

## TLS-GD2

### Description

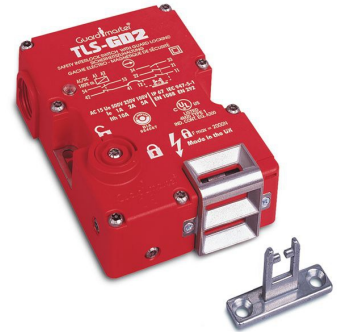
The TLS-GD2 is a positive mode, tongue operated guard locking interlock switch that locks a machine guard closed until power is isolated and ensures that it remains isolated while the guard is open. It has three safety (N.C.) contacts and two auxiliary (N.O.) contacts. The TLS-GD2 head has two entry slots and it can be rotated to provide four actuator entry points. A blanking plug is provided to seat the unused slot.

The guard may only be opened when a signal is applied to the TLSGD2's internal solenoid which releases the lock mechanism. This signal can be via CU1 electronic timer relays or CU2 stopped motion detectors. 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. Two 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 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. TLS-GD2 has an ingress protection rating of IP69K making it suitable for harsh washdown applications as found in the food and beverage, pharmaceutical, solar and semiconductor industries.



#### **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  $\leq 2000$  N (450 lb)
- 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
- Escape release version available
- IP69K, suitable for high pressure, high temperature washdown

### 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 (related to Safety Contacts) *	B10d: > 2 x 10 <sup>6</sup> operations at min. load PFHD: < 3 x10 <sup>-7</sup> MTTFd: > 385 years May be suitable for use in performance levels Pl <sub>e</sub> or Pl <sub>d</sub> systems (according to ISO 13849-1:2006) and for use in SIL2 or SIL3 systems (according to IEC 62061) depending on the architecture and application characteristics				
Note: For up-to-date information, visit <a href="http://www.ab.com/Safety/">http://www.ab.com/Safety/</a>					
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 <sub>th</sub>	10 A				
Rated Insulation Voltage	(Ui) 500V				
Switching Current @ Voltage, Min.	3 mA @ 18V 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			
Solenoid Characteristics					
Locking Type	TLS-1 & -3 Power-to-Release TLS-2 Power-to-Lock				
Holding Force, Max.	2000 N (450 lbf)				
Releasable Load, Max.	50 N (11.24 lbf)				
Power Supply	24V AC/DC or 110V AC or 230V AC (solenoid)				
Solenoid Power	Typically 7 W 100% ED				
Escape Release Button	Force max.: 50 N (11.25 lbs)				
Operating Characteristics					
Break Contact Force, Min.	20 N (4.5 lbf)				
Actuation Speed, Max.	160 mm (6.29 in.)/s				
Actuation Frequency, Max.	1 cycle/s				
Operating Radius, Min	160 mm (6.3 in.) [80 mm (3.15 in.) with flexible actuator]				
Mechanical Life	1,000,000 operations				
Environmental					
Enclosure Type Rating	IP66, IP67 and IP69K				
Operating Temperature [C (F)]	-20...+60° (-4...+140°)				
Physical Characteristics					
Housing Material	UL Approved glass-filled PBT				
Actuator Material	Stainless Steel				
Weight [g (lb)]	400 (0.88)				
Color	Red				

\* Usable for ISO 13849-1:2006 and IEC 62061. Data is based on the B10d value given and:

- Usage rate of 1op/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		Connector♣					
						M20	1/2 inch NPT Adaptor	12-Pin M23	8-Pin Micro (M12)Δ				
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-T2NBBPH-1R				
					GD2 Standard	440G-T27251	440G-T27169	440G-T27234	—				
					Fully flexible	440G-T27252	440G-T27171	440G-T27235	—				
				110V AC/DC	—	440G-T27124	—	—	—				
					GD2 Standard	440G-T27253	440G-T27172	—	—				
					Fully flexible	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-T2NBBPH-1L
									GD2 Standard	440G-T27255	440G-T27175	440G-T27240	—
Fully flexible	440G-T27256	440G-T27177	440G-T27241						—				
110V AC/DC	—	440G-T27132	—					—	—				
	GD2 Standard	440G-T27257	440G-T27178					—	—				
	Fully flexible	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-T2NBBPH-2R
									GD2 Standard	440G-T27259	440G-T27181	440G-T27246	—
				Fully flexible	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-T2NBNPH-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-T2NBNPH-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 Safety Switches and Connectors.

Δ With an 8-pin micro connector, not all contacts are connected. See Typical Wiring Diagrams for wiring details.

## Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
<b>Single-Function Safety Relays</b>								
MSR127RP	3 N.O.	1 N.C.	—	Removable (Screw)	Monitored Manual	24V AC/DC	MSR127RP/TP	440R-N23135
MSR127TP	3 N.O.	1 N.C.	—	Removable (Screw)	Auto./Manual	24V AC/DC	MSR127RP/TP	440R-N23132
MSR126T	2 N.O.	None	—	Fixed	Auto./Manual	24V AC/DC	MSR126R/T	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC	MSR30RT/RTP	440R-N23198
<b>Specialty Safety Relays</b>								
MSR178	3 N.O.	2 N.C.	0.5 s...30 min	Removable	Automatic	24V AC/DC, 115V AC or 230V AC	MSR178DP	440R-M23227
CU2	2 N.O.	1 N.C.	0.1 s...40 min	Fixed	—	24V AC/DC	CU2	440R-S07281
CU3	2 N.O.	1 N.C.	—	Fixed	Automatic/Manual	110V AC	CU3	440R-S35002
<b>Modular Safety Relays</b>								
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	MSR210P	440R-H23176
MSR220P Input Module	—	—	—	Removable	—	24V DC	MSR220P	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	—	Removable	Auto./Manual Monitored Manual	24V DC	MSR310P	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	—	Removable	—	24V DC from the base unit	MSR320P	440R-W23218

**Note:** For additional Safety Relays connectivity, see Safety Relays.  
For additional Safety I/O and Safety PLC connectivity, see Programmable Safety Solutions.  
For application and wiring diagrams, see Safety Applications and Wiring Diagrams.

## 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 Safety Connection Systems.

## Accessories

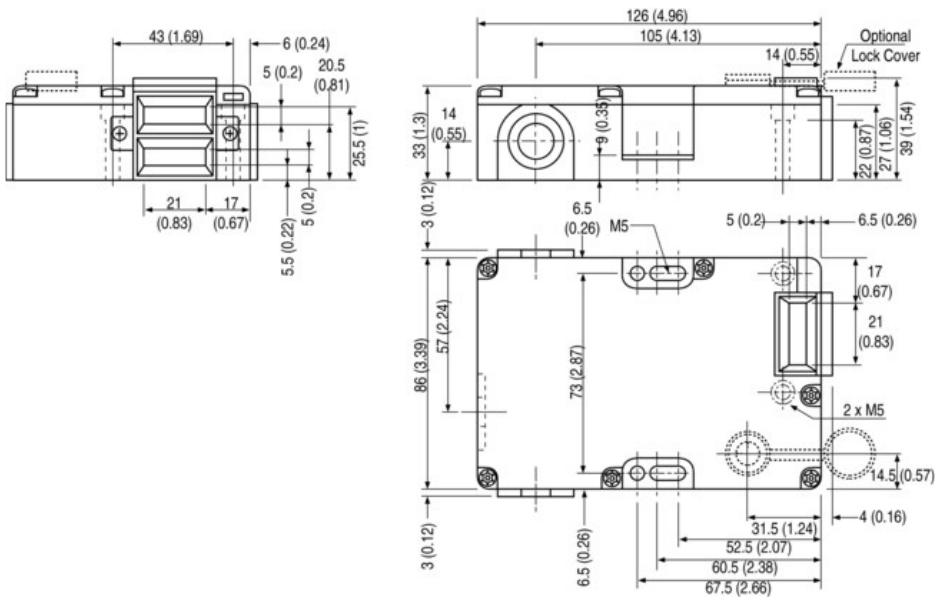
Description	Dimensions	Cat. No.	
 GD2 standard actuator	Actuators*	440G-A27011	
 GD2 flat actuator		440K-A11112	
 Extended flat actuator		440K-A17116	
 Fully flexible actuator		440G-A27143	
 Sliding bolt actuator not to be used with the TLS1 Escape Release	Door Handles	440G-A27163	
	—	Cover for TLS-1 with external override key for series D and earlier	440G-A27140
		Cover for TLS-3 with external override key for series D and earlier	440G-A27142
		Cover for TLS-1 with override key attached for series D and earlier	440G-A27207
		Cover for TLS-3 with override key attached for series D and earlier	440G-A27208
		Cover for TLS-1 with external override key for series E and later	440G-A27371
		Cover for TLS-3 with external override key for series E and later	440G-A27372
		Cover for TLS-1 with override key attached for series E and later	440G-A27373
		Cover for TLS-3 with override key attached for series E and later	440G-A27374
 Emergency override key (See Warning below.)	—	440G-A36026	
	Flex Release	Flexible release—1 m (3.28 ft) cable	440G-A27356
		Flexible release—3 m (9.84 ft) cable	440G-A27357
 Dust cover	—	440K-A17183	
 Sliding Bolt	Door Handles	440K-AMDS	
 Mounting Plate	Door Handles	440K-AMDSSMPB	



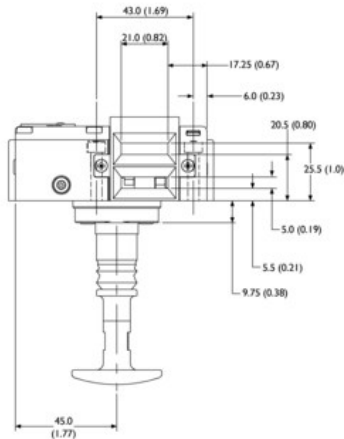
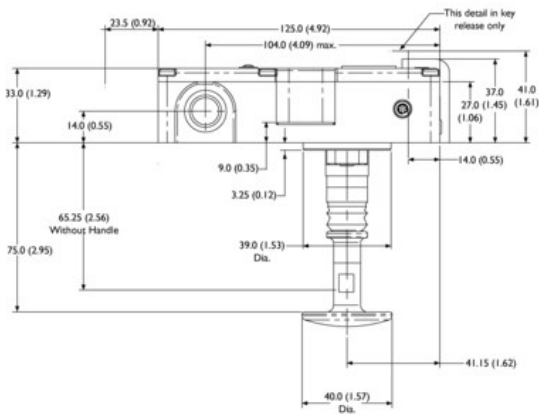
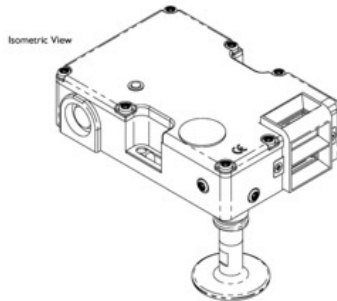
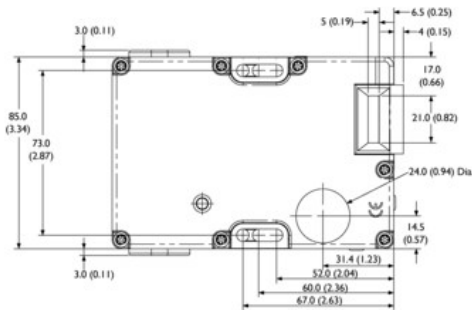
**WARNING:** Do not attach the Emergency Override Key to the TLS-GD2 switch.

### Approximate Dimensions

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



**TLS-GD2 Escape Release**



Note: 2D, 3D and electrical drawings are available on [www.ab.com](http://www.ab.com).

**Typical Wiring Diagrams**

Red Switches		TLS1	TLS2	TLS3	
Contact Configuration					
		Jumper between 12 & 41		Jumper between 12 & 41 and 22 & 51	
Contact Action					
□ Open ■ Closed		BBM	BBM	BBM	
8-Pin Micro (M12)					
		No jumper on 12-41.		Jumper on 12-41 and 22-51.	
12-Pin M23		1 and 3	Solenoid Power	1 and 3	Solenoid Power
		4 and 12	Safety A &	4 and 12	Safety A &
		7 and 8	Safety B	7 and 5	Safety B &
		9 and 10	Aux A	9 and 10	Aux A
		6 and 11	Solenoid A &	6 and 11	Solenoid A &
		2 and 5	Solenoid B	2 and 8	Solenoid B &
8-Pin Cordset 889D-F8AB-*	Brown Blue	Solenoid Power		Solenoid Power	
	Grey Red	Safety A		Safety A & Solenoid A	
	Yellow Pink	Safety B		Safety B & Solenoid B	
	White Green	Solenoid A		Solenoid A	
12-Pin, 9-Wire Cordset 889M-F12X9AE-*	Can not be used.		Brown		Solenoid Power
Pink/Yellow: Not connected			White Green		Safety A & Solenoid A
			Yellow Grey		Safety B & Solenoid B
			Pink Red		Aux A
12-Pin, 12-Wire Cordset 889M-F12AH-*	Brown Grey	Solenoid Power		Brown Grey	Solenoid Power
	Pink Green	Safety A &		Pink Green	Safety A &
	White Red/Blue	Safety B		White Red	Safety B &
	Black Violet	Aux A		Black Violet	Aux A
	Grey/Pink Yellow	Solenoid A &		Grey/Pink Yellow	Solenoid A &
	Blue Red	Solenoid B		Blue Red/Blue	Solenoid B &

\* Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.  
& See **WARNING** notes.



**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 and 41 must be removed
- For the TLS3: the jumpers between 12 and 41 and 22 and 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 pins 4 and 6 on the 12-pin, M23 receptacle or Pink and Yellow wires on the 12-wire cordset (889M-F12AH-\*)
- For the TLS3: by using pins 4 and 6 and pins 7 and 8 on the 12-pin, M23 receptacle or Pink and Yellow and White and Red/Blue wires on the 12-wire cordset (889M-F12AH-\*)

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