

# Safety Modules Use Case Reference Guide

## Contents

### [Overview](#)

[Scenario #1: Replacing a part inside a machine with light curtains without triggering an e-stop](#)

[Scenario #2: Robot automatically returns to normal operation when the area scanner-defined collaborative speed zone is not triggered](#)

[Scenario #3: Collaborative speed control with auto-reset and defined e-stop zone](#)

[Scenario #4: Integrating area scanners with a FANUC robot without a MachineMotion](#)

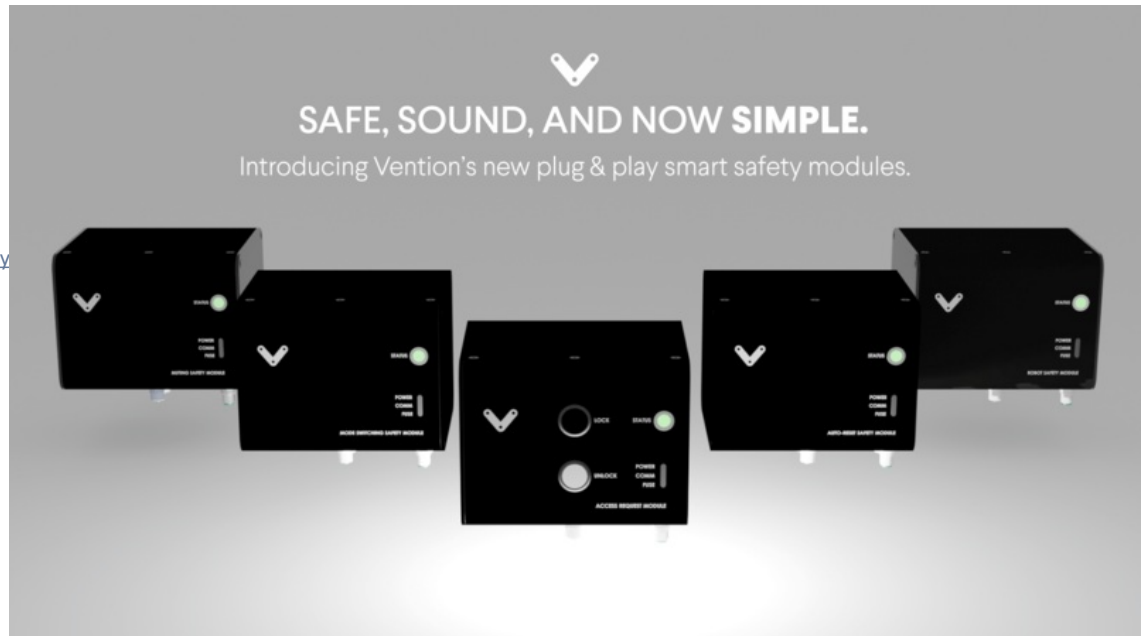
[Scenario #5: Access control for machine cells \(no robot\)](#)

[Scenario #6: Access control for machine cells \(with robot\)](#)

[Scenario #7: Muting light curtains for conveyor systems](#)

[Scenario #8: Managing multiple robots in a cell](#)

[Commissioning checklist](#)



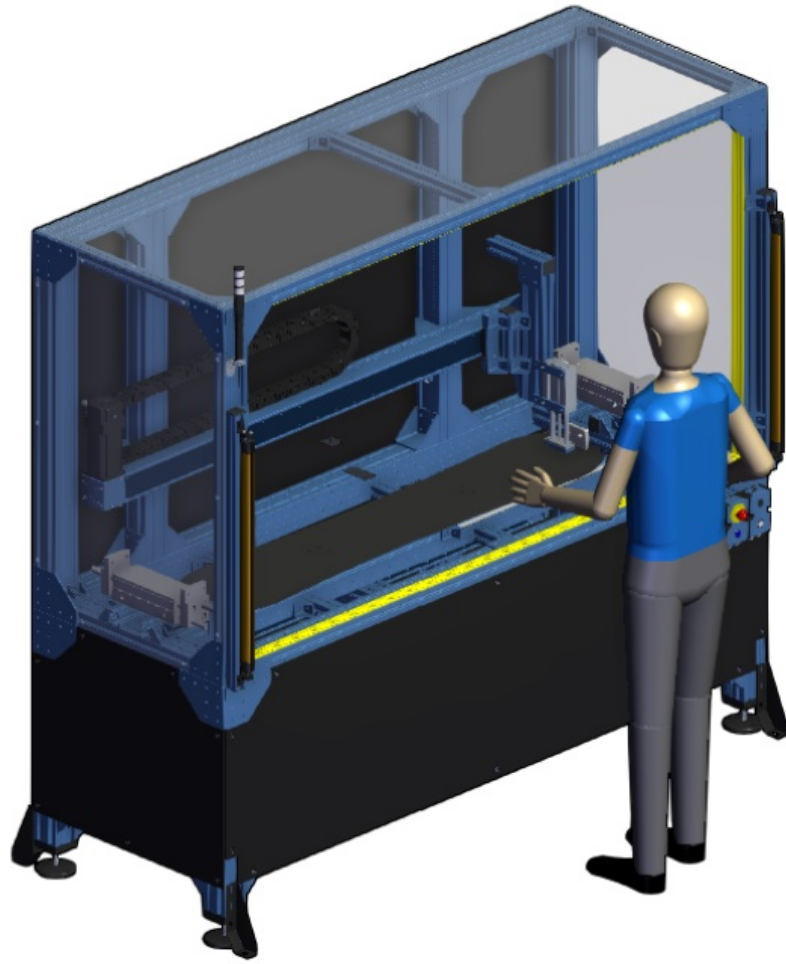
## Overview

Welcome to the Safety Modules Use Case Reference Guide! Here, you'll find all the information you need to seamlessly integrate Vention's safety devices into your machine design, based on your specific use case.

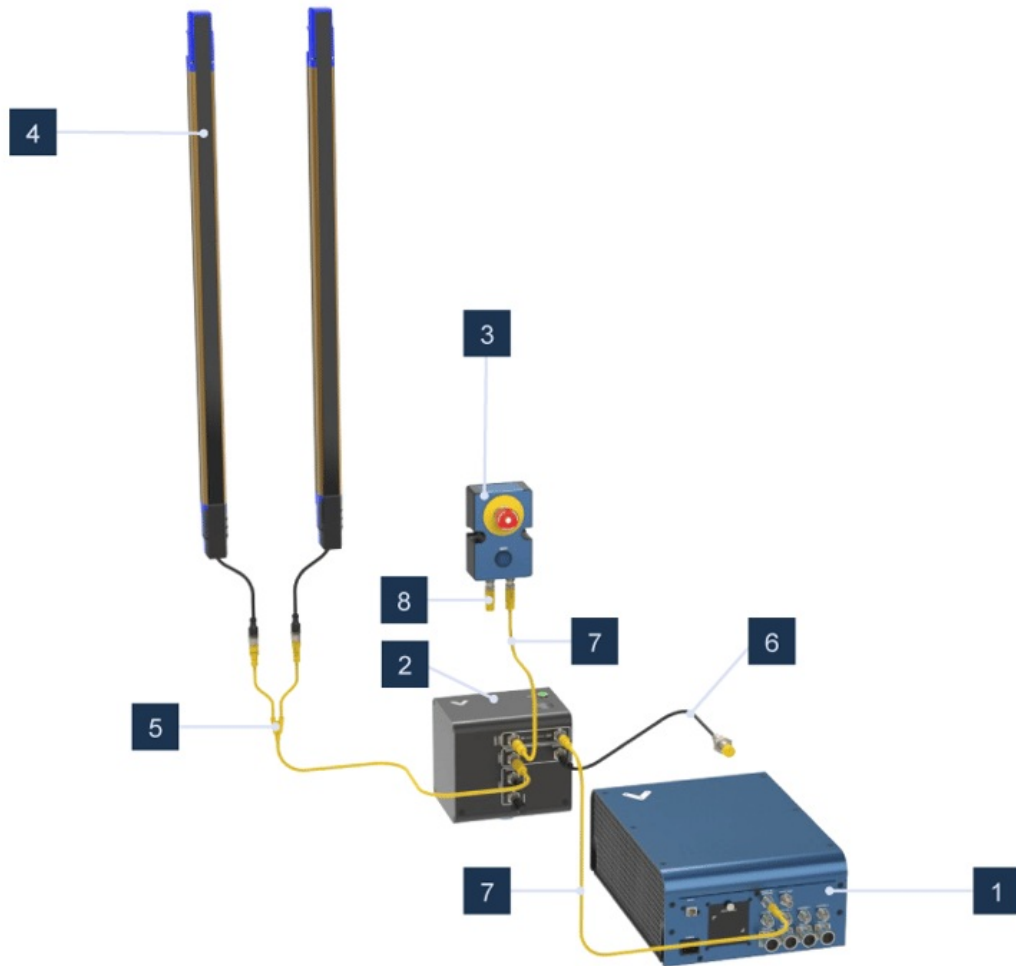
## Scenario #1: Replacing a part inside a machine with light curtains without triggering an e-stop

**Problem:** You have Vention equipment and need to manually feed and outfeed parts. You want the e-stop to trigger if the light curtains are activated while the machine is operating. Additionally, you want the light curtains to be disabled once the cycle is complete, allowing the operator to replace the part (e.g., glue dispensing machine, sanding cell, machine tending, etc.).

**Solution:** The Mode Switching Safety Module (CE-SA-018-0001) is tailor-made for these requirements. It seamlessly links light curtains and other safety devices, ensuring smooth operation and providing emergency stop functionality when necessary.



*Figure 1 - Example of a machine that could use the mode switching safety module*



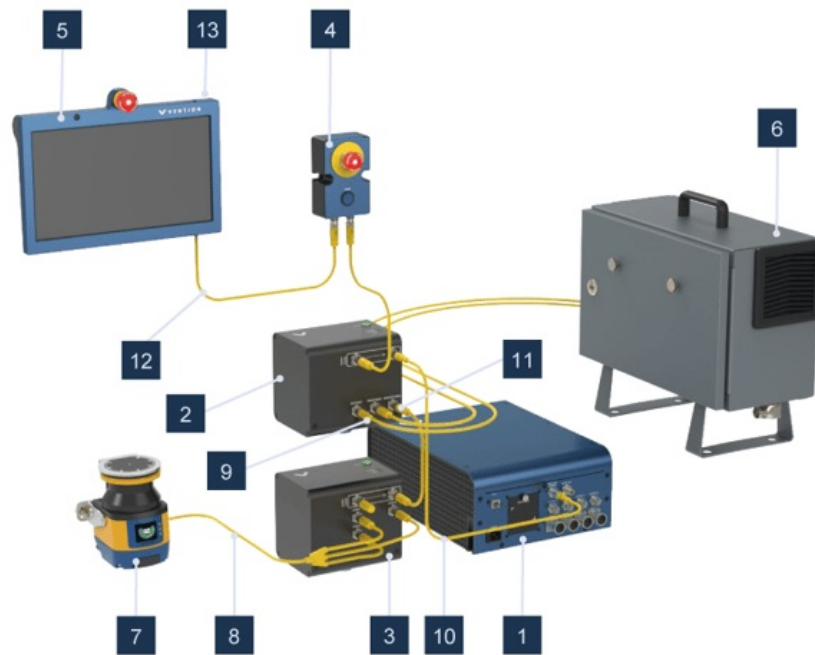
- |  |  |
|--|--|
| 1. MachineMotion - CE-CL-010-0004                | 5. Light Curtain Cable - CE-SA-106-0001        |
| 2. Mode-Switching Safety Module - CE-SA-018-0001 | 6. Fail-Safe Induction Sensor - CE-SA-010-0001 |
| 3. E-Stop Module - CE-SA-007-0000                | 7. Safety Extension Cable - CE-SA-102-5001__2  |
| 4. Datalogic Light Curtains                      | 8. Safety Jumper - CE-SA-102-0001              |

Figure 2 - Mode switching safety module wiring diagram

## Scenario #2: Robot automatically returns to normal operation when the area scanner-defined collaborative speed zone is not triggered

**Problem:** Machine tending cell with a FANUC robot on a range extender, and you want to only use area scanners. A first zone will slow the robot down to a collaborative speed, while stepping out of the collaborative zone resumes the robot to move at full speed.

**Solution:** Combine the Datalogic Laser Area Scanner (PR-DA-201-0489) with the Auto-reset Safety Module (CE-SA-019-0001) and Robot Safety Module (CE-SA-016-0001). The laser scanner's OSSD 1, 2, and 3 are connected to the auto-reset module, which has a safety OUT port connected to the reduced port of the robot safety module. This setup allows the scanner to automatically return to full speed when an operator exits the collaborative zone.



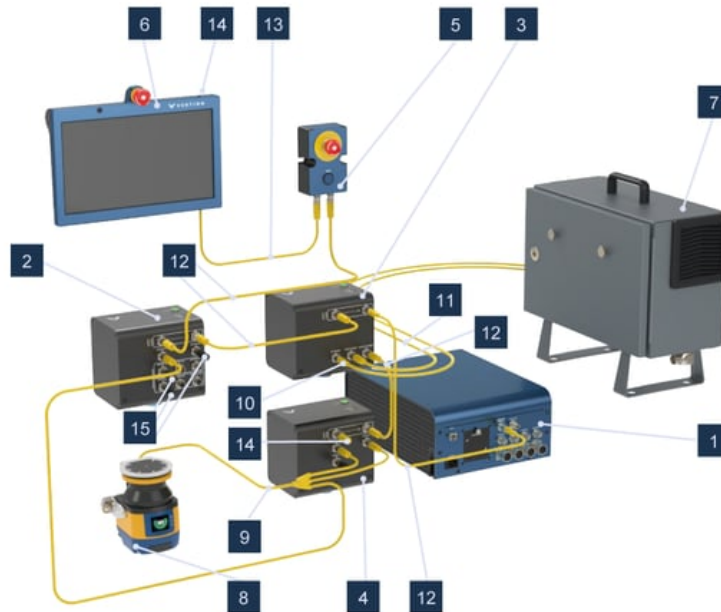
- |   |   |
|---|---|
| 1. MachineMotion - CE-CL-010-0004   | 8. Area Scanner 3 Output Cable - M12 17pin to 3x M12 12pin - CE-SA-126-0001 |
| 2. Robot Safety Module - CE-SA-016-0001                                       | 9. Robot Safety Module "TO ROBOT" Cable - CE-SA-111-0001                    |
| 3. Auto-Reset Module - CE-SA-019-0001   | 10. Safety IN Pigtail Cable - CE-CA-105-2000                                |
| 4. E-Stop Module - CE-SA-007-0000   | 11. Safety Extension Cable - CE-SA-102-5001__2                              |
| 5. Pendant V3 - CE-TP-014-0000  | 12. Pendant V3 cable - CE-CA-109-5000                                       |
| 6. Robot Controller   | 13. Pendant Safety Jumper - CE-SA-102-0001                                  |
| 7. Datalogic Laser Area Scanner - 3 OSSD Parent (auto-reset) - PR-DA-201-0489 |   |

*Figure 3 - Auto-reset wiring diagram*

### Scenario #3: Collaborative speed control with auto-reset and defined e-stop zone

**Problem:** Machine tending cell with a FANUC robot on a range extender and you want to only use area scanners. A first zone will decelerate the robot to a collaborative speed. If someone moves beyond that zone, the robot halts entirely. Entering the collaborative zone and then stepping out resumes normal operation (provided you don't enter the e-stop zone).

**Solution:** In addition to all the modules in scenario #2 you will need the Muting Safety Module (CE-SA-015-0001).



- |  |  |  |
|--|--|--|
| 1. MachineMotion - CE-CL-010-0004        | 7. Robot Controller  | 11. Safety IN Pigtail Cable - CE-CA-105-2000   |
| 2. Muting Safety Module - CE-SA-015-0001 | 8. Datalogic Laser Area Scanner -<br>3 OSSD Parent (auto-reset) - PR-DA-201-0489 | 12. Safety Extension Cable - CE-SA-102-5001__2 |
| 3. Robot Safety Module - CE-SA-016-0001  | 9. Area Scanner 3 Output Cable -<br>M12 17pin to 3x M12 12pin - CE-SA-126-0001   | 13. Pendant V3 cable - CE-CA-109-5000          |
| 4. Auto-Reset Module - CE-SA-019-0001    | 10. Robot Safety Module "TO ROBOT" Cable - CE-SA-111-0001                        | 14. Pendant Safety Jumper - CE-SA-102-0001     |
| 5. E-Stop Module - CE-SA-007-0000        |  | 15. Safety Device Jumper - CE-SA-125-0001      |
| 6. Pendant V3 - CE-TP-014-0000           |  |  |

**Figure 4 - Auto-reset with defined e-stop zone wiring diagram**

## Scenario #4: Integrating area scanners with a FANUC robot without a MachineMotion

**Problem:** Use area scanners in a machine tending cell with a FANUC robot, where you would like the auto-reset functionality without including a MachineMotion in the design.

**Solution:** The solution remains the same as in scenario #2, with the same analysis and connections. However, to achieve the desired functionality, you will need to incorporate the RSM - Stand Alone (CE-SA-016-0002), supplied by an external power supply extension.

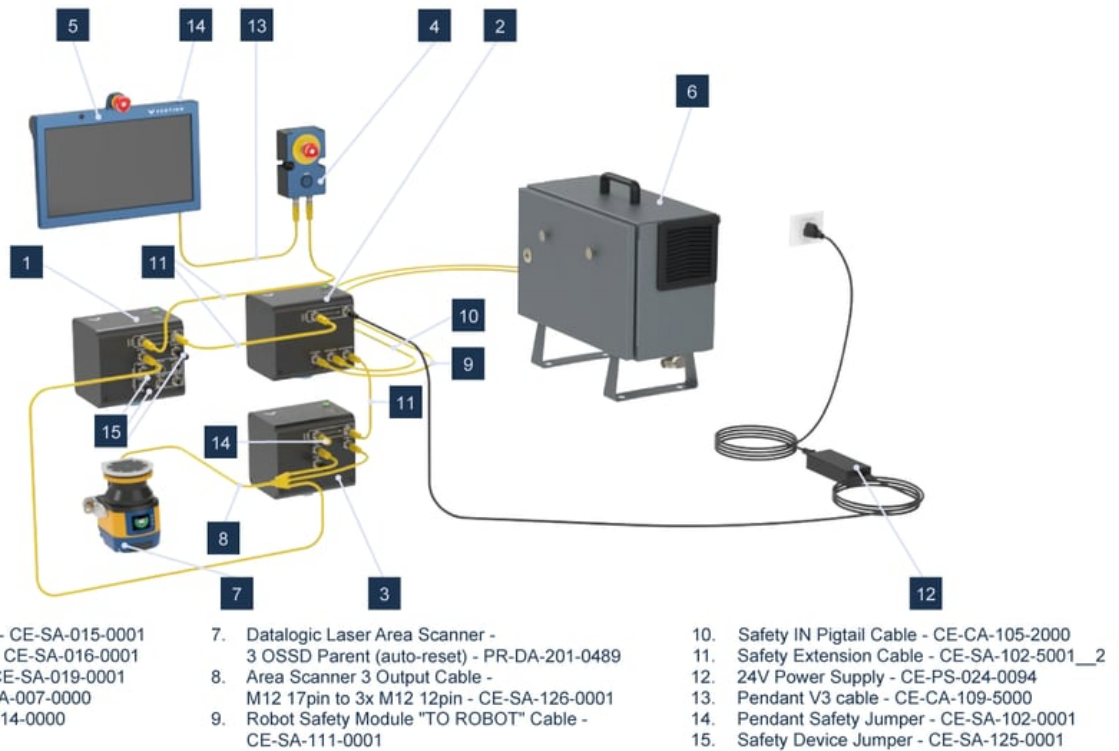
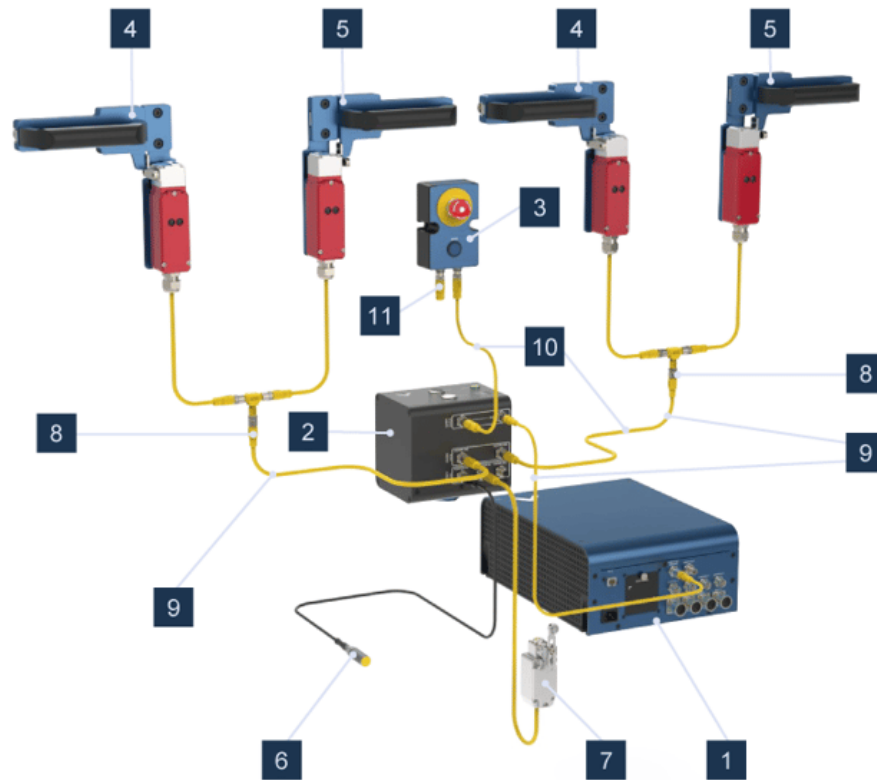


Figure 5 - Auto-reset with no MachineMotion wiring diagram

## Scenario #5: Access control for machine cells (no robot)

**Problem:** Ensure that your system is in a safe state before being able to open the door. You aim to press a button that triggers the homing sequence and then unlocks the system.

**Solution:** Utilize the Access Request Module (CE-SA-017-0001) to manage access to your machine, providing peace of mind and security.



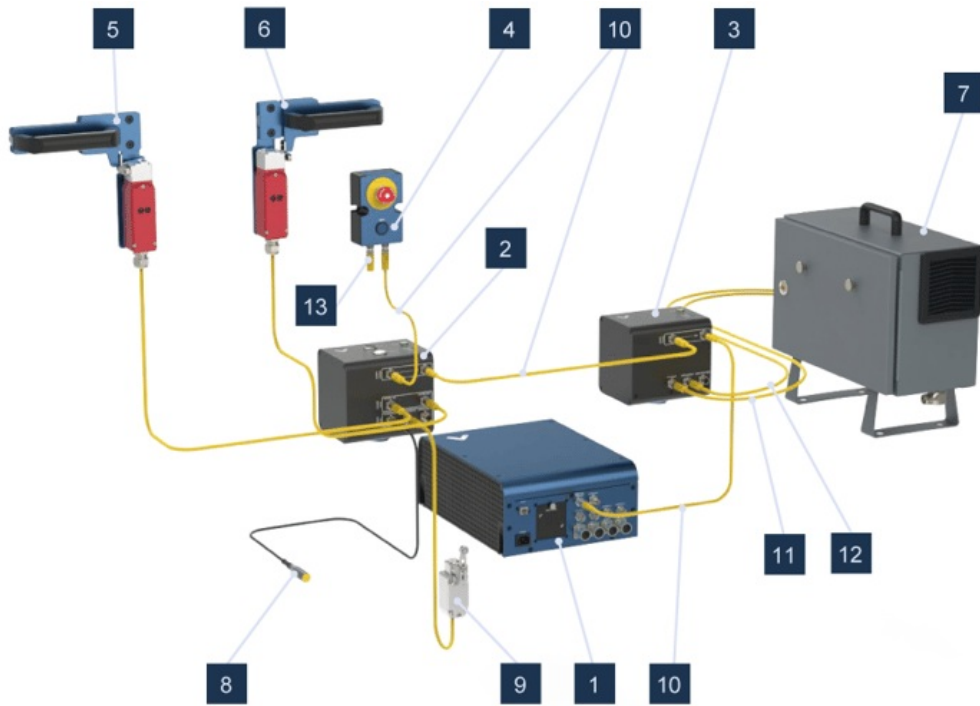
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|---|--|
| 1. MachineMotion - CE-CL-010-0004                           | 7. Safety Limit Switch for Grippers - CE-SN-011-0001 |
| 2. Access Request Module - CE-SA-017-0001                   | 8. Guardlock Lock T-Splitter - CE-SA-124-0001        |
| 3. E-Stop Module - CE-SA-007-0000                           | 9. Safety Extension Cable - CE-SA-102-5001__2        |
| 4. Right Gate Bolt with Lockable Interlock - ST-SE-006-2001 | 10. Safety Extension Cable - CE-SA-102-5001__2       |
| 5. Left Gate Bolt with Lockable Interlock - ST-SE-006-2002  | 11. Safety Jumper - CE-SA-102-0001                   |
| 6. Fail-safe Inductive Sensor - CE-SN-010-0001              |  |

Figure 6 - Access Request wiring diagram with four guardlocks

## Scenario #6: Access control for machine cells (with robot)

**Problem:** Ensure that your system is in a safe state before being able to open the door. You aim to press a button that triggers the homing sequence and then unlocks the system.

**Solution:** Utilize the Access Request Module (CE-SA-017-0001) to manage access to your machine and a Smart Robot Safety Module (CE-SA-016-0001) connected to your robot. The Robot Safety Module should be the last module in the safety chain connected to the MachineMotion.



- |   |   |
|---|---|
| 1. MachineMotion - CE-CL-010-0004                           | 8. Fail-safe Inductive Sensor - CE-SN-010-0001            |
| 2. Access Request Module - CE-SA-017-0001                   | 9. Safety Limit Switch for Grippers - CE-SN-011-0001      |
| 3. Robot Safety Module - CE-SA-016-0001                     | 10. Safety Extension Cable - CE-SA-102-5001__2            |
| 4. E-Stop Module - CE-SA-007-0000                           | 11. Robot Safety Module "TO ROBOT" Cable - CE-SA-111-0001 |
| 5. Right Gate Bolt with Lockable Interlock - ST-SE-006-2001 | 12. Safety IN Pigtail Cable - CE-CA-105-2000              |
| 6. Left Gate Bolt with Lockable Interlock - ST-SE-006-2002  | 13. Safety Jumper - CE-SA-102-0001                        |
| 7. Robot Controller   |   |

*Figure 7 - Access Request wiring diagram with robot with two guardlocks*

## Scenario #7: Muting light curtains for conveyor systems

**Problem:** Prevent boxes from triggering e-stops while using light curtains. You would like to mute light curtains when boxes are exiting or entering.

**Solution:** Combine the Muting Safety Module (CE-SA-015-0001) with proximity sensors (CE-AP-002-0000) for effective management of light curtain signals.

- Connect the light curtain to either port Device 3 or Device 4.
- Use Muting sensor Y adapters (CE-SA-107-0001). Connect two sensors to port XA and the other two to port XB.
- One sensor connected to port XA and 1 sensor connected to XB are placed on one side of the light curtain. The two remaining sensors are placed on the other side of the light curtain.

The distance between the sensors should be established based on the following information:

- Less than 2 seconds between activation of XA and XB.
- The distance between the two pairs of sensors is less than the length of the boxes.
- Muting ends after 10 seconds.



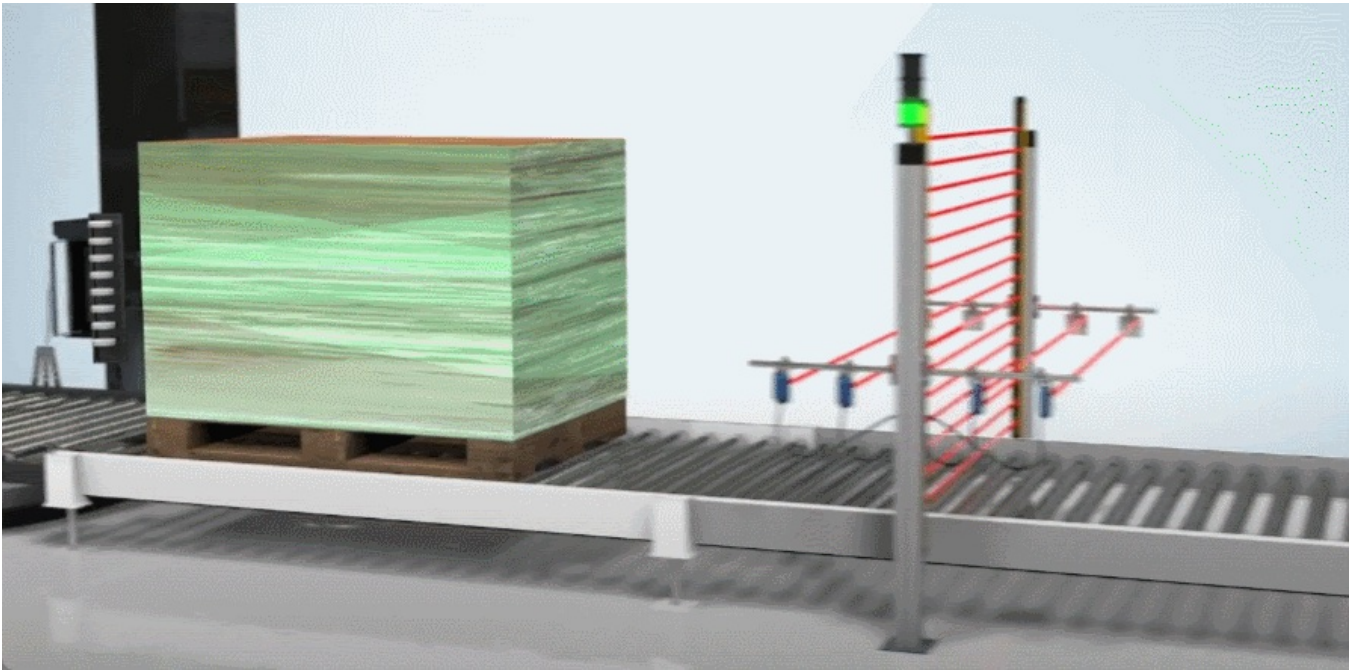


Figure 8 - Example of the muting use case

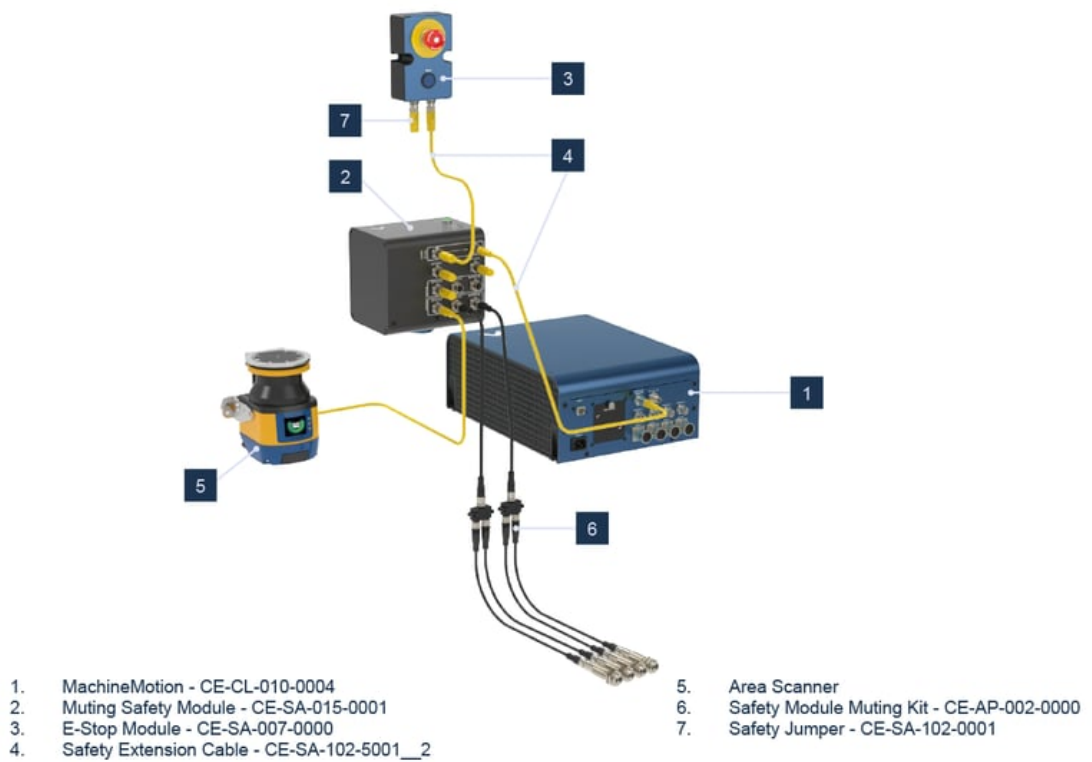


Figure 9 - Muting kit wiring diagram

## Scenario #8: Managing multiple robots in a cell

**Problem:** You have multiple robots in the same cell, and when you e-stop one, you would like the other robots in the cell to stop, too.

**Solution:** Custom safety modules are necessary for effectively managing multiple robot applications. Contact us to define a proper solution.

# Commissioning checklist

We're pleased to provide you with comprehensive commissioning checklists for the safety modules you've invested in. These checklists serve as valuable resources to ensure the seamless integration and optimal performance of your safety systems.

You can access the commissioning checklists through the following links:

[Muting safety module](#)

[Mode switching safety module](#)

[Auto-reset safety module](#)

[Robot safety module](#)

[Access request](#)

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We're committed to ensuring your workplace safety with our comprehensive range of safety devices. For more details and assistance, visit [Vention's Safety Device Collection](#).