

SCC-1224A Safety Mat / Edge Controller

User Manual



Original instructions

Introduction

Thank you for purchasing the SCC-1224A Safety Mat / Edge Controller.
This is the instruction Manual describing the use of the SCC-1224A.
Always take into account the following points when using the controller.

Make sure the SCC-1224A is handled by a "Responsible Person" who is well aware of and familiar with the machine to be installed. The term "Responsible Person" used in this Instruction Manual means the person qualified, authorized and responsible to secure "safety" in each process of the design, installation, operation, maintenance services and disposition of the machine. It is assumed that the SCC-1224A will be used properly according to the installation environment, performance and function of the machine. A responsible Person should conduct a risk assessment of the machine and determine the suitability of this product before installation. Read this Manual thoroughly and understand its contents.

Legislation and Standards

1. When used together the SCC-1224A Safety Mat/Edge Controller and the UMA Series Safety Mats comprise a system which has been EC type examined to the requirements of Category 3, EN ISO 13856-1. When used with the SGE Safety Edges, the SCC-1224A comprise a system which has been EC type examined to the requirements of Category 3, EN ISO 13856-2.
2. This product complies with the following legislation and standards:
 - 1) EU Legislation
 - Machinery Directive 2006/42/EC
 - EMC Directive 2014/30/EU
 - RoHS Directive 2011/65/EC

 - 2) European & International Standards
 - EN ISO 13849-1:2015 (PL d, Category 3)
 - EN ISO 13849-2:2012
 - EN 62061:2005/A2:2015 (SIL CL 2)
 - EN 61000-6-2:2005
 - EN 61000-6-3:2007

 - 3) North American Standards: cULus: Listed (ANSI/UL 508, CSA C22.2 No.14) file number: E195653

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Safety Precautions

This manual uses symbols and alerts to identify the level of risk associated with certain uses or misuses of the product. Failure to follow all precautions and alerts may result in an unsafe use or operation. Read this manual thoroughly and understand all installation procedures, operation check procedures and maintenance procedures before using the SCC-1224A Safety Mat/Edge Controller.




The following are the symbols and alerts used for Warnings and Cautions:



WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

The symbols below are combined with alert statements used to differentiate between mandatory and prohibited actions.

	Indicates prohibited actions.
	Indicates mandatory actions.
	Indicates the risk of electric shock.

Before installing and using the SCC-1224A Safety Mat / Edge Controller, carefully read the Quick Reference Guide attached to the product.



WARNING

Electric shock may occur. Make sure to shut down the power supply before performing wiring. DO NOT touch the terminals while power is being supplied.



Electric shock may occur. Make sure to shut down the power supply before setting the DIP Switch.



Serious injury may occur due to loss of required safety functions. DO NOT use the SCC-1224A Safety Mat/Edge Controller's auxiliary output as safety outputs.



Serious injury may occur due to breakdown of safety outputs. DO NOT connect loads beyond the rated values to the safety outputs.



DO NOT use the SCC-1224A Safety Mat/Edge Controllers for machines that cannot be stopped by electrical control. For example, DO NOT use it for a pressing machine that uses full-rotation clutch. Otherwise, the machine may not stop before a person reaches the hazardous part, resulting in serious injury.



Serious injury may occur due to loss of required safety functions. Wire the SCC-1224A Safety Mat/Edge Controller properly so that the 120 VAC or 24 VDC line does NOT touch the outputs.



Serious injury may occur due to loss of required safety functions. Ground the 0V line of the power supply for external output devices so that the devices do NOT turn ON when the safety output line or the auxiliary output line is grounded.



Serious injury may occur due to loss of required safety functions. DO NOT connect multiple sensors in parallel and connect them to the SCC-1224A Safety Mat/Edge Controller. Read and understand the wiring examples and connect the controller with sensors in series.



Serious injury or property damage may occur. DO NOT use the SCC-1224A Safety Mat/Edge Controller where flammable gases or explosive gases may be present. Doing so may cause combustion or explosion due to relay heating or arcing during switching.



Serious injury may occur due to loss of required safety functions. When replacing an SCC-1224A Safety Mat/Edge Controller, configure the replacement controller suitably and confirm that it operates correctly.



DO NOT disassemble the SCC-1224A Safety Mat/Edge Controller. Doing so may damage the product or cause fire or electric shock, resulting in seriously injury.



Serious injury may occur due to loss of required safety functions. Operate this presence sensing safety pressure-sensitive protective device only when it is properly installed, tested and inspected in accordance with all applicable government, industry and company safety regulations.



Precautions for Safe Use

Obey the following precautions during system installation to ensure that safety-related components are configured to enable the system functions to operate properly.

(1) Risk Assessment

The proper use of the safety devices described in this manual as they relate to installation conditions and mechanical performance and functions is a prerequisite for their use.

When selecting or using the safety devices, a risk assessment must be performed during the development stage of the equipment or facilities to identify potential danger factors in equipment or facilities in which the safety devices are to be applied. Suitable safety devices must be selected under the guidance of a sufficient risk assessment system. An insufficient risk assessment system may result in the selection of unsuitable safety devices.

- Typical related international standards: ISO 12100, Safety of machinery -- General principles for design -- Risk assessment and risk reduction

(2) Safety Measures

When using this safety device to build systems containing safety-related components for equipment or facilities, the system must be designed with the full understanding of and conformance to international standards, such as those listed below, and standards in related industries.

- Typical related international standards: ISO 12100, Safety of machinery -- General principles for design -- Risk assessment and risk reduction
IEC 61508, Safety Standard for Safety Instrumented Systems (Functional Safety of Electrical/ Electronic/ Programmable Electronic Safety-related Systems)

(3) Role of Safety Devices

The safety devices are provided with safety functions and mechanisms as stipulated in relevant standards, but suitable designs must be used to enable these functions and mechanisms to operate properly inside systems containing safety-related components. Build systems that enable these functions and mechanisms to perform properly, based on a full understanding of their operation.

- Typical related international standards: ISO 14119, Safety of machinery -- Interlocking devices associated with guards -- Principles for design and selection

(4) Installation of Safety Devices

The construction and installation of systems with safety-related components for equipment or facilities must be performed by technicians who have received suitable training.

- Typical related international standards: ISO 12100, Safety of machinery -- General principles for design -- Risk assessment and risk reduction
IEC 61508, Safety Standard for Safety Instrumented Systems (Functional Safety of Electrical/ Electronic/ Programmable Electronic Safety-related Systems)

(5) Compliance with Laws and Regulations

This safety device conforms to the relevant regulations and standards. Ensure that it is used in compliance with local regulations and standards for the equipment or facilities in which it is applied.

- Typical related international standards: IEC 60204, Safety of Machinery -- Electrical Equipment of Machines

(6) Observing Precautions for Use

When putting this safety device to actual use, heed the specifications and precautions in this manual and those in the instruction manual that comes with the product. Using the product in a manner that deviates from these specifications and precautions will lead to unexpected failures in equipment or devices, and to damage that results from such failures, due to insufficient operating functions in safety-related components.

(7) Mounting

The controller must be mounted correctly:

- For use in an environment with level 2 contamination.
- In an enclosure with a protection type of at least IP54 (IEC 60529).
- On a 35 mm DIN track (PFP-□N: sold separately).
- Use end plates (PFP-M: sold separately) on both ends of SCC-1224A Safety Mat/Edge Controller.
- The unit must not be operated in areas with major temperature changes.

(8) Moving or Transferring Devices or Equipment

When moving or transferring devices or equipment, be sure to include this manual to ensure that the person to whom the device or equipment is being moved or transferred will be able to operate it properly.

- Typical related international standards: ISO 12100, Safety of machinery -- General principles for design -- Risk assessment and risk reduction
IEC 61508, Safety Standard for Safety Instrumented Systems (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems)

(9) Wiring

Wire the connection terminals properly and check the operation before commissioning. Otherwise, the SCC-1224A Safety Mat/Edge Controller may not operate correctly or it can be burnt or destroyed by connection of electrical power to the incorrect terminals.

- Lines that are routed outside the switch cabinet must be protected properly.
- The limit values stated in the "Specifications" for the supply voltage must be observed. Do not use power supplies with large ripples or power supplies that intermittently generate incorrect voltages.
- When using a UMA Safety Mat, the terminals to connect to the UMA depend on the kind of the UMA. Connect the terminals X1, X2, X3 and X4 properly.
- To prevent short-circuit or ground failure of the load, connect protection elements such as fuses. Not doing so may damage or burn the controller.
- When connecting the SCC-1224A Safety Mat/Edge Controller to multiple sensors, ensure that the maximum number of sensors, the maximum sensor length, the maximum sensor surface area and the maximum total cable length for sensor connection are within the specified values.

(10) Disposal

Dispose of the product in accordance with the relevant rules and regulations of the country or area where the product is used.

Precautions for Correct Use

(1) Handle with care

Do not drop the product or expose it to excessive vibration or mechanical shock. The product may be damaged and may not function properly.

Do not place heavy goods on the product during transportation or storage. The product may be damaged and may not function properly.

(2) Solvents

Exposure of the product to organic solvents, such as alcohol, thinner, trichloroethane, or gasoline, should be avoided.

Such solvents make the markings on the SCC-1224A Controller illegible and cause deterioration of parts.

(3) Storage and operating conditions

Do not store or use the products under the following conditions.

1. In direct sunlight
2. At ambient temperatures not between -20 and 55°C
3. At relative humidity not exceeding 90% or under temperature changes that could causes condensation
4. At air pressure out of the range of 86 to 106 kPa
5. In corrosive or combustible gases
6. Where subject to vibration or mechanical shock beyond the rated values
7. Where subject to contact with water, oil, or chemicals
8. In an atmosphere containing excessive dust, saline, or metal powder

(4) Wiring

1. Use the following to wire to the SCC-1224A Controller.

Stranded wire (Flexible wire): 0.75 to 1.5 mm²

Solid wire: 0.75 to 1.5 mm²

Strip the cover of wire no longer than 7 mm.

Terminal tightening torque: 0.5 to 0.6 N·m

2. Ground the negative side of the power supply. A controller with the positive side grounding will not work.
3. Do not connect a safety mat and a safety edge together with the SCC-1224A.

(5) Mounting of multiple SCC-1224A Controllers

Keep 25 mm or more from adjacent SCC-1224A Controllers when mounting in row. Temperature range when mounted in row is +40°C (104°F) max.

(6) Auxiliary output

The following operations of the auxiliary output must be noted.

1. The auxiliary output is open when the SCC-1224A is powered off.
2. At power-on
 - In the auxiliary output without delay mode, the auxiliary output is closed once even when the safety output is closed immediately in the automatic reset mode.
 - In the auxiliary output delayed mode, the auxiliary output is closed for 3 s and then switched to open.
3. During operation

- In the auxiliary output delayed mode, the closed state of the auxiliary output (for 3 s) is not extended even the sensor is activated again during this state.

Refer to 2-2. *Operating Modes* for details of the settings and operations of the auxiliary output.

■ Automatic Reset (at power-on)

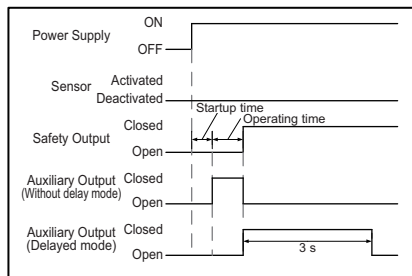


Fig. (6)-1 Automatic Reset (at power-on)

■ Automatic Reset (during operation)

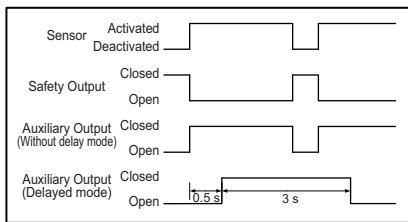


Fig. (6)-2 Automatic Reset (during operation)

■ Manual Reset (at power-on and during operation)

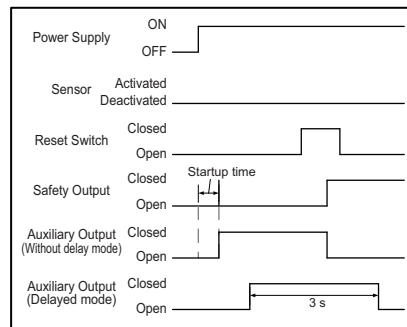


Fig. (6)-3 Manual Reset (at power-on and during operation)

(7) This is a Class A product (Product in industrial setting). Use of the product in residential setting may cause radio disturbance. In such case, take appropriate measures.



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Chapter1 System Overview

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1-1. Description

Presence sensing safety mats or safety contact edges and the SCC-1224A Safety Mat/Edge Controller are used where perimeter access guarding is required, such as around robots, manufacturing work cells, food processing equipment and automated assembly equipment. The SCC-1224A controller is used to evaluate the UMA Series Safety Mats or the SGE Safety Edges, such as SGE-125, SGE-225, SGE-245 and SGE-365.

1-1-1. How the System Works

The SCC-1224A controller is used to evaluate safety contact mats and safety contact edges. More than one sensor can be connected to the controller.

The SCC-1224A controller monitors the steady-state current of the sensor. If the desired steady-state current flows, the safety relays are driven and the switching contacts closed. If the sensor is activated or the sensor circuit is interrupted, the relay switching contacts open.

An auxiliary signal output is available. An activation of the sensor causes a reaction of the auxiliary output in accordance with the DIP switch configuration.

1-2. Ratings and Specifications

Power Input

Power supply voltage*	120 VAC 50/60Hz (Terminals A1 and A2) 24 VAC 50/60Hz or 24 VDC (Terminals B1 and B2)
Operating voltage range	-10% to +10% of rated power supply voltage
Power consumption (with sensors connected)	120 VAC: 3.8 VA max. 50 Hz, 3.5 VA max. 60 Hz 24 VAC: 1.2 VA max., 24 VDC: 1.5 W max.

* Select either Terminals A1 and A2 or Terminals B1 and B2 according to the power supply voltage applied. Never apply both voltages simultaneously.

Inputs

Sensor input	UMA Safety Mat: A maximum of 10 mats can be connected in series. SGE Safety Edge: A maximum of 5 edges can be connected in series. Maximum wiring length: 25 m max. Refer to 3-1-3. <i>Connection of Several Sensors per Sensor Circuit.</i>
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Contacts

Safety output	230 VAC 3 A, 24 VDC 3 A (resistive load) 230 VAC 1 A (AC-15), 24 VDC 2 A (DC-13) (inductive load)
Auxiliary output	24 VAC/DC 2A (resistive load)

Characteristics

Startup time *1	300 ms max.	
Operating time (Open to closed) *2	550 ms max.	
Response time (Closed to open) *3	13 ms max.	
Vibration resistance	Malfunction: 10 to 55 Hz, Sinus, 0.15 mm amplitude, 10 cycles	
Shock resistance	Malfunction: 147 m/s ²	
Durability	Mechanical	1,000,000 cycles min.
	Electrical	AC-15: 800,000 cycles min. (230 VAC, 1A) DC-13: 250,000 cycles min. (24 VDC, 2A)
Ambient operating temperature	-20 to 55°C (-4 to 131°F) (with no icing or condensation)	
Ambient operating humidity	0% to 90%	
Degree of protection	IP20	
Material (Housing)	Polyamide PA6.6, self-extinguishing according to UL 94-V2	
Protection type	Class II (protective insulation)	
Pollution degree	2	
Overvoltage category (IEC/EN 60664-1)	III	
Rated insulation voltage	250 V	
Rated impulse voltage resistance	4 kV	
Dielectric strength	1.5 kVAC	
Terminal tightening torque	0.5 to 0.6 N•m	
Weight	approx. 210 g (7.4 oz)	
Conformity	Conforming to Standards	Refer to <i>Legislation and Standards</i> for details.
	PFHd	6.5×10 ⁻⁹ (Nop 17,520)
	MTTFd	195 years
	DC	99% (Nop 17,520)

*1. The startup time is the delay time from power-on to when the SCC-1224A Safety Mat/Edge Controller is ready to operate.

*2. The operating time is the time it takes for the safety output contacts to be closed after the sensor is deactivated and the manual reset input contacts are closed. The contact bounce time is not included.

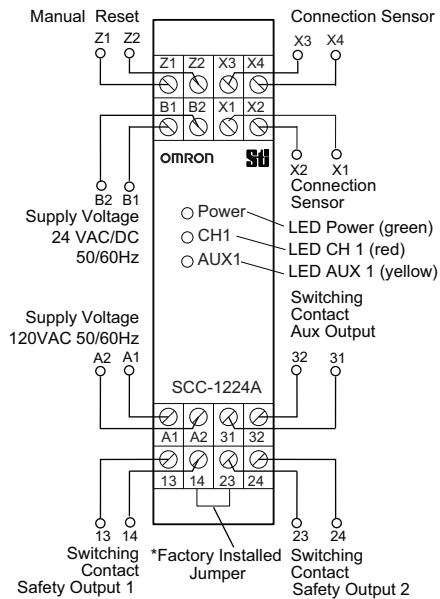
*3. The response time is the time it takes for the safety output contacts to open after the sensor is activated. Contact bounce time is included.

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2-1. Controller Overview

2-1-1. Signal Indicators and Connection Terminals



*Remove the factory-installed jumper between terminals 14 and 23 if safety outputs 1 and 2 are not connected in series.

Fig. 2-1 SCC-1224A Front View

■ Connection Terminals

Signal	Terminal	Overview	Wiring
Supply Voltage 120VAC	A1, A2	Input terminals of 120 VAC supply voltage.	Do not connect a supply voltage of 24 VAC or 24 VDC.
Supply Voltage 24VAC/DC	B1, B2	Input terminals of 24 VAC or 24 VDC.	Do not connect a supply voltage of 120 VAC. When using 24 VDC, connect 24 VDC line to B1 and 0 VDC line to B2.
Connection Sensor	X1, X2	Input terminals of sensor signal.	Connect signal lines of UMA Safety Mat or SGE Safety Edge. For 1-cable type of UMA Safety Mat (UM□□A-□-□-1), connect brown line to X1 and blue line to X2.
	X3, X4		Connect signal lines of 1-cable type of UMA Safety Mat (UM□□A-□-□-1), white line to X3 and black line to X4.
Manual Reset	Z1, Z2	Input terminals of a reset switch (NO contact). Also used as external device monitoring (EDM) terminals of contactors.	Do not connect any lines when in the automatic reset mode. Connect NC contacts of contactors when using the external device monitoring (EDM) function.
Safety Output 1	13-14	Closed or open according to sensor and manual reset inputs.	Do not connect any lines when not used. Remove the factory-installed jumper between terminals 14 and 23 if safety outputs 1 and 2 are not connected in series.
Safety Output 2	23-24		
Auxiliary Output	31-32	In the auxiliary output without delay mode, the auxiliary output is closed without delay when the safety outputs are open. In the auxiliary output delayed mode, the auxiliary output is closed with a delay of 0.5 s after the safety outputs are open, and remains closed for 3 s.	Do not connect any lines when not used. Do not use this as safety output.

■ Signal Indicators

Label	Color	Name	Status	Description
Power	Green	Power LED	ON	Operating state
			Flashing	Fault alarm*
CH1	Red	Sensor Input LED	ON	Sensor activated (Safety output OFF)
			Fast flashing* (approx. 4 Hz)	Sensor faulty*
			Slow flashing* (approx. 1 Hz)	Waiting for reset switch input* (Safety output OFF)
			OFF	Released from interlocked state (Safety output ON)
AUX1	Yellow	Auxiliary output LED	ON	Auxiliary output contact closed
			OFF	Auxiliary output contact open

*Refer to 4-2. Fault Diagnosis for more information.

2-1-2. DIP Switch

⚠ WARNING

Serious injury may occur due to loss of required safety functions. Make sure to shut down the power supply before setting the DIP Switch. Perform an inspection for the system according to 4-1. Test Procedure Log.

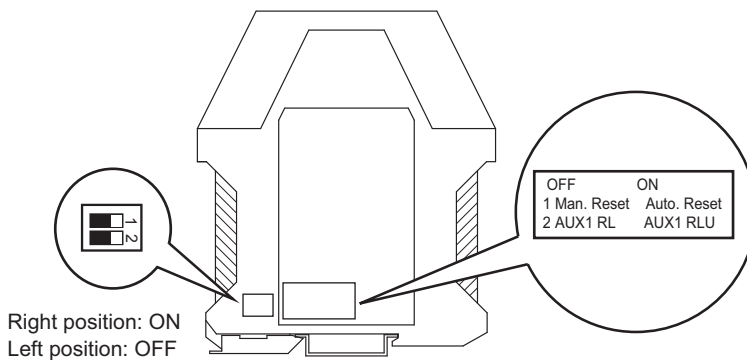


Fig. 2-2 Dip Switch

■ DIP switch for configuring the operating mode

DIP Switch	Operating Modes
1	"ON" - Automatic reset (factory setting)
	"OFF" - Manual reset, EDM monitoring
2	"ON" - Auxiliary output without delay (factory setting)
	"OFF" - Auxiliary output delayed

2-1-3. Dimensions

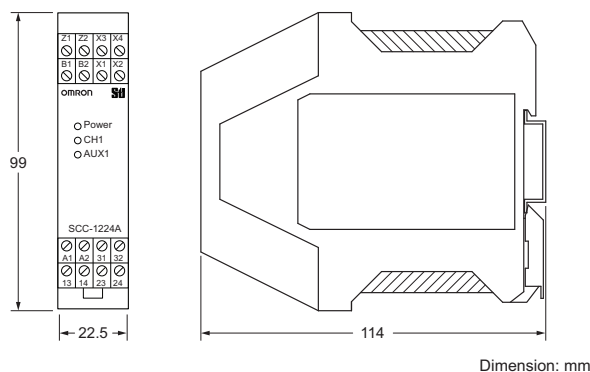


Fig. 2-3 SCC-1224A Dimensions

2-2. Operating Modes

2-2-1. Safety output

Separate or series-connected output of the control circuits (redundant continuation of the switching contacts). In order to use the two safety relays separately, the bridge between 14 and 23 contacts must be removed.

2-2-2. Automatic reset

DIP Switch 1 = "ON"

When the sensor is deactivated and power is applied, the controller will automatically close the safety outputs again. The external device monitoring (EDM) function cannot be used in the automatic reset mode.

2-2-3. Manual reset

DIP Switch 1 = "OFF"

When the sensor is deactivated and power is applied, the controller will close the safety outputs 20 ms after a NO reset switch connected between Z1 and Z2 contacts is pressed. There must be a delay of 500 ms between sensor deactivation and the press of the reset switch. This prevents the safety outputs from being closed when the reset switch is pressed during this delay.

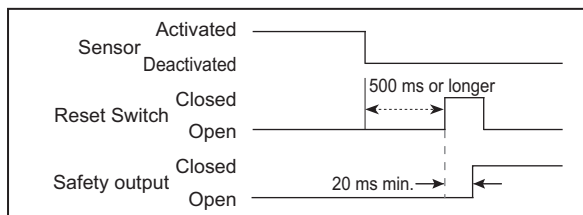


Fig. 2-4 Manual reset

2-2-4. Auxiliary output without delay (RLU)

DIP Switch 2 = "ON"

In this mode of operation the auxiliary output is closed without any delay when the safety outputs are open. The output is always simultaneous with the safety output.

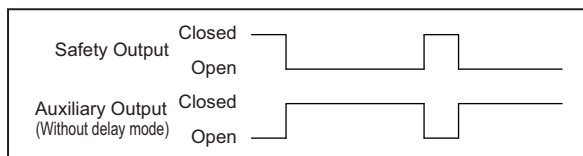


Fig. 2-5 Auxiliary Output without Delay

2-2-5. Auxiliary output delayed (RL)

DIP Switch 2 = "OFF"

In this operating mode the auxiliary output is closed after a delay of 0.5 s when the safety outputs are open, and then remains closed for 3 s.

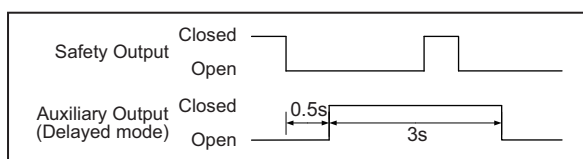


Fig. 2-6 Auxiliary Output with Delay

2-3. Functional Circuit

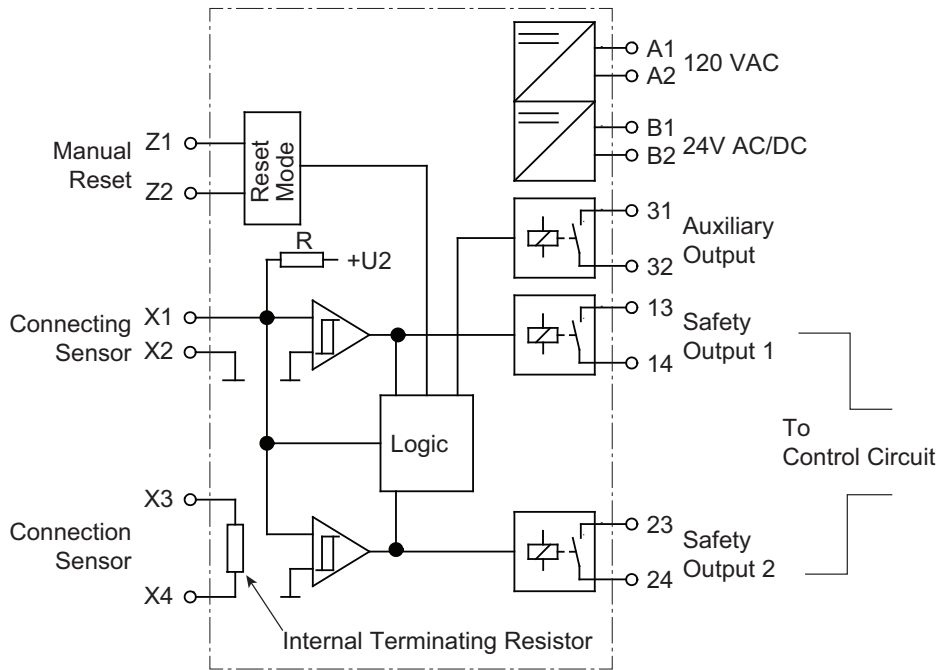


Fig. 2-7 Functional Circuit Diagram

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3-1. Electrical Connection

⚠ WARNING

Serious injury may occur due to loss of required safety functions. Wire the SCC-1224A Safety Mat/Edge Controller properly so that the 120 VAC or 24 VDC line does NOT touch the outputs.



Serious injury may occur due to loss of required safety functions. Ground the 0V line of the power supply for external output devices so that the devices do NOT turn ON when the safety output line or the auxiliary output line is grounded.



Serious injury may occur due to loss of required safety functions. DO NOT connect the SCC-1224A Safety Mat/Edge Controller in parallel with sensors. Read and understand the wiring examples and connect the SCC-1224A Safety Mat/Edge Controller with sensors in series.



3-1-1. Supply Voltage

The supply voltage can be a voltage of 120 V AC 50/60 Hz or a low voltage of 24 V AC/DC. For a supply with 24 V AC/DC the voltage must correspond to the requirements for protective low voltages (SELV). The supply line to the controller must be protected by means of a suitable fuse.

Never apply both voltages simultaneously!

The 120 VAC supply voltage must be applied to the A1 and A2 terminals. For operation with 24 VAC, the supply voltage must be applied to the B1 and B2 terminals. For operation with 24 VDC, connect 24 VDC line to the B1 terminal and 0 VDC line to the B2 terminal.

For a fixed installation a power disconnect device must be available (for example, a main switch for the system). A main plug is sufficient as a power disconnect device, if it is freely accessible.

3-1-2. Connection of Sensor

The 2-cable type of UMA Safety Mat (UM□□A-□-□-2) or SGE Safety Edge must be connected to the X1 and X2 terminals.

The 1-cable type of UMA Safety Mat (UM□□A-□-□-1) is connected to the X1 and X2 terminals, the other pair of leads must be connected to X3 and X4. Refer to 2-1-1. Signal Indicators and Connection Terminals.

3-1-3. Connection of Several Sensors per Sensor Circuit

Sensors must not be connected in parallel.

One or several sensors can be connected to the signal transmitter input. For this purpose, the individual sensors are connected in series in accordance with Fig. 3-1 and Fig. 3-2.

■ UMA Safety Mat

A maximum of 10 UMA Safety Mat can be connected in series. The maximum total surface area must not exceed 10 square meters (107 ft²).

The total line length of the cable used to connect the UMA Safety Mat in series must not exceed 25 m (82 ft). For the 1-cable type of UMA Safety Mat (UM□□A-□-□-1), the total line length of cable must be calculated by multiplying the total length of the cables used by two.

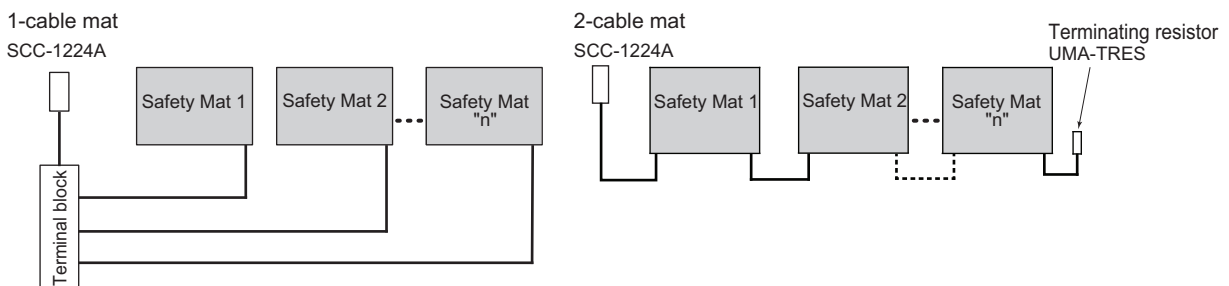


Fig. 3-1 Connecting several safety mats

■ SGE Safety Edge

A maximum of 5 SGE Safety Edges can be connected in series. The maximum total length of the edges must not exceed 30.5m (100 ft).

The length of an individual edge can be up to 6.1m (20 ft).

The total line length of the cable used to connect the edges in series must not exceed 25 m (82 ft).

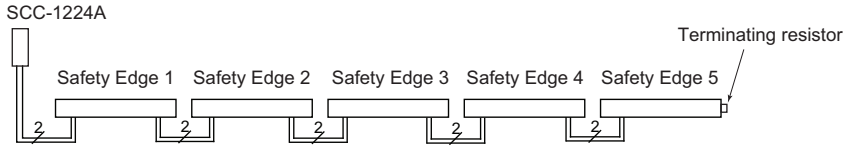


Fig. 3-2 Connecting several safety edges/bumpers

■ Considerations

Before connecting the series-connected sensors, it is recommended to measure the resistance value of the wiring. In the case of non-activated sensors the resistance must be $8.2 \text{ k}\Omega \pm 500 \Omega$. If the sensor is activated, the resistance must not exceed 500Ω .

3-1-4. Connection of Control Circuits

Connect the control circuit to be monitored to terminals 13 and 24. If the switching contacts are redundantly continued, the jumper between terminals 14 and 23 must be removed. See 2-1-1. Signal Indicators and Connection Terminals for wiring information.

In the event of any redundant use of the switching contacts only voltages with the same potential may be connected. The use of different voltage potentials does not correspond to any intended use within specifications.

Depending on the nominal current, the control circuits are to be protected by a corresponding fuse, or the nominal current on the control circuits must be limited to the maximum value by means of other measures.

3-1-5. Connection of Manual Reset/Re-start

For the operating mode "manual reset" the necessary NO reset switch must be connected to terminals Z1 and Z2.

3-1-6. Connection of Auxiliary Contact

The contacts on terminals 31 and 32 serves as an auxiliary output (signaling, display etc.) and must not be integrated into the safety circuit.

The auxiliary contact may only switch 24 VAC/DC (resistive load). The switching of voltages higher than 24 VAC/DC is not permissible.

3-2. Application Examples

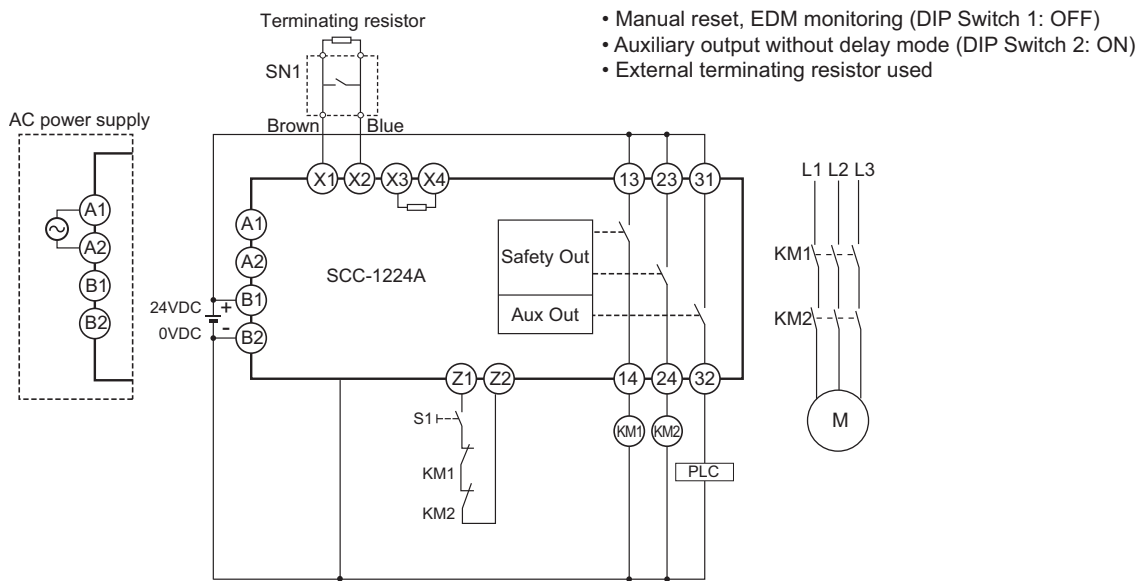
3-2-1. Manual Reset

Fig. 3-3 shows a manual reset configuration with a reset switch S1, using EDM monitoring. EDM monitoring is realized through NC contacts from KM1 and KM2, integrated into the re-start circuit (Z1 and Z2).

The auxiliary relay output is used to indicate the switching state of the safety mat.

■ Intended Application

- The power supply to the motor M is turned OFF when a person steps on the safety sensor.
- The power supply to the motor M is kept OFF until the reset switch S1 is pressed after the person steps out of the safety sensor.



SN1: Sensor (UMA safety mat (2 cable mat))
S1: Reset switch
KM1, KM2: Magnetic contactor
M: Motor

Timing Chart

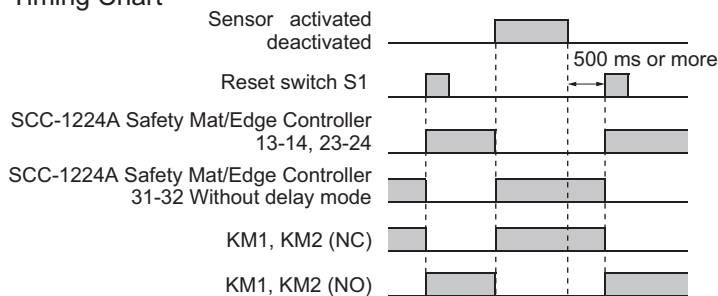


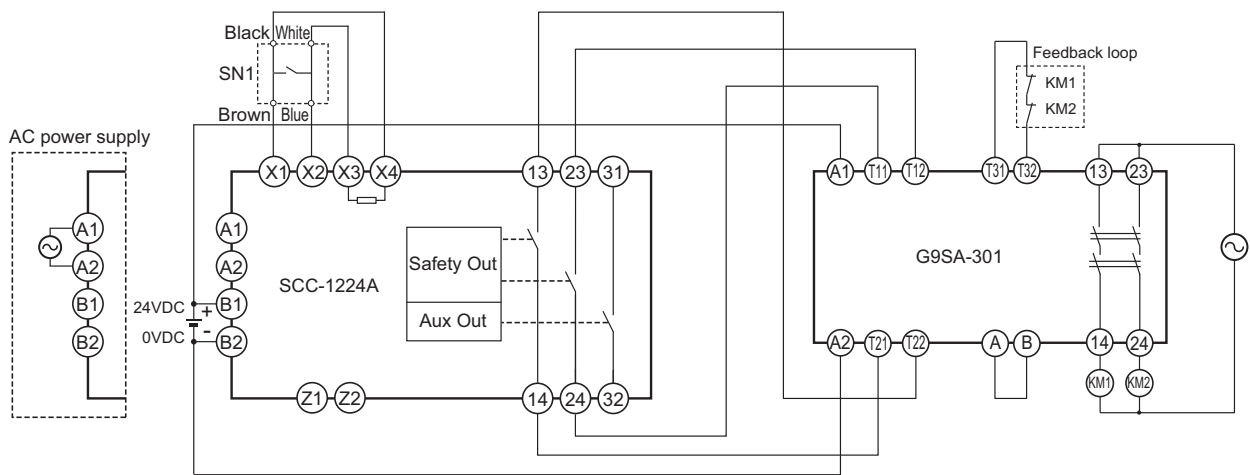
Fig. 3-3 Manual Reset Example - Using External Terminating Resistor Option

3-2-2. Automatic Reset

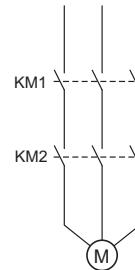
Fig. 3-4 shows an automatic reset configuration, using EDM monitoring. EDM monitoring is realized through NC contacts from KM1, KM2, integrated into the monitoring circuit of another safety controller (G9SA-301).

■ Intended Application

- The power supply to the motor M is turned OFF when a person steps on the safety sensor.
- The power supply to the motor M is kept OFF until the person steps out of the mat.
- Automatic reset (DIP Switch1: ON)
- Auxiliary output without delay mode (DIP Switch 2: ON)
- Internal terminating resistor used



SN1: Sensor (UMA safety mat)
 KM1, KM2: Magnetic contactor
 M: Motor



Timing Chart

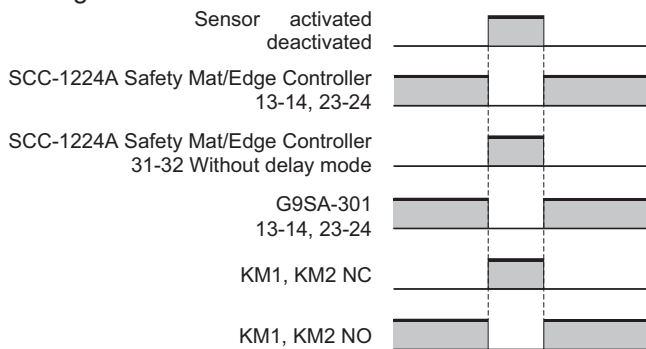


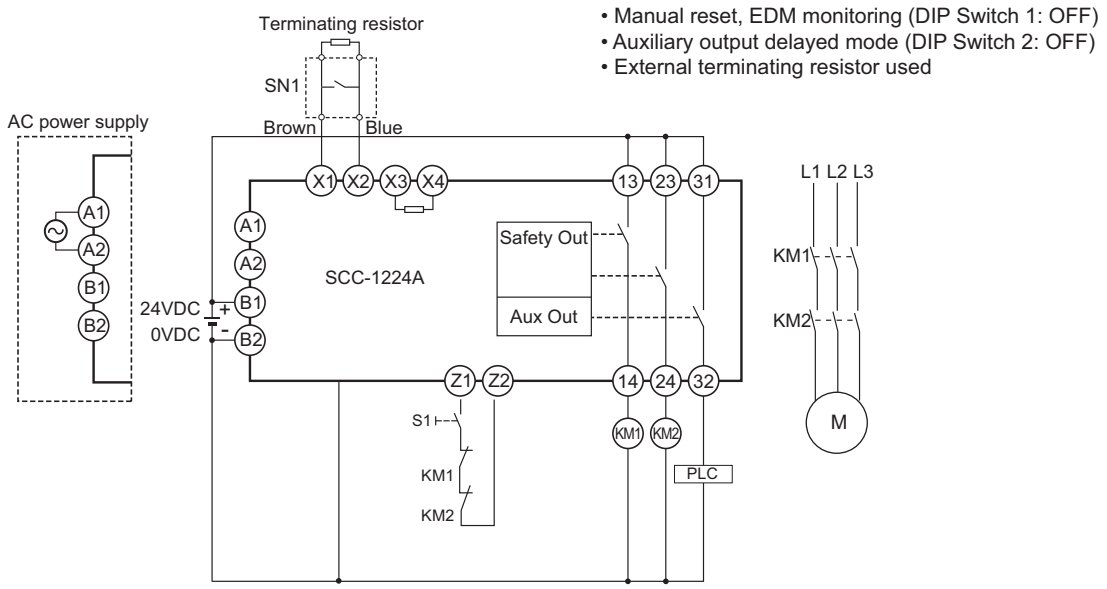
Fig. 3-4 Automatic Reset Example - Using Internal Terminating Resistor Option

3-2-3. Auxiliary Output Delayed Mode

Fig. 3-5 shows a manual reset configuration with the auxiliary output delayed mode.

■ Intended Application

- A slide door installed with the safety edge is operated.
- The power supply to the motor M is turned OFF when a safety edge is activated.
- The power supply to the motor M is kept OFF until the reset switch S1 is pressed after the safety edge is deactivated.



- Manual reset, EDM monitoring (DIP Switch 1: OFF)
- Auxiliary output delayed mode (DIP Switch 2: OFF)
- External terminating resistor used

SN1: Sensor (SGE safety edge)
 S1: Reset switch
 KM1, KM2: Magnetic contactor
 M: Motor

Timing Chart

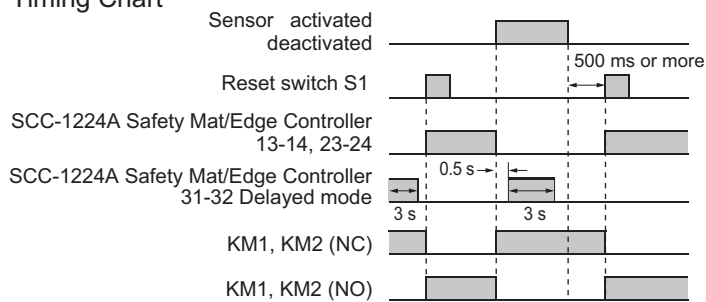


Fig. 3-5 Auxiliary Output Delayed Mode - Using External Terminating Resistor Option

Chapter4 Maintenance

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4-1. Test Procedure Log



Serious injury may occur due to loss of required safety functions. Operate this pressure-sensitive protective device only when it is properly installed, tested and inspected in accordance with all applicable government, industry and company safety regulations.






The following test procedure must be performed by qualified personnel at installation and after any maintenance, adjustment or modification to sensors, the SCC-1224A controller or the machine and machine control circuitry. Additionally, the test procedure must be performed at periodic intervals depending upon use. The machine installer must specify the interval according to national legislative requirements. Omron recommends a maximum interval of 6 months. Testing must be documented in a way that allows it to be traced at any time. Testing ensures that the sensors, SCC-1224A Safety Mat/Edge Controller, machine and machine control circuitry work properly to stop the machine. The requirements of the system and machine manufacturer are to be taken into account and observed. Familiarity with this installation and operating manual is required before proceeding.

Item	Condition	Comments
1. With the machine power off and no pressure on the sensor sensing area and at least 5 s after the SCC-1224A controller power on, verify the following: AUTOMATIC RESET Mode Only: a) The green POWER indicator is on. MANUAL RESET Mode Only: b) The green POWER indicator is on, the red CH 1 indicator flashes slowly and the yellow AUX1 light is on if set for without delay (RLU) mode. c) The green POWER indicator is on and the red CH 1 indicator flashes slowly if set for delayed (RL) mode.	__ Pass __ Failed	
2. If installed, press the reset switch to restart the controller from an interlocked (MANUAL RESET) mode. The green POWER indicator should be on and the output relays should be energized. The red CH 1 and yellow AUX1 indicators should be off. Repeat this step for each sensor in the sensing area.	__ Pass __ Failed	
3. If using a safety mat, simulate stepping on the mat by applying a force of 300N (66 lbs) through an 80mm (min.) diameter flat surface to the mat sensing area to activate the SCC-1224A controller. If using a safety edge, simulate compression by applying a force onto the edge sensing area to activate the SCC-1224A controller. Activation force varies according to the model. Please refer to SGE manual for details. Verify the following: AUTOMATIC RESET Mode Only: a) The green POWER, the red CH 1 and the yellow AUX1 indicators should be on if set for without delay (RLU) mode. b) The green POWER, the red CH 1 indicators should be on if set for delayed (RL) mode. The yellow AUX1 indicator turns on for approximately 3 seconds and then turns off. MANUAL RESET Mode Only: c) The green POWER and yellow AUX1 indicator are on and the red CH 1 indicator flashes slowly if set for without delay (RLU) mode. d) The green POWER is on and the red CH 1 indicator flashes slowly if set for delayed (RL) mode. The yellow AUX1 indicator turns on for approximately 3 seconds and then turns off. Repeat this step for each mat or edge in the sensing area.	__ Pass __ Failed	
4. With the SCC-1224A controller in the operating state, start the machine to be guarded. Simulate stepping (as above) on each sensor in the sensing area and verify that the machine stops immediately and that the red CH 1 indicator is either on or flashes slowly.	__ Pass __ Failed	
5. Verify that there is no damage such as cracks or deformation on the sensor surface. Verify that the sensor is secured to the intended position.	__ Pass __ Failed	
6. If the presence of sensors, SCC-1224A controller or the machine fail any of these tests, DO NOT run the machine. Immediately tag and lockout the machine to prevent its use and notify the supervisor.	__ Pass __ Failed	

4-2. Fault Diagnosis

When the SCC-1224A detects a fault, the SCC-1224A switches the safety output to open and indicates the fault by means of the LEDs. Faults can be determined by statuses of POWER and CH1 indicators. Follow the below steps for troubleshooting.

Step 1: Check the status of the POWER indicator.

Power(Green)	Description	Troubleshooting
 ON	Operating state	Check the status of CH1 indicator for sensor input. See Table 1.
 Flashing	Fault alarm	See Table 2.
 OFF	Supply voltage is missing, too low or incorrectly connected.	Check connections and supply voltage: - 120 VAC±10% at terminals A1 A2 or - 24 V AC/DC±10% at terminals B1 B2

Step 2. According to the status of the POWER indicator, determine the fault from Table 1.

Table 1. Checking CH1 indicator status










CH1(Red)	Description	Troubleshooting
 OFF	Operating state (Sensor deactivated)	-
 ON	The corresponding sensor is recognized as being activated (stepped on).	Check if the sensor is pressed or deformed. Disconnect the wires from the terminals X1 to X4 and connect X1 to X3 and X2 to X4. - If the red CH1 LED still lights up, the SCC-1224A is faulty. Replace the SCC-1224A. - If the red CH1 LED does not light up, the corresponding sensor or a cable connected to the sensor is faulty. Replace the sensor or cable.
 Slow flashing (approx. 1 Hz)	Waiting for reset switch. (Interlocked state)	Carry out manual reset after you confirm there is no one in the machine hazardous zone. If the safety output stays open even when the reset switch is pressed, check the wiring of the manual reset input between Z1 and Z2 terminals.
 Fast flashing (approx. 4 Hz)	Sensor circuit interrupted, sensor not connected, defectively connected or defective.	Disconnect the wires from the terminals X1 to X4 and connect X1 to X3 and X2 to X4. - If the red CH1 LED still flashes fast (at approx. 4 Hz), the SCC-1224A is faulty. Replace the SCC-1224A. - If the red CH1 LED does not light up, the corresponding sensor or a cable connected to the sensor is faulty. Replace the sensor or cable.

Table 2. Checking POWER indicator status

Power(Green)	Description	Troubleshooting
 Flashing once	Voltage supply outside the valid value range	Check supply voltage: - 120 VAC±10% at terminals A1 A2 or - 24 V AC/DC±10% at terminals B1 B2
 Flashing twice	Internal fault (Sensor input faulty)	Replace the SCC-1224A.
 Flashing 3 times	Internal fault (Sensor output relay faulty)	Replace the SCC-1224A.
 Flashing 4 times	Internal fault (Other than the above faulty)	Replace the SCC-1224A.
 Flashing 5 times	Setting of the DIP Switch may be switched during operation.	Check if the DIP Switches are set in the intended modes. Then cycle the power and check that the SCC-1224A operates as intended. If the SCC-1224A operates in an unintended mode, the internal circuit may be faulty. Replace the SCC-1224A.

Note 1. If more than one fault occur simultaneously, flashing patterns of corresponding faults are repeated in sequence.

Note 2. The AUX indicator operates according to the setting of the DIP Switch 2.

- Auxiliary output without delay: ON
- Auxiliary output delayed: ON for 3 s and then OFF

Chapter5 Appendix

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5-1. Declaration of Conformity

No. DECL-000134 Rev. B



EU DECLARATION OF CONFORMITY

1. Product Models/Products:

Safety Mats, UMA Series, Model(s) UMA, UMMA, UMMYA, UMYA used in conjunction with Safety Mat Controller Models SCC-1224A, MC3

2. Name and address of the manufacturer:

OMRON Scientific Technologies Incorporated
6550 Dumbarton Circle, Fremont, CA 94555-3605, U.S.A

3. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

4. Objects of the declaration:

Pressure Sensitive Protective Devices to detect the presence of persons – consisting of a Safety Mat Controller in conjunction with pressure sensitive safety mats. Not suitable for the detection of children

5. The objects of the declaration described above are in conformity with the relevant Union harmonization legislation:

Machinery Directive 2006/42/EC, 2014/30/EU EMC Directive, RoHS Directive 2011/65/EU

6. References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:

Machinery Directive: EN ISO 13856-1:2013, EN 12978:2003+A1:2009, EN ISO 13849-1:2015

7. Name, address, and identification number of Notified Body, Number of EC Type Examination

Machinery Directive:

Notified body: TÜV NORD CERT GmbH, Certification Body Machinery

Address: Langemarckstr. 20, 45141 Essen

Notified Body identification No.:0044

EC Type Examination Certificate Number: 44 205 15174901

No. DECL-000134 Rev. B

Signed and on behalf of: OMRON Scientific Technologies Incorporated**Place of issue:** Fremont, CA, 94555, USA **Date of issue:** 7 Feb 2017**Signature:** **Name:** Martin D. Krikorian**Function:** Quality Director, OMRON Scientific Technologies Incorporated**Name and address of contact in EU**OMRON Europe B.V.Quality & Environment DepartmentAttn: J.J.P.W. Vogelaar, European Quality & Environment ManagerZilverenberg 2, 5234 GM, 's-Hertogenbosch, The Netherlands



EU DECLARATION OF CONFORMITY

1. Product Models/Products:

Safety Contact Edge Models: SGE125, SGE225, SGE245, SGE365, SGEY365 in combination with Safety Switching Device Model SCC-1224A

2. Name and address of the manufacturer:

OMRON Scientific Technologies Incorporated
6550 Dumbarton Circle, Fremont, CA 94555-3605, U.S.A

3. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

4. Objects of the declaration:

Pressure-Sensitive Protective Devices (Edges & Bars) with Safety Switching Relay; Safety Devices for Power Operated Doors and Gates

5. The objects of the declaration described above are in conformity with the relevant Union harmonization legislation:

Machinery Directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EC

6. References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

Machinery Directive: EN ISO 13849-1:2015, EN 12978:2003+A1:2009, EN ISO 13856-2:2013 (for SGE-245 and SGE-365). EN ISO 13849-1:2015, EN ISO 13856-2:2013 (for SGE-125 and SGE-225).

7. Name, address, and identification number of Notified Body, Number of EC Type Examination

Machinery Directive:

Notified body: TUV NORD CERT GmBH

Address: Langemarckstrasse 20, D-45141 Essen, Germany.

Notified Body identification No.:0044

Certificates for EU Type Examination Registration:

TUV NORD EC Type-Exam Cert No 44 205 15174904, Safety Edge SGE-125

TUV NORD EC Type-Exam Cert No 44 205 15174905, Safety Edge SGE-225

TUV NORD EC Type-Exam Cert No 44 205 15174906, Safety Edge SGE-245

TUV NORD EC Type-Exam Cert No 44 205 15174907, Safety Edge SGE-365

No. DECL-000140 Rev. A

Signed and on behalf of: OMRON Scientific Technologies IncorporatedPlace of issue: Fremont, CA, 94555, USA Date of issue: 6/9/2017Signature: Vanessa ChenName: Vanessa ChenFunction: Quality Manager, OMRON Scientific Technologies Incorporated**Name and address of contact in EU**OMRON Europe B.V.Quality & Environment DepartmentAttn: J.J.P.W. Vogelaar, European Quality & Environment ManagerZilverenberg 2, 5234 GM, 's-Hertogenbosch, The Netherlands

2/2

5-2. Revision History

A manual revision code appears as a suffix to the manual number at the bottom of the front and back covers of this manual.

Z394-E1-01



Revision No.

Revision code	Date	Revised contents
01	September 2017	First edition

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