

Hinge operating safety switches



Description and technical data

These safety switches have been designed to control gates or guards to protect against hazardous parts of the machines. They are very sensible and positively open the contacts after few degrees of rotation, sending an immediate stop signal. The head may rotate in 90° steps allowing its installation in four different positions.

The housing metal made and the stainless steel actuator allows this switch to be used even in hard environments where sedimented powder or dirty could block working of safety switches with separated actuator.

Housing

FR, FX and FK series made of polymer glass-reinforced, self-extinguishing, shock proof thermoplastic resin and with double insulation □

FM and FZ series made of metal, coated with baked epoxy powder

FR, FM and FK series one conduit entry

FX and FZ series two conduit entries

Protection degree: IP65

Markings and quality marks:



Approval IMQ:	EG610 (FR series)
	EG609 (FM series)
	EG612 (FX series)
	EG611 (FZ series)
	EG613 (FK series)
Approval UL:	E131787
Approval EZU:	1010151

General data

Ambient temperature: from -25°C to +80°C

Max operating frequency: 3600 operations cycles¹/hour

Mechanical endurance: 1 million operations cycles¹

Max actuating speed: 180°/s

Min. actuating speed: 2°/s

(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by IEC 947-5-1 standard.

Complying with the requirements requested by: Low Voltage Directive 73/23/EEC and subsequent modifications and completions, Machinery Directive 98/37/EEC, Electromagnetic Compatibility 89/336/EEC and subsequent modifications and completions.

Positive contact opening complying with the standards: IEC 947-5-1, EN 60947-5-1, CEI EN 60947-5-1, VDE 0660-206.

Cross section of the conductors (flexible lead wire)

Contact blocks 20, 21, 22, 33, 34: min. 1 x 0,34 mm² (1 x AWG 22)
max. 2 x 1,5 mm² (2 x AWG 16)

Contact blocks 7, 9, 18: min. 1 x 0,5 mm² (1 x AWG 20)
max. 2 x 2,5 mm² (2 x AWG 14)

Conforms to the standards:

IEC 947-5-1, IEC 337-1, EN 60947-5-1, CEI EN 60947-5-1, CEI 17-45, IEC 204-1, EN 60204-1, CEI 44-5, EN 1088, EN 292, IEC 529, EN 60529, CEI 70-1, NFC 63-140, VDE 0660-200, VDE 0113, CENELEC EN 50013, BG-GS-ET-15.

Approvals:

IEC 947-5-1, UL 508.

Electrical data

without connectors	Thermal current (I _{th}):	10 A
	Rated insulation voltage (U _i):	500 VAC 600 VDC 400 VAC for contact block 20, 21, 22, 33, 34
	Protection against short circuits:	fuse 10 A 500V type aM
	Pollution degree:	3

with 4 - 5 poles M12 connectors	Thermal current (I _{th}):	4 A
	Rated insulation voltage (U _i):	250 VAC 300 VDC
	Protection against short circuits:	fuse 4 A 500 V type Gg
	Pollution degree:	3

with 8 poles M12 connectors	Thermal current (I _{th}):	2 A
	Rated insulation voltage (U _i):	30 VAC 36 VDC
	Protection against short circuits:	fuse 2 A 500 V type Gg
	Pollution degree:	3

Utilization categories

Alternate current: AC15 (50÷60 Hz)			
U _e (V)	250	400	500
I _e (A)	6	4	1
Direct current: DC13			
U _e (V)	24	125	250
I _e (A)	6	1,1	0,4

Alternate current: AC15 (50÷60 Hz)			
U _e (V)	24	120	250
I _e (A)	4	4	4
Direct current: DC13			
U _e (V)	24	125	250
I _e (A)	4	1,1	0,4

Alternate current: AC15 (50÷60 Hz)			
U _e (V)	24		
I _e (A)	2		
Direct current: DC13			
U _e (V)	24		
I _e (A)	2		

Data type approved by IMQ and EZU

Rated insulation voltage (Ui): 500 VAC
400 VAC for contact block 20, 21, 22, 33, 34

Thermal current (Ith): 10 A

Protection against short circuits: fuse 10 A 500 V type aM

Protection degree of the housing: IP66

MV terminals (screw clamps)

Pollution degree 3

Utilization category : AC15

Operation voltage (Ue): 400 VAC (50 Hz)

Operation current (Ie): 3 A

Forms of the contact element: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X

Positive opening of contacts on contact block 5, 6, 7, 9, 11, 14, 16, 20, 21, 22, 33, 34

Conforms to the standards: EN60947-1, EN 60947-1 A11, EN60947-5-1 and fundamental requirements of the Low Voltage Directive 73/23 EEC and 93/68 EEC.

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

Data type approved by UL

Utilization categories Q300 (69 VA, 125-250 VDC)
A600 (720 VA, 120-600 VAC)

Data of the housing type 1, 4X (indoor use only), 12, 13

Conforms to the standard: UL 508

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

How to order

Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office

FR 1896-XGM2K70

Housing

FR	polymer housing, one conduit entry
FM	metal housing, one conduit entry
FX	polymer housing, two conduit entries
FZ	metal housing, two conduit entries

Contact blocks

18	1NO+1NC, slow action	
5	1NO+1NC, snap action	
7	1NO+1NC, slow action	Overlapped Contacts
9	2NC, slow action	
20	2NC+1NO, slow action	
21	3NC, slow action	
22	1NC+2NO, slow action	
33	1NO+1NC, slow action	
34	2NC, slow action	

External metallic parts

	zinc plated steel (standard)
X	stainless steel (only FR, FX series)

Type of contacts

	silver contacts (standard)
G	silver contacts gold plated (1 µm) (only contact block 7, 18)

M12 assembled connectors (see chapter 17)

	no connector (standard)
K40	8 poles, metal body, bottom output (only for contact blocks 20, 21, 22 and FR, FM housing)
K41	8 poles, metal body, right output (only for contact blocks 20, 21, 22 and Fx, FZ housing)
K42	8 poles, metal body, left output (only for contact blocks 20, 21, 22 and FX, FZ housing)
K50	5 poles, metal body, bottom output (only for FM housing)
K51	5 poles, metal body, right output (only for FZ housing)
K52	5 poles, metal body, left output (only for FZ housing)
K70	4 poles, plastic body, bottom output (only for FR housing)
K71	4 poles, plastic body, right output (only for FX housing)
K72	4 poles, plastic body, left output (only for FX housing)

Threaded conduit entry

	PG 13,5 (standard)
A	PG 11 (only FR, FX housing)
M1	M16x1,5 (only FR, FX housing)
M2	M20x1,5
M3	1/2 NPT (only FR housing)

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How to order

FK 3396-XM1

Housing		Threaded conduit entry	
FK	polymer housing, one conduit entry		PG 11 (standard)
Contact blocks		M1	M16x1,5
33	1NO+1NC, slow action	External metallic parts	
34	2NC, slow action		zinc plated steel (standard)
		X	stainless steel

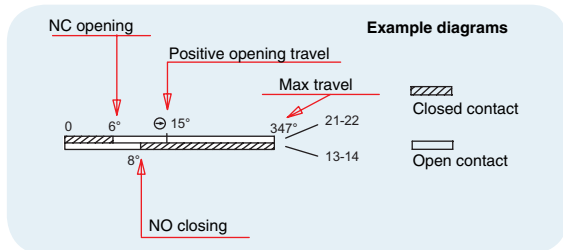
Accessories

Further accessories: **signal lamps, cable glands, adapters, connectors and protection caps**, please see chapter 16

On request

- Special versions with head oriented to the left, to the right or to the rear.
- Special versions for -40 °C use.
- Custom-made special versions.

How to read travel diagrams

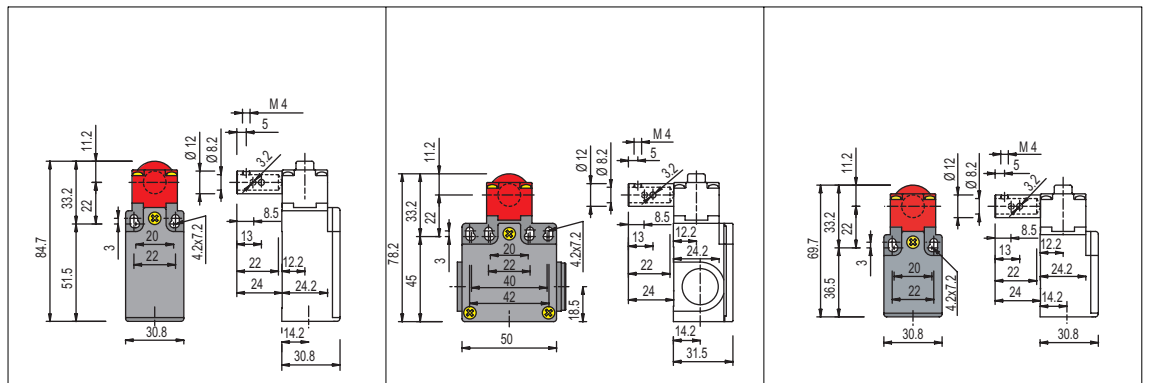


Travel diagrams table (all measure are in degree)

Contact blocks	Group 1
18 1NO+1NC 	
7 1NO+1NC 	
9 2NC 	
20 2NC+1NO 	
21 3NC 	
22 1NC+2NO 	
33 1NC+1NO 	
34 2NC 	

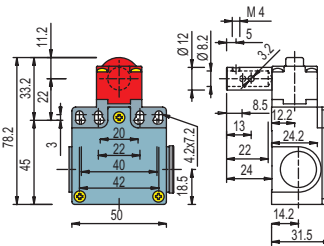
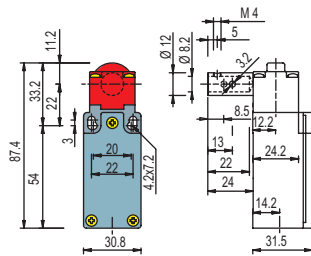
IMPORTANT:

In **safety applications** it is necessary to activate the switch **till the positive opening point**, indicated in the diagrams with the symbol ⊕. Operate the switch **with the positive opening force**, indicated between brackets, below each article, near to the value of minimum forces.



Contact blocks

18	Zb	slow action	FR 1896 → 1NO+1NC	FX 1896 → 1NO+1NC	
7	Zb	slow action	FR 796 → 1NO+1NC Overlapped Contacts	FX 796 → 1NO+1NC Overlapped Contacts	
9	Y+Y	slow action	FR 996 → 2NC	FX 996 → 2NC	
20	Y+Y+X	slow action	FR 2096 → 2NC+1NO	FX 2096 → 2NC+1NO	
21	Y+Y+Y	slow action	FR 2196 → 3NC	FX 2196 → 3NC	
22	Y+X+X	slow action	FR 2296 → 1NC+2NO	FX 2296 → 1NC+2NO	
33	Zb	slow action	FR 3396 → 1NO+1NC	FX 3396 → 1NO+1NC	FK 3396 → 1NO+1NC
34	Y+Y	slow action	FR 3496 → 2NC	FX 3496 → 2NC	FK 3496 → 2NC
Min. force	15 Ncm (40 Ncm)			15 Ncm (40 Ncm)	
Travel diagrams	chap. 13.7 - page 3 - group 1			chap. 13.7 - page 3 - group 1	



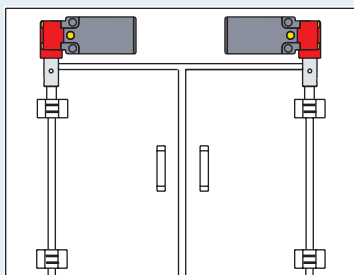
Contact blocks

18	Zb	slow action	FM 1896 → 1NO+1NC	FZ 1896 → 1NO+1NC	
7	Zb	slow action	FM 796 → 1NO+1NC Overlapped Contacts	FZ 796 → 1NO+1NC Overlapped Contacts	
9	Y+Y	slow action	FM 996 → 2NC	FZ 996 → 2NC	
20	Y+Y+X	slow action	FM 2096 → 2NC+1NO	FZ 2096 → 2NC+1NO	
21	Y+Y+Y	slow action	FM 2196 → 3NC	FZ 2196 → 3NC	
22	Y+X+X	slow action	FM 2296 → 1NC+2NO	FZ 2296 → 1NC+2NO	
33	Zb	slow action	FM 3396 → 1NO+1NC	FZ 3396 → 1NO+1NC	
34	Y+Y	slow action	FM 3496 → 2NC	FZ 3496 → 2NC	
Min. force	15 Ncm (40 Ncm)			15 Ncm (40 Ncm)	
Travel diagrams	chap. 13.7 - page 3 - group 1			chap. 13.7 - page 3 - group 1	

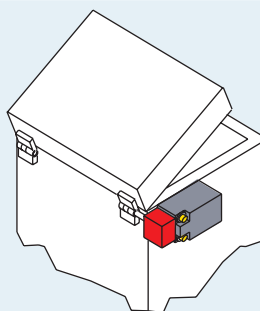
Items with code on the grey background are available in stock.

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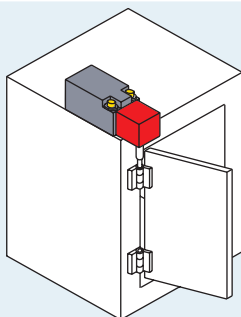
Application examples



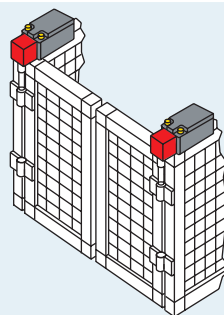
1) Hinge guards on the right and on the left



2) Scuttle guards



3) Hinge guards



4) Installation on fences

Instructions

Do not use in the following environments: Do not use where explosive or inflammable gas is present.

Assembling instructions



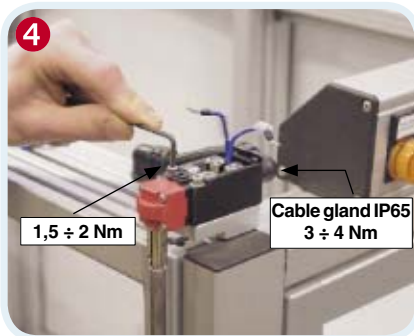
Drill the hinge and the shaft.



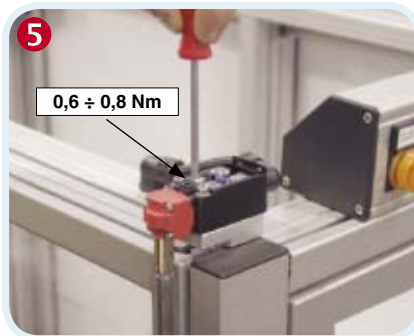
Lock by a plug pin the hinge to the shaft.



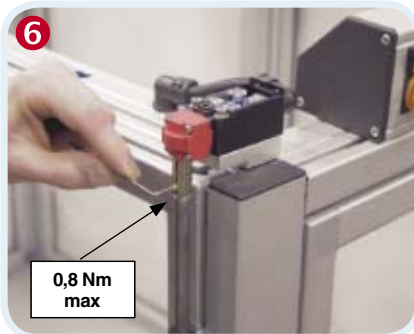
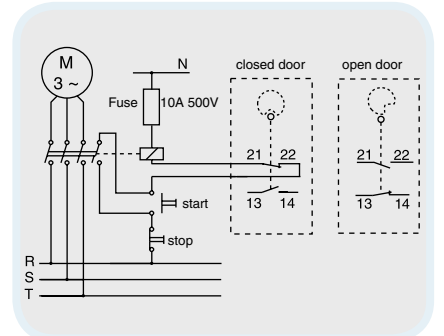
Insert the switch into the shaft.



Fix the switch on the machine frame



The safety circuit must be connected to the contacts 11-12, 21-22, 31-32.
The auxiliary contacts 13-14, 23-24, 33-34 are for signalling purpose.



Lock temporarily the switch to the shaft
(dowel supplied).



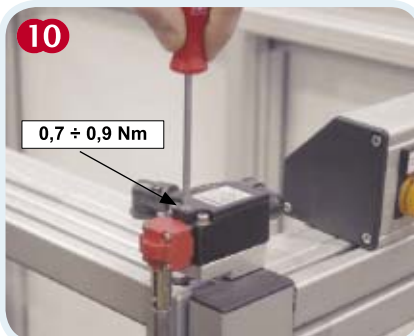
Check the operation point according to EN 294, if
necessary adjust the operation point again
(see fig. 6).



Drill the hinge shaft through one of the two holes in
the shaft of the switch.



Lock by a plug pin the switch (plug pin supplied).



Close the cover.

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Attention!
Check the correct operation of the switch before the first start of the machine and periodically according to maintenance programs. Verify that on every opening of the guard, the machine stop immediately.
Besides, with open guard (any position) must be impossible to start the machine.