Safety, Technology & Innovation

OMRON

Rev. 1.08

SR103AM

Operating Instructions for SR103AM Safety Monitoring Relays

- **STOP category 0**
- **Up to safety category 4**
- **3 positively driven safety contacts with redundancy and cyclical monitoring of the internal components**
- **Single-channel or dual-channel control**
- **Short circuit monitoring and/or earth fault monitoring**
- **According to EN 60 204-1 and EN 954-1**

The SR103AM safety relay is a compact, universal emergency stop safety switching device with 3 safety paths that can be loaded with up to 8A. In addition, there is a door auxiliary contact that can be loaded with up to 2A. This is a normally closed contact. The device complies with the requirements of EN60204-1 for safety circuits. Despite its very compact dimensions, the safety relay can be used for almost all applications up to the highest category, safety category 4.

Application

In case of danger, the SR103AM safety relay can quickly and safely shutdown the relevant parts of the machine by switching off all main circuits via a control circuit using positively driven, redundant relay contacts, i.e. using relay contacts with double safety. Additionally, on each on/off cycle automatic function monitoring is performed; this feature ensures that on the failure of a safety circuit, switch on is not possible (self-monitoring).

Preferred applications include single and dual-channel emergency stop circuits and guard monitoring.

The requirements in particular in EN60204-1 on switch off, STOP and EMERGENCY STOP functions were taken into consideration for the safety relay.

Stop category 0 is achieved with the technology used. The occurrence of a single failure in the device does not result in the loss of the safety function; the failure will be detected on or before the next demand for the safety function. As well as the requirements of EN60204-1, the safety relay also fulfills the requirements for the safety category 4 as per EN954-1, on the condition that the start button between terminals S12 and S21 is not replaced by a bridge.

As per EN60204-1 the device is intended for installation in control cabinets with a minimum degree of protection of IP 54.

Safety precautions

⚠ All relevant safety regulations and standards are to be ob-served.

⚠ Failure to observe the safety regulations can result in death, serious injury and serious damage.

⚠ Assembly and electrical connection must be performed only by authorized personnel.

⚠ As per EN 60204-1 the device is intended for installation in control cabinets with a minimum degree of protection of IP 54.

⚠ The electrical connection is only allowed to be made with the device and wiring isolated.

⚠ The wiring must comply with the instructions in this user information, otherwise there is a risk that the safety function will be lost.

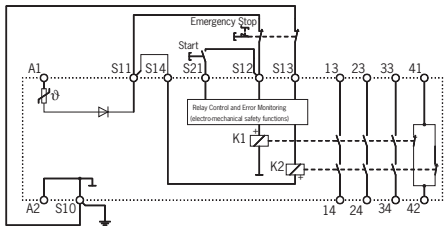
⚠ The tightening torque on the connection terminals must be 0.6 to 0.8 Nm.

⚠ It is not allowed to open the device, tamper with the device or bypass the safety devices.

⚠ In the event of a fault (e.g. short circuit) in the load circuit, excessively high currents may flow through the safety contacts. For protection against welding, each contact must be individually protected with an external fuse.

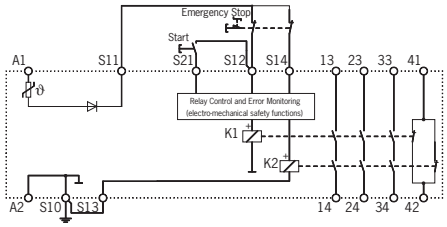
The device is maintenance-free when used correctly.

Two-channel emergency stop circuit with short circuit monitoring and earth fault monitoring



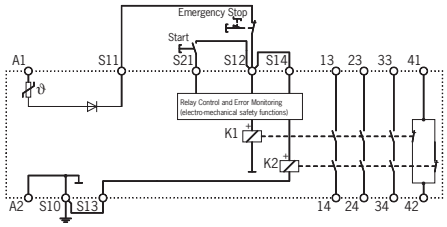
S11 and S14 must be connected to activate the short circuit monitoring. The emergency stop button is inserted in the wires S11–S12 and S10-S13. The start/reset button connects S12 and S21. S10 must be connected to PE (protective earth) to activate earth fault monitoring. After connecting the power supply to A1 and A2, the safety contacts can be closed using the start button.

Two-channel emergency stop circuit with earth fault monitoring (no short circuit monitoring)



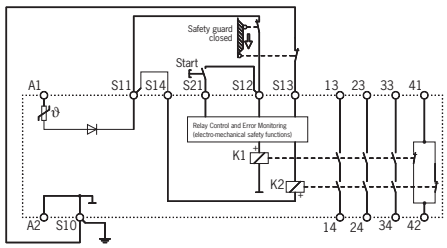
This circuit makes it possible to achieve an immediate shutdown on an earth fault in the control cables, however the short circuit monitoring is deactivated. Contacts S10 and S13 are bridged; the emergency stop button is inserted in the wires S11–S12 and S11–S14. The start/reset button connects S12 and S21.

Single-channel emergency stop circuit



The safety relay can also be used as an emergency stop circuit with single-channel control, provided this usage is permitted by a risk assessment in accordance with EN954-1. For this purpose, the contacts S10 and S13 as well as S12 and S14 need to be connected. The single-channel emergency stop button is inserted in the wire S11-S12/S14. Even with this circuit, earth fault monitoring is available if S10 is connected to PE

Two-channel sliding guard monitoring with short circuit and earth fault monitoring



This circuit variant uses the same principle as the dual-channel emergency stop circuit, however the emergency stop button is replaced by two limit switches that monitor the position of the sliding guard. At least one of these limit switches must have positively driven contacts, i.e. isolate the electrical connection by means of the active application of force.

Monitored start / auto start

- Additional monitoring of the start button can be realized by integrating the start button between S11 (instead of S12) and S21.
- Replacing the start button between terminals S12 and S21 with a bridge produces an auto start when the input signal is reset.

Time behavior of the relay in "auto start" operating mode (bridge S21-S12)
- If the signal at S12 is produced before the signal S13 or S14: the maximum time difference between S12 and S13 or S14 must not exceed 50 ms.
- If the signal at S13 or S14 is produced before the signal S12: any time difference between S12 and S13 (infinite).

Technical data

Parameters		Value			Unit
		min.	typ.	max.	
Housing material			Polyamide PA6.6		
Dimensions			114 x 99 x 22.5		mm
Weight			0.23		kg
Ambient temperature		-15	-	+ 40	°C
Degree of protection according to EN IEC 60529			IP 20		
Degree of contamination			2		
Mounting			35 mm DIN rail according to DIN EN 50022-35		
Type of connection			Screw terminals		
Terminals		0.14	-	2.5	mm^2
Operating voltage U_B	SR103AM01		24 ± 10% [1]		V AC/DC
	SR103AM02		115 ± 10%		V AC
	SR103AM03		230 ± 10%		V AC
Rated supply frequency		50	-	60	Hz
Power consumption			approx. 7		VA
Control voltage for start button (S11)		18.6	24	26	V DC
Control cable length (with cross-section 0.75 mm^2)		-	-	1000	m
Control current for start button (S11)			approx. 60		mA
Safety contacts			3 NO contacts		
- Switching voltage AC		-	-	250	V AC
- Switching voltage DC		-	-	24	V DC
- Breaking capacity AC		-	-	2,000	VA
- Breaking capacity DC (in utilization category DC-13)		-	-	48	W
- Switching current at 24 V		20	-	-	mA

- Utilization category according to EN IEC 60947-5-1		2)	U_e	I_e	Σ_e
	SR103AM01	AC-12	250 V	8 A	15 A
		AC-15	250 V	3 A	
		DC-12	24 V	2 A	
		DC-13	24 V	2 A	
	SR103AM02	AC-12	250 V	8 A	
	SR103AM03	AC-15	250 V	3 A	
		DC-12	50 V	8 A	
		DC-13	24 V	3 A	

-Breaking capacity according to UL		
	SR103AM01	8A 250V AC / 2A 24 V DC per contact
	SR103AM02 SR103AM03	8A 250V AC / 3A 24 V DC per contact

Door auxiliary contact					
		1 NC contact			
- Continuous current I_N per current path		-	-	2	A
- Switching voltage AC		-	-	250	V AC
- Switching voltage DC		-	-	24	V DC
- Breaking capacity AC		-	-	500	VA
- Breaking capacity DC (in utilization category DC-13)		-	-	30	W

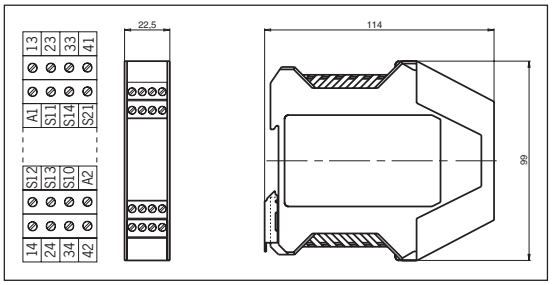
- Utilization category according to EN IEC 60947-5-1	2)	U_e	I_e
	AC-12	250 V	2 A
	AC-15	230 V	2 A
	DC-12	24 V	1.25 A
	DC-13	24 V	1.25 A

External contact fuses (control circuit fuse) acording to EN IEC 60269-1		10 AgG (T6 / F8A)
Contact material	SR103AM01	AgNi-10
	SR103AM02	$AgSnO_2$
	SR103AM03	$AgSnO_2$
Mechanical life		1 x 10^7 operating cycles
Electrical life		1 x 10^5 operating cycles
Reverse polarity protection		On version U_B = DC 24 V
Rated impulse withstand voltage Uimp		2.5 kV
Leakage path/air gap acc. to DIN VDE 0110-1:1997-04		4 kV
In compliance with		EN 60204-1: 1998 / EN 954-1: 1996
LEDs		2, status displays for relays K1 and K2

1) All the electrical connections must either be isolated from the mains supply by a safety transformer according to EN IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures.

2) U_e=Switching voltage. I_e=Maximum switching current per contact. ΣI_e=Maximum switching current per all safety contacts (cumulative current).

Dimension drawing/pin assignment



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