

Main features

- Actuator holding force F_{1max} : 2800 N
- 30 contact blocks with 4 contacts
- Metal housing, three conduit entries M20
- Protection degree IP67
- Versions with key release and emergency release button
- 4 stainless steel actuators
- Orientable head and devices, not detachable
- Signalling LED
- Operation with energised or de-energised solenoid

Markings and quality marks:



IMQ approval: CA02.03848
 UL approval: E131787
 CCC approval: 2013010305602309
 EAC approval: RU C-IT ДМ94.В.01024

Technical data

Housing

Metal head and housing, baked powder coating.
 Three threaded conduit entries: M20x1.5 (standard)
 Protection degree: IP67 acc. to EN 60529 with cable gland having equal or higher protection degree

General data

For safety applications up to: SIL 3 acc. to EN 62061
 PL e acc. to EN ISO 13849-1
 type 2 acc. to EN ISO 14119
 Low acc. to EN ISO 14119

Interlock with mechanical lock, coded:
 Coding level: Low acc. to EN ISO 14119

Safety parameters:
 B_{10d} : 5,000,000 for NC contacts
 Service life: 20 years
 Ambient temperature: -25°C ... +60°C
 Max. actuation frequency: 600 operating cycles¹/hour
 Mechanical endurance: 1 million operating cycles¹
 Max. actuation speed: 0.5 m/s
 Min. actuation speed: 1 mm/s
 Maximum force before breakage F_{1max} : 2800 N acc. to EN ISO 14119
 Max. holding force F_{zh} : 2150 N acc. to EN ISO 14119
 Maximum play of locked actuator: 4.5 mm
 Released actuator extraction force: 30 N
 Tightening torques for installation: see pages 297-308

(1) One operation cycle means two movements, one to close and one to open contacts, as defined in EN 60947-5-1.

Cable cross section (flexible copper strands)

Contact blocks: min. 1 x 0.34 mm² (1 x AWG 22)
 max. 2 x 1.5 mm² (2 x AWG 16)

In conformity with standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, EN 61000-6-2, EN 61000-6-3, BG-GS-ET-15, UL 508, CSA 22.2 N. 14.

Approvals:

IEC 60947-5-1, UL 508, CSA 22.2 N. 14.

In conformity with the requirements of:

Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

Positive contact opening in conformity with standards:

IEC 60947-5-1, EN 60947-5-1.

Solenoid

Duty cycle: 100% ED
 Solenoid protection 12 V: type gG fuse 1 A
 Solenoid protection 24 V: type gG fuse 0.5 A
 Solenoid protection 120 V: fuse 315 mA, delayed
 Solenoid protection 230 V: fuse 315 mA, delayed
 Solenoid consumption: 9 VA

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.

Electrical data

Utilization category

without connector	Thermal current (I _{th}): Rated insulation voltage (U _i): Rated impulse withstand voltage (U _{imp}): Conditional short circuit current: Protection against short circuits: Pollution degree:	10 A 400 Vac 300 Vdc 6 kV 1000 A acc. to EN 60947-5-1 type gG fuse 10 A 500 V 3	Alternating current: AC15 (50÷60 Hz)			
			U _e (V)	I _e (A)		
			120	250	400	
			6	5	3	
			Direct current: DC13			
			U _e (V)	24	125	250
			I _e (A)	3	0.7	0.4

with M23 connector 12 poles	Thermal current (I _{th}): Rated insulation voltage (U _i): Protection against short circuits: Pollution degree:	8 A 250 Vac 300 Vdc type gG fuse 8 A 500 V 3	Alternating current: AC15 (50÷60 Hz)			
			U _e (V)	I _e (A)		
			120	250		
			6	5		
			Direct current: DC13			
			U _e (V)	24	125	250
			I _e (A)	3	0.7	0.4

with M12 connector 12 poles	Thermal current (I _{th}): Rated insulation voltage (U _i): Protection against short circuits: Pollution degree:	1.5 A 30 Vac 36 Vdc type gG fuse 1.5 A 3	Alternating current: AC15 (50÷60 Hz)		
			U _e (V)	I _e (A)	
			24		
			1.5		
			Direct current: DC13		
			U _e (V)	24	
			I _e (A)	1.5	



Characteristics approved by IMQ

Rated insulation voltage (Ui): 400 Vac
 Conventional free air thermal current (Ith): 10 A
 Protection against short circuits: type gG fuse 10 A, 500 V
 Rated impulse withstand voltage (U_{imp}): 6 kV
 Protection degree of the housing: IP67
 MV terminals (screw terminals)
 Pollution degree 3
 Utilization category: AC15
 Operating voltage (Ue): 400 Vac (50 Hz)
 Operating current (Ie): 3 A
 Forms of the contact element: X+X+X+X, Y+Y+Y+Y, X+Y+Y+Y, X+X+Y+Y, X+X+X+Y
 Positive opening of contacts on all contact blocks: 60A, 60B, 60C, 60D, 60E, 60F, 60G, 60H, 60I, 60L, 60M, 60N, 60P, 60R, 60S, 60T, 60U, 60V, 60X, 60Y, 61A, 61B, 61C, 61D, 61E, 61G, 61H, 61M, 61R, 61S

In conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

Please contact our technical service for the list of approved products.

Characteristics approved by UL

Utilization categories: A300 (720 VA, 120 ... 300 Vac)
 Q300 (69 VA, 125 ... 250 Vdc)

Data of housing type 1, 4X "indoor use only"; 12, 13



In conformity with standard: UL508, CSA 22.2 N. 14

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Working principle

The working principle of these safety switches allows three different working states:

- state A: with inserted and locked actuator
- state B: with inserted actuator, not locked
- state C: with extracted actuator

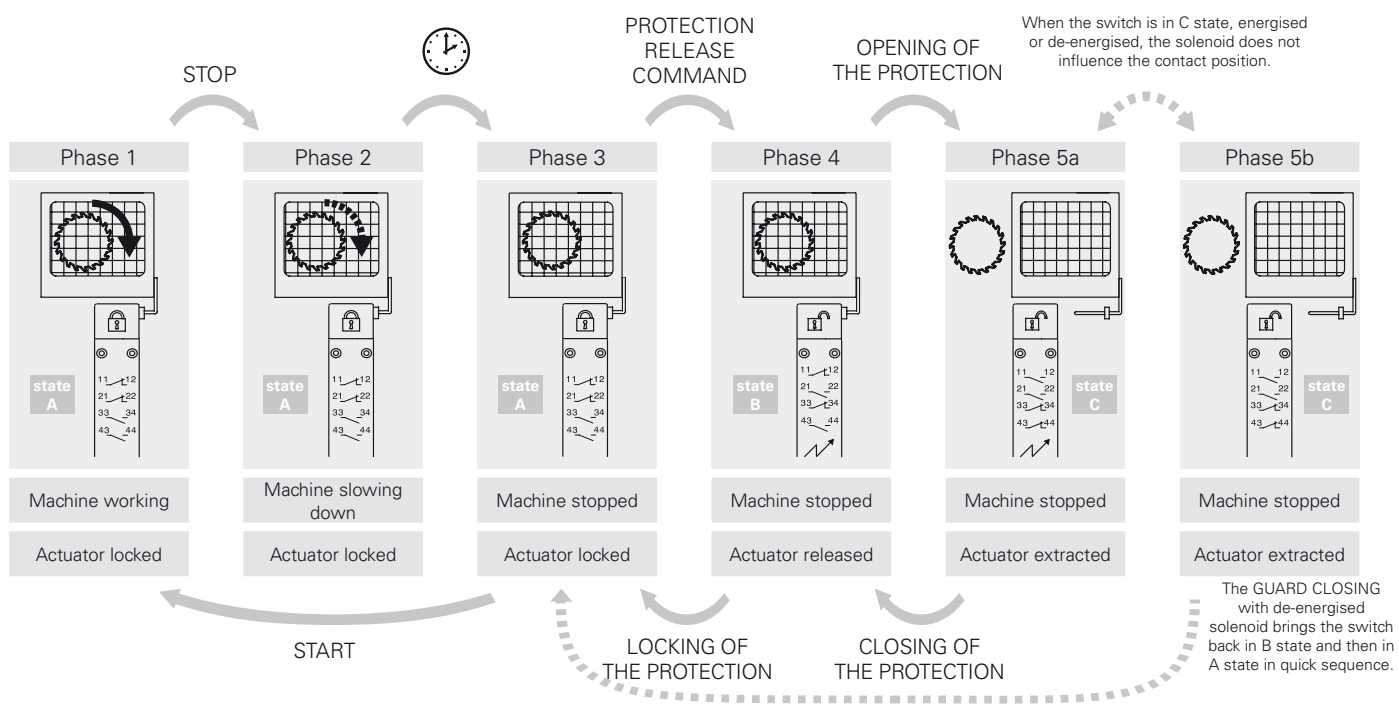
All or some of these states may be controlled through NO contacts or positive opening NC contacts of the internal contact block. In detail, contact blocks that have electric contacts marked with the symbol of the solenoid () are switched in the transition between the state A and state B, while the electric contacts marked with the symbol of the actuator () are switched between state B and state C:

Working principle

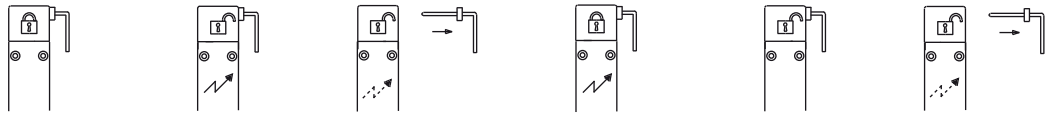
It is also possible to choose between two working principles for the actuator locking:

- Working principle D:** Actuator locked with de-energised solenoid. Actuator release is obtained by power supply to the solenoid (see example of working cycle steps).
- Working principle E:** Actuator locked with energised solenoid. The release of the actuator is obtained by power-off to the solenoid. It is advisable to use this version under special conditions because a blackout will allow the immediate opening of the protection.

Example of working cycle steps with FG 60AD1D0A-F21 (switch with working principle D)





Operating state	Working principle D locked actuator with de-energised solenoid			Working principle E locked actuator with energised solenoid		
	state A	state B	state C	state A	state B	state C
	Inserted and locked De-energised	Inserted and released Energised	Extracted -	Inserted and locked Energised	Inserted and released De-energised	Extracted -
Actuator Solenoid 						
FG 60T••••• 1NC controlled by the solenoid 1NO+2NC controlled by the actuator	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44
FG 60U••••• 4NC controlled by the actuator	11 12 21 22 31 32 41 42	11 12 21 22 31 32 41 42	11 12 21 22 31 32 41 42	11 12 21 22 31 32 41 42	11 12 21 22 31 32 41 42	11 12 21 22 31 32 41 42
FG 60V••••• 2NC controlled by the solenoid 2NO controlled by the actuator	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44
FG 60X••••• 1NO controlled by the solenoid 3NC controlled by the actuator	13 14 21 22 31 32 41 42	13 14 21 22 31 32 41 42	13 14 21 22 31 32 41 42	13 14 21 22 31 32 41 42	13 14 21 22 31 32 41 42	13 14 21 22 31 32 41 42
FG 60Y••••• 1NO controlled by the solenoid 1NO+2NC controlled by the actuator	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44
FG 61A••••• 1NO+3NC controlled by the actuator	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44
FG 61B••••• 2NO+2NC controlled by the actuator	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44	11 12 21 22 33 34 43 44
FG 61C••••• 3NO+1NC controlled by the actuator	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44
FG 61D••••• 1NC controlled by the solenoid 3NO controlled by the actuator	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44
FG 61E••••• 1NO controlled by the solenoid 2NO+1NC controlled by the actuator	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44
FG 61G••••• 2NO controlled by the solenoid 1NO+1NC controlled by the actuator	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44
FG 61H••••• 2NO controlled by the solenoid 2NC controlled by the actuator	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44
FG 61M••••• 3NO controlled by the solenoid 1NC controlled by the actuator	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44
FG 61R••••• 1NO+3NC controlled by the solenoid	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44	11 12 21 22 31 32 43 44
FG 61S••••• 3NO+1NC controlled by the solenoid	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44	13 14 21 22 33 34 43 44