

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 MA-13, 16, 21 — 2 N/C
	DC models	MA-12, 13, 14, 16 — 1 N/C MA-13, 15, 16, 20, 21 — 2 N/C
Safety Contact Operating Distance:		Make 7-12 mm (0.28-0.47in.); 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.

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



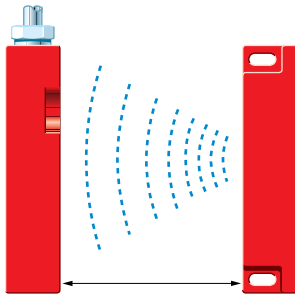
MA-3, MA-4 and MA-5



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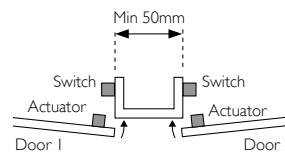
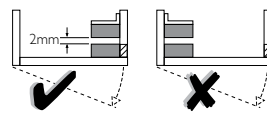
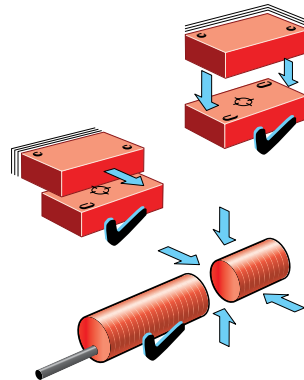
Operation

Operating Principle



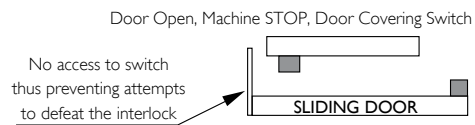
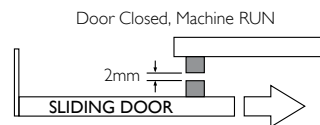
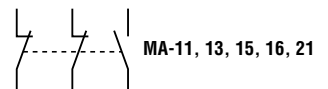
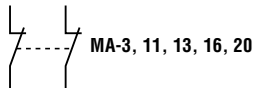
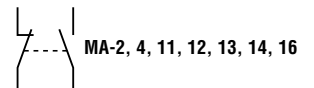
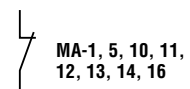
Encapsulated in the MA Series is a unique high-power industrial reed which is de-rated by a non-resettable overload protection circuit depending on switch type. On presenting the actuator to the switch, the high intensity magnetic field from the actuator causes the contacts to close. On removing the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

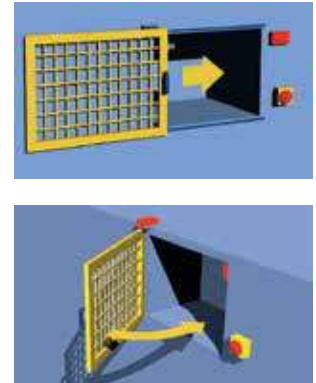
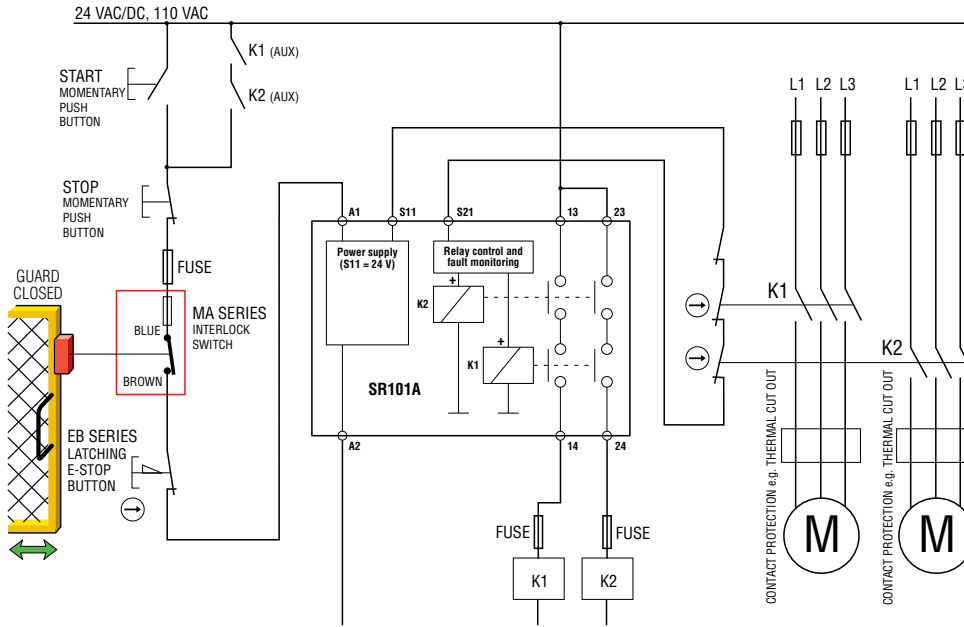
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Applications

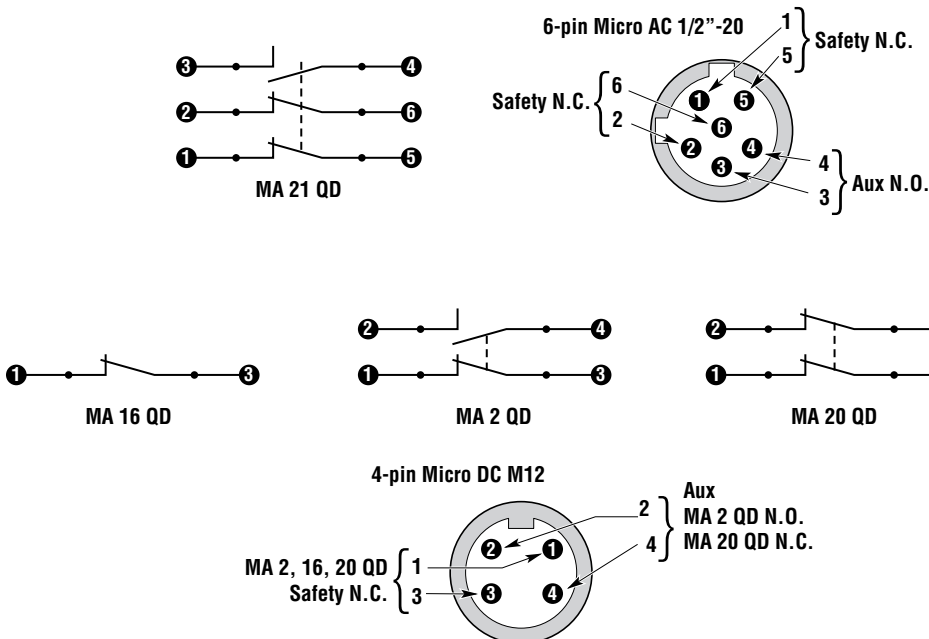
Typical Application of MA Series with a Safety Monitoring Relay

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



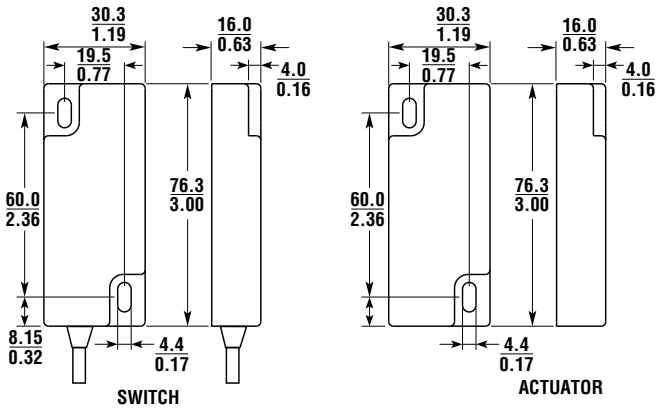
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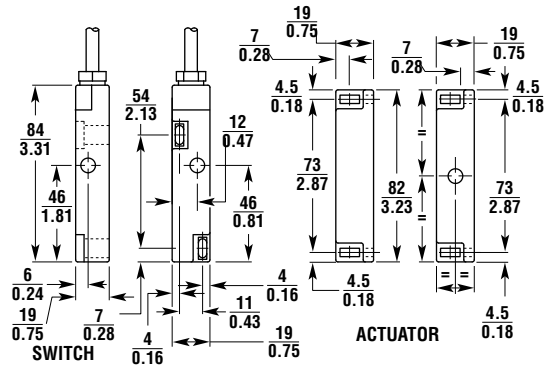
Dimensions

(mm/in.)

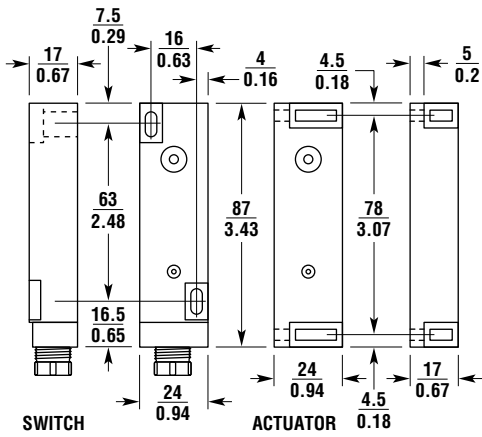
MA-1, 2, 20, 21



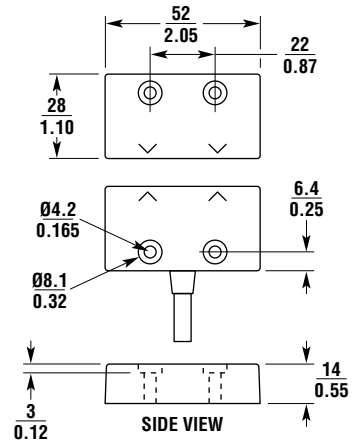
MA-10



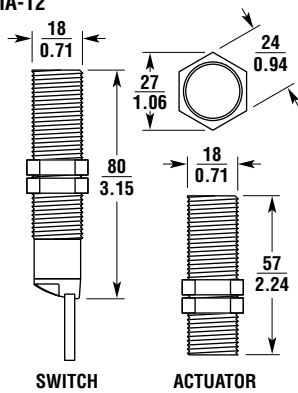
MA-11



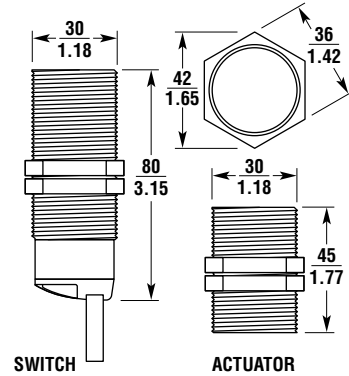
MA-14, 15



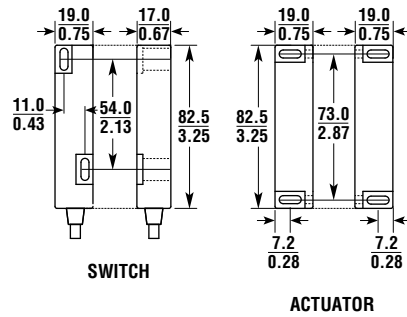
MA-12



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.

Select models are available for Rapid Delivery.

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1. **Offer; Acceptance.** These terms and conditions (these "**Terms**") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "**Products**") by Omron Electronics LLC and its subsidiary companies ("**Omron**"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. **Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
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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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8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
 - 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.
13. **Warranties.** (a) **Exclusive Warranty.** Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) **Limitations.** OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) **Buyer Remedy.** Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See <http://www.omron247.com> or contact your Omron representative for published information.
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