CAPTRON

safeCAP SC4

Original Operating Instructions

safeCAP SC4 with PNOZ s6

CAPTRON

Table of Contents

1 Foreword

This operating manual was written for installers and operators and should be kept for future reference. Read this operating manual carefully and ensure that you fully understand its contents before installing or working with the safeCAP SC4. Validation of the entire safety system is the responsibility of the operator.

2 Safety

2.1 Used Notes and Symbols

Warnings regarding personal injury or property damage are designed according to the "SAFE" principle. This means they include information on the nature and source of the hazard, possible consequences, and how to avoid or mitigate the hazard. The following hazard classifications apply to the safety instructions:

Danger indicates a hazardous situation; failure to comply will result in death or serious injury. The symbol preceding the warning indicates the nature and source of the hazard graphically.

Warning indicates a dangerous situation; failure to observe it may result in death or serious injury. The symbol preceding the warning indicates the type and source of the hazard graphically.

Caution indicates a hazardous situation; failure to observe this warning may result in injury. The symbol preceding the warning indicates the nature and source of the hazard.

Note indicates a situation; failure to observe it may result in property damage and impair the product’s function.

TIP

A tip provides additional and useful information on how to use the product.

Symbol	Meaning
‣	Avoiding and preventing the hazard described in the warning
▶	Instructions All instructions for a procedure are always listed in chronological order.
▪	List

2.2 General Safety

All work on electrical systems or equipment must be performed exclusively by a qualified electrician in accordance with applicable electrical regulations.
The safety of the system in which the SENSORtaster is integrated is the responsibility of the operator.

2.3 Personnel Qualifications

A qualified electrician is a person with appropriate technical training, knowledge, and experience, as well as knowledge of relevant standards, who can properly assess the work assigned to them and identify potential hazards.

The following general safety instructions for handling electrical energy must be observed:

WARNING

Improper work on electrical systems!

Electric shock can cause fatal or life-threatening injuries.

- Before working on electrical systems, disconnect them from the power supply and secure them against being switched back on.
- Wear appropriate personal protective equipment.
- Have any identified defects, such as damaged or loose cables, repaired immediately.

2.4 Intended Use

safeCAP SC4, in combination with the PNOZ s6 safety relay, is used for the safety-related enabling and disabling of a safety circuit.
safeCAP SC4 is used to protect people from machinery with hazardous closing movements.
If safeCAP SC4 is used without the aforementioned safety relay, the safety-related enabling and disabling of a safety circuit is the responsibility of the operator.

2.5 Reasonably foreseeable misuse

Any use other than that specified in the "Intended Use" section, or any use exceeding the scope of that section, is considered improper.

The pushbutton is not suitable for:

- use as a two-hand control without the aforementioned relay or independent calculation of the Performance Level according to ISO 13849.
- use as a two-hand control without validation of the entire system.
- use as an emergency stop control device.
- use in potentially explosive atmospheres.
- outdoor use.

2.6 Service life determination and validation of the entire system

The following steps are mandatory.

- Determine the actual parameters of the system.
  - Required performance level
  - dop
  - hop
  - tcycle
- The operator must demonstrate that the service life $T_M$is not exceeded.
- Validate the entire system.
- Observe the safety considerations in the safety relay's operating instructions.

2.7 Example of the calculation

The following values are only examples and must be replaced with your own values.

- Performance Level e must be achieved.
- d_{op} = 250 d
- h_{op} = 24 h
- t_{cycle} = 10 s

n_{op} [cycles/year]

n_{op} = (d_{op} * h_{op} * 3600 s) / t_{cycle}

n_{op} = 250 d / y * 24 h / d * 3600 s / h / 10 s / cycle = 2,160,000 cycles / year

According to the operating instructions, the relay has a service life of approximately 20 million cycles before a dangerous failure occurs.

T_M = 20,000,000 / n_{op}

T_M = 20,000,000 / 2,160,000 = 9.3 years

According to the calculation, the relay must be replaced after 9.3 years. For other relays, different values such as B_{10D}or T_{10D}may be specified. These values are not taken into account here and can be requested from CAPTRON

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2.8 Equivalent Circuit

If an equivalent circuit is used for the relay, the total FIT value of the equivalent circuit must be determined by an FMEDA or an equivalent method. The equivalent circuit must not exceed a FIT value of 45, and the $MTTF_d$ should be greater than 45 years to satisfy the following formula:

$MTTF_d$ (equivalent circuit) = $MTTF_d$ (safeCAP) * 30 / ($MTTF_d$ (safeCAP) - 30).
Assumption: $MTTF_d$ (safeCAP) = 100;

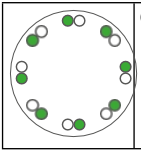
3 General Description

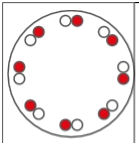
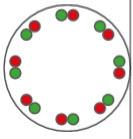
3.1 safeCAP SC4

1 Cover color
2 LEDs
3 Button surface

3.2 Operating states

The LEDs indicate the various operating states of the SC4.

	Green LEDs are lit.	The SC4 is ready for operation.

	Red LEDs are lit. The button is being pressed.	
	Green LEDs are lit. Red LEDs are flashing.	The SC4 cannot be operated ▪ The touch sensitivity is too low ▪ The touch surface is too dirty or too damp ▪ There are objects on the touchpad

4 Storage

Component	Conditions
safeCAP SC4	-25°C (-13°F) to 75°C (167°F)
Safety relay	-40°C (-40°F) to 85°C (185°F)
Protector SCP-4	Protected from UV light for a maximum of two years at 20°C (68°F) 50%–70% relative humidity

5 Installation

WARNING

Improper work on electrical systems!
Electric shock can cause fatal or life-threatening injuries.

- Before working on electrical systems, disconnect them from the power supply and secure them against being switched back on.
- Work on electrical systems must only be performed by qualified personnel in accordance with local and national electrical codes and regulations.

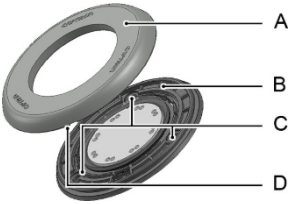
WARNING

Improper installation of safeCAP SC4!
A two-hand control system that is not installed in accordance with standards can result in fatal or life-threatening injuries.

- Select the mounting surfaces for the safeCAP SC4 according to the prescribed dimensions and distances specified in DIN EN ISO 13851.
- Protect the safeCAP SC4 against unintended activation, for example with SCP-4.
- Before working on the machine, check that the safeCAP SC4 is functioning properly.

5.1 Prepare for SC4 installation

Prerequisites: The mounting surface is level and clean.



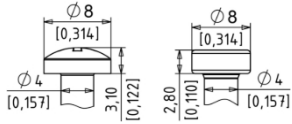
- ► Disconnect the system from the power supply and secure it against being switched back on.
- ► Determine the desired position of the SC4 and provide a center hole with a diameter of at least 45 mm and no more than 60 mm.
- ► Place the SC4 (B) in position, align it centrally and vertically, and mark the holes (C).
- ► Select the diameter of the holes according to the recommended screw type and drill.
- ► Depending on the installation position, it may be necessary to connect the SC4 at this point; see "Connecting the SC4 to the safety relay"

5.2 Recommended screw types

- DIN EN ISO 1207 M4
- DIN EN ISO 7045 M4
- DIN EN ISO 1481 Ø3.9 mm
- DIN EN ISO 7049 Ø3.9 mm

5.3 Maximum screw dimensions

The drawing shows the maximum dimensions of the screws.



5.4 Installation of SC4 without SCP4

Requirements: The mounting surface must be flat and clean.

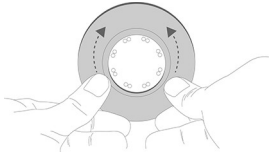
NOTE

Risk of damage to the mounting flange!
Inappropriate screw heads or excessive tightening torque can damage the mounting flange.

- Do not use countersunk screws.
- Tighten the screws to a maximum torque of 1.1 Nm.
- The screw head must not deform the mounting flange when tightening.

► Place the SC4 (B) in position, align it, and mount it using the recommended screws. The screw head must not deform the mounting flange (B).

► Place the colored cover ring (A) with the groove (D) facing down and press it close to the probe surface. The colored cover ring must be flush with the entire probe surface.



NOTE

Mineral-based greases and oils can damage the plastic of the sensor!

- Do not use any greases or oils to press on the colored cover ring (A).

NOTE

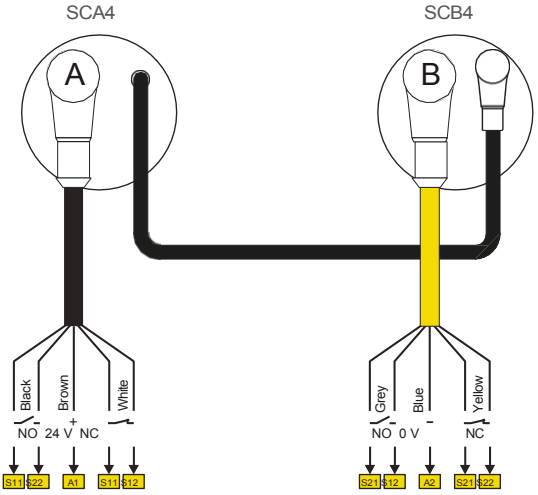
The SC4 units are not short-circuit proof and may be damaged if connected incorrectly.

- Check the connection for correctness before applying the operating voltage.

5.5 Connect the SC4 to the safety relay

1. Connect SC4A and SC4B to the safety line of SC4A (M8).
2. Connect the SC4A and SC4B to the safety relay according to the following wiring diagram.

5.5.1 Wiring diagram PNOZ s6



5.5.2 Connecting the SC4 to a replacement safety relay

The SC4 can also be connected to another safety relay or integrated into an SRP/CS; this must be coordinated with CAPTRON Electronic GmbH. The safety of the system in which the SC4 is integrated is the responsibility of the operator. For further information, please contactsales@captron.com .

5.6 Testing the SC4 Safety Function

To ensure the safety function of the SC4, the safety function must be checked according to the following points.

- During commissioning
- After the test interval has elapsed
- After maintenance and cleaning work The

results must be documented.

► Disconnect the SC4 from the machine.
► Connect the measuring device to the contacts of the safety relay that enable machine operation.
► Actuate the SC4 switches one after the other.
✔ The LEDs must light up red.
✔ The safety relay must not enable either the normally open or normally closed contacts.

Power-up must be verified with a measuring device at the output contacts of the safety relay and must not violate the safety time values (here 0.5 seconds).

► Disconnect SC4 from the power supply.
► Actuate SC4 and keep it actuated.
► Restore power supply.

✔ The LEDs must light up red.
✔ The safety relay must not release either the normally open or normally closed contacts.

6 Maintenance

6.1 Maintenance Tasks

Perform the following maintenance tasks at the specified intervals.

Maintenance task	As needed	Annually	Test interval
Clean the button surface	X		
Check safety function			X
Check cable for damage and secure fit		X	
Check that screw connections are tight		X	

7 Disposal

Electrical and electronic components of various types must be sorted and sent for recycling according to the relevant regulations.

8 Technical Data

General Data SC4	
Sensor principle	Capacitive, static-dynamic
Temperature range	0°C....+55°C (+32°F.....+131°F)
Rated insulation voltage	300 V
Degree of contamination	3
Degree of protection	IP 67
Housing material safeCAP	Polycarbonate (PC)
Electrostatic discharge	8 kV EN 61 000-4-2
HF radiation	10 V/m EN 61 000-4-3
Fast transients	2 kV EN 61 000-4-4
HF conducted	10 V EN 61 000-4-6
Radio interference suppression class	B EN 55 011

SC4 output	
Contact configuration	1 NO, 1 NC
Relay type	Electronic PhotMOS relay
Minimum current	10 mA per contact
Switching capacity at 24 V	200 mA per contact
Reliability	Semiconductor level

Input SC4	
Operating voltage	24 V DC $\pm$10%
Ripple	max. 10 %
Current consumption	< 65 mA
Switching frequency	1 Hz
Actuation speed	> 50 mm/s

8.1 Technical data for the PNOZ s6 safety relay

General data	Value
Conductor cross-section	0.2 - 2.5 mm²
Operating temperature	-10 ... +55°C
Storage temperature	-40 ... +85°C
Switching capacity	max. 6 A / 240 V AC (AC1) max. 5 A / 230 V AC (AC15) max. 6 A / 24 V DC (DC1) max. 5 A / 24 V AC (DC13)
Resistance to short cuircuit Max. safety fuse circuit breaker	 10 A 6 A 6 A, 24 V AC/DC, characteristic B/C

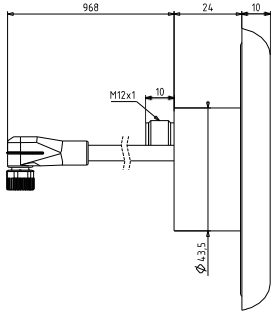
Safety specifications	Value	Unit
Category	4	
PL	e	
$MTTF_d$	100	a, years
DCavg	99.0	[%]
PFH_d	2.57×10^{-10}	[1/h]
average usage d_{op}	220	[days/year]
average usage h_{op}	12	[hours/day]
tcycle	20	[s/cycle]
Lifetime	20	years
Test Interval	2	years

TIP

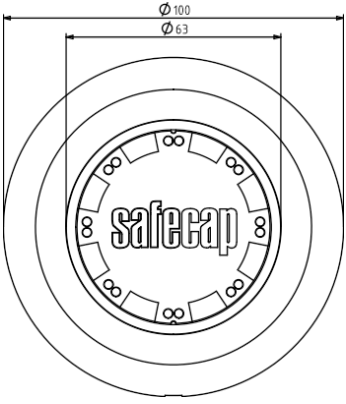
For further technical data, refer to the safety relay manual

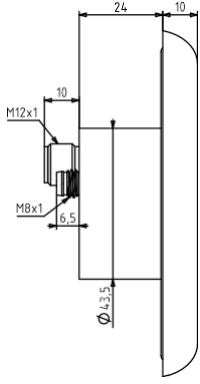
8.2 Dimensional drawing

8.2.1 SC4A



8.2.2 SC4B





9 Declaration of Conformity

CAPTRON

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EU-Konformitätserklärung
EU Declaration of Conformity

Verantwortlich als Hersteller: / *Responsible manufacturer:*
CAPTRON Electronic GmbH
Johann-G.-Gutenberg-Str. 7
D-82140 Olching

Dokumentationsbevollmächtigter: / *Authorised representative for documentation:*
CAPTRON Electronic GmbH
Johann-G.-Gutenberg-Str. 7
D-82140 Olching

erklärt, dass das Produkt: / *declares that the product:*
SENSORtaster safeCAP SC4 A+B mit Zweihand-Sicherheitsrelais PNOZ s6
SENSORswitch safeCAP SC4 A+B with two-hand safety relay PNOZ s6

Verwendungszweck: / *Intended purpose:*
Sicherheitsbauteil / kapazitive Zweihandschaltung
Safety device / capacitive two-hand safety control

den grundlegenden Anforderungen der Richtlinien:
complies with the essential requirements of the directives:

2006/42/EG	Maschinenrichtlinie
2014/30/EU	EMV-Richtlinie
2011/65/EU	RoHS-Richtlinie

Die Schutzziele der Niederspannungsrichtlinie wurden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie eingehalten.

gemäß den nachfolgend aufgeführten harmonisierten Normen entspricht.
in appliance with harmonised standards below.
DIN EN ISO 13849-1:2023-12
DIN EN ISO 13851: 2019-11
DIN EN 60947-5-1: 2018-03

Benannte Zertifizierung-Stelle: / *Named certificate authority:*
DGUV Test Prüf- und Zertifizierungsstelle Elektrotechnik
Fachbereich Energie Textil Elektro Medienerzeugnisse
Gustav-Heinemann-Ufer 130
D-50968 Köln
Benannte Stelle der EU, Kennnummer: 0340

EG-Baumusterprüfbescheinigung Nr.: / *EC-Type Examination Certificate No:* ET 26005

Olching, den 11.03.2026

Kilian Hüttenhofer
Head of Electrical Engineering

10 Legal Notice

The operating instructions were written and published by CAPTRON Electronic GmbH
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