



Conforms to all applicable standards  
UL and C-UL listed

■ **Description**

The ESD5020 Enabling Switch Device provides the margin of safety needed during troubleshooting, set-up, programming, or servicing of robotic or automated machinery when no other safety devices are possible or practical as required by ANSI/RIA R15.06. The ESD5020 Enabling Switch Device also conforms to ANSI B11.19-2003, Section 12.3.

Two three-position enabling switches are integrated into the trigger of the ESD5020 providing the operator with control at all times. The trigger's middle “enabled” position is easy to feel and the redundant switch contacts ensure that the machinery can be stopped by either releasing or squeezing the trigger.

Function switches may be added to the ESD5020 for activating user defined functions such as up/down, start/stop, or jog left/jog right.

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enabling switch device

# ESD5020

## Enabling Switch Device

- Three-position enabling switch is incorporated in an ergonomically-designed handheld enabling switch device
- Selection of connectors or a variety of integral 10 m cable terminations
- Optional function switches and LED indicators
- Wide selection of holder kits allows easy integration into a variety of applications
- Meets all applicable standards

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

■ **Operation**

The trigger of the ESD5020 contains a 3-position switch that operates as follows with reference to the switch diagram to the right:

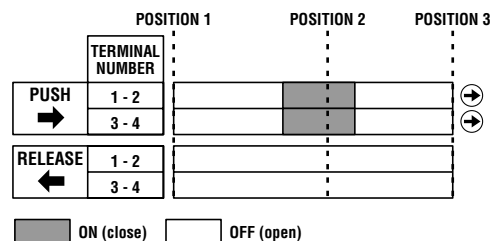
**Position 1:** This is the “released” STOP position of the 3-position trigger. The trigger is not pressed in this position.

**Position 2:** This is the ENABLED position of the 3-position trigger. The trigger is pressed and held in this position to allow machinery operation.

**Position 3:** This is the “squeezed” STOP position of the 3-position trigger. The trigger is pressed beyond the middle position (Position 2).

*Note: When the trigger of the ESD5020 is pressed to Position 3 and then released, Position 2 is not ENABLED as the trigger travels from Position 3 to Position 1.*

**CONTACT OPERATION**



**Optional Function Switches**

The ESD5020 can be supplied with two function switches as shown here. Pressing either of the switches closes a N/O contact for activation of user defined, non-safety functions such as up/down, start/stop, or jog left/jog right.

The N/O contacts of the function switches would typically be connected to the user’s system in such a way that the functions would only be active when the trigger of the ESD5020 is in the ENABLED position.

**Optional LED Indicators**

The ESD5020 can be supplied with two LED indicators as shown below. When connected to an appropriate controller, the red and green LED indicators may function as follows:

**Position 1:** The red LED is illuminated when the trigger of the ESD5020 is in the “released” STOP position.

**Position 2:** The green LED is illuminated when the trigger of the ESD5020 is pressed to the ENABLED position.

**Position 3:** The red LED is illuminated when the trigger of the ESD5020 is in the “squeezed” STOP position.



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■ **Operation (continued)**

**Holder Kits**

The ESD5020 Enabling Switch Device is typically placed in a holder consisting of one or two safety interlock switches as shown in the pictures to the right. The safety interlock switch holders allow the integration of the ESD5020 into the machine safety control system. Example wiring diagrams are on the following pages showing the integration of the ESD5020 into machine safety control systems using light curtains as well as safety interlock switches.

When the ESD5020 is not in use and is placed in the safety switch holders, the safety devices such as light curtains or interlock switches in the machine safety control system are active. However, when the ESD5020 is removed from the safety switch holder, the machine's STOP and START switches are disabled and the ESD5020 is activated and becomes a component in the machine safety control system.

Holder Kits contain all required hardware to mount the safety interlock switches and to mount



One switch holder with manual latch release.



Two switch holder with manual latch release.

the switch actuators onto the ESD5020. For example, the Holder Kit shown below contains a metal body safety interlock switch with a manual latch that securely locks the switch actuator, with ESD5020 attached, into the switch until the latch release button is pulled. The Holder Kit also contains all the screws required for attaching the actuator bracket and actuator to the ESD5020 as well as the screws for attaching

the interlock switch to the square universal mounting plate.

Holder Kits are available with one or two metal body switches as well as one or two plastic body switches. An example of a plastic body switch holder is shown below holding an ESD5020.



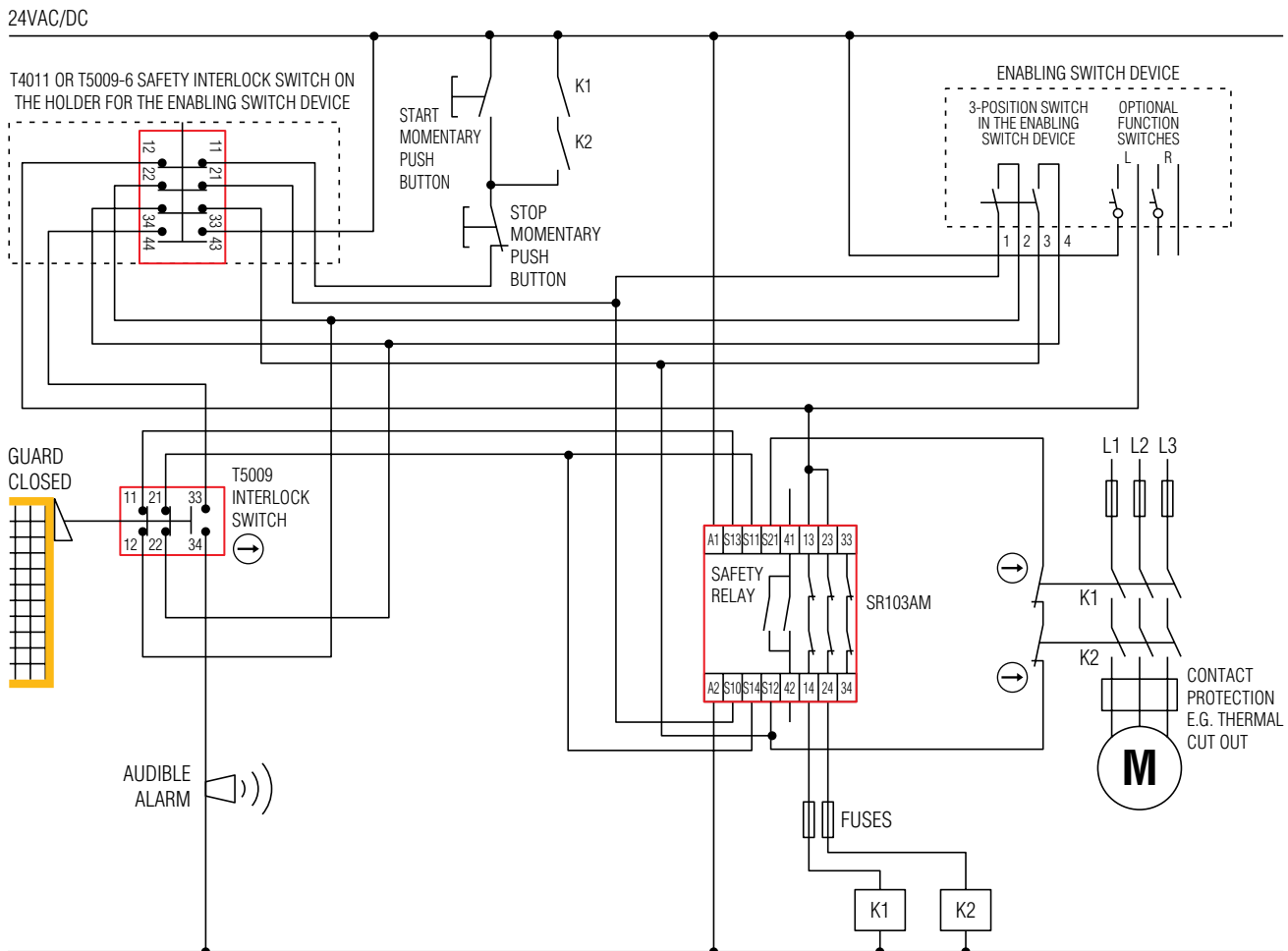
One switch holder kit with manual latch.



Plastic body switch holder with ESD5020

■ Applications

The ESD5020 Enabling Switch Device provides the margin of safety needed during trouble-shooting, setup, programming, or servicing of robotic or automated machinery when no other safety devices are possible or practical.



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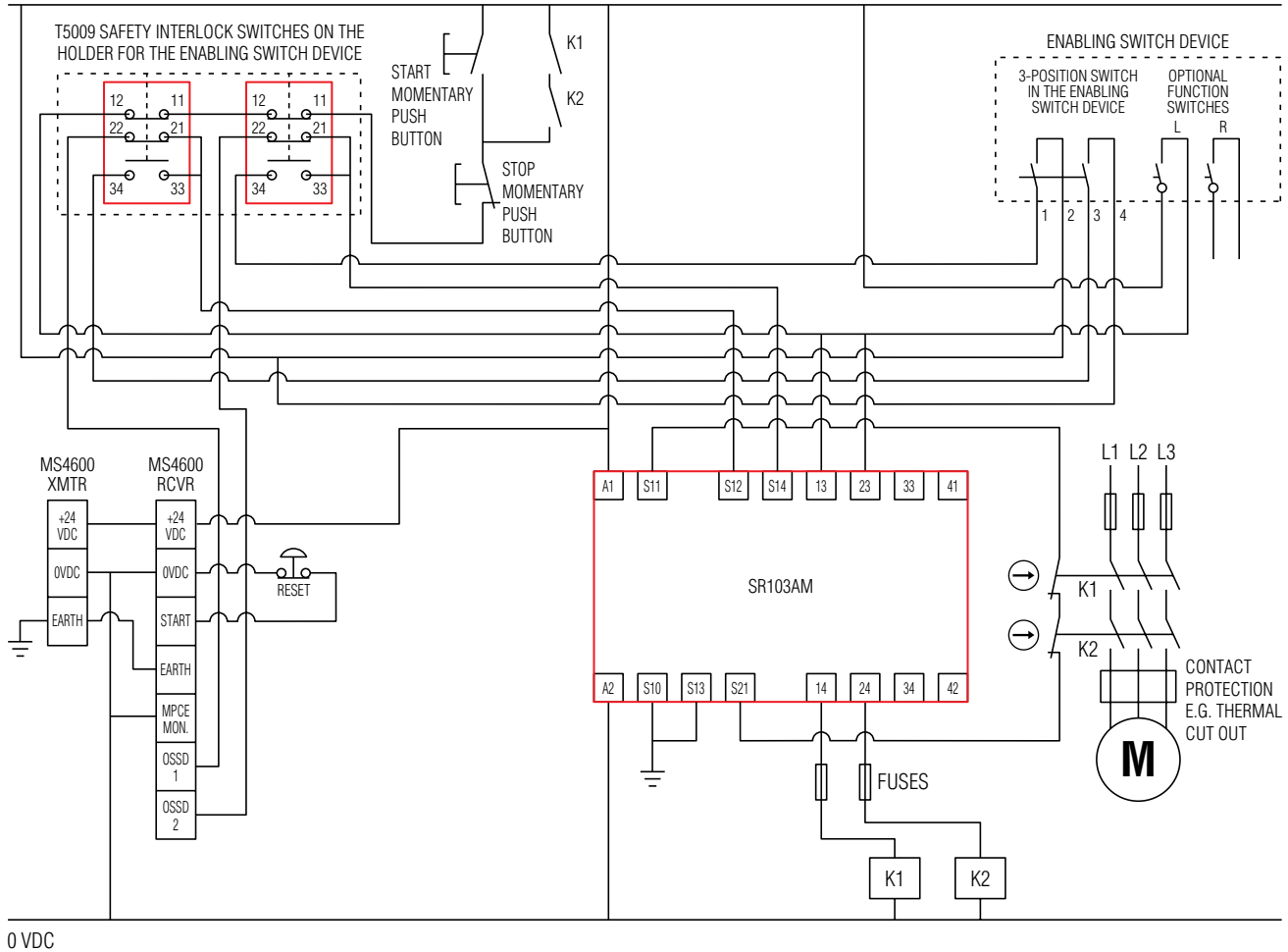
**Application Example of ESD5020 with T5009 Safety Interlock Switch**

The circuit above is shown with the guard door closed, Enabling Switch Device in the holder, and ready for the motor to be started by pressing the Start push button. When the ESD5020 Enabling Switch Device is removed from the holder the Start and Stop push buttons are disabled (preventing startup of the motor from this location), and the ESD5020 Enabling Switch Device is activated allowing the motor to be started by simultaneously squeezing the trigger of the Enabling Switch Device to the mid-position and pressing the Left Function Switch. The motor will stop running by either releasing the Left Function Button or by releasing the trigger of the Enabling Switch Device (or by squeezing the trigger to the 3rd position). Opening the guard door while the Enabling Device is activated will also prevent the motor from running and will sound the audible alarm to alert the Enabling Switch operator that someone may have entered the guarded area. The Right Function switch is not used in this example.



■ Applications (continued)

24 VDC



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enabling switch device

**Application Example of ESD5020 with a MS4600 Safety Light Curtain**

The circuit above is shown with the light curtain in the machine run state. The Enabling Switch Device is in the holder and ready for the motor to be started by pressing the Start push button. When the ESD5020 Enabling Switch Device is removed from the holder, the power to K1 and K2 is disabled, the Start and Stop push buttons are disabled (preventing startup of the motor from this location), and the ESD5020 Enabling Switch Device is activated allowing the motor to be started by simultaneously squeezing the trigger of the Enabling Switch Device to the mid-position and pressing the Left Function Switch. The motor will stop running by releasing the Left Function Button, releasing the trigger button, or by squeezing the trigger to the 3rd position. The light curtain is removed from the safety circuit when the Enabling Switch Device is not in the holder. The Right Function switch is not used in this example.

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

## ■ Specifications

| Electrical   |  |
|--|--|
| <b>Switching Ability of 3-Position Switch (Terminals 1-2 and 3-4):</b> |  |
| Resistive Load   | 2 A – 30 VAC/DC  |
| Inductive Load   | 1 A – 30 VAC/DC  |
| <b>Thermal Current:</b>  | 3 A  |
| <b>Function Switches (Optional):</b>                                   | 0.4 VA @ 28 VAC/DC (gold over silver contact material)   |
| Mechanical   |  |
| <b>Direct Opening Force:</b>   | 90 N (20 lb.) (3-position switch)  |
| <b>Operating Frequency:</b>  | 1200 operations per hour (3-position switch)   |
| <b>Weight (Without Cable):</b>   | 227 g (8 oz.)  |
| <b>Color:</b>  | Black and yellow   |
| Environmental  |  |
| <b>Protection:</b>   | IP66 (NEMA 6)  |
| <b>Operating Temperature:</b>  | -25 to 60°C (-13 to 140°F)   |
| Standards Conformity   |  |
| <b>Applicable Standards:</b>   | ISO12100, ISO11161, ISO10218,<br>IEC60947-5-1, IEC60204-1, EN60947-5-1,<br>EN292, EN60204-1, prEN11161, EN775<br>JISC8201-5-1, ANSI/RIA R15.06 |
| <b>Listings and Approvals</b>  | UL and c-UL-us listed  |

Specifications are subject to change without notice.

 For specifications on the T4011 Interlock Switch, see page G152.

 For specifications on the T5009 Interlock Switch, see page G176.

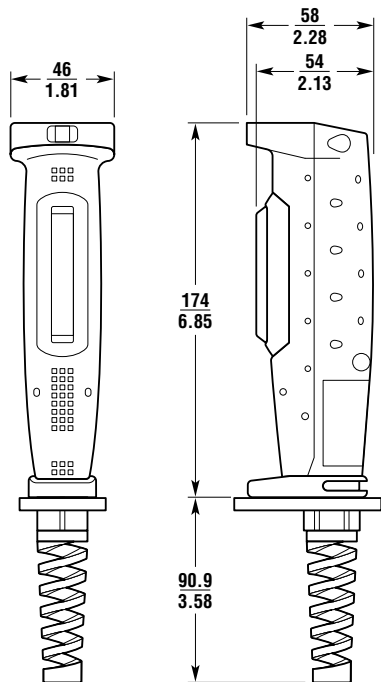
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enabling switch device

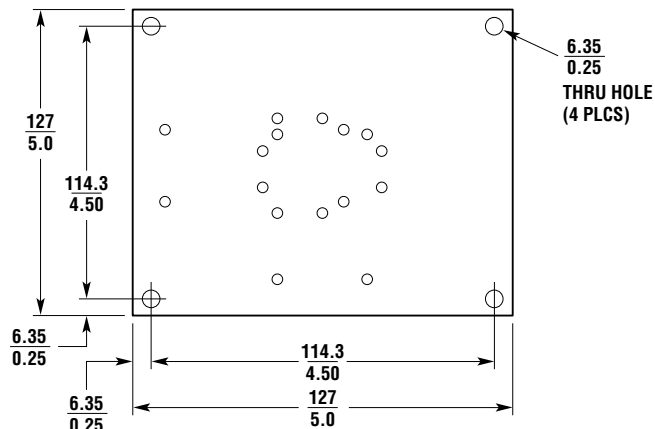


■ **Dimensions — mm/in.**

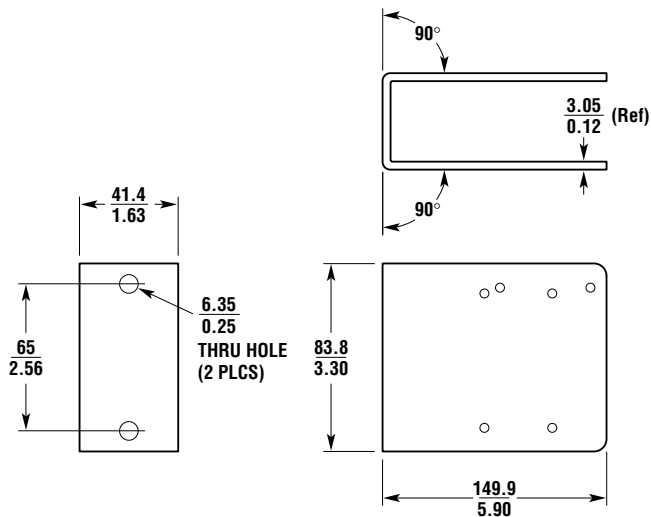
**ESD5020**



**ONE SWITCH MOUNTING PLATE**



**TWO SWITCH MOUNTING PLATE**

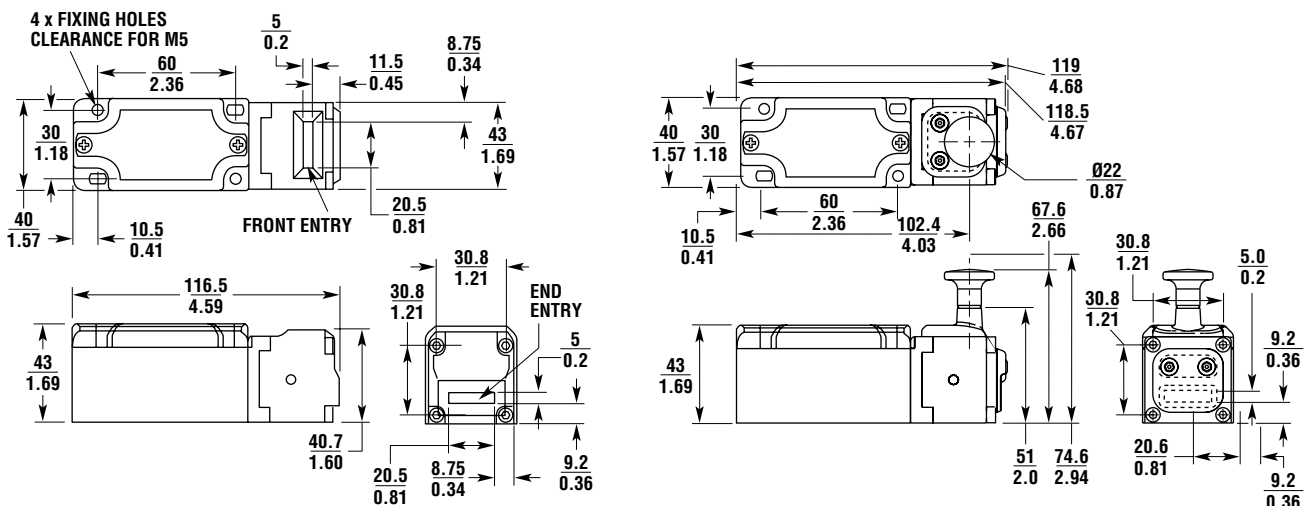


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enabling switch device

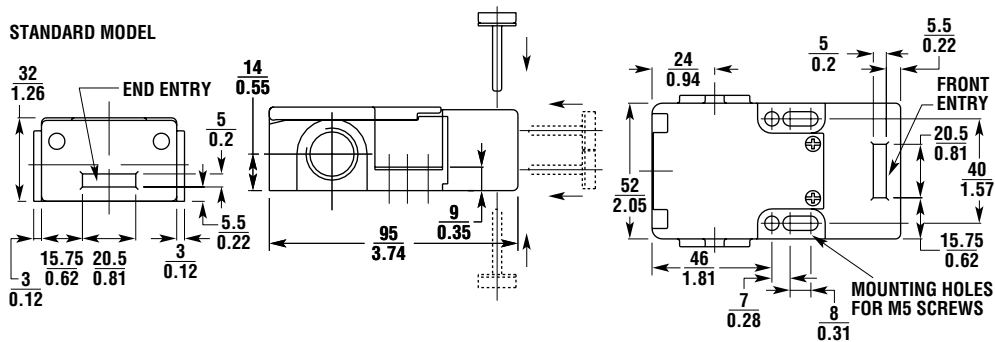
**A** Go to the Engineering Guide  
For in-depth information on safety standards and use.

**T4011**



**T5009**

STANDARD MODEL



**K**  
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## Ordering

Selecting the components for an Enabling Switch System is an easy three-step process:

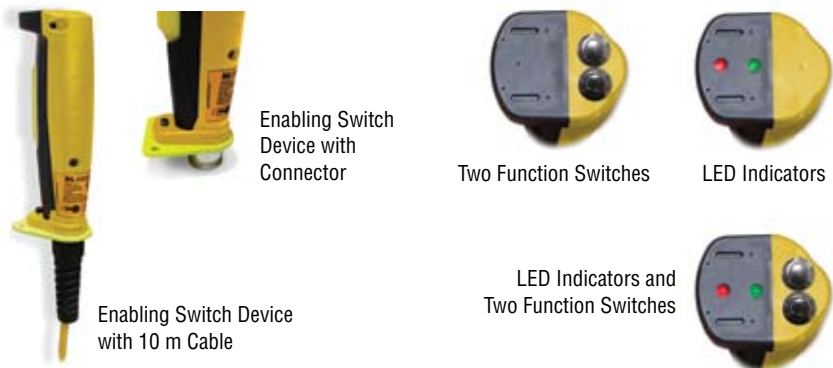
- 1 Enabling Switch Device**  
 Select an Enabling Switch Device from the variety of configurations listed.
- 2 Holder Kit**  
 Select a Holder Kit from the various configurations listed. The Holder Kit provides the switches and associated hardware typically required to integrate the Enabling Switch Device into the machine safety control system.
- 3 Safety Monitoring Relays**  
 Select the Safety Monitoring Relays needed for the application. Safety monitoring relays must be used with the Enabling Switch Device in order to achieve the level of safety and control reliability required for most applications.

### Accessories

Various accessories are also available.

## 1 Enabling Switch Devices

| ESD5020 Enabling Switch Device with 10 m Cable       | Wiring Termination     | Part No.   |
|--|------------------------|------------|
| <b>3-Position Trigger Only</b>                       |                        |            |
| ESD5020-21C10L4                                      | 4 Wire Leads           | 44509-1300 |
| ESD5020-21C10C4MA                                    | 4-Pin Male Mini Style  | 44509-1340 |
| ESD5020-21C10C4MB                                    | 4-Pin Male Micro Style | 44509-1342 |
| <b>Two Function Switches</b>                         |                        |            |
| ESD5020-21C10L8F2                                    | 8 Wire Leads           | 44509-2300 |
| ESD5020-21C10C8MAF2                                  | 8-Pin Male Mini Style  | 44509-2380 |
| <b>LED Indicators</b>                                |                        |            |
| ESD5020-21C10L8L2                                    | 8 Wire Leads           | 44509-3300 |
| ESD5020-21C10C8MAL2                                  | 8-Pin Male Mini Style  | 44509-3380 |
| <b>LED Indicators and Two Function Switches</b>      |                        |            |
| ESD5020-21C10L12F2L2                                 | 12 Wire Leads          | 44509-4300 |
| ESD5020-21C10C12MAF2L2                               | 12-Pin Male Mini Style | 44509-4320 |
| <b>ESD5020 Enabling Switch Device with Connector</b> |                        |            |
| <b>3-Position Trigger Only</b>                       |                        |            |
| ESD5020-21CC4MA                                      | 4-Pin Male Mini Style  | 44509-1040 |
| ESD5020-21CC4MB                                      | 4-Pin Male Micro Style | 44509-1042 |
| <b>Two Function Switches</b>                         |                        |            |
| ESD5020-21CC8MAF2                                    | 8-Pin Male Mini Style  | 44509-2080 |
| <b>LED Indicators</b>                                |                        |            |
| ESD5020-21CC8MAL2                                    | 8-Pin Male Mini Style  | 44509-3080 |
| <b>LED Indicators and Two Function Switches</b>      |                        |            |
| ESD5020-21CC12MAF2L2                                 | 12-Pin Male Mini Style | 44509-4020 |



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

## Holder Kits

| Metal Body  | Contacts          | Part No.   |
|---|-------------------|------------|
| <b>One Metal Body Interlock Switch with Latch</b>   |                   |            |
| ESDH1T4011-L021SN                                   | 2 N/C + 1 N/O BBM | 44509-9110 |
| ESDH1T4011-L022SN                                   | 2 N/C + 2 N/O BBM | 44509-9120 |
| ESDH1T4011-L031SN                                   | 3 N/C + 1 N/O BBM | 44509-9130 |
| <b>One Metal Body Interlock Switch</b>              |                   |            |
| ESDH1T4011-021SN                                    | 2 N/C + 1 N/O BBM | 44509-9150 |
| ESDH1T4011-022SN                                    | 2 N/C + 2 N/O BBM | 44509-9160 |
| ESDH1T4011-031SN                                    | 3 N/C + 1 N/O BBM | 44509-9170 |
| <b>Two Metal Body Interlock Switch with Latch</b>   |                   |            |
| ESDH2T4011-L021SN                                   | 2 N/C + 1 N/O BBM | 44509-9210 |
| ESDH2T4011-L022SN                                   | 2 N/C + 2 N/O BBM | 44509-9220 |
| ESDH2T4011-L031SN                                   | 3 N/C + 1 N/O BBM | 44509-9230 |
| <b>Two Metal Body Interlock Switches</b>            |                   |            |
| ESDH2T4011-021SN                                    | 2 N/C + 1 N/O BBM | 44509-9250 |
| ESDH2T4011-022SN                                    | 2 N/C + 2 N/O BBM | 44509-9260 |
| ESDH2T4011-031SN                                    | 3 N/C + 1 N/O BBM | 44509-9270 |
| <b>Plastic Body</b>                                 |                   |            |
| <b>One Plastic Body Interlock Switch with Catch</b> |                   |            |
| ESDH1T5009-C021SM                                   | 2 N/C + 1 N/O BBM | 44509-9310 |
| ESDH1T5009-6C022SM                                  | 2 N/C + 2 N/O BBM | 44509-9320 |
| ESDH1T5009-6C031SM                                  | 3 N/C + 1 N/O BBM | 44509-9330 |
| <b>One Plastic Body Interlock Switch</b>            |                   |            |
| ESDH1T5009-021SM                                    | 2 N/C + 1 N/O BBM | 44509-9350 |
| ESDH1T5009-6022SM                                   | 2 N/C + 2 N/O BBM | 44509-9360 |
| ESDH1T5009-6031SM                                   | 3 N/C + 1 N/O BBM | 44509-9370 |
| <b>Two Plastic Body Interlock Switch with Catch</b> |                   |            |
| ESDH2T5009-C021SM                                   | 2 N/C + 1 N/O BBM | 44509-9410 |
| ESDH2T5009-6C022SM                                  | 2 N/C + 2 N/O BBM | 44509-9420 |
| ESDH2T5009-6C031SM                                  | 3 N/C + 1 N/O BBM | 44509-9430 |
| <b>Two Plastic Body Interlock Switches</b>          |                   |            |
| ESDH2T5009-021SM                                    | 2 N/C + 1 N/O BBM | 44509-9450 |
| ESDH2T5009-6022SM                                   | 2 N/C + 2 N/O BBM | 44509-9460 |
| ESDH2T5009-6031SM                                   | 3 N/C + 1 N/O BBM | 44509-9470 |

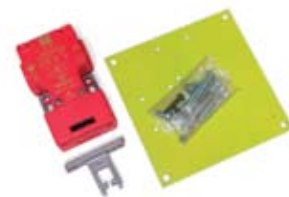
BBM = Break Before Make Contacts



**Metal Body:**  
**One Switch Holder Kits** consist of a switch mounting plate, assorted screws, actuator bracket, and interlock switch with actuator.



**Metal Body:**  
**Two Switch Holder Kits** consist of a switch mounting plate, assorted screws, actuator bracket, and two interlock switches with actuators.



**Plastic Body:**  
**One Switch Holder Kits** consist of a switch mounting plate, assorted screws, and interlock switch with actuator.



**Plastic Body:**  
**Two Switch Holder Kits** consist of a switch mounting plate, assorted screws, actuator bracket, and two interlock switches with actuators.

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## ■ Ordering (continued)



### ③ Safety Monitoring Relays

| Model       | Supply               | Inputs | Outputs | Auxiliary | Part No.   |
|-------------|----------------------|--------|---------|-----------|------------|
| SR103AM01   | 24 VAC/DC            | 2 N/C  | 3 N/O   | 1 N/C     | 44510-1031 |
| SR103AM02   | 110 VAC              | 2 N/C  | 3 N/O   | 1 N/C     | 44510-1032 |
| SR126AM01   | 24 VAC/DC            | 2 N/C  | 7 N/O   | 2 N/C     | 44510-1261 |
| SR126AM02   | 110 VAC              | 2 N/C  | 7 N/O   | 2 N/C     | 44510-1262 |
| SR18A24/110 | 24 VAC/DC or 110 VAC | 2 N/C  | 5 N/O   | 2 N/C     | 44510-0800 |

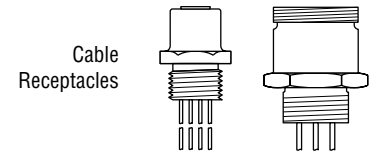
 For additional applicable safety relays and specifications on the relays listed above, see page H1.

### Accessories

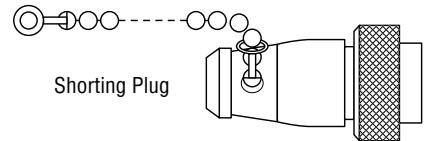
| Model  | Part No.   |
|--|------------|
| <b>10 m Cables</b>   |            |
| 4-Pin Female Mini Style and 4-Pin Male Mini Style                | 44509-0140 |
| 4-Pin Female Micro Style and 4-Pin Male Micro Style              | 44509-0142 |
| 8-Pin Female Mini Style and 8-Pin Male Mini Style                | 44509-0180 |
| 12-Pin Female Mini Style and 12-Pin Male Mini Style              | 44509-0120 |
| <b>Cable Receptacles</b>   |            |
| 4-pin Female Mini Style, 1/2 in. NPT, 18 AWG x 24 in.            | 44509-0540 |
| 4-pin Female Micro Style, 1/4 in. NPT, 18 AWG x 24 in.           | 44509-0542 |
| 8-pin Female Mini Style, 1/2 in. NPT, 16 AWG x 24 in.            | 44509-0580 |
| 12-pin Female Mini Style, 1/2 in. NPT, 16 AWG x 24 in.           | 44509-0512 |
| <b>Shorting Plugs</b>  |            |
| 4-pin Male Mini Style (Pins 1-2 and 3-4 are Shorted)             | 44509-0640 |
| 4-pin Male Micro Style (Pins 1-2 and 3-4 are Shorted)            | 44509-0642 |
| 8-pin Male Mini Style (Pins 1-2 and 3-4 are Shorted)             | 44509-0680 |
| 12-pin Male Mini Style (Pins 1-2 and 3-4 are Shorted)            | 44509-0612 |
| <b>Cabling Components for Interlock Switches</b>                 |            |
| M20 to NPT Adapter (One Supplied with Each Plastic Switch)       | 44512-0110 |
| M20 Cord Grip (4-5 mm ID)  | 44512-0090 |
| M20 Cord Grip (7-10 mm ID)                                       | 44512-0410 |
| MIN1-AC Adapter Coupling (for use with 4 pin mini style cables)  | 44509-0210 |
| MIN2-AC Adapter Coupling (for use with 8 pin mini style cables)  | 44509-0220 |
| MIN3-AC Adapter Coupling (for use with 12 pin mini style cables) | 44509-0230 |
| <b>Replacement Actuators</b>                                     |            |
| T4011 Replacement Standard Actuator                              | 44519-0700 |
| T5009 Replacement Standard Actuator                              | 44501-0750 |



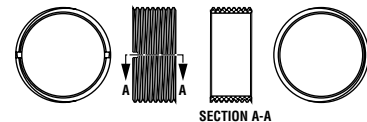
10 m Cable




Cable Receptacles



Shorting Plug



Adapter Couplings can be used to connect “mini style” cables in series, allowing for longer cable runs.

 For additional interlock switch accessories, see page G238.

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