



RM-5

Resource Module — Multi-Function, PSDI

- Multiple Functions:
 - **3 Light Curtains** – Light curtain number 1 is selectable for automatic start; Light curtain numbers 2 and 3 will always operate in start/restart interlock mode.
 - **2 Light Curtain, 2 Muting Sensors** (only for conveyor muting applications) – Light curtain number 1 will mute (suspend safety signal); Light curtain number 2 will operate in start/restart interlock mode.
 - **1 Light Curtain, 4 Muting Sensors** – Proper sequential activation of mute sensors will suspend machine run signal from light curtain; Muting function for conveyor muting application only .
- **1 or 2 Light Curtains, PSDI** – Presence Sensing Device Initiation, light curtain breaks in only light curtain number 1 will initiate a machine start; Light curtain breaks or steps required to activate the machine are adjustable from 1, 2, or 3 breaks; Light curtain number 2 remains in start/restart interlock mode.
- Outputs:
 - **Safety** – 2 normally open and 1 normally closed (2 NO, 1 NC) force-guided safety contacts
 - **Signal** – 2 transistor PNP outputs for status indication
- Housing: 45 mm (1.77 in.) DIN thermoplastic enclosure

■ Description

The RM-5 is a microprocessor-controlled multi-function relay that allows up to three light curtains to be connected and provides 2 NO and 1 NC force-guided safety contacts. The alternate capability of muting and PSDI (Presence Sensing Device Initiation) are also a function of this resource module.

Use of Muting

The term *Muting* is defined as bypassing the protective function of the safety light curtain and is only permitted during the non-hazardous portion of the machine cycle by ANSI B11.19.

Use of a muting function requires special precautions by the safety system machine controller, installer, operator and employer. The proper installation, checkout, and operation of a machine and muting system is critical to the safe operation of the machine. The following is only a partial list of requirements when utilizing muting and is not intended to be a complete guide to muting standards. The employer must contact the local safety authority for specific requirements regarding the machine, machine controller and safety related control system. STI provides the following information for user reference only and makes no claim regarding the accuracy, completeness or effectiveness for a specific application from any organization:

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safety light curtains

■ *Description (continued)*

- Muting of the light curtain is only permitted during the nonhazardous portion of the machine cycle.
- Muting function of the RM-5 and mute sensor input is designed for conveyor applications,
- If the machine tool has reversing capability where a muting hazard is possible, the control system shall include an automatic means through which muting is only permitted in the forward direction.
- A muting system must make use of two or four sensors. Either mechanical or photoelectric can be used.
- The muting position (of the mute signal source) shall be secured against unauthorized adjustment by provision of special tools, key entry, or electronics passwords and the positioning and the fixing of associated limit switches.

The above requirements were compiled from the following sources: ANSI B11.19-2003, prEN692-1994 and prEN50100-1-1993. Other standards may exist for your specific application. Contact your local safety authority and machine supplier for further information.

Use of PSDI

Presence Sensing Device Initiation (PSDI) is used to initiate the cycle of a machine by counting the number of “breaks” or obstructions of a presence sensing device (light curtain). An operator reaches through a light curtain to load a part into a machine; the interruption of the light curtain prevents the machine from starting. As the operator withdraws his/her hands from the machine (and the light curtain’s sensing field), the light curtain immediately initiates the machine’s start command, without the operator needing to press a control button or activate a foot switch to begin the cycle. The number of breaks required for initiation can be selected from a choice of 1, 2, or 3 breaks.

Operating a machine in PSDI mode allows for increased productivity. Employees no longer need to make “non-value added” movements to cycle machines. There is also an ergonomic advantage. By eliminating the need to press the cycle start switch(s), repetitive motion injuries caused by the motion of reaching and pressing start switches is removed from the process.

Use of PSDI requires special precautions by the safety system machine controller, installer, operator, and employer. The proper installation, checkout, and operation of a machine and PSDI system are critical to the safe operation of the machine.

Standards

The standards that are applicable to Muting and PSDI include but may not be limited to the following:

- EN 954-1
- ISO 13849-1
- IEC/EN 60204-1
- IEC 60947-5-1
- IEC 61496-1
- ANSI B11.1
- ANSI B11.3
- ANSI B11.19
- AS4024.3

■ Specifications

Input
Nominal Voltage U_N : 24 VDC
Voltage Range (at max. 5% residual ripple): 0.85 to 1.15 U_N
Nominal Consumption: 170 mA max (no load on semiconductor outputs)
Control Voltage on S21, S23, S31, S33, S41, S43, S48, S58: 23 VDC at U_N
Control Current on S12, S14, S22, S24, S32, S34, S42, S44: 4.5 mA at U_N each
Min. Voltage on Terminals S12, S14, S22, S24, S32, S34 S42, S44: 16 VDC
Short Circuit Protection: Internal with PTC
Min. Current on M1, M2: 25 mA with active lamp
Output
Contacts: 2 NO, 1 NC contacts (The NC contact must only be used as monitoring contact)
Contact Type: Force-guided relay
Operate Delay Typical at U_N
Manual Start: 50 ms max.
Automatic Restart: 40 ms max.
Release Delay (Reaction Time): 22.6 ms max.
Output Voltage: 250 VAC; DC - see limit curve for arc-free operation
Switching of Low Loads: ≥ 100 mV
Thermal Current I_{th} : 5 A
Switching Capacity to AC 15: AC 3 A / 230 V (IEC/EN 60 947-5-1) for NO contact; AC 2 A / 230 V (IEC/EN 60 947-5-1) for NC contact
Switching Capacity to DC 13 at 0.1 Hz: 8 A / 24 VDC (IEC/EN 60 947-5-1)
Electrical Life to AC 15 at 2 A, 230 VAC: 10^5 switching cycles (IEC/EN 60 947-5-1)
Maximum Switching Frequency: 1,200 switching cycles / h max.
Short Circuit Strength
Max. Fuse Rating: 6 A gL (IEC/EN 60 947-5-1)
Line Circuit Breaker: C 8 A
Mechanical Life: 10×10^6 switching cycles
Semiconductor Outputs
Output (Terminal 48 and 58): Transistors, plus-switching
Output Voltage: DC 24 VDC, max. 100 mA continuous current, max. 400 mA for 0.5 s internal short circuit, overtemperature and overload protection

General Data
Operating Mode: Continuous operation
Temperature Range: ± 0 to $+50^\circ\text{C}$
Clearance and Creepage Distances
Overvoltage Category/Contamination Level
– EMC: 4 kV / 2 (IEC 60664-1)
– Electrostatic Discharge: 8 kV (contact) (IEC/EN 61 000-4-2) (according to test degree 3)
– HF Irradiation: 10 V / m (IEC/EN 61 000-4-3)
– Fast Transients on Wires for Power Supply: A1-A2:2 kV (IEC/EN 61 000-4-4)
– Fast Transients on Wires for Signals and Control: 2 kV (IEC/EN 61 000-4-4)
– Surge Voltages Between Wires for Power Supply: 1 kV (IEC/EN 61 000-4-5)
– Surge Voltages Between Wire and Ground: 2 kV (IEC/EN 61 000-4-5)
– HF Wire Guided: 10 V (IEC/EN 61 000-4-6)
– Interference Suppression: Limit value class B (EN 55 011)
Degree of Protection: According to IEC/EN 61-496-1 (1997) the unit has to be installed in a housing with protection degree of IP54
Housing: IP 40 (IEC/EN 60 529)
Terminals: IP 20 (IEC/EN 60 529)
Housing: Thermoplastic with V0 behavior according to UL subject 94
Vibration Resistance: According to IEC/EN 61-496-1 (1997)
Amplitude: 0.35 mm (IEC/EN 60 068-2-6)
Frequency: 10 to 55 Hz
Shock Resistance:
Acceleration: 10 g
Impulse Length: 16 ms
Number of Shocks: 1000 per axis on 3 axis
Climate Resistance: 0 / 050 / 04 (IEC/EN 60 068-1)
Terminal Designation: EN 50 005
Wire Connection: 1×2.5 mm ² stranded ferruled or 1×4 mm ² solid or 2×1.5 mm ² stranded ferruled DIN 46 228-1/-2/-3/-4
Wire Fixing: Terminal screws M3.5, box terminal with wire protection
Mounting: DIN rail (IEC/EN 60 715)
Weight: 320 g
Dimensions: 45 x 84 x 121 mm W x H x D

Specifications are subject to change without notice.

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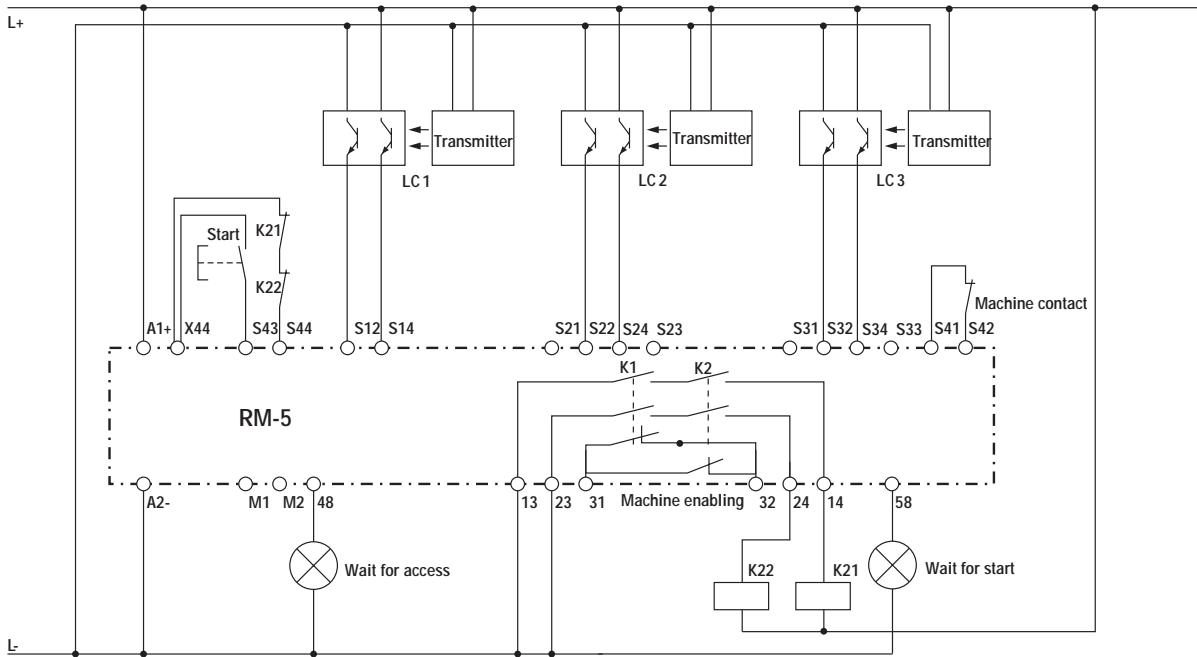
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■ Wiring Examples

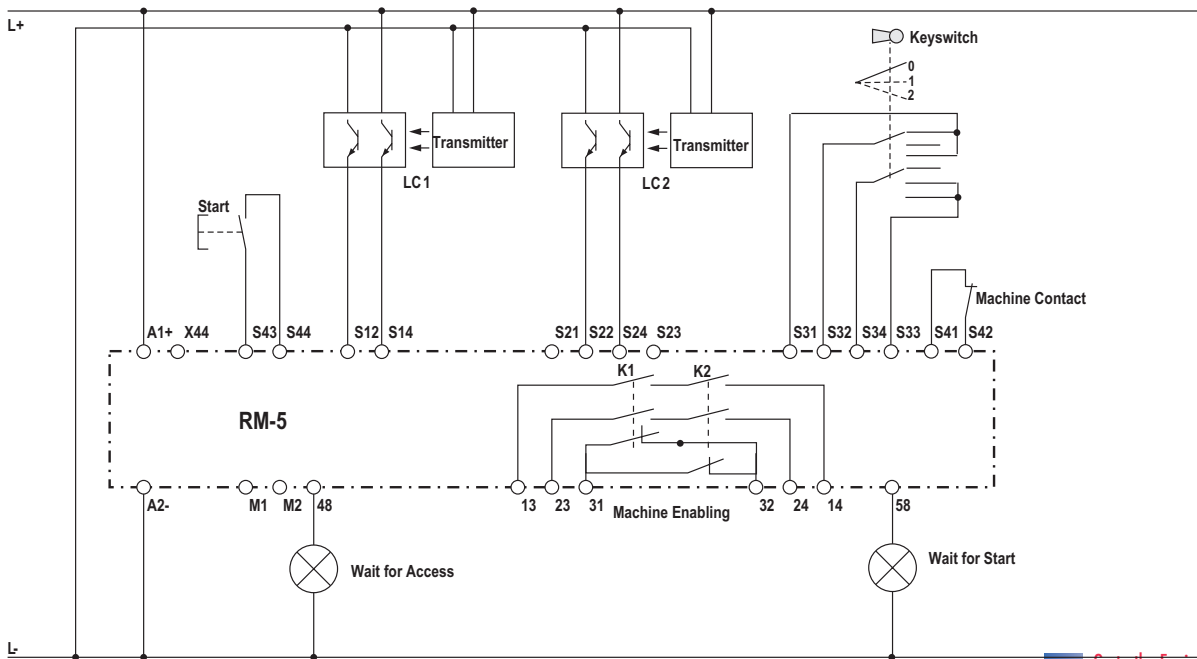
PSDI Operation with Three Light Curtains

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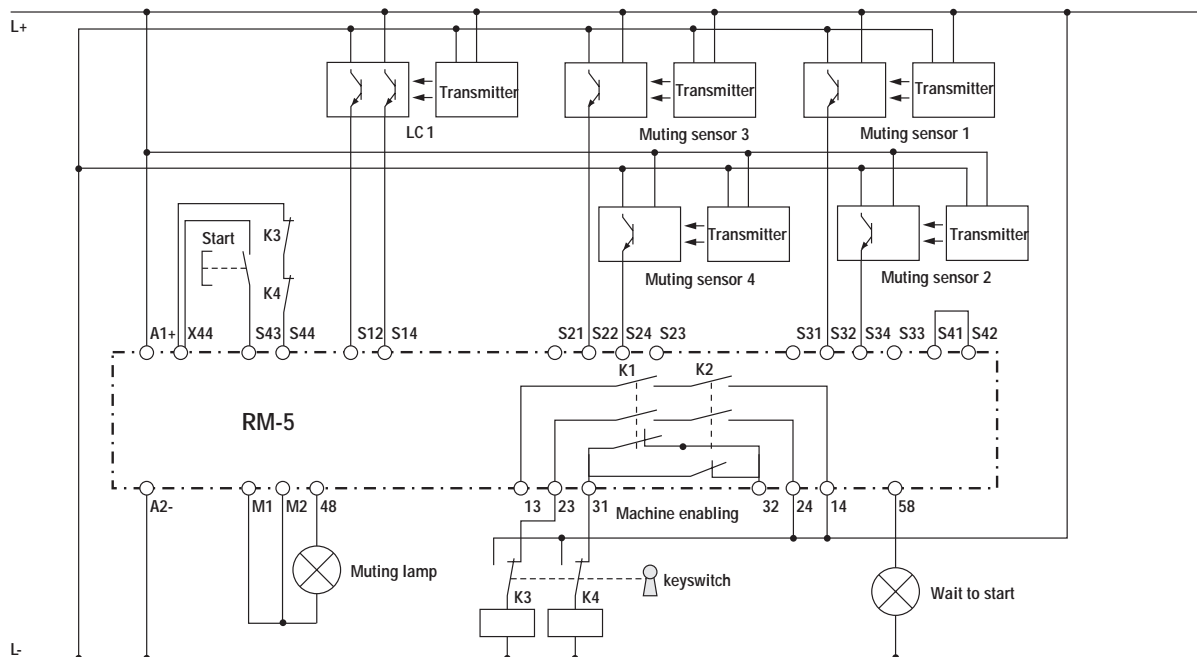


PSDI Operation with Key Switch Selection for Number of Breaks

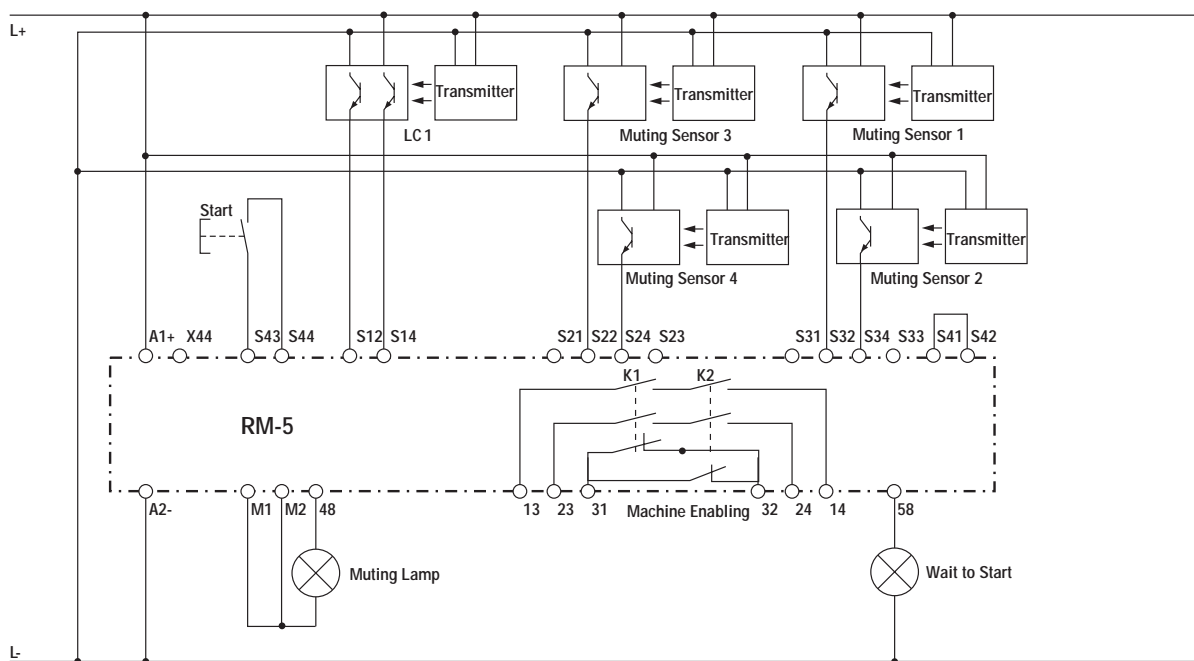


A Go to the Engineering Guide
For in-depth information on safety standards and use.

Muting One Light Curtain, Four Photo-Electric Sensors and Override

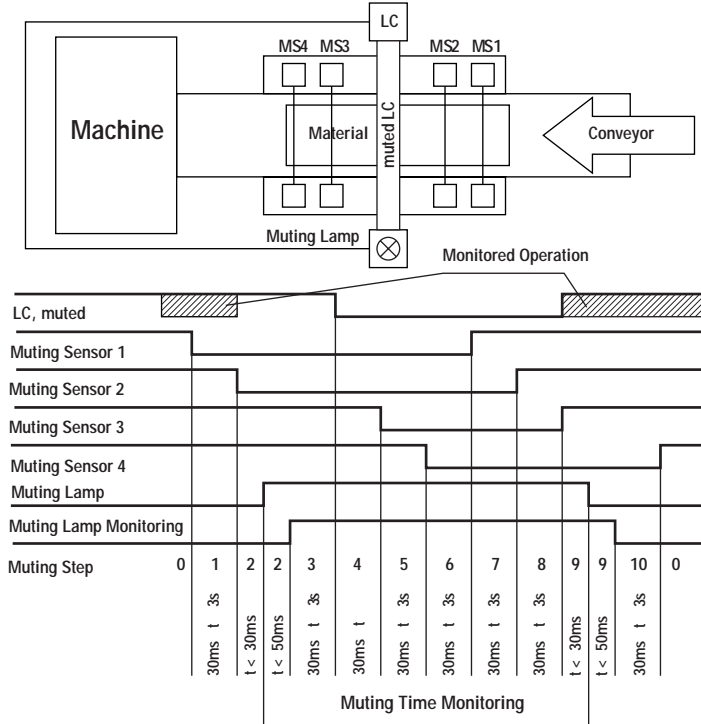


Muting One Light Curtain, Four Contact Muting Sensors



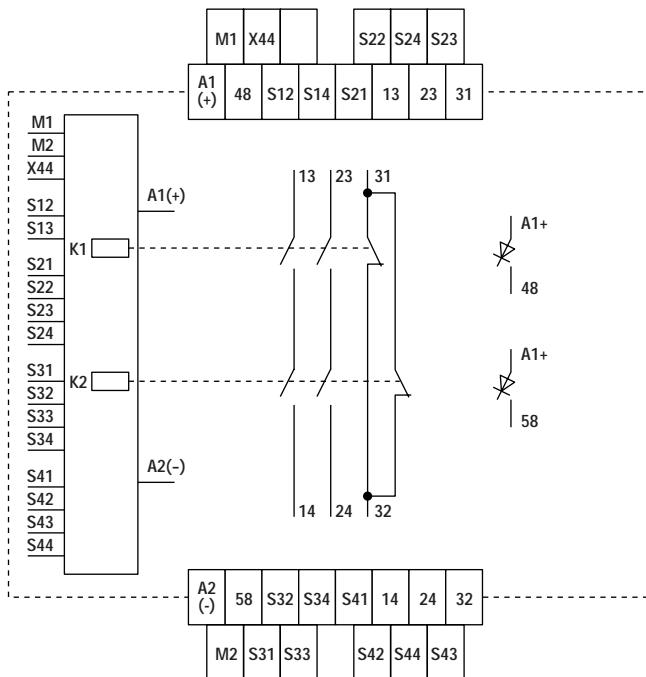
■ Wiring Examples (continued)

Timing Diagram for Four Sensor Muting

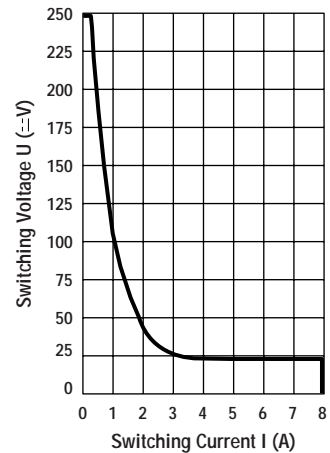


Additional wiring diagrams are available in the RM-5 manual, found at www.sti.com

■ Block Diagram



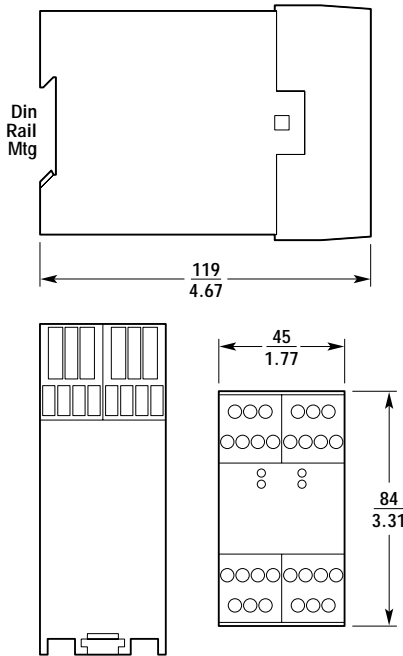
■ Relay Characteristic



Safe breaking, no continuous arcing under the curve, max. 1 switching cycle/s

A Go to the Engineering Guide For in-depth information on safety standards and use.

■ **Dimensions — mm/in.**



■ **Ordering**

The RM-5 is a resource module option for the PA4600, MC4700, MCF4700, MCJ4700, MSF4700, MS4600, MS4700 and OF4600 products with solid-state or relay safety outputs. The PA4600 and OF4600s must not be used in a PSDI circuit where the PA4600 and OF4600 would be used as the initiating device. Multi-segment light curtains such as the MCF4700, MCJ4700, and MSF4700 should only be used in either muting applications or PSDI applications where the protected fields adjoin or are contiguous.

Model No.	Description
RM-5	Resource Module, Multi-Function, PSDI
Accessories	
42992	Power Supply, 24 VDC
Indicators	
44512-0500	LED Beacon, Amber, 24 VDC
44512-0520	LED Beacon, Red, 24 VDC
44512-0540	LED Beacon, Green, 24 VDC
Switches	
44505-0XX0	SL Series Safety Limit Switch
51392	Start Switch, Light Duty

 For information on the PA4600, see page C34

 For information on the MicroSafe MC/MCF/MCJ/MSF4700, see page D4

 For information on the MiniSafe MS4600, see page D30

 For information on the MiniSafe MS4700, see page D22

 For information on the OptoFence OF4600-50, see page D48

 For information on STI safety light curtain accessories, see page D148