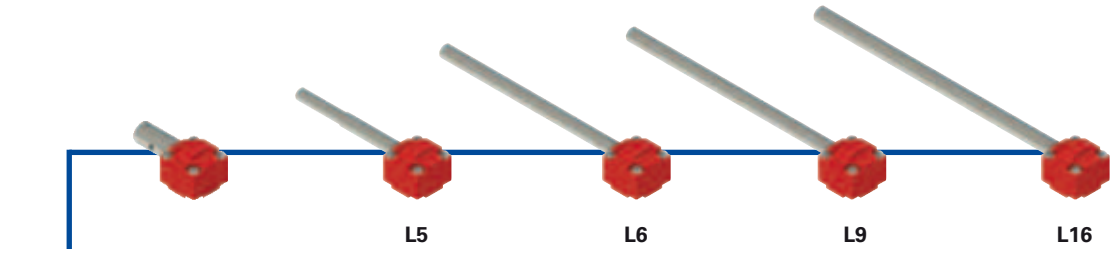
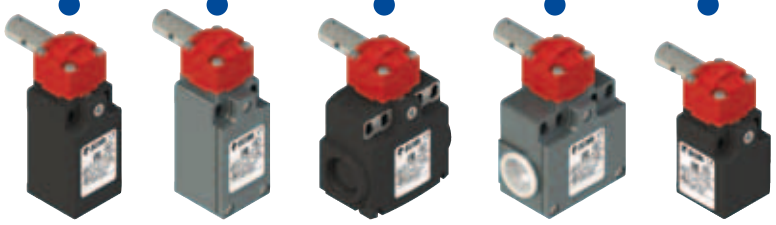
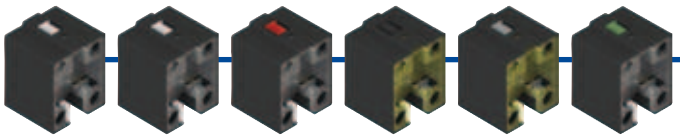
Selection diagram



ACTUATORS



CONTACT BLOCKS



5 1NO+1NC, snap action

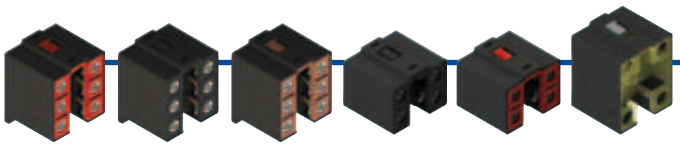
6 1NO+1NC, slow action

7 1NO+1NC, slow action, overlapped

9 2NC slow action

14 2NC slow action, shifted

18 1NO+1NC, slow action, closer



20 1NO+2NC, slow action

21 3NC slow action

22 2NO+1NC, slow action

33 1NO+1NC, slow action

34 2NC slow action

66 1NC slow action

CONDUIT ENTRIES

Threaded conduit entries (standard)

With cable gland

With M12 plastic connector

With M12 metal connector

product option

accessory sold separately

Code structure

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

article: **FR 1896-** | options: **XGL16** | options: **M2K70T6**

Housing

FR	technopolymer, one conduit entry
FM	metal, one conduit entry
FX	technopolymer, two conduit entries
FZ	metal, two conduit entries

Contact blocks

5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
9	2NC, slow action
14	2NC, slow action, shifted
18	1NO+1NC, slow action, closer
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action
33	1NO+1NC, slow action
34	2NC, slow action
66	1NC, slow action

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Actuator design

	actuator with hole (standard)
L5	Ø8x69 mm tapered Ø6.9
L6	Ø8x120 mm
L9	Ø8x140 mm
L16	Ø8.7x165 mm, stainless steel

Threaded conduit entry

M2	M20x1.5 (standard)
M1	M16x1.5 (FR-FX housing only)
	PG 13.5
A	PG 11 (FR-FX housing only)

Ambient temperature

	-25°C … +80°C (standard)
T6	-40°C … +80°C

Pre-installed cable glands or connectors

	without cable gland or connector (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
...	.....
K70	M12 plastic connector, 4 poles
...	.....

Please contact our technical service for the complete list of possible combinations.

article: **FK 3396-** | options: **XGL16** | options: **M1K24T6**

Housing

FK	technopolymer, one conduit entry

Contact blocks

33	1NO+1NC, slow action
34	2NC, slow action

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Actuator design

	actuator with hole (standard)
L5	Ø8x69 mm tapered Ø6.9
L6	Ø8x120 mm
L9	Ø8x140 mm
L16	Ø8.7x165 mm, stainless steel

Threaded conduit entry

M1	M16x1.5 (standard)
	PG11

Ambient temperature

	-25°C … +80°C (standard)
T6	-40°C … +80°C

Pre-installed cable glands

	without cable gland (standard)
K24	cable gland for cables Ø 5…Ø 10 mm
K28	cable gland for cables Ø 3…Ø 7 mm

Main features

- Metal housing or technopolymer housing, from one to two conduit entries
- Protection degree IP67
- 12 contact blocks available
- Versions with M12 connector
- Versions with gold-plated silver contacts
- Versions with stainless steel external metallic parts

Technical data

Housing

FR, FX and FK series housing made of glass fiber reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈
FM and FZ series: metal housing, baked powder coating.

FR, FM series - one threaded conduit entry:	M20x1.5 (standard)
FK series: one threaded conduit entry:	M16x1.5 (standard)
FX series - two knock-out threaded conduit entries:	M20x1.5 (standard)
FZ series - two 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
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	5,000,00 for NC contacts
Service life:	20 years
Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Max. actuation speed:	180°/s
Min. actuation speed:	2°/s
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 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 5, 6, 7, 9, 14, 18, 66:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

Markings and quality marks:

IMQ approval:	EG610 (FR-FX-FK series) EG609 (FM-FZ series)
UL approval:	E131787
CCC approval:	2007010305230013 (FR-FX-FK series) 2007010305229998 (FM-FZ series)
EAC approval:	RU C-IT ДМ94.B.01024

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, UL 508, CSA 22.2 No.14.
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14 , GB14048.5-2001.

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.

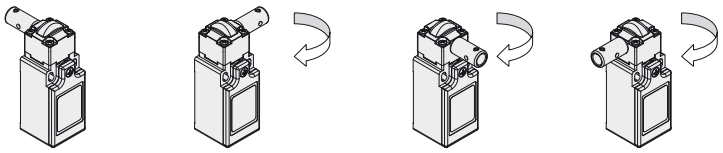
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.**

	Electrical data		Utilization category
without connector	Thermal current (Ith):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 20, 21, 22, 33, 34)	Ue (V) 250 400 500 Ie (A) 6 4 1
	Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)	Direct current: DC13
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Ue (V) 24 125 250 Ie (A) 6 1.1 0.4
	Protection against short circuits:	type aM fuse 10 A 500 V	
	Pollution degree:	3	
with M12 connector 4 and 5 poles	Thermal current (Ith):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (Ui):	250 Vac 300 Vdc	Ue (V) 24 120 250 Ie (A) 4 4 4
	Protection against short circuits:	type gG fuse 4 A 500 V	Direct current: DC13
	Pollution degree:	3	Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
with M12 connector 8 poles	Thermal current (Ith):	2 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (Ui):	30 Vac 36 Vdc	Ue (V) 24 Ie (A) 2
	Protection against short circuits:	type gG fuse 2 A 500 V	Direct current: DC13
	Pollution degree:	3	Ue (V) 24 Ie (A) 2

Description

These safety switches are ideal to control gates or doors protecting hazardous parts of machines without inertia. They are very sensitive and positively open the contacts after few degrees of rotation, sending an immediate stop signal. The head adjustable in 90° steps allows their installation in four different positions. Available with technopolymer or metal housings, with protection degree IP67. Its special shape allows to use this type of switches also in those areas where dust and dirt could block working of normal safety switches with separate actuator.

Orientable heads



Removing the four fastening screws, in all switches, it is possible to rotate the head in 90° steps. This allows you to use the same switch on both right- and left-facing door fronts.

Protection degree IP67

IP67

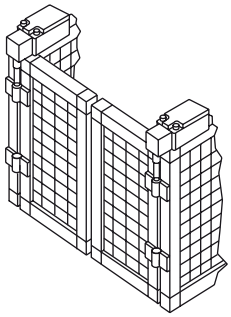
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529.
They can therefore be used in all environments where the maximum protection of the housing is required.

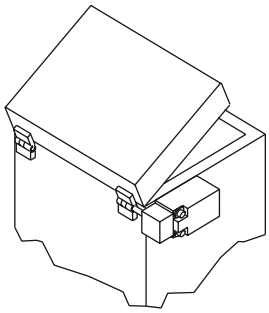
Extended temperature range

-40°C

This range of switches is also available in a special version with an ambient operating temperature range of -40°C to +80°C.
They can be used for applications in cold stores, sterilisers and other devices with low temperature environments. Special materials that have been used to realize these versions, maintain unchanged their features also in these conditions, widening the installation possibilities.

Application examples





Adjustable operating point

When installing the device, you can adjust the contact operating point over the entire 360° range. By affixing the stud screw, you can check the correct activation angle adjustment, and quickly and easily adjust it if required. Once adjustment is complete, you can render the device tamper-proof against commonly used tools using the supplied lock pin.

Characteristics approved by IMQ

Rated insulation voltage (Ui): 500 Vac
400 Vac (for contact blocks 20, 21, 22, 33, 34)
Conventional free air thermal current (Ith): 10 A
Protection against short circuits: type aM fuse 10 A 500 V
Rated impulse withstand voltage (U_{imp}): 6 kV
4 kV (for contact blocks 20, 21, 22, 33, 34)
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: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 14, 18, 20, 21, 22, 33, 34, 66

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 Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 12-14. Terminal tightening torque of 7.1 lb in (0.8 Nm).

In conformity with standard: UL 508, CSA 22.2 No.14

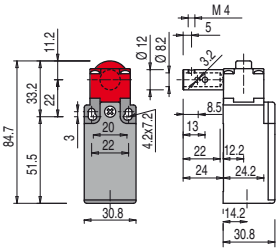
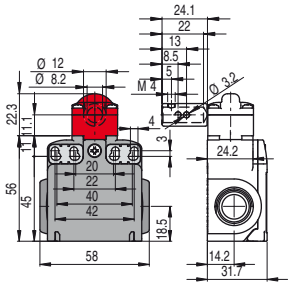
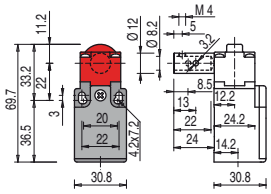
Please contact our technical service for the list of approved products.

Dimensional drawings

All measures in the drawings are in mm

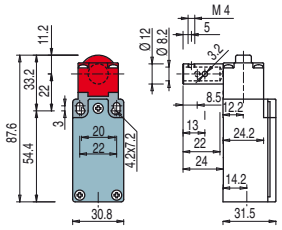
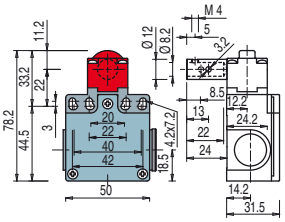
Contact type:

R = snap action
L = slow action
LO = slow action overlapped
LS = slow action shifted

Contact blocks		Technopolymer housing	Technopolymer housing	Technopolymer housing
				
5	R	FR 596-M2 → 1NO+1NC	FX 596-M2 → 1NO+1NC	
6	L	FR 696-M2 → 1NO+1NC	FX 696-M2 → 1NO+1NC	
7	LO	FR 796-M2 → 1NO+1NC	FX 796-M2 → 1NO+1NC	
9	L	FR 996-M2 → 2NC	FX 996-M2 → 2NC	
14	LS	FR 1496-M2 → 2NC	FX 1496-M2 → 2NC	
18	L	FR 1896-M2 → 1NO+1NC	FX 1896-M2 → 1NO+1NC	
20	L	FR 2096-M2 → 1NO+2NC	FX 2096-M2 → 1NO+2NC	
21	L	FR 2196-M2 → 3NC	FX 2196-M2 → 3NC	
22	L	FR 2296-M2 → 2NO+1NC	FX 2296-M2 → 2NO+1NC	
33	L	FR 3396-M2 → 1NO+1NC	FX 3396-M2 → 1NO+1NC	FK 3396-M1 → 1NO+1NC
34	L	FR 3496-M2 → 2NC	FX 3496-M2 → 2NC	FK 3496-M1 → 2NC
66	L	FR 6696-M2 → 1NC	FX 6696-M2 → 1NC	
Min. force		0.15 Nm (0.4 Nm →)	0.15 Nm (0.4 Nm →)	0.15 Nm (0.4 Nm →)
Travel diagrams		page 304 - group 9	page 304 - group 9	page 304 - group 9

Contact type:

R = snap action
L = slow action
LO = slow action overlapped
LS = slow action shifted

Contact blocks		Metal housing	Metal housing
			
5	R	FM 596-M2 → 1NO+1NC	FZ 596-M2 → 1NO+1NC
6	L	FM 696-M2 → 1NO+1NC	FZ 696-M2 → 1NO+1NC
7	LO	FM 796-M2 → 1NO+1NC	FZ 796-M2 → 1NO+1NC
9	L	FM 996-M2 → 2NC	FZ 996-M2 → 2NC
14	LS	FM 1496-M2 → 2NC	FZ 1496-M2 → 2NC
18	L	FM 1896-M2 → 1NO+1NC	FZ 1896-M2 → 1NO+1NC
20	L	FM 2096-M2 → 1NO+2NC	FZ 2096-M2 → 1NO+2NC
21	L	FM 2196-M2 → 3NC	FZ 2196-M2 → 3NC
22	L	FM 2296-M2 → 2NO+1NC	FZ 2296-M2 → 2NO+1NC
33	L	FM 3396-M2 → 1NO+1NC	FZ 3396-M2 → 1NO+1NC
34	L	FM 3496-M2 → 2NC	FZ 3496-M2 → 2NC
66	L	FM 6696-M2 → 1NC	FZ 6696-M2 → 1NC
Min. force		0.15 Nm (0.4 Nm →)	0.15 Nm (0.4 Nm →)
Travel diagrams		page 304 - group 9	page 304 - group 9

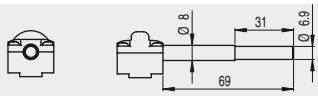
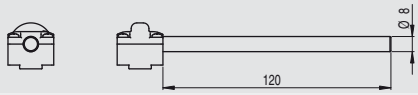
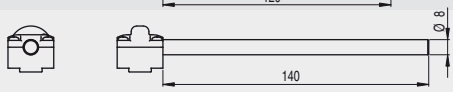
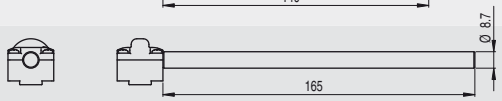
Items with code on **green** background are stock items

Accessories See page 287

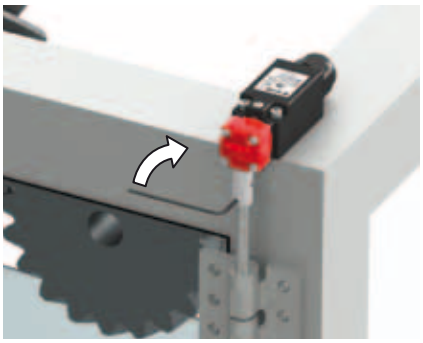
→ The 2D and 3D files are available at **www.pizzato.com**

Dimensional drawings for actuators

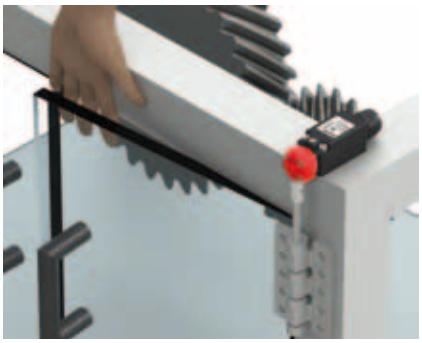
All measures in the drawings are in mm

Option	Drawing
L5	
L6	
L9	
L19	

Adjustment of the operating point



Temporary shaft locking (dowel provided).



Verify the operating point according to EN ISO 13857, adjust the operating point again if necessary.

Switch locking (pin provided).