

Safety Switches

Guard Locking Switches

TLS-GD2



Description

The TLS-GD2 is a positive-mode, tongue-operated guard-locking interlock switch that locks a machine guard closed until power is isolated while the guard is open. The TLS-GD2 head has two entry slots and can be rotated to provide four actuator entry points. A blanking plug is provided to seal the unused slot.

Power can only be restored through the guard after a signal is applied to the TLS-GD2's internal solenoid to release the locking mechanism. Therefore, the TLS-GD2 is ideal for machines which do not stop immediately or where premature interruption of the machine could cause damage to tooling and components or cause an additional hazard.

The TLS-GD2 is available in three types. The TLS-1 GD2 and TLS-3 GD2 incorporate a power-to-release function. Three manual release points with security screws allow the locked TLS-GD2 to be released in emergencies. An optional lid-mounted key-release style can also be supplied. The TLS-2 GD2 has a power-to-lock function. Each type of switch has five sets of contacts of various forms and are suitable for use with PLCs.

The TLS-1 GD2 and TLS-3 GD2 are both available with E escape Release options. They are intended for machine guarding with full body access. The switch is installed so that the escape release push button on the rear side is accessible from inside the hazardous area. This allows the intentional unlocking of the TLS-GD2 from inside a hazardous area, providing a means of escape for a person who may become trapped.

A stainless-steel actuator guide is fitted to protect the unit from actuator damage due to poor guard alignment or guard wear.



IMPORTANT: With the TLS-2 GD2 "power to lock" style, provisions may be required to ensure that a dangerous situation can not result from open circuit faults or power cuts.

Features

- Power to release or power to lock
- High locking force ≤ 2000 N (450 lbs)
- Five contacts: 2 N.C. & 1 N.O. for door position monitoring
1 N.C. & 1 N.O. or 2 N.C. for lock monitoring
- Rotatable head: 4 possible key entry slots
- Conforms to EN 1088 & EN 60947-5-1
- E escape Release version available

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 (related to Safety Contacts) *	B10d: $> 2 \times 10^6$ operations at min. load PFH _D : $< 3 \times 10^{-7}$ MTTFd: > 385 years May be suitable for use in performance levels PL e or PL d systems (according to ISO 13849-1:2006) and for use in SIL 2 or SIL 3 systems (according to IEC 62061) depending on the architecture and application characteristics				
Certifications	CE marked for all applicable directives, cULus, TÜV, and CCC				
Outputs					
Safety Contacts *	(TLS-1 & -2) 3 N.C. direct-opening action (TLS-3) 4 N.C. direct-opening action				
Auxiliary Contacts	(TLS-1 & -2) 2 N.O. (1 solenoid monitoring) (TLS-3 1 N.O.)				
Thermal Current I_{th}	10 A				
Rated Insulation Voltage	(U _i) 500V				
Switching Current @ Voltage, Min.	5 mA @ 5V DC				
Utilization Category					
A 600/AC-15	(U _e)	600V	500V	240V	120V
	(I _e)	1.2 A	1.4 A	3.0 A	6.0 A
N 600/DC-13	(U _e)	600V	500V	250V	125V
	(I _e)	0.4 A	0.55 A	1.1 A	2.2 A
Solenoid Characteristics					
Locking Type	TLS-1 & -3 Power-to-Release TLS-2 Power-to-Lock				
Holding Force, Max.	2000 N (450 lbs)				
Releasable Load, Max.	100 N (22.5 lbs)				
Power Supply	24V AC/DC or 110V AC or 230V AC (solenoid)				
Solenoid Power	Typically 7 W 100% ED				
E escape Release Button	Force max.: 50 N (11.25 lbs)				
Operating Characteristics					
Break Contact Force, Min.	12 N (2.7 lbs)				
Actuation Speed, Max.	160 mm per sec (6.3 ins per sec)				
Actuation Frequency, Max.	1 Cycle per sec				
Operating Radius, Min	160 mm (6.3 in) (80 mm (3.15 in) with flexible actuator)				
Operating Life @ 100 mA load	1,000,000 operations				
Environmental					
Enclosure Type Rating	IP 67				
Operating Temperature—C (F)	-20... + 60° (-4... +140°)				
Physical Characteristics					
Housing Material	UL approved glass-filled PBT				
Actuator Material	Stainless Steel				
Weight—g (lbs)	400 (0.88)				
Color	Red				

* Suitable for ISO 13849-1:2006 and IEC 62061. Data is based on the B10d value given and:
 - Usage rate of 1 op/10mins., 24hrs/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	Contacts		Solenoid		Actuator Type	Cat. No.					
	Safety	Auxiliary	Contacts	Voltage		Conduit		Connectors [§]			
						M20	1/2inch NPT Adaptor	12-Pin M23	8-Pin Micro (M12)*		
TLS-1 GD2 Power to Release	2 N.C.	1 N.O.	1 N.C. & 1 N.O.	24V AC/DC	—	440G-T27121	—	440G-T27233	440G-T2NB BPH-1R		
					GD2 Standard	440G-T27251	440G-T27169	440G-T27234	—		
					Fully Flex	440G-T27252	440G-T27171	440G-T27235	—		
				110V AC/DC	—	440G-T27124	—	—	—	—	—
					GD2 Standard	440G-T27253	440G-T27172	—	—	—	
					Fully Flex	440G-T27254	440G-T27174	—	—	—	
				230V AC/DC	—	440G-T27123	—	—	—	—	—
TLS-2 GD2 Power to Lock	2 N.C.	1 N.O.	1 N.C. & 1 N.O.	24V AC/DC	—	440G-T27127	—	440G-T27239	440G-T2NB BPH-1L		
					GD2 Standard	440G-T27255	440G-T27175	440G-T27240	—		
					Fully Flex	440G-T27256	440G-T27177	440G-T27241	—		
				110V AC/DC	—	440G-T27132	—	—	—	—	
					GD2 Standard	440G-T27257	440G-T27178	—	—	—	
					Fully Flex	440G-T27258	440G-T27180	—	—	—	
				230V AC/DC	—	440G-T27129	—	—	—	—	
TLS-3 GD2 Power to Release	2 N.C.	1 N.O.	2 N.C.	24V AC/DC	—	440G-T27134	—	440G-T27245	440G-T2NB BPH-2R		
					GD2 Standard	440G-T27259	440G-T27181	440G-T27246	—		
					Fully Flex	440G-T27260	440G-T27183	440G-T27247	—		
				110V AC/DC	—	440G-T27138	—	—	—	—	
					GD2 Standard	440G-T27261	440G-T27184	—	—	—	
					Fully Flex	440G-T27262	440G-T27186	—	—	—	
				230V AC/DC	—	440G-T27136	—	—	—	—	
TLS-1 GD2 Power to Release with Escape Release	2 N.C.	1 N.O.	1 N.C. & 1 N.O.	24V AC/DC	—	440G-T21BNPM-1B	440G-T21BNPT-1B	440G-T21BNPL-1B	440G-T2NB NPH-1B		
					GD2 Standard	440G-T21BGPM-1B	440G-T21BGPT-1B	440G-T21BGPL-1B	—		
				110V AC/DC	—	440G-T21BNPM-4B	440G-T21BNPT-4B	—	—		
					GD2 Standard	440G-T21BGPM-4B	440G-T21BGPT-4B	—	—		
TLS-3 GD2 Power to Release with Escape Release	2 N.C.	1 N.O.	2 N.C.	24V AC/DC	—	440G-T21BNPM-2B	440G-T21BNPT-2B	440G-T21BNPL-2B	440G-T2NB NPH-2B		
					GD2 Standard	440G-T21BGPM-2B	440G-T21BGPT-2B	440G-T21BGPL-2B	—		
				110V AC/DC	—	440G-T21BNPM-5B	440G-T21BNPT-5B	—	—		
					GD2 Standard	440G-T21BGPM-5B	440G-T21BGPT-5B	—	—		

§ For connector ratings, see page 3-9.

* With an 8-pin micro connector, not all contacts are connected. See *Typical Wiring Diagrams* on page 3-45 for wiring details.



WARNING:

To monitor **independently** the safety contact(s) and the solenoid feedback (TLS 1, 2 and 3):

- The 12-wire cordset 889M-F12AH-* must be used
- AND
- For the TLS1 and TLS2: the jumper between 12... 41 must be removed
- For the TLS3: the jumpers between 12... 41 and 22... 51 must be removed



WARNING:

Monitoring of safety contact(s) and the solenoid feedback (in series) is available, when jumpers are in place:

- AND
- For the TLS1 and TLS2: by using pin 4-6 on the 12-pin, M23 receptacle or Pink-Yellow wires on the 12-wire cordset (889M-F12AH-*)
- For the TLS3: by using pin 4-6 and 7-8 on the 12-pin, M23 receptacle or Pink-Yellow and White-Red/Bue wires on the 12-wire cordset (889M-F12AH-*)

3-Interlock Switches

Safety Switches
Guard Locking Switches
 TLS-GD2

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Time Delay	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
Specialty Safety Relays								
MSR178	3 N.O.	2 N.C.	1.5 s... 30 min	Removable	Automatic	24V AC/DC, 115V AC or 230V AC	5-38	440R-M23227
CU2	2 N.O.	1 N.C.	0.1 s... 40 min	Fixed	—	24V AC/DC	5-50	440R-S07281
CU3	2 N.O.	1 N.C.	—	Fixed	Automatic/Manual	110V AC	5-58	440R-S35002
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

§ For connector ratings, see page 3-9.

* With an 8-pin micro connector, not all contacts are connected. See *Typical Wiring Diagrams* on page 3-45 for wiring details.

Connection Systems

Description	8-Pin Micro (M12)	12-Wire, 12-Pin M23	9-Wire, 12-Pin M23§
Cordset	889D-F8AB-*	889M-F12AH-*	889M-F12X9AE-*
Patchcord	889D-F8ABDM-*	889M-F12AHMU-†	—

* 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 0M3, (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard lengths.


§ The 9-wire cordset can be used only with the TLS3 versions.

Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Accessories

	Description	Dimensions	Cat. No.
	GD 2 Standard Actuator	3-50	440G-A27011
	GD 2 Flat Actuator	3-51	440K-A11112
	Extended Flat Actuator	3-51	440K-A17116
	Fully Flexible Actuator	3-50	440G-A27143
	Sliding Bolt Actuator not to be used with the Escape Release	3-55	440G-A27163
	Replacement C cover for TLS -1 with External Override Key	3-54	440G-A27140
	Replacement C cover for TLS -3 with External Override Key		440G-A27142
	Replacement C cover for TLS -1 with Override Key Attached		440G-A27207
	Replacement C cover for TLS -3 with Override Key Attached		440G-A27208
	Emergency Override Key (See Warning below.)	3-54	440G-A36026
	Flexible Release— 1 m (3.28 ft) Cable	3-54	440G-A27356
	Flexible Release— 3 m (9.84 ft) Cable		440G-A27357
	Dust Cover	3-54	440K-A17183
	Sliding Bolt	3-55	440K-AMDS
	Mounting Plate	3-55	440K-AMDSSMPB

3-Interlock Switches

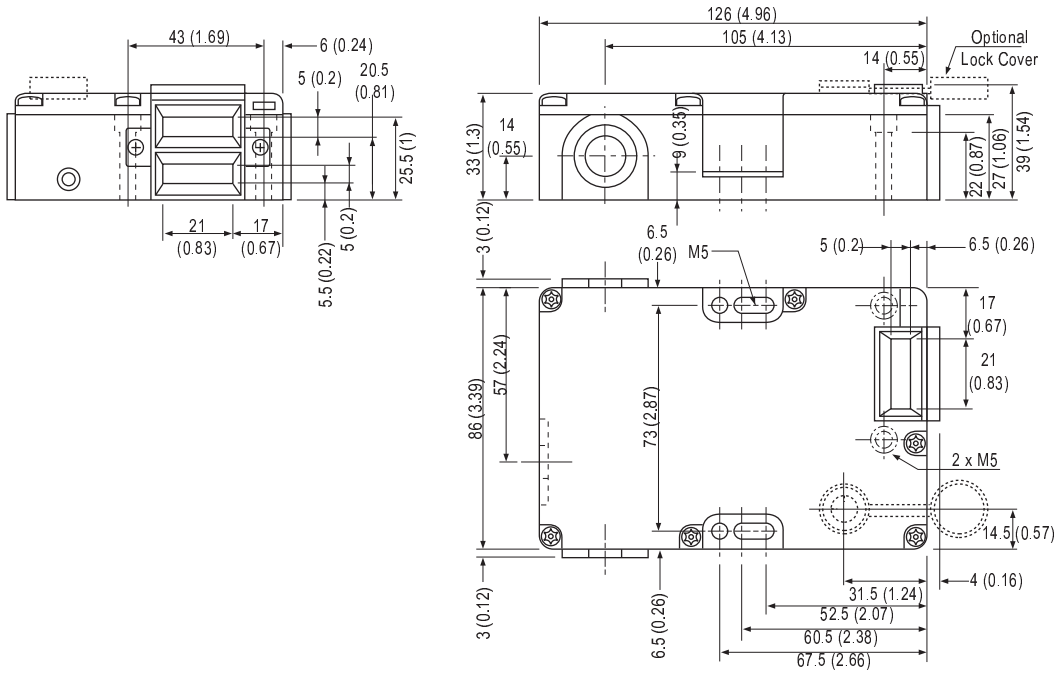


WARNING: Do not attach the Emergency Override Key to the TLS-GD2 switch.

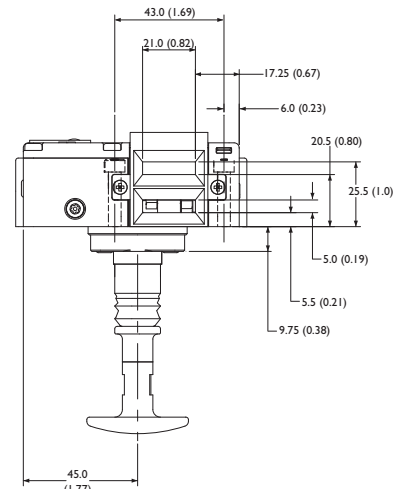
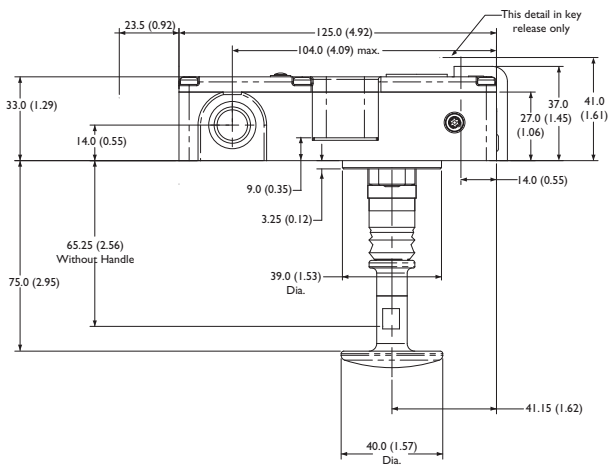
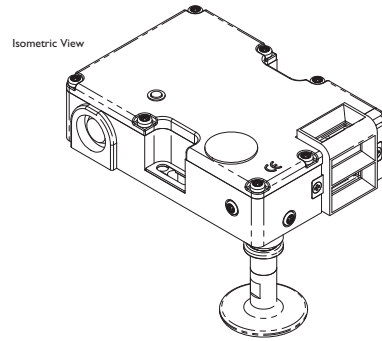
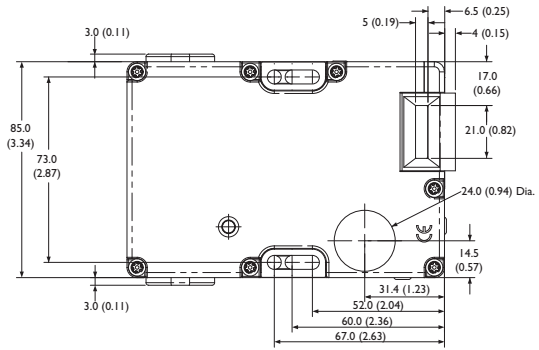
Safety Switches
Guard Locking Switches
 TLS-GD2

Approximate Dimensions—mm (inches)

Dimensions are not intended to be used for installation purposes.



TLS-GD2 Escape Release



3-Interlock
 Switches

Typical Wiring Diagrams

Red Switches	TLS1	TLS2	TLS3																							
<p>Contact Configuration</p>	<p>Jumper between 12 & 41</p>		<p>Jumper between 12 & 41 and 22 & 51</p>																							
<p>Contact Action</p> <p>□ Open ■ Closed</p>	<p style="text-align: center;">BBM</p>	<p style="text-align: center;">BBM</p>	<p style="text-align: center;">BBM</p>																							
<p>8-Pin Micro (M12)</p>	<p>No jumper on 12-41.</p>		<p>Jumper on 12-41 and 22-51.</p>																							
<p>12-Pin M23</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1 and 3</td><td>Solenoid Power</td></tr> <tr><td>4 and 12</td><td>Safety A ❖</td></tr> <tr><td>7 and 8</td><td>Safety B</td></tr> <tr><td>9 and 10</td><td>Aux A</td></tr> <tr><td>6 and 11</td><td>Solenoid A ❖</td></tr> <tr><td>2 and 5</td><td>Solenoid B</td></tr> </table>	1 and 3	Solenoid Power	4 and 12	Safety A ❖	7 and 8	Safety B	9 and 10	Aux A	6 and 11	Solenoid A ❖	2 and 5	Solenoid B	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1 and 3</td><td>Solenoid Power</td></tr> <tr><td>4 and 12</td><td>Safety A ❖</td></tr> <tr><td>7 and 5</td><td>Safety B ❖</td></tr> <tr><td>9 and 10</td><td>Aux A</td></tr> <tr><td>6 and 11</td><td>Solenoid A ❖</td></tr> <tr><td>2 and 8</td><td>Solenoid B ❖</td></tr> </table>	1 and 3	Solenoid Power	4 and 12	Safety A ❖	7 and 5	Safety B ❖	9 and 10	Aux A	6 and 11	Solenoid A ❖	2 and 8	Solenoid B ❖
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<p>12-Pin, 9-Wire Cordset 889M-F12X9AE-*</p> <p>Pink/Yellow: Not connected</p>	<p>Can not be used.</p>		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Brown Blue</td><td>Solenoid Power</td></tr> <tr><td>White Green</td><td>Safety A & Solenoid A</td></tr> <tr><td>Yellow Grey</td><td>Safety B & Solenoid B</td></tr> <tr><td>Pink Red</td><td>Aux A</td></tr> </table>	Brown Blue	Solenoid Power	White Green	Safety A & Solenoid A	Yellow Grey	Safety B & Solenoid B	Pink Red	Aux A															
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* Replace symbol with 2 (2m) 5 (5m) or 10 (10m) for standard cable lengths.
 ❖ On the 12-pin M23 quick-disconnect version of the TLS1 & 2 the jumper between 12 & 41 has been removed. On the TLS3 version, the jumpers between 12-41 and 22-51 have been removed.
 ❖ See **WARNING** notes on page 3-41.

3-Interlock Switches