

Industrial controls

SIRIUS 3SE71 cable-operated switches and 3SE73 conveyor belt unbalance trackers

Configuration Manual

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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.

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Introduction

1.1 Purpose of this documentation

This manual describes the possible uses of SIRIUS commanding 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 conveyor belt unbalance trackers.

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
- 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

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://www.siemens.com/support-request)
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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, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

2.4 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity 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 cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
<https://www.siemens.com/cybersecurity-industry>.

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

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
<https://new.siemens.com/cert>.

Description

3.1 Features of the cable-operated switches and conveyor belt unbalance trackers



	3SE71 cable-operated switches	3SE73 conveyor belt unbalance trackers
Description	System comprising a switch and cable and accessories • With and without latching • Optional with red LED light with visibility up to 50 m	• With latching and button reset • With stainless steel roller lever • Optional with red LED light with visibility up to 50 m
Design	Metal	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 according to IEC 60947-5-1, Appendix K.
Safety	EMERGENCY STOP function with latching according to ISO 13850	---

3.2 Cable-operated switches

3.2.1 Overview

SIRIUS 3SE71 cable-operated switches

Cable-operated switch for cable pull and cable-break monitoring				
 3SE7120-2DD01 3SE7120-1BH00	Metal enclosures, IP65, cover made of plastic, for wire lengths up to 5 m			
	• Without latching (only for cable-pull monitoring) 55 N spring	⊕	1 NO + 1 N C	3SE7120-2DD01
	• Without latching (only for cable-pull monitoring) 100 N spring	⊕	1 NO + 1 N C	3SE7120-2DD01-1AS7
	• With latching and button reset, with alignment window	⊕	2 NC	3SE7120-1BF00
 3SE7150-2DD00 3SE7150-1BH00	Metal enclosures, IP65, cover made of plastic, with alignment window for cable lengths up to 20 m			
	• Non-latching, with LED, red, 24 V DC	⊕	1 NO + 1 N C	3SE7150-2DD04
 3SE7150-1BD00	• With latching and button reset	⊕	1 NO + 1 N C	3SE7150-1BD00
	• With latching and button reset	⊕	2 NC	3SE7150-1BF00
	• With latching and button reset with yellow cover	⊕	1 NO + 2 N C	3SE7150-1BH00
	• With latching and button reset, with LED red, 24 V DC	⊕	1 NO + 1 N C	3SE7150-1BD04
	• With latching and button reset, with yellow cover, with LED red, 24 V DC	⊕	1 NO + 2 N C	3SE7150-1BH04
 3SE7140-1BD00	Metal enclosures, IP65, cover made of plastic, for cable lengths up to 50 m, 130 m with 1 x tension spring			
	• With latching and button reset	⊕	1 NO + 1 N C	3SE7140-1BD00
	• With latching and button reset	⊕	2 NC	3SE7140-1BF00
	• With latching and button reset, with LED red, 24 V DC, 1 x M20 x 1.5	⊕	1 NO + 1 N C	3SE7140-1BD04
	• With latching and button reset, with LED red, 24 V DC, 2 x M25 x 1.5	⊕	1 NO + 1 N C	3SE7140-1BD04-1AS6
	• With latching and key-operated release	⊕	1 NO + 1 N C	3SE7140-1CD00

 3SE7141-1EG10 3SE7141-1EG10-0CA1	Metal enclosures, IP67, cover made of plastic, for wire lengths up to 75 m			
	With EMERGENCY STOP mushroom pushbutton, latching and with rotate-to-unlatch mechanism		1 NO + 3 NC	3SE7141-1EG10
	Additionally with yellow cover		1 NO + 3 NC	3SE7141-1EG10-0CA1
 3SE7160-1AE00	Metal enclosure, IP65, with actuation on both sides, for cable lengths up to 2 x 100 m, with 2 x tension springs			
	With latching and button reset		2 NO + 2 NC	3SE7160-1AE00
	With latching and button reset		1 NO + 1 NC	3SE7160-1BD00
 3SE7160-1AE04	- With latching and button reset – In addition with LED red, 24 V DC		2 NO + 2 NC	3SE7160-1AE04
Accessories for cable-operated switches	Steel ropes, cable clamps, tension springs, rope rollers, thimbles, eyebolts, lifting eyebolts, turnbuckles, carabiner hooks			

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

For further variants, see Catalog (<https://sieportal.siemens.com/su/blg8R>).

3.2.2 Application areas for cable-operated switches

The 3SE71 cable-operated switches are used for cable-break monitoring or as EMERGENCY STOP devices on particularly endangered or extensive system components.

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

The cable-operated switches generally fulfill degree of protection IP65, some versions with key-operated release (3SE7140-1CD00) fulfill degree of protection IP54 and versions with EMERGENCY STOP (3SE7141) fulfill degree of protection IP67. They can be used for an ambient temperature from -25 °C to +70 °C.

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

Application examples for monitoring and shutting down in hazardous situations

- Conveyor belts in the stone and soil industries
- Conveyor belts in large warehouses and logistics centers for transporting packages and goods
- Paper feeders at printing machines

3.3 Conveyor belt unbalance trackers

- Conveyor belts in food production processes
- In agricultural production and processing
- Material feeders at automated production machines
- Door opening switches on barriers, factory gates, and workshop gates

3.2.3 Design of the cable-operated switches

For long distances of up to 2×100 m, complete units are available with metal enclosure and actuation on both sides.

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 are supplied with 2 NO + 2 NC contacts.

The cable-operated switches can be supplied with a factory-fitted LED light (red, 24 V DC). This light makes the operating state of the switch visible at a distance of at least 50 m.

3.3 Conveyor belt unbalance trackers

3.3.1 Overview

SIRIUS 3SE73 conveyor belt unbalance trackers

Conveyor belt unbalance trackers				
 3SE7310-1AE00	Metal enclosures, IP65			
	• With latching and button reset		2 NO + 2 NC	3SE7310-1AE00
 3SE7310-1AE04	• With latching and button reset, – In addition with LED red, 24 V DC		2 NO + 2 NC	3SE7310-1AE04

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

For ordering information, see Catalog (<https://sieportal.siemens.com/su/blg8R>).

3.3.2 Applications for conveyor belt unbalance trackers

Switching devices for protection of conveyor systems

Depending on the area of application and industry, the 3SE73 conveyor belt unbalance trackers are used on different conveyor belts, while at the same time having to meet safety and robustness requirements. The conveyor belt unbalance switches fulfill degree of protection IP65 and can be used for an ambient temperature from -25 °C to +70 °C.

The conveyor belt unbalance tracker monitors the correct running of conveyor belts and thus safeguards the transport process of heavy bulk materials. The large stainless steel roller lever of the conveyor belt unbalance tracker swings out if a belt does not move centrally between the rollers and – depending on the integration into the control system – causes a correction of the belt tracking or the shutdown of the entire system.

The conveyor belt unbalance tracker is supplied with 2 NO + 2 NC contacts. The conveyor belt unbalance tracker can be supplied with a factory-fitted LED light (red, 24 V DC). This light makes the operating state of the switch visible at a distance of at least 50 m.

Applications for shutdown on conveyor belt unbalance

- Conveyor belts in the stone and soil industries
- In agricultural production and processing
- Mining
- Cement and building material industry
- Large logistics centers
- Ports

3.3 Conveyor belt unbalance trackers

Mounting

4.1 Cable-operated switches

4.1.1 Installation of the cable-operated switches

General mounting instructions

Installation must only ever be performed in the de-energized condition and by authorized specialists.

Mounting

Fasten the enclosure with 2 screws through the fastening holes.

Mounting position

Any mounting position of the cable-operated switches is possible.

4.1.2 Ambient temperature range

Note

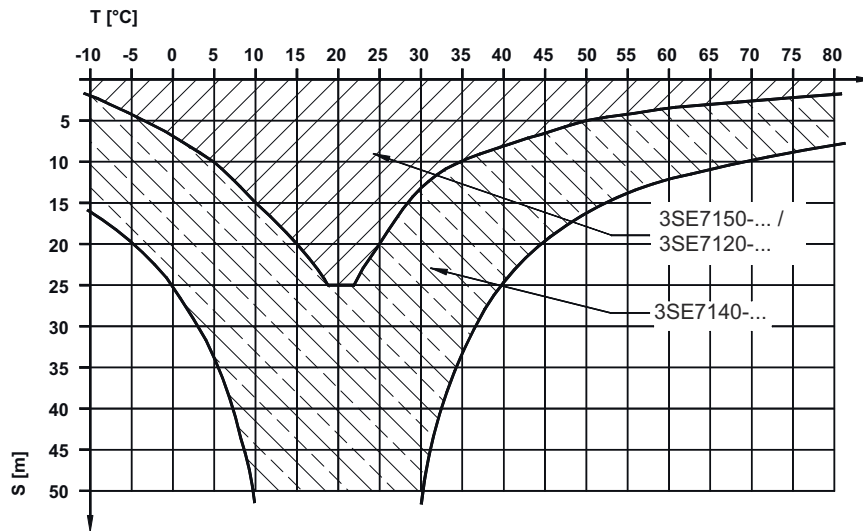
Observe the ambient temperature

The specified values are valid when the switches are installed at an ambient temperature of 20 °C.

The ambient temperature during operation is -25 °C to +70 °C.

Large temperature fluctuations require corresponding tension springs.

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.

Safety integrity level SIL 1 to SIL 3 depends on the application.

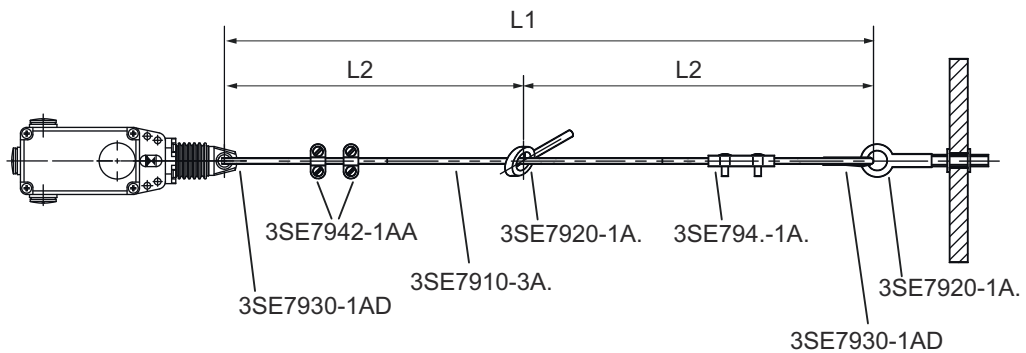
Note

Restriction of the ambient temperature range

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

4.1.3

Permissible wire lengths and actuating forces



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

No allowance for elongation of the wire by stretching or deformation of the thimble 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

4.1.4 Use of cable clamps

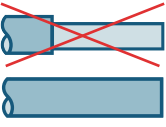
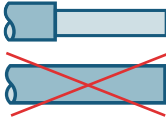
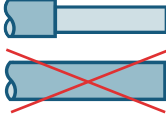
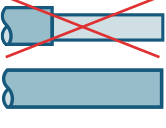
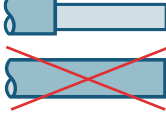


CAUTION

For reliable connection, pay attention to correct use of the cable clamps together with the steel cable.

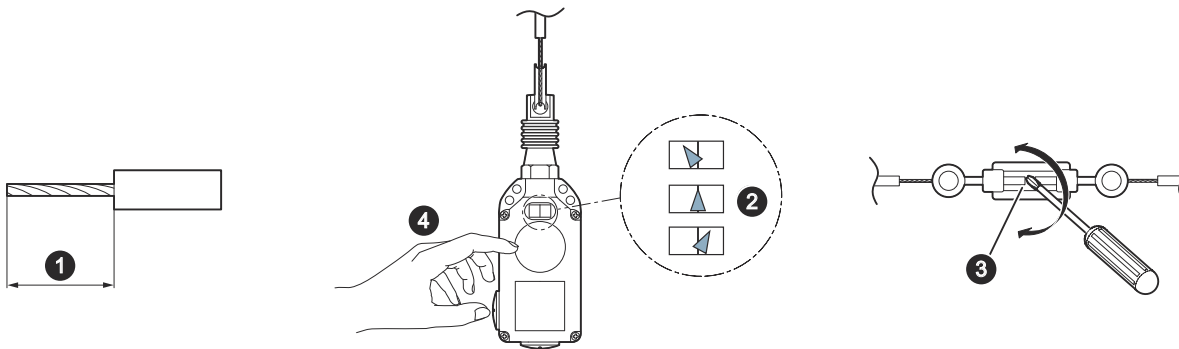
- If oval cable clamps are used, the sheath of the steel cable must not be removed.
- If simplex and duplex clamps are used, the PVC sheath must be removed from the clamping area of the steel rope.
- If cable clamp 3SE7942-1AA is used, a steel cable can be used with a sheath or without a sheath.
- Bowden wire supports must be used at the recommended intervals (Permissible wire lengths and actuating forces (Page 18)).

4.1 Cable-operated switches

	Article No.	Do not remove the sheath of the cable	Remove the sheath of the cable
 Oval cable clamp	3SE7941-1AC		---
 Cable clamp, simplex	3SE7943-1AC	---	
 Cable clamp, duplex	3SE7944-1AC	---	
 Cable clamp, simple	3SE7942-1AA		

4.1.5 Pretensioning the 3SE7120, 3SE7150 and 3SE7141 cable-operated switch

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 mounting 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 thimbles deform when the wire is pulled. Tension the wire using a rope 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.

Note

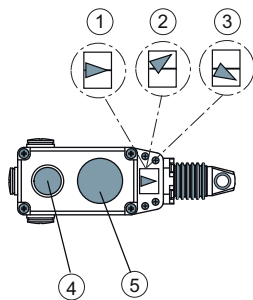
General information about mounting cable-operated switches.

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.

4.1.6 Switch position indicator

Note

Study the illustration of the switch position indicator in the diagram below before you commission the cable-operated switch.



①②③ = Position indication window of the pretensioned wire

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

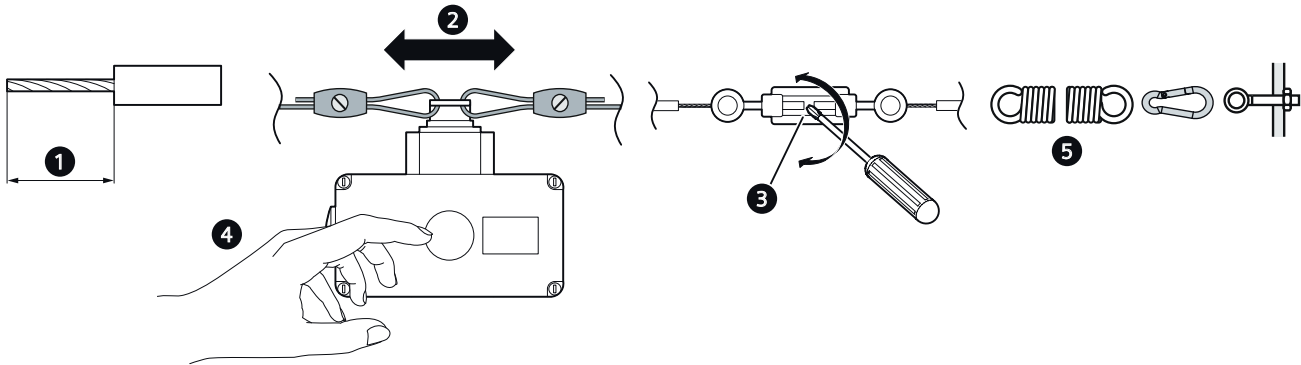
② Arrow in the reset position. Wire must be tensioned until the indicator arrow is in position ①.

③ Wire is overtensioned, cable-operated switch is not operational. The LED light 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.

For simple fastening of the cable to a tension spring, turnbuckle, and lifting eyebolt, use the carabiner hook DIN 5299, form C, 50 mm x 5 mm, article number 3SE7932-1AC (see Wire structure and attachment (Page 34)).

4.1.7 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 mounting 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 thimbles deform when the wire is pulled. Tension the wire using a rope 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.

4.1.8 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.

4.1.9 Function of the cable-operated switches

Positive opening ensures safety

The NC contacts for the cable break or cable pull signal 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 the position indicator (Page 21) on the cable-operated switch itself.

Function

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

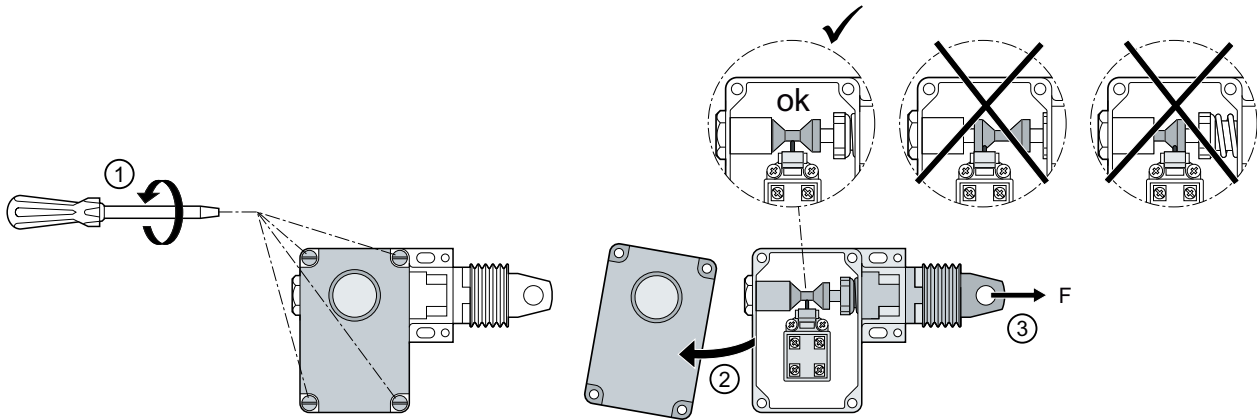
Both switching contacts for the cable break/cable pull signal are available in the 3SE7120, 3SE7140, 3SE7150, 3SE7160 and 3SE7141 cable-operated switches. The NO contact can be used, for example, for signaling purposes.

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.

4.1.10 Pretensioning for cable-operated switches 3SE7140-1..0

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.



4.1.11 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.

4.1.12 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 (Page 18) 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.

4.1.13 Resetting the latching mechanism for the cable-operated switch

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

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

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

4.2 Conveyor belt unbalance trackers

4.2.1 Installation of the conveyor belt unbalance tracker

General mounting instructions

Installation must only ever be performed in the de-energized condition and by authorized specialists.

Mounting

1. Fasten the enclosure with 2 screws through the fastening holes.
2. Observe the data for connection (see Electrical connection of the conveyor belt unbalance tracker (Page 31)).
3. Place the cover on the device after connection.
4. Tighten the cover screws using a Pozidriv screwdriver with a tightening torque of 1.2 Nm.

Stainless steel roller lever

The angle of the stainless steel roller lever of the conveyor belt unbalance tracker is set to 15 degrees in the factory and must not be readjusted by the customer.

The lever is permanently pinned to the shaft for safety reasons.

The pinning provides a positive fit, which ensures positive opening according to IEC 60947-5-1, Annex K.

4.2.2 Resetting the latching mechanism for the conveyor belt unbalance tracker

The conveyor belt unbalance tracker trips when a conveyor belt jumps out of the track provided and the roller lever reaches an actuating angle of more than 15 degrees.

The 3SE73 conveyor belt unbalance tracker engages in the event of a fault and can be unlocked by pressing the blue pushbutton.

Connecting

5.1 Cable-operated switches

5.1.1 General information about the electrical connection

Electrical connection must only ever be performed in the de-energized condition and by authorized specialists.

Procedure

1. Unscrew the cover screws.
2. Open the desired cable entry.
3. When connecting, ensure that no cables are in the vicinity of the lever system. For cable entry, insert suitable cable glands with an appropriate degree of protection into the available threaded holes.
4. Ensure that the interior of the switch is clean (e.g. removal of the cable residue) because foreign bodies can impair the switching behavior.
5. Seal all unused cable entries with threaded plugs.
6. After wiring, screw the device cover on with the specified torques.

Tightening torque of the cover screws

After wiring tighten the four cover screws according to the following table.

3SE7120 / 3SE7150	3SE7140	3SE7140-1CD00 (with key-operated release)	3SE7141 (with EMERGENCY STOP)
0.5 Nm	1.2 Nm	1.2 Nm	2 Nm
Pozidriv	Slotted	Slotted	Pozidriv
Degree of protection IP65	Degree of protection IP65	Degree of protection IP54	Degree of protection IP67

5.1.2 Electrical connection

Type	3SE7120-2	3SE7120-1	3SE7150	3SE7140	3SE7141	3SE7160
General data						
Regulations	IEC 60947-5-1, IEC 60204-1, ISO 13850					
Approvals	UL/CSA					
Electrical design	Contacts electrically isolated from each other					

5.1 Cable-operated switches

Type	3SE7120-2	3SE7120-1	3SE7150	3SE7140	3SE7141	3SE7160
Electrical load						
• 2-pole, at AC-15	400 V AC, 6 A				240 V AC, 2 A	400 V AC, 6 A
• 3-pole, at AC-15	240 V AC, 2 A			--		
• 4-pole, at AC-15	--					400 V AC, 6 A
• Minimum	24 V AC/DC, 10 mA					
Short-circuit protection	A	6 (time-lag)				
Mechanical endurance (operating cycles)		1 000 000	100 000			
Contact material		Fine silver				
Actuation		By cable pull	By cable pull or cable break			
Cable length, maximum	m	5	20	50	75	2 x 100
Distance between wire supports, max.	m	3		5		4

Type	3SE7120-2		3SE7120-1	3SE7150	3SE7140	3SE7141	3SE7160
Enclosure							
Degree of protection acc. to IEC 60529 ¹⁾		IP65	IP67	IP65			
Ambient temperature	°C	-25 ... +70					
Mounting		Designed for M5					
Distance between fixing holes	mm	30 or 40					
Cable entry		2 x (M20 x 1.5)			1 x (M20 x 1.5) 2 x (M25 x 1.5)	3 x (M20 x 1.5)	2 x (M25 x 1.5)
Type of connection		Screw terminals M3.5, self-lifting terminal clamp					

1) IP54 for versions with key-operated release

5.1.3 Conductor cross-sections cable-operated switches

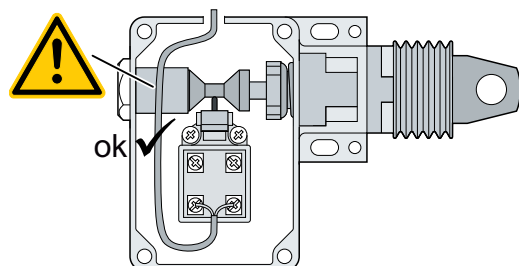
Conductor cross-sections

Type of electrical connection	Screw terminals
Tightening torque	0.8 Nm
Type of connectable conductor cross-sections	
• Solid	2 x (0.5 ... 2.5) mm ²
• Finely stranded with end sleeve	2 x (0.5 ... 2.5) mm ²
• For AWG cables	2 x 20 to 14

5.1.4 Connection for cable-operated switches 3SE7140-1..0

3SE7140-1..0 cable-operated switches

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



5.1.5 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

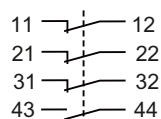


Figure 5-1 3SE7141-1EG10

Metal enclosures, degree of protection IP65

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

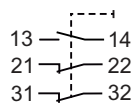


Figure 5-2 3SE7120-1BH00

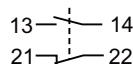


Figure 5-3 3SE7140-1BD00

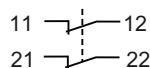


Figure 5-4 3SE7140-1BF00

5.1 Cable-operated switches



Figure 5-5 3SE7160-1BD00

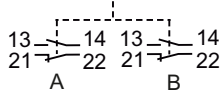


Figure 5-6 3SE7160-1AE00

Cable-operated switches, non-latching, without unlatching

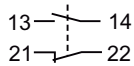


Figure 5-7 3SE7120-2DD01

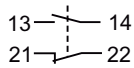


Figure 5-8 3SE7150-2DD00

Metal enclosures, degree of protection IP54

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



Figure 5-9 3SE7140-1CD00

5.1.6 Commissioning of the cable-operated switch

Function test

Test the function of the device before commissioning. Note the following:

1. Carefully ensure that the cable-operated switch is firmly seated.
2. Make sure the cable entry and cable connections are undamaged.
3. Check the switch enclosure for damage.
4. Check the switch function by operating the pull-wire.
5. Check the cable tension using the position indicator.

NOTICE**Maintenance**

Perform a function test of the cable-operated switch at regular intervals.

5.2 Conveyor belt unbalance trackers

5.2.1 Electrical connection of the conveyor belt unbalance tracker

Electrical connection

**DANGER**

Hazardous voltage. Will cause death or serious injury.

Disconnect the system and all devices from the power supply before starting work.

The connection must only be made by authorized specialists.

Use only cable entries that are approved for the specific application.

Conductor cross-sections

Type of electrical connection	Screw terminals
Tightening torque	0.8 Nm
Type of connectable conductor cross-sections	
• Solid	2 x (0.5 ... 2.5) mm ²
• Finely stranded with end sleeve	2 x (0.5 ... 2.5) mm ²
• Solid for AWG cables	2 x 20 to 14
• Stranded for AWG cables	2 x 20 to 14

After wiring tighten the four cover screws using a Pozidriv screwdriver with a tightening torque of 1.2 Nm.

The conveyor belt unbalance trackers fulfill degree of protection IP65.

5.2.2 Commissioning of the conveyor belt unbalance tracker

Function test

Before commissioning, test the correct function of the conveyor belt unbalance tracker:

1. Installation has been performed in accordance with the instructions
2. Connection has been performed properly
3. The cable has been brought through and connected properly
4. The device is not damaged
5. Check the actuator for easy movement
6. Remove residual dirt
7. Check the cable entry and cable connections in the de-energized state

NOTICE
Maintenance Perform a function test of the conveyor belt unbalance tracker at regular intervals.

Application examples

6.1 Cable-operated switches

6.1.1 Selection criteria

Selection criteria for 3SE71 cable-operated switches	
Cable 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
Integrated EMERGENCY STOP	Yes / No
Alignment window (position indication of pretensioned wire)	Yes / No
Accessories	Steel ropes, cable clamps, tension springs, rope rollers, thimbles, turnbuckles, carabiner hooks, eyebolts, lifting eyebolts
Eyebolt for fixing the wire • Including M8 nut • Including M10 nut	• Inside diameter of hole 8 mm (3SE7920-1AB) • Inside diameter of hole 10 mm (3SE7920-1AC)
Lifting eyebolt, rotated for cable tensioning and low-wear cable routing in the case of frequent pulling • Including M6 nut	• Inside diameter of hole 10 mm

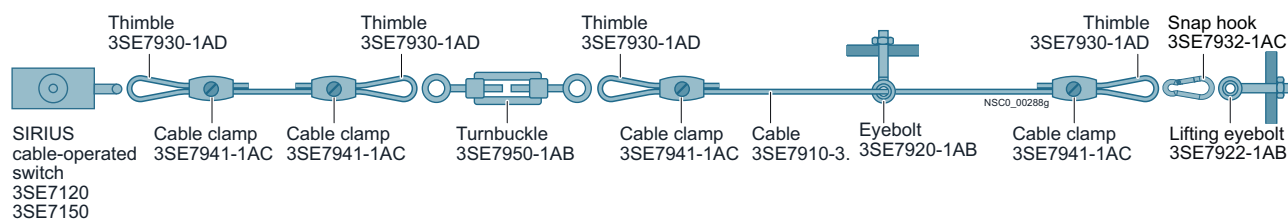
Note

Cable lengths in excess of 20 m

Tension springs and wire supports such as lifting eyebolts or eyebolts must be used for cable lengths in excess of 20 m.

6.1.2 Wire structure and attachment

Short wire lengths up to 20 m

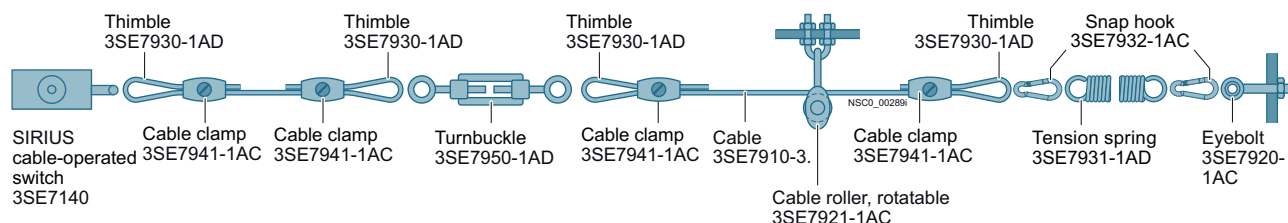


Long wire lengths up to 50 m

Note

Cable lengths in excess of 20 m

Tension springs and wire supports such as lifting eyebolts or eyebolts must be used for cable lengths in excess of 20 m.



Use of a tension spring is essential for cable length ≥ 20 m.

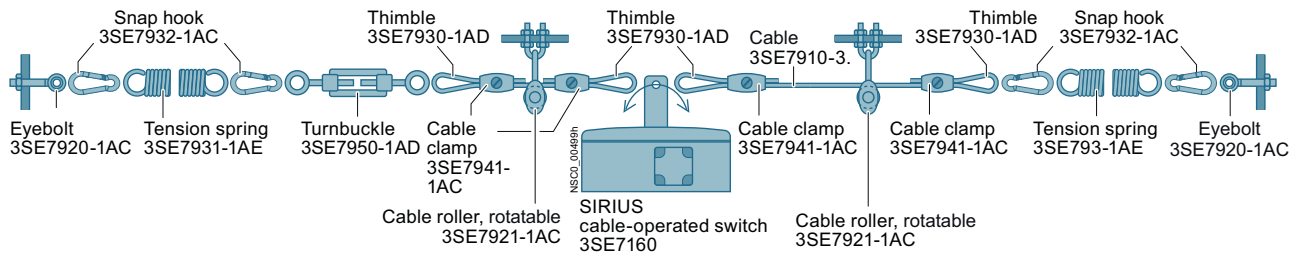
Actuation on both sides up to 2 x 100 m

Note

Actuation on both sides

If the two-sided cable-operated switch 3SE7160-1AE.. is used, a tension spring must be used on either side because otherwise it will not be possible to operate the switch.

Design 3SE7160-1AE..

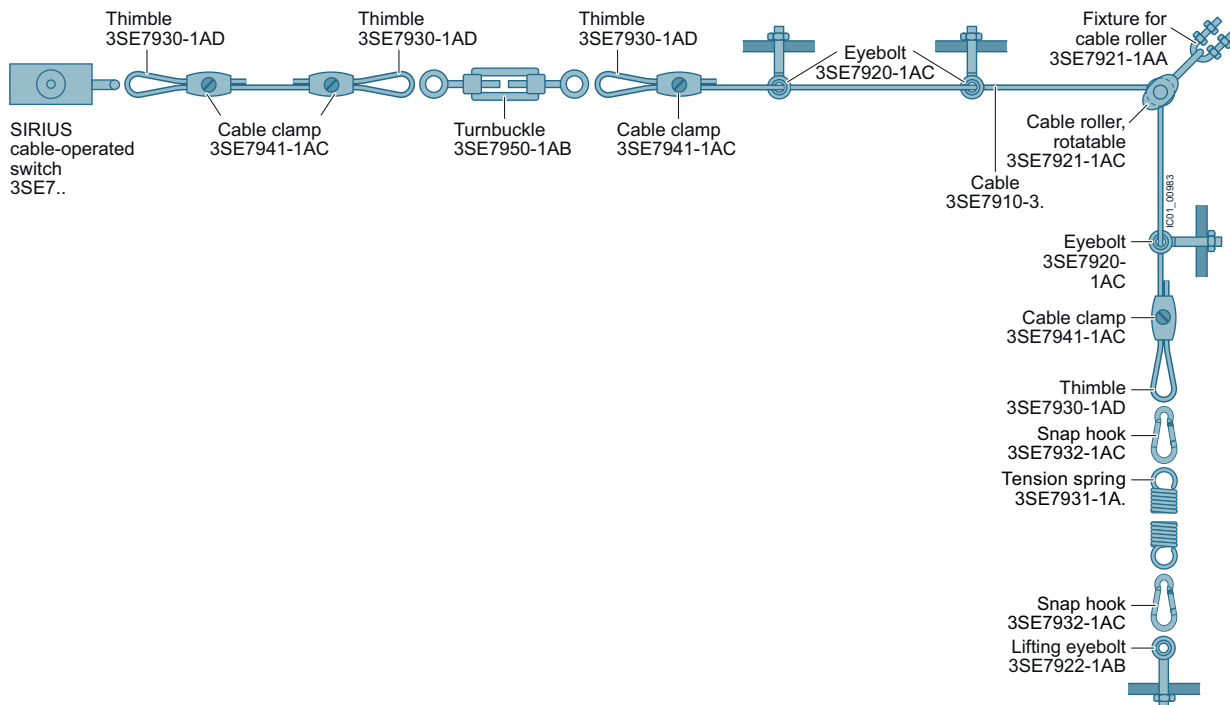


Spring must always be on both sides, as the switch is otherwise not able to be operated.

Mounting the redirection

Note

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



6.1.3 Setup of a safety function

A safety chain normally comprises the following functions: sensing, evaluating and responding.

- 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 using suitable motor switching devices such as contactors, fail-safe motor starters, or fail-safe soft starters

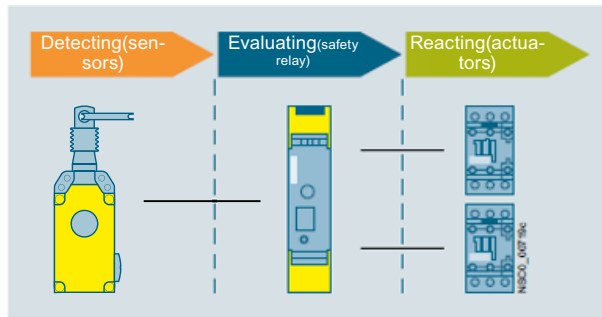
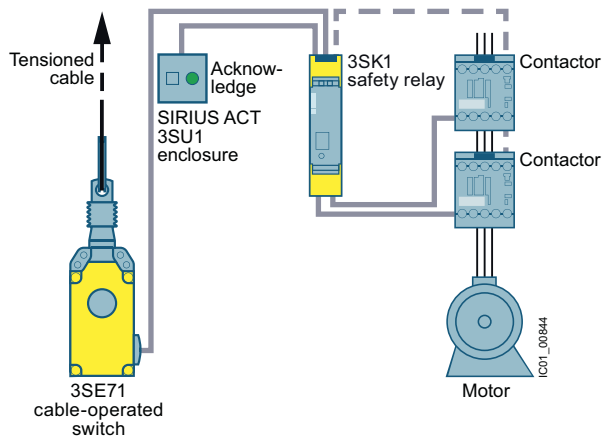


Figure 6-1 Possible setup of a safety function with SIRIUS cable-operated switches

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

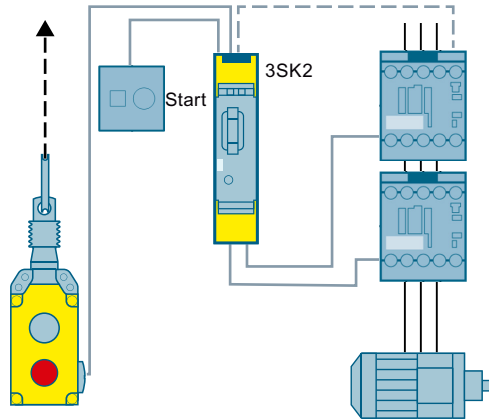
Setup of a safety application with a 3SE7 cable-operated switch and a 3SK1 safety relay

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 SIL 2 or PL d. Other device combinations are also possible.

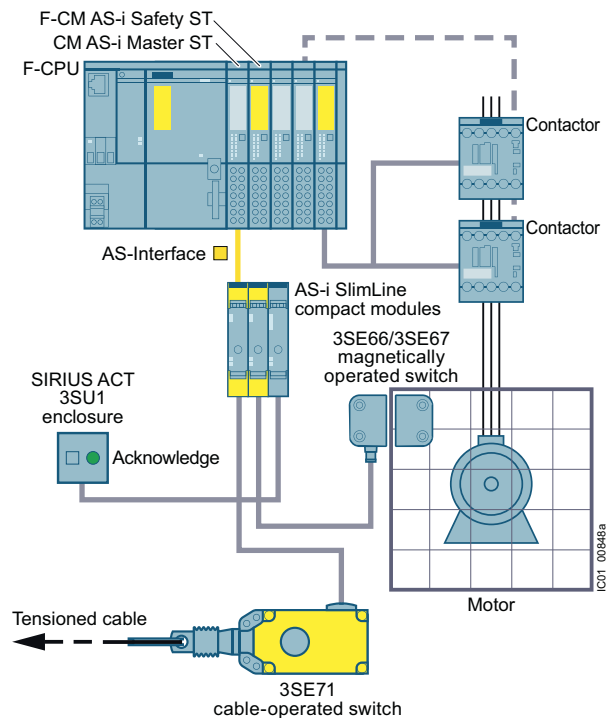


Setup of a safety application with a 3SE7 cable-operated switch and a 3SK2 safety relay

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. You will find a detailed description of the application example at the following Internet address: <https://support.industry.siemens.com/cs/ww/en/view/109738710>



Protective door monitoring using 3SE66/3SE67 non-contact safety switches (magnetically operated switches) and EMERGENCY STOP shutdown using 3SE71 cable-operated switch up to SIL 3/PL e by means of AS-i ET 200SP Master and AS-i SlimLine Compact modules



You will find a detailed description of the application example at the following Internet address:

<https://support.industry.siemens.com/cs/ww/en/view/109747653>

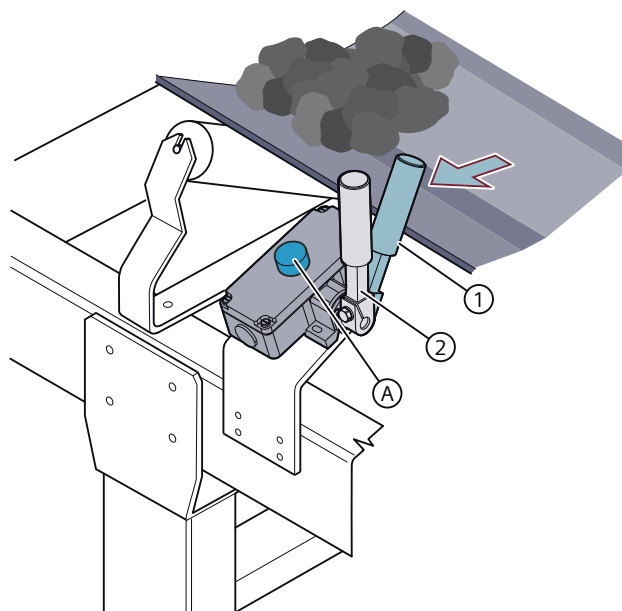
6.2 Conveyor belt unbalance trackers

6.2.1 Selection criteria

Selection criteria for conveyor belt unbalance tracker 3SE73	
Switching contacts	2 NO contacts and 2 NC contacts
Latching	With
Unlatching	Button reset
Visual signal	- None - With LED red, 24 V DC

6.2.2 Mounting example with conveyor belt unbalance trackers

Design 3SE7310-1AE...



- ① Position of the stainless steel roller lever at 15 degrees in the delivered condition
- ② Position of the stainless steel roller lever when triggered in the event of a fault
- A Blue pushbutton for resetting the stainless steel roller lever to the delivered condition

NOTICE**Risk of property 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.

Technical data

7.1 Technical specifications in the Siemens SiePortal

Technical data sheet

You can find the technical specifications for the product in Siemens SiePortal (<https://sieportal.siemens.com/su/bldxc>).

1. Enter the article number of the desired device in the "Products" field.
2. Click the "Technical specifications" link in the result.

7.2 Overview tables

Overview tables technical data

You will find overview tables with technical data in the "Product information" tab in our online ordering system (<https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/8260016?tree=CatalogTree>).

7.3 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

7.4 Example for illustration

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.

Safety characteristics - standard B10 values / failure rates

You can find more information on the Internet (<https://support.industry.siemens.com/cs/de/en/view/109739348>).

7.4 Example for illustration

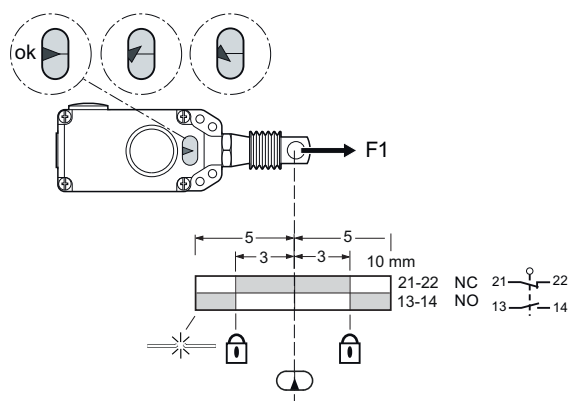
Siemens Industry Online Support

You will find the appropriate operating travel diagram for each cable-operated switch on the technical data sheet (see Chapter Technical specifications in the Siemens SiePortal (Page 41)).

Legend

	Contact element closed
	Contact element open
	Direction of actuation
	Mid-position
	Cable 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.

Cable 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.

7.5 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

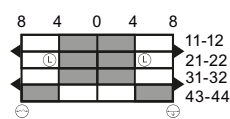


Figure 7-1 3SE7141-1EG10

Metal enclosures, degree of protection IP65

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

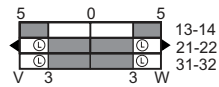


Figure 7-2 3SE7120-1BH00

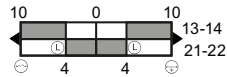


Figure 7-3 3SE7140-1BD00

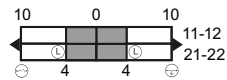


Figure 7-4 3SE7140-1BF00

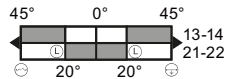


Figure 7-5 3SE7160-1BD00

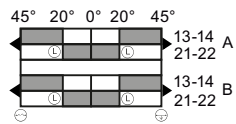


Figure 7-6 3SE7160-1AE00

Cable-operated switches, non-latching, without unlatching



Figure 7-7 3SE7120-2DD01

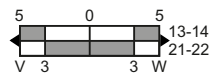


Figure 7-8 3SE7150-2DD00

Metal enclosures, degree of protection IP54

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

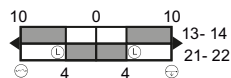


Figure 7-9 3SE7140-1CD00

Dimensional drawings

8.1 CAx data in the Siemens SiePortal

You can find CAx data for the product in the SiePortal (<https://sieportal.siemens.com/su/bldxc>).

1. Enter the article number of the desired device in the "Products" field.
2. Click the "CAx data" link in the result.

8.2 Cable-operated switches

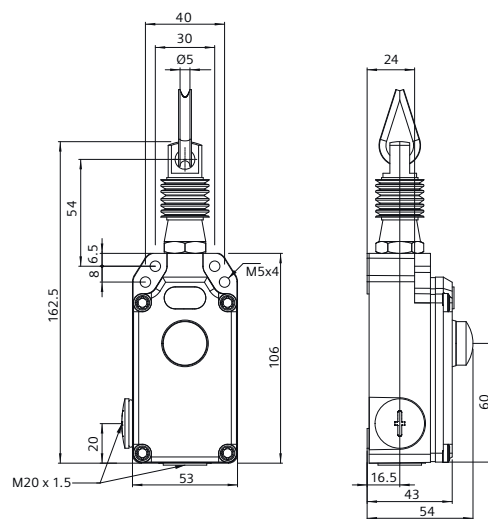
8.2.1 Examples of dimensional drawings for cable-operated switches

Note

All dimensions specified in mm.

3SE7120-1BF00

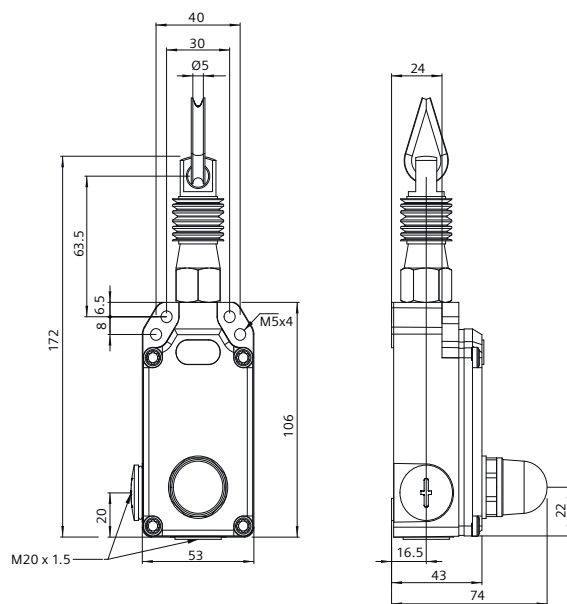
Non-latching



3SE7120-1BF00

3SE7150-2DD04

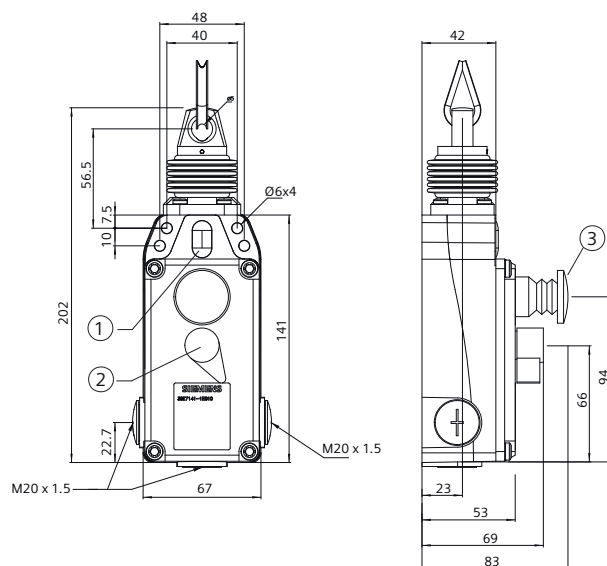
Non-latching, with LED light



3SE7150- 2DD04

3SE7141-1EG..

With EMERGENCY STOP, latching, and rotate-to-unlatch mechanism



3SE7141-1EG10

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

