2-Hand Safety Relay S2HC

Operating Instructions

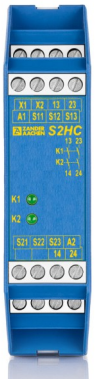
English translation

Errors and technical changes reserved

Correct Use

The S2HC 2-hand safety relay is an extremely compact, universal safety two-hand control unit. It complies with EN574/EN ISO 13851, Typ III C, and is intended for use in safety circuits that are designed in accordance with EN 60204-1, e.g. on presses, punches and bending tools. Due to the internal error monitoring, the 2-hand safety relay can be used, despite very compact dimensions, for all applications up to the highest safety category 4 and PL e according to EN ISO 13849-1, SILCL 3 according to EN 62061 or Typ III C according to EN574/EN ISO 13851.

- *2 safe, redundant relay outputs*
- *Cyclical monitoring of the output contacts*
- *Feedback loop for monitoring downstream contactors or expansion modules*
- *Short circuit and earth fault monitoring*
- *Extrem compact housing*
- *Up to PL e, SIL 3, cat. 4 (EN ISO 13849-1 an EN 62061)*



Function

The ZANDER 2-hand safety relay S2HC is suitable for setting up and monitoring two-hand circuits and is used to protect the operators. Dangerous work steps can only be triggered when both two-hand buttons connected are operated simultaneously, i.e. within 0.5 s.

It is to be ensured a single fault or a malfunction does not result in the loss of the safety function and every fault is detected by the cyclic self-monitoring at the latest prior to the next actuation.

When the operating voltage is applied to A1-A2 and the feedback loop X1-X2 is closed, the S2HC is ready for use. To be able to initiate a switching operation, the output relays must be de-energized. The output relays only switch to the energized position when the two-hand buttons T1 and T2 are operated simultaneously, i.e. within 0.5 s.

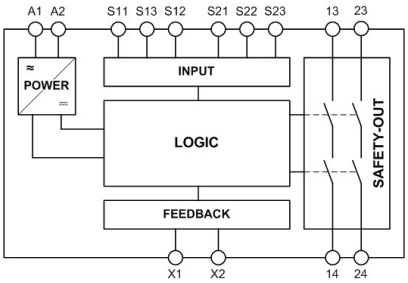


Fig. 1 Block diagram S2HC

The output relays are not switched if:

- *only one two-hand button is actuated or the time between the actuation of the 2 two-hand buttons is greater than 0.5 s,*
- *the feedback loop is open (fault in the external contactor),*
- *another error (short circuit, cable break, error in the switching device) has occurred.*

When T1 and/or T2 are/is released, the output relays opens immediately. In order to trigger a new operation, both two-hand buttons must first be released and the feedback loop must be closed.

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.

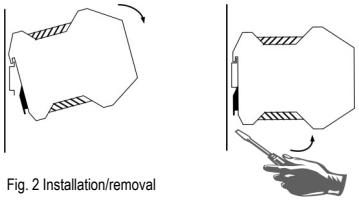


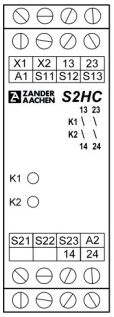
Fig. 2 Installation/removal

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.

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:	*Control line T1*
S12:	*Control line T1*
S13:	*Control line T1*
S21:	*Control line T2*
S22:	*Control line T2*
S23:	*Control line T2*
X1; X2:	*Feedback loop*
13-14:	*Safety contact 1*
23-24:	*Safety contact 2*

Fig. 3 Connections

T10
Ver. A
E61-134-00

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

Applications

The arrangement of the two-hand buttons must be designed in accordance with the standards EN574/EN ISO 13851 and DIN EN ISO 13855 such that accidental actuation or simple bypassing of the safety function is excluded.

The S2HC unit is provided for the connection of 2-hand push-buttons, with one normally open or one normally colsed contact.

Figur 1 shows the wiring of the S2HC with a 2-hand push-buttons:

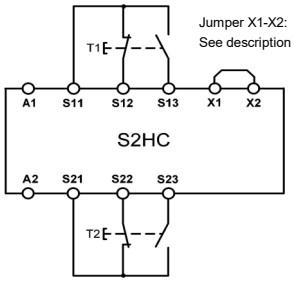


Fig. 4:
Wiring of the S2HC with a 2-hand push-buttons

Feedback loop

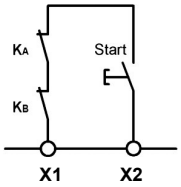


Fig. 5: Feedback loop
Contactors connected to the S2HC or the basic devices are monitored via the feedback loop of the basic device. KA and KB are the positively driven contacts of the connected contactor or expansion module.

Installation

Avoiding unintentional actuation or bypassing of the safety device

The arrangement of the two-hand buttons must be designed in accordance with the standard EN574/EN ISO 13851 such that accidental actuation or simple bypassing of the safety function is excluded.

The operation of both buttons using one hand must be prevented by an adequate distance (at least 260 mm) or by a separating wall. Actuation using forearm, elbow, knee, hip or other parts of the body can be effectively prevented by a further increase in the distance between the two buttons, adequate distance from the floor and/or covers and/or separating walls.

Distance from the two-hand buttons to the danger area

It is necessary to maintain a minimum distance between the buttons for the two-hand circuit and the danger area on the machine or plant so that, after the release of one or both buttons, the machine or plant can only be reached once the dangerous movement has been interrupted or completed. According to the standard DIN EN ISO 13855, the distance is calculated with the following equation:

$$S = (K \cdot T) + C$$

S: Minimum distance from the nearest pushbutton (two-hand button) to the danger area.

K: Parameter in mm/s, derived from data on the approach speeds of the body or parts of the body, for two-hand circuits 1600 mm/s.

T: The overtravel of the overall system in seconds, that is the time from releasing the two-hand button to the end of the dangerous movement.

C: Additional distance in mm that based on entry into the danger area prior to the triggering of the safety device. For twohand circuits this is 250 mm, this distance can also be set to 0 mm given an adequate cover on the buttons, however then S must be at least 100 mm.

Example

The overtravel time for the entire system is 90ms. Then the above equation gives for the minimum distance:

S = (1600 mm/s · 0.09 s) + 250 mm

S = 144 mm + 250 mm = 394 mm

If a suitable cover is used, S can be reduced to 144 mm (see above).

Commissioning Procedure

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

1. Wiring S2HC:
Wire the S2HC with the 2-hand push button according to your application (see Fig. 4).

2. Wiring feedback loop:
Wire the feedback loop as shown in Fig. 5.

3. Wiring power supply:
Connect the power supply to terminals A1 and A2.

Warning: Wiring only in de-energized state.

4. Starting the device:
Switch the operating voltage on.

5. Switch to working condition:
Press the two buttons T1 and T2 simultaneously, or within 0.5 seconds.
The positive-guided relay switches on.

6. Switch into hibernation:
Release the two buttons T1 and T2.
The positive-guided relay swiches off.

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

Maintenance

Once per month, the device must be checked for proper function and for signs of tampering and bypassing of the safety function (to do this, check the wiring of the device and activate the two hand 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 whether the 2-hand button of correct function.
- Check whether the wiring.
- Check the supply voltage on A1 and A2
- Is the feedback loop closed?

Device cannot be switched back on:

- Check the two-hand switch used for correct function
- Check the wiring (cross connection or similar)
- Is the feedback circuit 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 S2HC

Load (DC-13; 24 V)	**<= 0,1 A**	**<= 1 A**	**<= 3 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]	**<= 400.000**	**<= 100.000**	**<= 22.500**

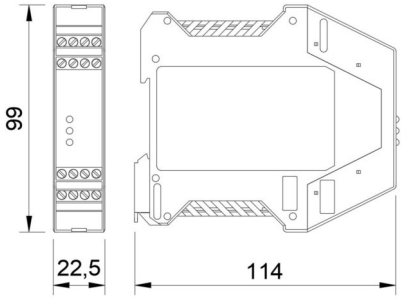
Techn. Data

Corresponds to the standards	EN574; EN ISO 13851; EN 60204-1; EN ISO 13849-1, EN 62061
Operating voltage	AC 230 V, AC 115 V, AC/DC 24 V
Rated supply frequency	AC: 50-60 Hz
Permissible deviation	+/- 10 %
Power consumption	**DC 24 V** approx. 1.5 W **AC 230 V** approx. 3.7 VA
Control voltage at S12-S12 and at S22-S23	DC 24 V
Control current (both switches)	approx. 2 x 40 mA
Release time for the safety relays after release of a button	< 20 ms
Response delay after actuation of the buttons	< 20 ms
Syncronization time	< 0.5 s
Safety contact configuration	2 NO contacts
Max. switching voltage	AC 250 V
Safety contact breaking capacity (13-14, 23-24) (6 switching cycles/ min)	AC: 250 V, 1500 VA, 6 A for ohmic load 250 V, 3 A for AC-15 DC: 24 V, 144 W, 6 A for ohmic load 24 V, 3 A for DC-13
Max. total current through all contacts:	12 A
Minimum contact load	5 V, 10 mA
Contact fuses	10A gG
Max. line cross section	0.14 - 2.5 mm^2
Tightening moment (Min. / Max.)	0.5 Nm / 0.6 Nm
Max. length of control line	1000 m 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 (EN 60664-1)
Rated insulation voltage	250 V
Degree of protection	IP20
Degree of contamination	2 (EN 60664-1)
Overvoltage category	3 (EN60664-1)
Temperature range	DC 24 V: -15 °C to +60 °C AC 230 V/115 V/24 V: -15 °C to +40 °C
Max. altitude	≤ 2000 m (above sea level)
Weight	ca. 230 g
Mounting	DIN rail according to EN 60715 TH35

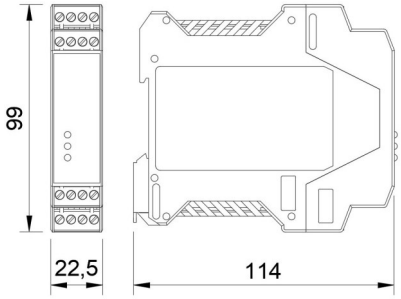
H. ZANDER GmbH & Co. KG • Am Gut Wolf 15 • 52070 Aachen • Germany
Tel +49 (0)241 9105010 • Fax +49 (0)241 91050138 • info@zander-aachen.de • www.zander-aachen.de

Dimension Drawing

Fixed Terminals



Plug-In Terminals



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

Variants

Order No. 472410	S2HC, AC 230 V,	fixed screw terminals
Order No. 472411	S2HC, AC 115 V,	fixed screw terminals
Order No. 472413	S2HC, AC/DC 24 V,	fixed screw terminals
Order No. 474410	S2HC, AC 230 V;	incl. plug-in screw terminals
Order No. 474411	S2HC, AC 115 V;	incl. plug-in screw terminals
Order No. 474413	S2HC, AC/DC 24 V;	incl. plug-in screw terminals
Order No. 475410	S2HC, AC 230 V;	incl. push-in twin spring connector
Order No. 475411	S2HC, AC 115 V;	incl. push-in twin spring connector
Order No. 475413	S2HC, AC/DC 24 V;	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

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
S2HC	2020	01/205/5077.02/20

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 normes suivantes confirme, s´il y a lieu, que les produits désignés sont conformes aux dispositions de la directive susmentionnée:

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

EN ISO 13849-1:2015
EN ISO 13851:2019
EN 62061:2005 + Cor.:2010 + A1:2013 + A2:2015

Benannte Stelle / Organisme notifé:
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln
Kenn-Nr.: 0035

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

Aachen, den 02.11.2020

Dr.-Ing. Marco Zander
Geschäftsleitung
General Manager
Direction

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

F7.3-0703

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

T10
Ver. A
E61-134-00