Emergency Stop Safety Relay SR3C

Operating Instructions

English translation

Errors and technical changes reserved

Correct Use

EN ISO 13849-1

IEC 62061
IEC 61511
IEC 61508

GL
RINA

The SR3C is a universal emergency stop safety switching device with three safe relay contactss that can quickly and safely stop the moving parts of a machine or system in case of danger.

Applications for the SR3C include single or dual-channel emergency stop circuits and guard monitoring on machines and plants.

Product Safety
Functional
Safety
TÜVRheinland
CERTIFIED
www.tuv.com
ID 0600000000

TYPE APPROVED PRODUCT
DNV·GL
DNVGL.COM/AF

Germanischer Lloyd
Zertifikat TAE00003JF

c UL us
LISTED

- *3 safe, redundant relay contacts*
  1 auxiliary contact (signaling contact)
- *Connection of:*
  - *Emergency stop buttons*
  - *Safety switches*
  - *Non-contact safety switches*
  - *OSSD-Outputs*
- *Single and dual-channel operation possible*
- *Feedback loop for monitoring downstream contactors or expansion modules*
- *Cyclical monitoring of the output contacts*
- *Indication of the switching state via LED*
- *2 start behaviors possible:*
  - Monitored manual start
  - Automatic start
- *Short circuit and earth fault monitoring*
- *Up to PL e, SILCL 3, category 4*

Function

The emergency stop safety switching device SR3C is designed for safe isolation of safety circuits according to EN 60204-1 and can be used up to safety category 4, PL e according to EN ISO 13849-1.

The internal logical system closes the safety contacts when the start button is pressed.

If the safety switch is opened, the positively driven safety contacts are opened and safely switch the machine off. It is ensured that a single fault does not lead to a loss of the safety function and that every fault is detected by cyclical self-monitoring no later than when the system is switched off and switched on again.

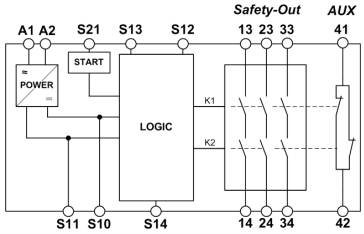


Fig. 1 Block diagram SR3C

Installation

As per EN 60204-1, the device is intended for installation in control cabinets with a minimum degree of protection of IP54. It is mounted on a 35 mm DIN rail according to DIN EN 60715 TH35.

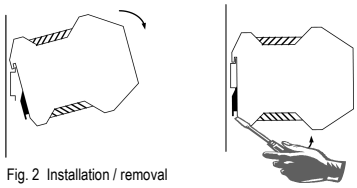


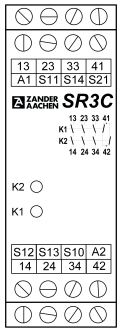
Fig. 2 Installation / removal

Safety Precautions

- Installation and commissioning of the device must be performed **only by authorized personnel**.
- Observe the country-specific regulations when installing the device.
- The electrical connection of the device is only allowed to be made with the device isolated.
- The wiring of the device must comply with the instructions in this user information, otherwise there is a risk that the safety function will be lost.
- It is not allowed to open the device, tamper with the device or bypass the safety devices.
- All relevant safety regulations and standards are to be observed.
- The overall concept of the control system in which the device is incorporated must be validated by the user.
- Failure to observe the safety regulations can result in death, serious injury and serious damage.
- Note down the version of the product (see label “Ver: x”) and check it prior to every commissioning of a new device. If the version has changed, the overall concept of the control system in which the device is incorporated must be validated again by the user.

Electrical Connection

- When the 24 V version is used, a safety transformer according to EN 61558-2-6 or a power supply unit with electrical isolation from the mains must be connected.
- External fusing of the safety contacts must be provided.
- A maximum length of the control lines of 1000 meters with a line cross section of 0.75 mm^2 must not be exceeded.
- The line cross section must not exceed 2.5 mm^2.
- If the device does not function after commissioning, it must be returned to the manufacturer unopened. Opening the device will void the warranty.



A1:	*Power supply*
A2 :	*Power supply*
S11:	*DC 24 V control voltage*
S10:	*Control line*
S21:	*Start control line*
S13:	*Control line*
S14:	*Control line*
S12:	*Control line*
13-14:	*Safety contact 1*
23-24:	*Safety contact 2*
33-34:	*Safety contact 3*
41-42:	*Auxiliary contact*

Fig. 3 Connections

L06
Ver. B
E61-137-00

Applications

Depending on the application or the result of the risk assessment according to EN ISO 13849-1, the device must be wired as shown in Fig. 1 to Fig. 11.

Emergency Stop Circuit

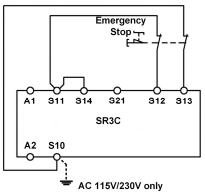


Fig. 1:
Two-channel emergency stop circuit with short circuit and earth fault monitoring.
(category 4, up to PL e)

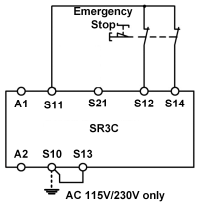


Fig. 2:
Two-channel emergency stop circuit with earth fault monitoring.
(category 3, up to PL d)

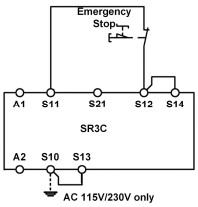


Fig. 3:
Single-channel emergency stop circuit with earth fault monitoring.
(category 1, up to PL c)

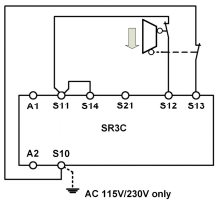


Fig. 4:
Two-channel sliding guard monitoring with short circuit and earth fault monitoring.
(category 4, up to PL e)

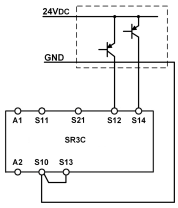


Fig. 5:
Two-channel emergency stop with pnp-outputs/OSSD-outputs ***with*** *short circuit monitoring.*
(category 4, up to PL e)

Notice:

In order to activate earth fault monitoring, S10 must be connected to PE (protective earth) on the AC 115/230 V devices. With AC/DC 24 V, connect PE only to the power supply unit according to EN 60204-1

Corresponded to the application, the starting circuit have to be wired according to Fig. 6 or Fig. 7.

Starting Behavior

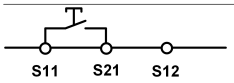
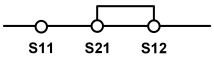


Fig. 6:
Monitored manual start.
It is monitored that the start button was opened before the emergency stop button closes. (Prerequisite: operating voltage must not be interrupted.)



Warning:
Safety contacts switch immediately when the power supply is connected.

Fig. 7:
Automatic start.
Max perm. delay during closing of the safety switches on S12 and S13:
S12 before S13: 300 ms
S13 before S12: any

Feedback Loop

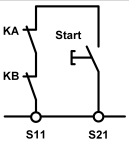


Fig. 8:
Feedback loop for monitored manual start:
The feedback loop monitors contactors or the expansion modules .

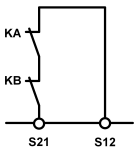


Fig. 9:
Feedback loop for automatic start:
The feedback loop monitors contactors or the expansion modules .

Power supply and Safety contacts

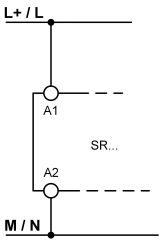


Fig. 10:
Power supply A1 and A2.

(Power supply according to techn. Data)

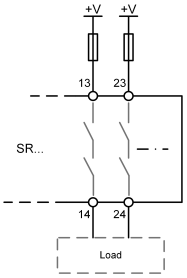


Fig. 11:
Connecting load to safety contacts.

(Figure shows example. Voltage „+V“ according to techn. Data)

Commissioning Procedure

Note: *The items listed under “Electrical connection” must be observed during commissioning.*

1. Input circuit:

Depending on the risk evaluation choose one of the wiring diagrams in „Applications“ (Fig. 1 to 5).

2. Choose start mode:

Connect the start button with S11 and S21 for monitored manual start or connect S21 with S12 directly for automatic start (Fig. 6 or 7).

Warning:

If “Automatic start” is set, bear in mind that the safety contacts will switch immediately after the power supply is connected. If “Monitored manual start” is set, the start button must be opened after wiring.

3. Feedback loop:

If external contactors or extension modules are used, connect them according to Fig. 8 or Fig. 9.

4. Power supply:

Connect the power supply to A1 and A2 (Fig. 10). ***Caution:*** Power must not yet be activated.

5. Starting the device:

Switch on the operating voltage.

Warning:

If the “Automatic start” starting behavior is set, the safety contacts will close immediately.

If the “Monitored manual start” starting behavior is set, close the start button to close the safety contacts.

LEDs ***K1*** and ***K2*** are lit.

6. Triggering safety function:

Open the emergency stop circuit by actuating the connected safety switch. The safety contacts open immediately.

7. Reactivation:

Close the emergency stop circuit. If “Automatic start” is selected, the safety contacts will close immediately.

If the “Monitored manual start” starting behavior is set, close the start button to close the safety contacts.

Maintenance

The device must be checked once per month for proper function and for signs of tampering and bypassing of the safety function.

The device is otherwise maintenance free, provided that it was installed properly.

What to Do in Case of a Fault?

Device does not switch on:

- *Check the wiring by comparing it to the wiring diagrams.*
- *Check the safety switch used for correct function and adjustment.*
- *Check whether the emergency stop circuit is closed.*
- *Check whether the start button (with manual start) is closed.*
- *Check the operating voltage at A1 and A2.*
- *Is the feedback loop closed?*

Device cannot be switched on again after an emergency stop:

- Check whether the emergency stop circuit was closed again.
- Was the start button opened before closing of the emergency stop circuit (with manual start)?
- Is the feedback loop closed?

If the fault still exists, perform the steps listed under “Commissioning Procedure”.

If these steps do not remedy the fault either, return the device to the manufacturer for examination.

Opening the device is impermissible and will void the warranty.

Safety Characteristics According to EN ISO 13849-1

The device is certified according to EN ISO 13849-1 up to a Performance Level of PL e.

Note:

Additional data can be requested from the manufacturer for applications that deviate from these conditions.

Safety characteristics according to EN ISO 13849-1 for all variants of SR3C

Load (DC-13; 24 V)	**<= 0,1 A**	**<= 1 A**	**<= 2 A**
T10d [years]	**20**	**20**	**20**
Category	**4**	**4**	**4**
PL	**e**	**e**	**e**
PFHd [1/h]	**1,2E-08**	**1,2E-08**	**1,2E-08**
nop [cycle / year]	**<= 500.000**	**<= 350.000**	**<= 100.000**

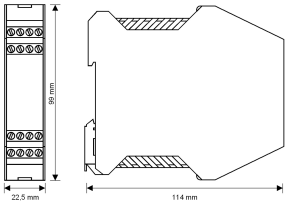
Techn. Data

Corresponds to the standards	EN 60204-1; DIN EN ISO 13849-1; EN 62061; IEC 61508 Parts 1-2 and 4-7; IEC 61511-1		
Operating voltage	AC 230 V, AC 115 V 50-60 Hz; AC/DC 24 V; AC: 50-60 Hz		
Permissible deviation	+ / - 10 %		
Power consumption	**AC 230 V** approx. 6.9 VA	**AC 24 V** approx. 4.5 VA	**DC 24 V** approx. 2.3 W
Control voltage at S11	DC 24 V		
Control current S11...S14	approx. 60 mA		
Safety contacts	3 NO contacts		
Auxiliary contacts	1 NC contact		
Max. switching voltage	AC 250 V		
Safety contact breaking capacity (13-14, 23-24, 33-34)	AC: 250 V, 2000 VA, 8 A for ohmic load (6 switching cycles/ min) 250 V, 3 A for AC-15 DC: 40 V, 320 W, 8A for ohmic load (6 switching cycles/ min) 24 V, 3 A, for DC-13 Max. total current through all 3 contacts: 15 A (13-14, 23-24, 33-34) *)		
Auxiliary contact breaking capacity (41-12)	AC: 250 V, 500 VA, 2 A for ohmic load DC: 40 V, 80 W, 2 A for ohmic load		
Minimum contact load	24 V, 20 mA		
Contact fuses	10 A gG		
Max. line cross section	0.14 - 2.5 mm^2		
Max. length of control line	1000m with 0.75 mm^2		
Contact material	$AgSnO_2$		
Contact service life	mech. approx. 1 x 10^7		
Test voltage	2.5 kV (control voltage/contacts)		
Rated impulse withstand voltage, leakage path/air gap	4 kV (DIN VDE 0110-1)		
Rated insulation voltage	250 V		
Degree of protection	IP20		
Temperature range	-15 °C to +40 °C *)		
Degree of contamination	2 (DIN VDE 0110-1)		
Overvoltage category	3 (DIN VDE 0110-1)		
Weight	approx. 230 g		
Mounting	DIN rail according to EN 60715 TH35		

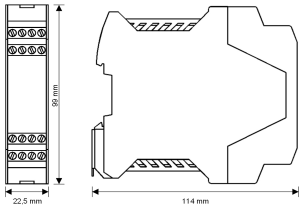
*) If several SR3C devices are closely spaced under load, the max. total current at the ambient temperature of T=20 °C: 9 A; at T=30 °C: 3 A; at T=40 °C =1 A. If these currents are exceeded, a spacing of 5 mm between the devices must be observed.

Dimension Drawing

Fixed Terminals



Plug-In Terminals



Variants

Order no. 472170	SR3C, AC 230 V (50-60 Hz),	fixed screw terminals
Order no. 472171	SR3C, AC 115 V (50-60 Hz),	fixed screw terminals
Order no. 472173	SR3C, AC/DC 24 V,	fixed screw terminals
Order no. 474170	SR3C, AC 230 V (50-60 Hz),	incl. plug-in screw terminals
Order no. 474171	SR3C, AC 115 V (50-60 Hz),	incl. plug-in screw terminals
Order no. 474173	SR3C, AC/DC 24 V,	incl. plug-in screw terminals
Order no. 475170	SR3C, AC 230 V (50-60 Hz),	incl. push-in twin spring connector
Order no. 475171	SR3C, AC 115 V (50-60 Hz),	incl. push-in twin spring connector
Order no. 475173	SR3C, AC/DC 24 V,	incl. push-in twin spring connector
Order No. 472592	EKLS4,	set of plug-in screw terminals
Order No. 472595	EKLZ4,	set of push-in twin spring connector
Order No. 472596	Spacer for a defined minimum distance between two safety relays (see derating)	

CE

Konformitätserklärung
EC Declaration of Conformity
Déclaration de conformité

Hersteller: / Producer: / Fabricant:
H. ZANDER GmbH & Co. KG
Am Gut Wolf 15 • 52070 Aachen • Deutschland

Produktgruppe: / Product Group: / Groupe de produits:
Sicherheits-Not-Halt-Schaltgeräte
Safety emergency stop switching devices
Relais de sécurité d'arrêt d'urgence

Produkt Name / Product Name / Nom du produit	**Anbringung der CE-Kennzeichnung** / Affixing of CE marking: / Application du marque CE	**Zertifikats-Nr.** / No of Certificate / N° du certificat
SRLC	2016	01/205/5463.01/16
SR2C	2016	01/205/5463.01/16
SR3C	2016	01/205/5463.01/16
SR3D	2016	01/205/5463.01/16
SK3D	2016	01/205/5463.01/16
TE-OR3	2016	01/205/5463.01/16
TE-OR3D	2016	01/205/5463.01/16

Die Produkte stimmen mit den Vorschriften folgender Europäischer Richtlinien überein:
The products conform with the essential protection requirements of the following European directives:
Les produits sont conformes aux dispositions des directives européennes suivantes:

2006/42/EG : Maschinenrichtlinie
2006/42/EG : Machinery directive
2006/42/EG : Directive Machines

2011/65/EU: RoHS Richtlinie
2011/65/EU: RoHS directive
2011/65/EU: Directive RoHS

2014/30/EU : EMV Richtlinie
2014/30/EU : EMC directive
2014/30/EU : Directive CEM

Die Übereinstimmung der bezeichneten Produkte mit den Vorschriften der o.a. Richtlinie wird, falls anwendbar, nachgewiesen durch die vollständige Einhaltung folgender Normen:
If applicable, the conformity of the designated products is proved by full compliance with the following standards:
Le strict respect des norms suivantes confirme, s´il y a lieu, que les produits désignés sont conformes aux dispositions de la directive susmentionnée:

EN 60439-1:2005-01
EN 61000-6-2:2006-03
EN 60947-1:2011-10
EN 61000-6-3:2011-09
EN 60947-5-1:2010-04
DIN EN 61326-3-1:2008-11

Gemäß Zertifikat der benannten Stelle:
According to the certificate of the below mentioned organisation:
Selon de organisme notifé:

EN 62061:2005 +AC:2010+A1:2013+A2:2015
IEC 61508 Parts 1-2 and 4-7:2010
EN 50156-1:2015 in extracts (SR3D, SK3D, TE-OR3D)
DIN EN ISO 13849-1:2015
IEC 61511-1:2016
EN 746-2:2010 in extracts (SR3D, SK3D, TE-OR3D)

Benannte Stelle / Organisme notifé: Nr. NB 0035
TÜV Rheinland Industrie Service GmbH
10882 Berlin
Zertifizierungsstelle für Maschinen

Dokumentationsbeauftragte/-r: Christiane Nittschalk
Documentation manager
Autorisé à constituer le dossier technique

Aachen, den 04.07.2017

Dipl.-Ing. Walter Zander
Geschäftsleitung
General Manager
Direction

Dipl.-Ing. Alfons Austerhoff
Leiter CE-Konformitätsbewertung
Manager for EC declaration of conformity
Responsable évaluation de conformité CE

F7 3-07/03

H. ZANDER GmbH & Co. KG • Am Gut Wolf 15 • 52070 Aachen • Germany
Tel +49 (0)241 9105010 • Fax +49 (0)241 91050138 • info@zander-aachen.de • www.zander-aachen.de