

Industrial controls

SIRIUS Cable-operated switches and foot switches

Configuration Manual

<u>Introduction</u>	1
<u>Safety instructions</u>	2
<u>Overview</u>	3
<u>Cable-operated switches</u>	4
<u>Foot switches</u>	5
<u>Appendix</u>	A

Legal information

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

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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.

Trademarks

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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.

Table of contents

1	Introduction	5
1.1	Purpose of this documentation	5
1.2	Target group.....	5
1.3	Required knowledge	5
1.4	Siemens Industry Online Support	6
1.5	Siemens Industry Online Support app.....	8
1.6	Support Request	8
2	Safety instructions	9
2.1	Important notes.....	9
2.2	Before commencing work: Isolating the equipment from the supply system and ensuring that it cannot be reconnected.	9
2.3	Recycling and disposal	10
2.4	Security information	10
3	Overview.....	11
3.1	Cable-operated switches and foot switches	11
4	Cable-operated switches	13
4.1	Application areas for cable-operated switches	13
4.2	Features of the cable-operated switches.....	13
4.3	Overview	14
4.4	Design	16
4.5	Function	16
4.6	Cable-operated switches with EMERGENCY STOP function	16
4.7	Resetting the latching mechanism.....	17
4.8	Cable-operated switches with EMERGENCY STOP function and rotate-to-unlatch mechanism.....	17
4.9	Positive opening ensures safety.....	17
4.10	Mounting	18
4.10.1	Selection criteria	18
4.10.2	Ambient temperature range.....	19
4.10.3	Permissible wire lengths and actuating forces	19
4.10.4	Switch position indicator.....	21
4.10.5	Mounting	22
4.10.6	Installing a cable-operated switch with actuation on both sides	23
4.10.7	Wire breakage and overtensioning	24

4.10.8	3SE7140 cable-operated switches	25
4.11	Application examples for cable-operated switches	26
4.11.1	Wire structure and attachment	26
4.11.2	Mounting example with conveyor belt unbalance device	29
4.11.3	Setup of a safety function	30
4.11.4	Use of a SIRIUS 3SE7 cable-operated switch with 3SK safety relay	31
4.12	Connecting	32
4.12.1	Circuit diagrams for cable-operated switches	32
4.13	Technical data	34
4.13.1	Technical data in Siemens Industry Online Support	34
4.13.2	Overview tables	34
4.13.3	Failure rates	35
4.13.4	Example for illustration	35
4.13.5	Operating travel diagrams for cable-operated switches	37
4.14	Dimensional drawings	39
4.14.1	CAX data	39
4.14.2	Examples of dimensional drawings for cable-operated switches	40
5	Foot switches	43
5.1	Application areas for foot switches	43
5.2	Features of the foot switches	43
5.3	Overview	44
5.4	Circuit diagrams for foot switches	46
5.5	Technical data	49
5.5.1	Technical data in Siemens Industry Online Support	49
5.5.2	Overview tables	49
5.6	Dimensional drawings	50
5.6.1	CAX data	50
5.6.2	Dimensional drawings for foot switches	51
5.6.2.1	Metal enclosures	51
5.6.2.2	Plastic enclosures	53
5.7	Application examples for foot switches	54
5.7.1	Application examples	54
A	Appendix	57
A.1	Certifications and approvals	57
A.2	List of abbreviations	58
	Index	61

Introduction

1.1 Purpose of this documentation

This manual describes the possible uses of SIRIUS command and signaling devices.

In order to provide users with the information they need to operate the system safely, this manual provides a general explanation of operating principles, selection and installation of cable-operated switches and foot switches.

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
- Digital circuit logic
- Automation systems
- AS-Interface
- Safety and security systems

1.4 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (<https://support.industry.siemens.com/cs/de/en>)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
Answers to frequently asked questions
- **Manuals/operating instructions**
Read online or download, available as PDF or individually configurable.
- **Certificates**
Clearly sorted according to approving authority, type and country.
- **Characteristics**
For support in planning and configuring your system.
- **Product announcements**
The latest information and news concerning our products.
- **Downloads**
Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**

Technical product data for support in planning and implementing your project

Link: Product support (<https://support.industry.siemens.com/cs/ww/en/ps>)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
Search for request number, product or subject
- **My filters**
With filters, you limit the content of the online support to different focal points.
- **My favorites**
With favorites you bookmark articles and products that you need frequently.
- **My notifications**
Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
Configure your individual documentation from different manuals.
- **CAX data**
Easy access to CAX data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
Register your Siemens products, systems and software.

1.5 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:



Android



iOS

1.6 Support Request

Use the Support Request online form to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)
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Safety instructions

2.1 Important notes

The products described here have been developed to perform safety-related functions as part of an overall system 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.

2.2 Before commencing work: Isolating the equipment from the supply system and ensuring that it cannot be reconnected.

DANGER

Hazardous voltage Will cause death or serious injury.

- Disconnect the system and all devices from the power supply before starting work.
- Secure against switching on again.
- Verify that the equipment is not live.
- Ground and short-circuit.
- Erect barriers around or cover adjacent live parts.

DANGER

Hazardous voltage Will cause death or serious injury.

Qualified Personnel.

The equipment / system may only be commissioned and operated by qualified personnel. For the purpose of the safety information in these operating instructions, a "qualified person" is someone who is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures.

2.3 Recycling and disposal

For environmentally friendly recycling and disposal of your old device, please contact a company certified for the disposal of old electrical and/or electronic devices and dispose of the device in accordance with the regulations in your country.

2.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. These systems, machines and components should only be connected to the enterprise network or the Internet if and only to the extent necessary and with appropriate security measures (firewalls and/or network segmentation) in place.

You can find more information on protective measures in the area of industrial security by visiting:

<https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends performing product updates as soon as they are available and using only the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

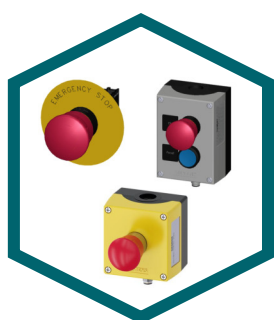
To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

<https://www.siemens.com/industrialsecurity>.

Overview

3.1 Cable-operated switches and foot switches

Portfolio overview –SIRIUS Safety commanding and signaling devices for hand or foot operation



3SU EMERGENCY STOP mushroom pushbutton

- Used for switching off systems in case of danger



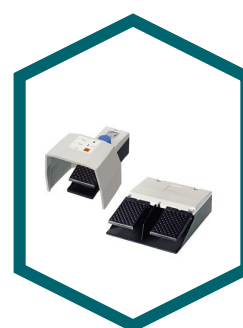
Two-hand operation console

- Including EMERGENCY STOP and 2 mushroom pushbuttons
- Additional command devices can be installed



3SE7 cable-operated switches

- System of switch and rope
- With and without locking
- LED position indicator with very high luminosity



3SE29 foot switches

- Foot-operated command devices as 1 or 2 -pedal version
- With and without protective cover
- Contacts as latching or momentary-contact types

	3SE7 cable-operated switches	3SE39 foot switches
Description	System consisting of a switch and wire, with and without latching function, LED position indication with very high luminosity	Foot-operated command devices with 1 or 2 pedals, with and without protective cover, latching and momentary-contact versions of contacts
Design	Metal	Plastic and metal
Installation / Connection	Screw terminals	Screw terminals
Degree of protection	IP65/IP67	IP65
Approval	UL, CSA, CE	UL, CSA, CE
Relevant standards	Acc. to ISO 13849-1; up to Performance Level e (EN 954-1, up to Cat. 4) EMERGENCY STOP acc. to ISO 13850 (EN 418)	Positive opening of NC contacts acc. to IEC/EN 60947-5-1
Safety	EMERGENCY STOP function with latching according to ISO 13850	Safety foot switches with latching function acc. to ISO 13850
Options	Visibility of LED signal indication over a distance of 50 m	Safe locking even when operated beyond the pivot point

3.1 Cable-operated switches and foot switches

Cable-operated switches

4.1 Application areas for cable-operated switches

Cable-operated switches are used to protect conveyors or other very long machines.

Examples are:

- Conveyor belts in the stone and soil industries
- Paper feeders at printing machines
- Conveyor belts in food production processes
- Material feeders at automated production machines
- Door opening switches on factory doors and gates

SIRIUS 3SE7 cable-operated switches are used for monitoring high-risk areas or as EMERGENCY STOP devices on particularly endangered system components.

They are available as a complete EMERGENCY STOP system according to ISO 13850 (EN 418) or with an integral EMERGENCY STOP button.

The switches are equipped with positive latching and positive NC contacts and are thus suitable for operation in  EMERGENCY STOP devices according to EN ISO 13850.

As the effective range of a cable-operated switch is only limited by the length of the trip-wire, large systems can also be protected. Cable-operated switches (requiring pulling at both ends) and conveyor belt unbalance trackers are used primarily for monitoring very long conveyor systems.

4.2 Features of the cable-operated switches

	3SE7 cable-operated switches
Description	System consisting of a switch and wire, with and without latching function, LED position indication with very high luminosity
Design	Metal
Installation / Connection	Screw terminals
Degree of protection	IP65/IP67
Approval	UL, CSA, CE
Relevant standards	Acc. to ISO 13849-1; up to Performance Level e (EN 954-1, up to Cat. 4) EMERGENCY STOP acc. to ISO 13850 (EN 418)
AS-Interface	Can be connected to ASIsafe via fail-safe modules using conventional wiring
Safety	EMERGENCY STOP function with latching according to ISO 13850
Options	Visibility of LED signal indication over a distance of 50 m

4.3 Overview

 3SE7120-1BH00	Metal enclosures, IP65, cover made of molded plastic, for wire lengths up to 5 m			
	• Non-latching, cable-operated function only, 55N spring	⊕	1 NO + 1 NC	3SE7120-2DD01
	• Non-latching, cable-operated function only, 100N spring	⊕	1 NO + 1 NC	3SE7120-2DD01-1AS7
	• With latching and button reset, with alignment window	⊕	2 NC	3SE7120-1BF00
	• With latching and button reset with yellow cover, with alignment window	⊕	1 NO + 2 NC	3SE7120-1BH00
 3SE7150-2DD00	Metal enclosures, IP65, cover made of molded plastic, for wire lengths up to 20 m			
	• Non-latching	⊕	1 NO + 1 NC	3SE7150-2DD00
 3SE7150-1BD00	Metal enclosures, IP65, with alignment window, cover made of molded plastic, for wire lengths up to 20 m			
	• With latching and button reset, with alignment window	⊕	1 NO + 1 NC	3SE7150-1BD00
	• With latching and button reset, with LED, red, 24 V DC	⊕	1 NO + 1 NC	3SE7150-1BD03
	• With latching and button reset, with alignment window	⊕	2 NC	3SE7150-1BF00
	• With latching and button reset, with LED, red, 24 V DC	⊕	2 NC	3SE7150-1BF03
	• With latching and button reset with yellow cover, with alignment window	⊕	1 NO + 2 NC	3SE7150-1BH00
	• With latching and button reset, with LED, red, 24 V DC, with alignment window	⊕	1 NO + 1 NC	3SE7150-1BD04
	• With latching and button reset, with yellow cover, with LED, red, 24 V DC, with alignment window	⊕	1 NO + 2 NC	3SE7150-1BH04
	• Non-latching, with LED, red, 24 V DC, with alignment window	⊕	1 NO + 1 NC	3SE7150-2DD04

 3SE7140-1B.00	Metal enclosures, IP65, cover made of molded plastic, for wire lengths up to 50 m, 130 mm with 1x tension spring			
	• With latching and button reset	⊕	1 NO + 1 NC	3SE7140-1BD00
	• With latching and button reset, cable-operated function only, with LED, red, 115 V AC	⊕	1 NO + 1 NC	3SE7140-1BD00-0AS0
	• With latching and button reset	⊕	2 NC	3SE7140-1BF00
	• With latching and button reset, with LED, red, 24 V DC	⊕	1 NO + 1 NC	3SE7140-1BD04
	• With latching and button reset, with LED, red, 24 V DC, 2x M25 x 1.5	⊕	1 NO + 1 NC	3SE7140-1BD04-1AS6
	• With latching and key-operated release	⊕	1 NO + 1 NC	3SE7140-1CD00
 3SE7141-1EG10	Metal enclosures, IP67, cover made of molded plastic, for wire lengths up to 75 m			
	• With EMERGENCY STOP, latching and rotate-to-unlatch mechanism	⊕	1 NO + 3 NC	3SE7141-1EG10
 3SE7160-1AE00	Metal enclosures, IP65, with actuation on both sides, for wire lengths up to 2 x 100 m, with 2x tension springs			
	• With latching and button reset	⊕	2 NO + 2 NC	3SE7160-1AE00
	• With latching and button reset	⊕	1 NO + 1 NC	3SE7160-1BD00
	• With latching, with LED, red, 115 V AC	⊕	1 NO + 1 NC	3SE7160-1BD00-0AS1
	• In addition with LED, red, 24 V DC	⊕	2 NO + 2 NC	3SE7160-1AE04
Conveyor belt unbalance trackers				
 3SE7310-1AE00	Metal enclosures, IP65			
	• With latching and button reset	⊕	2 NO + 2 NC	3SE7310-1AE00
	• With latching and button reset, with LED lamp, red, 24 V DC	⊕	2 NO + 2 NC	3SE7310-1AE04

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

For further variants, please refer to Catalog IC 10 in the Information and Download Center.

4.4 Design

For long distances of up to 2×100 m, complete devices are available with metal enclosure and actuation on both sides or as conveyor belt unbalance trackers for monitoring conveyor systems.

Alternatively, it is also possible to use LED technology or cable-operated switches with integral EMERGENCY STOP button.

The switches for wire lengths up to 50 m are supplied with 1 NO + 1 NC or 2 NC contacts and those up to 75 m with 1 NO + 3 NC contacts. The switches for wire lengths of 2×100 m and the conveyor belt unbalance tracker are supplied with 2 NO + 2 NC contacts.

The cable-operated switch and the conveyor belt unbalance tracker can be supplied optionally with a factory-fitted LED (red, 24 V DC). This light in chip-on-board technology makes the operating state of the switch visible at a distance of at least 50 m.

4.5 Function

The NC contacts of the cable-break or cable-pull signaling are positive opening.

Cable-operated switches with one-sided operation are made ready for use by pre-tensioning the tension lock.

Both switching contacts for the wire break/wire pull signal are available in the 3SE7120, 3SE7140, 3SE7150, 3SE7160 and 3SE7141 cable-operated switches. The NO contact can be used, for example, for signaling purposes.

On switches with interlocking, with a pretensioned cable, the locking must be deactivated beforehand in order to return the cable-operated switch to its original position.

4.6 Cable-operated switches with EMERGENCY STOP function

The EMERGENCY STOP function of the cable-operated switches can be activated at any point along the wire.

The connection between the NC contacts and the wire is positively driven.

The wire of the cable-operated switch must be pre-tensioned with the correct preload in order to render the switch operational.

When the cable-operated emergency switch is in the operating state, the NC contacts are closed and the NO contacts open.

Note

Make sure that the cable-operated switch is correctly installed or else it will not be possible to deactivate the lock.

4.7 Resetting the latching mechanism

The latching device (incl. EMERGENCY STOP switch) can be reset as follows:

- Pretension the wire (target pretension)
- Pressing the pushbutton or turning the key

With a cable-operated switch, the operator pulls a plastic-sheathed steel wire.

4.8 Cable-operated switches with EMERGENCY STOP function and rotate-to-unlatch mechanism

3SE7141-1EG10, version with yellow cover 3SE7141-1EG10-0CA1

If the arrow in the status display is pointing to the center position (= correct wire tension), the blue lever can be turned from "0" to "1", thus activating the switch.

In the current design, the operator can intervene using the EMERGENCY STOP button. This means that the system can be deactivated centrally. The blue lever jumps back to "0".

The cable-operated switch can be reactivated using the blue lever as long as the correct wire pre-tensioning is maintained. The EMERGENCY STOP button need not be unlatched for this purpose.

4.9 Positive opening ensures safety

The NC contacts are positive opening contacts, i.e. the contacts open and interrupt the circuit as soon as a wire breaks or is pulled. Furthermore, the cable-operated switches can be adjusted to within a millimeter, a process that is made easier by a position indicator on the switch itself.

4.10 Mounting

4.10.1 Selection criteria

Selection criteria for 3SE7 cable-operated switches / conveyor belt unbalance trackers	
Wire lengths	5 m, 20 m, 50 m, 130 m with tension spring, 75 m, 2 x 100 m
Switching contacts	Varying number of NO and NC contacts (depending on article number)
Cover	• Gray • Yellow
Latching	• With • Without
Unlatching	• Push-to-release mechanism • Key-operated release • Rotate-to-unlatch mechanism (depending on article no.)
Visual signal	• None • With LED red, 24 V DC, 115 V AC
Integrated EMERGENCY STOP	Yes / No
Alignment window (position indication of pretensioned wire)	Yes / No
Accessories	Steel wire, wire clamps, wire eyes, eyebolts
Basic equipment	

Note

Wire lengths in excess of 20 m

Tension springs and wire supports must be used for wire lengths in excess of 20 m.

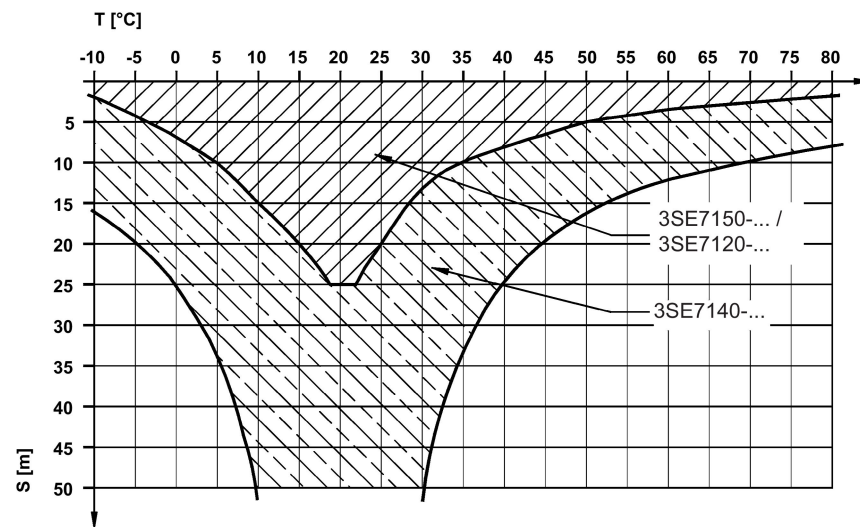
4.10.2 Ambient temperature range

Note

Restriction of the ambient temperature range

The thermal expansion behavior of the wire will restrict the ambient temperature range with increasing wire length.

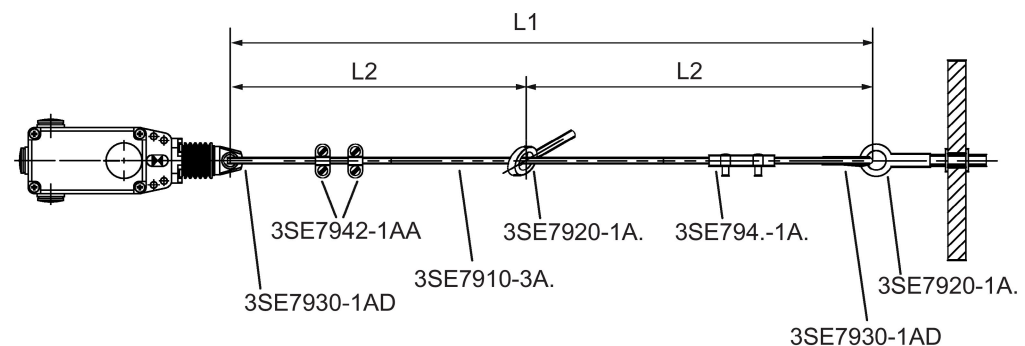
The following diagram shows the ambient temperature range for cable-operated switches of type 3SE7150-.../3SE7120-... and 3SE7140-....



Tension springs are not included in the figure.

Integrity level SIL1 to SIL3 depending on the application.

4.10.3 Permissible wire lengths and actuating forces



To ensure proper operation of cable-operated switches, they must be installed with specific preloads.

4.10 Mounting

No allowance for elongation of the wire by stretching or deformation of the wire eye is included in the values.

You will find permissible wire lengths and preloads in the table below:

	3SE7120	3SE7150	3SE7140	3SE7140-1BD00 3SE7140-1BD04 3SE7140-1CD00 3SE7140-1BF00	3SE7141	3SE7160
				+ 1 x 		+ 2 x 
L1 wire length (max.)	5 m	20 m	50 m	130 m ²⁾	75 m	2 x 100 m ³⁾
L2 wire support (max.)	3 m	3 m	5 m	5 m	5 m	4 m
Actuator travel	11 cm	11 cm	13 cm	13 cm	20 ... 22 cm	32 ... 40 cm
Preload	55 N / 100 N	200 N	295 ... 390 N	295 ... 390 N	100 N	45 ... 60 N
Actuating force ¹⁾	38 ... 60 N (max. 200 N / EN 60947-5-5)					

¹⁾ Since spring forces are subject to tolerances, the specified actuating forces are guide values only.

²⁾ When using one tension spring

³⁾ When using two tension springs

Note

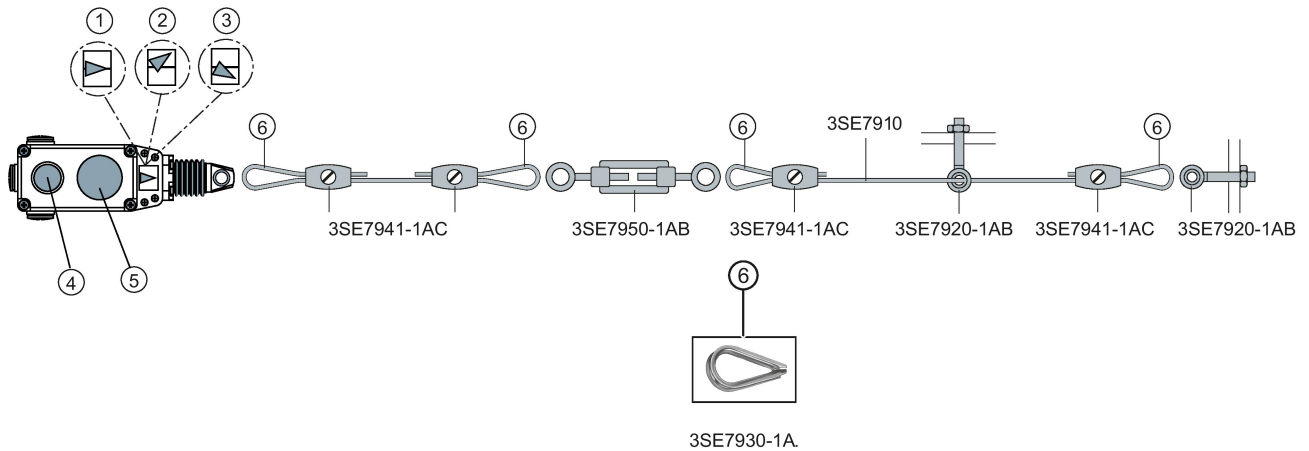
Large temperature fluctuations require corresponding tension springs. The specified values are valid when the switches are installed at an ambient temperature of 20 °C.

For reliable connection using simplex and duplex terminals, the PVC sheath must be removed from the clamping area of the steel wire. With the U-clamp (single) terminal, it does not matter whether it is sheathed or not. When using oval clamps, the sheathing must not be removed. Bowden wire supports must be used at the recommended intervals.

4.10.4 Switch position indicator

Note

Please study the illustration of the switch position indicator in the diagram below before you assemble the cable-operated switch.



①②③ = Position indication window of the pretensioned wire

① Wire is correctly tensioned, cable-operated switch is operational.

② Arrow in the reset position. Wire must be tensioned until the indicator arrow is in position ①.

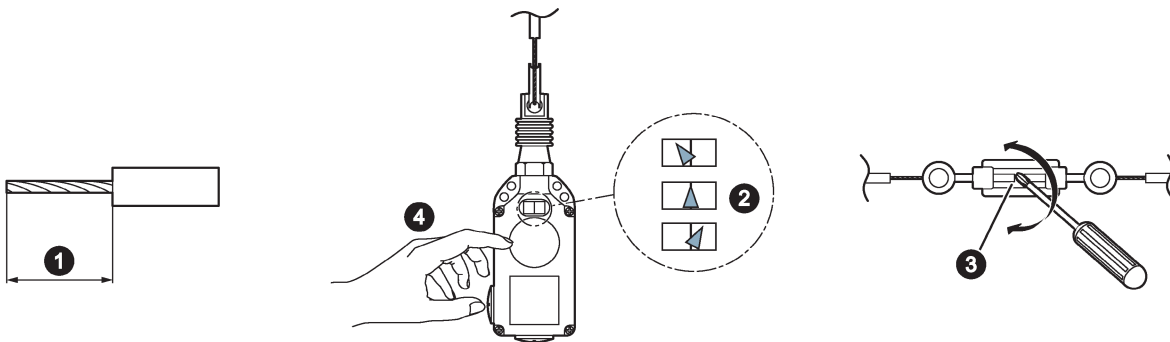
③ Wire is overtensioned, cable-operated switch is not operational. The LED lamp ④ is illuminated red. If the switch does not move automatically to position ②, press the blue reset button ⑤ in order to release the switch.

4.10.5 Mounting

Note**General information about mounting cable-operated switches.**

The switch may only be actuated by pulling the pull-wire, and never by pushing out the mechanical system inside the enclosure or by using tools to pull the tension ring. The user must regularly check the switch for correct operation.

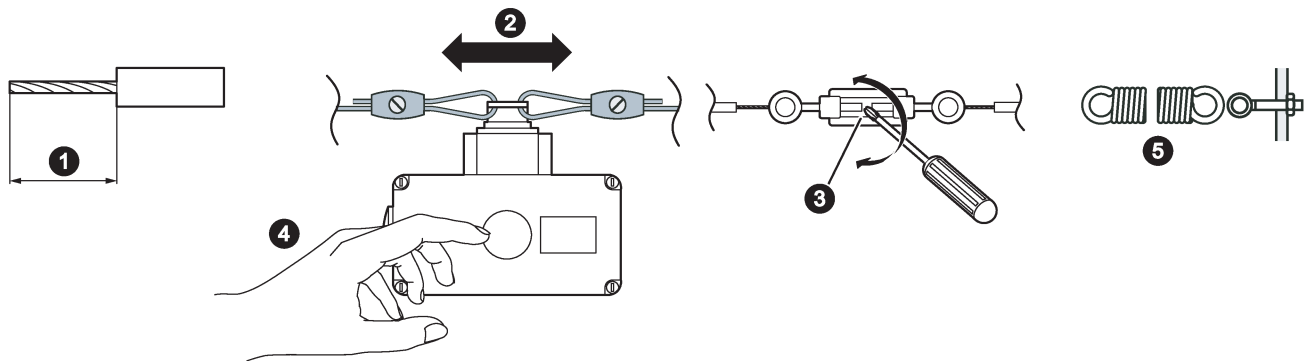
3SE7120-..., 3SE7150-..., 3SE7141-...



1. Remove the plastic sheath from the wire clamping area before you attach the pull-wire. Install the pull-wire as described in the installation instructions.
2. Pretension the wire until the arrow in the position indicator is aligned horizontally (mid-position).
3. After installing the switch, pull the wire forcefully several times as the wire eyes deform when the wire is pulled. Tension the wire using a wire clamp or by means of a turnbuckle.
4. The cable-operated switch must be installed in such a way that it can be safely unlatched by hand.

4.10.6 Installing a cable-operated switch with actuation on both sides

3SE7160-1AE...



1. Remove the plastic sheath from the wire clamping area before you attach the pull-wire. Install the pull-wire as described in the installation instructions.
2. Pretension the wire until the operating lever of the cable-operated switch is aligned horizontally (mid-position).
3. After installing the switch, pull the wire forcefully several times as the wire eyes deform when the wire is pulled. Tension the wire using a wire clamp or by means of a turnbuckle.
4. The cable-operated switch must be installed in such a way that it can be safely unlatched by hand.
5. Adjust the tension springs in such a way that the cable-operated switch is tripped at the opposite end if the wire breaks or becomes detached.

! CAUTION

Limitation of travel of tension springs

Make sure that the tension spring is not under maximum tension. Proper functioning of the cable-operated switch cannot otherwise be guaranteed.

Note

The 3SE7160 cable-operated switches for actuation on both sides must always be mounted centrally so that the wire length is the same on both sides.

4.10.7 Wire breakage and overtensioning

Please note the following with respect to wire breakage and overtensioning:

1. If the wire is pulled too hard and breaks, the signal lamp on cable-operated switches with LED lights up red.
2. The indicator arrow for the operating cam points to the left on all cable-operated switches.
3. If the wire is overtensioned, the indicator arrow points to the right and the switch opens.
4. A reset is triggered and the arrow points to the left.
5. A manual reset can be initiated by actuation of the blue reset button.
6. On cable-operated switches with EMERGENCY STOP function, an emergency stop is initiated when the red button is actuated.

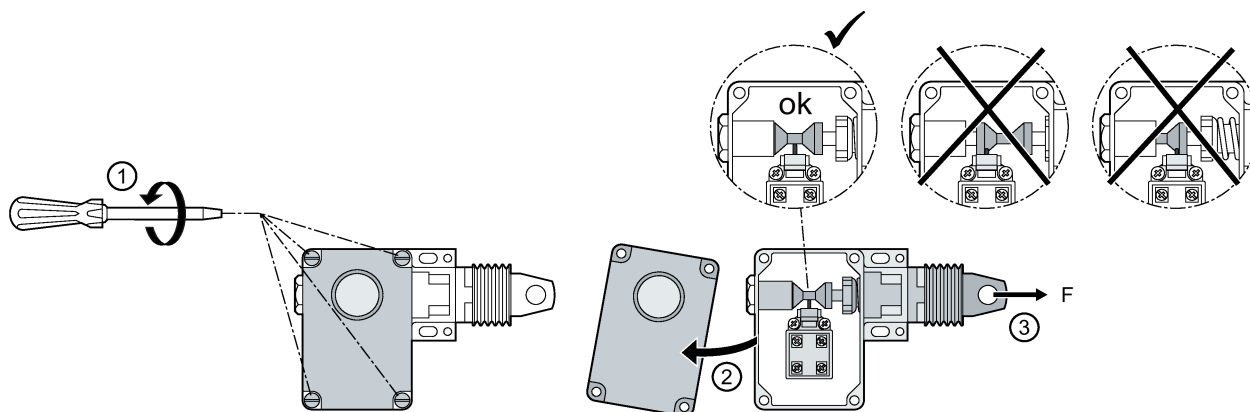
Note

In the case of cable-operated switches with latching, contacts 21-22 and 41-42 are latched in the open state and contacts 13-14 and 33-34 are latched in the closed state if the wire is pulled or broken. The contacts can be unlatched by means of the button. The contacts can be unlatched only in the mid-position, i.e. in the pretensioned position.

4.10.8 3SE7140 cable-operated switches

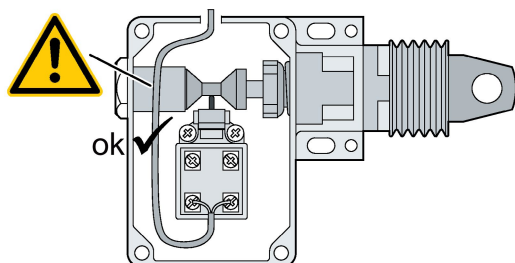
Pretensioning 3SE7140

1. Loosen the four screws to remove the cover of the cable-operated switch.
2. Take off the cover.
3. Tension the cable-operated switch until the plunger is in the correct position.



Connection

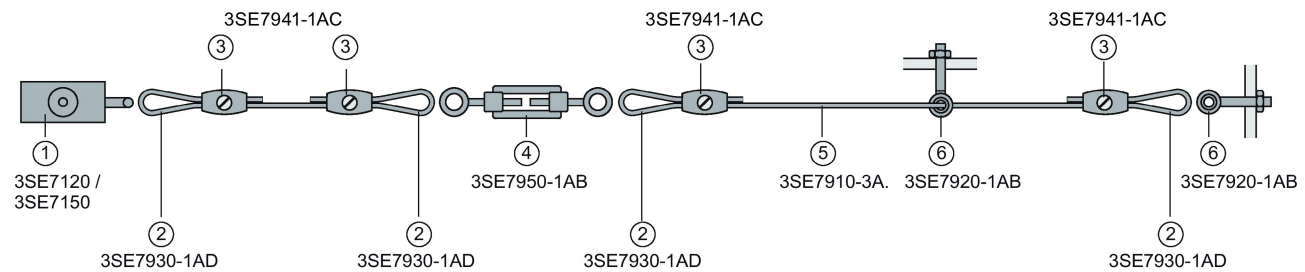
When connecting, make sure that the line is not routed over the plunger.



4.11 Application examples for cable-operated switches

4.11.1 Wire structure and attachment

Short wire lengths up to 20 m



- ① SIRIUS cable-operated switch
- ② Wire eye, diameter 4 mm
- ③ Wire clamp simplex, diameter 4 mm, oval
- ④ Turnbuckle, M6 x 60
- ⑤ Wire, diameter 4 mm
- ⑥ Eyebolt M8

Article No.

3SE7120 / 3SE7150

3SE7930-1AD

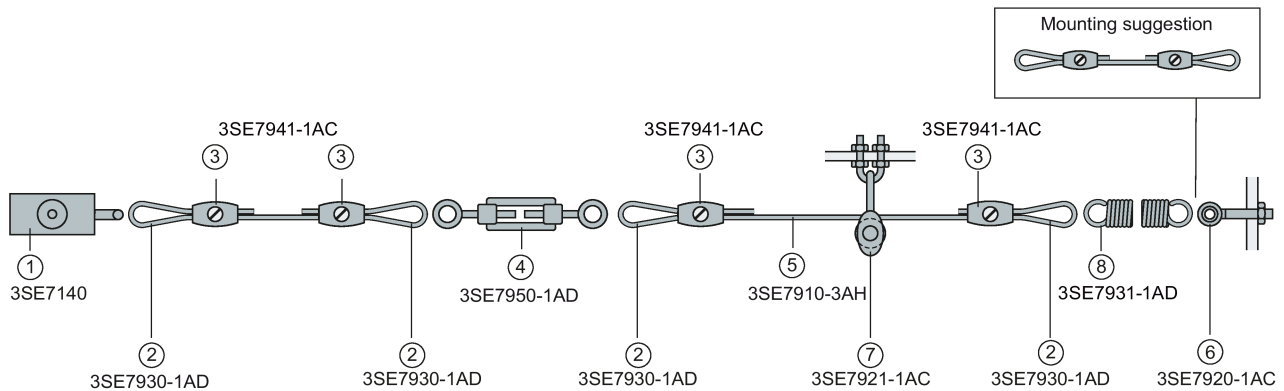
3SE7941-1AC

3SE7950-1AB

3SE7910-3A.

3SE7920-1AB

Long lengths of wire up to 50 m



- ① SIRIUS cable-operated switch
- ② Wire eye, diameter 4 mm
- ③ Wire clamp simplex, diameter 4 mm, oval
- ④ Turnbuckle, M6 x 110
- ⑤ Wire, diameter 4 mm
- ⑥ Eyebolt M10
- ⑦ Wire roller, rotatable
- ⑧ Tension spring

Article No.

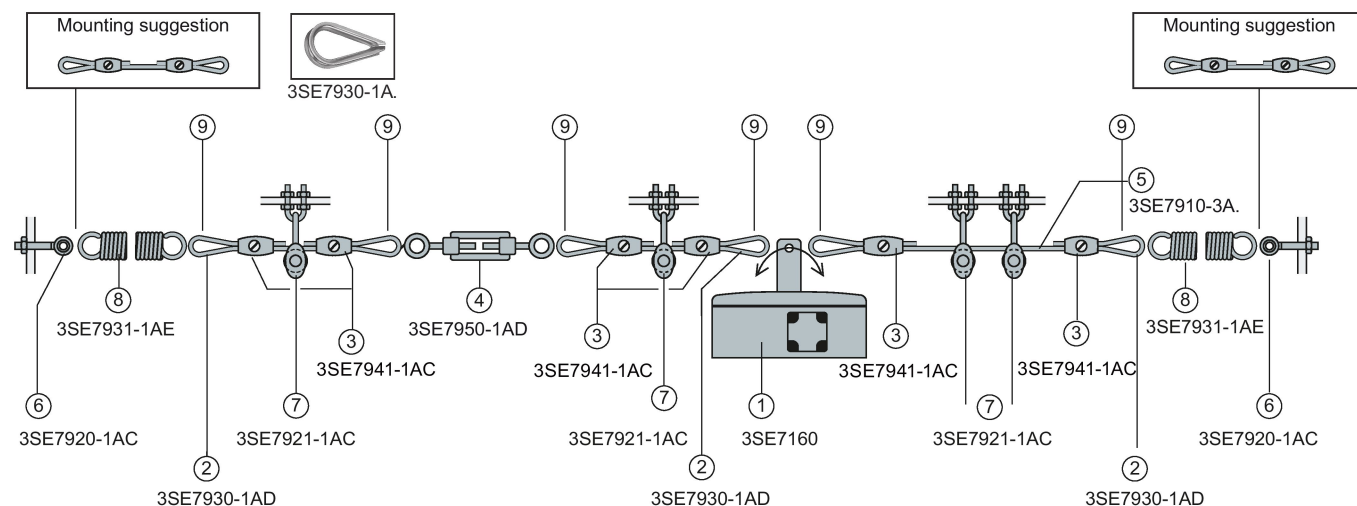
- 3SE7140
- 3SE7930-1AD
- 3SE7941-1AC
- 3SE7950-1AD
- 3SE7910-3AH
- 3SE7920-1AC
- 3SE7921-1AC
- 3SE7931-1AD (up to 2 x 50 m)

Note

Use of a tension spring is absolutely essential for lengths of wire ≥ 20 m.

Actuation on both sides up to 2 x 100 m

Design 3SE7160-1AE...



- ① SIRIUS cable-operated switch
- ② Wire eye, diameter 4 mm
- ③ Wire clamp simplex, diameter 4 mm, oval
- ④ Turnbuckle, M6 x 110
- ⑤ Wire, diameter 4 mm
- ⑥ Eyebolt M103
- ⑦ Wire roller, rotatable
- ⑧ Tension spring
- ⑨ Wire eye

Article No.

- 3SE7160
- 3SE7930-1AD
- 3SE7941-1AC
- 3SE7950-1AD
- 3SE7910-3A.
- 3SE7920-1AC
- 3SE7921-1AC
- 3SE7931-1AE (up to 2 x 100 m)
- 3SE7930-1A.

Note

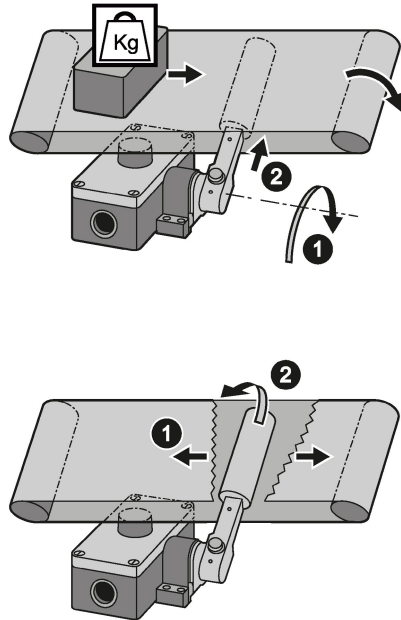
Use of a tension spring is absolutely essential for lengths of wire ≥ 20 m.

Note

The route of a wire may be redirected through a maximum angle of 90 degrees. Wire rollers must be used to redirect wire routes.

4.11.2 Mounting example with conveyor belt unbalance device

Design 3SE7310-1AE...



The roller of the conveyor belt unbalance device 3SE7310-1AE00 / 3SE7310-1AE04 is made of stainless steel NIRO 1.4104.

NOTICE

Risk of material damage. Do not adjust the lever angle.

The angle of the lever of the conveyor belt unbalance trackers 3SE7310-1AE00 / 3SE7310-1AE04 must not be adjusted.

The lever is securely pinned to the shaft for safety reasons. This achieves positive opening according to IEC 60947-5-1, Appendix K.

4.11.3 Setup of a safety function

Setup of a safety function

A safety chain normally comprises the following functions: sensing, evaluating and responding. In detail this means:

- Detect = the detection of a safety requirement with corresponding sensors, e.g. SIRIUS cable-operated switches or position switches
- Evaluate = the detection of a safety requirement and the reliable initiation of a reaction, e.g. shutting down the enabling circuits
- React = shutting down the hazard through suitable motor switching devices such as contactors, fail-safe motor starters, or fail-safe soft starters

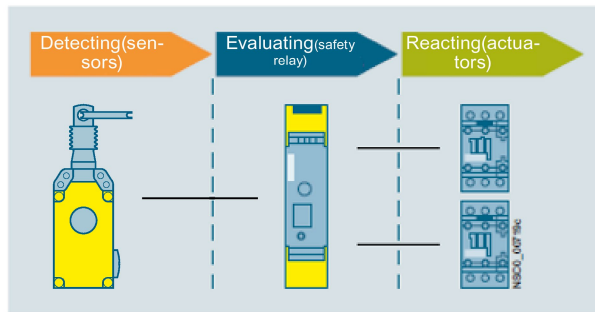
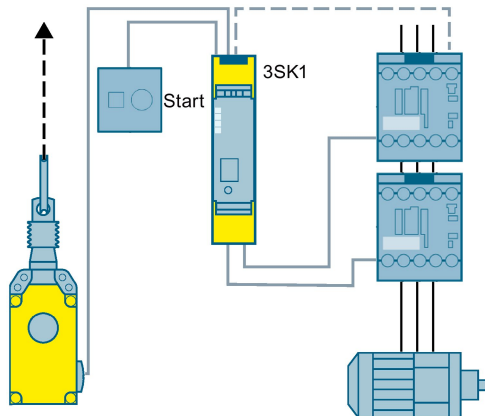


Figure 4-1 Possible setup of a safety function with SIRIUS cable-operated switches

4.11.4 Use of a SIRIUS 3SE7 cable-operated switch with 3SK safety relay

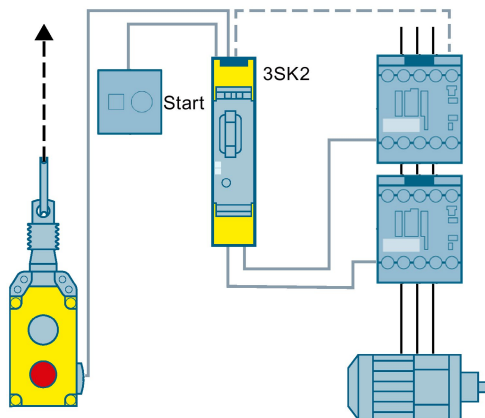
Setup of a safety application with a 3SE7 cable-operated switch and a 3SK1 safety relay

As an example, the application is set up with the 3SK1 Advanced safety relay, the 3SE7120-1BH00 cable-operated switch (2 NC + 1 NO) with push-to-release mechanism, and contactors up to SIL2 or PL d. Other device combinations are also possible.



Setup of a safety application with a 3SE7 cable-operated switch and a 3SK2 safety relay

As an example, the application is set up with the 3SK2112 22.5 mm safety relay, the 3SE7150-1BH04 cable-operated switch (2 NC + 1 NO) with push-to-release mechanism and integrated LED, and contactors up to SIL 2 or PL d. Other device combinations are also possible.



4.12 Connecting

4.12.1 Circuit diagrams for cable-operated switches

Metal enclosures, degree of protection IP67

Cable-operated switches, latching according to EN ISO 13850, with rotate-to-unlatch mechanism

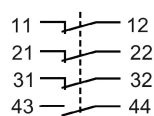


Figure 4-2 3SE7141-1EG10

Metal enclosures, degree of protection IP65

Cable-operated switches, latching according to EN ISO 13850, with button reset

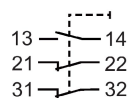


Figure 4-3 3SE7120-1BH00

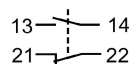


Figure 4-4 3SE7140-1BD00

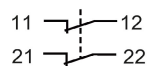


Figure 4-5 3SE7140-1BF00

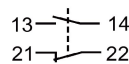


Figure 4-6 3SE7160-1BD00

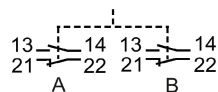


Figure 4-7 3SE7160-1AE00

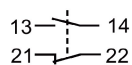
Cable-operated switches, non-latching, without unlatching

Figure 4-8 3SE7120-2DD01

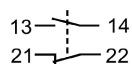


Figure 4-9 3SE7150-2DD00

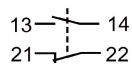
Metal enclosures, degree of protection IP54**Cable-operated switches, latching according to EN ISO 13850, with key-operated release**

Figure 4-10 3SE7140-1CD00

4.13 Technical data

4.13.1 Technical data in Siemens Industry Online Support

Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data" link.

4.13.2 Overview tables

Overview tables technical data

You will find overview tables with technical data in the "Product information" tab in our online ordering system.

See also

Overview tables

(<https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/8260016?tree=CatalogTree>)

4.13.3 Failure rates

Using the B10 value, the failure rate of the command and signaling devices is calculated according to the following formula:

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

$$\lambda D = [0.1 \times C / B10d]$$

λ = Total failure rate of a command and signaling device

λD = Failure rate of dangerous failures

C = Operating cycle per hour

B10d = B10 / Proportion of dangerous failures

SN 31920 standard

The B10 value for devices subject to wear is expressed in the number of operating cycles. This is the number of operating 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.

4.13.4 Example for illustration

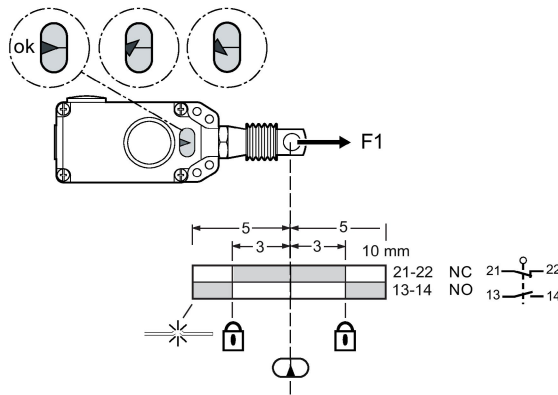
Siemens Industry Online Support

You will find the appropriate operating travel diagram for each cable-operated switch on the technical data sheet (see Chapter Technical data in Siemens Industry Online Support (Page 34)).

Legend

	Contact element closed
	Contact element open
	Direction of actuation
	Mid-position
	Wire break
	Lock

Explanation of functions



F1 Preload force direction of actuation

NC Normally closed contact

NO Normally open contact

Operating travel diagrams show the switching states depending on the actuation or the wire tension.

Actuation:

If the wire is deflected or pulled, the contacts close or open after a pulling distance of 3 mm (in the example) and the switch locks these switch positions.

This means that even if the wire is released, it will not return to the previous switching status.

A total travel of 5 mm in the actuating direction is possible. To reactivate the cable-operated switch, check the wire for correct pretension and reset it with the blue unlatching button.

Wire break / loss of wire tension:

If the wire breaks, the wire is no longer pretensioned and the switch actuates itself and also locks itself. If the wire tension is slowly reduced or the wire is elongated by 3 mm, the function of the cable-operated switch would no longer be guaranteed, the switch will trip automatically and lock until the cause in the setup has been completely eliminated.

4.13.5 Operating travel diagrams for cable-operated switches

Metal enclosures, degree of protection IP67

Cable-operated switches, latching according to EN ISO 13850, with rotate-to-unlatch mechanism

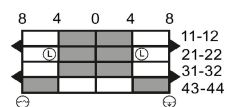


Figure 4-11 3SE7141-1EG10

Metal enclosures, degree of protection IP65

Cable-operated switches, latching according to EN ISO 13850, with button reset

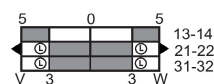


Figure 4-12 3SE7120-1BH00

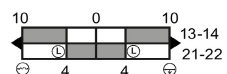


Figure 4-13 3SE7140-1BD00



Figure 4-14 3SE7140-1BF00

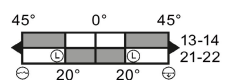


Figure 4-15 3SE7160-1BD00

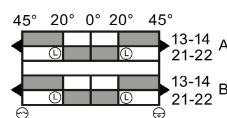


Figure 4-16 3SE7160-1AE00

Cable-operated switches, non-latching, without unlatching



Figure 4-17 3SE7120-2DD01



Figure 4-18 3SE7150-2DD00

Metal enclosures, degree of protection IP54

Cable-operated switches, latching according to EN ISO 13850, with key-operated release

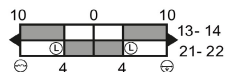


Figure 4-19 3SE7140-1CD00

4.14 Dimensional drawings

4.14.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link."

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a "Product tree" dropdown set to "All" and a search bar labeled "Enter keyword...". Below this, there are three filters: "Product" (set to "3RV2016-4BA10"), "Entry type" (set to "Technical data (1)"), and "Date" (set to "From" to "To"). A "Search product" button is located below the filters. The search results section displays a product image and the following text: "3RV2016-4BA10", "CIRCUIT BREAKER, SCREW-TYPE, 20 A", "CIRCUIT BREAKER SIZE S2 FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14...20A, N-RELEASE 20A, SCREW TERMINAL, STANDARD BREAKING CAPACITY". At the bottom of the results, there is a breadcrumb trail: "> Product details > Technical data > CAx data", where "CAx data" is highlighted with a red box.

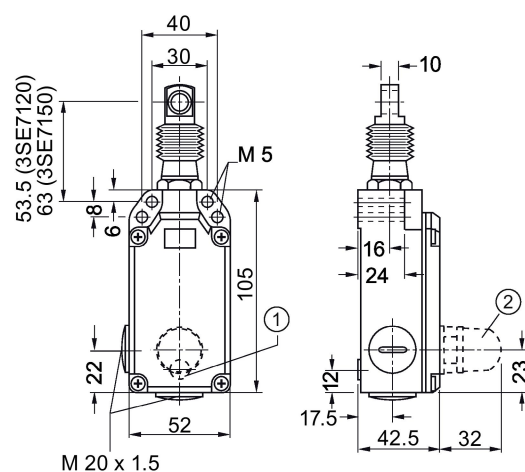
4.14.2 Examples of dimensional drawings for cable-operated switches

Note

All dimensions specified in mm.

3SE7120-2DD..., 3SE7150-2DD..

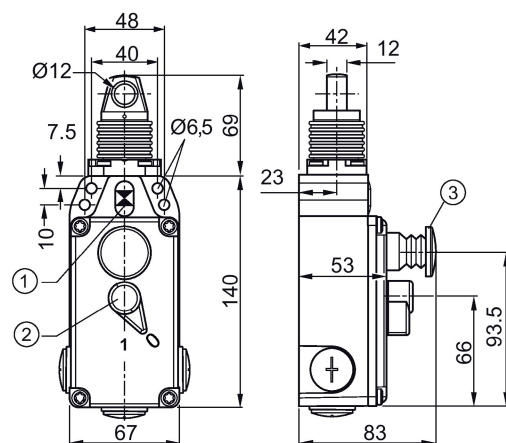
Non-latching



- ① Option for additional fixing
- ② Lamp

3SE7141-1EG..

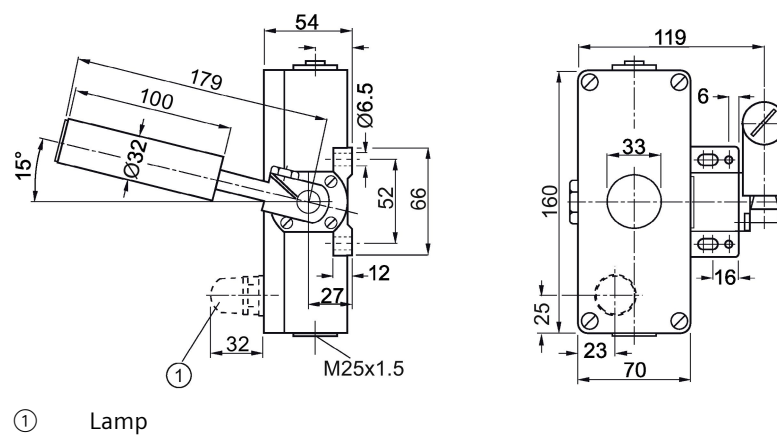
With EMERGENCY STOP and rotate-to-unlatch mechanism



- ① Wire tension indicator
- ② Position indicator / unlatch button
- ③ EMERGENCY STOP button

Conveyor belt unbalance tracker 3SE7310-1AE..

With latching and push-to-release mechanism



Foot switches

5.1 Application areas for foot switches

3SE29/3SE33 foot switches are used in installations in which manual switch actuation is not possible.

Foot switches can be used for the following applications:

- Output of control signals to press brakes and machine tools
- Manual workstations in small batch production
- In the manufacture of machine tools and special-purpose machines
- Presses
- Sheet metal processing machines

Foot switches

The 3SE29 and 3SE39 foot switch range encompasses versions in a metal enclosure for rugged applications as well as versions with plastic enclosure for use in less harsh environments. The devices can be supplied with or without a protective cover and have fixing holes for them to be screwed to the floor.

Latching or momentary-contact versions of the devices are available depending on the requirements of the application.

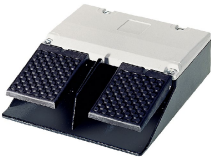
Safety foot switches

The single-pedal safety foot switches according to EN ISO 13850 lock when actuated. After the hazard has been eliminated, the machine cannot be restarted until the switch is unlocked manually directly at the switch. This is done by means of a pushbutton on top of the switch enclosure. The devices are supplied with a protective cover.

5.2 Features of the foot switches

	3SE29 foot switches
Description	Foot-operated command devices with 1 or 2 pedals, with and without protective cover, latching and momentary-contact versions of contacts
Design	Plastic and metal
Installation / Connection	Screw terminals
Degree of protection	IP65
Approval	UL, CSA, CE
Relevant standards	Positive opening of NC contacts acc. to IEC/EN 60947-5-1
AS-Interface	Can be connected to ASIsafe via fail-safe modules using conventional wiring
Safety	Safety foot switches with latching function acc. to ISO 13850
Options	Safe locking even when operated beyond the pivot point

5.3 Overview

Metal enclosures, degree of protection IP65				
	Momentary-contact foot switches, single pedal, non-latching M20 x 1.5 cable entry			
 3SE290-.-AA20	Without protective cover	⊕	1 NO + 1 NC 2 NO + 2 NC	3SE2902-0AB20 3SE2903-1AB20 3SE2903-1AE20
	With protective cover	⊕	1 NO + 1 NC 2 NO + 2 NC	3SE2902-0AA20 3SE2903-1AA20
	Momentary-contact foot switches, single pedal, latching M20 x 1.5 cable entry			
	Without protective cover	⊕	1 NO + 1 NC	3SE2912-2AB20
	With protective cover	⊕	1 NO + 1 NC	3SE2912-2AA20
	Momentary-contact foot switches, two-pedal, non-latching M25 x 1.5 cable entry			
 3SE2932-.-AB20	Without protective cover	⊕	1 NO + 1 NC 2 NO + 2 NC	3SE2932-0AB20 3SE2932-1AB20
	With protective cover	⊕	1 NO + 1 NC 2 NO + 2 NC	3SE2932-0AA20 3SE2932-1AA20
 3SE2924-3AA20	Safety foot switches, single-pedal, with protective cover, M20 x 1.5 cable entry, with interlock according to ISO 13850, NO closes as momentary contact type, NC opens with latching	⊕	2 NO + 2 NC	3SE2924-3AA20

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

Plastic enclosures, degree of protection IP65			
	Pedal pushbuttons, 3 m cable, single-pedal		
 3SE3902-4CA20	• Without protective cover	1 CO	3SE3902-4CB20
	• With protective cover	1 CO	3SE3902-4CA20
 3SE3934-5CB20	Two pedals , without protective cover	2 × 1 CO	3SE3934-5CB20

5.4 Circuit diagrams for foot switches

Metal enclosures, with cover

Momentary-contact foot switches, single pedal, non-latching

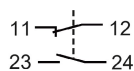


Figure 5-1 3SE2902-0AA20

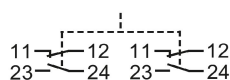


Figure 5-2 3SE2903-1AA20

Foot switches, single pedal, latching

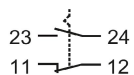


Figure 5-3 3SE2912-2AA20

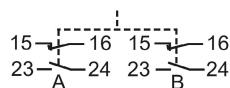


Figure 5-4 3SE2924-3AA20

Momentary-contact foot switches, two-pedal, non-latching

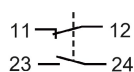


Figure 5-5 3SE2932-0AA20

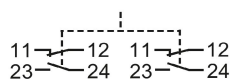


Figure 5-6 3SE2932-1AA20

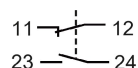
Metal enclosures, without cover**Momentary-contact foot switches, single pedal, non-latching**

Figure 5-7 3SE2902-0AB20

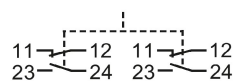


Figure 5-8 3SE2903-1AB20

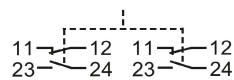


Figure 5-9 3SE2903-1AE20 (with two fastening holes)

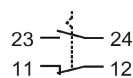
Foot switches, single pedal, latching

Figure 5-10 3SE2912-2AB20

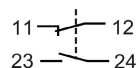
Momentary-contact foot switches, two-pedal, non-latching

Figure 5-11 3SE2932-0AB20

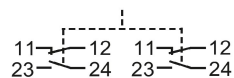


Figure 5-12 3SE2932-1AB20

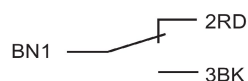
Plastic enclosures with protective insulation, with cover**Pedal pushbuttons, single-pedal, non-latching**

Figure 5-13 3SE3902-4CA20

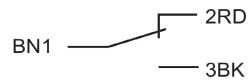
Plastic enclosures with protective insulation, without cover**Pedal pushbuttons, single-pedal, non-latching**

Figure 5-14 3SE3902-4CB20

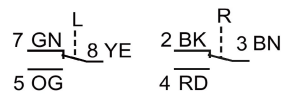
Pedal pushbuttons, two-pedal, non-latching

Figure 5-15 3SE3934-5CB20

5.5 Technical data

5.5.1 Technical data in Siemens Industry Online Support

Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data" link.

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a 'Product tree' dropdown set to 'All' and a search bar labeled 'Enter keyword...'. Below this, the 'Product' field contains '3RV2016-4BA10' and is highlighted with a red box. The 'Entry type' dropdown is set to 'Technical data (1)' and is also highlighted with a red box. To the right of the 'Entry type' dropdown is a 'Date' field with 'From' and 'To' sub-fields. Below the search fields, there is a 'Search product' button. The search results are displayed below, showing a product image and the text '3RV2016-4BA10 CIRCUIT BREAKER, SCREW-TYPE, 20 A CIRCUIT BREAKER SIZE S2 FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14...20A, N-RELEASE 20DA, SCREW TERMINAL, STANDARD BREAKING CAPACITY'. Below the product details, there are three links: 'Product details', 'Technical data' (highlighted with a red box), and 'CAx data'.

5.5.2 Overview tables

Overview tables technical data

You will find overview tables with technical data in the "Product information" tab in our online ordering system.

See also

Overview tables

(<https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/8260030?tree=CatalogTree>)

5.6 Dimensional drawings

5.6.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/>).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link."

The screenshot shows the Siemens Industry Online Support search interface. At the top, there is a "Product tree" dropdown set to "All" and a search bar labeled "Enter keyword...". Below this, there are three input fields: "Product", "Entry type", and "Date". The "Product" field contains the article number "3RV2025-4BA10" and is highlighted with a red box. The "Entry type" dropdown is set to "Technical data (1)" and is also highlighted with a red box. The "Date" field has "From" and "To" sub-fields. Below these fields is a "Search product" button. The search results are displayed in a table. The first result is for the article number "3RV2025-4BA10" and is highlighted with a red box. The description of the product is "CIRCUIT BREAKER, SCREW TYPE, 20 A CIRCUIT BREAKER SIZE S2, FOR MOTOR PROTECTION, CLASS 10, A-RELEASE 14...20A, N-RELEASE 200A, SCREW TERMINAL, STANDARD BREAKING CAPACITY". Below the description, there is a breadcrumb trail: "> Product details > Technical data > CAx data", where "CAx data" is highlighted with a red box.

5.6.2 Dimensional drawings for foot switches

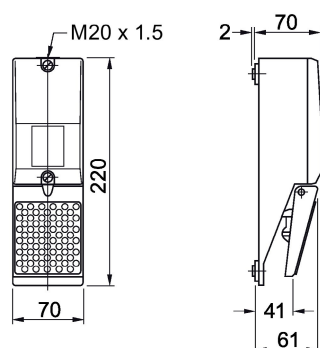
5.6.2.1 Metal enclosures

Note

All dimensions specified in mm.

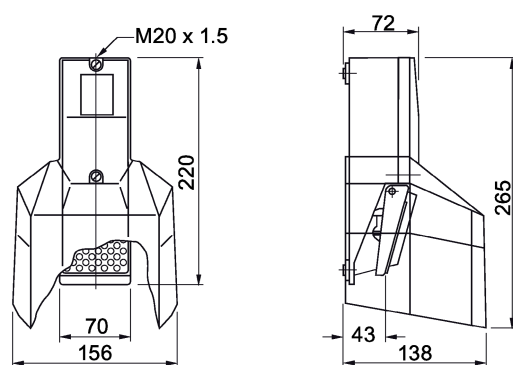
3SE2902-0AB20, 3SE2903-1AB20, 3SE2912-2AB20

Momentary-contact foot switch, foot switch, single-pedal, without protective cover



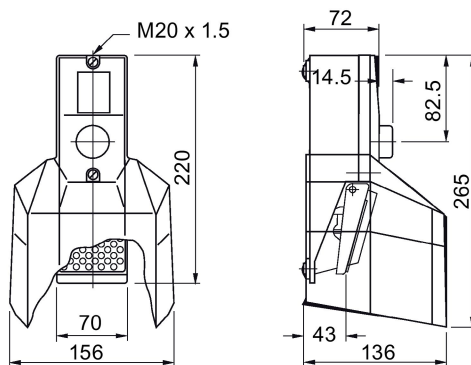
3SE2902-0AA20, 3SE2903-1AA20, 3SE2912-2AA20

Momentary-contact foot switch, foot switch, single-pedal, with protective cover

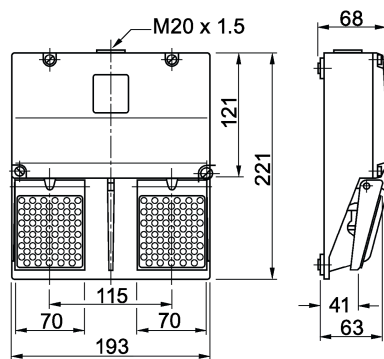


3SE2924-3AA20

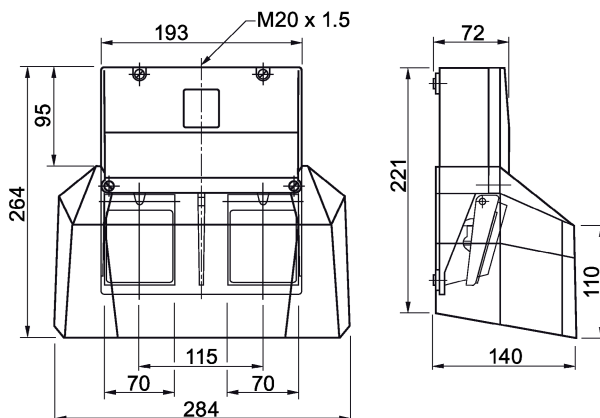
Safety foot switches with interlock

**3SE2932-0AB20, 3SE2932-1AB20**

Momentary-contact foot switch, two-pedal, without protective cover

**3SE2932-0AA20, 3SE2932-1AA20**

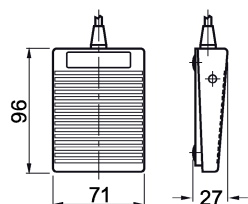
Momentary-contact foot switch, two-pedal, with protective cover



5.6.2.2 Plastic enclosures

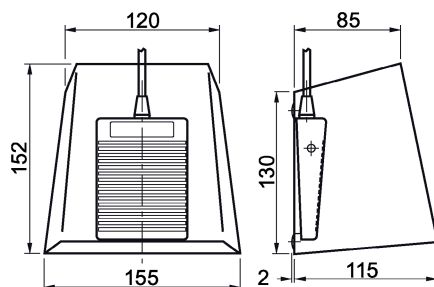
3SE3902-4CB20

Pedal pushbutton, single-pedal, without protective cover



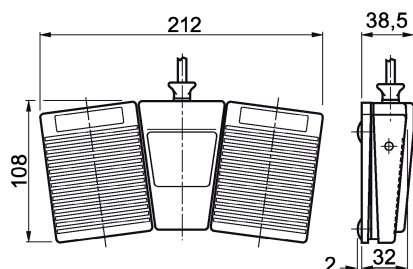
3SE3902-4CA20

Pedal pushbutton, single-pedal, with protective cover



3SE3934-5CB20

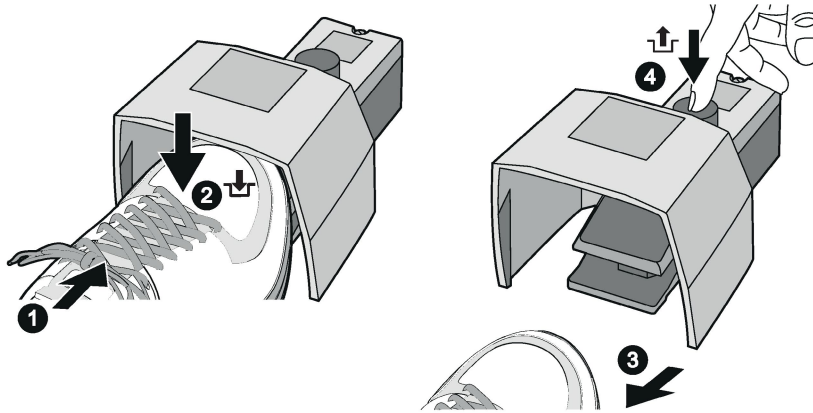
Pedal pushbutton, two-pedal, without protective cover



5.7 Application examples for foot switches

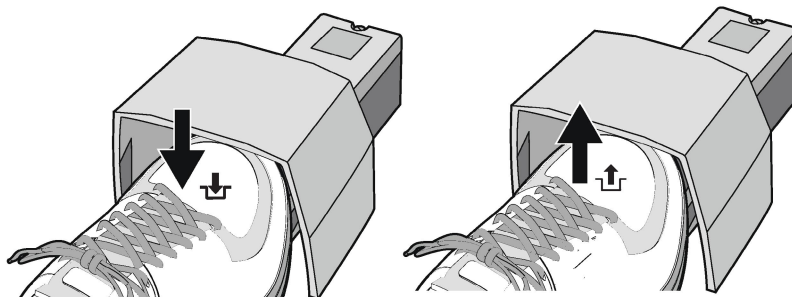
5.7.1 Application examples

Momentary-contact safety foot switch 3SE2924-3AA20

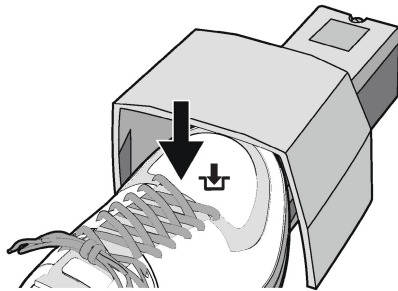


1. In order to lock the momentary-contact safety foot switch, press the pedal down with your foot.
2. To unlock the switch, remove your foot from the pedal and press down the button on the foot switch.

Momentary-contact foot switch 3SE2902-0AA20



1. The momentary-contact foot switch 3SE2902-0AA20 starts up the machine while the pedal is pressed down.
2. The machine is stopped as soon as the pedal is released.

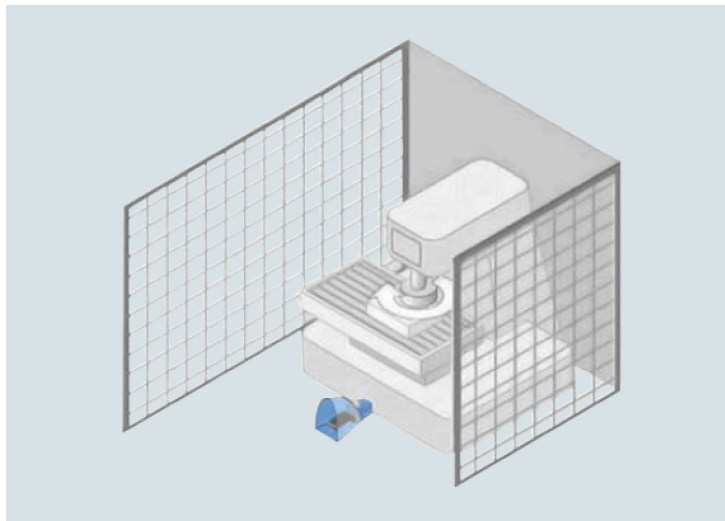
Foot switch 3SE2912-2AA20

1. In order to lock the foot switch, press the pedal down with your foot. The switch engages.
2. To unlock the switch, press the pedal down again. The machine is then stopped.

3SE2924-3AA20 safety foot switches

The 3SE2924-3AA20 single-pedal safety foot switches are used on machines and in systems as enabling switches if operation by hand is not possible. The switches have an interlocking function.

The safety foot switches are protected against unintentional operation by a protective cover.



Appendix

A.1 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 List of abbreviations

Abbreviation	Meaning
AC	Alternating current
AC-12	Control of resistive loads and solid-state loads with isolation by optocouplers
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
AWG	American Wire Gauge = coding for wire diameters in North America
BG	Employer's Liability Insurance Associations
BKS	Manufacturer of locking systems and cylinder locks
Bus	Binary Unit System System for transferring data between multiple nodes
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.
CES	Manufacturer of locking systems and cylinder locks
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
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 "Deutsches Institut für Normung" is the German institution that is responsible for standards development and that represents German interests in European and global standards organizations.
EMC	Electromagnetic compatibility
EN	Europäische Norm (European standard)
GOST	Certification for Russia
IEC	International Electrotechnical Commission
IP	Ingress protection
ISO	International Organization for Standardization
KFW	Saturated atmosphere with variations in air humidity and temperature
KK	Constant saturated atmosphere
KTW	Saturated atmosphere with variations in air temperature
LED	Light emitting diode
M12	Metric ISO thread

Abbreviation	Meaning
CET	Central European Time
NC	NC contact
PDF	Platform-independent file format for documents (Portable Document Format)
PE	Protective Earth
SELV	Safety extra-low voltage
PFD	Probability of dangerous failure on demand
UL	Underwriters Laboratories Inc. U.S. organization for certifying electrotechnical products.
NO	NO contact
SIL	Safety Integrity Level
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e. V. (Association of Electrical Engineering, Electronics and Information Technology (Germany))

Index

A

- Application areas
 - Cable-operated switches, 13
 - Foot switches, 43

B

- B10 value
 - Formula, 35

C

- Cable-operated switches
 - Actuation on both sides, 28
 - Ambient temperature, 19
 - Wire lengths, 20, 26
- Certifications and approvals, 57

D

- Documentation
 - Target group, 5

F

- Failure rate, 35
- Formula
 - B10 value, 35

I

- Important notes, 9

M

- Mounting
 - Cable-operated switches, 20

O

- Overview
 - 3SE7 cable-operated switches, 14
 - Momentary-contact foot switch, 44

S

- Standard
 - SN 31920, 35

T

- Target group, 5

