RM-3

Resource Module — Mute Module

- +24 VDC input power
- 100 mm DIN box enclosure with removable terminal blocks
- Type 4 safety product, when used in combination with a Type 4 safety light curtain with solid-state safety outputs
- Diagnostic display
- Safety outputs are solid-state PNP type that source 24 VDC at 625 mA
- Response time 1 msec (from machine run to machine stop state)
- Customer selectable configuration set by DIP switches
- DeviceNet option

Description

The RM-3 Mute Module is a microprocessor-controlled "Type 4" safety product. The purpose of the RM-3 is to furnish a temporary, automatic suspension of the safety function(s) provided by a safeguarding device such as a safety light curtain. The RM-3 is a control accessory that provides this safety muting feature for one or two safety light curtains and is housed in a DIN box.

Input Signals

- Input Power +24 VDC
- Two independent channels, each channel is comprised of one light curtain and up to four mute sensors
- Start
- MPCE monitor
- Mute enable

Output Signals

- Two independent PNP safety outputs
- NPN & PNP auxiliary outputs
- Mute lamp drivers (2)
- Mute auxiliary (NPN)
- Mute armed (NPN)

Indicators

- Diagnostic display
- Machine Run
- Machine Stop
- Interlock
- OSSD input active (light curtains)
- Sensor input active (sensors)
- Mute Enable active
- DeviceNet indicator (option)

Muting

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

Machine controllers which initiate muting must be designed

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

USA Tel. 1/888/510-4357
Canada Tel. 1/800/221-7060
UK Tel. +44 (0) 1395-273-209
Europe Tel. +49 (0) 5258-938-776
Japan Tel. +81-466-22-1132
China Tel. +86-21-5836-7708
Singapore Tel. +65-648-44-001
For the Latest Information
On the Internet: **www.sti.com**
E-mail: **sales@sti.com**

for control reliability. The ANSI B11.19-2003 standard explains the muting requirements:

"Muting of the device shall be permitted during the nonhazardous portion of the machine cycle. Muting of the device shall be accomplished in such a manner that no single component failure shall prevent the normal stop command and shall prevent subsequent machine cycles until the failure is corrected.

If the machine tool has reversing capability where a muting hazard is possible, the control [system] shall include an automatic means through which the muting is only permitted in the forward direction." [Section 4.2.3.3.7]

Using Muting

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 users reference only and makes no claim regarding the accuracy, completeness or effectiveness for a specific application from any organization:

- Muting of the light curtain is only permitted during the nonhazardous portion of the machine cycle.
- 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, three, or four PNP (24 VDC sourcing) sensors. A single sensor, either mechanical or photoelectric, cannot be used in place of the required multiple sensor system.
- The muting position (of the mute signal source) shall be secured against unauthorized adjustment by provision of special tools, key entry, 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.

Specifications

Performance	
	Response Time: 1 ms
Electrical	
	Outputs
	Safety Outputs: Two independent 625 mA (max.) current sources (PNP), 24 VDC
	Auxiliary Outputs: Auxiliary NPN output: 100 mA (max.) current sink, 30 VDC max. Auxiliary PNP output: 500 mA (max.) current source, 24 VDC
	Mute Lamp: Two (NPN) output with 40-300 mA, 30 VDC max.**
	Mute Auxiliary: NPN output 100 mA (max.), 30 VDC max.
	Mute-Armed: NPN output, 100 mA (max.), 30 VDC max.
	MPCE Monitor: 24 VDC, 50 mA (sourced by RM-3)
	Inputs
	Input Power*: 24 VDC ±10%, 50 W max.
	Safety Devices: PNP 24 VDC @ 50 mA machine run, 0 V machine stop
	Mute Sensor: PNP 24 VDC (20 mA consumption)***
	Mute-Enable: SPDT key-operated switch, maintained contacts
	Start/Restart: Either N/O or N/C momentary contact (10 mA consumption)
Environmental	
	Enclosure Rating: IP20 (Unit to be installed in enclosure with minimum IP54)
	Operating Temperature: 0 to 55°C (32 to 131°F)
	Storage Temperature: -25 to 75°C (-13 to 167°F)
	Humidity: 95% maximum, non-condensing
Conformity/Approvals	
	Conformity to Standards: Type 4 per IEC 61496-1. UL listed.
	Vibration: In accordance with IEC 68-2-6, 0.35 mm displacement, 10 to 55 Hz
	Shock: In accordance with IEC 68-2-29, 10 g, 16 msec. pulses, 1000/axis

Specifications are subject to change without notice.

* Power to the RM-3 must come from a dedicated power supply that meets the requirements of IEC 60204-1 and IEC 61496-1, STI part number 42992 or equivalent.

** The external lamp must provide a current load between 40 mA and 300 mA for the lamp monitoring circuit to sense proper operation of the mute lamp.

*** When photoelectric sensors are used, they need to alternate between “dark operate” and “light operate” configuration. That is to say that sensors S1A, S1C and S2A, S2C need to have “dark-operate” PNP type outputs. Sensors S1B, S1D and S2B, S2D must have “light-operate” outputs.

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

■ Wiring

Muting Module Example 1

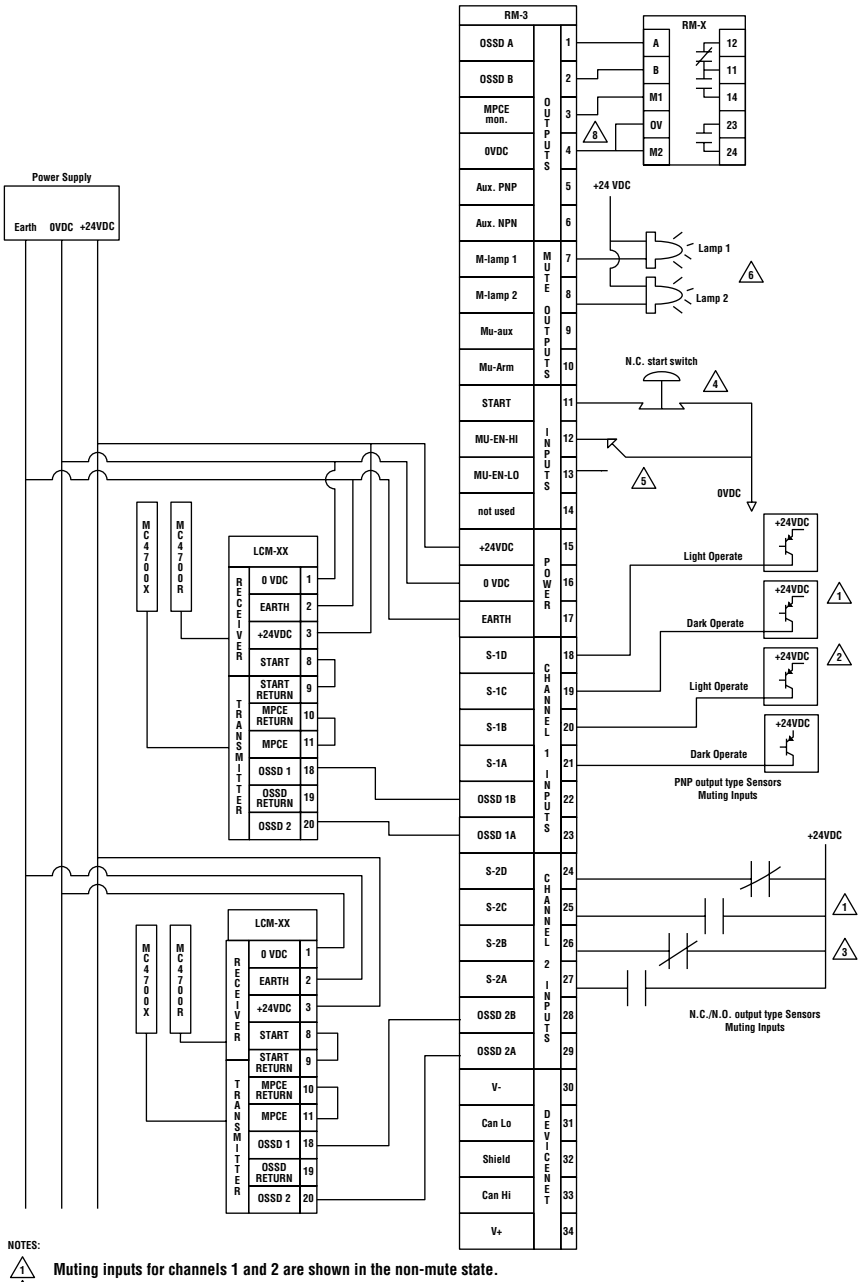
This example shows two MC4700 safety light curtains with LCM series controllers interfaced to an RM-3. The RM-3 is muting both safety light curtains and each has four muting sensors per light curtain channel. The RM-3 is driving a RM-X resource module as the final switching device.

The LCM controllers are configured as follows:

- Automatic start mode
- MPCE inactive
- Channel select (application dependent)
- Floating blanking (application dependent)
- Auxiliary output (application dependent)

The RM-3 muting module is configured as follows:

- Automatic start mode
- MPCE active
- For two light curtain systems
- Muting input for 4 sensors — PNP-type light/dark operate or N.C./N.O. relay type — both types can be used
- Muting time limit (application dependent)
- Auxiliary output (application dependent)
- Start switch input set for Normally Closed



NOTES:

1. Muting inputs for channels 1 and 2 are shown in the non-mute state.
2. Inputs for channel 1 are PNP-type sensors, light/dark operate.
3. Muting inputs for channel 2 are N.C./N.O. relay output type sensors. The number of muting sensors can be configured for 2, 3 or 4 (application dependent).
4. The start input is Normally Closed; install a jumper if a switch is not needed.
5. Mute enable input is shown in the non-mute state.
6. External mute indicating lamps (rated 40-300 mA @ 30 VDC max.) MUST be used.
7. Verify that the final switching devices are properly suppressed.

■ *Wiring (continued)*

Muting Module Example 2

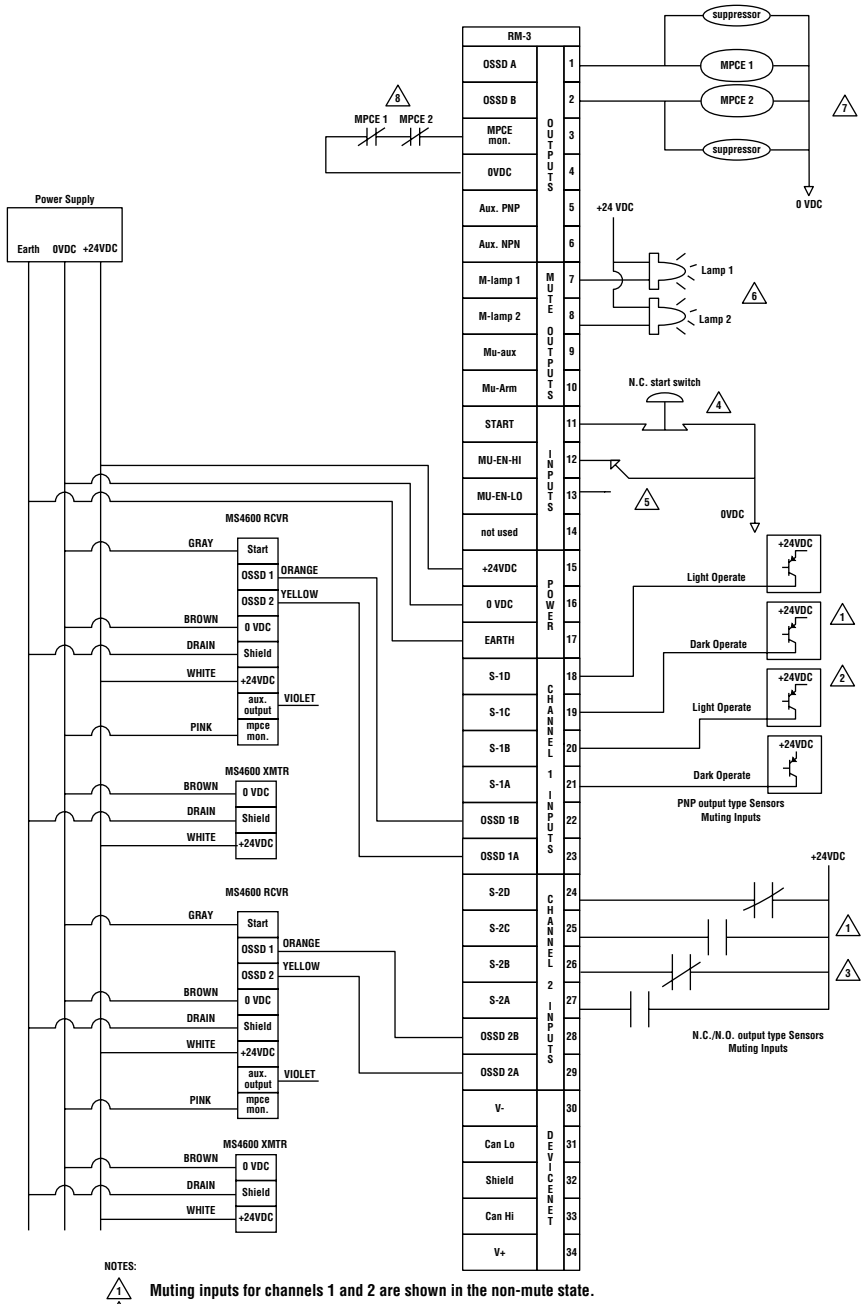
This example shows two MS4600 series safety light curtains interfaced to an RM-3. The RM-3 is muting both safety light curtains and each has four muting sensors per light curtain channel. The RM-3 is driving two MPCE control relays and monitoring the N.C. auxiliary contacts.

The MS4600 receivers are configured as follows:

- Automatic start mode
- MPCE inactive
- Channel select (application dependent)
- Floating blanking (application dependent)
- Auxiliary output (application dependent)

The RM-3 muting module is configured as follows:

- Automatic start mode
- MPCE active
- For two light curtain systems
- Muting input for 4 sensors — PNP-type light/dark operate or N.C./N.O. relay type — both types can be used
- Muting time limit (application dependent)
- Auxiliary output (application dependent)
- Start switch input set for Normally Closed



NOTES:

1. Muting inputs for channels 1 and 2 are shown in the non-mute state.
2. Inputs for channel 1 are PNP-type sensors, light/dark operate.
3. Muting inputs for channel 2 are N.C./N.O. relay output type sensors. The number of muting sensors can be configured for 2, 3 or 4 (application dependent).
4. The start input is Normally Closed; install a jumper if a switch is not needed.
5. Mute enable input is shown in the non-mute state.
6. External mute indicating lamps (rated 40-300 mA @ 30 VDC max.) MUST be used.
7. Verify that the final switching devices are properly suppressed.
8. MPCE monitoring must be used when forced-guided control relays are used as the final switching devices.

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

USA Tel. 1/888/510-4357
Canada Tel. 1/800/221-7060
UK Tel. +44 (0) 1395-273-209
Europe Tel. +49 (0) 5258-938-776
Japan Tel. +81-466-22-1132
China Tel. +86-21-5836-7708
Singapore Tel. +65-648-44-001
For the Latest Information
On the Internet: **www.sti.com**
E-mail: **sales@sti.com**

Muting Module Example 3

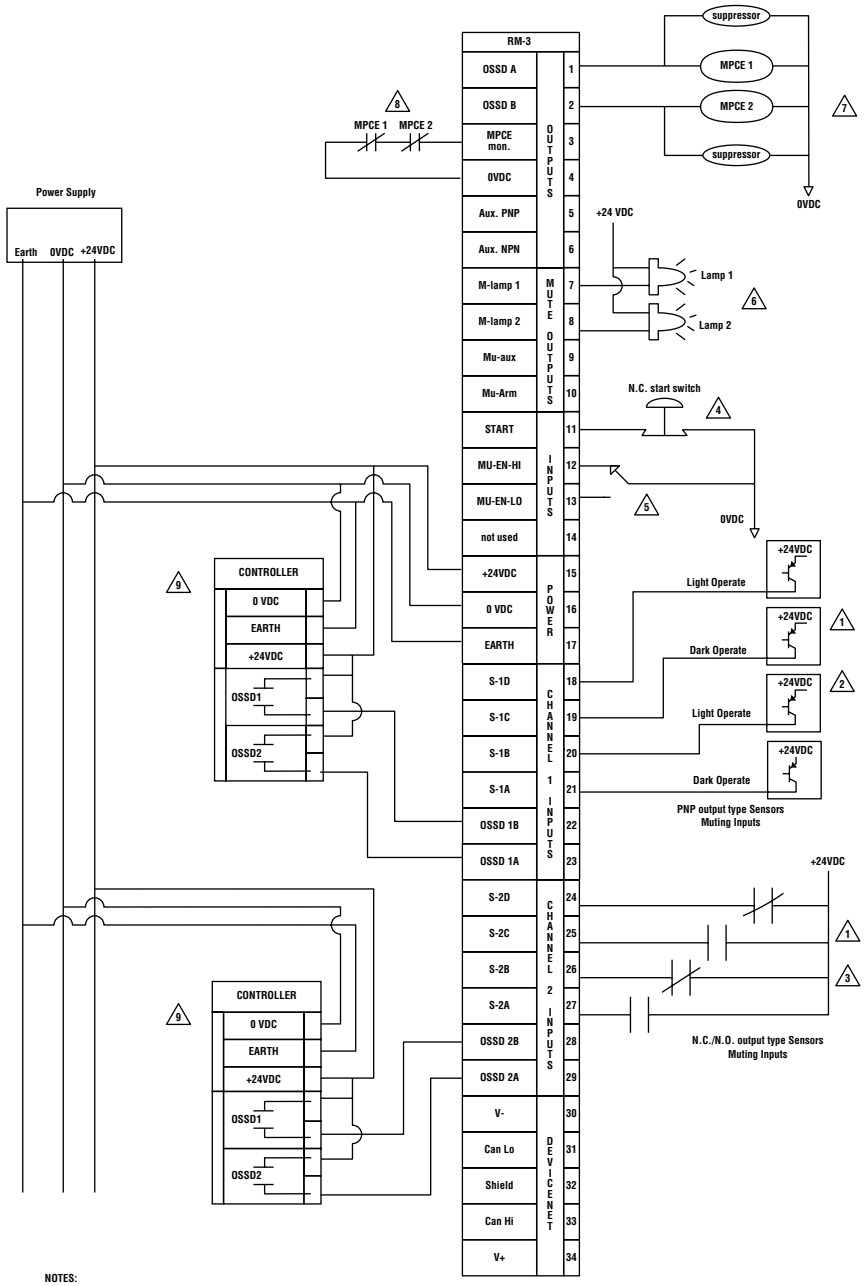
This example shows two safety devices each with two Normally Open relay outputs interfaced to an RM-3. The RM-3 is muting both safety devices and each has four muting sensors per channel. The RM-3 is driving two MPCE control relays and monitoring the N.C. auxiliary contacts.

The safety devices are configured as follows:

- Automatic start mode
- MPCE inactive
- Channel select (application dependent)
- Floating blanking (application dependent)
- Auxiliary output (application dependent)

The RM-3 muting module is configured as follows:

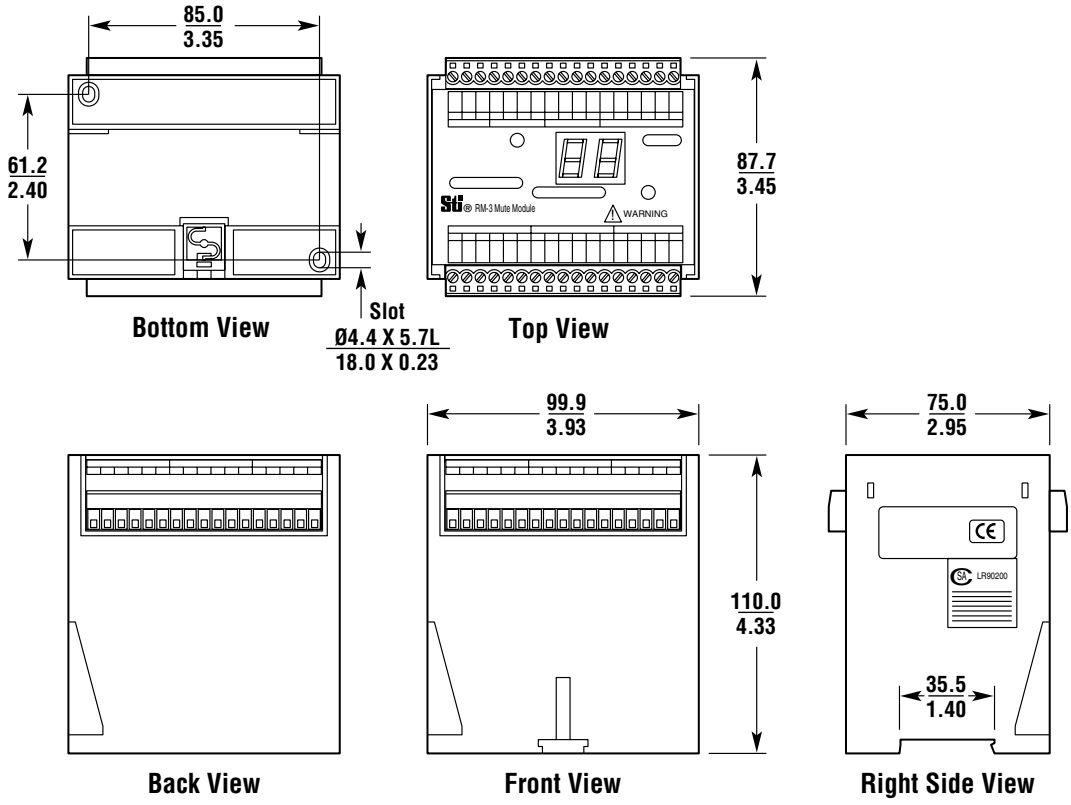
- Automatic start mode
- MPCE active
- For two light curtain systems
- Muting input for 4 sensors — PNP-type light/dark operate or N.C./N.O. relay type — both types can be used
- Muting time limit (application dependent)
- Auxiliary output (application dependent)
- Start switch input set for Normally Closed



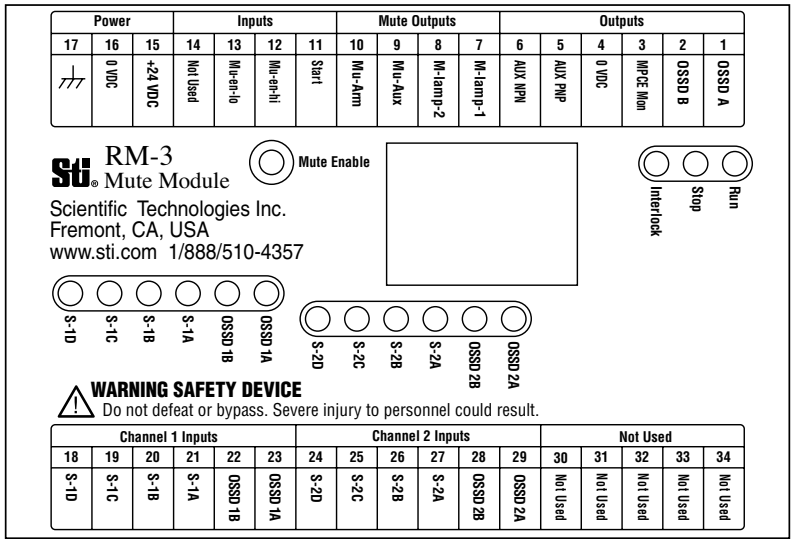
NOTES:

1. Muting inputs for channels 1 and 2 are shown in the non-mute state.
2. Inputs for channel 1 are PNP-type sensors, light/dark operate.
3. Muting inputs for channel 2 are N.C./N.O. relay output type sensors. The number of muting sensors can be configured for 2, 3 or 4 (application dependent).
4. The start input is Normally Closed; install a jumper if a switch is not needed.
5. Mute enable input is shown in the non-mute state.
6. External mute indicating lamps (rated 40-300 mA @ 30 VDC max.) MUST be used.
7. Verify that the final switching devices are properly suppressed.
8. MPCE monitoring must be used when forced-guided control relays are used as the final switching devices.
9. The safety controllers need to have two Normally Open relay outputs.

■ Dimensions—mm/in.



■ Terminal Orientation Reference



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

USA Tel. 1/888/510-4357
Canada Tel. 1/800/221-7060
UK Tel. +44 (0) 1395-273-209
Europe Tel. +49 (0) 5258-938-776
Japan Tel. +81-466-22-1132
China Tel. +86-21-5836-7708
Singapore Tel. +65-648-44-001
For the Latest Information
On the Internet: **www.sti.com**
E-mail: **sales@sti.com**

Ordering

The RM-3 is a resource module option for the PA4600, MC4700, MCF4700, MCJ4700, MS4600, MS4700 and OF4600 products with solid-state or relay safety outputs.

Model No.	Description
RM-3	Resource Module, 24 VDC, DIN-rail mount
RM-3-RV	Resource Module, 24 VDC, DIN-rail mount with DeviceNet
RM-X	Relay Expansion Module
51169	Mute Enable Keyswitch
51173	Mute Enable Keyswitch Contact Block
43987-0010	Mute Lamp Kit (consists of the three items below)
37095	Mute Indicator Lamp, Bulb, 24 VDC
90684	Replacement Indicator Lens, white
90685	Mute Indicator Lamp Socket

Note: The Mute Enable Keyswitch and Mute Indicator may be substituted with equivalent items from other manufacturers.

For information on the PA4600, see page C34

For information on the MicroSafe MC/MCF/MCJ4700, 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