Auto-Reset Safety Module Datasheet

Contents

Overview

The Auto-Reset Safety Module, CE-SA-019-0001 is intended to interface up to 3 safety devices and with the MachineMotion V2. It can interface with area scanners, light curtains and other safety devices to perform safety functions. If the order of the zone triggered is respected then the module will automatically reset its own state. A Safety function is a function which reduces risk, if a safety function was to be removed, the users would be subject to increased risk. Every safety equipment deployment should be paired with a safety assessment.

Features

- Compatible with MachineMotion V2
- Configuration-free: plug & play
- Modules can be daisy-chained
- Compatible with all light curtain and laser scanner supplied by Vention
- Inputs for 2 pairs of muting sensors (CE-AP-002-0000 compatible)
- On-board LED for power, fuse, and communication status indication, located on the bottom of the module
- LED indicator displaying power status, fault alerts, safety status, and activation of an emergency stop triggered by the module
- Publishes safety state to MachineMotion 2
- Reports warning of eminent auto-reset when sequence is accepted

Included cables

- 1x Safety Extension cable (5m) - CE-CA-102-5001__2
- 2x Safety Device Jumper - CE-SA-125-0001
- 1x Safety Jumper - CE-SA-102-0001

Important Notes

Safety

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Vention's safety modules perform safety functions as a part of a whole installation or machine. A complete safety system normally includes sensors or input units, logic units and contactors or output units. The manufacturer of the installation or machine is responsible for ensuring proper functioning of the whole system. The total concept of the control system into which the safety module is integrated must be validated by the user. Vention cannot guarantee all specifications of an installation or a machine without being responsible for the risk assessment and the design of the safety system. Vention takes over no liability for recommendations which are given or implied in the following description.

The following items must be taken into consideration during the design, risk assessment & installation of the safety system :

- The Safety Modules shall be put into operation only after the safety functions have been tested during the commissioning.
- According to EN IEC 60204-1:2018 and EN ISO 10218-1:2011 it is not allowed to restart automatically after emergency stop. Therefore the control systems of the connected devices have to disable the automatic start after emergency stop.
- Opening the Safety Module or implementing unauthorized changes voids any warranty.

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Functional error! Danger to life, risk of serious injuries or property damage

- The Auto-Reset Safety Module may only be connected to the equipment listed in this manual.
- The Auto-Reset Safety Module does not monitor the input redundant signals at the safety device ports. If the connected devices do not have monitoring of its output signals, the performance level of the safety function can be reduced.
- When using the auto-reset function in a full body entry application, we recommend to use Devices 1, 2 & 3. If the risk assessment doesn't show risks of using only two zones, only Device 1 and Device 2 can be used;
- When using the auto-reset function in a partial body entry application, it is possible to use only the Device 1 port and connect a jumper to Device 2 and Device 3.
- When using the auto-reset function the risk of having two personnes entering the safeguard space at the same time shall be considered in the risk assessment. For example, that one of the personne access a non-monitored dangerous area from the monitored area.
- The auto-reset module should only be used in a safety chain connected to the Reduced port of a Smart Robot Safety Module and/or if the safety assessment permits it.
  - The risk assessment shall demonstrate that when triggering the safety devices connected to the Device ports, the state of the machine and the safety distance are acceptable;
- The Auto-Reset Safety Module is designed to operate in indoor environments without dust or high humidity. Dust and dampness may lead to malfunction. Do not install or operate the Muting Safety Module outdoors.
- The machine shall be designed in such a way that it is not possible to press the reset button from inside a safeguarded area without triggering one of the devices connected to the Device ports.

Technical specs

General Specifications

Item	Specification
Part Number	CE-SA-019-0001
Weight	0.8kg
Dimensions	19.0 x 15.0 x 9.0mm
Material	- Bottom enclosure: Aluminum - Top enclosure: Aluminum

Item	Specification
Operating Temp	0 to 40°C

Electrical Specifications

Item	Specification
Nominal input voltage	24 VDC (Class 2 or SELV power supply**
Input voltage range	19.2 ~ 26.4 VDC
Operating power consumption	• With light curtains (TX and RX): 8.4 W • With laser scanner: 8.4 W
Peak power consumption	• With light curtains (TX and RX): 18.6 W • With laser scanner: 42 W
Short circuit protection	Internal E-FUSE IC*
Max current allowed	2 A
Post-short current	250 mA
Release delay at 24 V	‹ 40 ms

*Note: Due to the inrush of safety devices, the E-FUSE might trip if you power the unit while 4 or more Safety devices are plugged into it. To fix this issue, you can remove power from the MachineMotion and start it again.

** Note: In North America the Safety Module shall be supplied by a certified class 2 power supply. In Europe, the Safety Module must be supplied by an SELV circuit. When powered by the MachineMotion those requirements are met.

Physical Interface

Figure 1: Physical Interface

LED Indicators

Name	LED Color	Indicated (when ON)
POWER	White	24 VDC supplied to module
COMM	White	EtherNet communication functional
FUSE	Red	Module internal fuse tripped
STATUS	Off	Disconnected
STATUS	Green	Connected
STATUS	White	Communication issue
STATUS	Orange	Error
STATUS	Red	E-Stop
STATUS	Blinking Red	User triggered E-Stop
STATUS	Blinking Blue	Auto-Reset

Functionality

The Auto-Reset Safety Module has 3 devices as inputs. The devices can be multiple light curtains or a single area scanner with 3 outputs. The transitions must overlap and an incorrect sequence will cancel the internal reset. The internal reset does not send a reset outside of the module.
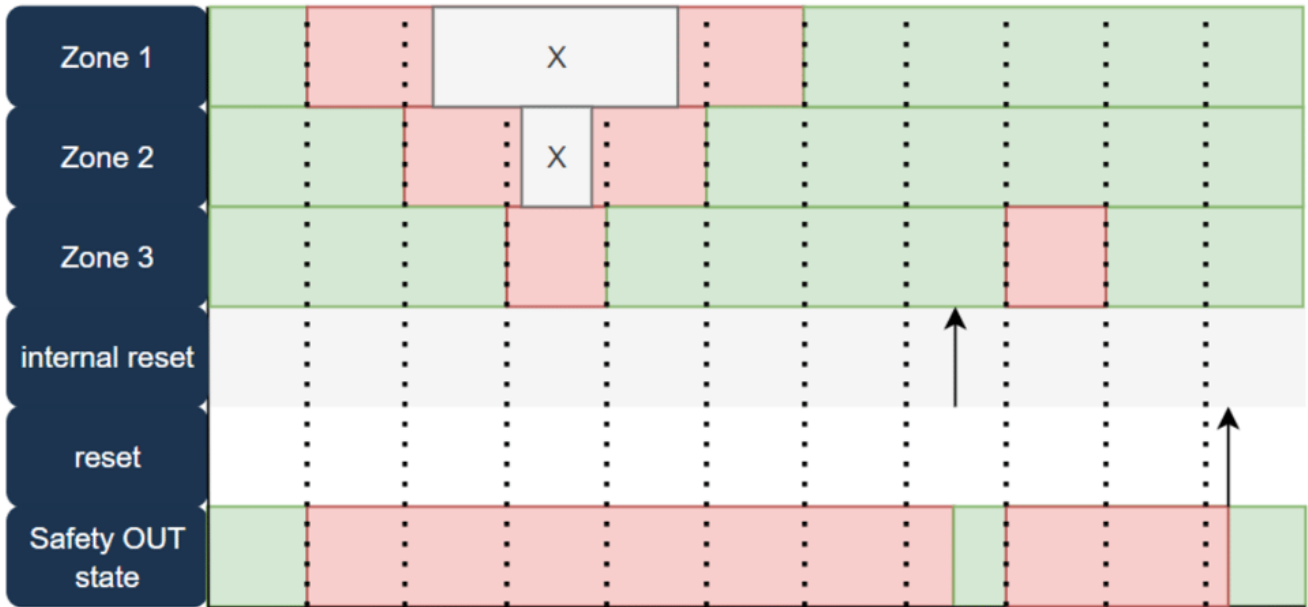
Figure 2: Auto-Reset Safety Module logic

Once the sequence is initiated, the safety out port is triggered. If the sequence is not respected the module will not auto-reset. The internal reset happens 5 seconds after the sequence is respected. The auto-reset module can change the state of the safety out if certain conditions are met. If device 1 is triggered then not triggered, the safety out will be tripped when the device 1 is triggered then when the device 1 is not triggered after a delay the safety out will be reset. The Auto-reset module does not send a reset pulse (this would be unwanted since it could potentially automatically reset the emergency stop safety chain).

Port definitions

Figure 3: Auto-Reset Safety Module ports

Safety OUT - Pin-out - M12, male, 12-pin, A-Keyed

The Safety OUT port connects to the SAFETY IN port of another Safety Module (if daisy-chaining multiple safety modules) or to a MachineMotionV2.

Pin	Function
Pin 1	24 VDC
Pin 2	0V
Pin 3	SAFETY OUT 11
Pin 4	SAFETY OUT 12
Pin 5	SAFETY OUT 21
Pin 6	SAFETY OUT 22

Pin	Function
Pin 7	RESET +(24V)
Pin 8	RESET - (OUTPUT)
Pin 9	ETHERNET TX+ (auto-MDIX)
Pin 10	ETHERNET TX- (auto-MDIX)
Pin 11	ETHERNET RX+ (auto-MDIX)
Pin 12	ETHERNET RX- (auto-MDIX)

Safety IN - Pin-out - M12, female, 12-pin, A-Keyed

The Safety IN port connects to the SAFETY OUT port of another Safety Module (if daisy-chaining multiple safety modules) or to an E-Stop and Reset Module (CE-SA-007-0000). IMPORTANT: If the SAFETY IN port is not used, insert the included yellow jumper.

Pin	Function
Pin 1	24 VDC
Pin 2	0V
Pin 3	SAFETY IN11
Pin 4	SAFETY IN 12
Pin 5	SAFETY IN 21
Pin 6	SAFETY IN 22
Pin 7	RESET +(24V)
Pin 8	RESET - (INPUT)
Pin 9	ETHERNET TX+ (auto-MDIX)
Pin 10	ETHERNET TX- (auto-MDIX)
Pin 11	ETHERNET RX+ (auto-MDIX)
Pin 12	ETHERNET RX- (auto-MDIX)

Zone 1/2/3 - Pin-out - M12, female, 12-pin, A-Keyed

Pin	Function
Pin 1	24V fused
Pin 2	0V
Pin 3	NC

Pin	Function
Pin 4	NC
Pin 5	OSSD input 1
Pin 6	NC
Pin 7	NC
Pin 8	OSSD input 2
Pin 9	NC
Pin 10	NC
Pin 11	NC
Pin 12	NC

Mounting

Install the module mounting bracket (CE-HW-005-1002) to the extrusion with the screws provided (HW-FN-003-0018). Install the module onto the mounting bracket as illustrated below.
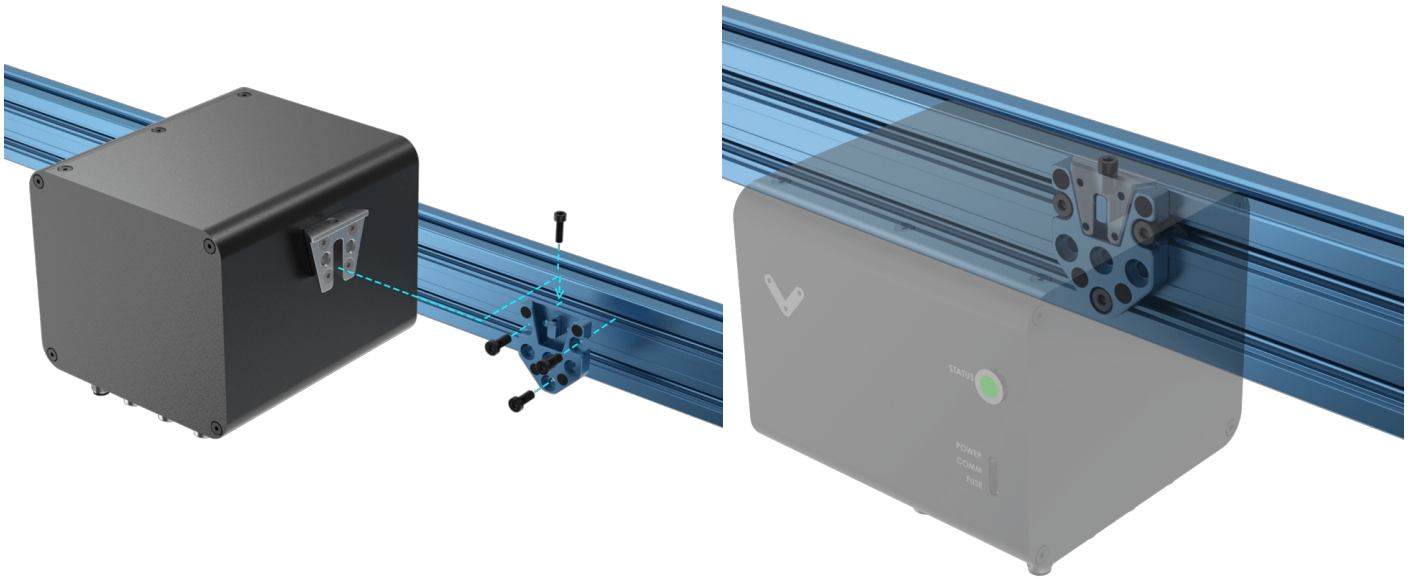

Figure 4: Module Mounting

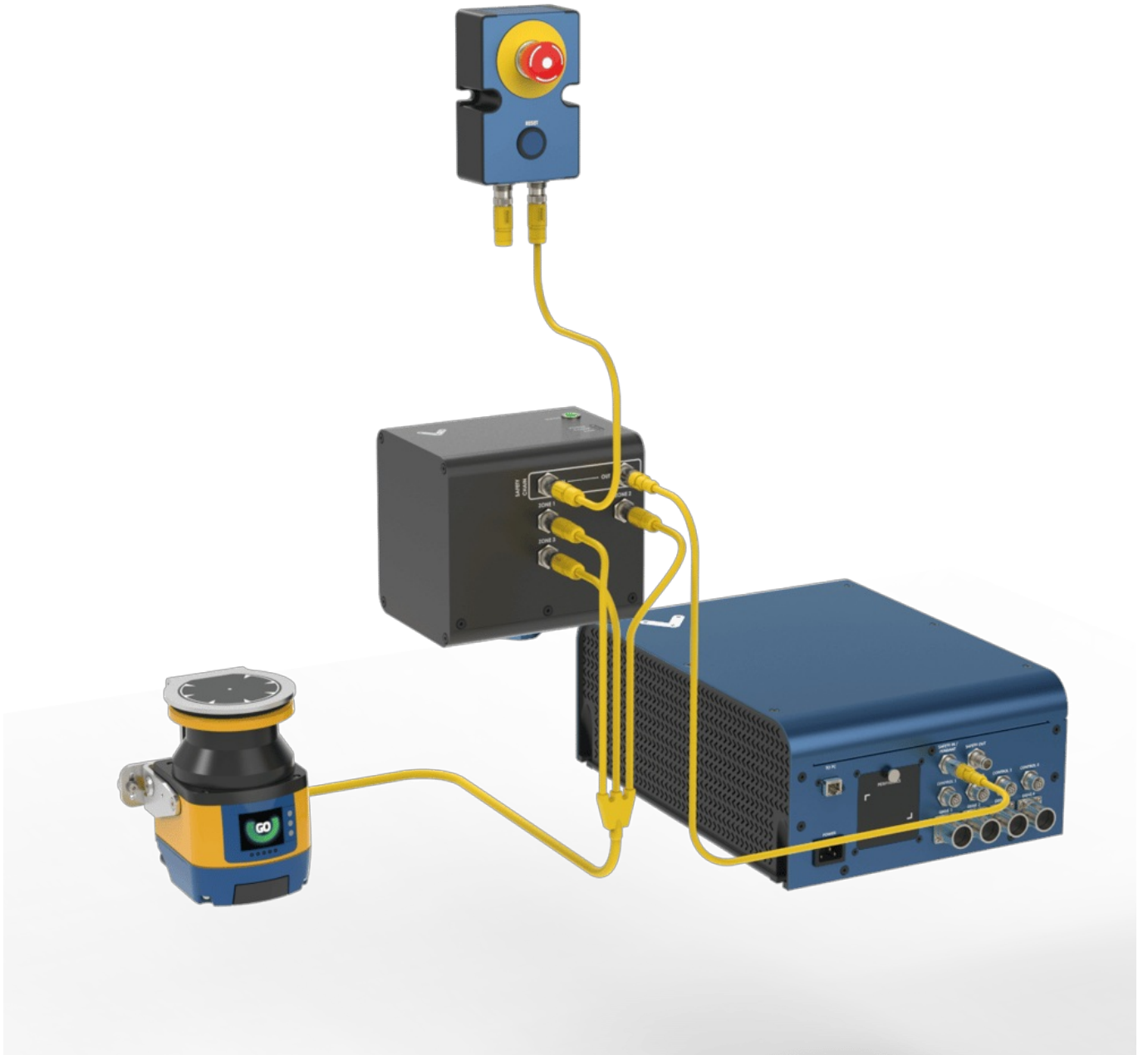*Figure 4: Module Mounting*

Wiring Diagram

Figure 5: Auto-Reset Safety Module wiring diagram

Safety Data

The Vention's Safety Modules realize the following safety functions :

- System emergency stop output at the Safety OUT connector from the Safety IN port (E-stop_SafetyIN-to-SafetyOUT);
- The Device port (light-curtain or area scanner) to the Safety OUT portSystem emergency stop output at the Safety OUT connector from a Safety Device port (E-stop_Device-to-SafetyOUT); and
- System reset propagation from the Safety IN port to the Safety OUT port (Reset_SafetyOUT).

For each of these functions, safety data can be found in the following table.

Safety Function	PL	Cat.	$MTTF_d$	DC_{avg}	PFH_d
E-stop_SafetyIN-to-SafetyOUT	e	3	186	99%	4.29E-08
E-stop_Device-to-SafetyOUT	e	3	186	99%	4.29E-08

Safety Function	PL	Cat.	MTTF	DC	PFH
Reset_SafetyOUT	c	1	›100	N/A	1.14E-06

The above information have been calculated based on the following operation conditions:

Data	Value	Unit
d_{op}	365	days/years
h_{op}	24	hours/days
t_{cycle}	8640	s/cycle