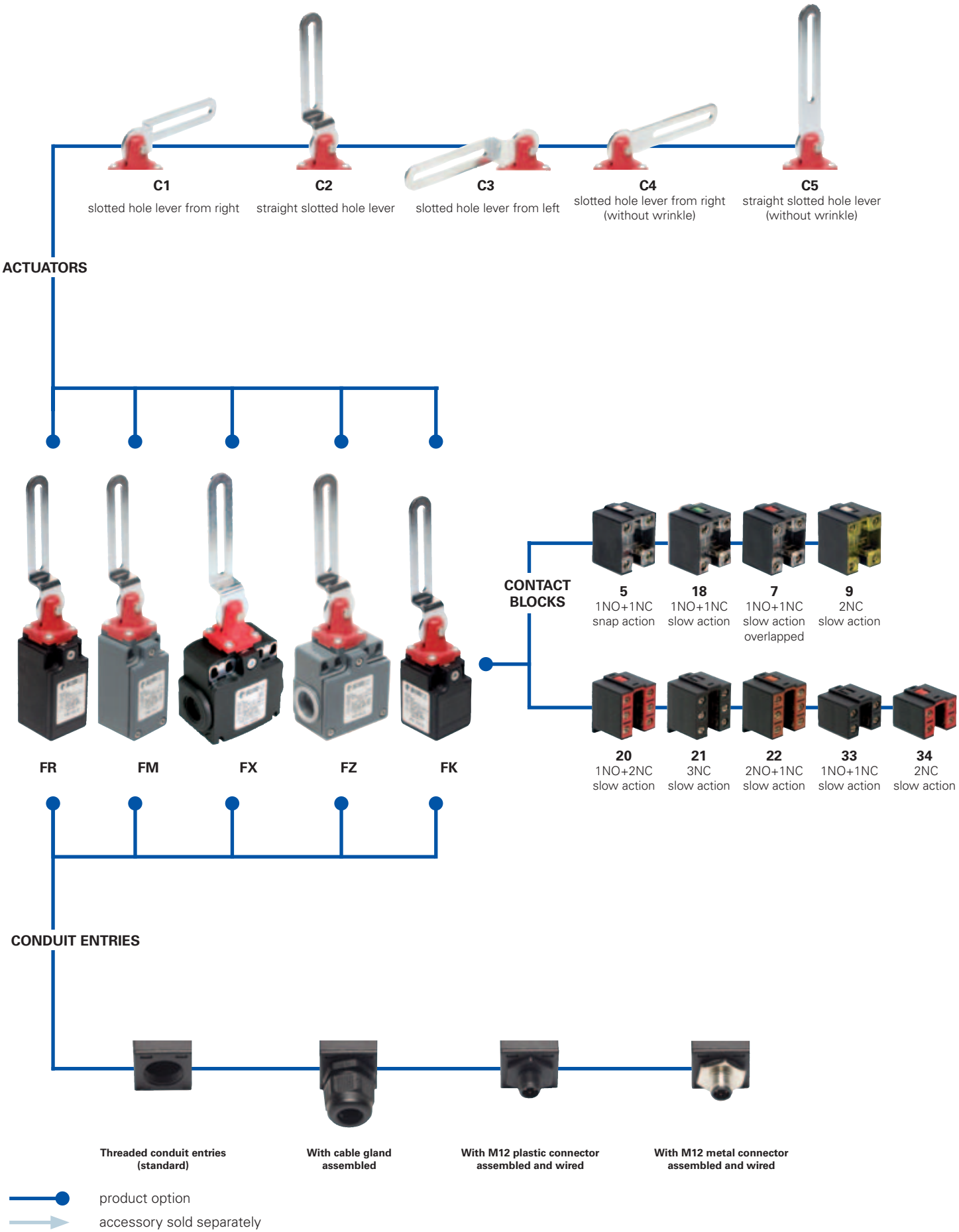
Selection diagram



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 18C1** options: **-GM2K70**

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
9	2NC, slow action
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action
33	1NO+1NC, slow action
34	2NC, slow action

Head type	
C1	slotted hole lever from right
C2	straight slotted hole lever
C3	slotted hole lever from left
C4	slotted hole lever from right (without wrinkle)
C5	straight slotted hole lever (without wrinkle)

Contacts type	
	silver contacts (standard)
G	silver contacts gold plated 1 µm

Threaded conduit entry	
	PG 13,5 (standard)
A	PG 11 (only for FR-FX housing)
M1	M16x1,5 (only for FR-FX housing)
M2	M20x1,5

Preinstalled cable gland or connectors	
	no cable gland or connector (standard)
K21	with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range
...	.....
K70	with 4 poles M12 plastic connector
...	.....

For the complete list of all combinations, please contact our technical office.

article: **FK 33C1** options: **-GM1K22**

Housing	
FK	polymer housing, one conduit entry

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

Head type	
C1	slotted hole lever from right
C2	straight slotted hole lever
C3	slotted hole lever from left
C4	slotted hole lever from right (without wrinkle)
C5	straight slotted hole lever (without wrinkle)

Contacts type	
	silver contacts (standard)
G	silver contacts gold plated 1 µm

Threaded conduit entry	
	PG 11 (standard)
M1	M16x1,5

Preinstalled cable gland	
	no cable gland (standard)
K22	with assembled cable gland suitable for Ø 5 to Ø 10 mm cables range
K26	with assembled cable gland suitable for Ø 3 to Ø 7 mm cables range

Main data

- Metal housing or polymer housing, from one to two conduit entries
- Protection degree IP67
- 9 contact blocks available
- M12 assembled connector versions
- Silver contacts gold plated versions

Markings and quality marks:

Approval IMQ:	EG610 (FR-FX-FK series) EG609 (FM-FZ series)
Approval UL:	E131787
Approval CCC:	2007010305230013 (FR-FX-FK series) 2007010305229998 (FM-FZ series)
Approval EZU:	1010151

Technical data

Housing

Housing type FR, FX and FK made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin ▣
Housing type FM and FZ 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: IP67 according to EN 60529

General data

Safety parameters:	see page 6/32
Ambient temperature:	from -25°C to +80°C
Version for operation in ambient temperature from -40°C to +80° C on request	
Max operating frequency:	3600 operations cycles[1]/hour
Mechanical endurance:	1 million of operations cycles[1]
Max actuating speed:	180°/s
Min. actuating speed:	2°/s
Driving torque for installation:	see pages 6/1-6/10

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

Cross section of the conductors (flexible copper 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 5, 7, 9, 18:	min.	1 x 0,5 mm²	(1 x AWG 20)
	max.	2 x 2,5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60204-1, EN 60204-1, EN 1088, EN ISO 12100-1, EN ISO 12100-2, IEC 60529, EN 60529, NFC 63-140, VDE 0660-200, VDE 0113, CENELEC EN 50013.
Approvals:
IEC 60947-5-1, UL 508, GB14048.5-2001

In conformity with requirements requested by:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and Electromagnetic Compatibility 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

⚠ If not expressly indicated in this chapter, for the right installation and the correct utilization of all articles see requirements indicated from page 6/1 to page 6/10.

Electrical data			Utilization categories
without connector	Thermal current (Ith):	10 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	500 Vac 600 Vdc	Ue (V) 250 400 500
		400 Vac for contact blocks 20, 21, 22, 33, 34	Ie (A) 6 4 1
	Conditional shot circuit current:	1000 A according to EN 60947-5-1	Direct current: DC13
	Protection against short circuits:	fuse 10 A 500 V type aM	Ue (V) 24 125 250
	Pollution degree:	3	Ie (A) 6 1,1 0,4
with 4 or 5 poles M12 connector	Thermal current (Ith):	4 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	fuse 4 A 500 V type gG	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24 125 250
			Ie (A) 4 1,1 0,4
with 8 poles M12 connector	Thermal current (Ith):	2 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	30 Vac 36 Vdc	Ue (V) 24
	Protection against short circuits:	fuse 2 A 500 V type gG	Ie (A) 2
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 2

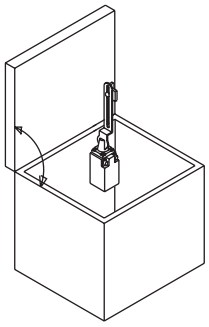
Description

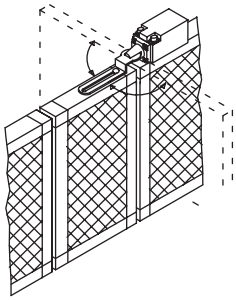
These safety switches are used to control gates or doors with hinge protecting hazardous parts of machines. Easy to install, they do not need the interaction with the hinge of the guard. Very sensitive, they positively open the contacts after few rotation degrees, sending the stop signal immediately.

Rotating heads

Removing the four fastening screws, in all switches, it is possible to rotate the head in 90° steps.

Installation examples





Data type approved by IMQ, CCC and EZU

Rated insulation voltage (Ui): 500 Vac
400 Vac for contact blocks 20, 21, 22, 33, 34
Thermal current (Ith): 10 A
Protection against short circuits: fuse 10 A 500 V type aM
Protection degree: IP67
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: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact block 5, 7, 9, 18, 20, 21, 22, 33, 34

In conformity with standards: EN 60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low Voltage Directive 2006/95/CE and subsequent modifications and completions.

Please contact our technical service for the list of 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
For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7,1 lb in (0.8 Nm).

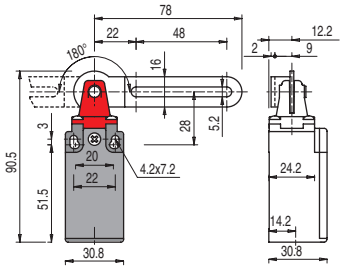
In conformity with standard: UL 508

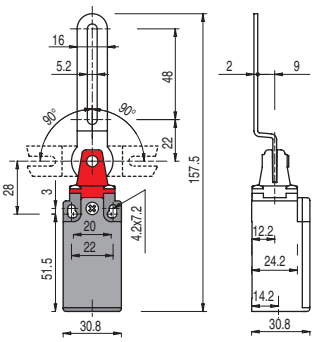
Please contact our technical service for the list of approved products.

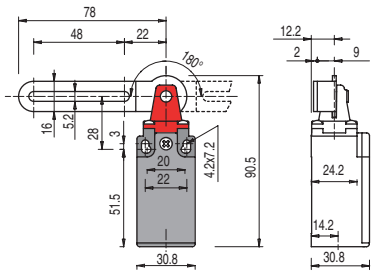
Dimensional drawings

Contacts type:

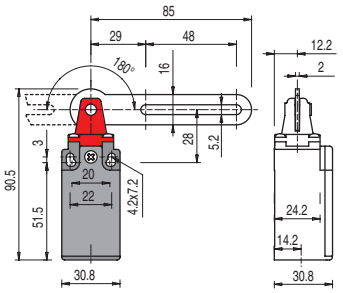
R = snap action
L = slow action
LO = slow action overlapped

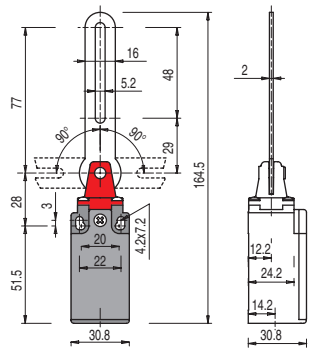






Contact blocks								
18	L	FR 18C1	1NO+1NC		FR 18C2	1NO+1NC		FR 18C3	1NO+1NC
5	R	FR 5C1	1NO+1NC		FR 5C2	1NO+1NC		FR 5C3	1NO+1NC
7	LO	FR 7C1	1NO+1NC		FR 7C2	1NO+1NC		FR 7C3	1NO+1NC
9	L	FR 9C1	2NC		FR 9C2	2NC		FR 9C3	2NC
20	L	FR 20C1	1NO+2NC		FR 20C2	1NO+2NC		FR 20C3	1NO+2NC
21	L	FR 21C1	3NC		FR 21C2	3NC		FR 21C3	3NC
22	L	FR 22C1	2NO+1NC		FR 22C2	2NO+1NC		FR 22C3	2NO+1NC
33	L	FR 33C1	1NO+1NC		FR 33C2	1NO+1NC		FR 33C3	1NO+1NC
34	L	FR 34C1	2NC		FR 34C2	2NC		FR 34C3	2NC
Min. force		0,11 Nm (0,15 Nm)			0,11 Nm (0,15 Nm)			0,11 Nm (0,15 Nm)	
Travel diagrams		page 4/58 - group 1			page 4/58 - group 2			page 4/58 - group 1	





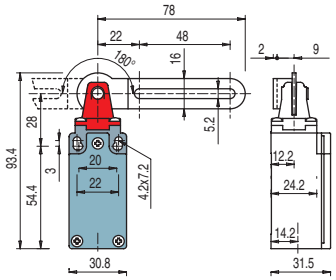
Contact blocks								
18	L	FR 18C4	1NO+1NC		FR 18C5	1NO+1NC		
5	R	FR 5C4	1NO+1NC		FR 5C5	1NO+1NC		
7	LO	FR 7C4	1NO+1NC		FR 7C5	1NO+1NC		
9	L	FR 9C4	2NC		FR 9C5	2NC		
20	L	FR 20C4	1NO+2NC		FR 20C5	1NO+2NC		
21	L	FR 21C4	3NC		FR 21C5	3NC		
22	L	FR 22C4	2NO+1NC		FR 22C5	2NO+1NC		
33	L	FR 33C4	1NO+1NC		FR 33C5	1NO+1NC		
34	L	FR 34C4	2NC		FR 34C5	2NC		
Min. force		0,11 Nm (0,15 Nm)			0,11 Nm (0,15 Nm)			
Travel diagrams		page 4/58 - group 1			page 4/58 - group 2			

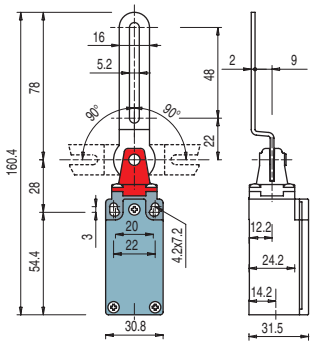
Accessories See page 5/1

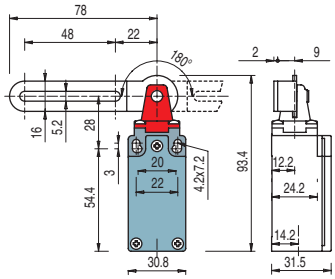
All measures in the drawings are in mm

Contacts type:

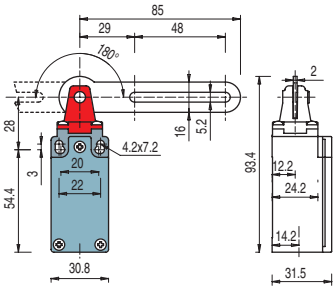
R = snap action
L = slow action
LO = slow action overlapped

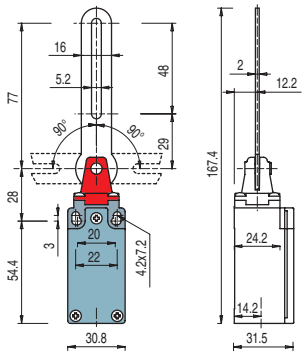






Contact blocks							
18	L	FM 18C1	1NO+1NC	FM 18C2	1NO+1NC	FM 18C3	1NO+1NC
5	R	FM 5C1	1NO+1NC	FM 5C2	1NO+1NC	FM 5C3	1NO+1NC
7	LO	FM 7C1	1NO+1NC	FM 7C2	1NO+1NC	FM 7C3	1NO+1NC
9	L	FM 9C1	2NC	FM 9C2	2NC	FM 9C3	2NC
20	L	FM 20C1	1NO+2NC	FM 20C2	1NO+2NC	FM 20C3	1NO+2NC
21	L	FM 21C1	3NC	FM 21C2	3NC	FM 21C3	3NC
22	L	FM 22C1	2NO+1NC	FM 22C2	2NO+1NC	FM 22C3	2NO+1NC
33	L	FM 33C1	1NO+1NC	FM 33C2	1NO+1NC	FM 33C3	1NO+1NC
34	L	FM 34C1	2NC	FM 34C2	2NC	FM 34C3	2NC
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)	
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		page 4/58 - group 1	

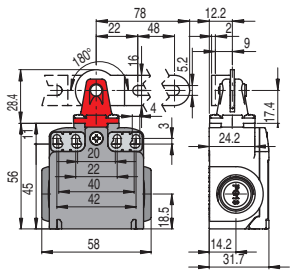


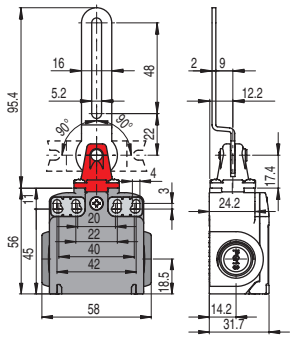


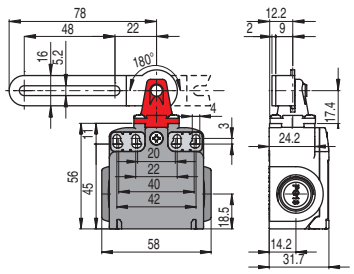
Contact blocks							
18	L	FM 18C4	1NO+1NC	FM 18C5	1NO+1NC		
5	R	FM 5C4	1NO+1NC	FM 5C5	1NO+1NC		
7	LO	FM 7C4	1NO+1NC	FM 7C5	1NO+1NC		
9	L	FM 9C4	2NC	FM 9C5	2NC		
20	L	FM 20C4	1NO+2NC	FM 20C5	1NO+2NC		
21	L	FM 21C4	3NC	FM 21C5	3NC		
22	L	FM 22C4	2NO+1NC	FM 22C5	2NO+1NC		
33	L	FM 33C4	1NO+1NC	FM 33C5	1NO+1NC		
34	L	FM 34C4	2NC	FM 34C5	2NC		
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)			
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2			

Contacts type:

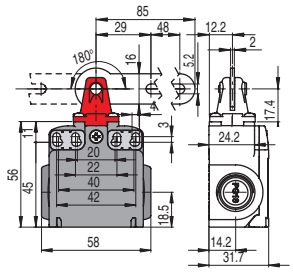
R = snap action
L = slow action
LO = slow action overlapped

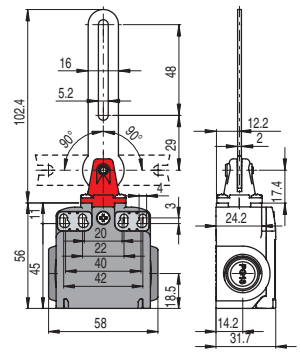






Contact blocks						
18	L	FX 18C1	1NO+1NC	FX 18C2	1NO+1NC	FX 18C3	1NO+1NC
5	R	FX 5C1	1NO+1NC	FX 5C2	1NO+1NC	FX 5C3	1NO+1NC
7	LO	FX 7C1	1NO+1NC	FX 7C2	1NO+1NC	FX 7C3	1NO+1NC
9	L	FX 9C1	2NC	FX 9C2	2NC	FX 9C3	2NC
20	L	FX 20C1	1NO+2NC	FX 20C2	1NO+2NC	FX 20C3	1NO+2NC
21	L	FX 21C1	3NC	FX 21C2	3NC	FX 21C3	3NC
22	L	FX 22C1	2NO+1NC	FX 22C2	2NO+1NC	FX 22C3	2NO+1NC
33	L	FX 33C1	1NO+1NC	FX 33C2	1NO+1NC	FX 33C3	1NO+1NC
34	L	FX 34C1	2NC	FX 34C2	2NC	FX 34C3	2NC
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)	
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		page 4/58 - group 1	



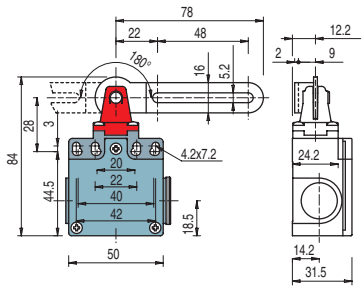


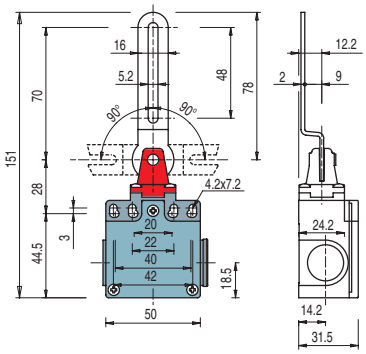
Contact blocks						
18	L	FX 18C4	1NO+1NC	FX 18C5	1NO+1NC	
5	R	FX 5C4	1NO+1NC	FX 5C5	1NO+1NC	
7	LO	FX 7C4	1NO+1NC	FX 7C5	1NO+1NC	
9	L	FX 9C4	2NC	FX 9C5	2NC	
20	L	FX 20C4	1NO+2NC	FX 20C5	1NO+2NC	
21	L	FX 21C4	3NC	FX 21C5	3NC	
22	L	FX 22C4	2NO+1NC	FX 22C5	2NO+1NC	
33	L	FX 33C4	1NO+1NC	FX 33C5	1NO+1NC	
34	L	FX 34C4	2NC	FX 34C5	2NC	
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		

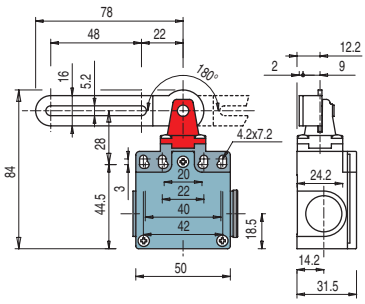
Accessories See page 5/1

Contacts type:

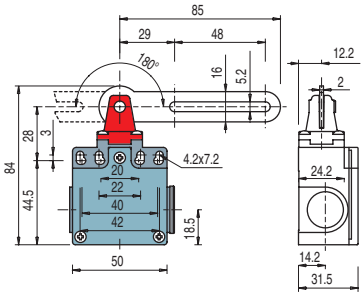
R = snap action
L = slow action
LO = slow action overlapped

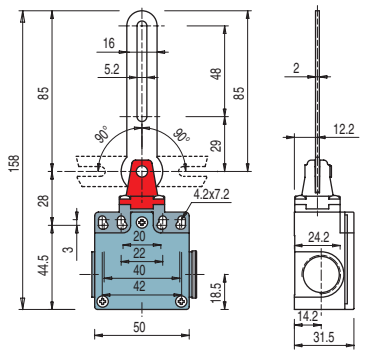






Contact blocks							
18	L	FZ 18C1	1NO+1NC	FZ 18C2	1NO+1NC	FZ 18C3	1NO+1NC
5	R	FZ 5C1	1NO+1NC	FZ 5C2	1NO+1NC	FZ 5C3	1NO+1NC
7	LO	FZ 7C1	1NO+1NC	FZ 7C2	1NO+1NC	FZ 7C3	1NO+1NC
9	L	FZ 9C1	2NC	FZ 9C2	2NC	FZ 9C3	2NC
20	L	FZ 20C1	1NO+2NC	FZ 20C2	1NO+2NC	FZ 20C3	1NO+2NC
21	L	FZ 21C1	3NC	FZ 21C2	3NC	FZ 21C3	3NC
22	L	FZ 22C1	2NO+1NC	FZ 22C2	2NO+1NC	FZ 22C3	2NO+1NC
33	L	FZ 33C1	1NO+1NC	FZ 33C2	1NO+1NC	FZ 33C3	1NO+1NC
34	L	FZ 34C1	2NC	FZ 34C2	2NC	FZ 34C3	2NC
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)	
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		page 4/58 - group 1	

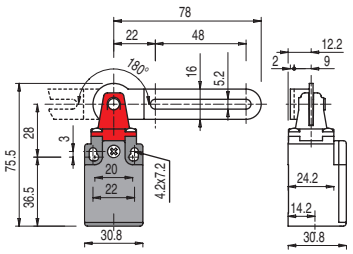


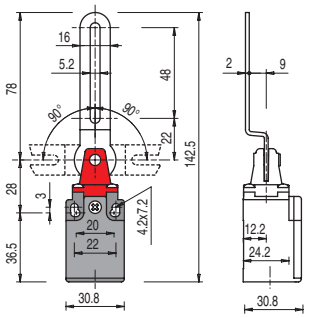


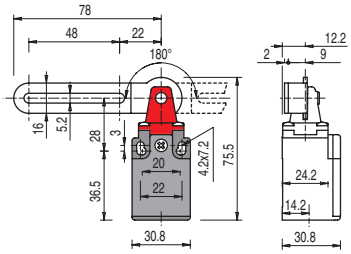
Contact blocks							
18	L	FZ 18C4	1NO+1NC	FZ 18C5	1NO+1NC		
5	R	FZ 5C4	1NO+1NC	FZ 5C5	1NO+1NC		
7	LO	FZ 7C4	1NO+1NC	FZ 7C5	1NO+1NC		
9	L	FZ 9C4	2NC	FZ 9C5	2NC		
20	L	FZ 20C4	1NO+2NC	FZ 20C5	1NO+2NC		
21	L	FZ 21C4	3NC	FZ 21C5	3NC		
22	L	FZ 22C4	2NO+1NC	FZ 22C5	2NO+1NC		
33	L	FZ 33C4	1NO+1NC	FZ 33C5	1NO+1NC		
34	L	FZ 34C4	2NC	FZ 34C5	2NC		
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)			
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2			

Contacts type:

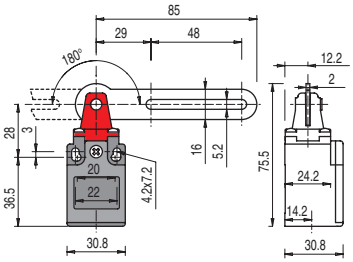
R = snap action
L = slow action

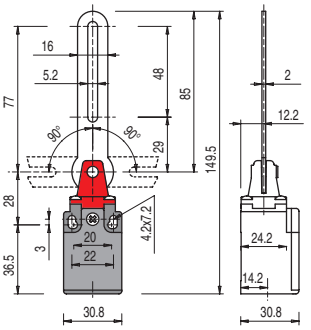






Contact blocks						
33	L	FK 33C1	1NO+1NC	FK 33C2	1NO+1NC	FK 33C3	1NO+1NC
34	L	FK 34C1	2NC	FK 34C2	2NC	FK 34C3	2NC
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)	
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		page 4/58 - group 1	



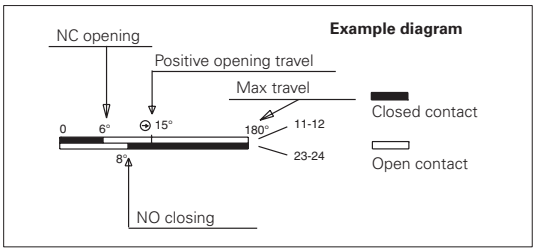


Contact blocks						
33	L	FK 33C4	1NO+1NC	FK 33C5	1NO+1NC	
34	L	FK 34C4	2NC	FK 34C5	2NC	
Min. force		0,11 Nm (0,15 Nm)		0,11 Nm (0,15 Nm)		
Travel diagrams		page 4/58 - group 1		page 4/58 - group 2		

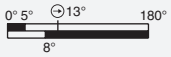
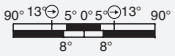
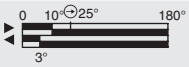
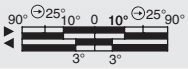
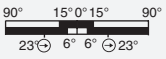
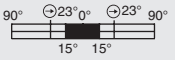
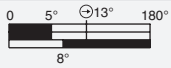
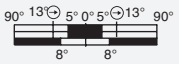
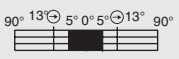
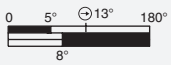
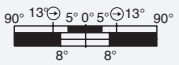
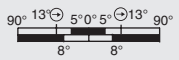
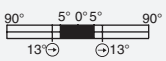
Accessories See page 5/1

How to read travel diagrams

All measures in the diagrams are in degrees



Travel diagrams table

Contact blocks		Group 1	Group 2
18 1NO+1NC			
5 1NO+1NC			
7 1NO+1NC			
9 2NC			
20 1NO+2NC			
21 3NC			
22 2NO+1NC			
33 1NC+1NO			
34 2NC			

IMPORTANT:
In safety applications it is necessary to activate the switch **at least up to the positive opening point** indicated in the diagrams with the symbol ⊖. Operate the switch **at least with the positive opening force**, indicated between brackets, below each article, next the value of minimum force.

Items with code on the **green** background are available in stock