Note

You cannot use the dust cap for plastic enclosures.

4.5 Mechanical safety switches with separate actuation

The mechanical safety switches with separate actuator without tumbler are used for applications where the position of doors, covers, or protective grilles must be monitored for safety reasons. The 3SE5 position switches with separate actuator have the same enclosure as the mechanical position switches (modular system).



4.5.1 Technical data for mechanical safety switches with separate actuation

		3SE5132-.QV20	3SE5112-.QV10	3SE5122-.QV10
Width of the sensor	mm	40		56
material of the housing		plastic	metal	
Insulation voltage rated value	V	400		
Degree of pollution		class 3		
Impulse voltage resistance rated value	kV	6	6 ¹⁾	
Thermal current	A	10	6	
Operating current				
• at AC-15				
– at 24 V rated value	A	6	6 ²⁾	
– at 125 V rated value	A	6 ²⁾		
– at 230 V rated value	A	1.5 ²⁾		
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	0.55 ²⁾		
– at 230 V rated value	A	0.27 ²⁾		
Continuous current				
• of the slow DIAZED fuse link	A	6		
• of the quick DIAZED fuse link	A	10		
• of the C characteristic circuit breaker	A	1		
Mechanical operating cycles as operating time typical		1000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		1000000		
• at AC-15 at 230 V typical		100000 ²⁾		
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Actuating speed minimum	mm/s	0.4	0.4 ³⁾	0.4
Actuating speed maximum	m/s	0.5		
Minimum actuating force in activation direction	N	20	20 ⁴⁾	
Repeat accuracy	mm	0.05		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		

		3SE5132-.QV20	3SE5112-.QV10	3SE5122-.QV10
Ambient temperature				
• during operating	°C	-25 ... +85 ⁵⁾		
• during storage	°C	-40 ... +90		
Protection class IP		IP66/IP67		
mounting position		any		
Switching capacity apparent power		5 V DC, 1 mA		
Type of the connectable conductor cross-section				
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• finely stranded				
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• for AWG conductors				
– solid		1x (20 ... 16), 2x (20 ... 18)		
– stranded		1x (20 ... 16), 2x (20 ... 18)		

1) 3SE51.2-1QV10 = 0,8 kV / 3SE51.2-3QV10 = 4 kV

2) 3SE51.2-1QV.0 = —

3) 3SE5112-0QV10-1AA7 = 0,1 mm/s

4) 3SE51.2-0QV10-1AA7 = 30 N

5) 3SE51.2-1QV.0 / 3SE51.2-3QV.0 = +60 °C

Safety position switches with separate actuator without tumbler with connector

		3SE5115-1RV10-	3SE5114-1RV10-	3SE5115-0QV10-	3SE5114-0RV10- 3SE5114-0QV10-
Width of sensor	mm	40			
Material of enclosure		Metal			
Insulation voltage rated value	V	250	125	250	125
Degree of pollution		Class 3			
Impulse withstand voltage rated value	kV	0.8		2.5	1.5
Thermal current	A	6	4	6	4
Operating current					
• At AC-15					
– At 24 V rated value	A	—		6	4
– At 125 V rated value	A	—		6	4
– At 230 V rated value	A	—		1.5	—
• At DC-13					
– At 24 V rated value	A	3			
– At 125 V rated value	A	—		0.55	
– At 230 V rated value	A	—		0.27	—
Continuous current					
• of DIAZED fuse link, slow-acting	A	6	4	6	4
• of DIAZED fuse link, fast-acting	A	6	4	6	4
• of circuit breaker, C characteristic	A	1			
Mechanical service life (switching cycles) typical		1.000.000			
Electrical service life (switching cycles)					
• With contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026, typical		1000000			
• At AC-15 and 230 V, typical		—		100.000	—
Number of electrical switching cycles per hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			

		3SE5115-1RV10-	3SE5114-1RV10-	3SE5115-0QV10-	3SE5114-0RV10- 3SE5114-0QV10-
Actuation speed					
• Minimum	mm/s	0.4			
• Maximum	m/s	0.5			
Minimum actuation force in actuation direction	N	20			
Repeat accuracy	mm	0.05			
Vibration resistance		0.35 mm/5 g			
Shock resistance		30 g/11 ms			
Ambient temperature					
• During operation	°C	-25 ... +60		-25 ... +85	
• During storage	°C	-40 ... +90			
IP degree of protection		IP65	IP66/IP67	IP65	IP66/IP67
Mounting position		Any			
Switching capacity apparent power		5 V DC, 1 mA			

4.5 Mechanical safety switches with separate actuation

		3SE5242-.QV40	3SE5232-.RV40	3SE5232-.QV40
Width of the sensor	mm	50	31	
material of the housing		plastic		
Insulation voltage rated value	V	400		
Degree of pollution		class 3		
Impulse voltage resistance rated value	kV	6 ¹⁾		
Thermal current	A	6		
Operating current				
• at AC-15				
– at 24 V rated value	A	6		
– at 125 V rated value	A	6		
– at 230 V rated value	A	1.5	1.5 ²⁾	1.5
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	0.55		
– at 230 V rated value	A	0.27		
Continuous current				
• of the slow DIAZED fuse link	A	6		
• of the quick DIAZED fuse link	A	10		
• of the C characteristic circuit breaker	A	1	2	1
Mechanical operating cycles as operating time typical		1000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000		
• at AC-15 at 230 V typical		100000		
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Actuating speed minimum	mm/s	0.4		
Actuating speed maximum	m/s	0.5		
Minimum actuating force in activation direction	N	20		20 ³⁾
Repeat accuracy	mm	0.05		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		

		3SE5242-.QV40	3SE5232-.RV40	3SE5232-.QV40
Ambient temperature				
• during operating	°C	-25 ... +60 ⁴⁾		
• during storage	°C	-40 ... +90		
Protection class IP		IP66/IP67	IP65	
mounting position		any		
Switching capacity apparent power		5 V DC, 1 mA		
Type of the connectable conductor cross-section				
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• finely stranded				
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)		
• for AWG conductors				
– solid		1x (20 ... 16), 2x (20 ... 18)		
– stranded		1x (20 ... 16), 2x (20 ... 18)		

1) 3SE52.2-1Q410 / 3SE5232-1RV40 = 0,8 kV

2) 3SE5232-0RV40 = 1,5 A

3) 3SE5232-0QV40-1AA1 = 30 N

4) 3SE52.2-0QV40 / 3SE52.2-0RV40 = +85 °C

Safety position switches with separate actuator without tumbler with connector

		3SE5234-1RV40-....	3SE5234-0RV40-....	3SE5234-0QV40-....
Width of the sensor	mm	31		
material of the housing		plastic		
Insulation voltage rated value	V	125	250	
Degree of pollution		class 3		
Impulse voltage resistance rated value	kV	0.8	2.5	
Thermal current	A	6	4	
Operating current				
• at AC-15				
– at 24 V rated value	A	—	4	
– at 125 V rated value	A	—	4	
– at 230 V rated value	A	—	3	1.5
• at DC-13				
– at 24 V rated value	A	3		
– at 125 V rated value	A	—	0.55	
– at 230 V rated value	A	—	0.27	
Continuous current				
• of the slow DIAZED fuse link	A	6	4	
• of the quick DIAZED fuse link	A	10	4	
• of the C characteristic circuit breaker	A	2		1
Mechanical operating cycles as operating time typical		1000000		
Electrical operating cycles as operating time				
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		—		
• at AC-15 at 230 V typical		—	100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000		
Actuating speed				
• minimum	mm/s	0.4		
• maximum	m/s	0.5		
Minimum actuating force in activation direction	N	20		
Repeat accuracy	mm	0.05		

		3SE5234-1RV40-....	3SE5234-0RV40-....	3SE5234-0QV40-....		
Resistance against vibration		0.35 mm / 5g				
Resistance against shock		30g / 11 ms				
Ambient temperature						
• during operating	°C				-25 ... +60	-25 ... +85
• during storage	°C				-40 ... +90	
Protection class IP		IP65				
mounting position		any				
Switching capacity apparent power		5 V DC, 1 mA				

4.5.2 Dimension drawings of mechanical safety switches with separate actuation

Complete units

Enclosure according to EN 50047	
Enclosure width 31 mm 3SE523.-.QV40, 3SE523.-.RV40 (plastic) 3SE521.-.QV40, 3SE521.-.RV40 (metal)	Enclosure width 50 mm 3SE524.-.QV40, 3SE524.-.RV40 (plastic)
Enclosure according to EN 50041	
Enclosure width 40 mm 3SE511.-.QV10, 3SE511.-.RV10 (metal) 3SE5132-0QV20 (plastic)	Enclosure width 56 mm 3SE512.-.QV10, 3SE512.-.RV10 (metal)

4.6 Mechanical safety switches with tumbler

Safety switches with separate actuator and additional electromagnetic tumbler are used when the shutdown of machines calls for closed protective doors. For example, this is the case when protecting the work zone of a robot system.

An integrated auxiliary magnet keeps the protective door locked until a specific signal is received. The actuator cannot be withdrawn with a pulling force of 2600 N for metal variants and 1300 N for plastic variants. A safety locking mechanism also ensures that the normally closed contacts of the magnet are never closed while the door is open. The switch can be released manually using an auxiliary release mechanism if, for example, access is required following a power failure or during installation.

Benefits

- Integrated tumbler with 24 V, 115 V, or 230 V coil voltage
- Default assembly with 6 switching contacts (actuator 1 NO + 2 NC; magnet 1 NO + 2 NC)
- Separate evaluation of the magnet position and the protective door position
- Optical signaling devices enable reliable status monitoring

Safety switches with tumbler are special safety-related devices that prevent accidental or intentional opening of protective doors, protective grilles, or other covers as long as dangerous conditions exist, e.g., follow-on motions of shut-down machines.



Safety switches with tumbler consist of a switch part with electromechanical tumbler and a mechanical actuator, which must be ordered separately. These rugged protective devices provide the greatest possible safety for humans and machines. The safety switches with tumbler are offered with a plastic or metal enclosure.

Dimensions (W × H × D)

- 3SE53: 54 mm × 185 mm × 43.5 mm

Protection from manipulation

Mechanical safety switches with separate actuator offer "Protection against easy bypassing". Actuation with a simple tool (e.g., screwdriver) and other aids (e.g., wires, pencils, adhesive tape) is not possible.

Exception

Removal of components of the position switch or separate actuator, as well as jumpering of the switching contacts, is regarded as a deliberate action and not as "easy bypassing".

Requirements

The separate actuator is triple-coded and acts like a key. Once an actuator and switch are functionally joined together (protective device closed), a machine or plant can begin operation. When the protective device is opened, a positively-locking, positive-opening operation of the normally closed contacts becomes operative. The switching contact remains positively opened until the actuator is inserted again. Additional expenses for, e.g., an approach rod or switching cam, as is necessary for conventional position switches, as well as shielding measures for tamper protection, do not apply in the case of the switches. Installing the switch on the machine at a location that is as concealed and inaccessible as possible provides additional protection against manipulation.



WARNING

Improper use may cause a risk of death.

You must not use the 3SE5000-0AW11 actuator for position switches with tumbler.

The actuator head is included in the scope of delivery. It can be offset by $4 \times 90^\circ$ to allow actuation from four directions. The 3SE5 3 switches can also be approached from above.

The actuator is not included in the scope of delivery of the position switches and must be ordered separately. There are six variants to choose from, depending on the application.

Actuation data:

- Maximum actuating speed $v_{\max} = 1.5 \text{ m/s}$
- Minimum actuating speed $v_{\min} = 0.4 \text{ mm/s}$
- Minimum force in direction of actuation $F_{\min} = 30 \text{ N}$

Operation

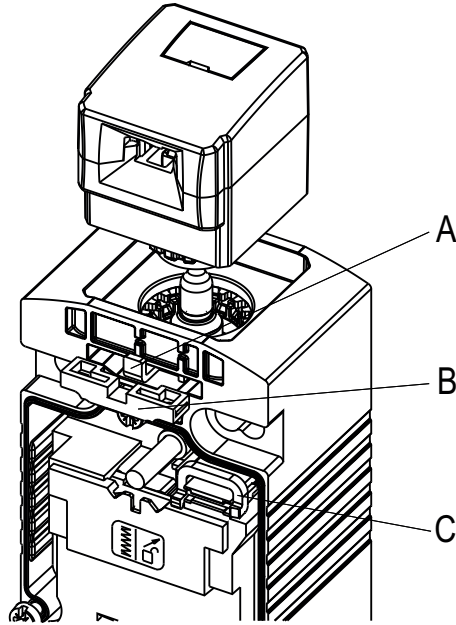
Safety switches with tumbler can only be switched with the associated triple-coded actuator. This prevents simple tampering by hand or with tools.

The normally closed contact is positively opened and the normally open contact is closed by pulling the actuator.

Insertion guides

For large doors, insertion funnels/guides for positioning of switches must be used.

Installing and securing the actuator head



Installing/removing the actuator head

1. Insert an actuator into the actuator head, or press the auxiliary release lever (C).
2. Release the actuator head by rotating the locking plate (A) to the right.
3. The actuator head is interlocked in the center position of the locking plate.

Securing the actuator head

1. To secure the locking plate (A), push in the filler (B) (mounted on the inside of the cover) while the actuator head is interlocked.
2. This secures the closed locking plate (A) against unauthorized opening. The actuator head can no longer be rotated.

Contact block

Two contacts with two positive-opening normally closed contacts and one normally open contact are used (terminal markings according to EN 50013).

Interlock types

Two actuator interlock types are available:

- **Spring-locked** (closed-circuit principle): Actuator inserted and mechanically interlocked. Actuator is released by applying voltage to the magnet or, in the case of voltage drop, by means of a manual or key-operated auxiliary release mechanism (version-dependent). Release variants:
 - Auxiliary release
 - Key-operated release
 - Emergency release
 - Escape release
- **Solenoid-locked** (open-circuit principle): Actuator released. Actuator is interlocked by applying voltage to the magnet. Actuator is released by switching off the voltage applied to the magnet.

For emergency situations or for setup mode, the spring-locked switch is equipped with an auxiliary release. The following is available as an option (3SE5 only):

- An escape release, or
- An emergency release

Auxiliary release



3SE53.2-0SD2.

The auxiliary release may only be used when the tumbler fails.

! DANGER

Risk of death.

Possibility of unauthorized use.

The switch can be manipulated.

Seal the access point of the auxiliary release following installation.

Auxiliary release with lock



3SE53.2-0SE2.

Rotation of the key of the key-operated auxiliary release by an authorized person releases the tumbler. The actuator is released for withdrawal.

Eliminate the dangerous situation. An authorized person resets the device to operating mode by turning the key (clockwise). The key can be withdrawn.

Front escape release



3SE53.2-0SF2.

Rear escape release and front auxiliary release



3SE53.2-0SG2.

The escape release is intended for use cases in which the possibility for escape or rescue of persons is required. Its purpose is to release the safety interlock without an auxiliary tool in dangerous situations.

A deliberate action on the device is required to cancel the block and restore the ready-to-operate condition.

Rear emergency release and front auxiliary release



3SE53.2-0SJ1.

Manual activation of the emergency pushbutton by any person in the danger zone releases the tumbler. The actuator is released for withdrawal.

Safety switches equipped with the escape release option must be installed within the danger zone. The escape release may only be operated to allow a person to exit the danger zone in the event of a system failure.

Note

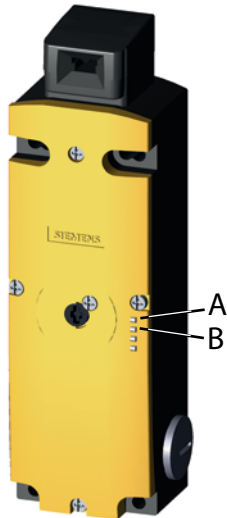
The safety switches with tumbler have one contact block each for the following:

- Monitoring the actuator or position of the protective door
- Monitoring the position of the magnet

The mechanical design of the switches complies with the requirements for protection against incorrect locking according to EN 1088.

4.6.1 Mechanical safety switches with tumbler and LED display

The safety switches with tumbler are available with an optional LED display. 2 LEDs on the front panel indicate the switch position of the interlock and the protective device.



CAUTION

Risk of property damage.

The voltage of the LEDs at the monitored contacts must match the operating voltage of the magnet (same potential).

Protective device	Tumbler	Display	Meaning
Closed	Released	☀ yellow (A) + ☀ green (B)	Actuator free for withdrawal
Closed	Interlocked	☀ green	Actuator interlocked
Open	Released	☀ yellow	Actuator withdrawn

4.6.2 Technical data for mechanical safety switches with tumbler

		3SE5322-.....	3SE5312-.....
Width of the sensor	mm	54	
material of the housing		plastic	metal
Insulation voltage rated value	V	250	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	4	
Operating voltage for AC rated value	V	230	
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	3	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	0.5	
Mechanical operating cycles as operating time typical		1000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		1000000	
• at AC-15 at 230 V typical		—	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Actuating speed	m/s	0.4 ... 1.5	
Minimum actuating force in activation direction	N	30	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ¹⁾ ... +60	-25 ... +60
• during storage	°C	-40 ... +80	
Protection class IP		IP66/IP67 ²⁾	

4.6 Mechanical safety switches with tumbler

		3SE5322-.....	3SE5312-.....
mounting position		any	
Switching capacity apparent power		5 V DC, 1 mA	
Type of the connectable conductor cross-section			
• solid		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded			
– with wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing		1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors			
– solid		1x (20 ... 16), 2x (20 ... 18)	
– stranded		1x (20 ... 16), 2x (20 ... 18)	
Recorded real power of the magnet coil	W	3.5	
Relative ON period of the magnet coil	%	100	
Locking pressure	N	1300	2600

1) 3SE5 322-0SL21-1AJ0 = -40 °C

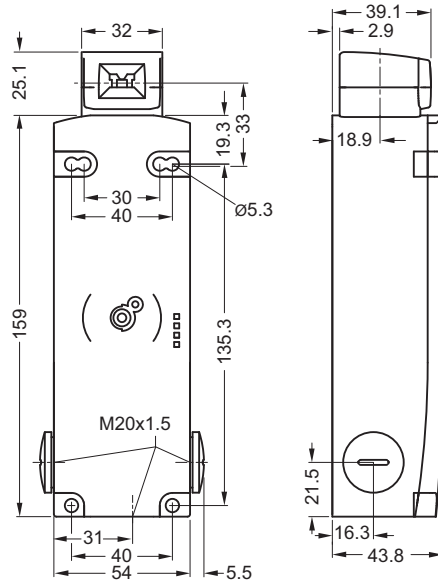
2) 3SE5 3.2-..F.. / 3SE5 3.2-..G.. / 3SE5 3.2-..H.. / 3SE5 3.2-..J.. / 3SE5 3.2-..L.. = IP65/67

4.6.3

Dimension drawings for mechanical safety switches with tumbler

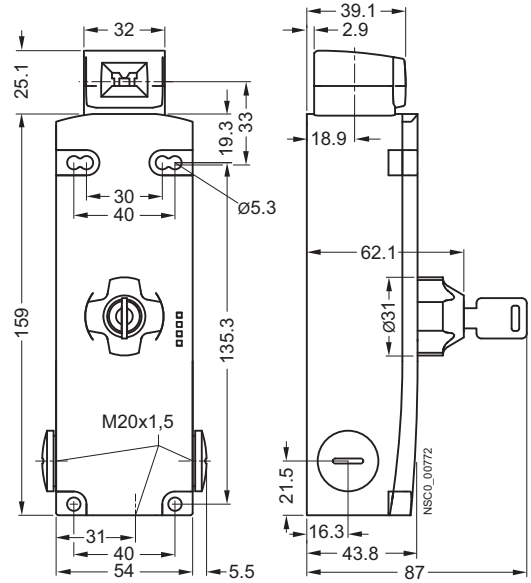
Spring-locked, with front auxiliary release

3SE5322-.SD2., 3SE5322-.SG2.,
3SE5322-.SJ2., 3SE5312-.SD1.,
3SE5312-.SG1., 3SE5312-.SJ1.,



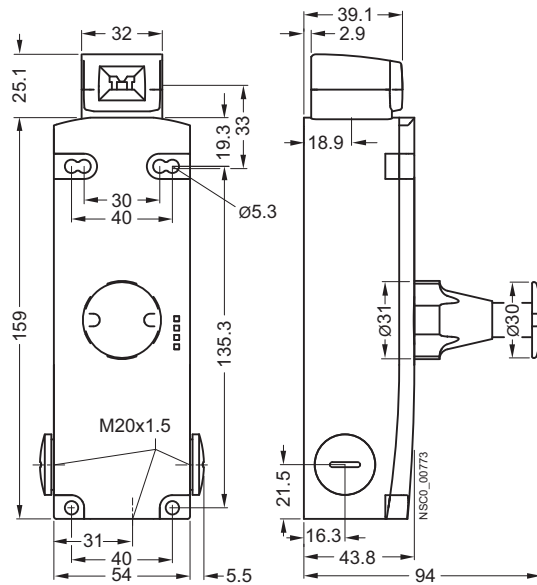
Spring-locked, with auxiliary release with lock

3SE5322-.SE2.,
3SE5312-.SE1.



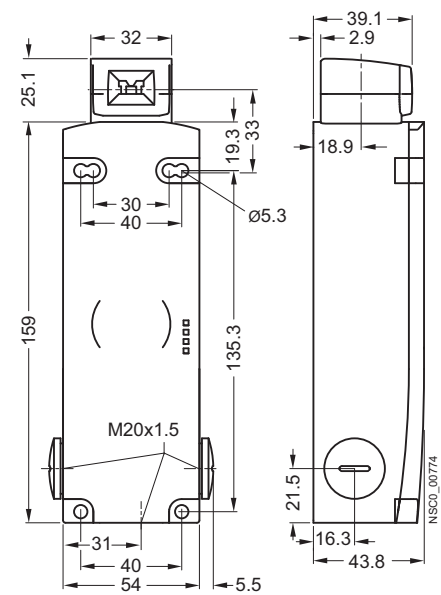
Spring-locked, with escape release

3SE5322-.SF2.,
3SE5312-.SF1.



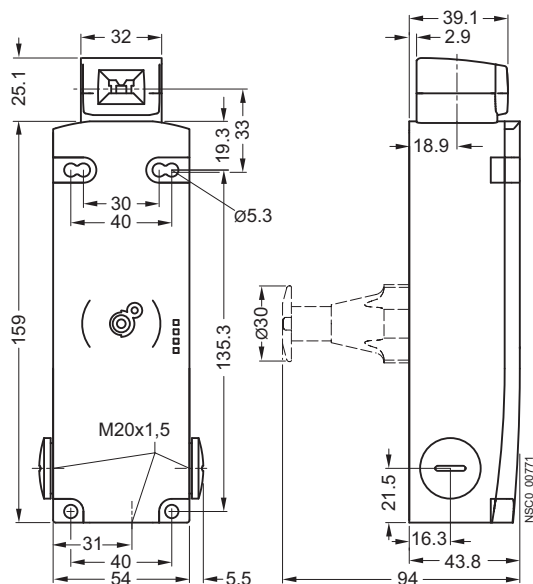
Solenoid-locked

3SE5322-.SB2.,
3SE5312-.SB1.

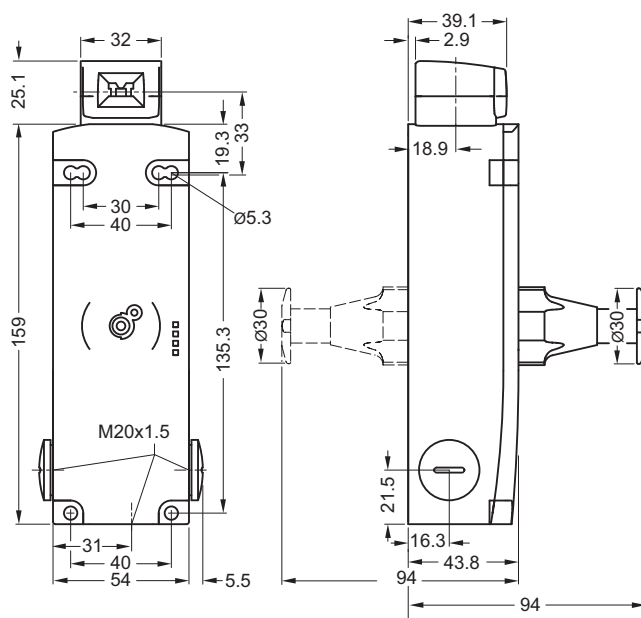


4.6 Mechanical safety switches with tumbler

Rear escape release



Front escape release and rear emergency release



Note

The plastic enclosures have knock-outs behind the connecting thread; therefore, blind caps are not included in the scope of delivery.

4.6.4 Interlock types

Spring-locked (closed-circuit principle)

The actuator is inserted and mechanically interlocked. The actuator is released by applying voltage to the magnet or, in the case of voltage failure, by means of a manual or key-operated auxiliary release (version-dependent).

Actuator	Connected	Connected	Disconnected
Switch position	Interlocked	Released	Released
Spring-locked	Magnet not energized	Magnet energized	Magnet energized

Figure 4-2 Switch position spring-locked

Solenoid lock (open-circuit principle)

The actuator is released. The actuator is interlocked by applying voltage to the magnets. The actuator is released by switching off the voltage applied to the magnets.

Solenoid-locked

Actuator	Connected	Connected	Disconnected
Switch position	Interlocked	Released	Released
Solenoid-locked	Magnet energized	Magnet not energized	Magnet not energized

Figure 4-3 Switch position solenoid-locked

4.7 Hinge switches



4.7.1 General description

Application areas and features

- Used for hinged protective devices, such as doors or flaps, for which the position must be monitored for safety reasons.
- The position of the doors and flaps is converted to electrical signals with the hinge switch.
- The hinge switches have snap-action contacts with an actuating angle of 10° and enable shutdown and signaling without delay at a small opening angle.

The 3SE5 hinge switches have the same enclosure as mechanical position switches (modular system).

Benefits

- Fixed and positively-locking connections between the switch and protective door hinge directly at the pivot point of the protective device provide maximum protection from tampering and manipulation.
- Hinge switches in a standard enclosure according to EN 50047 and EN 50041 provide a small actuating angle of only 10°.
- The 1 NO/1 NC snap-action contacts enable simultaneous shutdown and signaling.

Enclosure sizes

The 3SE5 hinge switches are available as complete units in two enclosure sizes:

- Metal enclosure/plastic enclosure according to EN 50047, 31 mm wide, 1 cable entry
- Metal enclosure/plastic enclosure according to EN 50041, 40 mm wide, 1 cable entry

Enclosure versions

With the enclosures, you can choose from a variety of basic switches:

- Available with 2- or 3-pin contact blocks, designed as snap-action contacts only.
- Metal enclosure for explosion protection (ATEX)

Actuator

The hinge switches are intended for mounting on hinges. The actuator head is included in the scope of delivery. There are two variants:

- Actuator with hollow shaft, inside diameter 8 mm, outside diameter 12 mm
- Actuator with solid shaft, diameter 10 mm

4.7 Hinge switches

4.7.2 Technical data for hinge switches

		3SE5232-0LU2. 3SE5232-0HU2.	3SE5212-0LU2.
Width of the sensor	mm	31	
material of the housing		plastic	metal
Insulation voltage rated value	V	400	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	6	
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		1000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000	
• at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Actuating speed minimum	mm/s	0.1	
Minimum actuating force in activation direction	N·m	0.2	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	
• during storage	°C	-40 ... +90	
Protection class IP		IP65	IP66/IP67

	3SE5232-0LU2. 3SE5232-0HU2.	3SE5212-0LU2.
mounting position	any	
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

4.7 Hinge switches

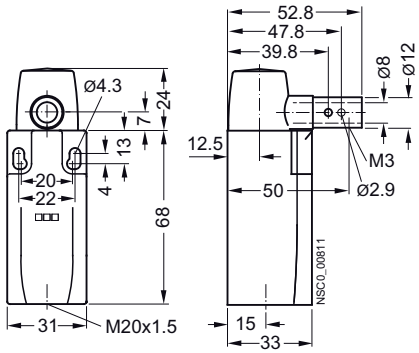
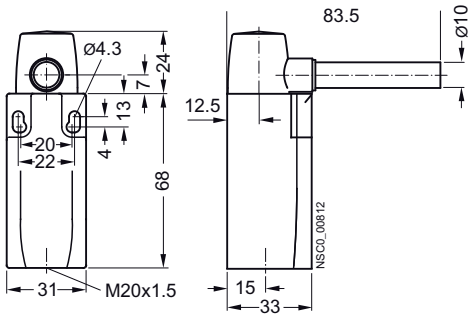
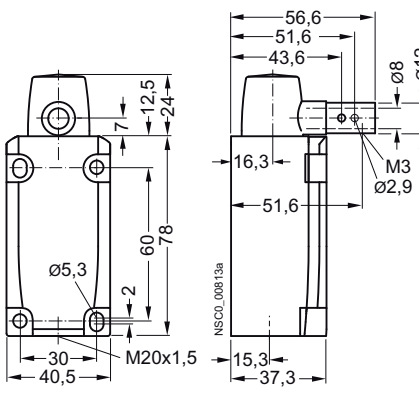
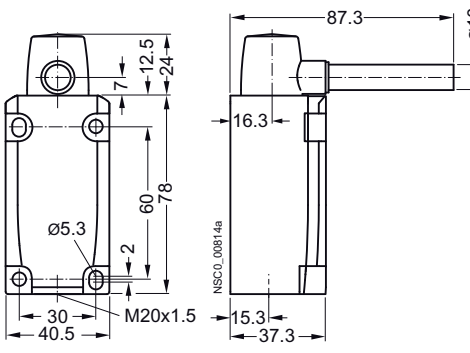
		3SE5132-0LU..	3SE5112-0LU..
Width of the sensor	mm	40	
material of the housing		plastic	metal
Insulation voltage rated value	V	400	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	6	
Thermal current	A	10	6
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		1000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		1000000	
• at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Actuating speed minimum	mm/s	0.1	
Minimum actuating force in activation direction	N·m	0.2	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	
• during storage	°C	-40 ... +90	
Protection class IP		IP66/IP67	
mounting position		any	

	3SE5132-0LU..	3SE5112-0LU..
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

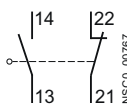
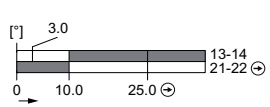
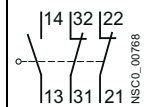
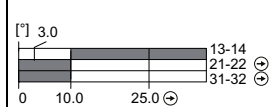
4.7 Hinge switches

4.7.3 Dimension drawings and operating travel diagrams for hinge switches

Dimension drawings

Enclosure width 31 mm with hollow shaft 3SE5212-0.U21 3SE5232-0.U21	Enclosure width 31 mm with solid shaft 3SE5212-0.U22 3SE5232-0.U22
	
Enclosure width 40 mm with hollow shaft 3SE5112-0.U21 3SE5132-0.U21	Enclosure width 40 mm with solid shaft 3SE5122-0.U22 3SE5132-0.U22
	

Operating travel diagrams

Snap-action contacts	
1 NO + 1 NC  Code number 11 3SE5...-0HU2. 	1 NO + 2 NC  Code number 12 3SE5...-0LU2. 

- ⊕ Positive opening operation according to EN 60947-5-1
 → Direction of actuation
 ■ Contact element closed
 □ Contact element open

4.8 Mechanical position switches for explosion protection

4.8.1 General description

In many industries, the manufacture, processing, transport, and storage of combustible materials can produce or emit gases, vapors, or mists, which are released into the environment. Other processes can produce combustible dust. In conjunction with the oxygen in the air, an explosive atmosphere (Atmosphère Explosive in French) may arise in which case an explosion will be triggered if an ignition occurs.

To ensure maximum possible safety in these areas, legislators in most countries have elaborated numerous requirements covered by a range of laws, regulations, and standards. Our switches comply fully with these government requirements.

In areas with explosion protection as well as environments with vapors or dust, we recommend the use of our position switches according to ATEX 95. These switches comply with device group II and device category 2D. They meet the requirements of Directive 94/9/EG (ATEX 95) of the European Union and are suitable for use in Zone 21/22.

Required knowledge

The following knowledge is required:

- Explosion protection
- **IEC 60079-14 / DIN VDE 0165 - 1** Explosive atmospheres – Part 14: Electrical installations design, selection and erection
- **IEC 60079-17 / DIN VDE 0165-10-1** Explosive atmospheres – Part 17: Electrical installations inspection and maintenance
- **German Ordinance on Industrial Safety and Health - BetrSichV.**



Position switches in metal enclosure, including Hinge switches (Page 186) and Mechanical safety switches with separate actuation (Page 163) (without tumbler), are also available in versions for use in areas with combustible dust.

To achieve maximum possible safety in these areas, legislators in most countries have elaborated numerous requirements covered by a range of laws, regulations, and standards. These switches comply fully with these government requirements.

The switches have a grounding screw on the outside of the enclosure. The connection openings are sealed with dummy caps in the as-delivered condition.

Note

Field of application

The safety switches 3SE5...-.....-1DA0 described here comply with European Directive 94/9/EC (ATEX 95) and are suitable for use in hazardous areas of Zone 22 (device group II, category 3D) and Zone 21 (device group II, device category 2D).

CAUTION
The use of position switches with plastic actuator head is not permitted in areas in which occurrence of propagating brush discharges can be expected.

The dimension drawings and operating travel diagrams for mechanical position switches for explosion protection are identical to the data presented in Section "Mechanical position switches" Dimension drawings and operating travel diagrams for mechanical position switches (Page 119).

4.8.2 Technical data for mechanical position switches for explosion protection

		3SE5122-.....-1DA0	3SE5112-.....-1DA0
Width of the sensor	mm	56	40
material of the housing		metal	
Insulation voltage rated value	V	400 ¹⁾	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	6 ²⁾	
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	6 ³⁾⁴⁾	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10 ⁵⁾	
• of the C characteristic circuit breaker	A	1	
Mechanical operating cycles as operating time typical		15000000	
Electrical operating cycles as operating time			
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		10000000	
• at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	
• during storage	°C	-40 ... +90	
Protection class IP		IP66/IP67 ⁶⁾	
mounting position		any	

	3SE5122-.....-1DA0	3SE5112-.....-1DA0
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

1) 3SE51.2-0MA00-1DA0 / 3SE51.2-0PA00-1DA0 = 250 V

2) 3SE51.2-0.A00-1DA0 = 4 kV

3) 3SE51.2-0BA00-1DA0 = 3 A

4) 3SE51.2-0.A00-1DA0 = 1,5 A

5) 3SE51.2-0MA00-1DA0 / 3SE51.2-0PA00-1DA0 = 6 A

6) 3SE51.2-0CR01-1DA0 = IP65/67

4.8.3 Technical data for mechanical safety switches for explosion protection with separate actuation

		3SE5122-0QV.0-1DA0	3SE5112-0QV.0-1DA0
Width of the sensor	mm	56	40
material of the housing		metal	
Insulation voltage rated value	V	400	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	6	
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	1	
Electrical operating cycles as operating time at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	
• during storage	°C	-40 ... +90	
Protection class IP		IP66/IP67	
mounting position		any	

	3SE5122-0QV.0-1DA0	3SE5112-0QV.0-1DA0
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

4.8.4 Technical data for mechanical safety switches for explosion protection - hinge switches

		3SE5112-0LU2.-1DA0	3SE5112-0LU1.-1DA0
Width of the sensor	mm	40	
material of the housing		metal	
Insulation voltage rated value	V	400	
Degree of pollution		class 3	
Impulse voltage resistance rated value	kV	6	
Thermal current	A	6	
Operating current			
• at AC-15			
– at 24 V rated value	A	6	
– at 125 V rated value	A	6	
– at 230 V rated value	A	1.5	
• at DC-13			
– at 24 V rated value	A	3	
– at 125 V rated value	A	0.55	
– at 230 V rated value	A	0.27	
Continuous current			
• of the slow DIAZED fuse link	A	6	
• of the quick DIAZED fuse link	A	10	
• of the C characteristic circuit breaker	A	1	
Electrical operating cycles as operating time at AC-15 at 230 V typical		100000	
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000	
Repeat accuracy	mm	0.05	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +85	
• during storage	°C	-40 ... +90	
Protection class IP		IP66/IP67	
mounting position		any	

	3SE5112-0LU2.-1DA0	3SE5112-0LU1.-1DA0
Switching capacity apparent power	5 V DC, 1 mA	
Type of the connectable conductor cross-section		
• solid	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• finely stranded		
– with wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
– without wire end processing	1x (0.5 ... 1.5 mm ²), 2x (0.5 ... 0.75 mm ²)	
• for AWG conductors		
– solid	1x (20 ... 16), 2x (20 ... 18)	
– stranded	1x (20 ... 16), 2x (20 ... 18)	

4.9 3SF1 mechanical safety switches for AS-Interface

4.9.1 General description

Connection with AS-Interface

SIRIUS detection devices are ideally suited as the basis for networked systems within a plant.

Benefits

The individual components can be integrated into the AS-Interface system.

They are fully compatible according to IEC 62026-2 with the well-known AS-Interface components, e.g., master, slaves, power supply unit, etc., and can be connected to the same yellow AS-Interface cable. We supply all components for configuring a safe AS-Interface network.

- The entire range of 3SE5 position switches is available with integrated ASIsafe electronics:
 - Mechanical position switches
 - Mechanical safety switches with separate actuator
 - Mechanical safety switches with tumbler
- The connection to the AS-Interface system is made via an M12 connector
- Because the safety switches with tumbler are directly integrated into the AS-i network, the load on the data cable is very low. The maximum current consumption of the magnet is 170 mA.

4.9.2 Overview

The SIRIUS 3SF1 mechanical safety switches with safety-related communication can be directly connected via the AS-Interface bus system. As a result, the safety functions no longer have to be conventionally wired.

The ASIsafe electronics are integrated within the switch enclosure in 3SF1 safety switches.



Figure 4-4 Examples of possible selections in the modular system

4.9.3 Modular system

The safety switches of the 3SF11.4 and 3SF12.4 series are configured as a modular system, consisting of the basic enclosure in different variants and an actuator, which must be ordered separately. The modular switch design allows the end user to choose the appropriate solution from a wide selection of variants and to quickly assemble it himself. The 3SF1 safety switches have the same enclosure as the mechanical position switches.

4.9.4 LED display

The switches have a display with three LEDs:

Status display (operating status)			
LED	LED 1 (F-IN1)	LED 2 (F-IN2)	LED 3 AS-i/Fault
	 yellow	 yellow	 green/red

4.9.5 Plug connection

The connection to the AS-Interface is made via a 4-pin M12 plug connector (plastic version) to the yellow AS-Interface bus cable.

The 50 mm and 56 mm-wide enclosures also have an M12 socket for connecting a second position switch. As a result, category 4 according to ISO 13849-1 (EN 954-1) or SIL2/SIL3 according to IEC 61508 is achieved.

4.9.6 Technical data for safety switches for AS-Interface

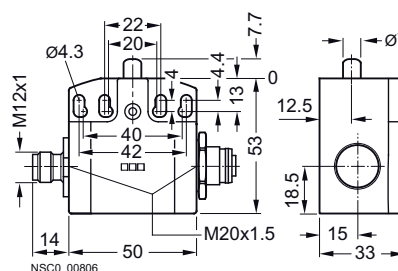
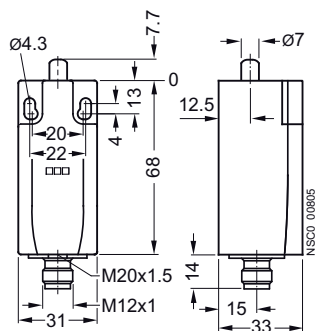
		3SF1244-1.C05-1BA2	3SF1234-1.C05-1BA1	3SF1214-1.C05-1BA1
Width of the sensor	mm	50	31	
material of the housing		plastic		metal
Insulation voltage rated value	V	30		
Degree of pollution		class 3		
Impulse voltage resistance rated value	V	800		
Operating voltage for AC rated value	V	30		
Mechanical operating cycles as operating time typical		15000000		
Actuating speed				
• minimum	mm/s	0.4 ¹⁾		
• maximum	mm/s	1000		
Minimum actuating force in activation direction	N	20		
Repeat accuracy	mm	0.1		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		
Ambient temperature				
• during operating	°C	-25 ... +60		
• during storage	°C	-40 ... +80		
Protection class IP		IP66/IP67	IP65	IP66/IP67
mounting position		any		
Switching capacity apparent power		5 V DC, 1 mA		

¹⁾ 3SF12.4-1LC05-1BA. = 0,1 mm/s

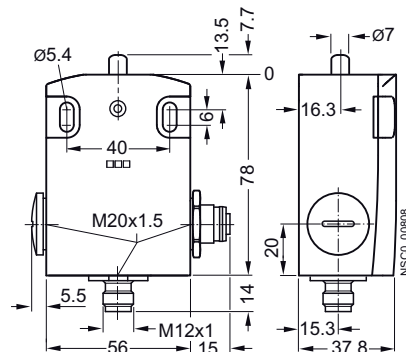
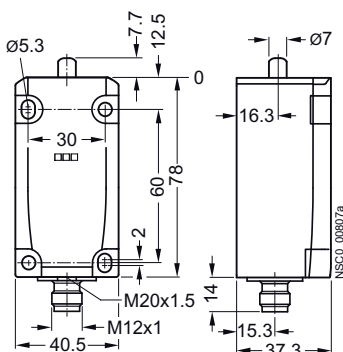
Data according to AS-Interface Specification	3SF11 / 3SF12
I/O configuration	7 / B
ID1 code/ID2 code (hex)	F / F

Basic switches (without actuator)

Enclosure width 50 mm
3SF1244



Enclosure width 56 mm
3SF1124



Mechanical safety switches with separate actuation (Page 163)

4.9.8 Safety switches for AS-Interface with separate actuation

4.9.8.1 Overview

The 3SF1 safety switches with safety-related communication are directly connected via the AS-Interface bus system. As a result, the safety functions are no longer conventionally wired.

The ASIsafe electronics are integrated within the switch enclosure in 3SF1 safety switches.



Figure 4-5 3SF1 safety switches for AS-Interface with separate actuator

The 3SF1 safety switches with separate actuator have the same enclosure as the mechanical position switches.

4.9.8.2 Actuators

The actuator head is included in the scope of delivery. It can be offset by $4 \times 90^\circ$ to allow actuation from four directions. The switches can also be approached from above.

The actuator is not included in the scope of delivery of the position switch and must be ordered separately. There are six variants to choose from, depending on the application.

The actuator is coded. This prevents simple tampering by hand or with tools.

For additional security, a stainless steel lock insert that accommodates up to eight padlocks is offered (see Accessories (Page 157)).

For use in dusty environments, a dust cap is offered for safety switch 3SF1...-..V10 that protects the actuator entries of the actuator head from dirt (see Accessories (Page 157)).

4.9.8.3 LED display

The switches have a display with three LEDs:

Status display (operating status)			
LED	LED 1 (F-IN1)	LED 2 (F-IN2)	LED 3 AS-i/Fault
	 yellow	 yellow	 green/red

4.9.8.4 Connection with separate actuation

The connection to the AS-Interface is made via a 4-pin M12 plug connector (plastic version) to the yellow AS-Interface bus cable.

The 50 mm and 56 mm-wide enclosures also have an M12 socket for connecting a second position switch. As a result, category 4 according to ISO 13849-1 (EN 954-1) or SIL2/SIL3 according to IEC 61508 is achieved.

4.9.8.5 Technical data for safety switches for AS-Interface with separate actuation

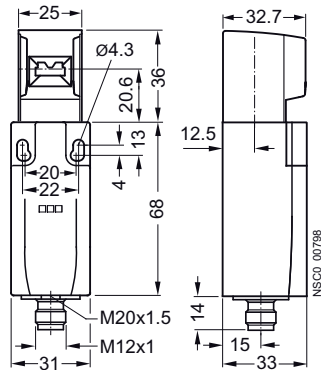
		3SF1124-1QV10-1BA2	3SF1114-1QV10-1BA1
Width of the sensor	mm	56	40
material of the housing		metal	
Insulation voltage rated value	V	30	
Degree of pollution		class 3	
Impulse voltage resistance rated value	V	800	
Operating voltage for AC rated value	V	30	
Mechanical operating cycles as operating time typical		1000000	
Actuating speed minimum	mm/s	0.4	
Actuating speed maximum	m/s	0.5	
Minimum actuating force in activation direction	N	10	
Repeat accuracy	mm	0.1	
Resistance against vibration		0.35 mm / 5g	
Resistance against shock		30g / 11 ms	
Ambient temperature			
• during operating	°C	-25 ... +60	
• during storage	°C	-40 ... +80	
Protection class IP		IP66/IP67	
mounting position		any	
Switching capacity apparent power		5 V DC, 1 mA	

4.9 3SF1 mechanical safety switches for AS-Interface

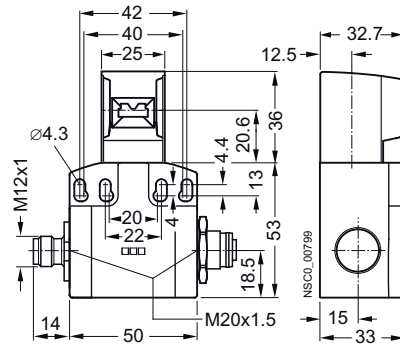
		3SF1244-1QV40-1BA2	3SF1234-1QV40-1BA1	3SF1214-1QV40-1BA1
Width of the sensor	mm	50	31	
material of the housing		plastic		metal
Insulation voltage rated value	V	30		
Degree of pollution		class 3		
Impulse voltage resistance rated value	V	800		
Operating voltage for AC rated value	V	30		
Mechanical operating cycles as operating time typical		1000000		
Actuating speed	mm/s	0.4 ... 500		
Minimum actuating force in activation direction	N	10	20	
Repeat accuracy	mm	0.1		
Resistance against vibration		0.35 mm / 5g		
Resistance against shock		30g / 11 ms		
Ambient temperature				
• during operating	°C	-25 ... +60		
• during storage	°C	-40 ... +80		
Protection class IP		IP66/IP67	IP65	IP66/IP67
mounting position		any		
Switching capacity apparent power		5 V DC, 1 mA		

4.9.8.6 Dimension drawings for safety switches for AS-Interface with separate actuation

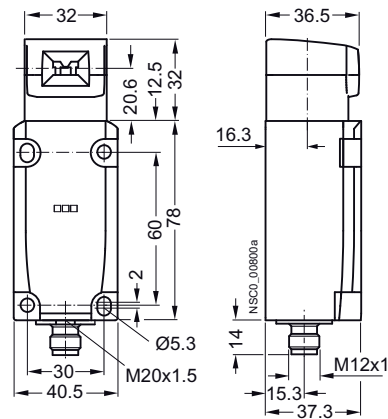
Enclosure width 31 mm, EN 50047
3SF1234-..V..



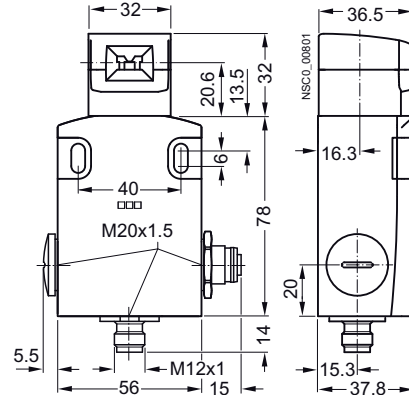
Enclosure width 50 mm
3SF1244-..V..



Enclosure width 40 mm, EN 50041
3SF1114-..V..

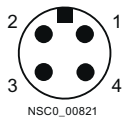


Enclosure width 56 mm
3SF1124-..V..



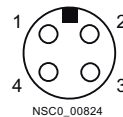
4.9.9 Pin assignment

Plug connector M12, 4-pin



- 1 ASi+
- 2 Not used
- 3 ASi-
- 4 Not used

Socket M12, 4-pin



- 1 Channel 2
- 2 Not used
- 3 Channel 2
- 4 Not used

4.9.10 Safety switches for AS-Interface with separate actuation with tumbler

4.9.10.1 Overview

The mechanical safety switches for AS-Interface with tumbler are special safety-related devices that prevent accidental or intentional opening of protective doors, protective grilles, or other covers as long as dangerous conditions exist, e.g., follow-on motions of shut-down machines.

The 3SF1 safety switches with safety-related communication can be directly connected via the AS-Interface bus system. As a result, the safety functions no longer have to be conventionally wired.

The ASIsafe electronics are integrated within the switch enclosure in 3SF1 safety switches.



Figure 4-6 3SF13 safety switches with tumbler and with integrated ASIsafe electronics

4.9.10.2 Actuation

Actuators

The actuator head is included in the scope of delivery. It can be offset by $4 \times 90^\circ$ to allow actuation from four directions. The switches can also be approached from above.

The actuator is not included in the scope of delivery of the position switch and must be ordered separately. There are six variants to choose from, depending on the application.

The actuator is coded. This prevents simple tampering by hand or with tools.

For additional security, a stainless steel lock insert that accommodates up to eight padlocks is offered.

For use in dusty environments, a rubber cap is offered that protects the actuator entries of the actuator head from dirt.

4.9.10.3 3SF13...-1BA1

The protective door is closed when the machine is running. The actuator is located in the safety switch and is interlocked there. The positive-opening contacts of the safety switch are closed in this state. An 8 x 4 bit code table is transferred via the closed contacts (channel 1 - actuator monitoring; channel 2 - magnet monitoring) and is passed from the AS-Interface module to the AS-i bus cable. The safety monitor connected to the AS-i bus cable evaluates the transferred code table. For maintenance purposes, there is a need to manually intervene behind the protective grille. The operator switches off the machine for this purpose. The user must ensure that the protective grille can only be opened after the machine has come to a standstill. It is not possible to restart the machine until the protective door is closed and the actuator is interlocked. The contacts used for monitoring the protective door are connected with positive locking by the actuator such that the position of the protective door is detected immediately. The contacts used for monitoring the blocking means are connected with positive locking to the blocking element such that a failure of the tumbler device is detected by the safety monitor. An integrated protection against incorrect closing prevents the blocking element from being in the blocking position even though the actuator is still outside the safety switch.

With the monitoring of channel 1 (actuator) and channel 2 (magnet) of position switches 3SF13...-1BA1, PL d according to ISO 13849-1 and SIL2 according to IEC 61508 are achieved for the corresponding operation. For information on the achievable safety category, refer to the ASIsafe Function Manual. The PFH_D value of the entire loop according to IEC 61508 must be calculated by the user. The PFH_D value of the position switch can be calculated from failure rate λ_D . The calculation of the failure rate is described in Section Failure rates (Page 16).

- Channel 1: 1-channel actuator monitoring
- Channel 2: 1-channel magnet monitoring

SIL 1/PL c with setting in the AS-Interface Monitor:

2-channel conditionally dependent:

- Feedback from magnet available
- Reclosing condition: Door must not be opened

SIL 2/PL d with setting in the AS-Interface Monitor:

2-channel dependent:

- Feedback from magnet available
- Reclosing condition: Door must be opened

4.9.10.4 3SF13...-....-1BA4

The protective door is closed when the machine is running. The actuator is located in the safety switch and is interlocked there. The positive-opening contacts of the position switch are closed in this state. An 8 x 4 bit code table is transferred via the closed contacts (channel 1: 2-channel actuator monitoring; channel 2: 1-channel magnet monitoring) and is passed from the AS-Interface module to the AS-i bus cable. The "Safety at Work" evaluation unit, such as an ASIsafe 3RK1 safety monitor, which is connected to the AS-i bus cable, evaluates the transferred code table. For maintenance purposes, there is a need to manually intervene behind the protective door. The operator switches off the machine for this purpose. The user must ensure that the protective door can only be opened after the machine has come to a standstill. It is not possible to restart the machine until the protective door is closed and the actuator is interlocked. The contacts used for monitoring the protective door are connected with positive locking by the actuator such that the position of the protective door is detected immediately. The contacts used for monitoring the blocking means are connected with positive locking to the blocking element such that a failure of the tumbler device is detected, e.g., by an ASIsafe 3RK1 safety monitor. An integrated protection against incorrect closing prevents the blocking element from being in the blocking position even though the actuator is still outside the safety switch.

With the channel monitoring (channel 1: 2-channel actuator monitoring; channel 2: 1-channel magnet monitoring) of position switches 3SF13...-....-1BA4, PL d according to ISO 13849-1 and SIL2 according to IEC 61508 are achieved for the corresponding operation. For information on the achievable safety category, refer to the ASIsafe Function Manual. The PFH_D value of the entire loop according to IEC 61508 must be calculated by the user. The PFH_D value of the position switch can be calculated from failure rate λ_D . The calculation of the failure rate is described in Section Failure rates (Page 16).

- Channel 2: 1-channel magnet monitoring

SIL 2/PL d with setting in the AS-Interface Monitor:

2-channel conditionally dependent:

- Feedback from magnet available
- Reclosing condition: Door must not be opened

4.9.10.5 Direct connection of safety monitor, Category 3/SIL 2/PL d

- Spring-locked position switch with tumbler
- Direct connection to AS-Interface
- Unsafe release
- The position switch transfers the information of the two actuator contacts on a transfer channel because the discrepancy of the actuator contacts is already evaluated in the switch. The second transfer channel is therefore available for the magnet monitoring (for the standard process evaluation).

Configuring

Protective door monitoring with ASIMON monitoring block, type "conditionally dependent":

Category 3 according to EN 954-1 or SIL2 according to IEC 62061 or PL d according to ISO 13849-1

The safety monitor monitors the actuator and the magnet ("conditionally dependent" monitoring). When you activate the "Independent In -1" parameter, you can release the protective door without having to open it afterwards.

The standard output integrated in the position switch is used to release the protective door.

4.9.10.6 Tumbler

Two actuator interlock types are available:

- Spring-locked (closed-circuit principle) with various release variants
- Solenoid-locked (open-circuit principle)

4.9.10.7 LED display

The switches have a display with four LEDs:

Status display (operating status)			
LED 1 (F-IN1)	LED 2 (F-IN2)	LED 3 (AS-i)	LED 4 (FAULT)
 yellow	 yellow	 green	 red

Status display (operating status)				
LED	No voltage	Communication OK	Communication failure	Slave has the address "0"
Fault (GN/RD)				

4.9.10.8 Connection with tumbler

The connection to the AS-Interface is made using a 4-pin M12 plug connector (plastic version) to the yellow AS-Interface bus cable (the low current consumption of the magnet, i.e., max. 170 mA, means that an additional auxiliary power feed is not necessary).

4.9.10.9 Technical data for safety switches for AS-Interface with tumbler

		3SF1324-1S.21-1BA1	3SF1324-1S.21-1BA3	3SF1324-1S.21-1BA4	3SF1314-1S.11-1BA1
Width of the sensor	mm	54			
material of the housing		plastic			metal
Insulation voltage rated value	V	30			
Degree of pollution		class 3			
Impulse voltage resistance rated value	kV	0.8			
Operating voltage for AC rated value	V	30			
Thermal current	A	4			
Operating current					
• at AC-15					
– at 24 V rated value	A	4			
– at 125 V rated value	A	—			
– at 230 V rated value	A	—			
• at DC-13					
– at 24 V rated value	A	3			
– at 125 V rated value	A	—			
– at 230 V rated value	A	—			
Continuous current					
• of the slow DIAZED fuse link	A	4			
• of the quick DIAZED fuse link	A	4			
• of the C characteristic circuit breaker	A	0.5			
Mechanical operating cycles as operating time typical		1000000			
Electrical operating cycles as operating time					
• with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026 typical		1000000			
• at AC-15 at 230 V typical		—			
Electrical operating cycles in one hour with contactor 3RH11, 3RT1016, 3RT1017, 3RT1024, 3RT1025, 3RT1026		6000			
Actuating speed minimum	mm/s	0.4	3	0.4	

4.9 3SF1 mechanical safety switches for AS-Interface

		3SF1324-1S.21-1BA1	3SF1324-1S.21-1BA3	3SF1324-1S.21-1BA4	3SF1314-1S.11-1BA1
Actuating speed maximum	m/s	1.5			
Minimum actuating force in activation direction	N	30			
Repeat accuracy	mm	0.1			
Resistance against vibration		0.35 mm / 5g			
Resistance against shock		30g / 11 ms			
Ambient temperature					
• during operating	°C	-25 ... +60			
• during storage	°C	-40 ... +80			
Protection class IP		IP66/IP67 ¹⁾	IP66/IP67	IP66/IP67 ²⁾	IP66/IP67 ¹⁾
Built in orientation		any			
Switching capacity apparent power		5 V DC, 1 mA			
Recorded real power of the magnet coil	W	3.5			
Relative ON period of the magnet coil	%	100			
Supply voltage of the magnet coil	V	24			
Locking pressure according to BG-GS-ET 19	N	1000			2000
Locking pressure	N	1300			2600
Design of the electrical connection		M12 plug, fixed			

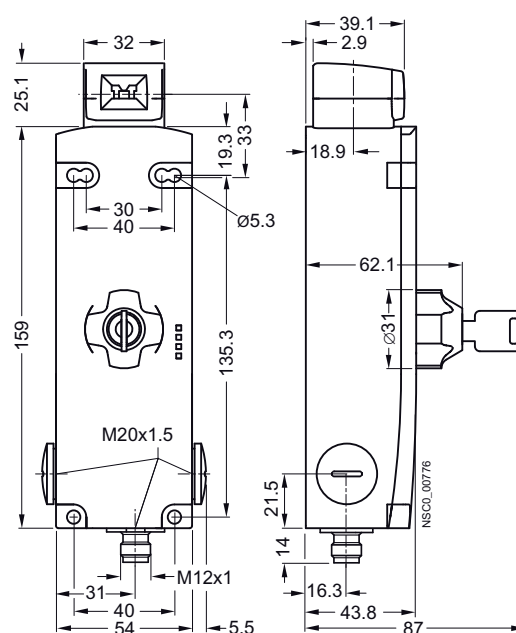
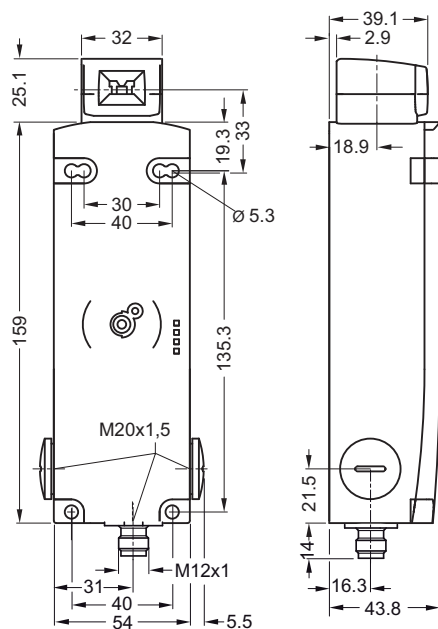
1) 3SF13.4-1SJ.1-1BA. / 3SF13.4-1SF.1-1BA. / 3SF13.4-1SG.1-1BA. = IP65/67

2) 3SF1324-1SF21-1BA. = IP65/67

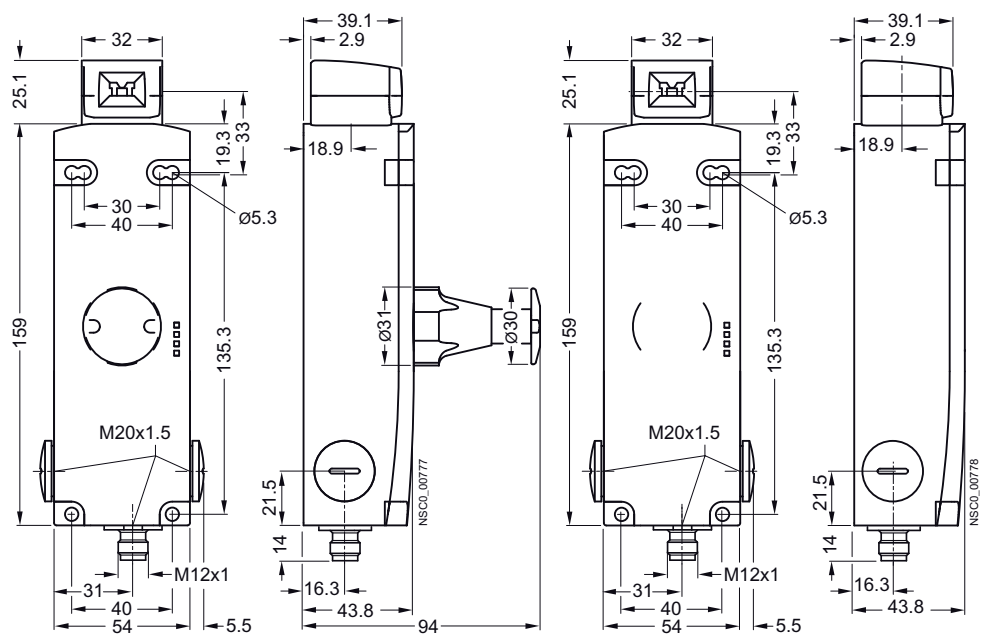
4.9.10.10 Dimension drawings for safety switches for AS-Interface with tumbler

Spring-locked, with front auxiliary release
3SF1324-.SD1., 3SF1324-.SG1.,
3SF1324-.SJ1., 3SF1314-.SD1.,
3SF1314-.SG1., 3SF1314-.SJ1.

Spring-locked, with auxiliary release with lock
3SF1324-.SE1., 3SF1314-.SE1.



Solenoid-locked
3SF1324-.SB1., 3SF1314-.SB1



You will find further information under: Combinations (Page 156)

Application examples

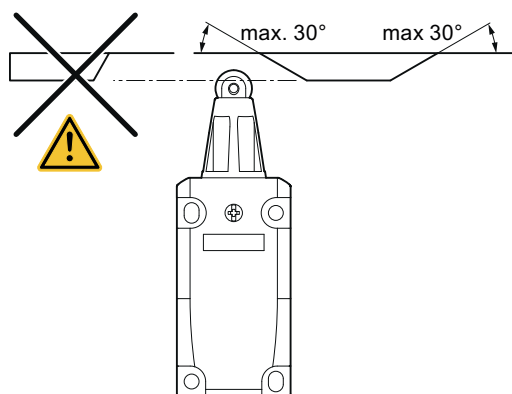
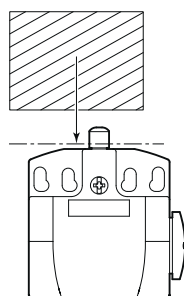
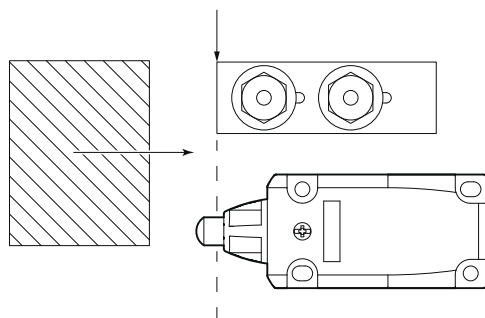
5.1 Installation instructions

CAUTION
Risk of property damage. Failure to observe this caution may result in damage to the switch. • Make sure that the actuating element of any actuator with a roller can approach in such a way that no lateral forces occur. The actuating element should be moved on the roller in a flat manner. • The actuating element must be configured according to its purpose so that the position switch is not subjected to unnecessary stress on actuation.

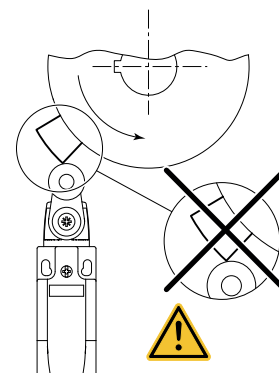
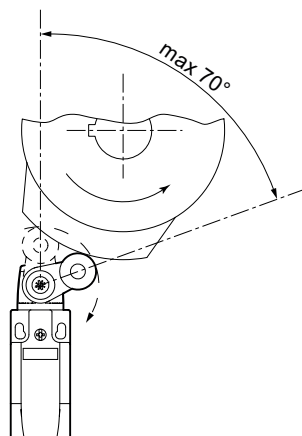
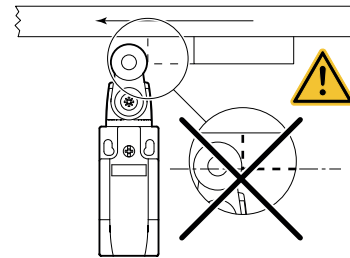
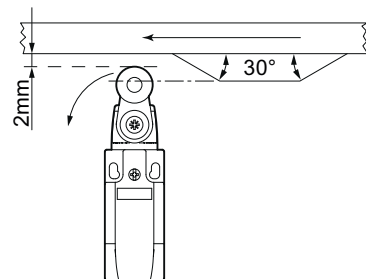
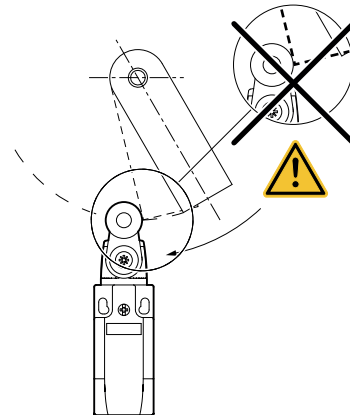
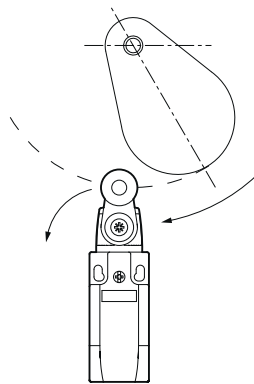
5.1.1 Protection against approach and overtravel

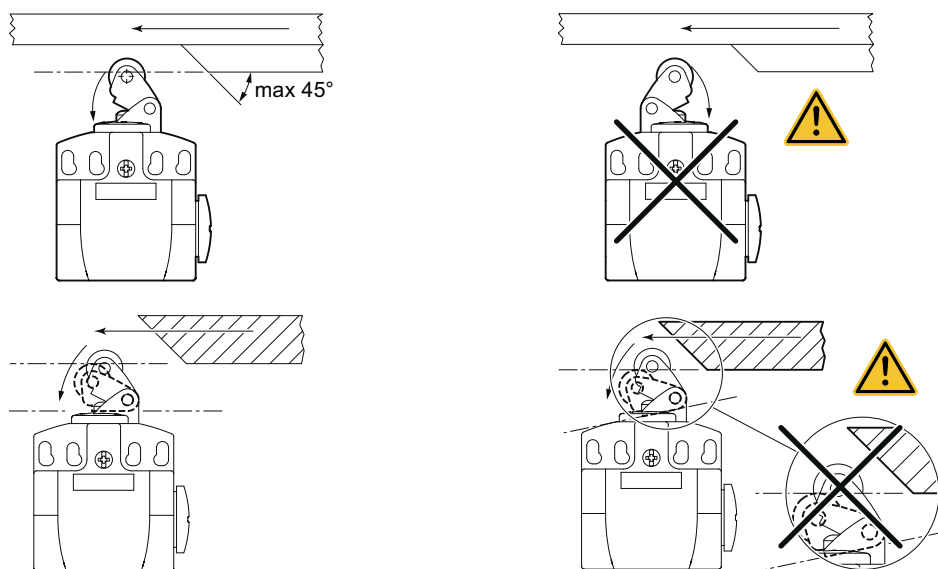
CAUTION
Risk of property damage. Do not use position switches as a mechanical endstop. Place the position switches in such a position that they are not damaged during approach and overtravel. For this reason, it is not permissible to use them as a mechanical stop. Choose a height for the control rod or cam that is less than the total travel in the switch, so that no mechanical loading of the switch or its mounting occurs.

Installation instructions for rounded and roller plungers

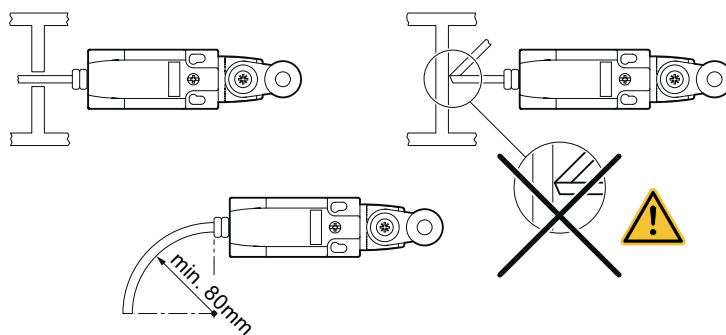


Installation instructions for position switches with roller lever, angular roller lever, twist lever, and rod lever

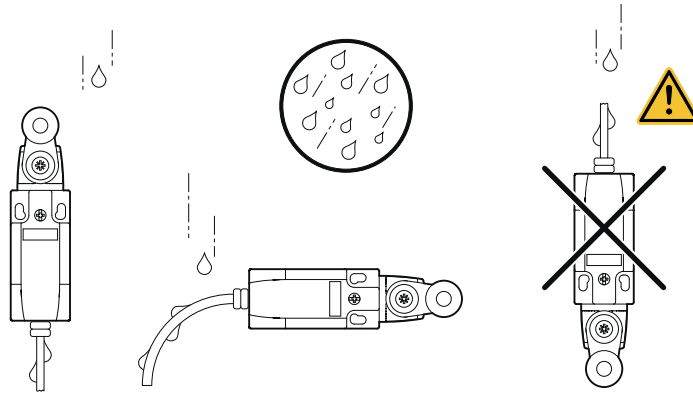




Position switches with cable



When moisture is present



5.1.2 Cable entry

Seal the cable entries (M20 x 1.5) carefully in order to avoid a reduction in the degree of protection according to DIN VDE 0470 and IEC 60529. If a cable entry is not needed, fit it with a threaded dummy cap. The protective ground connection is located in the metal enclosure.

NOTICE

Proper use of cable entries.

Only cable entries that meet the requirements described in DIN EN 61241-0 are permitted to be used. The cable entries must be designed and mounted in such a way that the degree of protection according to DIN VDE 0470 and IEC 60529 is not impaired. Unused cable entries must be sealed with the supplied threaded caps. Required torque: 1.1 Nm.

CAUTION

Risk of property damage.

In case of damage or wear, the complete switch must be replaced. The replacement of individual parts or modules is not permitted.

CAUTION

Risk of property damage.

Avoid bending the connecting cable. If bending of the connecting cable cannot be avoided, the bending radius should not be less than 80 mm.

DIN EN 60204-1 stipulates:

Position switches must be positioned in such a way that they are not damaged in the case of overtravel. They must be positioned in such a way that they are protected against inadvertent actuation.

Instructions based on practical experience

Position switches, especially open-type position switches, must be mounted on a flat base in order not to exert any bending moment on the plastic enclosure when screwing into place.

CAUTION
Risk of property damage. The installation location of position switches and their electrical connecting cables must be at least 400 mm above the floor or the platform where maintenance and repair personnel work.

Make sure that the following actions can be performed easily and safely:

- Fastening
- Connecting
- Setting up
- Testing during the operating sequence

Note the following installation instructions:

- Position switches should be accessible without having to dismantle mechanical parts (except for protective grilles, maintenance doors).
- Make sure there is sufficient room for setting up and connecting.
- Seal the cable entry in such a way that liquids (splash water, drill emulsion, etc.) cannot penetrate the enclosure interior.
- Mount the position switch in such a way that chips, coarse dirt, oils, and coolants do not impair the function.
- Make sure that position switches can be easily tested during the operating sequence.
- Use a suitable cover or appropriate positioning to prevent chips from damaging or blocking the position switch.
- Take steps to prevent an inadvertent actuation by operating personnel.
- Ensure sufficient covers as a protection against inadvertent actuation as a result of normal movements of operating personnel.
- Take steps to rule out the possibility of mechanical damage during transport of the position switch.
- Avoid bending the connecting cable. If bending of the connecting cable cannot be avoided, the bending radius should not be less than 80 mm.

Ensure the following:

- Positive locking on a significant portion of the actuator travel of the position switch up until positive opening →.
- Configuration of the switch as a switch with positive-opening operation and fail-safe signal processing.
- Adjustment of the actuating travel to conform to the positive opening operation travel according to manufacturer specifications.
- Actuation of the total positive-opening operation travel before intervention in the danger zone is possible.
- Positively-locking mounting (position can be rotated and offset) of the switch and final controlling element (cam disk, control rod), use of oblong hole mounting only with additional fixing means.
- Securing of the mounting elements of the switch and final controlling element (cam disk, control rod) against self-loosening.
- Sufficient mechanical strength of the support elements and functional elements for the switch.
- Protection against overtravel.
- Protection against external damage.
- Adaptation of the cable entry to the required degree of protection of the switch.
- Accessibility for maintenance and functional testing.
- Assurance that easy bypassing of the protective function is not possible.

 CAUTION

Risk of property damage.

Do not use the position switch as an endstop, as this may cause damage to the switch.

5.1.3 Securing against change of position (fixing)

To secure position switches with a safety function against a change of position, **keyed** techniques must be employed upon installation between the enclosure and mounting surface, such as the following:

- Mounting using round holes
- Use of additional dowel pins or stops when mounting using oblong holes

5.1.4 Quick-release device for enclosure width 40 mm

1. Mount the intermediate plate (b) on the position switch (a).
2. Install the base plate (c) at the installation location.
3. Fit the position switch and use the locking lever (d) to interlock it.

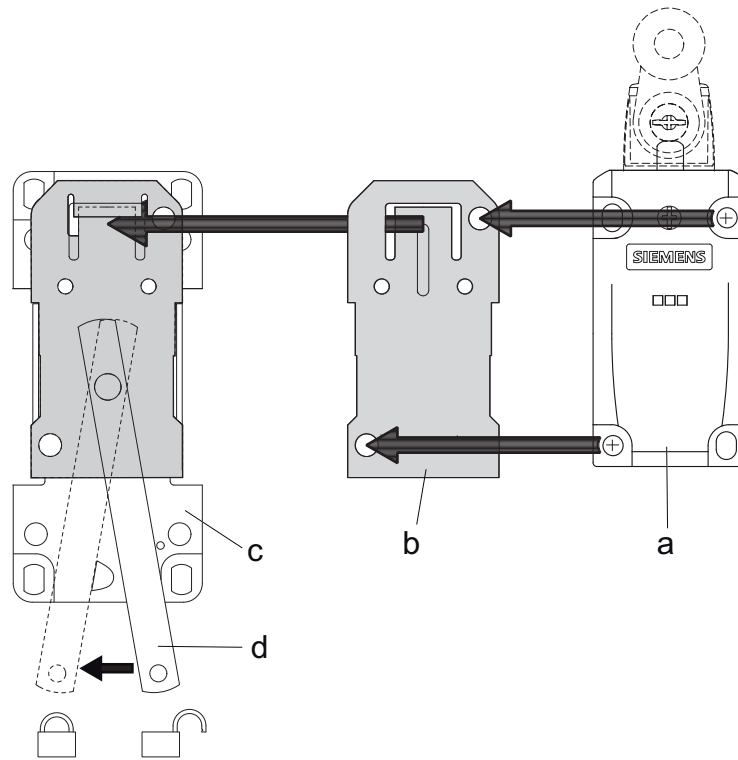


Figure 5-1 Quick-release device

5.2 Application suggestion

System description/application suggestion

The protective door is closed when the machine is running. The actuator is located in the safety switch and is interlocked there. In this case, the enable path of the evaluation unit is closed and the enable path of the contactor control unit is open. For maintenance purposes, there is a need to manually intervene behind the protective grille. The operator switches off the machine for this purpose.

This opens the enable path of the evaluation unit and shuts down the performance level of the machine. Because dangerous machine movement does not cease immediately, the safety switch must not enable the actuator until the follow-on movement of the machine ends. This is ensured by a suitable contactor control unit, such as a standstill monitor or a delay module.

When the protective door is open, the safety contacts (positive-opening normally closed contact $\ominus$) prevent the machine from restarting. The additional normally open contacts can be used as signaling contacts. These functions are not used for safety purposes but rather for machine availability.

With suitable evaluation units, the normally open contacts can also be incorporated in the safety circuit as an additional check.

The contacts used for monitoring are connected with positive locking by the actuator such that the position of the protective door is detected immediately.

The contacts used for monitoring the blocking means are connected with positive locking to the blocking element such that a failure of the tumbler device is detected by the safety-related control system. An integrated protection against incorrect closing prevents the blocking element from being in the blocking position even though the actuator is still outside the safety switch. Thus, the contacts used for monitoring the blocking can also be used to monitor the protective device. When integrated into suitable safety concepts, the ability to perform reciprocal monitoring of contacts enables implementation of safety-related control systems up to Category 3 with Performance Level d according to ISO 13849-1 and SIL 2 according to IEC 62061.

5.2.1 Positive opening position switches

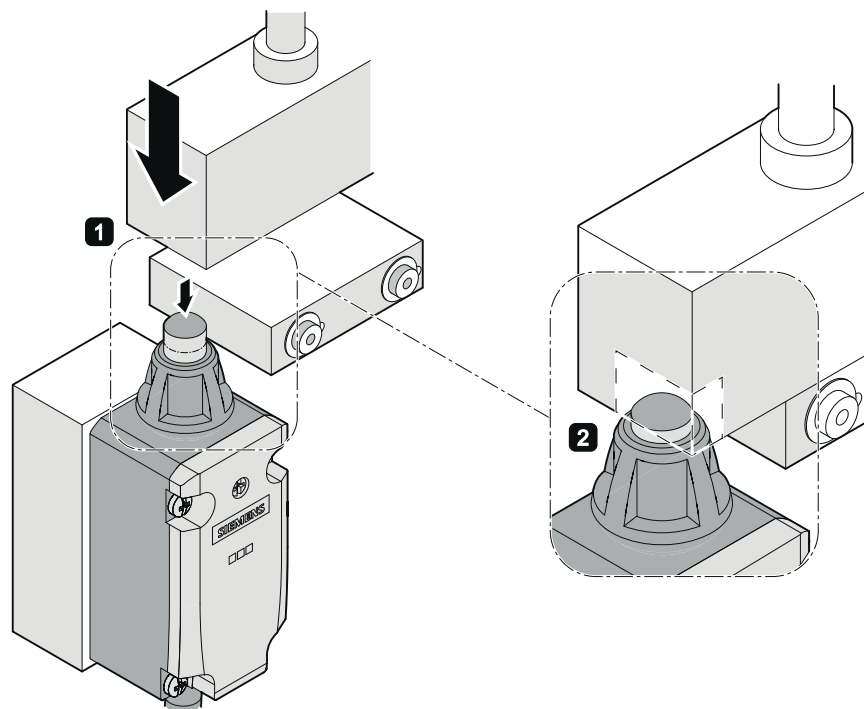
Positive opening position switches with slow-action function, snap-action function, and slow-action function with overlap

On actuation, the positive opening normally closed contact opens and reaches its positive opening point in a defined manner. On reset (closing of protective device), the contact closes at the same point (no hysteresis) in the case of slow-action contacts. When using switches with slow-action contacts, you should observe the manufacturer's specifications with respect to operating travel diagrams and actuator travel. The installation of switches must ensure their complete mechanical actuation such that the necessary positive opening travel is achieved. Position switches with snap-action contacting can also be used in the case of very slow actuating speeds and for applications in which the contacts are to switch with almost no delay. If the snap-action contact block fails, the positive opening operation $\odot$ is initiated by a deflection mechanism. The hysteresis actually describes only the difference between the operating point and reset point in the case of snap-action contacts. This difference results from the different geometric positions of the snap-action mechanism during the switch and reset operations. In the case of slow-action contacts, the operating point and the reset point are generally always the same because the actuator head actuates the contact mechanism linearly. There is therefore no hysteresis.

Operating distances are largely standardized, and thus it is possible to compare competitors within the usual tolerances. We can offer short-stroke contact blocks for the types of construction according to EN 50041 and EN 50047, which enable the switching operation to take place significantly earlier.

5.3 Application example - Rounded plunger

Possible application of a mechanical position switch with rounded plunger



Application examples

- Door monitoring
- Endstop monitoring

Notes on installation

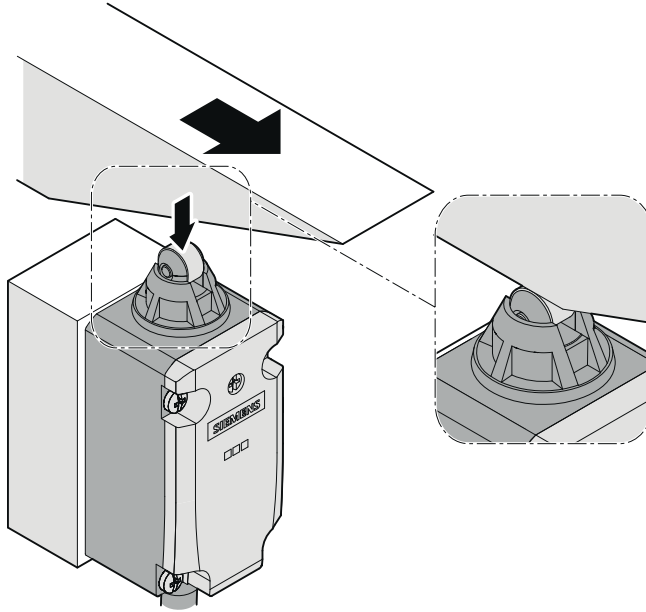
- Approach possible in travel direction only
- Rounded plungers and roller plungers have an overtravel and thus a longer actuator travel than other actuators.

Variants

- Rounded plunger made of plastic
- Rounded plunger made of metal

5.4 Application example - Roller plunger

Possible application of a mechanical position switch with roller plunger



Application examples

- Conveyor belts
- Assembly lines
- Sliding doors

Notes on installation

- Approach possible in travel direction
- Approach with switching bar perpendicular to the travel axis
- Rounded plungers and roller plungers have an overtravel and thus a longer actuator travel than other actuators.
- The roller plunger is recommended in the case of lateral actuation and a relatively long overtravel distance.

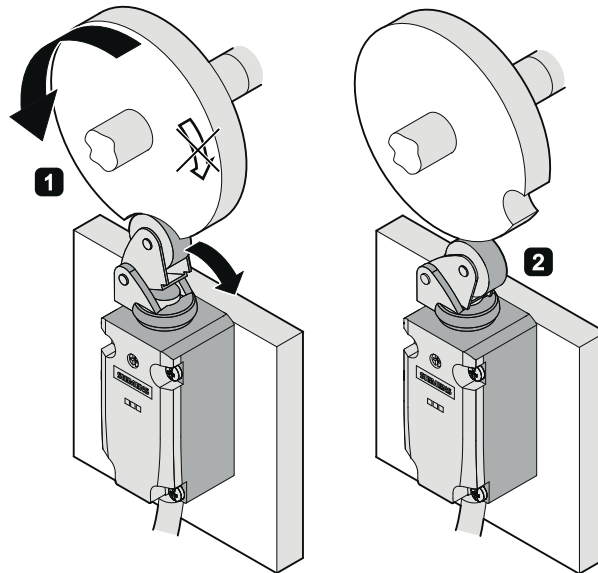
Variants

Roller plunger with plastic roller

Roller plunger with stainless steel roller for frequent overtravel

5.5 Application example - Roller lever

Possible application of a mechanical position switch with roller lever



Application examples

Cam disks

Notes on installation

- Especially suitable for actuating elements made of finely-ground steel in the form of cams, bars, or cam disks without additional lubrication.
- Approach angle = trailing angle, maximum 30 °
- Each actuator can be offset by 90 °.

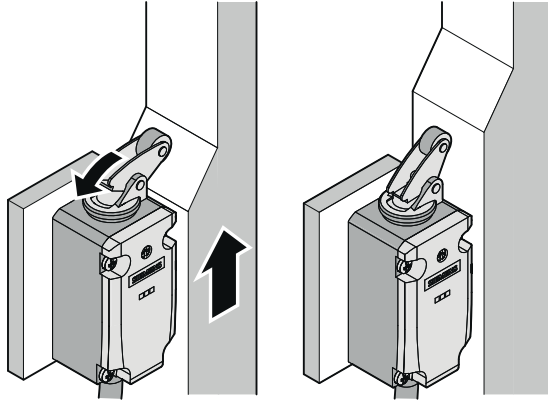
Variants

Roller lever (Page 67) made of metal or stainless steel with plastic roller

Roller lever made of metal or stainless steel with stainless steel roller for frequent overtravel

5.6 Application example - Angular roller lever

Possible application of a mechanical position switch with angular roller lever



Application examples

- Installation in confined space conditions

Notes on installation

- Especially suitable for actuating elements made of finely-ground steel in the form of cams, bars, or cam disks without additional lubrication.
- High approach velocity $v_{\max} = 2.5 \text{ m/s}$
- Different approach angles ($\alpha = 30^\circ$) or trailing angles ($\gamma = 45^\circ$)

Variants

Angular roller lever made of metal or stainless steel with plastic roller

Angular roller lever made of metal or stainless steel with metal roller

CAUTION

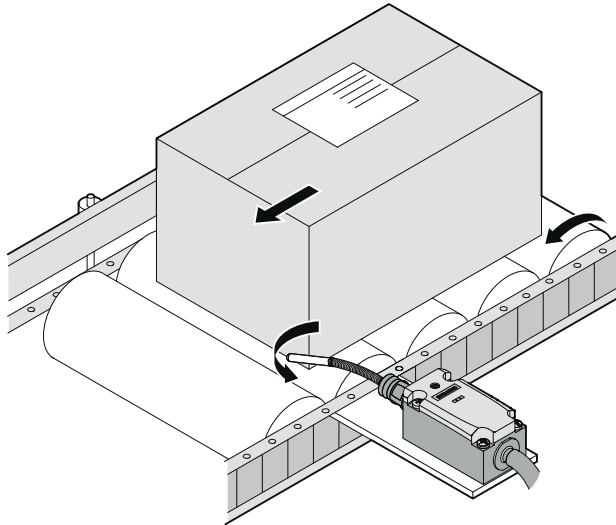
Risk of property damage.

Do not use position switches as a mechanical endstop.

Place the position switches in such a position that they are not damaged during approach and overtravel. For this reason, it is not permissible to use them as a mechanical stop. Choose a height for the control rod or cam that is less than the total travel in the switch, so that no mechanical loading of the switch or its mounting occurs.

5.7 Application example - Spring rod

Possible application of a mechanical position switch with spring rod



Application examples

Package conveyor systems

Notes on installation

- Approach from all directions
- With varying actuation direction
- With approach by angular objects (e.g., packages)
- With undefined actuation

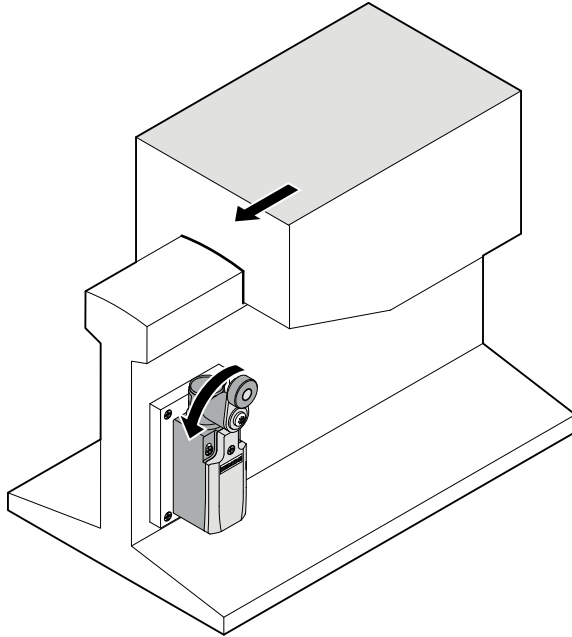
Variants

Spring rod in various lengths with metal plunger

Spring rod in various lengths with plastic plunger

5.8 Application example - Twist lever

Possible application of a mechanical position switch with twist lever



Application examples

- Conveyor belts
- Assembly lines
- Door monitoring

Notes on installation

- For high approach velocity ($v = 1.5 \text{ m/s}$)
- Many possible approaches
- Insensitive to oil, grinding dust, dirt, coarse-grained material
- In the case of twist levers, the maximum approach angle is equal to the maximum trailing angle
- 10° offset of twist levers possible
- Right, left, or right/left direction of operation can be selected in the default configuration

Variants

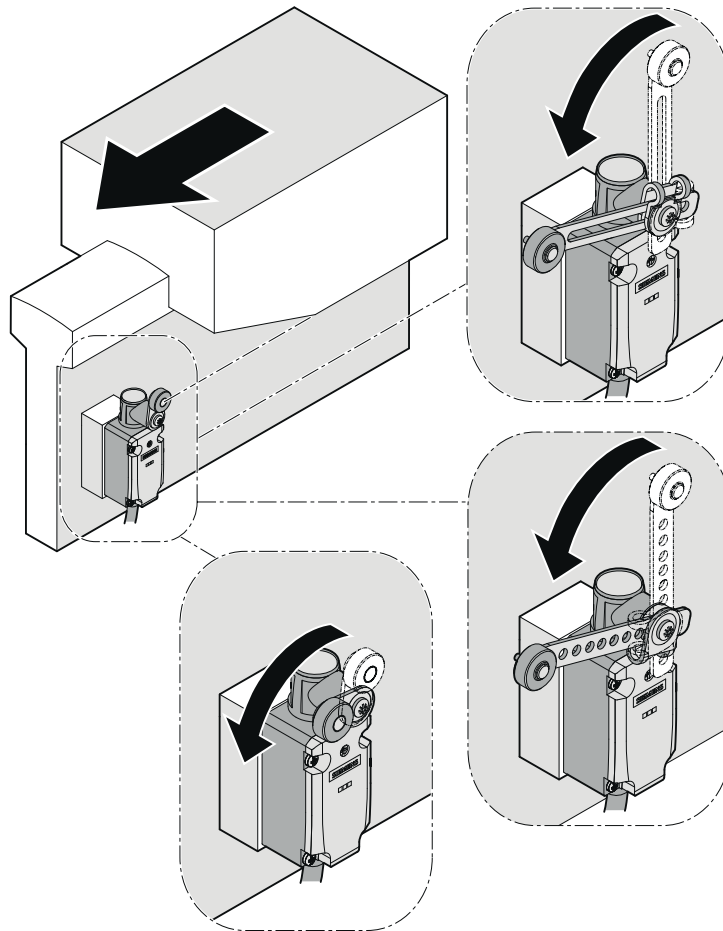
Twist lever with plastic roller

Twist lever with metal roller

Twist lever with ball bearing

5.9 Application example - Adjustable-height twist lever

Possible application of a mechanical position switch with adjustable-height twist lever

**CAUTION**

Risk of property damage.

To avoid property damage, do not use the last drill hole.

Application examples

- With varying approach height distances
- Conveyor belts, assembly lines
- If an actuating element with approach and trailing angles is not possible for technological reasons, e.g., bottles, packages

Notes on installation

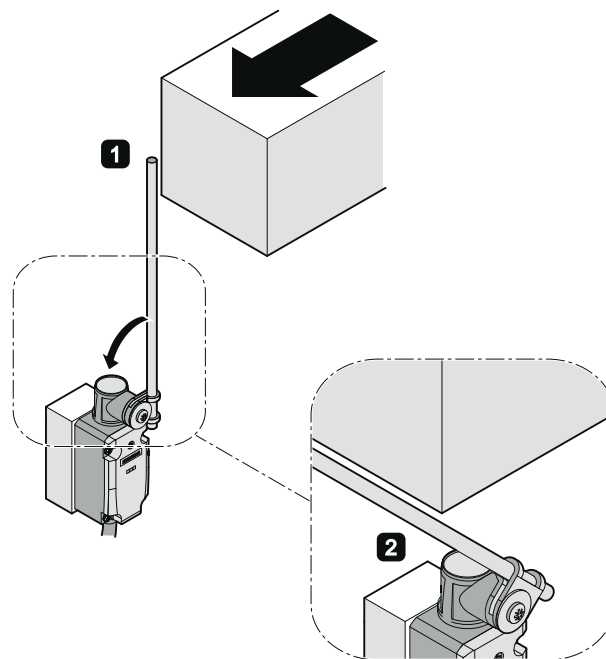
- Many possible approaches
- Insensitive to oil, grinding dust, dirt, coarse-grained material
- In the case of twist levers, the maximum approach angle is equal to the maximum trailing angle
- 10 ° offset of twist levers possible
- Right, left, or right/left direction of operation can be selected in the default configuration

Variants

- Metal lever with pre-drilled holes with plastic roller
- Adjustable-length metal lever with
 - Plastic roller
 - Stainless steel roller
- Adjustable-length twist lever with pre-drilled holes
 - Made of stainless steel
 - Made of metal
- Adjustable-length twist lever with oblong hole
 - Made of stainless steel
 - Made of metal

5.10 Application example - Adjustable-height rod lever

Possible application of a mechanical position switch with adjustable-height rod lever



Application examples

- With approach heights of varying distances, e.g. conveyor belts, assembly lines
- When the distance between position switch and actuating element is greater for technological reasons

Notes on installation

- Many possible approaches
- Insensitive to oil, grinding dust, dirt, coarse-grained material
- If an actuating element with approach angle and trailing angle is not possible
- Infinitely adjustable

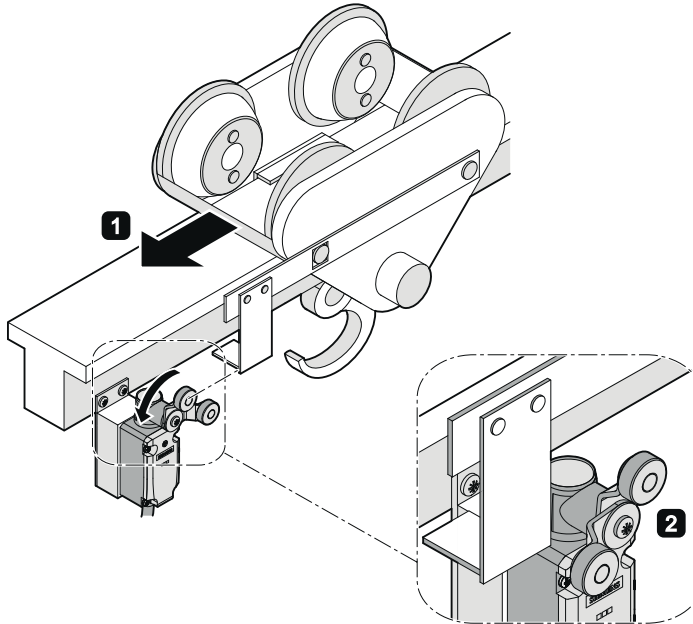
Variants

Rod lever with plastic rod

Rod lever with aluminum rod

5.11 Application example - Fork lever

Possible application of a mechanical position switch with fork lever



Application examples

- Cranes
- Crane trolleys

Notes on installation

- For reciprocating movements
- Can be operated in two directions
- Latching actuator

CAUTION
Risk of property damage. The fork lever latches after actuation and must be reset.

Note
The actuator is not suitable for safety circuits.

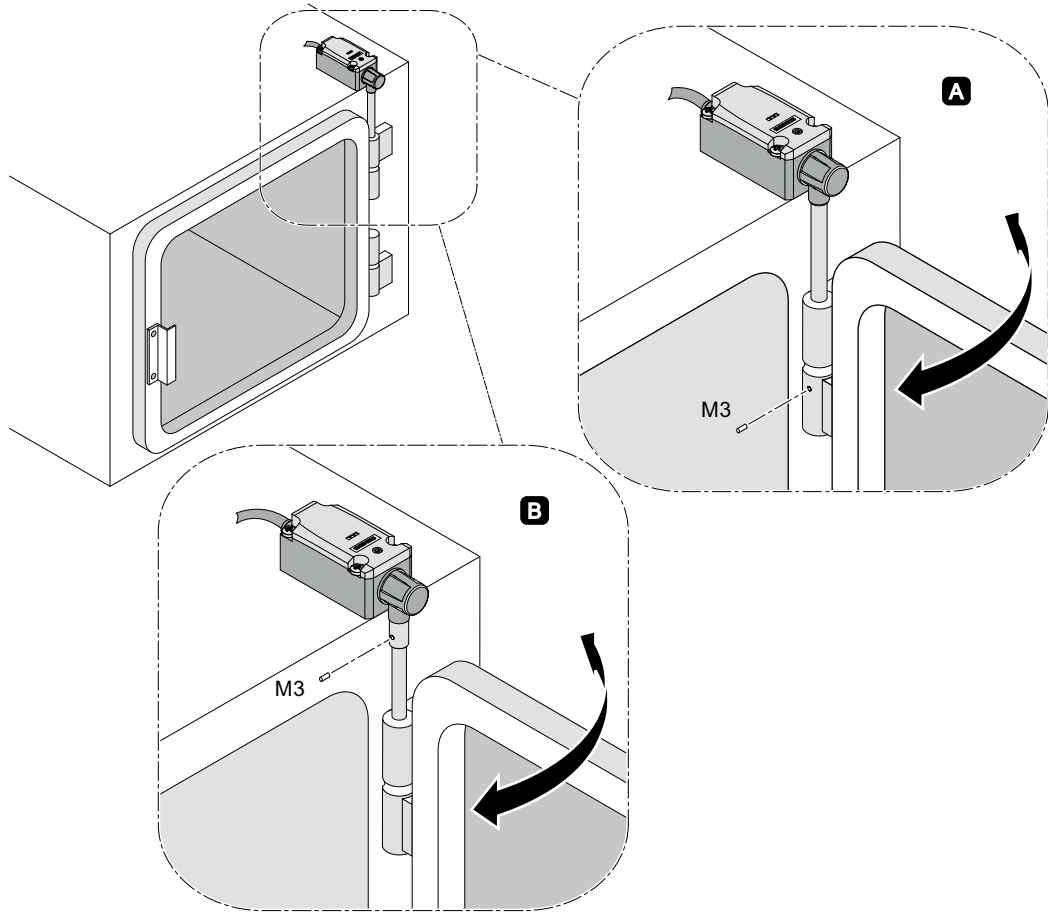
Variants

Fork lever (Page 79) made of stainless steel or metal with plastic roller

Fork lever made of stainless steel or metal with metal roller

5.12 Application example - Hinge switch

Possible application of a hinge switch



Application examples

- Hinged doors
- For monitoring of hinged doors and flaps, with a fixed positively-locking connection between the switch and door hinge.

Notes on installation

- For inserting into a hinge (solid shaft 3SE5112-0LU.)
- For inserting into a hinge pin (hollow shaft 3SE5232)
- Tamper proof
- Direct connection to the ASi network with a very low current load of ≤ 40 mA
- Default: 2 x 3 contacts

Variants

A

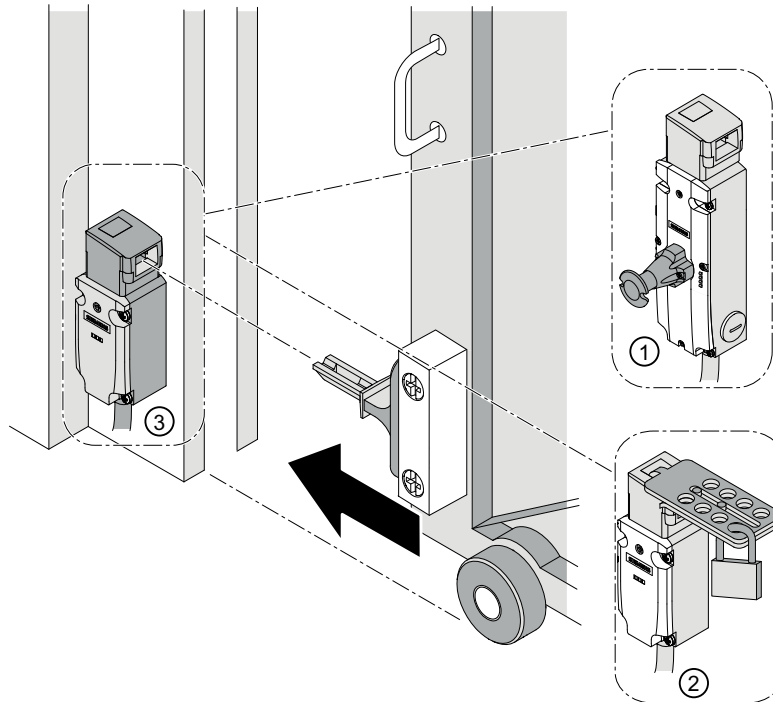
Actuator with solid shaft, diameter 10 mm

B

Actuator with hollow shaft, inside diameter 8 mm, outside diameter 12 mm

5.13 Application example - Safety switch with and without tumbler

Possible application of a mechanical safety switch with and without tumbler



- (1) With tumbler: e.g., for safe interlock of protective doors
- (2) With locking device: e.g., for protection against inadvertent actuation
- (3) Without tumbler: e.g., for monitoring of protective doors

Application examples

- Rolling gates
- Position monitoring of doors, covers, or protective grilles (without tumbler)
- Protection of a work zone (with tumbler)
- Shutting down of machines requires that safety doors are closed (with tumbler)
- Additional interlock requirement, e.g., in the work zone of a robot system

Notes on installation

Note

For precise positioning of safety switches with separate actuator in the case of large, heavy protective doors, an insertion guide should be used.

- The safety switch can only be switched with the associated triple-coded actuator.
- The switch can be actuated on the face side and laterally.

CAUTION**Risk of property damage.**

Do not use the safety switch as an endstop, as this may cause damage to the switch.

Variants

Safety switch with separate actuator without tumbler (Page 163)

Safety switch with separate actuator with tumbler (Page 173)

- Spring-locked
 - Auxiliary release
 - Key-operated release
 - Emergency release
 - Escape release
- Solenoid-locked
- Front escape release
- Rear escape release and front auxiliary release
- Rear emergency release and front auxiliary release

5.14 Special environmental requirements

5.14.1 Icing

Position switches must be mounted and, if necessary, protected in such a way that damage resulting from foreseeable influences are avoided.

- The interface and actuating element must be positioned so as to avoid condensation, water accumulation, or icing.
- Choose actuators that are less prone to icing (rotary instead of linear), such as a rod lever or twist lever.
- All basic designs without actuator are ideal since the plunger guide is sealed only by means of an external chlorinated rubber membrane.
- See also Humidity and wet conditions (Page 247)

5.14.2 UV radiation

The actuator interface of the complete 3SE5 series is sealed with a UV-resistant chlorinated rubber membrane.

Note

For purposes of long-term stability, make sure to mount the position switches in such a way that seals and plastics are protected against direct and extreme UV radiation.

5.14.3 Humidity and wet conditions

5.14.3.1 Condensation

Moisture in sealed enclosure

While enclosures tested according to IP standard are impervious to liquids, they are not gas-tight. Therefore, moisture can penetrate the enclosure in spite of degree of protection IP66 and IP67.

Wetness

Wetness refers to water in liquid state, e.g., rain.

Humidity

Humidity is water in gaseous state, e.g., micro-aerosols or water vapor.

Enclosures according to IP standards are impervious to liquids, but they are not permanently gas-tight. Therefore, while rain cannot penetrate the enclosure, water vapor can. If an underpressure is created in the enclosure, humid air can be drawn in. Underpressure or overpressure conditions form very quickly when an enclosure is used under open-air weather conditions. This moisture can no longer escape from the enclosure, where it accumulates and condenses.

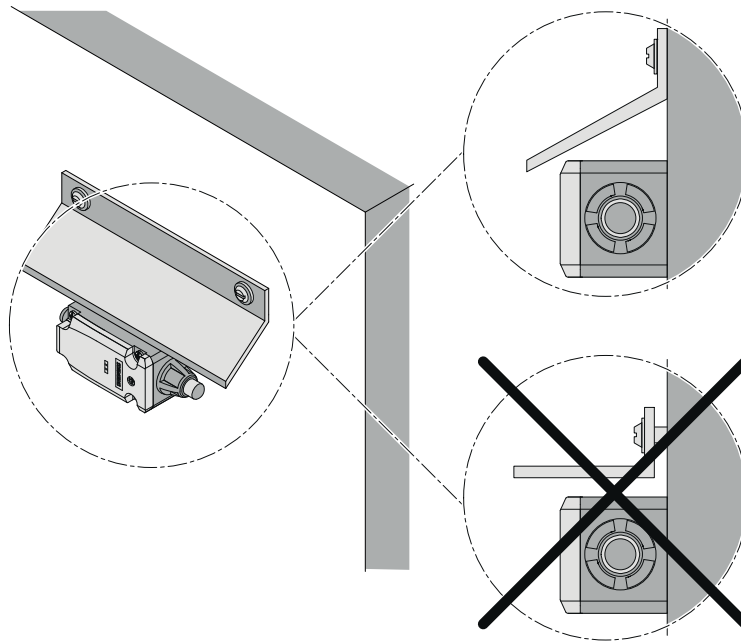
Result

Short-circuit and corrosion

The more often the enclosure is exposed to temperature change cycles, the more moisture is transported into the enclosure. This is due to the fact that each temperature cycle places a constant load on the seals, whose function may be impaired due to abrasion and stress cracks.

Remedy, measures

- Separate protective cover over enclosure, protective canopy



CAUTION

Risk of property damage

Ensure the following when installing protective canopies:

- The interface and actuating element must be positioned so as to avoid water accumulation.
- The protective canopy must be adequately sealed.
- The protective canopy must have an adequate projection and slope.

5.14.3.2 Water jet

Protection against water jets

- The switches have degree of protection IP65 or IP66 and are therefore protected against water jets. When high-pressure cleaners are used frequently, protection must be provided for the installation (e.g., in the case of cleaning operations in the food and beverage industry).
- The interface and actuating element must be positioned so as to avoid water accumulation.

5.14.3.3 Immersing

Switches with degree of protection IP67 can be immersed for 1 hour in water up to 1 m deep. In this case, attention must be paid that the threaded caps (cable gland) fit tightly.

5.14.4 Dust, dirt, oil

Note**Avoidance of dirt.**

Ensure that the switch is attached in such a way that accumulation of dirt in the interface is avoided.

5.14.5 Cleaning agent, chemical environment

CAUTION
Risk of property damage. Cleaning agents can make devices sticky. Ensure that the switch is attached in such a way that accumulation of cleaning agents in the interface is avoided. This can cause linear guides (e.g., rounded plunger, roller plunger) to become sticky. Extremely aggressive cleaning agents can attack and damage seals.

5.14.6 Extreme temperatures

Under extreme operating conditions down to -40 °C, mechanical position switches 3SE5.-1AJ0 are recommended. These switches are characterized by their use of special sealing materials as well as low-temperature greases.

Application

- In external areas, e.g., for crane systems, train applications, etc.

Installation in cooling systems

When the switches are installed in or on cooling systems, increased condensation may occur. When the doors are opened, warm, moist air flowing in condenses and can cause icing on the switches.

Recommendation

Mount the switch outside the cooling chamber or install with a cover (see Section Icing (Page 246)).

5.15 Protecting against change in position

Securing against change of position (fixing)

- When used as a safety switch, ensure that the enclosure and mounting plane are fastened with positive locking.
- When oblong holes are used for mounting, dowel pins or stops must also be used.

Appendix

A.1 Standards and approvals

A.1.1 Standards for mechanical position switches

SIRIUS position switches are developed and manufactured according to product standard DIN EN / IEC 60947-5-1. The SIRIUS position switches also meet the requirements of DIN EN 50041 and DIN EN 50047 and thus help you to comply with the specifications when designing your machines.

All modules/devices marked with the positive-opening symbol can be used in safety circuits.

DIN EN / IEC 60204-1:

This part of IEC 60204 contains requirements and recommendations for electrical equipment of machines, in order to:

- promote the safety of persons and property
- maintain correct functioning
- simplify service and maintenance

For example, mechanically actuated position switches (travel sensors used for safety purposes must be provided with a positive-opening normally-closed contact).

DIN EN / IEC 60947-5-1

This standard applies to control devices and contact blocks intended for controlling, signaling, interlocking, and so on, of switching devices and switchgear, especially position switches, e.g., auxiliary switches actuated by a machine part or a mechanism.

Requirements for the design and behavior of the auxiliary switches are described.

DIN EN / IEC 60079-0:

This part of IEC 60079 specifies the general requirements for the design, testing, and marking of electrical equipment and Ex components that are intended for use in hazardous areas.

DIN EN / IEC 60079-31:

This part of IEC 60079 is applicable to electrical equipment protected by enclosure and surface temperature limitation for use in explosive dust atmospheres. It specifies requirements for design, construction, and testing of electrical equipment.

A.1.2 General information regarding dimensions and characteristic values for position switches

These standards describe the mountings and operating points of position switches.

DIN EN 50041 - Control switches; position switches 42.5 x 80

This standard applies to certain position switches with automatically resetting actuator elements for industrial application, whose standard dimensions and required characteristic values for use are specified in the following.

The electrical values must conform to IEC Publication 337 "Control switches".

This standard includes the following 6 types:

- With twist lever (type A)
- With rounded plunger (type B)
- With roller plunger (type C)
- With rod lever (type D)
- Lateral actuator with rounded plunger (type F)
- Lateral actuator with rounded plunger (type G)

The devices are designed with snap-action or slow-action function.

DIN EN 50047 - Control switches; position switches 30 x 55

This standard applies to certain position switches with automatically resetting actuator elements for industrial application, whose standard dimensions and required characteristic values for use are specified in the following.

The electrical values must conform to IEC Publication 337 "Control switches".

This standard includes the following 4 types:

- With twist lever (type A)
- With rounded plunger (type B)
- With roller plunger (type C)
- With roller lever (type E)

The devices are designed with snap-action or slow-action function.

A.1.3 Certifications and approvals

Approval markings



Communautés Européennes

(The CE approval mark is required in order to market your products within Europe. The CE mark indicates to European authorities that your claims of product compliance meet the applicable standards.)



Underwriters Laboratories Inc.

(Product safety certification organization)

(Approval mark for Canada and USA)



Underwriters Laboratories Inc.

(Product safety certification organization)



UL Recognized Component Mark

(Approval mark for recognized components)



Canadian Standards Association

(Zertifizierung für den kanadischen Markt)



Atmosphère explosible

(Explosion protection)



China Compulsory Certification

(Certification system in China)

A.2 Description of the degrees of protection

Degree of protection

The protection of position switches against ingress of solid foreign objects and liquids must be appropriate, taking into consideration the external influences under which the switch is operated (e.g., dust, coolant, and metal chips).

Examples of minimum degrees of protection

General industrial applications	IP32, IP43, and IP54
Building site areas	IP54
Enclosure that is cleaned with low-pressure water jet	IP55
Enclosure that guarantees protection against fine dust.	IP65

IPX5, IPX6, and IPX7 do not mean that an interlocking device may be sprayed, e.g., with a hose or high-pressure cleaning unit. Additional protective measures must be taken in this case.

A marking in which the second digit is "7" or "8" (e.g., IP67) does not necessarily mean that the requirements for degrees of protection in which the second digit is "5" or "6" (e.g., IP65) are met.

Excerpt from DIN EN 60529 "IP degrees of protection; protection against contact, foreign objects, and water for electrical equipment"

First code number	Degrees of protection (protection against contact and solid foreign objects)
5	Ingress of dust is not totally prevented, but dust must not be allowed to enter in such quantities that satisfactory operation of the device or safety is impaired.
6	No ingress of dust
Second code number	Degrees of protection (water protection)
4	Water splashing onto the enclosure from any direction must not have a harmful effect.
5	A jet of water directed at the enclosure from any direction must not have a harmful effect.
6	A strong jet of water directed at the enclosure from any direction must not have a harmful effect.
7	Water must not enter in an amount that causes harmful effects if the enclosure is submerged in water temporarily under standardized pressure and time conditions.

Components of the IP code and their meaning

Component:	Digits or letters	Meaning for protection of equipment :	Meaning for protection of persons :
Code letters	IP	—	—
First code number		Ingress of solid foreign bodies	Access to dangerous parts with
	0	(Not protected)	(Not protected)
	1	≥ 50 mm diameter	Back of hand
	2	≥ 12.5 mm diameter	Finger
	3	≥ 2.5 mm diameter	Tool
	4	≥ 1.0 mm diameter	Wire
	5	Dust protected	Wire
	6	Dust-tight	Wire
		Ingress of water with harmful effects	
Second code number	0	(Not protected)	—
	1	Vertically-falling drops of water	
	2	Drops of water (15° from vertical)	
	3	Spray water	
	4	Splash water	
	5	Water jet	
	6	Strong water jet	
	7	Temporary immersion	
	8	Permanent immersion	

Have you noticed any errors while reading this manual? If so, please use this form to tell us about them. We welcome comments and suggestions for improvement.

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Table A- 1 Errors, comments, and suggestions for improvements

[illegible]

List of abbreviations

Overview

Abbreviation	Meaning
AS-i	AS-Interface The AS-Interface (or actuator/sensor interface; abbreviated as AS-i) is a connection system for the lowest process level in automation systems. The AS-International Association promotes the AS-Interface as a multi-vendor industry standard. It is open to users and manufacturers of AS-Interface as well as research organizations. National groups are established in various countries.
AC	Alternating current
AC-15	Utilization category for contactor relays according to IEC 60947-5-1 AC-15 Control of electromagnetic loads (> 72 VA).
ASIsafe	Concept for integration of safety-related components in an AS-Interface network
ATEX	Atmosphère explosible (French) = Explosion protection Synonym for the two European Directives for explosion protection: • ATEX Directive 94/9/EC (applies to equipment manufacturers) • ATEX Directive 1999/92/EC (applies to workplace owners)
AWG	American Wire Gauge = coding for wire diameters in North America
BG	Employer's Liability Insurance Associations
BGIA	Safety and health in the workplace
BIA	BG-Institute for Occupational Safety and Health
CAD	Computer-aided design
C-Charakteristik	Circuit breakers with C characteristic are used for cables to loads with high inrush current.
CE	CE marking Confirmation of conformity of the product with the applicable EU directives and compliance with the essential requirements contained in these directives.
CCC	China Compulsory Certification. The CCC certificate is the compulsory Chinese certificate for various product groups, especially electronic products and products in the automobile industry.
CSA	Canadian Standards Association Provider of product testing and certification services in North America.
C-UL-US	C-UL-US Listing approval mark This classification mark is used for products that are sold in Canadian and U.S. markets. It indicates that Canadian and U.S. requirements for classified products have been fulfilled.
DC	Direct current

Abbreviation	Meaning
DC-13	Utilization category for contactor relays according to IEC 60947-5-1 DC-13 Control of DC electromagnets
DIAZED	Diametrically graded two-part Edison fuse DIAZED is a trademark of Siemens AG. The neutral standard designation is D fuse.
DIN	The "Deutsche Institut für Normung" is the German institution that is responsible for standards development and that represents German interests in European and global standards organizations.
EKS	Increased anti-corrosion protection
EN	Europäische Norm (European standard)
GOST	Certification for Russia
GS-ET-15	Basics for testing of positive-opening position switches for safety functions.
GS-ET-19	Basics for testing of interlocks with electromagnetic tumblers for safety functions
IEC	International Electrotechnical Commission
IP	Ingress protection
ISO	International Organization for Standardization
LED	Light emitting diode
M12	Metric ISO thread
NC	Safety contacts
NPT	National Pipe Thread - U.S. thread standard for self-sealing pipe couplings
NC	NC contact
PDF	Platform-independent file format for documents (Portable Document Format)
PE	Protective Earth
RoHS	Restriction of the use of certain hazardous substances
UL	Underwriters Laboratories Inc. U.S. organization for certifying electrotechnical products.
NO	Normally open contact
PLC	Programmable logic controller
TÜV	Technischer Überwachungs-Verein This symbol designates registered non-governmental organizations that conduct technical safety checks, in particular, those stipulated by law or regulation.
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e. V. (Association of Electrical Engineering, Electronics and Information Technology (Germany))

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