Tongue Switches

Elf™

Description

The Elf is a tongue-operated (or key-operated) safety interlock switch designed to fit at the leading edge of sliding, hinged or lift-off guards. The Elf's unique miniature housing (only 75 x 25 x 29 mm (2.95 x 0.98 x 1.14 in.)) makes it the smallest interlock currently available. It is designed for smaller machines such as printers, copiers and domestic machinery which, until now, have been unable to use safety interlocks due to space restrictions. With its dual entry slots and rotatable head, the versatile Elf can offer up to eight different actuator entry options.

Operation of the switch is achieved through the insertion of a specially-profiled stainless-steel key that is permanently mounted to the guard door. The semi-flexible key allows the Elf to be used on small-radii doors (60 mm or 2.36 in.).

The Elf is available with a variety of contact configurations, conduit entry types and connectors. It is sealed to IP67 (watertight and dustproof). A blanking plug is supplied for the unused key entry.

Features

- Ideal for small, lightweight guards
- The smallest interlock switch available
- Contacts, 2 N.C. or 1 N.O. and 1 N.C.
- Eight possible actuator entry points, easy to install
- Environmental protection: IP67
- GD2 style available for demanding applications

Specifications

Safety Ratings					
Standards		EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/EN60947-5-1, ANSI B11.19, AS4024.1			
Safety Classification		Cat. 1 Device per EN954-1 Dual channel interlocks suitable for Cat. 3 or 4 systems			
Certifications		CE Marked for all applicable directives, cULus, TÜV, and CCC			
Outputs					
Safety Contacts ❄ Direct Opening Action		1 N.C.		2 N.C.	
Auxiliary Contacts		1 N.O.		None	
Thermal Current I_{th}		5 A (10 A if A600)			
Rated Insulation Voltage		2500V			
Switching Current @ Voltage, Min.		5 mA @ 5V DC			
Utilization Category					
A600/AC-15	(Ue)	600V	500V	240V	120V
	(Ie)	1.2 A	1.4 A	3.0 A	6.0 A
DC-13	(Ue)	24V			
	(Ie)	2 A			
Operating Characteristics					
Break Contact Force, Min.		6 N (1.35 lbf)			
Actuation Speed, Max.		160 mm (6.29 in.)/s			
Actuation Frequency, Max.		2 cycles/s			
Operating Radius, Min		150 mm (5.90 in.) [60 mm (2.36 in.) with GD2 kit, min.]			
Operating Life @ 100 mA load		1 x 10^6 operations			
Environmental					
Enclosure Type Rating		IP67			
Operating Temperature [C (F)]		-20…+80° (-4…+176°)			
Physical Characteristics					
Housing Material		UL Approved glass-filled PBT			
Actuator Material		Stainless Steel			
Weight [g (oz)]		60 (2.11)			
Color		Red			

∗ Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:
- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

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Product Selection

Contact			Actuator Type	Cat. No.			
				M16 Conduit		Connector§	
Safety	Auxiliary	Action		M16	1/2 inch NPT Adaptor	Connect to Distribution Box 4-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12) ♣
1 N.C.	1 N.O.	BBM	Flat	440K-E33036	440K-E33029	440K-E33074	—
			90°	**440K-E33040**	440K-E33030	440K-E33025	—
			GD2 Metal alignment guide w/semi-flex actuator	440K-E33034	440K-E33031	440K-E33075	—
			—	440K-E33014	440K-E33053	440K-E33076	—
2 N.C.	—	—	Flat	440K-E33080	440K-E33037	440K-E33077	440K-E2NNFPS
			90°	**440K-E33041**	440K-E33045	440K-E33024	—
			GD2 Metal alignment guide w/semi-flex actuator	—	440K-E33046	440K-E33078	440K-E2NNAPS
			—	**440K-E33047**	—	440K-E33079	—

§ For connector ratings see page 3-9.
§ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-13 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Single-Function Safety Relays for 1 N.C. & 1 N.O. Contact Switch							
MSR9T	2 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	5-14	440R-F23027
MSR33RT	2 N.O. Solid State	1 N.O.	Removable	Auto. or Monitored Manual	24V DC SELV	5-18	440R-F23200
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	Connection to Distribution Box 4-Pin Micro (M12)		Connection to ArmorBlock Guard I/O 5-Pin Micro (M12)
	1 N.C. & 1 N.O.	2 N.C.	2 N.C.
Cordset	889D-F4AC-∗	889D-F4AC-∗	—
Patchcord	889D-F4ACDM-❄	889D-F4ACDM-❄	889R-F5ECRM-∗
Distribution Box	898D-P4‡KT-DM4	898D-4‡LT-DM4	—
Shorting Plug	898D-41KU-DM	898D-41LU-DM	—
T-Port	898D-43KY-D4	898D-43LY-D4	—

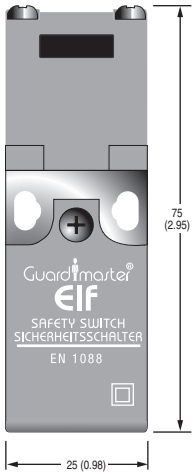
∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

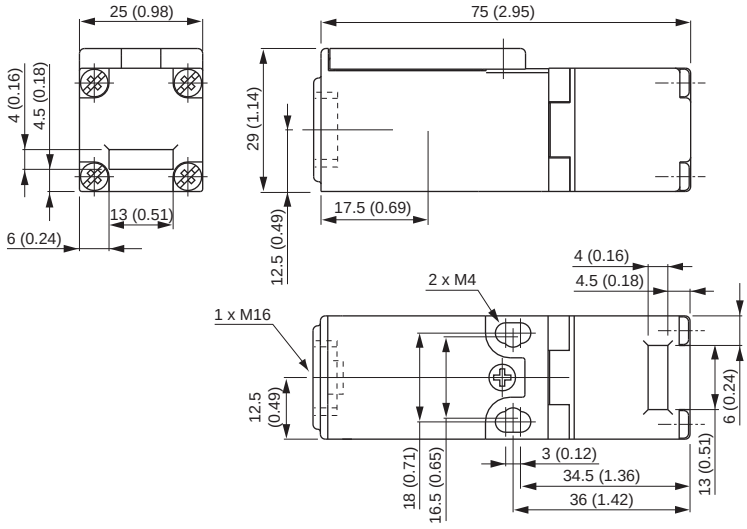
Accessories

Description		Dimensions	Cat. No.
	Flat actuator, not to be used with metal alignment guide	3-52	**440K-A21014**
	90° actuator, not to be used with metal alignment guide	3-52	**440K-A21006**
	Metal alignment guide with semi-flexible actuator	3-52	440K-A21030
	Metal Alignment Guide	3-52	440K-A21069
	Replacement Cover	—	440A-A33085
	Dust Cover	—	440K-A17182

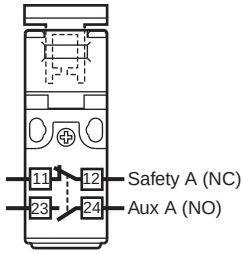
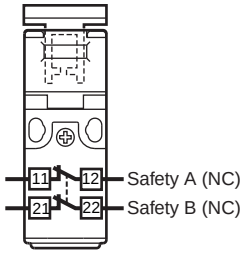
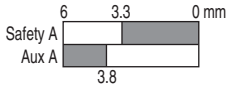
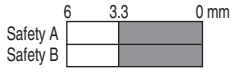
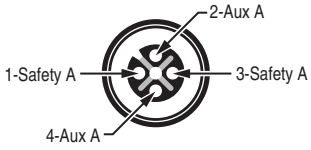
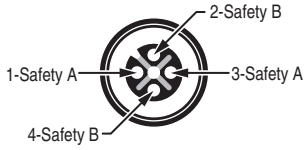
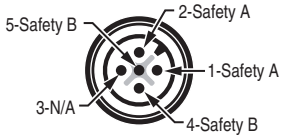
Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.





Typical Wiring Diagrams

Description		1 N.C. & 1 N.O.	2 N.C.
Contact Configuration			
Contact Action □Open ■Closed		 BBM	
4-Pin Micro (M12)			
5-Pin Micro (M12) For ArmorBlock Guard I/O		—	
Cordset 889D-F4AC-∗	Brown	Safety A	Safety A
	Blue		
	White	Aux A	Safety B
	Black		

∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Tongue Switches

Cadet™ 3

Description

The Cadet 3 is a tongue-operated (or key-operated) safety interlock switch designed to fit at the leading edge of sliding, hinged or lift-off guards. With its dual entry slots and rotatable head, the versatile Cadet 3 can offer up to eight different actuator entry options. The unique compact housing (90.5 x 31 x 30.4 mm (3.56 x 1.22 x 1.19 in.)) has industry standard DIN 50047 fixing centers for ease of mounting.

Operation of the switch is achieved through the insertion of a specially-profiled stainless-steel key that is permanently mounted to the guard door. A semi-flexible key allows the Cadet 3 to be used on small-radii doors (60 mm or 2.36 in.).

Available with a variety of contact configurations, the Cadet 3 is sealed to IP67. A blanking plug is supplied for the unused key entry.

Features

- Compact size
- Ideal for small, lightweight guards
- Contacts, 2 N.C. and 1 N.O. or 3 N.C.
- Sealed to IP67
- Eight possible actuator entry points, easy to install
- Industry standard fixing centres to DIN 50047
- GD2 style available for demanding applications

Specifications

Safety Ratings					
Standards		EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/EN60947-5-1, ANSI B11.19, AS4024.1			
Safety Classification		Cat. 1 device per EN 954-1 dual channel interlocks suitable for Cat. 3 or 4 systems			
Certifications		CE Marked for all applicable directives, cULus, TÜV, and CCC			
Outputs					
Safety Contacts ❄ Direct Opening Action		2 N.C.		3 N.C.	
Auxiliary Contacts		1 N.O.		None	
Thermal Current I_{th}		10 A			
Rated Insulation Voltage		(Ui) 500V			
Switching Current @ Voltage, Min.		5 mA @ 5V DC			
Utilization Category					
A600/AC-15	(Ue)	600V	500V	240V	120V
	(Ie)	1.2 A	1.4 A	3.0 A	6.0 A
DC-13	(Ue)	24V			
	(Ie)	2 A			
Operating Characteristics					
Break Contact Force, Min.		15 N (3.37 lbf)			
Actuation Speed, Max.		160 mm (6.29 in.)/s			
Actuation Frequency, Max.		2 cycles/s			
Operating Radius, Min		150 mm (5.90 in.) [60 mm (2.36 in.) with GD2 kit]			
Operating Life @ 100 mA load		1 x 10^6 operations			
Environmental					
Enclosure Type Rating		IP67			
Operating Temperature [C (F)]		-20…+ 80° (-4…+176°)			
Physical Characteristics					
Housing Material		UL Approved glass-filled PBT			
Actuator Material		Stainless Steel			
Weight [g (lb)]		80 (0.176)			
Color		Red			

∗ Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:
- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

Product Selection

Contact			Actuator Type	Cat. No.			
				M16 Conduit		Connector§	
Safety	Auxiliary	Action		M16	1/2 inch NPT Adaptor	Connect to Distribution Box 6-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)♣
3 N.C.	—	—	Flat	440K-C21096	440K-C21048	440K-C21090	440K-C2NNFPS
			90°	440K-C21097	440K-C21057	440K-C21091	—
			GD2 Metal alignment guide w/semi-flex actuator	—	440K-C21062	440K-C21092	440K-C2NNAPS
			—	440K-C21070	—	—	—
2 N.C.	1 N.O.	BBM	Flat	440K-C21098	440K-C21050	440K-C21054	—
			90°	**440K-C21061**	440K-C21058	440K-C21067	—
			GD2 Metal alignment guide w/semi-flex actuator	—	**440K-C21074**	**440K-C21088**	—
			—	440K-C21055	—	—	—
		MBB	Flat	440K-C21052	440K-C21093	440K-C21060	—
			90°	440K-C21065	440K-C21094	440K-C21068	—
			GD2 Metal alignment guide w/semi-flex actuator	—	440K-C21095	440K-C21089	—
			—	440K-C21080	—	—	—

§ For connector ratings see page 3-9.
§ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-17 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	6-Pin Micro (M12)	5-Pin Micro (M12)
Cordset	889R-F6ECA-∗	—
Patchcord	889R-F6ECRM-❄	889R-F5ECRM-∗
Distribution Box	898R-P68MT-A5	—
Shorting Plug	898R-P61MU-RM	—
T-Port	NA	—

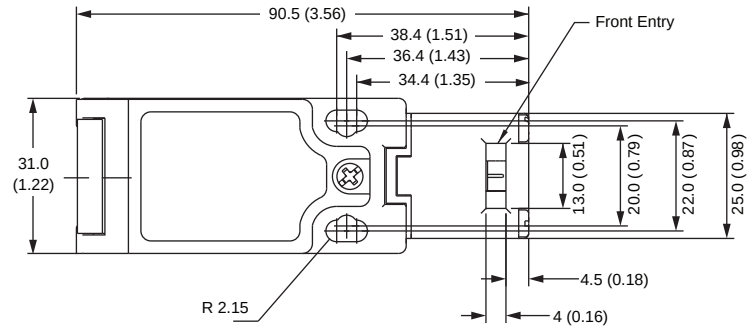
∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

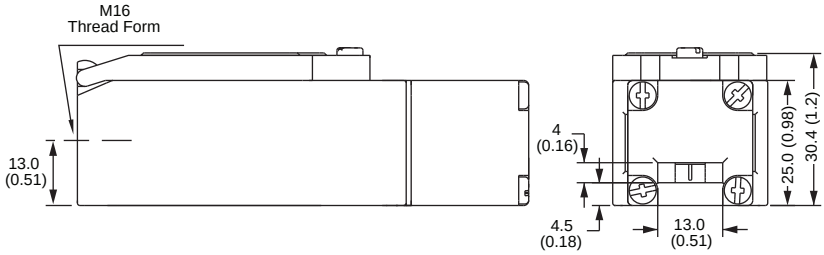
Accessories

Description		Dimensions	Cat. No.
	Flat actuator, not to be used with metal alignment guide	3-52	**440K-A21014**
	90° actuator, not to be used with metal alignment guide		**440K-A21006**
	Metal alignment guide with semi-flexible actuator		440K-A21030
	Replacement Cover	—	440A-A21115
	Dust Cover	—	440K-A17182

Approximate Dimensions

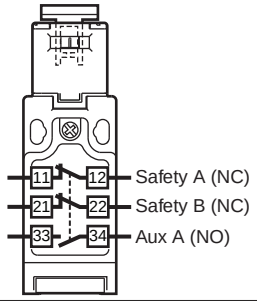
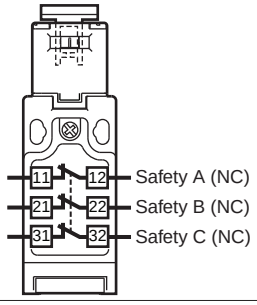
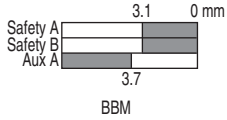
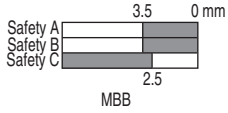
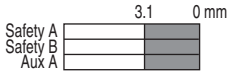
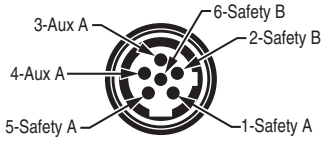
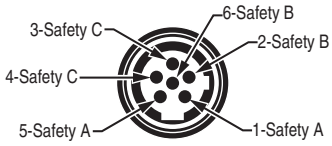
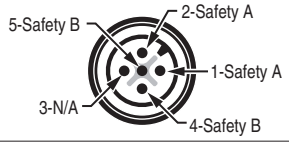
Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.





***Note**: 2D, 3D and electrical drawings are available on www.ab.com.*

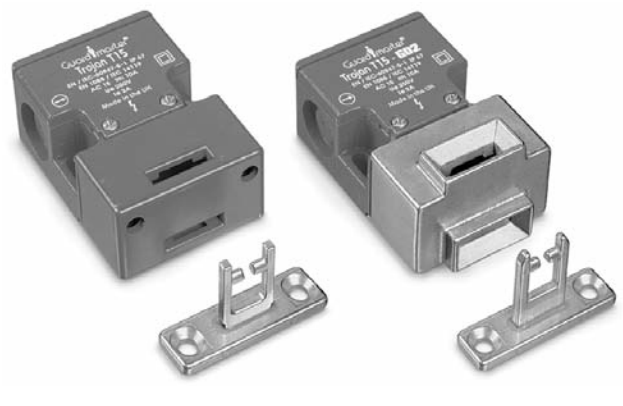
Typical Wiring Diagrams

Description		2 N.C. & 1 N.O.	3 N.C.
Contact Configuration			
Contact Action □Open ■Closed		 	
6-Pin Micro (M12)			
5-Pin Micro (M12)		—	
Cordset 889R-F6ECA-∗	Red/White	Safety A	Safety A
	Red/Black		
	Red	Safety B	Safety B
	Red/Blue		
	Green	Aux A	Safety C
	Red/Yellow		

∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Tongue Switches

Trojan™ T15



Description

The Trojan T15 is a compact universal tongue-operated (or key-operated) safety interlock switch designed to fit at the leading edge of sliding, hinged or lift-off guards. With its dual entry slots and rotatable head, movable only by releasing the cover screws, the Trojan T15 can offer four different options for actuator entry.

The Trojan T15 features a compact housing, only 75 x 52 x 32 mm (2.95 x 2.04 x 1.25 in.) and includes direct opening action contacts and a tamper-resistant mechanism. The Trojan T15 has 2 N.C. safety contacts or 1 N.C. safety contact and 1 N.O. auxiliary contact. The unit is sealed to IP67 and has three M20 conduit entries.

Operation of the switch is achieved by the insertion of the specially-profiled stainless-steel actuator which should be permanently fixed to the leading edge of the guard door. The standard T15 incorporates actuator retention force of 30N. An optional catch mechanism helps keep doors shut on vibrating machinery.

Features

- Compact size, 75 x 52 x 32 mm (2.95 x 2.05 x 1.26 in.) case
- 30 N actuator retention force
- Strong and versatile, can be used in most applications
- Contacts: 2 N.C. safety or 1 N.C. safety & 1 N.O. auxillary
- GD2 style available for demanding applications

Specifications

Safety Ratings				
Standards		EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/EN60947-5-1, ANSI B11.19, AS4024.1		
Safety Classification		Cat. 1 device per EN 954-1 dual channel interlocks suitable for Cat. 3 or 4 systems		
Certifications		CE Marked for all applicable directives, cULus, TÜV, and CCC		
Outputs				
Safety Contacts ❄ Direct Opening Action		2 N.C.		1 N.C.
Auxiliary Contacts		None		1 N.O.
Thermal Current I_{th}		10 A		
Rated Insulation Voltage		(Ui) 500V		
Switching Current @ Voltage, Min.		5 mA @ 5V DC		
Utilization Category				
A600/AC-15 (Ue)	(Ue)	600V	500V	240V	120V
(Ie)	(Ie)	1.2 A	1.4 A	3.0 A	6.0 A
DC-13 (Ue)	(Ue)	24V			
(Ie)	(Ie)	2 A			
Operating Characteristics				
Break Contact Force, Min.		30 N (6.70 lbf)		
Actuation Speed, Max.		160 mm (6.29 in.)/s		
Actuation Frequency, Max.		2 cycles/s		
Operating Radius, Min		175 mm (6.89 in.) [60 mm (2.36 in.) with flexible actuator]		
Operating Life @ 100 mA load		1 x 10^6 operations		
Environmental				
Enclosure Type Rating		IP67		
Operating Temperature [C (F)]		-20…+80° (-4…+176°)		
Physical Characteristics				
Housing Material		UL Approved glass-filled PBT		
Actuator Material		Stainless Steel		
Weight [g (lb)]		120 (0.265)		
Color		Red		

∗ Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:
- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

Product Selection

Type	Contact		Contact Action	Actuator Type	Cat. No.			
					M20 Conduit		Connector§	
	Safety	Auxiliary			M20	1/2 inch NPT Adaptor	Connect to Distribution Box 4-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)
Trojan T15 Standard	2 N.C.	—	—	Standard	440K-T11303	440K-T11267	440K-T11307	440K-V2NNSPS
				Fully-Flex	440K-T11395	440K-T11273	440K-T11384	440K-V2NNBPS
				—	**440K-T11269**	—	440K-T11385	—
	1 N.C.	1 N.O.	BBM	Standard	440K-T11305	440K-T11268	440K-T11386	—
				Fully-Flex	440K-T11396	440K-T11276	440K-T11387	—
				—	440K-T11270	—	440K-T11388	—
Trojan T15 GD2	2 N.C.	—	—	GD2 Standard	440K-T11463	440K-T11288	440K-T11389	440K-V2NNGPS-NG
				Fully-Flex	440K-T11397	440K-T11287	440K-T11390	—
				—	440K-T11280	—	440K-T11391	—
	1 N.C.	1 N.O.	BBM	GD2 Standard	440K-T11398	440K-T11284	440K-T11392	—
				Fully-Flex	440K-T11399	440K-T11283	440K-T11393	—
				—	440K-T11279	—	440K-T11394	—

§ For connector ratings see page 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Single-Function Safety Relays for 1 N.C. & 1 N.O. Contact Switch							
MSR9T	2 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	5-14	440R-F23027
MSR33RT	2 N.O. Solid State	1 N.O.	Removable	Auto. or Monitored Manual	24V DC SELV	5-18	440R-F23200
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	Connection to Distribution Box 4-Pin Micro (M12)		Connection to ArmorBlock Guard I/O 5-Pin Micro (M12)
	2 N.C.	1 N.C. & 1 N.O.	2 N.C.
Cordset	889D-F4AC-∗	889D-F4AC-∗	—
Patchcord	889D-F4ACDM-❄	889D-F4ACDM-❄	889D-F5ACDM-∗
Distribution Box	898D-4‡LT-DM4	898D-P4‡KT-DM4	—
Shorting Plug	898D-41LU-DM	898D-41KU-DM	—
T-Port	898D-43LY-D4	898D-43KY-D4	—

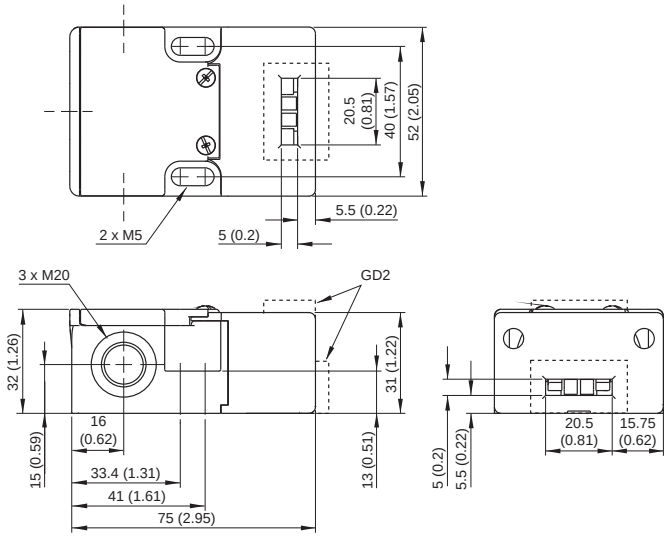
∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Accessories

Description		To Be Used With:	Dimensions	Cat. No.
	Standard actuator	Trojan T15 Standard Models Only	3-51	440K-A11238
	GD2 standard actuator	Trojan GD2 Models Only	3-50	**440G-A27011**
	GD2 flat actuator	Trojan GD2 Models Only	3-51	**440K-A11112**
	Alignment guide with semi-flexible actuator	Discard Alignment Guide for GD2 Models		440K-A11144
	Alignment guide with fully-flexible actuator	Discard Alignment Guide for GD2 Models	3-52	440K-A27010
	Sliding bolt actuator	Trojan GD2 Models Only	3-55	440G-A27163
	Catch and Retainer Kit	Trojan T15 Standard Models Only	3-50	440K-A11094
	Replacement Cover	All Models	—	440A-A11499
	Dust Cover	All Models	—	440K-A17180

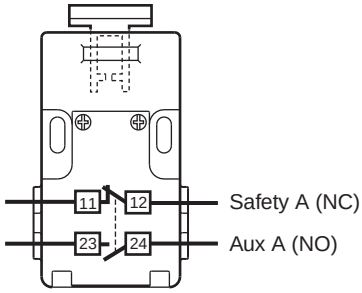
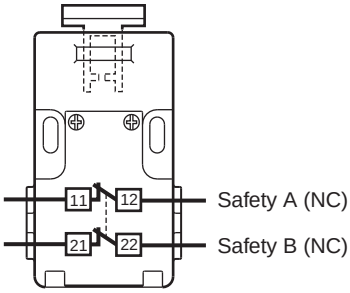
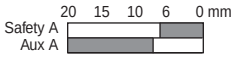
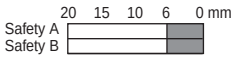
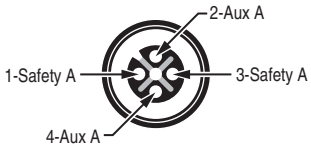
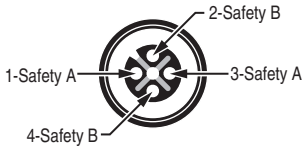
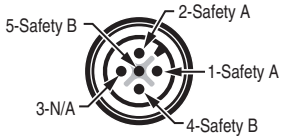
Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.



***Note**: 2D, 3D and electrical drawings are available on www.ab.com.*

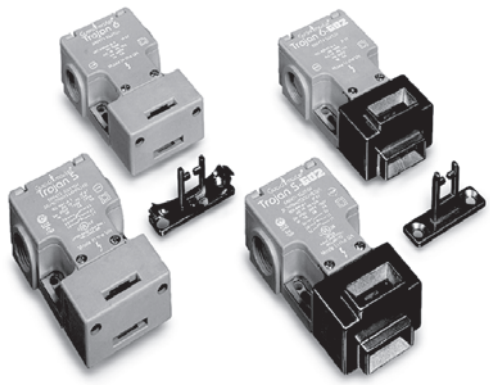
Typical Wiring Diagrams

Description		1 N.C. & 1 N.O.	2 N.C.
Contact Configuration			
Contact Action □Open ■Closed		 BBM	
4-Pin Micro (M12)			
5-Pin Micro (M12) For ArmorBlock Guard I/O		—	
Cordset 889D-F4AC-∗	Brown	Safety A	Safety A
	Blue		
	White	Aux A	Safety B
	Black		

∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Tongue Switches

Trojan™ 5 & 6



Description

The Trojan family is a universal tongue-operated (or key-operated) safety-interlock switch designed to fit at the leading edge of sliding, hinged or lift-off guards. The dual key entry slots and rotatable head, movable only by releasing the cover screws, allow four actuator entry options. The Trojan contains all of the safety related functions—i.e., forced guided contacts, tamper resistant mechanism—allowing the machine to be safeguarded in compliance with the machine directive.

Operation of the switch is achieved through the insertion of a specially-profiled stainless-steel key that is permanently mounted to the leading edge of the guard door. The standard (not GD2) Trojan actuator includes a self-ejecting mechanism that prevents operation of the switch if the actuator is not mounted to the guard door (e.g., if the operator uses a spare key).

Features

- Strong and versatile, can be used in most applications
- Self-ejecting tamper resistant actuator, only operates when mounted to the guard (not with GD2 models)
- Four possible actuator entry points, easy to install
- GD2 style available for demanding applications

Specifications

Safety Ratings					
Standards		EN 954-1, ISO 13849-1, IEC/EN 60204-1, NFPA 79, EN 1088, ISO 14119, IEC/EN 60947-5-1, ANSI B11.19, AS 4024.1			
Safety Classification		Cat. 1 device per EN 954-1 dual channel interlocks suitable for Cat. 3 or 4 systems			
Functional Safety Data ✶ **Note**: For up-to-date information, visit *http://www.ab.com/Safety/*		B10d: > 2 x 10^6 operations at min. load PFH_D: > 3 x10^{-7} MTTFd: > 385 years Dual channel interlock may be suitable for performance levels Ple or Pld (according to ISO 13849-1:2006) and for use in SIL2 or SIL3 systems (according to IEC 62061) depending on application characteristics			
Certifications		CE Marked for all applicable directives, cULus, TÜV, and CCC			
Outputs					
Safety Contacts ❄ Direct Opening Action		3 N.C.	2 N.C.	2 N.C.	
Auxiliary Contacts		1 N.O.	2 N.O.	1 N.O.	
Thermal Current I_{th}		10 A			
Rated Insulation Voltage		(Ui) 500V			
Switching Current @ Voltage, Min.		5 mA @ 5V DC			
Utilization Category					
Trojan 5 A300/AC-15	(Ue)	240V	120V		
	(Ie)	3 A	6 A		
DC-13	(Ue)	24V	24V		
	(Ie)	2 A			
Trojan 6 A600/AC-15	(Ue)	600V	500V	240V	120V
	(Ie)	1.2 A	1.4 A	3 A	6 A
DC-13	(Ue)	24V			
	(Ie)	2 A			
Operating Characteristics					
Break Contact Force, Min.		Trojan 5: 12 N (2.7 lbf) & 30 N (6.75 lbf)			
		Trojan 6: 20 N (4.5 lbf)			
Actuation Speed, Max.		160 mm (6.29 in.)/s			
Actuation Frequency, Max.		2 cycles/s			
Operating Radius, Min		175 mm (6.89 in.) [60 mm (2.36 in.) with flexible actuator]			
Operating Life @ 100 mA load		1 x 10^6 operations			
Environmental					
Enclosure Type Rating		IP67			
Operating Temperature [C (F)]		-20…+80° (-4…+176°)			
Physical Characteristics					
Housing Material		UL Approved glass-filled PBT			
Actuator Material		Stainless Steel			
Weight [g (lb)]		160 (0.35)			
Color		Red			

✶ Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:
- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

Product Selection

Type	Contact			Actuator Type	Cat. No.			
					M20 Conduit		Connector§	
	Safety	Auxiliary	Action		M20	1/2 inch NPT Adaptor	Connect to Distribution Box 6-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)♣
Trojan 5 Standard	2 N.C.	1 N.O.	BBM	Standard	**440K-T11090**	**440K-T11202**	440K-T11205	—
				Guide/Semi-Flex	440K-T11110	440K-T11203	440K-T11206	—
				Guide/Fully-Flex	**440K-T11467**	440K-T11204	440K-T11207	440K-T2NNBPS
				—	**440K-T11089**	—	440K-T11129	—
			BBM Gold Contacts	Standard	440K-T11085	—	—	—
			MBB	Standard	**440K-T11118**	440K-T11208	440K-T11224	—
				Guide/Semi-Flex	440K-T11123	440K-T11209	440K-T11363	—
				Guide/Fully-Flex	440K-T11468	440K-T11210	440K-T11364	—
				—	440K-T11146	440K-T11469	440K-T11365	—
Trojan 5 GD2			BBM	GD2 Standard	440K-T11336	440K-T11211	440K-T11366	440K-T2NNGPS-NG
				Guide/Semi-Flex	440K-T11337	440K-T11212	440K-T11367	—
				Guide/Fully-Flex	440K-T11338	440K-T11213	440K-T11368	—
				—	**440K-T11147**	—	440K-T11226	—
			MBB	GD2 Standard	440K-T11339	440K-T11470	440K-T11369	—
				Guide/Semi-Flex	440K-T11340	440K-T11471	440K-T11370	—
				Guide/Fully-Flex	440K-T11341	440K-T11472	440K-T11371	—
				—	440K-T11167	—	440K-T11372	—
Trojan 5 30 N			BBM	Standard	440K-T11333	440K-T91024	440K-T11492	—

§ For connector ratings see page 3-9.
§ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-27 for wiring details.

Type	Contact			Actuator Type	Cat. No.		
					M20 Conduit		Connector§
	Safety	Auxiliary	Action		M20	1/2 inch NPT Adaptor	8-Pin Micro (M12)♣
Trojan 6	3 N.C.	1 N.O.	BBM	Standard	440K-T11171	440K-T11435	—
				—	440K-T11449	440K-T11408	—
	2 N.C.	2 N.O.	BBM	Standard	440K-T11174	440K-T11438	—
				—	440K-T11452	440K-T11416	440K-W21BNPH
			MBB	—	440K-T11453	440K-T11454	440K-W21MNPH
Trojan 6 GD2	3 N.C.	1 N.O.	BBM	GD2 Standard	440K-T11418	440K-T11466	—
				—	440K-T11188	440K-T11444	—
			MBB	—	440K-T11456	440K-T11457	—
	2 N.C.	2 N.O.	BBM	GD2 Standard	440K-T11445	440K-T11425	—
				—	440K-T11459	440K-T11433	440K-W21BNPH-NG
			MBB	—	440K-T11460	440K-T11461	440K-W21MNPH-NG

§ For connector ratings see page 3-9.
§ With an 8-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-27 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	Trojan 5		Trojan 6
	5-Pin Micro (M12)	6-Pin Micro (M12)	8-Pin Micro (M12)
Cordset	—	889R-F6ECA-∗	889D-F8AB-∗
Patchcord	889R-F5ECRM-∗	889R-F6ECRM-❄	889D-F8ABDM-❄
Distribution Box	—	898R-F68MT-A5	—
Shorting Plug	—	898R-P61MU-RM	—
T-Port	—	—	—

∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

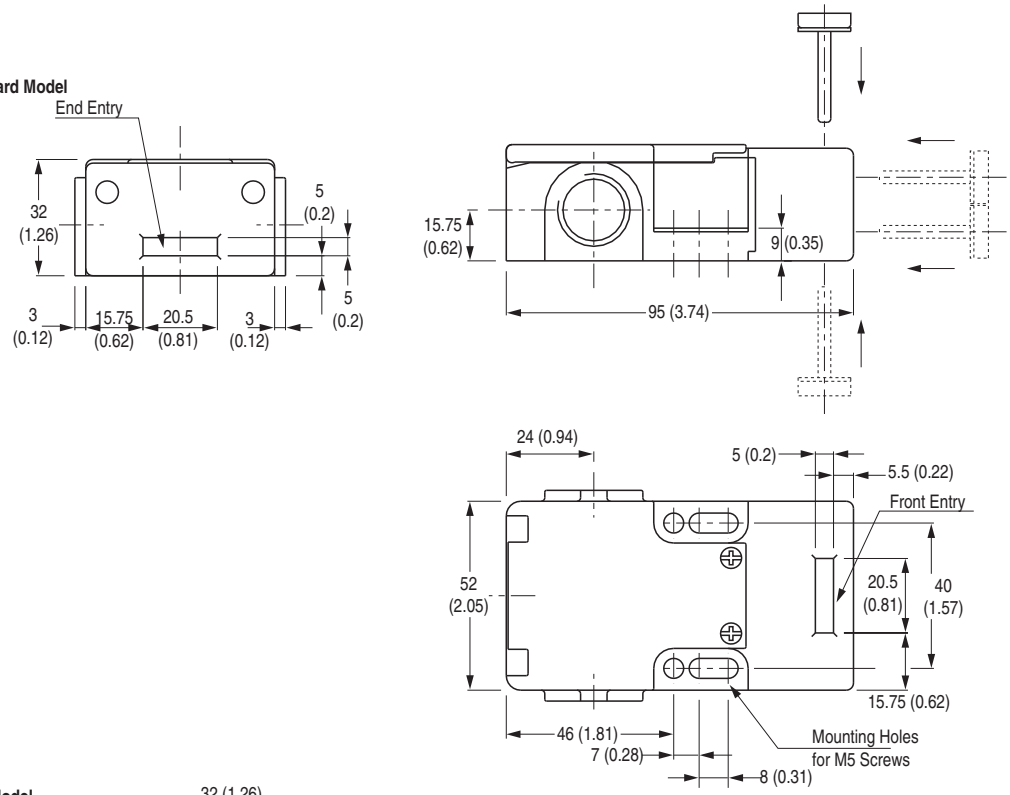
Accessories

Description		To Be Used With:	Dimensions	Cat. No.
	Standard actuator	Trojan T5 and T6 Standard Models Only	3-51	**440K-A11095**
	GD2 standard actuator	GD2 Models Only	3-50	**440G-A27011**
	GD2 flat actuator	GD2 Models Only	3-51	**440K-A11112**
	Alignment guide with semi-flexible actuator	Discard Alignment Guide for GD2 Models	3-51	440K-A11144
	Alignment guide with fully-flexible actuator	Discard Alignment Guide for GD2 Models	3-52	440K-A27010
	Sliding bolt actuator	GD2 Models Only	3-55	440G-A27163
	Catch and Retainer Kit	Trojan T5 and T6 Standard Models Only	3-50	440K-A11094
	Replacement Cover	Trojan T5 Standard Models Only	—	440A-A11495
		Trojan T5 GD2		440A-A11496
		Trojan T6 Standard Models Only		440A-A11497
		Trojan T6 GD2		440A-A11498
	Dust Cover	All Models	—	440K-A17180

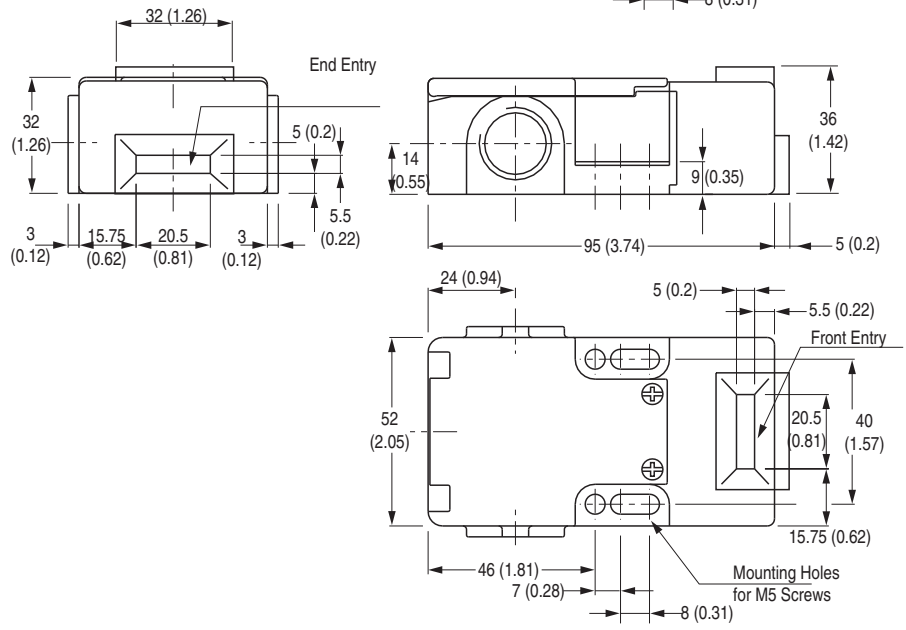
Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.

Standard Model

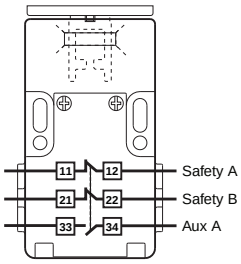
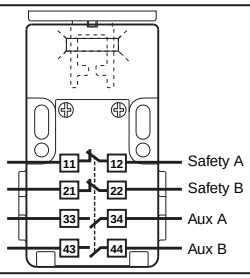
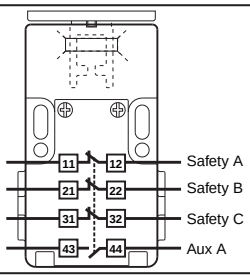
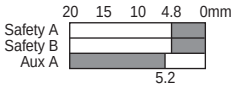
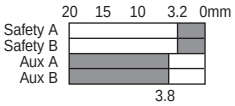
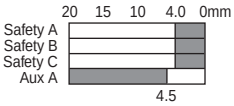
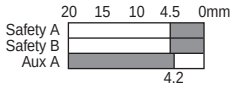
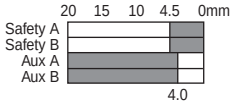
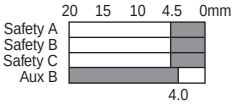
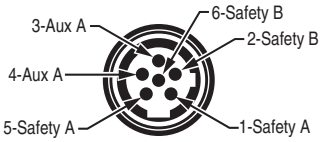
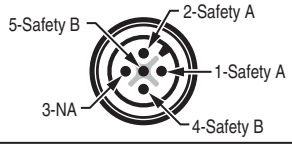
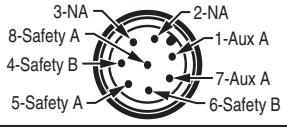


GD2 Model



***Note**: 2D, 3D and electrical drawings are available on www.ab.com.*

Typical Wiring Diagrams

Description		Trojan 5	Trojan 6	
		2 N.C. & 1 N.O.	2 N.C. & 2 N.O.	3 N.C. & 1 N.O.
Contact Configuration				
Contact Action		 BBM	 BBM	 BBM
□Open ■Closed		 MBB	 MBB	 MBB
6-Pin Micro (M12)			—	—
5-Pin Micro (M12) for ArmorBlock Guard I/O			—	—
8-Pin Micro (M12)		—		—
6-Pin Cordset 889R-F6ECA-∗	Red/White	Safety A	—	—
	Red/Black			
	Red	Safety B	—	—
	Red/Blue			
	Green	Aux	—	—
	Red/Yellow			
8-Pin Cordset 889D-F8AB-∗	Grey Red	—	Safety A	—
	Yellow Pink	—	Safety B	—
	White Blue	—	Aux A	—
	Green Brown	—	NA	—

∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

Tongue Switches

MT-GD2

Description

The MT-GD2 family is a robust, tongue-operated (or key-operated) safety-interlock switch designed to fit at the leading edge of sliding, hinged or lift-off guards. With its dual entry slots and rotatable head, the MT-GD2 can offer eight different options for actuator entry.

The MT-GD2 features a compact housing of only 117 x 40 x 43 mm (4.60 x 1.57 x 1.69 in.) with DIN 50041 standard fixing centres and includes forced guided contacts and a tamper-resistant mechanism.

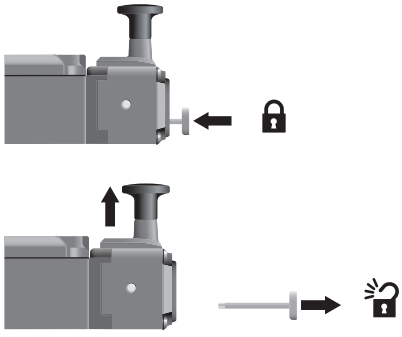
The MT-GD2 is available with a variety of contact configurations enabling it to be used as part of a system for higher-risk applications. Operation of the switch is achieved by the insertion of the specially-profiled stainless-steel actuator which should be permanently fixed to the leading edge of the guard door. An optional flexible actuator allows the MT-GD2 to operate on smaller-radii doors (≥60 mm) and a flat actuator gives additional mounting options, for example, on a chain.

A style incorporating a latch release mechanism allows manual retention of the actuator in the switch until the release mechanism is manually activated.

Features

- Strong and versatile, can be used in most applications
- Eight possible actuator entry points, easy to install
- Variety of contact configurations
- Snap acting MT-GD2 gives a min. break contact force of 40 N
- Optional latch release styles
- Industry standard fixing centers to DIN/EN50041

MT-GD2 Latch Release Style



Specifications

Safety Ratings					
Standards		EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC/EN60947-5-1, ANSI B11.19, AS4024.1			
Safety Classification		Cat. 1 device per EN 954-1 dual channel interlocks suitable for Cat. 3 or 4 systems			
Functional Safety Data ∗ **Note**: For up-to-date information, visit *http://www.ab.com/Safety/*		B10d: > 2 x 10^6 operations at min. load PFH_D: > 3 x10^{-7} MTTFd: > 385 years Dual channel interlock may be suitable for performance levels Ple or Pld (according to ISO 13849-1:2006) and for use in SIL2 or SIL3 systems (according to IEC 62061) depending on application characteristics			
Certifications		CE Marked for all applicable directives, cULus, TÜV, and CCC			
Outputs					
Safety Contacts ❄		Standard: 3 N.C. or 2 N.C. direct opening action Snap acting: 2 N.C. direct opening forced disconnection			
Auxiliary Contacts		Standard: 1 N.O. or 2 N.O. Snap Acting: 2 N.O.			
Thermal Current/I_{th}		10 A			
Rated Insulation Voltage		(Ui) 500V			
Switching Current @ Voltage, Min.		5 mA @ 5V DC			
Utilization Category					
A600/AC-15	(Ue)	600V	500V	240V	120V
	(Ie)	1.2 A	1.4 A	3 A	6 A
Standard—DC-13	(Ue)	24V			
	(Ie)	2 A			
Snap-Acting—A300/AC-15	(Ue)	240V	120V		
	(Ie)	3 A	6 A		
Snap-Acting—DC-13	(Ue)	24V			
	(Ie)	2 A			
Operating Characteristics					
Break Contact Force, Min.		BBM & MBB: 12 N (2.7 lbf) BBM & Extended Flat Actuator: 32 N (7.2 lbf) Snap acting: 40 N (9.0 lbf)			
Actuation Speed, Max.		160 mm (6.29 in.)/s			
Actuation Frequency, Max.		2 cycles/s			
Operating Life @ 100 mA load		1 x 10^6 operations			
Environmental					
Enclosure Type Rating		IP67			
Operating Temperature [C (F)]		-20…+80° (-4…+176°)			
Physical Characteristics					
Housing Material		Painted zinc			
Actuator Material		Stainless Steel			
Weight [g (lb)]		520 (1.15)			
Color		Yellow or Red			

∗ Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:
- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

Product Selection

Red Body Switches

Type	Contact			Actuator Type	Cat. No.				
					Conduit		Connector§		
	Safety	Auxiliary	Action		M20	1/2 in NPT	12-Pin M23	8-Pin Micro (M12)❄	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)∗
MT-GD2	3 N.C.	1 N.O.	BBM	—	**440K-MT55002**	440K-MT55085	440K-MT55094	—	—
				GD2 Standard	440K-MT55074	**440K-MT55022**	**440K-MT55095**	—	—
				Fully Flexible	440K-MT55075	**440K-MT55029**	**440K-MT55096**	—	—
			MBB	—	440K-MT55004	**440K-MT55088**	440K-MT55100	—	—
	2 N.C.	2 N.O.	BBM	—	**440K-MT55005**	440K-MT55086	440K-MT55097	440K-M21BNDH	—
				GD2 Standard	**440K-MT55076**	**440K-MT55026**	440K-MT55098	—	—
				Fully Flexible	440K-MT55077	**440K-MT55087**	440K-MT55099	—	—
			MBB	—	440K-MT55006	440K-MT55089	440K-MT55101	—	—
			Snap Acting	—	—	440K-M22ANDT	440K-M22ANDL	440K-M21ANDH	440K-M2NNNDS
				Extended Flat	440K-M22AEDM	**440K-M22AEDT**	—	—	—
				GD2 Standard	440K-M22ASDM	440K-M22ASDT	—	—	—
				Fully Flexible	440K-M22ABDM	440K-M22ABDT	—	—	—
MT-GD2 Latch Release	3 N.C.	1 N.O.	BBM	—	**440K-MT55039**	440K-MT55062	440K-MT55042	—	—
				GD2 Standard	**440K-MT55078**	440K-MT55041	440K-MT55070	—	—
				Fully Flexible	440K-MT55079	440K-MT55045	440K-MT55103	—	—
			MBB	—	440K-MT55082	440K-MT55091	440K-MT55106	—	—
	2 N.C.	2 N.O.	BBM	—	440K-MT55063	440K-MT55065	440K-MT55066	440K-M21BNDH-N5	440K-M2NNNDS-N5
				GD2 Standard	440K-MT55080	**440K-MT55050**	440K-MT55104	—	—
				Fully Flexible	440K-MT55081	440K-MT55051	440K-MT55052	—	—
			MBB	—	440K-MT55083	440K-MT55092	440K-MT55105	440K-M21MNDH-N5	—

§ For connector ratings see page 3-9.
∗ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-32 for wiring details.
❄ With an 8-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-32 for wiring details.

Yellow Body Switches

Type	Contact			Actuator Type	Cat. No.		
					Conduit	Connector§	
	Safety	Auxiliary	Action		1/2 in NPT	12-Pin M23	5-Pin Micro (M12)∗
MT-GD2	2 N.C.	2 N.O.	Snap Acting	—	**440K-M22ANYT**	—	—
				Extended Flat	**440K-M22AEYT**	440K-M22AEYL	440K-M2NAEYS
—	2 N.C.	2 N.O.	MBB	—	440K-M22MNYT-N5	—	440K-M2NNNYS-N5

§ For connector ratings see page 3-9.
∗ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-32 for wiring details.
❄ With an 8-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-32 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	4-Pin Micro (M12)	5-Pin Micro (M12)	8-Pin Micro (M12)	12-Pin M23
Cordset	889D-F4AC-∗	—	889D-F8AB-∗	889M-FX9AE-∗
Patchcord	889D-F4ACDM-❄	889D-F5ACDM-∗	889D-F8ABDM-❄	—
Distribution Box	898D-P4‡LT-DM4	—	—	—
Shorting Plug	898D-41LU-DM	—	—	—
T-Port	898D-43LY-D4	—	—	—

∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

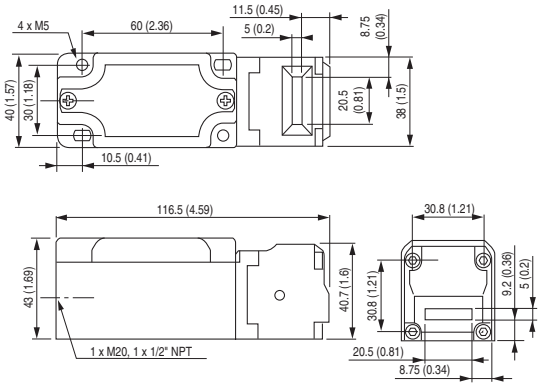
Accessories

Description		Dimensions	Cat. No.
	GD2 standard actuator	3-50	**440G-A27011**
	GD2 flat actuator	3-51	**440K-A11112**
	Fully flex actuator	3-50	**440G-A27143**
	Sliding bolt actuator	3-55	440G-A27163
	Extended flat actuator	3-51	**440K-A17116**
	Dust Cover	—	440K-A17180

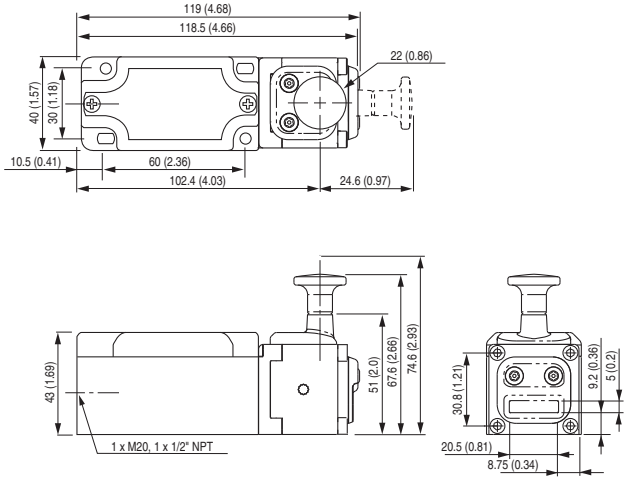
Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.

MT-GD2

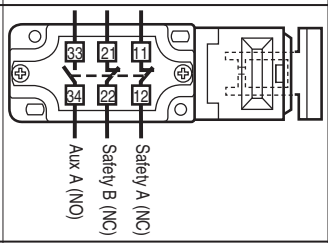
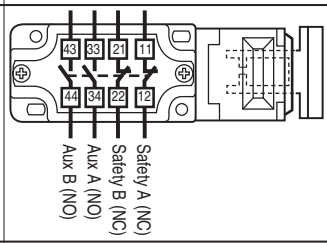
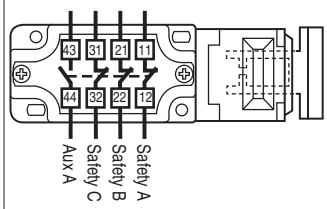
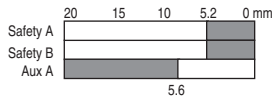
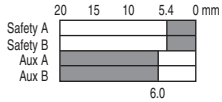
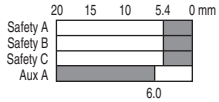
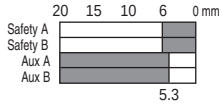
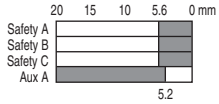
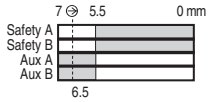
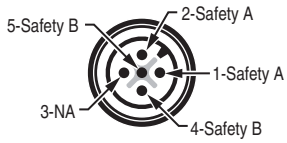
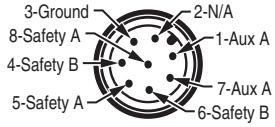
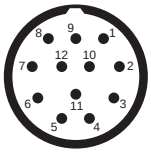


MT-GD2 Latch Release



***Note**: 2D, 3D and electrical drawings are available on www.ab.com.*

Typical Wiring Diagrams

Description		2 N.C. & 1 N.O.	2 N.C. & 2 N.O.	3 N.C. & 1 N.O.
Contact Configuration				
Contact Action		 BBM	 BBM	 BBM
		—	 MBB	 MBB
☐Open ■Closed		—	 Snap Acting	—
5-Pin Micro (M12) for Connection to ArmorBlock Guard I/O		—		—
8-Pin Micro (M12)		—		—
12-Pin Cordset	1 and 3	Safety A	Safety A	Safety A
	4 and 6	Safety B	Safety B	Safety B
	7 and 8	NC	Aux A	Safety C
	9 and 10	Aux A	Aux B	Aux A
Pins 2, 5 and 11 are not connected.	12	Ground	Ground	Ground
8-Pin Cordset 889D-F8AB-∗	Grey Red	—	Safety A	—
	Yellow Pink	—	Safety B	—
	White Blue	—	Aux A	—
	Green	—	Ground	—
	Brown	—	Not Used	—
12-Pin Cordset 889M-FX9AE-∗	Brown Blue	Safety A	Safety A	Safety A
	White Green	Safety B	Safety B	Safety B
	Yellow Grey	Not Used	Aux A	Safety C
	Pink Red	Aux A	Aux B	Aux A
	Green/Yellow	Ground	Ground	Ground

∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.