

SIRIUS 3SE5 Interlock Switches

Technical data

Benefits

The 3SE5 position switches with separate actuator differ from the previous series through the following new characteristics:

- All enclosure sizes with increased corrosion protection
- All enclosure sizes are optionally available with a LED signaling indicator.
- The three-pole contact block 1 NO + 2 NC is available for all enclosure sizes.
- The plastic enclosure has simple and fast wiring equipment which makes it possible to save from approx. 20 to 25 % of the time when connecting.
- The ASIsafe electric component is integrated for the versions with the AS-Interface connection (see online); an adapter is not required.

Application

Position switches with separate actuator are used where the position of doors, covers or protective grills must be monitored for safety reasons.

The position switch can only be operated with the matching coded actuator. Simple overruling by hand or auxiliary devices is impossible.

Devices are available with enclosure versions to suit the particular ambient conditions. Different control tasks can be performed with the best contact blocks suited for the particular purpose. Dimensions, fixing points of the enclosure are in

accordance with EN 50041 or EN 50047 standards. The devices are suitable for use in any climate.

Standards

IEC 60947-5-1 or EN 60947-5-1.

The protective measure of "total insulation" by the molded-plastic enclosure is guaranteed by the use of molded-plastic screw-lands.

Safety position switches

For controls according to IEC 60204-1 or EN 60204-1 the devices can be used as a safety position switch. To secure position switches against changes in their position, keyed techniques must be employed on installation.

Safety circuits

IEC 60947-5-1 and EN 60947-5-1 require positive opening of the NC contacts, i.e. for the purposes of personal safety, the assured opening of NC contacts is expressly stipulated for the electrical equipment of machines in all safety circuits and marked according to the IEC standard 60947-5-1 with the symbol ☞.

Category 3 according to ISO 13849-1 (EN 954-1) can be attained with a position switch with a separate actuator if the corresponding failsafe evaluation units are selected and correctly installed, e.g. the 3TK28 safety relays or matching units from the ASIsafe, SIMATIC or SINUMERIK product ranges.

Category 4 can be achieved when using an additional position switch.

Technical specifications

Type		3SE5 1...-V.., 3SE5 2...-V..	3SE2 257-XX..	3SE2 243-XX..			
General data							
Standards		IEC 60947-5-1, EN 60947-5-1					
Rated insulation voltage U_i	V	400	500				
Pollution degree acc. to IEC 60664-1		Class 3	Class 3				
Rated impulse withstand voltage U_{imp}	kV	6					
Rated operational voltage U_e	V	400 AC; over 300 V AC only equal potential	500 AC; over 380 V AC only equal potential				
Conventional thermal current I_{th}	A	6	10				
Rated operational current I_e		2-pole	3-pole	1-pole	3-pole		
• With alternating current 50/60 Hz		$I_e/AC-15$	$I_e/AC-15$	$I_e/AC-12$	$I_e/AC-15$	$I_e/AC-12$	$I_e/AC-15$
- At 24 V	A	6	6	10	10	10	10
- At 120 V	A	6	3	10	10	10	10
- At 240 V	A	3	1.5	10	6	10	4
- At 400 V	A	—	—	10	4	10	4
- At 500 V	A	—	—	10	3	10	3
• For direct current		$I_e/DC-13$	$I_e/DC-13$	$I_e/DC-12$	$I_e/DC-13$	$I_e/DC-12$	$I_e/DC-13$
- At 24 V	A	3	3	10	10	10	10
- At 125 V	A	0.55	0.55	—	—	—	—
- At 250 V	A	0.27	0.27	—	—	—	—
- At 110 V	A	—	—	4	1	4	1
- At 220 V	A	—	—	1	0.4	1	0.4
- At 440 V	A	—	—	0.5	0.2	0.5	0.2
Short-circuit protection¹⁾							
• With DIAZED fuse links, gG operational class	A	6	6				
• With fuse links, quick		—	10				
• With miniature circuit breaker, Char. C	A	1	2	—			
Mechanical endurance		1 × 10 ⁶ operating cycles					
Electrical endurance							
• With 3RH.1, 3RT contactors in size S00, S0		10 × 10 ⁶ operating cycles		> 1 × 10 ⁶ operating cycles			
• For utilization category AC-15 when switching off $I_e/AC-15$ at 240 V		0.1 × 10 ⁶ operating cycles		0.5 × 10 ⁶ operating cycles			
Switching frequency With 3RH.1, 3RT contactors in size S00, S0		6000 operating cycles/h					
Minimum pull-out force for positive opening	N	20	10		30		

SIRIUS 3SE5 Interlock Switches

3SE5 with separate actuator – Metal and plastic enclosures

Configuration

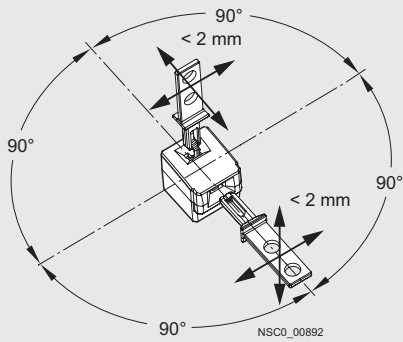
Operation and operating travel of actuators

<p>Operation by a separate actuator</p> <p>⊕ Positive opening acc. to EN 60947-5-1</p> <p>v_{max} Max. actuating speed</p> <p>→ Direction of operation</p>	<p>Contact blocks</p> <p>Terminal designation acc. to EN 50013</p>	<p>Nominal travel</p> <p>■ Contact closed</p> <p>□ Contact open</p> <p>Actuator in actuator head: NC is closed</p>
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Separate actuators

Standard actuators

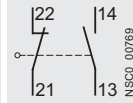
Axial and lateral actuation ($4 \times 90^\circ$)



Minimum force required in operating direction 30 N (on retraction)

Slow-action contacts

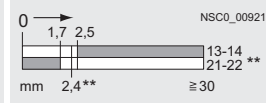
1 NO + 1 NC



Ident. No. 11

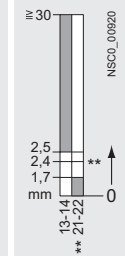
Lateral actuation

3SE5 ...-RV..

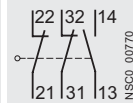


Axial actuation

3SE5 ...-RV..

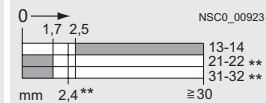


1 NO + 2 NC

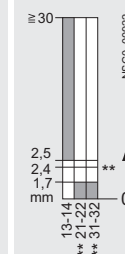


Ident. No. 12

3SE5 ...-QV..

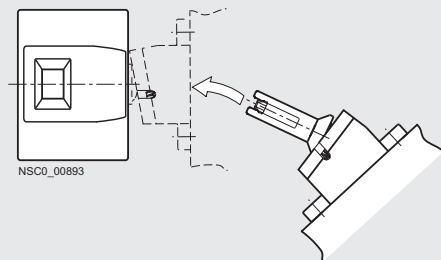


3SE5 ...-QV..



Radius actuators (all directions of approach)

Example: direction of approach from the left



For connector assignment, see page 13/61.

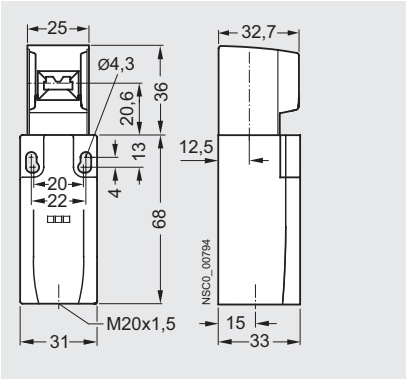
SIRIUS 3SE5 Interlock Switches

3SE5 with separate actuator – Metal and plastic enclosures

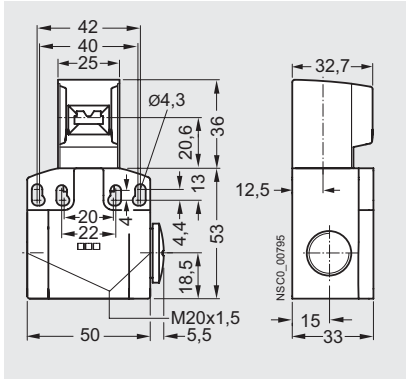
Dimensional drawings

Complete units

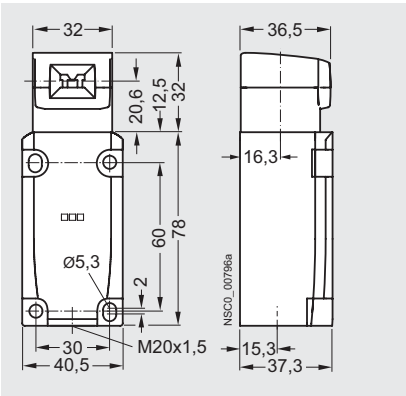
Enclosure width 31 mm
3SE5 23.-.QV40, 3SE5 23.-.RV40



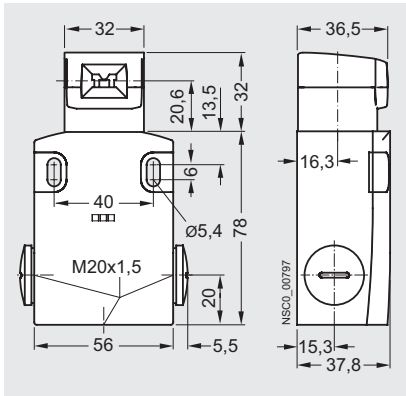
Enclosure width 50 mm
3SE5 24.-.QV40, 3SE5 24.-.RV40



Enclosure width 40 mm
3SE5 11.-.QV10, 3SE5 11.-.RV10

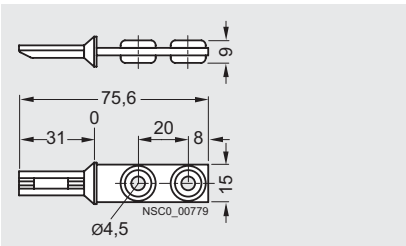


Enclosure width 56 mm
3SE5 12.-.QV10, 3SE5 12.-.RV10

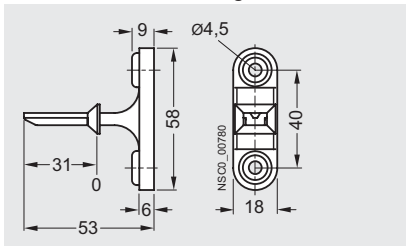


Actuators

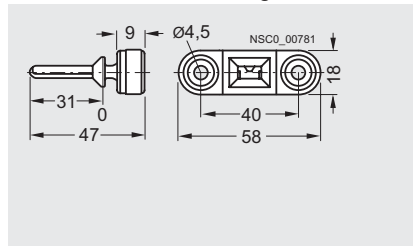
3SE5 000-0AV01
standard actuator



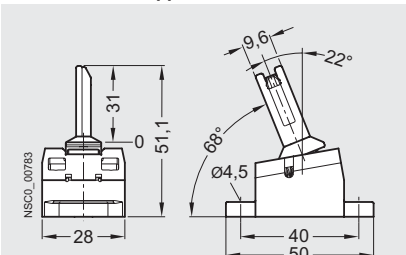
3SE5 000-0AV02
actuator with vertical fixing



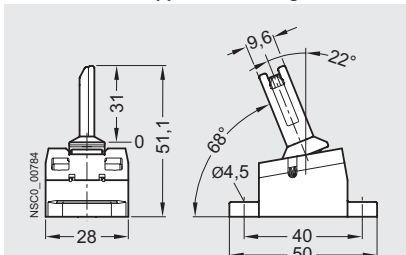
3SE5 000-0AV03
actuator with horizontal fixing



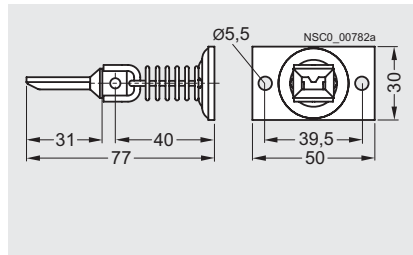
3SE5 000-0AV04
radius actuator, approach from left



3SE5 000-0AV06
radius actuator approach from right



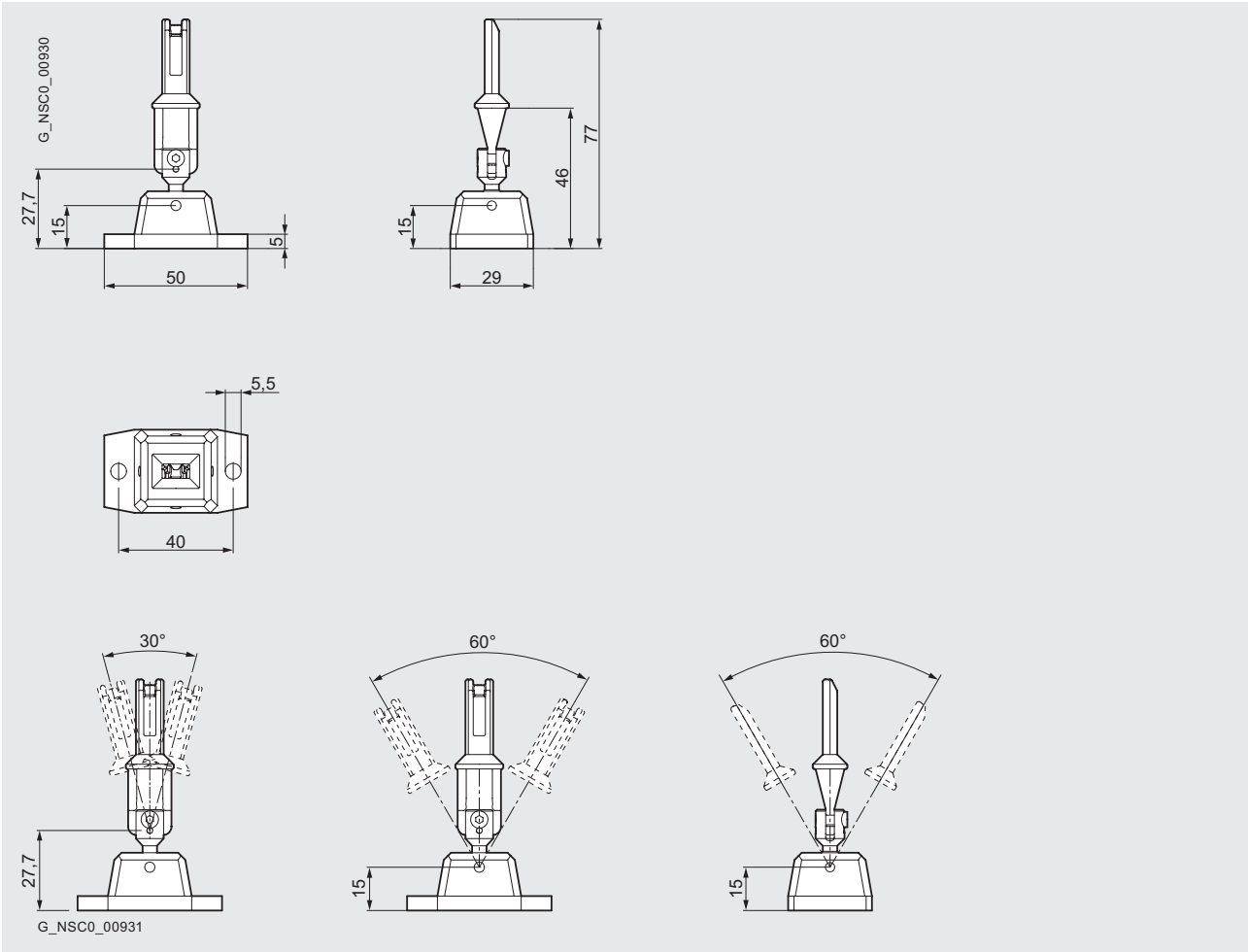
3SE5 000-0AV05
universal radius actuator



SIRIUS 3SE5 Interlock Switches

3SE5 with separate actuator – Metal and plastic enclosures

3SE5 000-0AV07
universal radius actuator, heavy duty

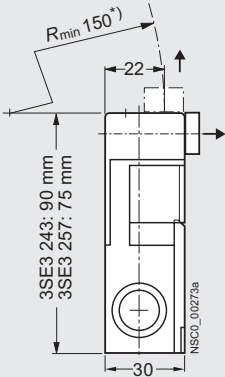

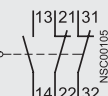
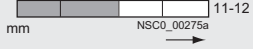
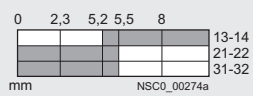


SIRIUS 3SE5 Interlock Switches

3SE2 with separate actuator – Plastic enclosures

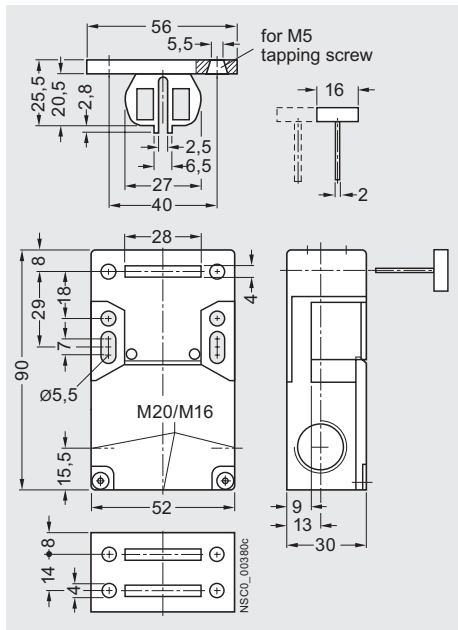
Configuration

Operation and operating travel of actuators

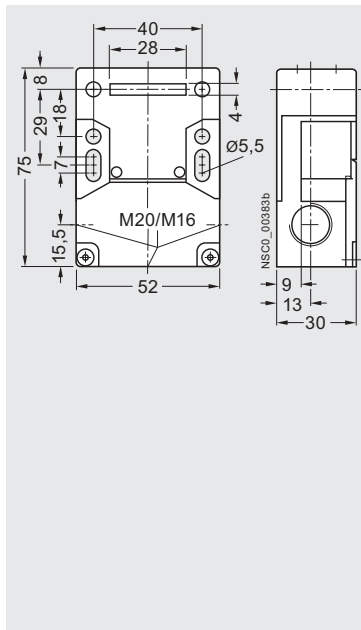
<p>Operation by a separate actuator</p> <p>v_{max} Max. actuating speed \rightarrow Direction of operation</p> <p>Radius actuation: for all directions of approach</p>	<p>Contact blocks</p> <p>Terminal designation acc. to EN 50013</p>	<p>Nominal travel</p> <p>■ Contact closed □ Contact open</p> <p>Actuator in actuator head: NC is closed</p>	<p>Minimum force required in operating direction on retraction</p>
<p>Separate actuators</p>			
<p>Standard and radius actuators</p> <p>Axial and lateral actuation</p>  <p>*) Radius actuator: $R_{min} > 38$ mm.</p>	<p>Slow-action contacts</p> <p>1 NC</p>  <p>Ident. No. 01</p> <p>1 NO + 2 NC</p>  <p>Ident. No. 12</p>	<p>Lateral actuation</p> <p>3SE2 257–XX..</p>  <p>30 N or 5 N</p> <p>3SE2 243–XX..</p>  <p>30 N or 5 N</p>	

Dimensional drawings

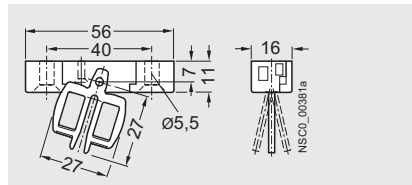
3SE2 243, lateral and front-end actuation, with 3SX3 218 standard actuator



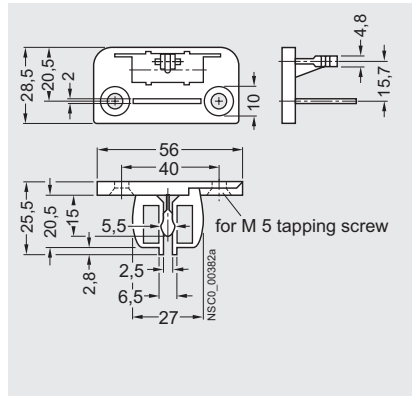
3SE2 257, lateral and front-end actuation



3SX3 228 universal radius actuator



3SX3 217 actuator with ball locating



SIRIUS 3SE5 Interlock Switches

3SE5 / 3SE2 with solenoid locking – General data

Overview

The position switches with solenoid interlocking are exceptional, technically safe devices which restrict and prevent an unforeseen or intentional opening of protective doors, protective grilles or other covers as long as a dangerous situation is present (i.e. follow-on motion of the shutdown machine).



The safety position switches with solenoid interlocking are comprised of a switch part with electromechanical interlock and a mechanical actuator which has to be ordered separately.

They are rugged protective devices that enable the greatest possible safety for man and machine.

The position switches with solenoid interlocking are offered in plastic or metal enclosures.

Dimensions (W × H × D):

- 3SE5 3: 54 mm × 185 mm × 43.5 mm,
- 3SE2 8: 90 mm × 100 mm (+ head 41.3 mm) × 45 mm.

Operation

The actuator head is included in the scope of supply. For actuation from four directions it can be adjusted through 4 × 90°. The 3SE5 3 switches can also be approached from above.

The actuators are not included in the scope of supply of the position switch and must be ordered separately from a choice of six versions to suit the application (see page 13/97).

Actuation data:

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

The actuator is encoded. Simple overruling by hand or auxiliary devices is impossible.

Radius actuators

The position switches with radius actuators are particularly suitable for rotatable protective devices. The movable actuation key allows even small radii to be approached. Damage to the switch and the actuator due to inaccurate approach is prevented.

Locking devices

A high-grade steel locking device for attaching up to eight padlocks is available for even more safety (see page 13/97).

Dust protection

A rubber cap to protect the actuator head from contamination is available for operation in dusty environments (see page 13/97).

Solenoid interlocking

There are two versions for locking the actuator:

- Spring-actuated lock (closed-circuit principle) with various release mechanisms
- Magnetic field lock (open-circuit principle)

The spring-actuated switch is equipped with an auxiliary release for emergency situations or setup mode. Available as options:

- Escape release or
- Emergency release

Contact blocks

The position switches with solenoid interlocking have one contact block each for:

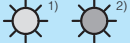


- Monitoring the actuator or the position of the protective door
- Monitoring the position of the solenoid

The mechanical design of the switch corresponds to the requirements of the failsafe principle according to EN 1088.

Optical signaling equipment

The position switches with solenoid interlocking are available with an optional optical signaling device.

The signaling device indicates the switch position of the lock and the protective device optically by means of 2 LEDs on the front.

Protective device	Interlock	Display	Meaning
Closed	Released		Actuator free to be pulled
Closed	Closed		Actuator locked
Open	Open		Actuator pulled

Note:

The voltage of the LEDs at the monitored contacts must be the same as the operational voltage of the solenoid (same potential).

¹⁾ Yellow LED.

²⁾ Green LED.

SIRIUS 3SE5 Interlock Switches

3SE5 / 3SE2 with solenoid locking – General data

Benefits

The new generation of 3SE5 3 position switches offers:

- More safety through higher locking forces:
 - 1300 N with plastic enclosure
 - 2600 N with metal enclosure
- Various release mechanisms: lock release, escape release and emergency release
- Two contact blocks each with three contacts as standard equipment, hence fewer versions needed
- Same dimensions for all enclosure variants: Plastic, metal or with integrated ASIsafe
- An extensive range of actuators
- An optional LED status display 24 V DC, 115 V AC or 230 V AC for all switch variants

Application

The position switches with solenoid interlocking are exceptional, technically safe devices which restrict and prevent an unforeseen or intentional opening of protective doors, protective grilles or other covers as long as a dangerous situation is present (i.e. follow-on motion of the shutdown machine).

The safety position switches with solenoid interlocking have the following functions:

- Enabling the machine or process with closed and locked protective device
- Locking the machine or process with opened protective device
- Position monitoring of the protective device and solenoid

Standards

The switches comply with the standards IEC 60947-1 (Low-Voltage Controlgear, General) and IEC 60947-5-1 (Electromechanical Control Devices).

The mechanical design of the switch corresponds to the requirements of the failsafe principle according to EN 1088.

Approvals

The switches are approved for use with locking devices according to EN 1088 and EN 292, Parts 1 and 2.

3SE5 3 position switches with solenoid interlocking bear the VDE test mark for tested according to GS-ET 19 (Test Principles of the German Trade Association for Locking Devices with Electromagnetic Interlocks).

The 3SE2 8 metal-enclosed position switches with solenoid interlocking have been awarded a test certificate from the BIA (Berufsgenossenschaftliches Institut für Arbeitssicherheit).

Category 3 according to ISO 13849-1 (EN 954-1) can be attained with a position switch with solenoid interlocking if the corresponding failsafe evaluation units are selected and correctly installed, e. g. the 3TK28 safety relays or matching units from the ASIsafe, SIMATIC or SINUMERIK product ranges.

Category 4 can be achieved when using an additional position switch.

They are approved according to UL 508, UL 50 and UL 746-C.

Solenoid interlocking

The separate actuator operates in a similar way to the coding of a key and protects against manipulation. It transmits the locking force to the protective device and helps to monitor its position.

There are two versions of locking:

Spring-actuated lock (closed-circuit principle)

- In the standard version, the position switch locks by means of spring force and releases by means of electromagnetic force. In the case of voltage failure, it reliably prevents the protective device from opening when machine parts are still moving.
- The switch is equipped with an auxiliary release for emergency situations or setup mode.
- An auxiliary release which can be secured with a lock to prevent misuse is available as a version.

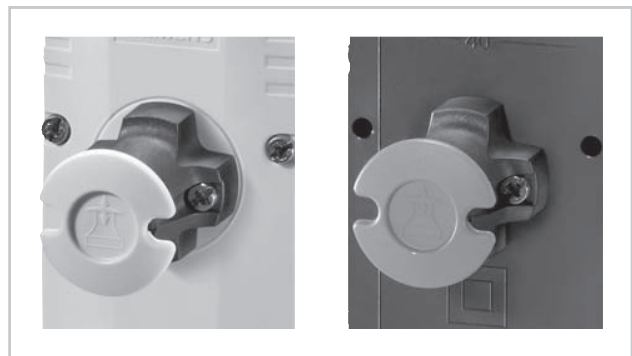


Auxiliary release

Auxiliary release with lock

The new 3SE5 3 position switches are also available with an escape release or an emergency release.

- Personnel working inside the hazard zone can use the escape release feature to manually release the interlock without tools from the escape side (hazardous area side) so that they can exit the hazard area. An intentional act (in this case pulling the gray actuator) is required to release the locking mechanism and restore the normal operating state.
- The emergency release enables someone in an emergency situation to manually release the interlock without tools from the access side (outside the hazardous area). Releasing the lock and restoring the normal operating state must require effort which is comparable to repair activity, in this case disassembly of the red actuator and resetting the mechanical lock.



Escape release from the front

Emergency release from the back

Magnetic field lock (open-circuit principle)

- The second version offers locking by means of electromagnetic force and release by means of spring force. This version has an advantage when it is necessary to quickly access the machine after a power failure occurs, or in the case of very short overtravel times.

SIRIUS 3SE5 Interlock Switches

3SE5, metal enclosures with locking force up to 2000 N

Selection and ordering data

6 slow-action contacts · 5 directions of approach · Cable entry 3 × M20 × 1.5 · Degree of protection IP66/IP67
 Locking force 2600 N (2000 N according to GS-ET 19)

Interlock ¹⁾	LEDs	Solenoid Rated opera- tional voltage	DT	Complete units Position monitoring: Actuators: 1 NO + 2 NC Solenoid: 1 NO + 2 NC	<input type="checkbox"/>	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
		V		Order No.	Price \$ per PU				kg

2600 N locking force · Enclosure width 54 mm

Spring-actuated locks

- With auxiliary release

--	24 DC	⊕ ▶	3SE5 312-0SD11	1	1 unit	102	1.030
--	115 AC	⊕ ▶	3SE5 312-0SD12	1	1 unit	102	1.030
--	230 AC	⊕ B	3SE5 312-0SD13	1	1 unit	102	1.030
Yellow/Green	24 DC	⊕ B	3SE5 312-1SD11	1	1 unit	102	1.040
Yellow/Green	115 AC	⊕ ▶	3SE5 312-2SD12	1	1 unit	102	1.040
Yellow/Green	230 AC	⊕ B	3SE5 312-3SD13	1	1 unit	102	1.040

3SE5 312-0SD1.

- With auxiliary release
With lock

--	24 DC	⊕ B	3SE5 312-0SE11	1	1 unit	102	1.180
--	115 AC	⊕ B	3SE5 312-0SE12	1	1 unit	102	1.180
--	230 AC	⊕ B	3SE5 312-0SE13	1	1 unit	102	1.180
48 AC/DC		⊕ C	3SE5 312-0SE14	1	1 unit	102	1.180
Yellow/Green	24 DC	⊕ B	3SE5 312-1SE11	1	1 unit	102	1.180
Yellow/Green	115 AC	⊕ B	3SE5 312-2SE12	1	1 unit	102	1.180
Yellow/Green	230 AC	⊕ B	3SE5 312-3SE13	1	1 unit	102	1.180

3SE5 312-0SE1.

- With escape release
from the front

--	24 DC	⊕ B	3SE5 312-0SF11	1	1 unit	102	1.180
--	115 AC	⊕ B	3SE5 312-0SF12	1	1 unit	102	1.180
--	230 AC	⊕ B	3SE5 312-0SF13	1	1 unit	102	1.180
Yellow/Green	24 DC	⊕ B	3SE5 312-1SF11	1	1 unit	102	1.180
Yellow/Green	115 AC	⊕ B	3SE5 312-2SF12	1	1 unit	102	1.180
Yellow/Green	230 AC	⊕ B	3SE5 312-3SF13	1	1 unit	102	1.180

3SE5 312-0SF1.

- With escape release
from the back
and auxiliary release
from the front

--	24 DC	⊕ B	3SE5 312-0SG11	1	1 unit	102	1.175
--	115 AC	⊕ B	3SE5 312-0SG12	1	1 unit	102	1.175
--	230 AC	⊕ B	3SE5 312-0SG13	1	1 unit	102	1.175
Yellow/Green	24 DC	⊕ ▶	3SE5 312-1SG11	1	1 unit	102	1.180
Yellow/Green	115 AC	⊕ B	3SE5 312-2SG12	1	1 unit	102	1.180
Yellow/Green	230 AC	⊕ B	3SE5 312-3SG13	1	1 unit	102	1.180

3SE5 312-0SG1.

- With escape release
from the back
and auxiliary release
with lock from the front

--	24 DC	⊕ B	3SE5 312-0SH11	1	1 unit	102	1.180
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- With emergency release
from the back
and auxiliary release
from the front

--	24 DC	⊕ B	3SE5 312-0SJ11	1	1 unit	102	1.180
--	115 AC	⊕ B	3SE5 312-0SJ12	1	1 unit	102	1.180
--	230 AC	⊕ B	3SE5 312-0SJ13	1	1 unit	102	1.180
Yellow/Green	24 DC	⊕ B	3SE5 312-1SJ11	1	1 unit	102	1.180
Yellow/Green	115 AC	⊕ B	3SE5 312-2SJ12	1	1 unit	102	1.180
Yellow/Green	230 AC	⊕ B	3SE5 312-3SJ13	1	1 unit	102	1.180

3SE5 312-0SJ1.

Magnetic field locks

--	24 DC	⊕ ▶	3SE5 312-0SB11	1	1 unit	102	1.030
--	115 AC	⊕ B	3SE5 312-0SB12	1	1 unit	102	1.030
--	230 AC	⊕ B	3SE5 312-0SB13	1	1 unit	102	1.030
Yellow/Green	24 DC	⊕ B	3SE5 312-1SB11	1	1 unit	102	1.040
Yellow/Green	115 AC	⊕ B	3SE5 312-2SB12	1	1 unit	102	1.040
Yellow/Green	230 AC	⊕ B	3SE5 312-3SB13	1	1 unit	102	1.040

3SE5 312-0SB1.

⊕ Positive opening according to IEC 60947-5-1, Appendix K.

1) Supplied without actuator. Please order separately (see page 13/97).

For 1/2" NPT adaptors and cable glands, see page 13/48.