

MA Series

Magnetically Actuated Safety Interlock Switches

- Large selection—choose from a large selection of contact configurations housed in plastic to satisfy most application requirements
- NEMA 6 enclosure enables the MA Series switches to satisfy most application requirements (MA 3, 4, 5 are NEMA 4)
- Misalignment tolerant—the non-contact actuation of the switches makes them very tolerant to misalignment of up to 10 mm (0.39 in.)
- Variety of terminations—select various cable lengths or terminal strip termination for easy installation. Cable connector on selected models.
- Long life—the MA Series is designed for a minimum of one million actuations
- A Rapid Delivery Product: Select models are available for shipment today or within 3 to 5 days



Conforms to EN1088, EN292, EN60204-1
UL and C-UL listed

Specifications

Electrical	All Models Unless Indicated	
Safety Contacts:	AC models	MA-1 thru 5, 10, 12, 13, 16 — 1 N/C
	DC models	MA-12, 13, 14, 16 — 1 N/C
Safety Contact Operating Distance:	Make 7-12 mm (0.28-0.47 in.); Break 12-25 mm (0.47-0.98 in.)	
Auxiliary Contacts:	MA-2, 4, 12, 13, 14, 15, 16, 21	1 N/O
	MA-3	1 N/C
Aux. Contact Operating Distance:	MA-2, 4, 16, 21	Make 8-13 mm (0.39-0.51 in.); Break 8-10 mm (0.31-0.39 in.)
	MA-3	Make 21 mm (0.83 in.); Break 24 mm (0.94 in.)
Safety Rated Voltage:	AC models: All except MA-10	230 VAC
	AC models: MA-10	110 VAC
	DC models	30 VDC
Safety Rated Current:	AC models: All except MA-3	2 A, fuse externally 1.6 A quick acting
	AC model: MA-3	3 A, fuse externally 2.5 A quick acting
	DC models: All except MA-15	1 A, fuse externally 800 mA quick acting
	DC model: MA-15	0.3 A max., fuse externally 0.2 A quick acting
Internal Fuse:	AC models	2 A fast acting
	DC models	1 A fast acting
External Fuse (Customer Supplied):	AC models	1.6 A fast acting
	DC models: All except MA-15	0.8 A fast acting
Electrical Life:	1 x 10 ⁶	
Mechanical—Special Safety Reed	Safety	Aux.
Closing Time:	3.0 mS	0.5 mS
Drop-Out Time:	2.1 mS	0.3 mS
Bounce Time:	0.7 mS	0.7 mS
Shock:	10 G	10 G
Vibration:	10 G, 50 to 100 Hz	
Mechanical		
Mounting:	Any position	
Case & Actuator Material:	Molded ABS	
Wiring Connection:	Various lengths or male M12 micro connector	
Weight:	Approx. 384 g (14 oz.)	
Color:	Red	
Mechanical Life:	10 x 10 ⁶	
Environmental		
Protection:	All models except MA-3, 4, 5	IP67 (NEMA 6)
	MA-3, 4, 5	IP65 (NEMA 4)
Operating Temperature:	All models except MA-3, 4, 5	-10 to 55°C (14 to 131°F)
	MA-3, 4, 5	-10 to 65°C (14 to 149°F)
Compliance		
Standards:	EN1088, EN292, EN60204-1	
Approvals/Listings:	CE marked for all applicable directives	
	All models: except MA-3, 4, 5	UL and C-UL
	MA-3, 4, 5	cCSAus

Specifications are subject to change without notice. Note: The safety contacts of the STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.

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Basic Body Styles

MA-1, MA-2, MA-20 and MA-21



MA-10 and MA-16



MA-12 and MA-13



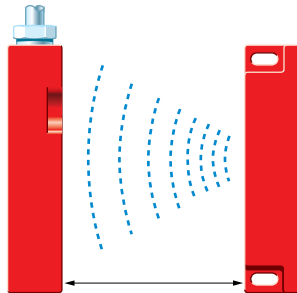
MA-14 and MA-15



MA-3, MA-4 and MA-5

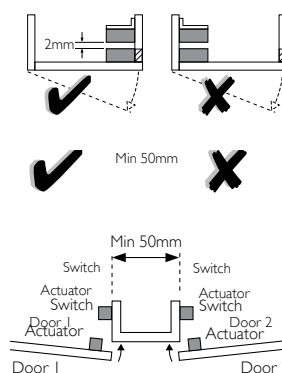
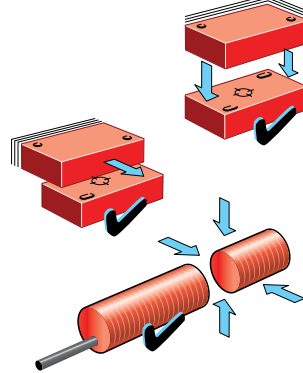
Operation

Operating Principle



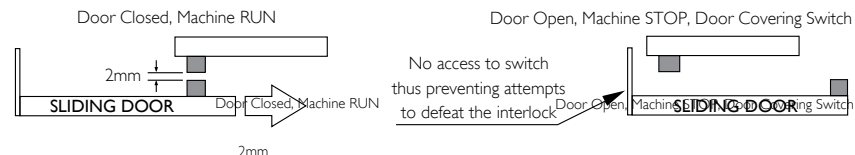
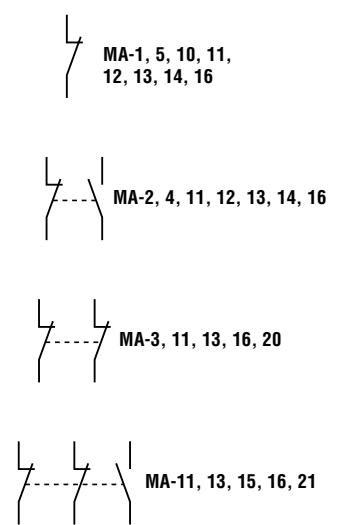
Encapsulated in the MA Series is a unique high-power industrial reed which is de-rated by a non-resettable overload protection circuit depending on switch type. On presenting the actuator to the switch, the high intensity magnetic field from the actuator causes the contacts to close. On removing the actuator (opening the door), the safety contacts open, isolating the machine.

Mounting Examples



It is advisable, where possible, to mount the switch and actuator on non-ferrous materials otherwise it may affect the operating distances.

Contact Arrangement



Wherever possible the units should be mounted so that no access can be obtained to the switch when the guard door is open, thus preventing attempts to defeat the safety system.

 **Select models are available for Rapid Delivery.**

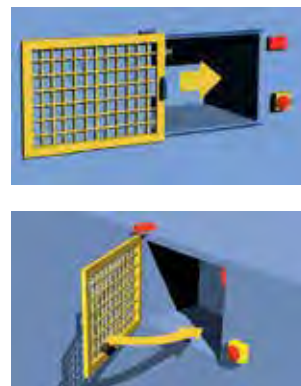
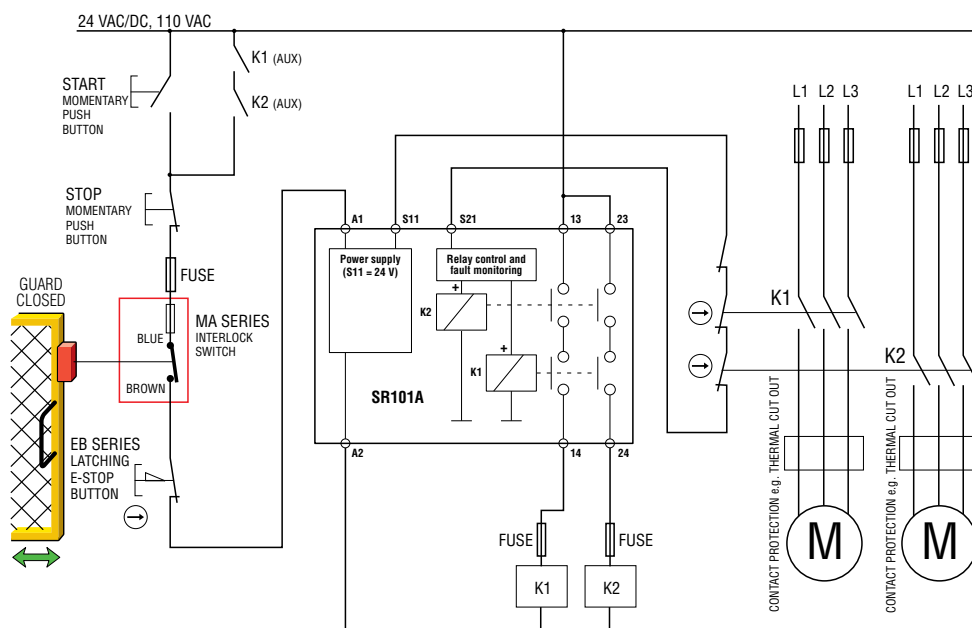
Door Closed, Machine RUN


Door Open, Machine STOP, Door Covering Switch

Applications

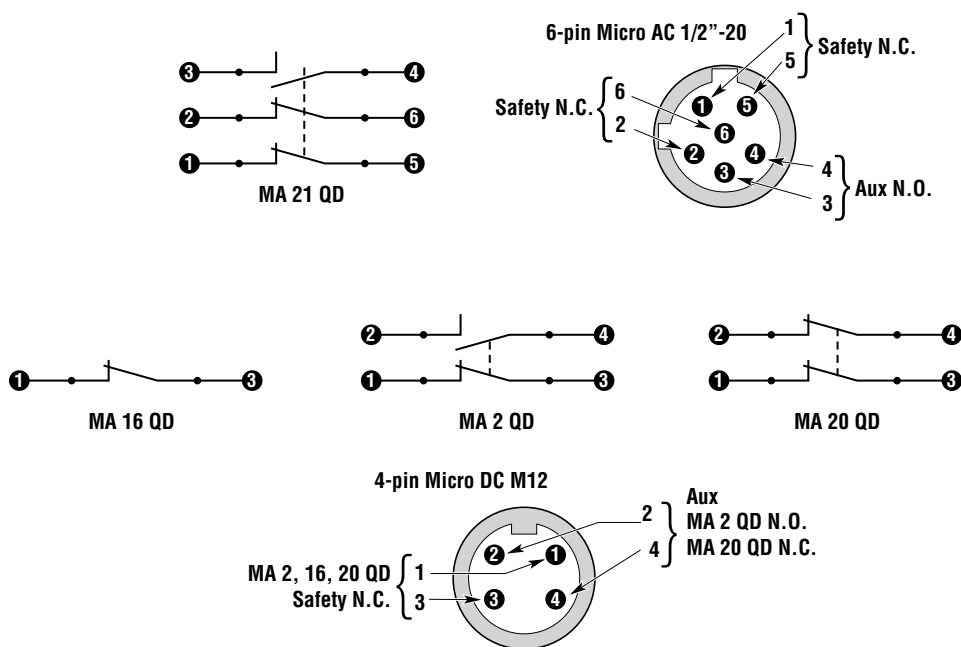
Typical Application of MA Series with a Safety Monitoring Relay

Typical applications are on sliding guard doors or swinging guard doors.



 For a full explanation of the circuit operating principle and fault detection, see “Common Circuit Examples” in the Expert Area Section of this catalog on page A-31.

Pin Assignments with Connector Option



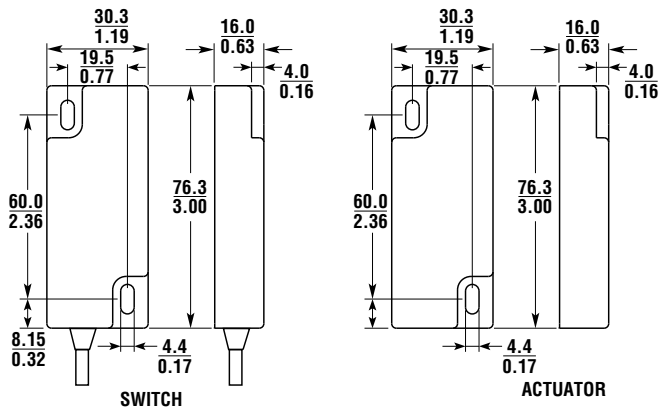
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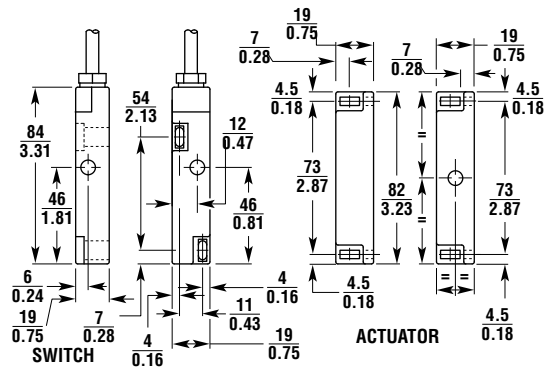
Dimensions

(mm/in.)

MA-1, 2, 20, 21

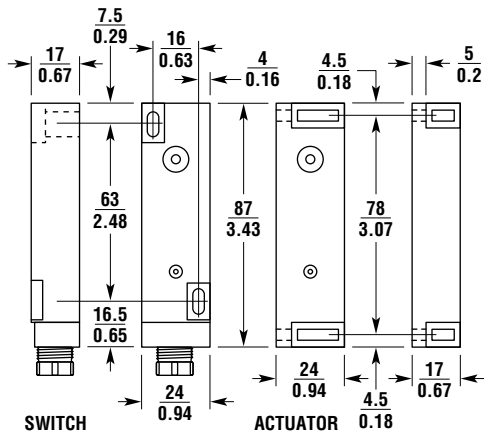


MA-10

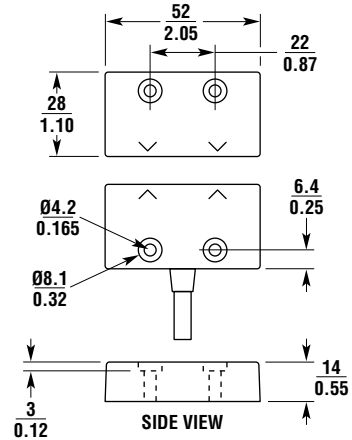


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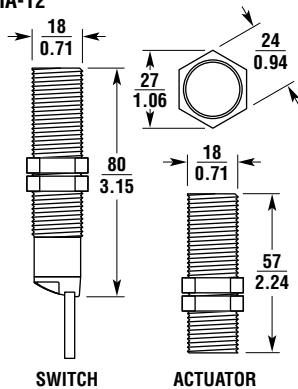
MA-11



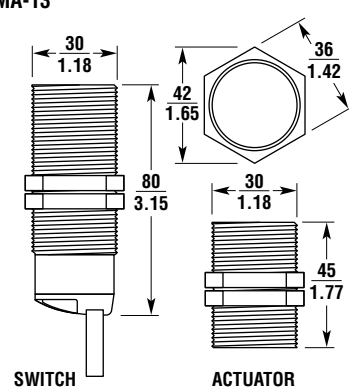
MA-14, 15



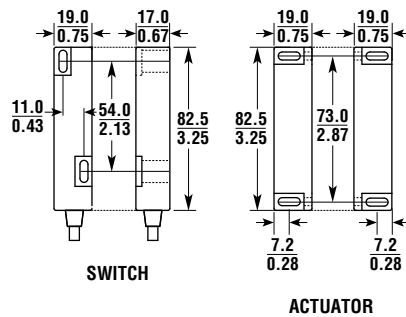
MA-12



MA-13



MA-16



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Ordering

Model	Contacts	Wiring Entry	Part No.
AC Only			
MA-1APC2 (AC only)	1 N/C	2 m cable, pre-wired	44507-0010
MA-1APC4 (AC only)	1 N/C	4 m cable, pre-wired	44507-0020
MA-1APC8 (AC only)	1 N/C	8 m cable, pre-wired	44507-0180
MA-1APCC (AC only)	1 N/C	4 pin micro DC M12	44507-0619
MA-2APC2 (AC only)	1 N/C + 1 N/O	2 m cable, pre-wired	44507-0030
MA-2APC4 (AC only)	1 N/C + 1 N/O	4 m cable, pre-wired	44507-0040
MA-2APC6 (AC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-0150
MA-2APC10 (AC only)	1 N/C + 1 N/O	10 m cable, pre-wired	44507-0750
MA-2APC15 (AC only)	1 N/C + 1 N/O	15 m cable, pre-wired	44507-0740
MA-2APCC (AC only)	1 N/C + 1 N/O	4-pin micro DC M12	44507-0600
MA-3APTC (AC only)	1 N/C + 1 N/C	Terminal connections	44507-0050
MA-4APTC (AC only)	1 N/C + 1 N/O	Terminal connections	44507-0060
MA-5APTC (AC only)	1 N/C	Terminal connections	44507-0070
MA-10APC2 (110 VAC, 3A max)	1 N/C	2 m cable, pre-wired	44507-0110
MA-10APC4 (110 VAC, 3A max)	1 N/C	4 m cable, pre-wired	44507-0330
MA-11AP10C3	1 N/C	3 m cable, pre-wired	44507-1150
MA-11AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1160
MA-11AP11C10	1 N/C + 1 N/O	10 m cable, pre-wired	44507-1161
MA-11AP20C3	2 N/C	3 m cable, pre-wired	44507-1170
MA-11AP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1180
MA-12AP10C3	1 N/C	3 m cable, pre-wired	44507-1250
MA-12AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1260
MA-13AP10C3	1 N/C	3 m cable, pre-wired	44507-1350
MA-13AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1360
MA-13AP20C3	2 N/C	3 m cable, pre-wired	44507-1370
MA-13AP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1380
MA-16AP10C3 (AC only)	1 N/C	3 m cable, pre-wired	44507-1650
MA-16AP10C6 (AC only)	1 N/C	6 m cable, pre-wired	44507-1651
MA-16AP10C10 (AC only)	1 N/C	10 m cable, pre-wired	44507-1659
MA-16AP10CC	1 N/C	4-pin micro DC M12	44507-1652
MA-16AP11C3 (AC only)	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1660
MA-16AP11C6 (AC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-1661
MA-16AP20C3 (AC only)	2 N/C	3 m cable, pre-wired	44507-1670
MA-16AP20C6 (AC only)	2 N/C	6 m cable, pre-wired	44507-1671
MA-16AP21C3 (AC only)	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1680
MA-16AP21C6 (AC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-1681
MA-20APC4 (AC only)	2 N/C	4 m cable, pre-wired	44507-0345
MA-20APCC (AC only)	2 N/C	4-pin micro DC M12	44507-0640
MA-21APC2 (AC only)	2 N/C + 1 N/O	2 m cable, pre-wired	44507-0160
MA-21APC4 (AC only)	2 N/C + 1 N/O	4 m cable, pre-wired	44507-0260
MA-21APC6 (AC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-0250
MA-21APC10 (AC only)	2 N/C + 1 N/O	10 m cable, pre-wired	44507-0170
MA-21APC15	2 N/C + 1 N/O	15 m cable, pre-wired	44507-0175
MA-21APCC	2 N/C + 1 N/O	6-pin micro DC M12	44507-0660

(Continued on next page)



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Ordering (continued)

Model	Contacts	Wiring Entry	Part No.
DC Only			
MA-1DPC2	1 N/C	2 m cable, pre-wired	44507-0022
MA-1DPC4	1 N/C	4 m cable, pre-wired	44507-0024
MA-1DPC8	1 N/C	8 m cable, pre-wired	44507-0028
MA-1DPCC	1 N/C	4p-pin micro DC M12	44507-0629
MA-2DPC2	1 N/C + 1 N/O	2 m cable, pre-wired	44507-0392
MA-2DPC4	1 N/C + 1 N/O	4 m cable, pre-wired	44507-0390
MA-2DPC6	1 N/C + 1 N/O	6 m cable, pre-wired	44507-0396
MA-2DPC10	1 N/C + 1 N/O	10 m cable, pre-wired	44507-0380
MA-2DPC15	1 N/C + 1 N/O	15 m cable, pre-wired	44507-0370
MA-2DPCC	1 N/C + 1 N/O	4-pin micro DC M12	44507-0650
MA-11DP10C3	1 N/C	3 m cable, pre-wired	44507-1110
MA-11DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1120
MA-11DP20C3	2 N/C	5 m cable, pre-wired	44507-1130
MA-11DP20C5	2 N/C	3 m cable, pre-wired	44507-1131
MA-11DP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1140
MA-12DP10C3	1 N/C	3 m cable, pre-wired	44507-1210
MA-12DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1220
MA-13DP10C3	1 N/C	3 m cable, pre-wired	44507-1310
MA-13DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1320
MA-13DP20C3	2 N/C	3 m cable, pre-wired	44507-1330
MA-13DP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1340
MA-13DP21C10	2 N/C + 1 N/O	10 m cable, pre-wired	44507-1341
MA-14DP10C3	1 N/C	3 m cable, pre-wired	44507-1410
MA-14DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1420
MA-15DP21C3*	2 N/C + 1 N/O	3 m cable, pre-wired (300 mA max.)	44507-1540
MA-15DP21C5*	2 N/C + 1 N/O	5 m cable, pre-wired (300 mA max.)	44507-1541
MA-15DP21CC*	2 N/C + 1 N/O	6-pin micro DC M12	44507-1549
MA-16DP10C3 (DC only)	1 N/C	3 m cable, pre-wired	44507-1610
MA-16DP10C6 (DC only)	1 N/C	6 m cable, pre-wired	44507-1611
MA-16DP10C10 (DC only)	1 N/C	10 m cable, pre-wired	44507-1612
MA-16DP10CC (DC only)	1 N/C	4-pin micro DC M12	44507-1619
MA-16DP11C3 (DC only)	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1620
MA-16DP11C6 (DC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-1621
MA-16DP20C3 (DC only)	2 N/C	3 m cable, pre-wired	44507-1630
MA-16DP20C6 (DC only)	2 N/C	6 m cable, pre-wired	44507-1631
MA-16DP21C3 (DC only)	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1640
MA-16DP21C6 (DC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-1641
MA-20DPC4 (24 VDC only)	2 N/C	4 m cable, pre-wired	44507-0340
MA-20DPCC (24 VDC only)	2 N/C	4-pin micro DC M12	44507-0630
MA-21DPC2 (24 VDC only)	2 N/C + 1 N/O	2 m cable, pre-wired	44507-0270
MA-21DPC4 (24 VDC only)	2 N/C + 1 N/O	4 m cable, pre-wired	44507-0280
MA-21DPC6 (24 VDC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-0290
MA-21DPC10 (24 VDC only)	2 N/C + 1 N/O	10 m cable, pre-wired	44507-0350
MA-21DPC15 (24 VDC only)	2 N/C + 1 N/O	15 m cable, pre-wired	44507-0360
MA-21DPCC	2 N/C + 1 N/O	6-pin micro DC M12	44507-0670
Accessories			
Spare Actuator (1-5 & 20, 21), Red ABS Plastic			44507-0700
Replacement Actuator for MA-11, Red ABS Plastic			44507-0711
Replacement Actuator for MA-12, Red ABS Plastic			44507-0712
Replacement Actuator for MA-13, Red ABS Plastic			44507-0713
Replacement Actuator for MA-14, Red ABS Plastic			44507-0714
Replacement Actuator for MA-15, Red ABS Plastic			44507-0715
Replacement Actuator for MA-16, -10 Red ABS Plastic			44507-0716

*MA-15 switches are not compatible with the following STI safety relays: SR203M, SR203AM, SR208AD, SR209AD and all Legacy Relays.



Universal Mounting Brackets can be used with this product. See page G-210 for details.



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6. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
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 - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
 - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 - d. Delivery and shipping dates are estimates only; and
 - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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16. **Property; Confidentiality.** Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
18. **Miscellaneous.** (a) **Waiver.** No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) **Assignment.** Buyer may not assign its rights hereunder without Omron's written consent. (c) **Law.** These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) **Amendment.** These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) **Definitions.** As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. **Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
 - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
 - (ii) Use in consumer products or any use in significant quantities.
 - (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
 NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. **Programmable Products.** Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. **Performance Data.** Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
4. **Change in Specifications.** Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
5. **Errors and Omissions.** Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.