

Operating Instructions

Correct Use



The SR2C is a universal emergency stop safety switching device with two safe relay outputs that can quickly and safely stop the moving parts of a machine or system in case of danger.

Applications for the SR2C include single or dual-channel emergency stop circuits and guard monitoring on machines and systems in accordance with EN ISO 13849-1, EN IEC 62061 and in machines and plants in accordance with IEC 61508 and IEC 61511.

- 2 safe, redundant relay contacts
- 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, SIL 3, category 4

Function

The emergency stop safety switching device SR2C is designed for safe isolation of safety circuits according to EN 60204-1 and can be used up to safety category 4, PL e / SIL 3 according to EN ISO 13849-1 / IEC 61508.

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

If the emergency stop circuit 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.

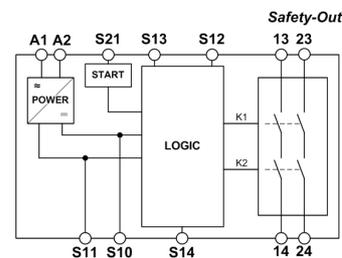


Fig. 1 Block diagram SR2C

Installation

As per EN 60204-1, the device is intended for installation in control cabinets with a minimum degree of protection of IP54. The following should be noted:

- Mounting on 35 mm rail according to EN 60715 TH35
- Ensure sufficient heat dissipation in the control cabinet
- With the AC 115 V / 230 V version, a minimum distance of 10 mm to adjacent devices must be maintained

Note: Spacer from ZANDER AACHEN (Art. No. 472596) for defined distances - See section Accessories.

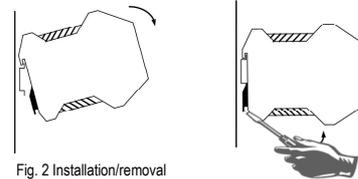


Fig. 2 Installation/removal

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.
- The year of manufacture can be found on the type label on the device. It is located at the end of the line of the voltage specification, below the ID number.

Electrical Connection

- Consider the information in the section "Techn. data"
- 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.
- If the device does not function after commissioning, it must be returned to the manufacturer unopened. Opening the device will void the warranty
- Use adequate protective circuit for inductive loads (e.g. free-wheeling diode)



- 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

Fig. 3 Connections

Operating Instructions

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. 4 to Fig. 15.

Emergency Stop Circuit

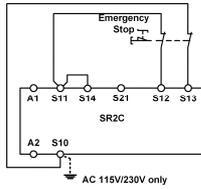


Fig. 4:
Two-channel emergency stop circuit with short circuit and earth fault monitoring.
(category 4, up to PL e, SIL 3)

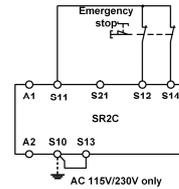


Fig. 5:
Two-channel emergency stop circuit with earth fault monitoring.
(category 3, up to PL d, SIL 2)

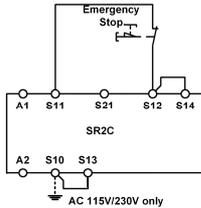


Fig. 6:
Single-channel emergency stop circuit with earth fault monitoring.
(category 1, up to PL c, SIL 1)

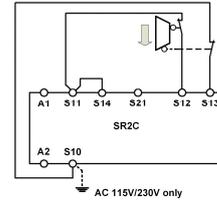


Fig. 7:
Two-channel sliding guard monitoring with short circuit and earth fault monitoring.
(category 4, up to PL e, SIL 3)

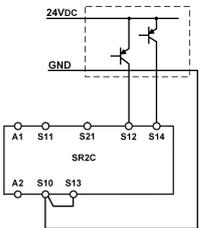


Fig. 8:
Two-channel emergency stop with pnp-outputs/OSSD-outputs with short circuit monitoring.
(category 4, up to PL e, SIL 3)

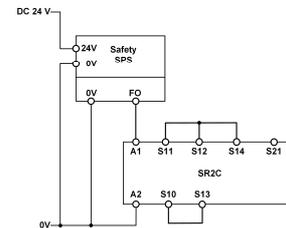


Fig. 9:
Connecting to a safety PLC
(category 4, up to PL e, SIL 3)

Prerequisite:
Fault exclusion for cross-circuit (e.g. according to EN ISO 13849-2, Table D4 - wiring in protected wiring space) and PLC also meets requirements for category 4, PL e, SIL 3.



Notice:

- In order to activate earth fault monitoring, S10 must be connected to PE (protective earth) on the AC 115/230 V devices
- For AC/DC 24 V devices, the earth connection of the power supply unit must be on the secondary side
- It must be ensured that any switch-on pulses (light test) sent by the signal generator do not lead to a short activation of the safety relay and should therefore basically be deactivated
- For the applications according Fig. 8 and 9, make sure that the reference potential of the signal generator and the SR2C is the same

Starting Behavior

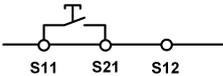


Fig. 10:
Monitored manual start.
It is monitored that the start button was opened before the emergency stop button closes.
(Prerequisite: operating voltage must not be interrupted.)

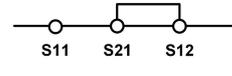


Fig. 11:
Automatic start.
Max perm. delay during closing of the safety switches on S12 and S13:
S12 before S13: 300 ms
S13 before S12: any

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

Feedback Loop

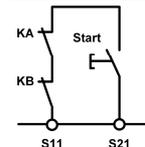


Fig. 12:
Feedback loop for monitored manual start.
The feedback loop monitors contactors or the expansion modules.

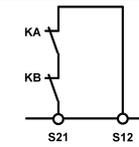


Fig. 13:
Feedback loop for automatic start.
The feedback loop monitors contactors or the expansion modules.

Power supply and Safety contacts

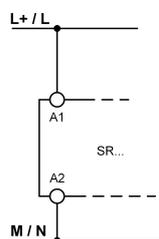


Fig. 14:
Power supply A1 and A2.
(Power supply according to techn. Data)

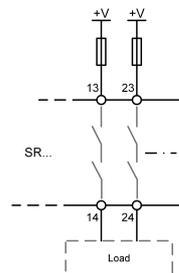


Fig. 15:
Connecting load to safety contacts.
(Figure shows example. Voltage „+V“ according to techn. Data)

Commissioning Procedure



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

1. Wiring emergency stop circuit:

Wire the emergency stop circuit according to the required Performance Level determined (see Fig. 4 to Fig. 9).

2. Wiring start circuit:

Wire the start circuit according to Fig. 10 or Fig. 11 to set the starting behavior.

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. Wiring feedback loop:

If your application provides for external contactors or expansion modules, connect them to the device according to Fig. 12 or Fig. 13.

4. Wiring power supply:

Connect the power supply to terminals A1 and A2 (Fig. 14).

Warning: Wiring only in de-energized state.

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English translation

Errors and technical changes reserved

Disclaimer and warranty

If the above mentioned conditions for appropriate use are not complied with or if the safety instructions are not followed or if any maintenance operations are not carried out as required, this shall lead to an exclusion of liability and loss of warranty.

ATTENTION!

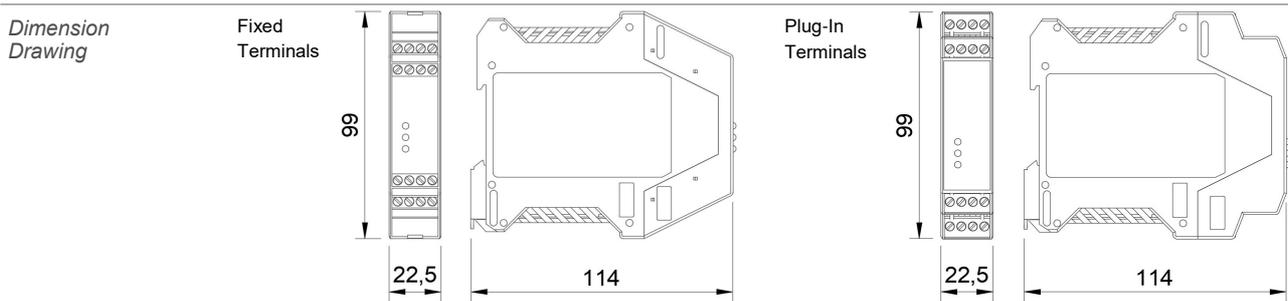
We would like to point out that it is the full responsibility of the operator to ensure a plant availability. Using the SR2C, a safety emergency stop relay according to

- EN ISO 13849-1
- EN IEC 62061
- IEC 61508
- IEC 61511-1

is used, which will be brought into the safe state when the safety function is requested.

This means that the connected load is switched off as soon as a request from connected sensor elements or diagnostic measures detects a dangerous state, e.g. caused by a component fault.

Since process-related applications in particular have high demands on availability, limited availability can also have significant consequences. It is therefore recommended to stock a second unit to avoid long downtimes in such a case. These are recommendations of the manufacturer, the evaluation of the importance of the plant availability is the sole responsibility of the operator.



Note: Actual number of front LEDs may differ from the number shown in the drawing, depending on the variant.

Order No.	SR2C, AC 230 V (50-60 Hz),	fixed screw terminals
Order No. 472150	SR2C, AC 230 V (50-60 Hz),	fixed screw terminals
Order No. 472151	SR2C, AC 115 V (50-60 Hz),	fixed screw terminals
Order No. 472152	SR2C, AC/DC 24 V (AC: 50-60 Hz),	fixed screw terminals
Order No. 474150	SR2C, AC 230 V (50-60 Hz),	incl. plug-in screw terminals
Order No. 474151	SR2C, AC 115 V (50-60 Hz),	incl. plug-in screw terminals
Order No. 474152	SR2C, AC/DC 24 V (AC: 50-60 Hz),	incl. plug-in screw terminals
Order No. 475150	SR2C, AC 230 V (50-60 Hz),	incl. push-in twin spring connector
Order No. 475151	SR2C, AC 115 V (50-60 Hz),	incl. push-in twin spring connector
Order No. 475152	SR2C, AC/DC 24 V (AC: 50-60 Hz),	incl. push-in twin spring connector
Accessories		
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 Electric Cabinet	rail spacer 5mm, PU = 12 pcs

Safety
Characteristics

Safety characteristics according to EN ISO 13849-1

Load - DC-13	≤ 0.1 A	≤ 1 A	≤ 2 A
Max. duration of use [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 [Cycles / year]	≤ 400,000	≤ 100,000	≤ 22,500

Safety characteristics according to IEC 61508 - High Demand

Conditions: Days of operation/year: 365; Hours/Day: 24; Switching-Cycle/Hour: 1; Maximum load AC-15 / DC-13

Max. duration of use [Years]	20
Proof-Test-Intervall [Years]	20
PFH [1/h]	7.23E-11
SIL	3

Safety characteristics for alternate 1oo1 structure for process industry - High Demand

Conditions: Days of operation/year: 365; Hours/Day: 24; Switching-Cycle/Hour: 1; Maximum load AC-15 / DC-13

Device type	A
HFT	0
SIL	3
SFF [%]	99.93
λ _{SD} [FIT]	0
λ _{SU} [FIT]	99.81
λ _{DD} [FIT]	7.23
λ _{DU} [FIT]	0.07
PFH [1/h]	7.23E-11

Safety characteristics according to IEC 61508 - Low Demand

Conditions: Maximum load AC-15 / DC-13

Max. duration of use [Years]	20
Proof-Test-Intervall [Years]	9
PFD _{AVG}	9.87E-05
SIL	3

Safety characteristics for alternate 1oo1 structure for process industry - Low Demand

Conditions: Maximum load AC-15 / DC-13

Device type	A
HFT	0
SIL	3
SFF [%]	97.01
λ _{SD} [FIT]	0
λ _{SU} [FIT]	101.04
λ _{DD} [FIT]	0
λ _{DU} [FIT]	3.12
PFD _{avg} (e.g. for T = 1 year)	1.37E-05

Proof-Test

In order to check the proper function of the device, the following steps have to be carried out

- Demand the safety function by opening the safety circuit. Check that the relay contact (13-14; 23-24) opened by activation of the safety function.
 - Close the safety circuit and start the device again. Check that the safety contacts (13-14; 23-24) closed again.
- If the device doesn't switch on again, the proof-test failed.

ATTENTION:

If the proof-test fails, the device must be replaced. Otherwise there is a risk of loss of functional safety.



CE
Declaration

CE Konformitätserklärung EC Declaration of Conformity Déclaration de conformité

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

Produktgruppe: Sicherheits-Not-Halt-Schaltgeräte
Product Group: Safety emergency stop switching devices
Groupe de produits: 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.....2023.....		01/205/5463.03/23
SR2C.....2023.....		01/205/5463.03/23
SR3C.....2023.....		01/205/5463.03/23
SR3D.....2023.....		01/205/5463.03/23
SR3A.....2023.....		01/205/5463.03/23
SR3AD.....2023.....		01/205/5463.03/23
SK3D.....2023.....		01/205/5463.03/23

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	2011/65/EU :RoHS Richtlinie
2006/42/EG : Machinery directive	2011/65/EU: RoHS directive
2006/42/EG : Directive Machines	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 61326-3-1:2018 **EN IEC 61000-6-2:2019** **IEC 63000:2018**

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

EN ISO 13849-1:2015 **EN ISO 13849-1:2023** **IEC 61508 Parts 1-7:2010**

Benannte Stelle / Organisme notifié: Nr. NB 0035
TÜV Rheinland Industrie Service GmbH
51105 Köln
Zertifizierungsstelle für Maschinen

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

Aachen, den 24.10.2023


Dr.-Ing. Marco Zander
Geschäftsführung
General Manager
Direction


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

FT 3/07/03

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