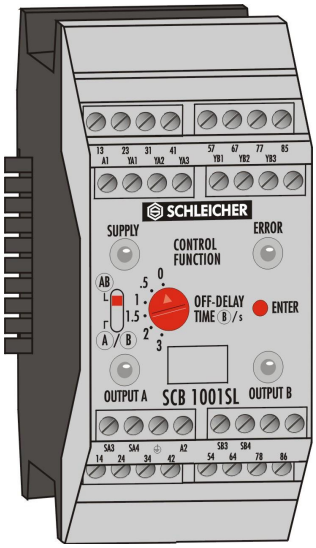
SAFETY CENTER Basic Module

PI 0089-0302 E

SCB 1001S, SCB 1001SL, SCB 1002S, SCB 1001S-A, SCB 1001SL-A, SCB 1002S-A



EN 954-1	Safety Category	4

Basic module for the modular **SAFETY CENTER** safety control unit for emergency-off, safety door applications and selenoid-operated switch monitoring.

- with / without disengagement delay for stop category 0 and 1
- two groups: A and B
- diagnostics through fieldbus
- category 4 according to EN 954-1

Equipment Description

A Safety Center consists of one basic module type SCB for a supply voltage of 24 VDC, at least one (maximum 4) input module(s) type SCI, and one bus coupler module (if necessary).
SCB basic modules are mounted in a 45 mm wide rack designed for 35 mm standard rails according to EN 50022.
Device types A are equipped with a plug-in screw-type terminal block.
The control has two groups, A and B, which can be operated as two independent devices.
The SCB can be configured so the input groups A and B have either a common or a separate effect on the SCB's enable contact groups A and B, on the start performance, and on the disengagement delay.
A connector is integrated into the housing to provide the connection between modules.

Caution!

If used more than one input module every input module must have a unique address.

Features

- Device for category 4 acc. to EN 954-1 and stop categories 0 and 1 acc. to EN 60204-1.
- Safe, positive-guided relay current paths in 2 groups, A and B.
- One relay alarm current path per group.
- For the group B outputs of the SCB 1001 SL, the disengagement delay can be adjusted with a rotary switch for a controlled stoppage of hazardous movements.
- Slide switch to adjust the effect of the SCI input groups A/B on the SCB output groups A/B.
- With/without startup block for manual/automatic start after voltage supply is turned on.
- With/without restart block for manual/automatic start upon triggering the safety feature.
- Connection of a RESET button for manual start.
- Monitoring of RESET button for shunting during operation.
- With/without bridge-fault detection for adaptation to the required safety category.
- Integration of a feedback loop to monitor external contactors.
- Status indicator LEDs.
- ENTER key for accepting system settings.
- Plug-in connectors for input modules.
- Plug-in connector for non-safe bus coupler module.
- Contact multiplication by connecting external contactors or extension devices.

Functional Description

The SCB is designed as a 2-channel diversified structure with micro-controllers. The controllers monitor each other, evaluate the information from the SCI input modules, and activate the positive-guided output relays. Internal errors are detected by regular self-tests.

Proper Use / Intended Purpose

The SCB is the basic module in the modular Safety Center control unit.
The Safety Center is used to monitor signal transmitters, e.g., emergency-off buttons, position switches, etc., that are used as safety devices on machinery for the protection of people, material and equipment.
To achieve the protection function, safe outputs are switched on or off depending on the state of the signal transmitter. These safe outputs are turned off to avoid hazardous situations around the machinery. The control can be used for applications with stop categories 0 and 1 according to EN 60204-1.

Assembly

Place the SCB on the standard rail and lock it in. The standard rail must be connected with protective earth (PE) conductor. Connect the SCI input modules and the coupling modules with the SCB using the side connectors. It is very important that a solid connection is ensured in the finished installation (e.g., using rail stop elements).
Then the SCB and SCI must be connected to the peripherals.
The Safety Center must be installed in a control cabinet with a protection type of at least IP 54.

Disassembly

See Safety Instructions!
For type A devices, pull out the plug-in terminals, or loosen the terminal screws. Push apart the modules on the standard rail until the module connector is accessible. Release the lock at the bottom of the device and remove the module.

Note

The safety category according to EN 954-1 depends on external wiring, the selected command source, and the local layout at the machinery.

SAFETY CENTER Basic Module

PI 0089-0302 E

SCI 1001S, SCI 1002S-xx
SCI 1001S-A, SCI 1002S-xx-A

Control Functions and System Settings

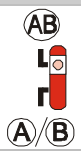
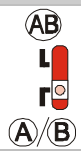
The control circuit functions at the switches and terminals can be set only, if the device is turned off, i.e., no operating voltage may be applied to A1/A2. In order to then select the desired operating mode for program execution, press the **ENTER** key at the SCB for at least 2 seconds while turning on the operating voltage until the ERROR-LED is blinking. When you release the **ENTER** key, the set operating mode will be active (saved).

Caution

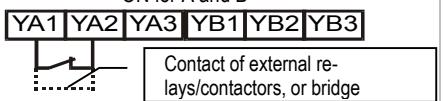
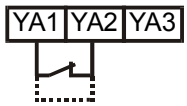
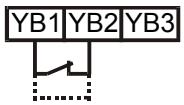
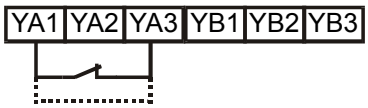
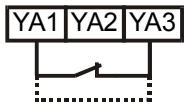
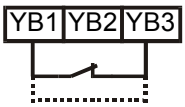
The selected functions are activated only, if the terminal states and switch settings shown below are set while pressing the ENTER key during the startup phase. Change of the terminal states or the switch settings is not permitted while pressing the ENTER key during start-up.

SCB 1001S, SCB 1001SL

Group A and B Setup: Assignment of input and output circuits.

	Slide Switch AB		Slide Switch A / B	
Safety Function:	SCI input circuits of both groups affect the output circuits of both groups (A + B).		SCI input circuits of group A affect the output circuits of group A. SCI input circuits of group B affect the output circuits of group B	

Startup Block / Feedback Loop: Feedback loop connection of the monitored external contactors/relays.

	AB	A / B	
Startup block ON: Upon activation of the voltage supply and safe input state of the SCI, the SCB expects a RESET or at least an operation at one SCI input circuit.	ON for A and B 	ON for A 	ON for B 
Startup block OFF: If AUTOSTART is selected for the restart block, the enable currents paths will be activated immediately after the voltage supply is turned on.	OFF for A and B 	OFF for A 	OFF for B 

Restart Block: Connection of bridges and RESET button.

	AB	A / B
Restart block: If restart block is ON, the SCB expects operation of the RESET button for a restart. This ensures the required manual start after an emergency-off.	MANUAL START for A and B 	MANUAL START for A MANUAL START for B 
	AUTOSTART for A and B 	AUTOSTART for A / AUTOSTART for B 

OFF-Delay B (only SCB 1001 SL)

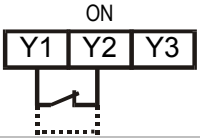
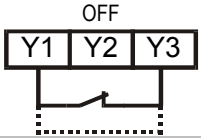
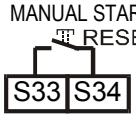
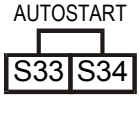
The disengagement delay for group B can be set at the front panel in fixed increments from 0 to 3 seconds or from 0 to 30 seconds. In the zero (0) position, the disengagement delay will be the specified time t_R. If the healthy state is reached again before timeout, the output circuits of group B will not change, and the disengagement delay will be reset (can be post-triggered). If the disengagement delay is post-triggered external contactors can not monitored.

	AB	A / B
Safety Function:	Output relay group A steps back immediately. Group B can be post-triggered.	Output relay group A is independent from group B. Group B can be post-triggered.

SCB 1002S

Restart Block and Start Block / Feedback Loop

Feedback loop connection of the monitored external contactors/relays, RESET buttons and bridges.

	AB	AB
	Start Block ON  OFF 	Restart Block MANUAL START RESET  AUTOSTART 

SAFETY CENTER Basic Module

PI 0089-0302 E

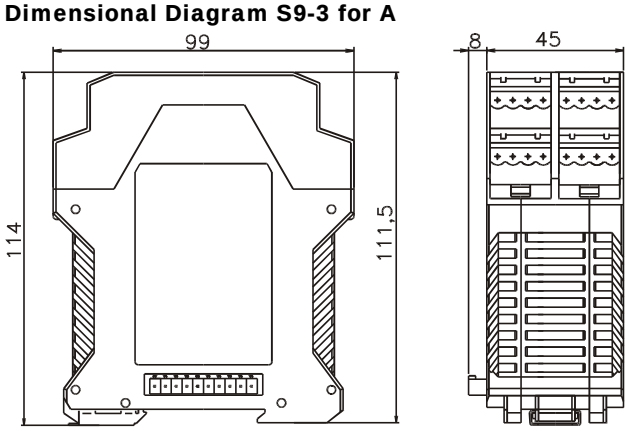
SCI 1001S, SCI 1002S-xx
SCI 1001S-A, SCI 1002S-xx-A

Troubleshooting

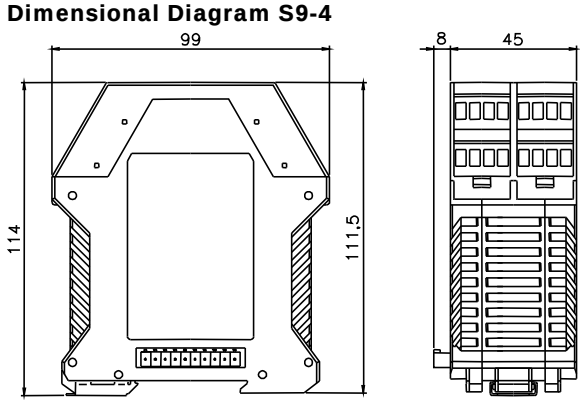
Overall Safety Center System (SCI, SCB)
If random or systematic system errors are detected within the SC system or in its control, the SC will shut down. In this case, all safe output circuits (enable current paths) will open and the ERROR LED at the SCB or SCI will light up. This type of shutdown may be corrected either by turning the power off and on again, or by correcting an error in the control.

Cause of Error	Response of the Safety Center	LED Indicator	Remedy
System settings (configuration) changed since the last turned on state or in operation (rotary switch adjusted, bridge modified, address slide switch adjusted, SC module removed or added)	Cannot be turned on.	Permanent red ERROR-LED at the SCB / SCI	Adjust switches and bridges to previous setting, or implement the new configuration as described under “Control Circuit Functions”.
Shorted connection lines in the input circuits of the SCI against A2 potential (fault to ground)	Immediate detection in all input circuits with high potential controlled inputs.	-	Remove short in the wiring or in the signal transmitters.
Short circuit between adjoining input circuits (bridge-fault) of the SCI	Cancellation of the groups (A or B) safe output signal, if the affected input circuits are in a healthy state.	Blinking ERROR-LED at the SCI group	Remove the bridge-fault in the wiring or in the signal transmitters
Synchronous time error during synchronous time monitoring in 2-channel applications (synchronous time between the two channels exceeded, e.g., when closing the safety door).	Cannot be turned on.	Blinking ERROR-LED at the SCI group	Operate the signal transmitter again (open and close the safety door). Remove the line break in the wiring or in the signal transmitters.
Sequence error in 2-channel applications (only one channel opens and closes again)	Cannot be turned on after addressing the safety feature.	Blinking ERROR-LED at the SCI group	Operate the signal transmitter again (open and close both channels). Remove short circuit between input and output of the affected channel.
Shorted connection lines in the SCB control circuits	Short circuit against A2 potential (fault to ground) will be recognized in all control circuits either immediately or upon requesting the function. The short (bridge-fault) of a connected restart block (RESET button) will be detected upon requesting the function, and the regeneration of a safe output signal for the affected group will not be possible; i.e., the enable current paths remain open.		Remove the short or bridge-fault in the wiring or in the signal transmitters.
Interrupted connection lines in the SCI input circuits	The safe output signal of the affected group (A or B) will be cancelled immediately, i.e., the enable current paths open.	-	Remove the line interruption in the wiring or in the signal transmitters.
Interrupted connection lines in the SCB control circuits	Regeneration of a safe output signal for the affected group is not possible, i.e., the enable current paths remain open.	-	Remove the line interruption in the wiring or in the signal transmitters.
Operation with under-voltage ($U_{line} < U_{bmin}$)	Operation below the minimum operating voltage results in the immediate cancellation of all safe output signals, i.e., all enable current paths open.	Permanent red ERROR-LED at the SCB	Maintain proper operating voltage range
Operation with over-voltage ($U_{line} > U_{bmax}$)	Operation above the maximum operating voltage results in the immediate cancellation of all safe output signals, i.e., all enable current paths open. This error may cause internal, irreversible damages.	Permanent red ERROR-LED at the SCB	Maintain proper operating voltage range

Dimensional Diagram S9-3 for A



Dimensional Diagram S9-4



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SCI 1001S, SCI 1002S-xx
SCI 1001S-A, SCI 1002S-xx-A

Specifications

Supply Circuit	
rated voltage U_N, DC	24 VDC
residual ripple	2.4 Vpp
rated power SCB 1002S	3.0 W
rated power SCB 1001S / SCB 1001SL	3.5 W
operating range, U_{bmin}, U_{bmax}	0.85 to 1.1 U_N
internal fusing	yes
min. off-time	1 sec
Electrical Safety	
air and leakage paths	DIN VDE 0110 –1: 1997-04
over-voltage category	III
contamination level	2 internal, 3 external
rated voltage	300 VAC
rated surge voltage	4 kV
enclosure / terminals protection type (DIN EN 60529: 2000-09)	IP 40/ IP 20
DC isolation	
suppy / control circuit	no
supply / output circuit	yes
Control Circuits	
short-circuit-proof outputs	yes
rated output voltage	24 VDC
rated current	8 mA
min. input voltage (High)	15 VDC
max. input voltage (Low)	5 VDC
min. ON period t_{ER} Enter key	2 sec
min. ON period t_{ST} Start command	50 ms
max. control line resistance	70 Ohm
Output Circuits	
max. continuous current I_N per current path	6 A
max. sum current per group	9 A
rated switching voltage U_n	230 VDC, 230 VAC
contact material	Ag alloy
contact type: enable current paths	positive-guided
usage category	AC-15 Ue 230 V, Ie 4 A
acc. to IEC 947-5-1	DC-13 Ue 24 V, Ie 5 A (360 cycles/h)
contact type: alarm current paths	not positive-guided
usage category	AC-15 Ue 230 V, Ie 3 A DC-13 Ue 24 V, Ie 2 A
short-circuit protection:	
max. fuse insert	6 A class gG
turn-on delay after applying U_N	1 sec
disengagement delay t_R, undelayed current paths	60 ms
SCB 1001S	
enable current paths, undelayed	6 (13/14, 23/24, 33/34, 53/54, 63/64, 73/74)
alarm current paths, undelayed	2 (41/42, 81/82)
SCB 1001SL	
enable current paths, undelayed	3 (13/14, 23/24, 33/34)
enable current paths, delayed	3 (57/58, 67/68, 77/78)
alarm current paths, undelayed	1 (41/42)
alarm current paths, delayed	1 (87/88)
OFF delay t_R	
3 sec execution; del.current paths	0,5; 1; 1,5; 2; 3 sec
30 sec execution;del.current paths	5; 10; 15; 20; 30 sec
SCB 1002S	
enable current paths, undelayed	3 (13/14, 23/24, 33/34)
Meldestrompfade, unverzögert	1 (41/42)
Climatic Conditions	
ambient operating temperature	-25 to +50 °C
storage temperature	-25 to +70 °C
relative humidity	30 to 95 %, non-condensing
climatic application class (DIN 40040)	H V F
Dimensions	
weight	0.34 kg
size HxWxD	99 x 53 x 111.5 cm

Terminal Data	
1-wire or fine wire	1 x 0.14 mm² to 2.5 mm² 2 x 0.14 mm² to 0.75 mm²
fine wire with wire-end sleeve acc. to DIN 46228	1 x 0.25 mm² to 2.5 mm² 2 x 0.25 mm² to 0.5 mm²
max. torque	0.5 to 0.6 Nm
for UL and CSA approbations	only copper wire AWG 18-16
max. torque	5.25 lbs-in

LED Indicators

SUPPLY	green	supply voltage applied to A1/A2. Internal voltage supply is OK.
OUTPUT A	green	Group A enable current paths closed. Alarm current path A open.
OUTPUT B	green	Group B enable current paths closed. Alarm current path B open.
ERROR	red	System error in Safety Center or operating error (see causes for errors in Trouble-shooting section)

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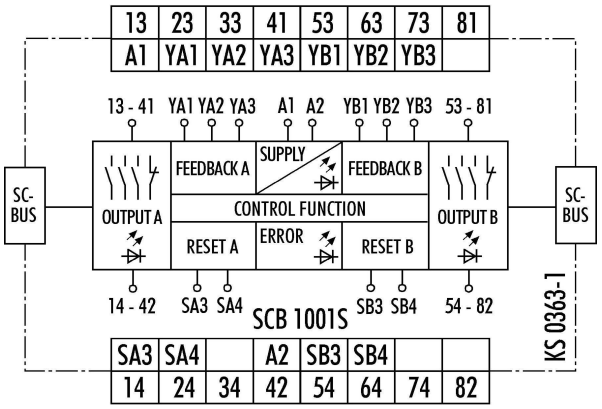
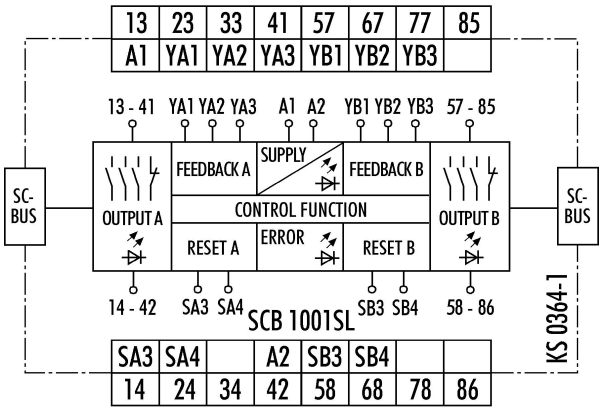
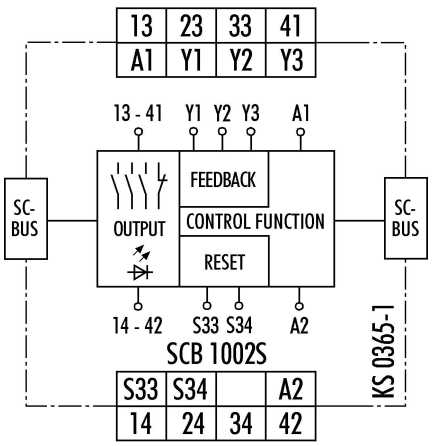
SCI 1001S, SCI 1002S-xx
SCI 1001S-A, SCI 1002S-xx-A

Connection Diagrams







Subject to changes

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