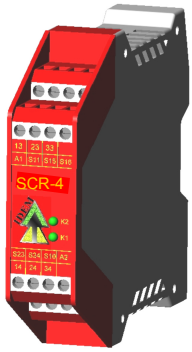
Safety Relays from IDEM — SCR-4-TD..

User Information

Correct Use

SCR-4 is an emergency stop safety relay combination that combines non-time-delayed and time-delayed contacts in a very compact housing. This permits dangerous components of a system to be switched off quickly and safely in an emergency situation. At the same time, other circuits can continue to be supplied with voltage for up to 30 seconds to allow a tool to be moved to its idle position or to brake following parts, for example.



Features

- *4 positively driven safety relays contacts. Possible variants:*
  - *3 non-time-delayed and 1 time-delayed contact*
  - *2 non-time-delayed and 2 time-delayed contact*
  - *1 non-time-delayed and 3 time-delayed contact*
- *Continuously adjustable time delay (1 to 30 s).*
- *Connection of:*
  - *Emergency stop buttons*
  - *Safety switches*
  - *Non-contacts safety switches*
  - *OSSD-Outputs*
- *1- or 2-channel activation 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*

(not for plug-in terminals)

Function

The moving parts of a machine or system can be quickly and safely stopped in case of danger with the non-time-delayed contacts of the SCR-4 Safety contacts with time-delay switch-off are also integrated into the SCR-4. They are used whenever it is safer to keep supplying voltage to parts of a machine after the emergency stop switch is operated.

It is ensured that a single fault or malfunction 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.

The time-delay contacts are activated at the same time as the non-time-delay contacts; however, when the emergency stop button is pressed, the contacts are only deactivated after the time set on the potentiometer (1 … 30 s).

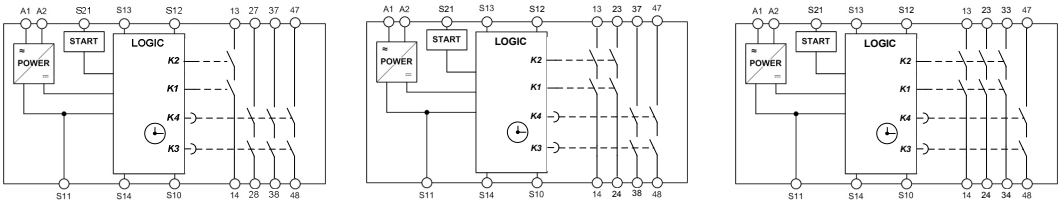


Fig. 1 Block diagram: SCR-4 -TD3(1nd/3d); SCR-4 -TD2(2nd/2d); SCR-4 -TD1(3nd/1d)

Installation

As per DIN 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.

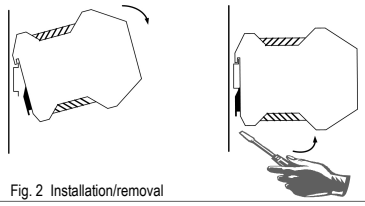


Fig. 2 Installation/removal

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

- A safe 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 (10 A gG) 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.

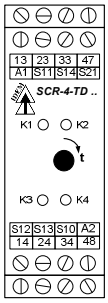


Fig. 3 Connections

A1:	*Power supply*
A2 :	*Power supply*
S11:	*DC 24 V control voltage*
S10:	*Control line*
S12:	*Control line*
S13:	*Control line*
S14:	*Control line*
S21:	*Start control line*
13-14:	*Safety contact 1 (nd)*
23-24/27-28:	*Safety contact 2 (d / nd)*
33-34/37-38:	*Safety contact 3 (d / nd)*
47-48:	*Safety contact 4 (d)*

nd = non-time delayed; d = time-delayed

Safety Relays from IDEM SCR-4-TD..

User Information

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. Non-time delayed contacts can be used up to category 4, PL e, time-delayed safety contacts up to category 3, PL e.

Emergency Stop Circuit

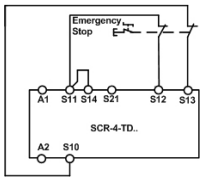


Fig. 1:
Two-channel emergency stop circuit with short circuit and earth fault monitoring.
(up to category 4, PL e)

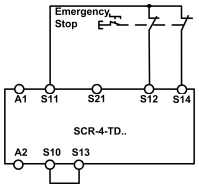


Fig. 2:
Two-channel emergency stop circuit with earth fault monitoring.
(up to category 3, PL d)

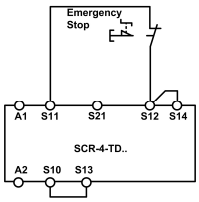


Fig. 3:
Single-channel emergency stop circuit with earth fault monitoring.
(up to category 1, PL c)

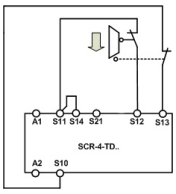


Fig. 4:
Two-channel sliding guard monitoring with short circuit and earth fault monitoring.
(up to category 4, PL e)

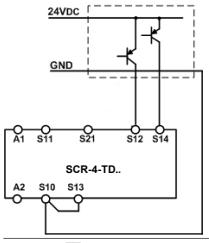


Fig. 5:
Two-channel emergency stop with pnp-outputs/OSSD-outputs ***with*** *short circuit monitoring.*
(up to category 4, PL e)

Warning:
In order to activate earth fault monitoring, the PE must be connected only to the power supply unit in accordance with EN60204-1.

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

Starting Behavior

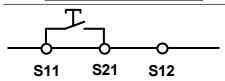
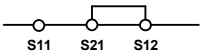


Fig. 6:
Manual start.



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

Fig. 7:
Automatic start (e.g. for application with a safety door).
Max perm. delay during closing of the safety switches on S12 and S13:

Feedback Loop

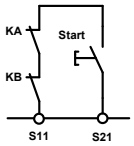


Fig. 8:
Feedback loop for manual start:
The feedback loop monitors contactors or the expansion modules .

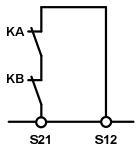


Fig. 9:
Feedback loop for automatic start:
The feedback loop monitors contactors or the expansion modules .

Power supply and Safety contacts

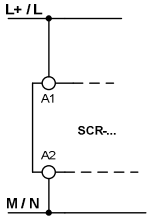


Fig. 10:
Power supply A1 and A2.

(Power supply according to techn. data)

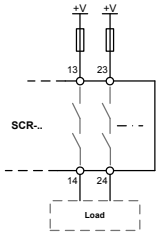


Fig. 11:
Connecting load to safety contacts.

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

Commissioning Procedure

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

1. Wiring emergency stop circuit:
Wire the emergency stop circuit according to the required Performance Level determined (see Fig. 1 to Fig. 5).

2. Wiring start circuit:
Wire the start circuit according to Fig. 6 or Fig. 7 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. 8 or Fig. 9.

4. Wiring power supply:
Connect the power supply to terminals A1 and A2 (Fig. 10).
Warning: Wiring only in de-energized state.

5. Set time delay:
Set the desired time delay on the rotary knob (not for fixed delay time)

Warning:
Scale divisions should be regarding only as a setting aid. Always make shure to measure the delay time.

6. 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***, ***K2, K3*** and ***K4*** are lit.

7. Triggering safety function:
Open the emergency stop circuit by actuating the connected safety switch. The safety contacts open immediately.
Warning: *Messen Sie die Verzögerungszeit.*

8. 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.

Safety Relays from IDEM SCR-4-TD..

User Information

Maintenance

The device must be checked once per month 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 emergency stop function. Check the delay time).

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 SCR-4

Load (DC-13; 24 V)	**<= 0.1 A**	**<= 1 A**	**<= 2 A**
T10d [years]	20	20	20
Category			
Time-delay	3	3	3
Non-time-delay	4	4	4
PL	e	e	e
PFHd [1/h]			
Time-delay	8.84E-08	8.84E-08	8.84E-08
Non-time-delay	4.22E-08	4.22E-08	4.22E-08
nop [cycle / year]	<= 500,000	<= 350,000	<= 100,000

Techn. Data

Corresponds to the standards	EN60204-1, VDE0113-1, EN ISO 13849-1, EN 62061
Operating voltage	AC/DC 24 V
Rated supply frequency	50 - 60 Hz
Permissible deviation	+/- 10 %
Power consumption	**DC 24 V** **AC 24 V** approx. 4.7 W approx. 5.3 VA
Control voltage at S11	DC 24 V
Control current	approx. 190 mA
Response delay after actuation of the buttons	< 20 ms
Safety contacts	4 NO contacts (3n/1d, 2n/2d, 1n/3d)
Max. switching voltage	AC 250 V
Safety contact breaking capacity	AC: 250 V, 2000 VA, 8 A for omic load (6 switching cycles/ min) 250 V, 3 A for AC-15 DC: 40 V, 320 W, 8 A for omic load (6 switching cycles/ min) 24 V, 3 A for DC-13
Max. cumulative current on the safety contacts	15 A *)
Time delay	1 ... 30 s, continuously adjustable
Minimum contact load	24 V, 20 mA
Min. contact fuses	10 A gG
Max. line cross section	0.14 - 2.5 mm^2
Max. length of control line	1000 m at 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
Rated insulation voltage	250 V
Degree of protection	IP20
Degree of contamination	2 (DIN VDE 0110-1)
Overvoltage category	3 (DIN VDE 0110-1)
Temperature range	-15 °C ... +40 °C
Weight	approx. 250 g
Mounting	DIN rail according to EN 60715TH35

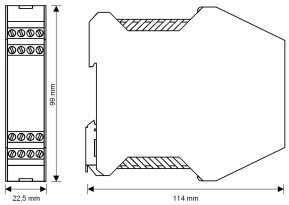
*) If several SCR-4 devices are closely spaced under load, the max. total current at the ambient temperature of T=20 °C: 9 A; at T=30 °C: 3 A; at T=40 °C =1 A. If these currents are exceeded, a spacing of 5 mm between the devices must be observed.

Safety Relays from IDEM SCR-4-TD..

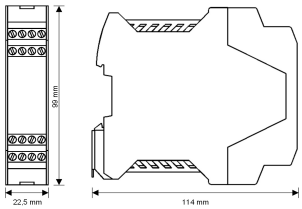
User Information

Dimension Drawing

Fixed Terminals



Plug-In Terminals



Versions

SCR-4-TD1	AC/DC 24 V, 3 non-time del./ 1 time-del. contact 1-30 s, fixed screw terminals
SCR-4-TD2	AC/DC 24 V, 2 non-time del./ 2 time-del. contacts 1-30 s, fixed screw terminals
SCR-4-TD3	AC/DC 24 V, 1 non-time del./ 3 time-del. contacts 1-30 s, fixed screw terminals
SCR-4-TD1	AC/DC 24 V, 3 non-time del./ 1 time-del. contact 1-30 s, plug-in terminals
SCR-4-TD2	AC/DC 24 V, 2 non-time del./ 2 time-del. contacts 1-30 s, plug-in terminals
SCR-4-TD3	AC/DC 24 V, 1 non-time del./ 3 time-del. contacts 1-30 s, plug-in terminals

CE *EC Declaration of Conformity*

Producer: IDEM SAFETY SWITCHES Ltd.
2 Ormside Close, Hindley Industrial Estate, Hindley Green, Wigan, WN2 4HR, UK

Product Group: Safety emergency stop relay for monitoring Emergency Stop and Safety Switches

Product Name	Affixing of CE marking:	No of Certificate
SCR-4	2015	01/205/5239.01/15

The products conform with the essential protection requirements of the following European directives:

2006/42/EG : Machinery directive

2004/108/EG : EMC directive till 2016-04-19 **2014/30/EU : EMC directive from 2016-04-20**

If applicable, the conformity of the designated products is proved by full compliance with the following standards:

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

According to the certificate of TÜV-Rheinland:

DIN EN ISO 13849-1:2008-12 **EN 62061:2005 +AC:2010:A1:2013**

Certification Body: Nr. NB 0035
TÜV Rheinland Industrie Service GmbH
10882 Berlin
Zertifizierungsstelle für Maschinen

14th August 2015

M. Mohtasham: Managing Director

V. Crolla: Documentation Manager

H02
Ver. A
E61-325-00