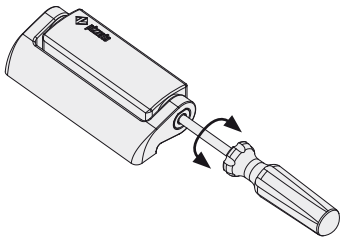
Safety hinge switches **HP-HC** series

Description

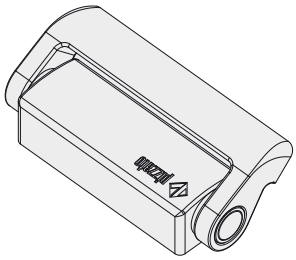
Pizzato Elettrica widens its own range of products with the new HP-HC series of safety hinge switches, where safety and style are melted in one single product.
The electrical switch is completely integrated in the mechanical hinge, to result practically invisible to an inexpert eye. This guarantees a higher safety because a switch hard to identify is consequently also more difficult to defeat. The assembly without visible screws and the pleasant line, make the switch perfectly integrated also with guards of modern design machinery. In order to complete the offer complementary hinges with purely mechanics functions are available.

Adjustment of the operating point



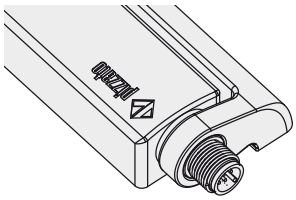
The operating point of the switches can be set with a flat-blade screwdriver.
The operating point regulation allows the setting possibility for large guards. After the setting, it's always necessary to seal the hole with the supplied safety seal plug.

Variations of the activation base angle



New versions with the switch activation angle equal to a multiple of 15° (e.g. 45° or 90°) are available on request.
The different activation angle does not invalidate the possibility to adjust the operating point through the switch adjusting screws. The variation of the operating angle does not alter the switch maximum mechanical travel.

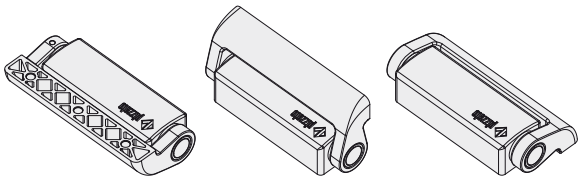
Integrated M12 connector



Versions with connection from the top or the bottom are available with integrated M12 connector.
The application of versions with connector allows a faster wiring when it's necessary to move guards from test line to final user.

Opening angle up to 180°

The mechanical design of the switch allows the application also on protections up to 180° opening angle.

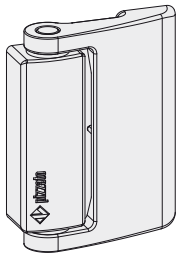


Protection degrees IP67 and IP69K

IP69K
IP67

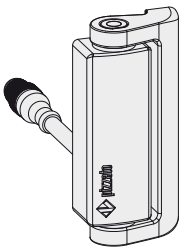
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required. Special measures also allow devices to be used even in machines which are subjected to washing with high pressure warm water jets. In fact these devices pass the IP69K test according to ISO 20653, using jets of water to 100 atmospheres at a temperature of 80°C.

Versions for glass or polycarbonate doors



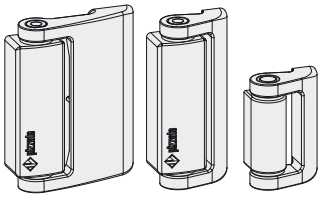
It's available a variation of the switch shape specifically designed for glass and polycarbonate doors without frame.
The wider supporting arm and the spaced fixing points facilitate the installation and prevent the cracking caused by holes too near the guard edge.
However, it is necessary to verify that the door mechanical stop is not performed by the switch.

Cable with connector at the back



The version with a rear cable and M12 connector is the best combination between aesthetics and connection ease.
When machineries have to be assembled by the final customer, this solution allows to hide the wiring and at the same time to easily connect or disconnect it from inside the machinery.

Additional hinges

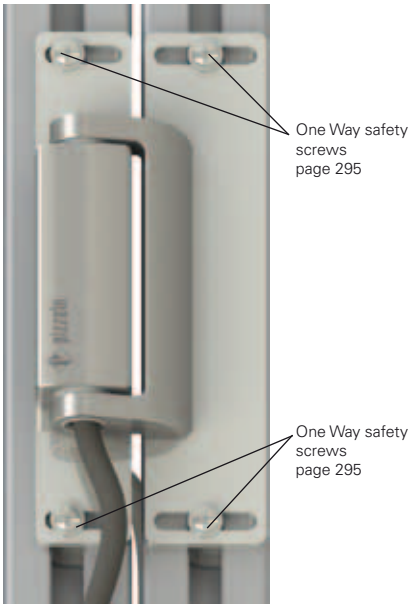


To complete installation, various types of additional hinges are available, varying in numbers depending on the protection guard weight.
These hinges keep the same aesthetics and without the electrical part their price is lower.

Application examples

- Switch without supports
- Rear fixing
- Cable output, rear

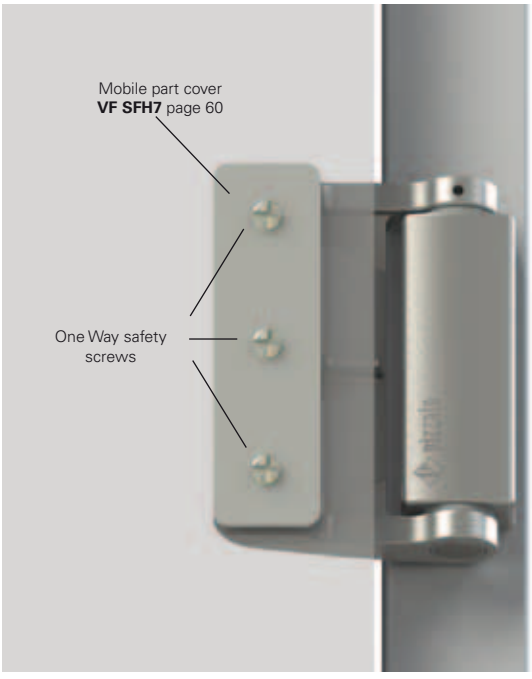
- Switch with angular supports for profiles with slots
- Fixing with internal screws
- Connector output, bottom



- Switch with plane supports for profiles with slots
- Fixing with front screws.
- Cable output, bottom

Closed door

Open door



- Direct fixing to the polycarbonate plate
- Switch without supports
- Fixing with internal screws
- Connector output, rear.

Selection diagram

SHAPES

A

100x50 mm movable part
metal

B

100x75 mm movable part
metal

CABLES AND CONNECTORS

S
cable output, bottom
(standard)

A
cable output, top

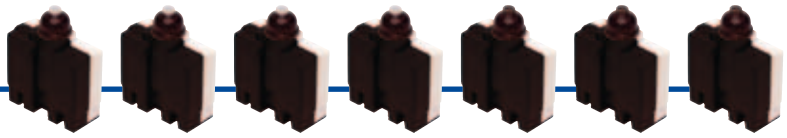
P
cable output, rear

KSM
M12 connector
bottom

KAM
M12 connector
top

0.2PM
cable (0.2 m) with M12
connector, rear

CONTACT BLOCKS



52C
1NO+1NC,
slow action

52D
2NC
slow action

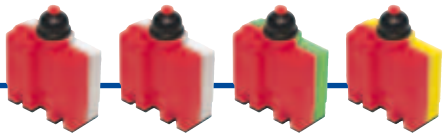
52F
1NO+2NC,
slow action

52M
2NO+2NC
slow action

53C
1NO+1NC,
slow action
overlapped

53F
1NO+2NC,
slow action
overlapped

53M
2NO+2NC
slow action
overlapped



50C
1NO+1NC,
snap action

50D
2NC
snap action

50F
1NO+2NC,
snap action

50M
2NO+2NC
snap action

ADDITIONAL HINGES

HC LL

HC AA

HC AB

product option

Code structure

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

article options

HP AA052C-2SNGH15

Movable part	
A	100x50 mm movable part, metal
B	100x75 mm movable part, metal

Contact blocks	
52C	1NO+1NC, slow action
52D	2NC, slow action
52F	1NO+2NC, slow action
52M	2NO+2NC, slow action
53C	1NO+1NC, slow action, overlapped
53F	1NO+2NC, slow action, overlapped
53M	2NO+2NC, slow action, overlapped
50C	1NO+1NC, snap action
50D	2NC, snap action
50F	1NO+2NC, snap action
50M	2NO+2NC, snap action

The versions with snap-action contact blocks are recommended for doors having a radius not greater than 600 mm.

Connection type	
0.2	cable length 0.2 m (available only for versions 0.2 PM)
0.5	cable length 0.5 m
...	.....
2	cable length 2 m (standard)
...	.....
10	cable length 10 m
K	integrated connector

Activation angle	
	0° activation angle (standard)
H15	15° activation angle
H30	30° activation angle
H45	45° activation angle
H60	60° activation angle
H75	75° activation angle
H90	90° activation angle

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

Cable or connector type	
N	black PVC cable, IEC 60332-1 (standard)
G	grey PVC cable, CEI 20-22 II
H	grey PUR cable, halogen free
R	cable for railway applications (EN 50306-4)
M	M12 connector

Output direction, connections	
S	movable part at the right and bottom output
P	movable part at the right and rear output
A	movable part at the right and output at top
Q	movable part at the left and rear output

HC AA

Additional hinges (H x L)	
HC AA	100.6 x 49 mm
HC AB	100.6 x 79 mm
HC LL	65 x 44.5 mm

Safety hinge switches **HP-HC** series

Main features

- Metal housing, cable output at top, bottom or rear
- 4 integrated cable types available
- Versions with M12 connector
- Protection degrees IP67 and IP69K
- 9 contact blocks with positive opening ⊕
- Additional hinges without contacts

Markings and quality marks:

IMQ approval:	CA02.03746
UL approval:	E131787
CCC approval:	2013010305647255
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

Metal housing, baked powder coating
Version with integrated cable, length 2 m, other lengths on request.
Versions with integrated M12 connector, 5 or 8 poles

Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)

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}:	5,000,000 for NC contacts
Service life:	20 years
Ambient temperature:	See table on page 56
Max. actuation frequency:	1200 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Max. actuation speed:	90°/s
Min. actuation speed:	2°/s
Mounting position:	any
Max. axial load:	1500 N (HP AA) / 750 N (HP AB)
Max. radial load:	1000 N (HP AA) / 500 N (HP AB)
Tightening torque, M5 screws:	3 … 5 Nm

(1) One operation cycle means two movements, one to close and one to open contacts, as defined in EN 60947-5-1. After 1 million operating cycles the operating point increases by 1.8°.

Electrical data

Rated impulse withstand voltage Uimp:	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Pollution degree:	3

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, ISO 20653, UL 508, CSA 22.2 No.14.
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.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.

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

⚠ **Important: Switch off the circuit voltage before disconnecting the connector from the switch. The connector is not suitable for separation of electrical loads. According to EN 60204-1, versions with 8-pin 2NO+2NC M12 connector can be used only in PELV circuits.**

Characteristics approved by IMQ

Rated insulation voltage (Ui):	250 Vac
Conventional free air thermal current (Ith): /	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 5-pin M12 connector)
Protection against short circuits (fuse):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 5-pin M12 connector), gG type

Rated impulse withstand voltage (U_{imp}): 4 kV
Protection degree of the housing: IP67
MA terminals (saddle clamps)

Pollution degree:	3
Utilization category:	AC15 / DC13 (with connector)
Operating voltage (Ue):	250 Vac (50 Hz) / 24 Vdc (with connector)
Operating current (Ie):	3 A / 2 A (with connector)

Forms of the contact element: X, Y, X+Y, X+X, Y+Y, Y+Y+X, X+X+Y, X+X+Y+Y
Positive opening of contacts on contact blocks 50A, 50C, 50D, 50F, 50G, 50M, 51A, 51C, 51D, 51F, 51G, 51M, 52A, 52C, 52D, 52F, 52G, 52M, 53A, 53C, 53D, 53F, 53G, 53M

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	R300 pilot duty (28 VA, 125-250 Vdc) B300 pilot duty (360 VA, 120-240 Vac) (1-2-3 cont.) C300 pilot duty (180 VA, 120-240 Vac) (4 cont.)

Data of housing type 1, 4X "indoor use only", 12.
Housing data for versions with 1-2 contacts and type N cable type 1, 4X "indoor use only"

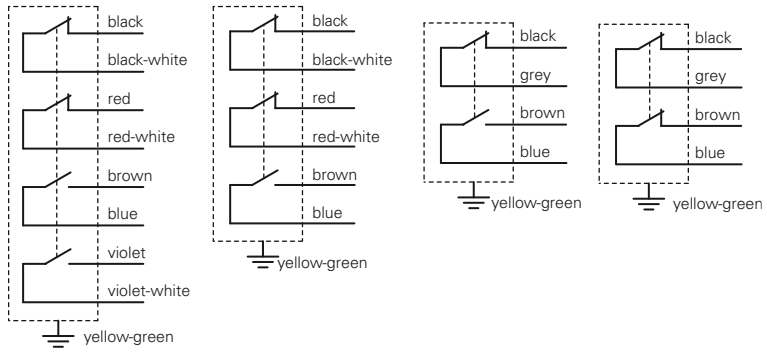
In conformity with standard: UL 508, CSA 22.2 No.14

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

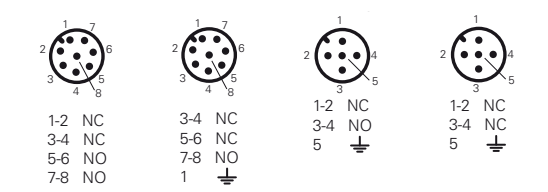
Utilization temperatures and electrical data

		Output with cable								Output with M12 connector	
		Versions with 2 contacts				Versions with 3 contacts		Versions with 4 contacts		Versions with 2 contacts	Versions with 3/4 contacts
		Cable type N 5x0.75 mm², Sheath PVC H05VV-F, Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 72 mm External diameter: 8 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type G 5x0.75 mm², Sheath PVC 05VV-F, Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 IEC 60332-3 CEI 20-22 II Minimum bending radius: 72 mm External diameter: 8 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type H 5x0.75 mm², Max. speed 100 m/min Max. acceleration 2 m/s² Sheath PUR HALOGEN FREE Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 70 mm Without halogen Oil resistant IEC 60811-2-1 External diameter: 8 mm Stripped end: 80 mm IEC 60228 class 6 copper	Cable type R 5x0.5 mm² Cable for railway applications EN50306-4 1E-300V-5x0.5 mm² MM-90 Cable in conformity with standards: EN 50306-4 EN 45555 Self-extinguishing: IEC 60332-1 EN 50305 EN 50306-1 Minimum bending radius: 60 mm External diameter: 6 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type N 7x0.5 mm² Sheath PVC 03VV-F, Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 108 mm External diameter: 7 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type H 7x0.5 mm², Max. speed 300 m/min Max. acceleration 25 m/s² Sheath PUR HALOGEN FREE Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 108 mm Halogen free Oil resistant IEC 60811-2-1 External diameter: 7 mm Stripped end: 80 mm Class 6 copper IEC 60228	Cable type N 9x0.34 mm² Sheath PVC 03VV-F, Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 94 mm External diameter: 7 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type R 9x0.5 mm² Cable for railway applications EN50306-4 1P300V-9x0.5 mm² MM-90 Cable in conformity with standards: EN 50306-4 EN 45555 Self-extinguishing: IEC 60332-1 EN 50305 EN 50306-1 Minimum bending radius: 60 mm External diameter: 6,5 mm Stripped end: 80 mm Class 5 copper IEC 60228	M12 connector 5 poles	M12 connector 8 poles
Ambient temperature standard	Cable fixed installation	-25°C … +70°C	-25°C … +70°C	-25°C … +80°C	-25 °C +80 °C	-25°C … +80°C	-25°C … +80°C	-25°C … +80°C	-25 °C +80 °C	-25°C … +80°C	
	Cable flexible installation	+5°C … +70°C	+5°C … +70°C	-25°C … +80°C	-25 °C +80 °C	-5 °C … +80 °C	-25°C … +80°C	-5 °C … +80 °C	-25 °C +80 °C		
	Cable mobile installation	/	/	-25°C … +80°C	/	/	-25°C … +80°C	/	/		
Ambient temperature extended (-T6)	Cable fixed installation	/	/	-40°C … +80°C	-40°C … +80°C	/	-40°C … +80°C	/	-40 °C +80 °C		
	Cable flexible installation	/	/	-40°C … +80°C	-40°C … +80°C	/	-30 °C … +80 °C	/	-40 °C +80 °C	-40°C … +80°C	
	Cable mobile installation	/	/	-40°C … +80°C	/	/	-30 °C … +80 °C	/	/		
Electrical data	Thermal current Ith	10 A	10 A	10 A	6 A	6 A	6 A	3 A	4 A	4 A	2 A
	Rated insulation voltage Ui	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac 300 Vdc	30 Vac 36 Vdc
	Protection against short circuits (fuse)	10 A 500 V type gG	10 A 500 V type gG	10 A 500 V type gG	6 A 500 V type gG	6 A 500 V type gG	6 A 500 V type gG	3 A 500 V type gG	4 A 500 V type gG	4 A 500 V type gG	2 A 500 V type gG
	Utilization category DC13 24 V	2 A	2 A	2 A	2 A	2 A	2 A	2 A	2 A	2 A	2 A
	Utilization category DC13 125 V	0.4 A	0.4 A	0.4 A	0.4 A	0.4 A	0.4 A	0.4 A	0.4 A	0.4 A	/
	Utilization category DC13 250 V	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	/
	Utilization category AC15 24 V	4 A	4 A	4 A	4 A	4 A	4 A	3 A	4 A	4 A	2 A
	Utilization category AC15 120 V	4 A	4 A	4 A	4 A	4 A	4 A	3 A	4 A	4 A	/
	Utilization category AC15 250 V	4 A	4 A	4 A	4 A	4 A	4 A	3 A	4 A	4 A	/
Approvals		CE cULus IMQ EAC CCC	CE EAC CCC	CE cULus IMQ EAC CCC	CE IMQ EAC CCC	CE cULus IMQ EAC CCC	CE cULus IMQ EAC CCC	CE cULus IMQ EAC CCC	CE IMQ EAC CCC	CE cULus IMQ EAC CCC	CE cULus EAC CCC

Internal connections of the cable



Internal connections of the connector



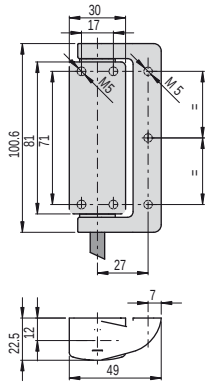
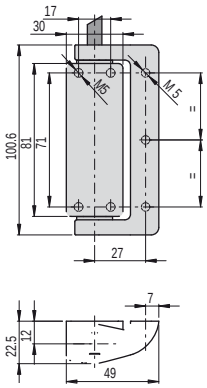
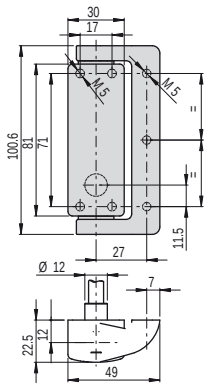
Sockets See page 287

Dimensional drawings

All measures in the drawings are in mm

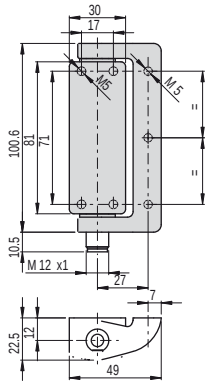
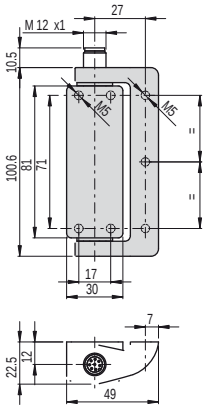
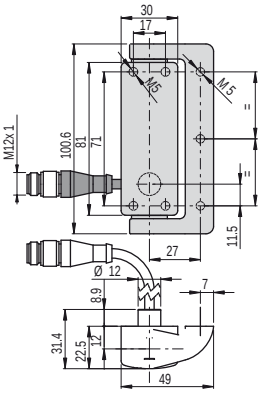
Contact type:

L = slow action
LO = slow action overlapped

Contact blocks		2 m cable, bottom		2 m cable, top		2 m cable, rear	
							
52C	L	HP AA052C-2SN	1NO+1NC	HP AA052C-2AN	1NO+1NC	HP AA052C-2PN	1NO+1NC
52D	L	HP AA052D-2SN	2NC	HP AA052D-2AN	2NC	HP AA052D-2PN	2NC
52F	L	HP AA052F-2SN	1NO+2NC	HP AA052F-2AN	1NO+2NC	HP AA052F-2PN	1NO+2NC
52M	L	HP AA052M-2SN	2NO+2NC	HP AA052M-2AN	2NO+2NC	HP AA052M-2PN	2NO+2NC
53C	LO	HP AA053C-2SN	1NO+1NC	HP AA053C-2AN	1NO+1NC	HP AA053C-2PN	1NO+1NC
53F	LO	HP AA053F-2SN	1NO+2NC	HP AA053F-2AN	1NO+2NC	HP AA053F-2PN	1NO+2NC
53M	LO	HP AA053M-2SN	2NO+2NC	HP AA053M-2AN	2NO+2NC	HP AA053M-2PN	2NO+2NC
Min. force		0.3 Nm (0.65 Nm)		0.3 Nm (0.65 Nm)		0.3 Nm (0.65 Nm)	
Travel diagrams		page 59 - group 1		page 59 - group 1		page 59 - group 1	

Contact type:

L = slow action
LO = slow action overlapped

Contact blocks		M12 connector, bottom		M12 connector, top		cable (0.2 m) and M12 connector, rear	
							
52C	L	HP AA052C-KSM	1NO+1NC	HP AA052C-KAM	1NO+1NC	HP AA052C-0.2PM	1NO+1NC
52D	L	HP AA052D-KSM	2NC	HP AA052D-KAM	2NC	HP AA052D-0.2PM	2NC
52F	L	HP AA052F-KSM	1NO+2NC	HP AA052F-KAM	1NO+2NC	HP AA052F-0.2PM	1NO+2NC
52M	L	HP AA052M-KSM	2NO+2NC	HP AA052M-KAM	2NO+2NC	HP AA052M-0.2PM	2NO+2NC
53C	LO	HP AA053C-KSM	1NO+1NC	HP AA053C-KAM	1NO+1NC	HP AA053C-0.2PM	1NO+1NC
53F	LO	HP AA053F-KSM	1NO+2NC	HP AA053F-KAM	1NO+2NC	HP AA053F-0.2PM	1NO+2NC
53M	LO	HP AA053M-KSM	2NO+2NC	HP AA053M-KAM	2NO+2NC	HP AA053M-0.2PM	2NO+2NC
Min. force		0.3 Nm (0.65 Nm)		0.3 Nm (0.65 Nm)		0.3 Nm (0.65 Nm)	
Travel diagrams		page 59 - group 1		page 59 - group 1		page 59 - group 1	

Attention! The safety hinge switch can be combined together exclusively with one or more Pizzato Elettrica hinges (series HP or HC). The use of whichever other hinge does not guarantee the correct operation of the safety device.

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

Accessories See page 287

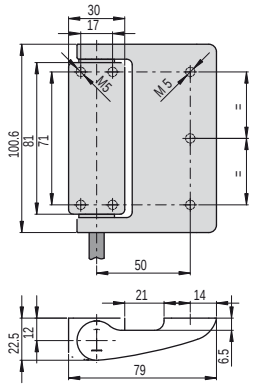
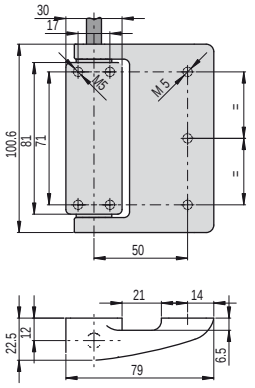
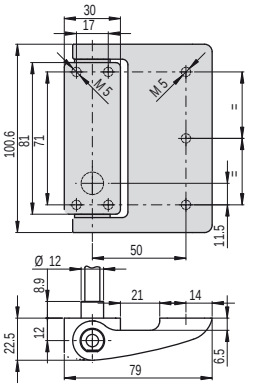
The 2D and 3D files are available at **www.pizzato.com**

Versions for glass or polycarbonate doors - Dimensional drawings

All measures in the drawings are in mm

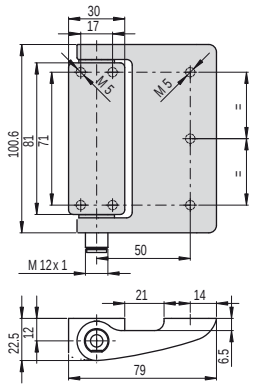
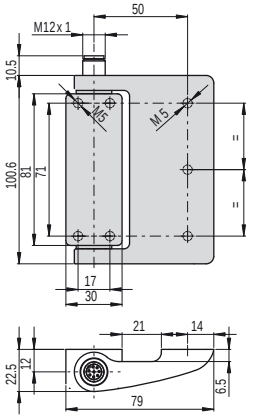
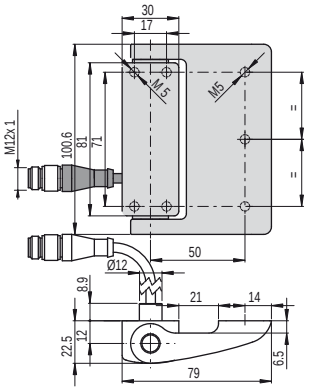
Contact type:

L = slow action
LO = slow action overlapped

Contact blocks		2 m cable, bottom	2 m cable, top	2 m cable, rear
				
52C	L	HP AB052C-2SN → 1NO+1NC	HP AB052C-2AN → 1NO+1NC	HP AB052C-2PN → 1NO+1NC
52D	L	HP AB052D-2SN → 2NC	HP AB052D-2AN → 2NC	HP AB052D-2PN → 2NC
52F	L	HP AB052F-2SN → 1NO+2NC	HP AB052F-2AN → 1NO+2NC	HP AB052F-2PN → 1NO+2NC
52M	L	HP AB052M-2SN → 2NO+2NC	HP AB052M-2AN → 2NO+2NC	HP AB052M-2PN → 2NO+2NC
53C	LO	HP AB053C-2SN → 1NO+1NC	HP AB053C-2AN → 1NO+1NC	HP AB053C-2PN → 1NO+1NC
53F	LO	HP AB053F-2SN → 1NO+2NC	HP AB053F-2AN → 1NO+2NC	HP AB053F-2PN → 1NO+2NC
53M	LO	HP AB053M-2SN → 2NO+2NC	HP AB053M-2AN → 2NO+2NC	HP AB053M-2PN → 2NO+2NC
Min. force		0.3 Nm (0.65 Nm →)	0.3 Nm (0.65 Nm →)	0.3 Nm (0.65 Nm →)
Travel diagrams		page 59 - group 1	page 59 - group 1	page 59 - group 1

Contact type:

L = slow action
LO = slow action overlapped

Contact blocks		M12 connector, bottom	M12 connector, top	cable (0.2 m) and M12 connector, rear
				
52C	L	HP AB052C-KSM → 1NO+1NC	HP AB052C-KAM → 1NO+1NC	HP AB052C-0.2PM → 1NO+1NC
52D	L	HP AB052D-KSM → 2NC	HP AB052D-KAM → 2NC	HP AB052D-0.2PM → 2NC
52F	L	HP AB052F-KSM → 1NO+2NC	HP AB052F-KAM → 1NO+2NC	HP AB052F-0.2PM → 1NO+2NC
52M	L	HP AB052M-KSM → 2NO+2NC	HP AB052M-KAM → 2NO+2NC	HP AB052M-0.2PM → 2NO+2NC
53C	LO	HP AB053C-KSM → 1NO+1NC	HP AB053C-KAM → 1NO+1NC	HP AB053C-0.2PM → 1NO+1NC
53F	LO	HP AB053F-KSM → 1NO+2NC	HP AB053F-KAM → 1NO+2NC	HP AB053F-0.2PM → 1NO+2NC
53M	LO	HP AB053M-KSM → 2NO+2NC	HP AB053M-KAM → 2NO+2NC	HP AB053M-0.2PM → 2NO+2NC
Min. force		0.3 Nm (0.65 Nm →)	0.3 Nm (0.65 Nm →)	0.3 Nm (0.65 Nm →)
Travel diagrams		page 59 - group 1	page 59 - group 1	page 59 - group 1

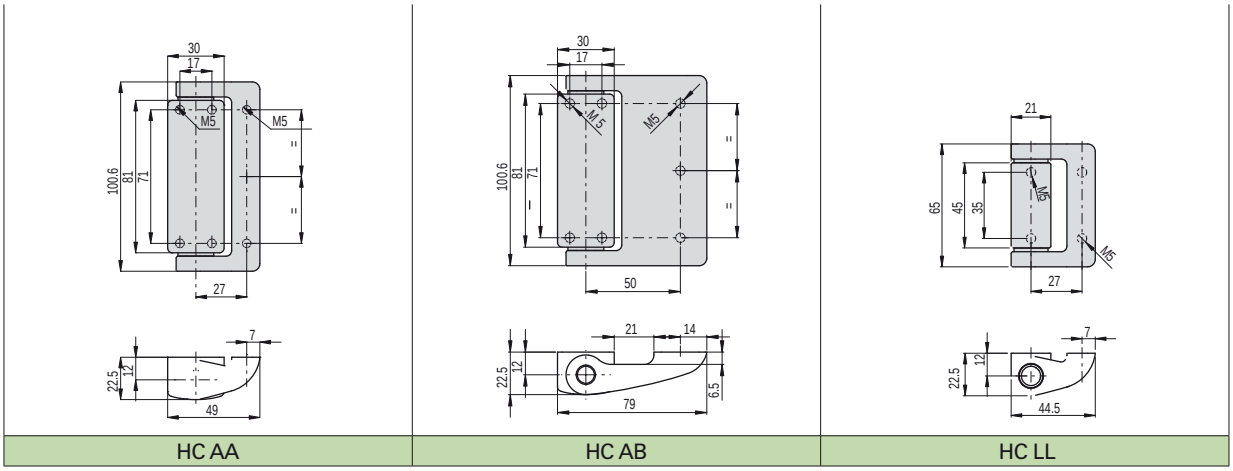
Attention! The safety hinge switch can be combined together exclusively with one or more Pizzato Elettrica hinges (series HP or HC). The use of whichever other hinge does not guarantee the correct operation of the safety device.

Accessories See page 287

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

Additional hinges

All measures in the drawings are in mm



HC AA | HC AB | HC LL

Travel diagrams

All measures in the diagrams are in degrees

Contact blocks		Group 1
52C	1NO+1NC	0 3° 7° 180° 5°
52D	2NC	0 3° 7° 180°
52F	1NO+2NC	0 3° 7° 180° 5°
52M	2NO+2NC	0 3° 7° 180° 5°

Contact blocks		Group 1
53C	1NO+1NC	0 3° 7° 180° 1°
53F	1NO+2NC	0 3° 7° 180° 1°
53M	2NO+2NC	0 3° 7° 180° 1°

Contact blocks		Group 1
50C	1NO+1NC	0 4° 8° 180° 1.5°
50D	2NC	0 4° 8° 180° 1.5°
50F	1NO+2NC	0 4° 8° 180° 1.5°
50M	2NO+2NC	0 4° 8° 180° 1.5°

The contact operating point indicated in the travel diagrams can be adjusted from 0° to +4°.

Accessories

Article	Description
VF AC7032	Protection cap of regulation screw

The plug is supplied with every hinge and must always be inserted after the operating point regulation.
In case of loss or damage, the cap can be ordered separately.

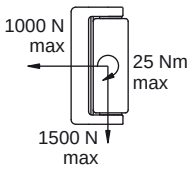
Legend

- Closed contact
- Open contact
- Positive opening travel
- Pushing the switch / Releasing the switch

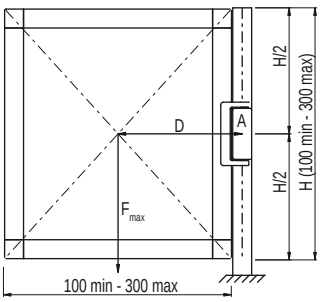
Max. forces and loads HP AA

All measures in the drawings are in mm

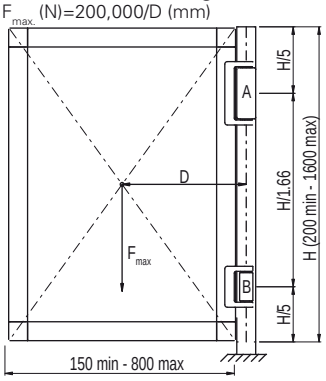
Admitted max. loads, independent of utilization conditions.



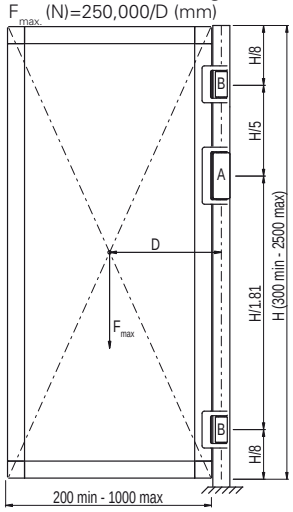
Doors with one safety hinge
$F_{max.}$ (N)=25,000/D (mm)



Doors with one safety hinge and one additional hinge
$F_{max.}$ (N)=200,000/D (mm)



Doors with one safety hinge and two additional hinges
$F_{max.}$ (N)=250,000/D (mm)



Legend

F_{max}	Force exercised by the door weight (N)
D	Distance from the door barycentre to the hinge axis (mm)
A	Safety hinge
B	Additional hinge

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

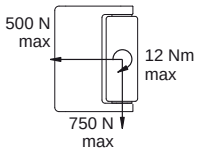
Accessories See page 287

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

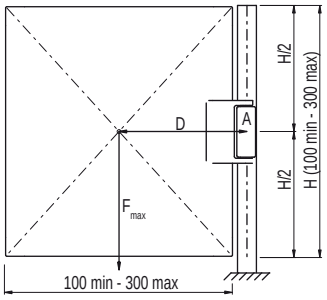
Max. forces and loads HP AB

All measures in the drawings are in mm

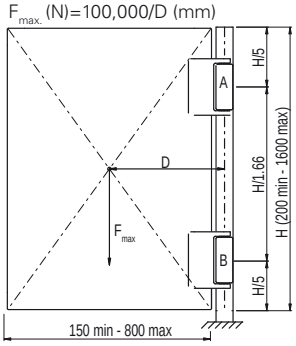
Admitted max. loads, independent of utilization conditions.



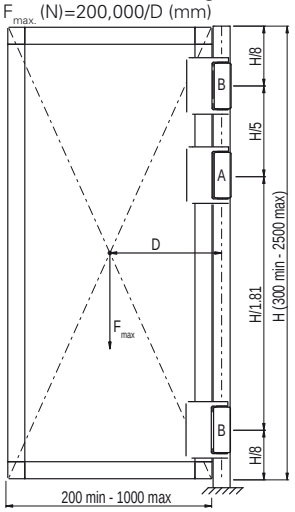
Doors with one safety hinge
$F_{max.}$ (N)=12,500/D (mm)



Doors with one safety hinge and one additional hinge
$F_{max.}$ (N)=100,000/D (mm)



Doors with one safety hinge and two additional hinges
$F_{max.}$ (N)=200,000/D (mm)



Legend

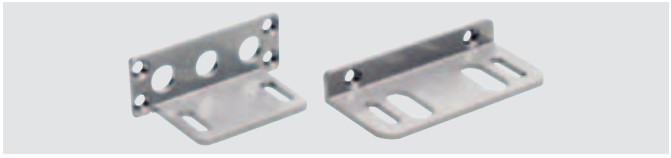
F_{max}	Force exercised by the door weight (N)
D	Distance from the door barycentre to the hinge axis (mm)
A	Safety hinge
B	Additional hinge

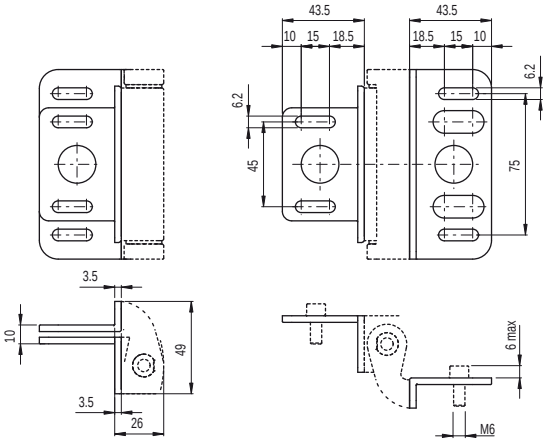
Fixing plates

All measures in the drawings are in mm

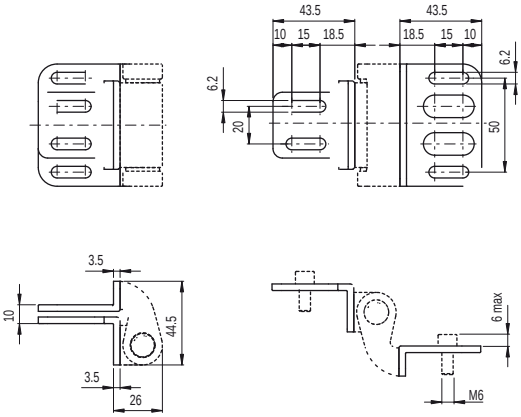
Fixing screws for profile not supplied.

Article	Description
VF SFH1-C	Couple of angular supports for HP AA and HC AA supplied with fixing screws for switch

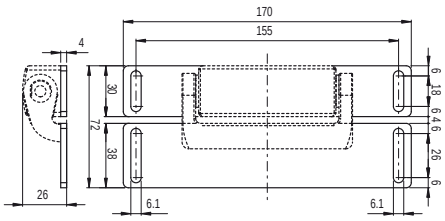




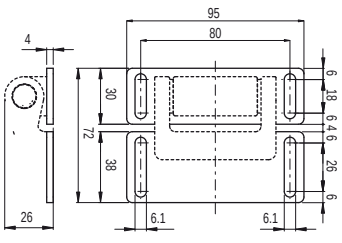
Article	Description
VF SFH2-C	Couple of angular supports for HC LL supplied with fixing screws for switch



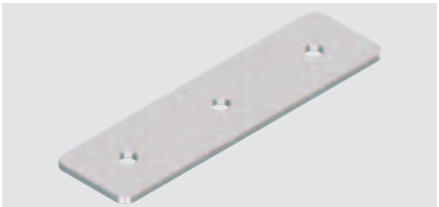
Article	Description
VF SFH3-C	Couple of plane supports for HP AA and HC AA supplied with fixing screws for switch

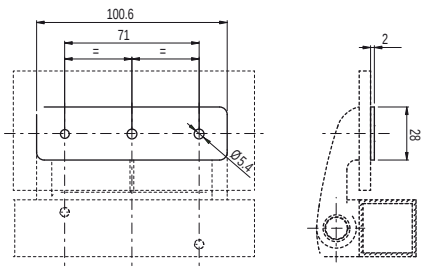


Article	Description
VF SFH4-C	Couple of plane supports for HC LL supplied with fixing screws for switch



Article	Description
VF SFH7	HP AB series mobile part cover in stainless steel





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

Accessories See page 287

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

Safety hinge switches **HX** series

Description

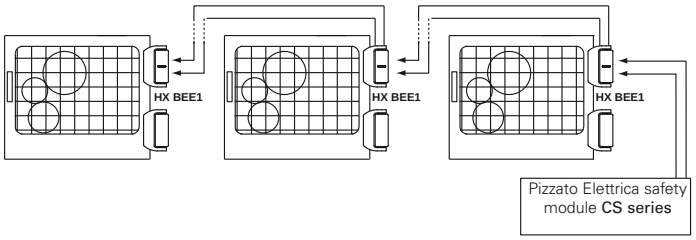
Pizzato Elettrica widens its own range of products with the new HX series of safety hinge switches, where safety and style are melted in one single product.
The electrical switch is completely integrated in the mechanical hinge, to result practically invisible to an inexpert eye. This guarantees a higher safety because a switch hard to identify is consequently also more difficult to defeat. The assembly without visible screws and the pleasant line, make the switch perfectly integrated also with guards of modern design machinery.
The hinge-shaped safety switches of the HX series, being made of stainless steel, can be used in any environment where particular attention is required for cleanliness and hygiene, therefore they are suitable for various applications ranging from the food to the pharmaceutical sectors, as well as the chemical or marine sector.

Maximum safety with a single device

PL e + SIL 3 Constructed with redundant electronic technology, the HX BEE1 series hinge switches make it possible to create circuits having maximum PL e and SIL 3 safety levels by installing just one device on the protection. This avoids expensive wiring on the field and allows quicker installation. Inside the panel, the two electronic safety outputs must be connected to a safety module with OSSD inputs or to a safety PLC.

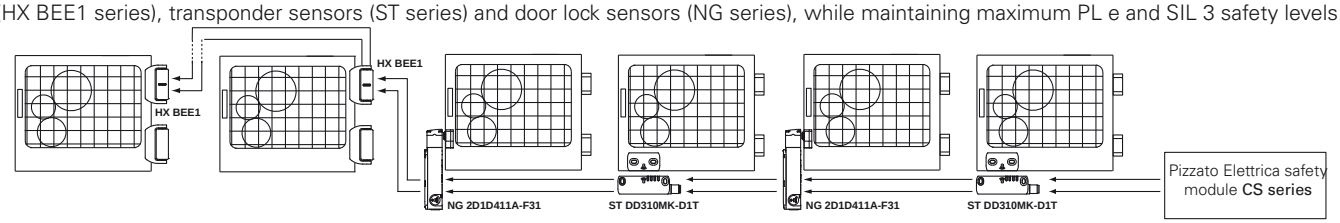
Connection of several switches in series

PL e + SIL 3 One of the most relevant features of the HX line is the optional connection in series of several switches, up to a maximum number of 32 devices, while maintaining the maximum PL e safety level prescribed by the EN 13849-1 standard and the SIL 3 safety level according to the EN 62061 standard.
This connection method is permitted in safety systems which, at the end of the chain, feature a safety module evaluating the outputs of last HX switch.
The fact that the PL e safety level can be maintained even with 32 switches connected in series indicates the presence of an extremely safe structure inside each individual device.

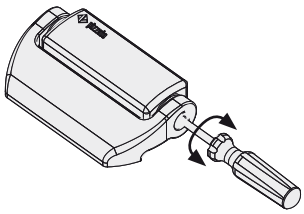


Series connection with other devices

PL e + SIL 3 The HX BEE1 series features two safe inputs and two safe outputs, which can be connected in series with other Pizzato Elettrica safety devices. This option allows the creation of safety chains containing various devices, for example the creation of circuits with connections in series, including stainless steel safety hinges (HX BEE1 series), transponder sensors (ST series) and door lock sensors (NG series), while maintaining maximum PL e and SIL 3 safety levels.



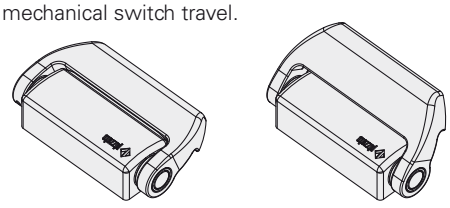
Adjustment of the operating point



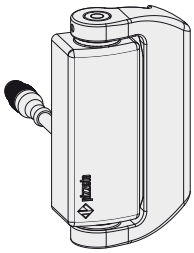
The switches operating point can be regulated through a flat-blade screwdriver.
The operating point regulation allows the setting possibility for large guards. After the setting, it's always necessary to seal the hole with the supplied safety seal plug.

Variations of the activation base angle

New versions with the switch activation angle equal to a multiple of 15° (e.g. 45° or 90°) are available on request.
The different activation angle does not exclude the possibility of finely adjusting the operating point by means of the adjustment screw found in the switch. Any change in the base operating angle does not alter the maximum mechanical switch travel.



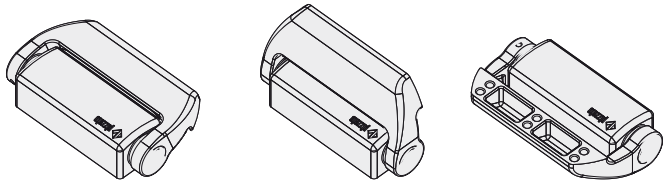
Cable with connector at the back



The version with a rear cable and M12 connector is the best combination between aesthetics and connection ease.
This solution makes it possible to hide the wiring and, at the same time, easily connect or disconnect it from inside the machinery.

Opening angle up to 180°

The mechanical design of the switch allows the application also on protections up to 180° opening angle.

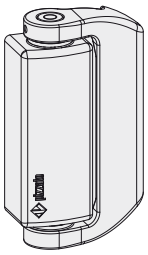


Protection degrees IP67 and IP69K

IP69K
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. Special measures also allow devices to be used even in machines which are subjected to washing with high pressure warm water jets. In fact these devices pass the IP69K test according to ISO 20653, using jets of water to 100 atmospheres at a temperature of 80°C.

Additional hinges



To complete installation, various types of additional hinges are available, varying in numbers depending on the protection guard weight.
These hinges keep the same aesthetics and mechanical structure but, having no electrical part, they cost less.

Materials

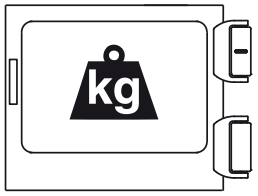
AISI
316L

With this new series in AISI316L stainless steel, Pizzato Elettrica offers a range of devices suitable for any environment where particular attention is required for cleanliness and hygiene.
Accurate surface finish makes it possible for these devices to be used in various applications ranging from the food to the pharmaceutical sectors, as well as the chemical or marine sector.

Laser engraving

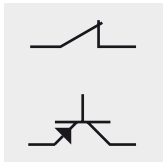
Pizzato Elettrica has introduced a new laser marking for stainless steel switches of the HX series.
Thanks to this new system which excludes the use of labels, markings on the products are indelible.

For heavy duty applications



Specifically designed for heavy duty industrial applications, these hinges are made of precision cast materials with increased thickness and high strength mechanical characteristics. The maximum loads indicated in the technical data are those that the hinge supports with no lubrication, for one million opening and closing cycles, while maintaining its safety device characteristics with perfect efficiency.

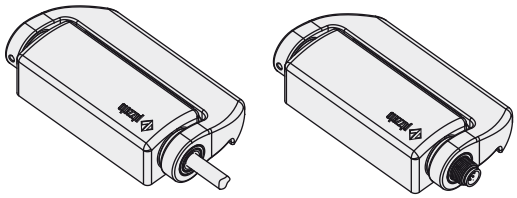
Mechanical or electronic contact blocks



Internally equipped with innovative concepts, the HX series safety switches can be supplied both with electromechanical safety contacts with positive opening, or with self monitoring redundant electronic safety outputs. This allows the customer to choose between the most cost-effective solution (mechanical contacts) or a maximum security solution (electronic outputs).

With cable or connector

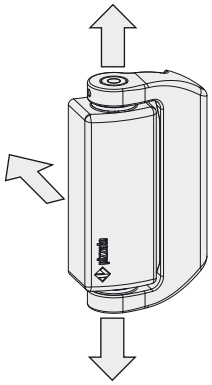
The electrical connection via integrated cable or M12 connector option makes the device suitable for the most diverse applications. The connector versions allow faster device replacement and installation, by making incorrect wiring connection impossible. The cable versions, on the other hand, offer the best value for money. Both cable and connector versions are available in mechanical or electronic contact block versions.



Four LEDs for immediate diagnosis

The versions with electronic contact block are equipped with four signalling LEDs. Each LED represents a specific hinge function, this greatly facilitates operating point adjustment via the immediate visual indication for the installer during the adjustment phase. There are also three separate LEDs available: one for input status, one for output status, and one for general device status. For serial applications, this independence enables identification of any interruptions in the safety chain and of any internal errors. All that in a straightforward way without needing to decode complex blinking sequences.

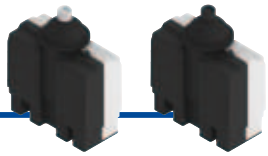
Three different output directions



Designed for flexibility, the HX series safety hinges are equipped with three different output directions for the electrical conductors. The "from bottom" or "from top" directions allow you to maintain the same output direction as the conductor, for both left- and right-facing doors. The "from back" direction obtains the most aesthetic, clean, and hygienic result. All three electrical conductor output directions are available with output cables in various lengths or with M12 connector.

Selection diagram

MECHANICAL CONTACT BLOCKS



L22
2NO+2NC
slow action
closer

H22
2NO+2NC
slow action,
overlapped

CABLES AND CONNECTORS

•SN
cable output, bottom
(standard)

•AN
cable output, top

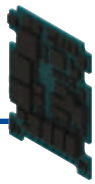
•PN
cable output, rear

KSM
M12 connector
bottom

KAM
M12 connector
top

0.2PM
cable (0.2 m) with M12
connector, rear

ELECTRONIC CONTACT BLOCKS



EE1

Electronic
contact block
with LED

CABLES AND CONNECTORS

•SN
cable output, bottom
(standard)

•AN
cable output, top

•PN
cable output, rear

KSM
M12 connector
bottom

KAM
M12 connector
top

0.2PM
cable (0.2 m) with M12
connector, rear

ADDITIONAL HINGES

HX CB

product option

Code structure

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

article | options

HX BL22-2PNGH15

Body and movable part dimensions	
B	126x76x31 mm

Contact blocks	
L22	2NO+2NC, slow action, closer
H22	2NO+2NC, slow action, overlapped
EE1	electronic contact block with LED 2 PNP safety outputs 1 PNP signalling output 2 PNP safety inputs

Activation angle	
	0° activation angle (standard)
H15	15° activation angle
H30	30° activation angle
H45	45° activation angle
H60	60° activation angle
H75	75° activation angle
H90	90° activation angle

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

Connection type	
0.2	cable length 0.2 m (available only for versions 0.2 PM)
0.5	cable length 0.5 m
...	.....
2	cable length 2 m (standard)
...	.....
10	cable length 10 m
K	with integrated connector

Other cable lengths on request.

Cable or connector type	
N	black PVC cable, IEC 60332-1
M	cable with M12 connector

Output direction, connections	
S	movable part at the right and bottom output
P	movable part at the right and rear output
A	movable part at the right and output at top
Q	movable part at the left and rear output (on request)

HX CB

Additional hinges	
CB	126x76x31 mm, movable part at the right
CD	126x76x31 mm, movable part at the left

Safety hinge switches **HX** series

Main features

- AISI 316L stainless steel housing
- Protection degrees IP67 and IP69K
- Electronic contact block with LED
- Versions with M12 connector
- Additional hinges without contacts

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC
Machinery Directive 2006/42/EC
EMC Directive 2004/108/EC
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

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, ISO 20653, IEC 61508-1, IEC 61508-2, IEC 61508-3, EN ISO 13849-1, EN ISO 13849-2, EN 62061 , EN 61326-1, EN 61326-3-1, EN 61326-3-2, UL 508, CSA 22.2 No.14

Markings and quality marks:

UL approval:	E131787
TÜV SÜD approval:	Z10 14 03 75157 007
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing
Metal housing, polished, AISI 316L stainless steel
Version with integrated cable, length 2 m, other lengths on request.
Versions with M12 connector
Versions with cable, length 0.2 m, M12 connector

Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)

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 HX B•22-•••	
B_{10d}:	5,000,000 for NC contacts
Safety parameters HX BEE1-•••	
$MTTF_d$:	4018 years
PFH_d:	2.29E-11
DC:	High
Service life:	20 years
Ambient temperature:	see table on page 66
Max. actuation frequency:	600 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Max. actuation speed:	90°/s
Min. actuation speed:	2°/s
Mounting position:	any
Tightening torque, M6 screws:	10 … 12 Nm

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

Electrical data (L22 - H22 mechanical contact blocks)

Rated impulse withstand voltage Uimp:	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Pollution degree:	3

Electrical data (EE1 electronic contact block)

Rated operating voltage Ue:	24 Vdc -15% … +10% SELV
Consumption at voltage Ue:	< 1W
Rated impulse withstand voltage Uimp:	1.5 kV
Resettable internal protection fuse:	1.1 A
Overvoltage category:	III
Inputs IS1/IS2	
Rated operating voltage Ue:	24 Vdc
Rated current consumption:	5 mA
OS1/OS2 safety outputs	
Rated operating voltage Ue:	24 Vdc
Output type:	OSSD, PNP
Utilization category:	DC12; Ue=24Vdc; Ie=0.25A
Short circuit detection:	Yes
Protection against overcurrent:	Yes
Time of deactivation impulses on safe outputs:	< 300 µs
Permissible capacitance between outputs:	< 200 nF
Permissible cap. between output and ground:	< 200 nF
O3 signalling output	
Rated operating voltage Ue:	24 Vdc
Output type:	PNP
Utilization category:	DC12; Ue=24Vdc; Ie=0.1A
Short circuit detection:	No
Protection against overcurrent:	Yes

⚠ 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 of the 2015-2016 catalogue.

⚠ Important: Switch off the circuit voltage before disconnecting the connector from the switch. The connector is not suitable for separation of electrical loads. According to EN 60204-1, versions with 8-pin M12 connector can be used only in PELV circuits.

Characteristics approved by UL

Utilization categories	R300 pilot duty (28 VA, 125-250 Vdc) B300 pilot duty (360 VA, 120-240 Vac)

Data of housing type 1, 4X "indoor use only", 12.
Housing data for versions with 2 contacts and type N cable type 1, 4X "indoor use only"

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

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

Characteristics approved by TÜV SÜD

Supply voltage: 24 Vdc
Rated operating current (max.): 0.25 A
Ambient temperature: -25°C … +70°C
Protection degree: IP67
PL, category: PL e, category 4

In conformity with standards: IEC 61508-1:2010 (SIL 3), IEC 61508-2:2010 (SIL 3), IEC 61508-3:2010 (SIL 3), IEC 61508-4:2010 (SIL 3), IEC 620611/A1:2012 (SIL CL 3), EN ISO 13849-1:2008 (PL e, Cat. 4), EN 60947-5-1/A1:2009, ISO 14119:2013

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

Utilization temperatures and electrical data for L22 / H22 mechanical contact blocks

			Cable type N 9x0.34 mm²	M12 connector 8 poles
Ambient temperature	Cable, fixed installation		-25°C … +80°C	-25°C … +80°C
	Cable, flexible installation		-5 °C ... +80 °C	-5 °C ... +80 °C
	Cable, mobile installation		/	/
Electrical data	Thermal current Ith		3 A	2 A
	Rated insulation voltage Ui		250 Vac	30 Vac 36 Vdc
	Protection against short circuits (fuse)		3 A 500 V type gG	2 A 500 V type gG
	Utilization category DC13	24 V	2 A	2 A
		125 V	0.4 A	/
		250 V	0.3 A	/
	Utilization category AC15	24 V	3 A	2 A
		120 V	3 A	/
		250 V	3 A	/

Utilization temperatures and electrical data for EE1 electronic contact block

			Cable type N 8x0.34 mm²	M12 connector 8 poles
Ambient temperature	Cable, fixed installation		-25°C … +70°C	-25°C … +70°C
	Cable, flexible installation		-5 °C ... +70 °C	-5 °C ... +70 °C
	Cable, mobile installation		/	/
Electrical data	Thermal current Ith		0.25 A	0.25 A
	Rated insulation voltage Ui		32 Vdc	32 Vdc
	Protection against short circuits (fuse)		1 A	1 A
	Utilization category DC12	24 V	0.25 A	0.25 A

Internal connections with cable

L22 / H22 mechanical contact blocks

cable colour	contacts
black	NC
black-white	
red	NC
red-white	
brown	NO
blue	
purple	NO
purple-white	
yellow/green	⏚

EE1 electronic contact block

cable colour	connection
brown	A1
red	IS1
blue	A2
red-white	OS1
black	O3
purple	IS2
black-white	OS2
purple-white	not connected

Internal connections with M12 connector

L22 / H22 mechanical contact blocks

pin	contacts
1	NC
2	
3	NC
4	
5	NO
6	
7	NO
8	
/	⏚

EE1 electronic contact block

pin	connection
1	A1
2	IS1
3	A2
4	OS1
5	O3
6	IS2
7	OS2
8	not connected

Legend

A1-A2	supply
IS1-IS2	safety inputs
OS1-OS2	safety outputs
O3	signalling output
NC	normally closed contact
NO	normally open contact
⏚	ground connection

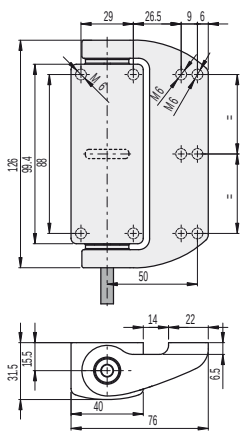
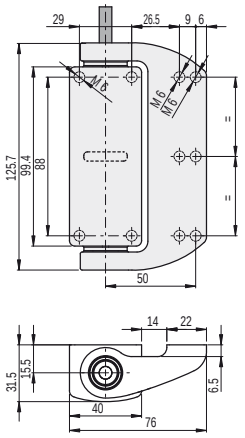
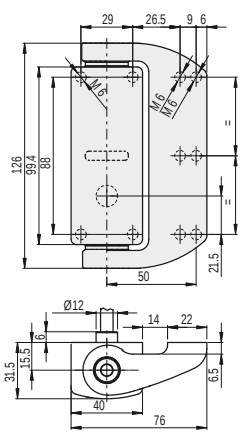
Sockets See page 287

Dimensional drawings

All measures in the drawings are in mm

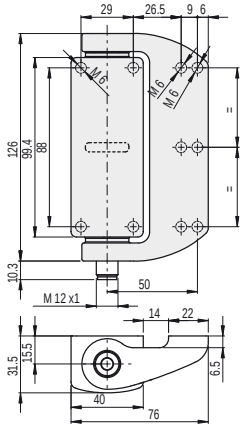
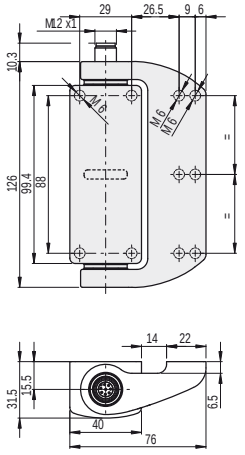
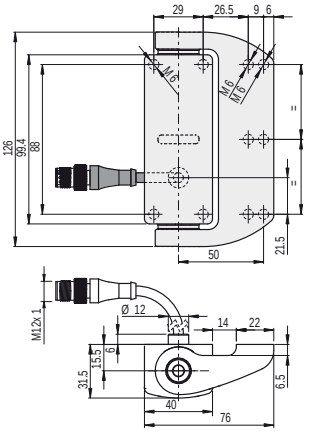
Contact type:

- LA = slow action closer
- LO = slow action overlapped
- = electronic PNP

Contact blocks		2 m cable, bottom		2 m cable, top		2 m cable, rear	
							
L22	LA	HX BL22-2SN	2NO+2NC	HX BL22-2AN	2NO+2NC	HX BL22-2PN	2NO+2NC
H22	LO	HX BH22-2SN	2NO+2NC	HX BH22-2AN	2NO+2NC	HX BH22-2PN	2NO+2NC
EE1		HX BEE1-2SN	PNP	HX BEE1-2AN	PNP	HX BEE1-2PN	PNP
Min. force		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)	

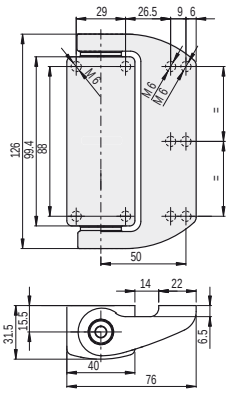
Contact type:

- LA = slow action closer
- LO = slow action overlapped
- = electronic PNP

Contact blocks		M12 connector, bottom		M12 connector, top		cable (0.2 m) and M12 connector, rear	
							
L22	LA	HX BL22-KSM	2NO+2NC	HX BL22-KAM	2NO+2NC	HX BL22-0.2PM	2NO+2NC
H22	LO	HX BH22-KSM	2NO+2NC	HX BH22-KAM	2NO+2NC	HX BH22-0.2PM	2NO+2NC
EE1		HX BEE1-KSM	PNP	HX BEE1-KAM	PNP	HX BEE1-0.2PM	PNP
Min. force		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)	

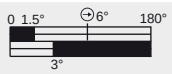
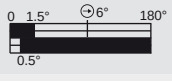
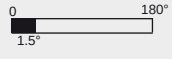
To purchase a product with a movable part at the left replace P with Q in the codes shown above.
Example: HX BL22-2**P**N → HX BL22-2**Q**N

Additional hinges



HX CB

Travel diagrams

Contact blocks	Group 1
L22 2NO+2NC	
H22 2NO+2NC	
EE1 PNP	

The contact operating point indicated in the stroke diagrams can be adjusted to ± 1°.
All measures in the diagrams are in degrees

Legend

- Closed contact /Outputs OS1, OS2, O3 active
- Open contact /Outputs OS1, OS2, O3 not active
- Positive opening travel

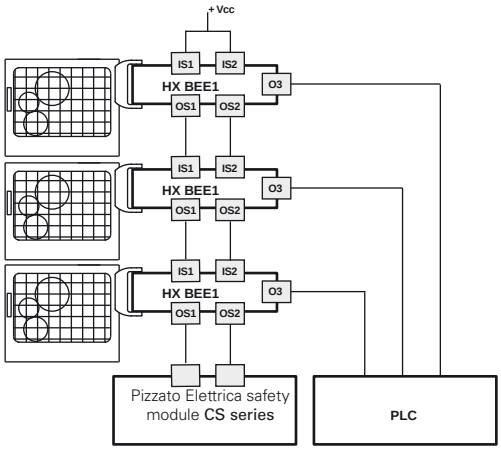
Accessories See page 287

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

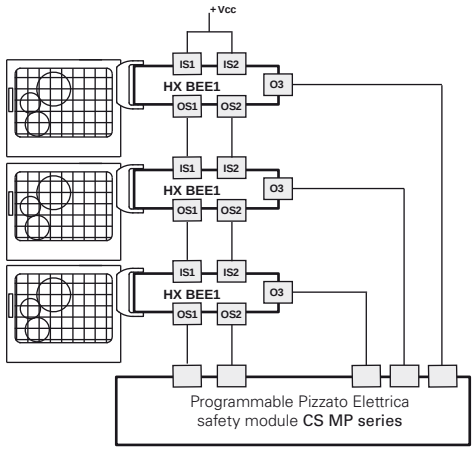
Complete safety system

The use of complete tested solutions means that the customer can be certain of the electrical compatibility between the ST series sensor and Pizzato Elettrica safety modules, thus ensuring greater reliability. In fact, these sensors have been tested for operation with the modules specified in the table shown on the side.

Switch	Compatible safety modules	Safety module output contacts		
		Instantaneous safety contacts	Delayed safety contacts	Signalling contacts
HX BEE1-•••	CS AR-05••••	3NO	/	1NC
	CS AR-06••••	3NO	/	1NC
	CS AR-08••••	2NO	/	/
	CS AT-0•••••	2NO	2NO	1NC
	CS AT-1•••••	3NO	2NO	/
	CS MP••••••	see page 243		
	CS MF••••••	see page 271		

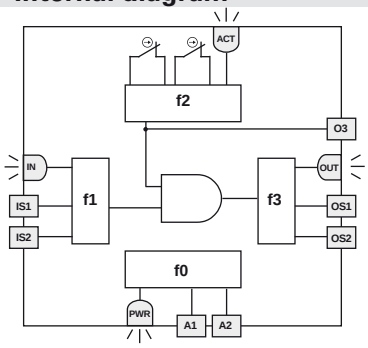


Possible connection in series of several hinges in order to simplify the safety system wiring, after evaluating the outputs from the last hinge in the chain by means of a Pizzato Elettrica safety module (table for safety modules to be combined). Each HX switch is provided with a signalling output, which is activated when the respective guard is closed. This piece of information can be managed by a PLC, depending on the specific requirements of the system installed.



Possible connection in series of several hinges in order to simplify the safety system wiring, after evaluating the outputs from the last hinge in the chain by means of a safety module from Pizzato Elettrica CS MP series, which allows management of both safety and signalling functions.

Internal diagram

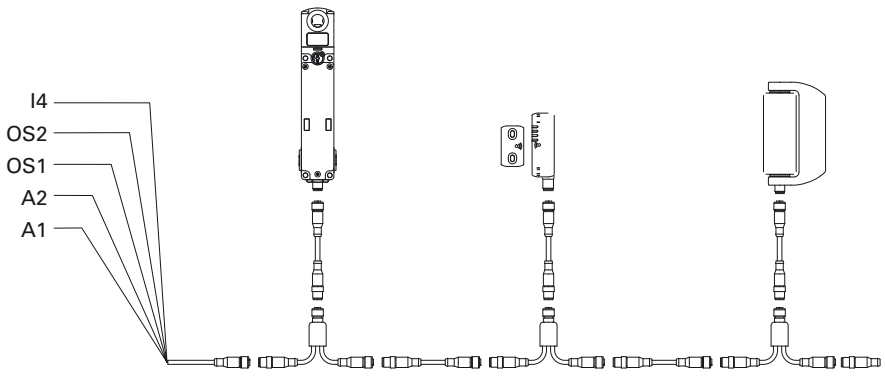


The side scheme shows the 4 logical functions interacting inside the switch.
Function f0 is a global function which deals with the device power supply and the internal tests which it cyclically undergoes.
The task of function f1 is to evaluate the status of the device inputs, whereas function f2 checks the opening of the guard.
Function f3 is intended to activate or deactivate the safety outputs and check for any faults or short circuits in the outputs.
The macro-function, which controls the above mentioned functions, enables the safety outputs only in presence of active inputs with the actuator within the safe zone limits.
The status of each function is displayed by the corresponding LED (PWR, IN, ACT, LOCK, OUT), in such a way that the general device status becomes immediately obvious to the operator.

LED	Function
ACT	state of actuator / output O3
IN	status of safety inputs
OUT	status of safety outputs
PWR	power supply/self-diagnosis

Series connection

To simplify serial connections, a series of M12 connectors are available that allow complete wiring.
This solution significantly reduces installation times, whilst maintaining the maximum PL e and SIL 3 safety levels.
For further information see page 290.



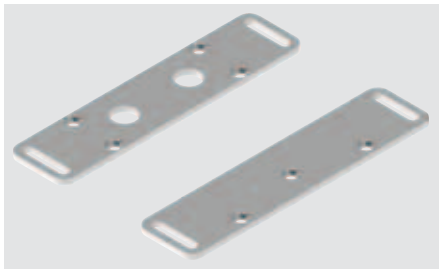
Accessories

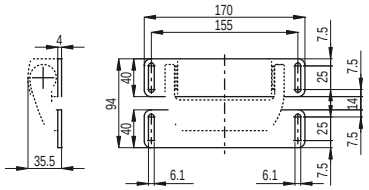
Article	Description
VF AC7032	Protection cap of regulation screw

The plug is supplied with every hinge and must always be inserted after the operating point regulation.
In case of loss or damage, the cap can be ordered separately.

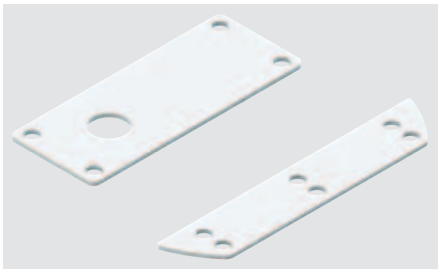
Fixing plates

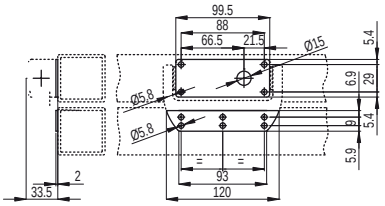
Article	Description
VF SFH10-TX	Couple of stainless steel plane supports supplied with fixing screws for switch



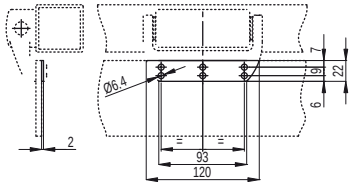


Article	Description
VF SFH9	Polyethylene packing for the food industry. Seals the contact surface between the hinge and the frame.





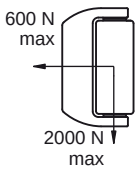
Article	Description
VF SFH8	Mobile part cover in stainless steel



Max. forces and loads HX

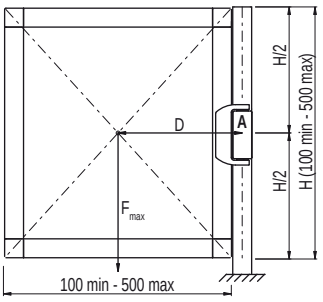
All measures in the drawings are in mm

Admitted max. loads, independent of utilization conditions.

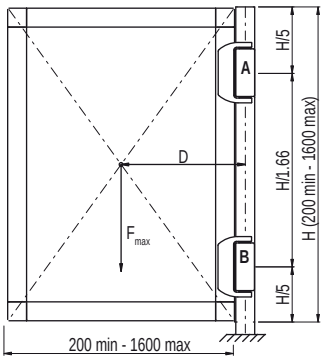


Attention: Never exceed the loads listed above under any circumstances.
The loads have been verified by a fatigue test of one million operating cycles with a 90° opening angle.

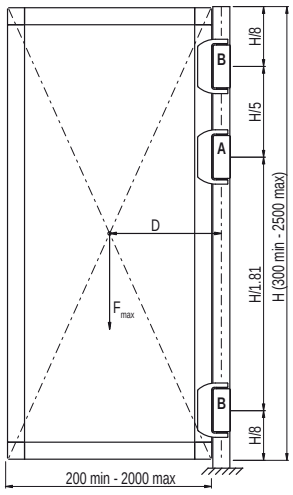
Doors with one safety hinge
$F_{max.}$ (N)=50,000/D (mm)



Doors with one safety hinge and one additional hinge
F_{max}(N)=400,000/D (mm)



Doors with one safety hinge and two additional hinges
$F_{max.}$ (N)=500,000/D (mm)



Legend

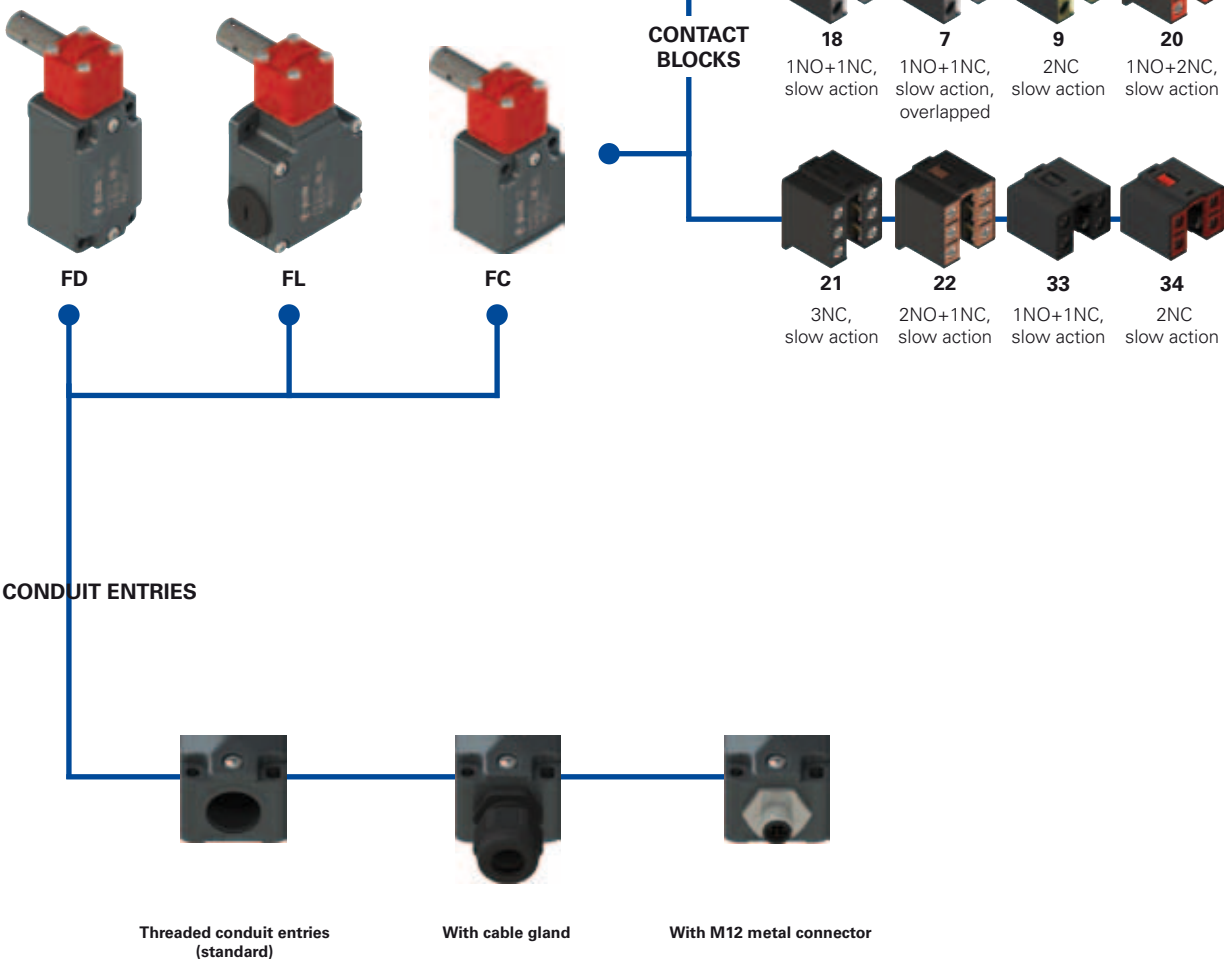
F_{max}	Force exercised by the door weight (N)
D	Distance from the door barycentre to the hinge axis (mm)
A	Safety hinge
B	Additional hinge

Accessories See page 287

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

Notes

Selection diagram



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 | options | options

FD 1895-GM2K50T6

Housing	
FD	metal, one conduit entry
FL	metal, three conduit entries

Contact blocks	
18	1NO+1NC, slow 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

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

Threaded conduit entry	
M2	M20x1.5 (standard)
	PG 13.5

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
...	.....
K50	M12 metal connector, 5 poles
...	.....

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

article | options | options

FC 3395-GM2K50T6

Housing	
FC	metal, one conduit entry

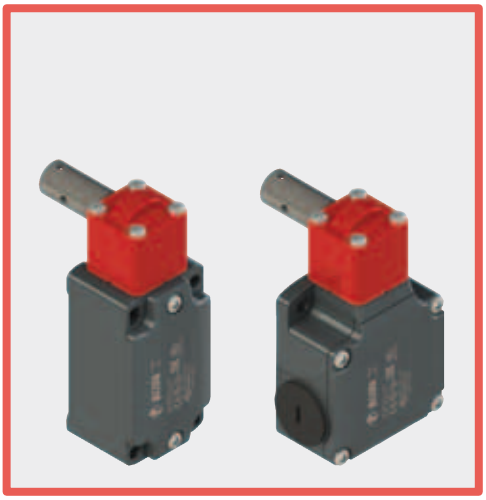
Contact blocks	
33	1NO+1NC, slow action
34	2NC, slow action

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

Threaded conduit entry	
M2	M20x1.5 (standard)
	PG 11

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

Pre-installed cable glands or connectors	
	without cable gland (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
K50	M12 metal connector, 5 poles



Main features

- Metal housing, from one to three conduit entries
- Protection degree IP67
- 8 contact blocks available
- Stainless steel actuator
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

FD, FL and FC series: metal housing, baked powder coating.
Stainless steel actuator

FD, FC series - one threaded conduit entry:	M20x1.5 (standard)
FL series - 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
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 7, 9, 18:	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:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
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.

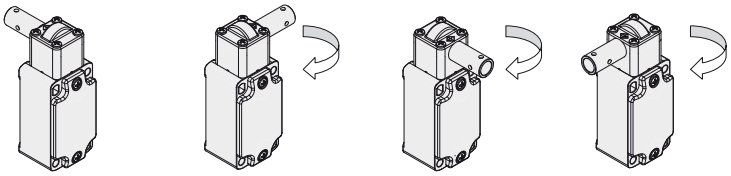
⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.

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 or 5 poles	Thermal current (Ith):	4 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 120 250 Ie (A) 4 4 4
	Rated insulation voltage (Ui):	250 Vac 300 Vdc	Direct current: DC13
	Protection against short circuits:	type gG fuse 4 A 500 V	Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
	Pollution degree:	3	
with M12 connector 8 poles	Thermal current (Ith):	2 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 Ie (A) 2
	Rated insulation voltage (Ui):	30 Vac 36 Vdc	Direct current: DC13
	Protection against short circuits:	type gG fuse 2 A 500 V	Ue (V) 24 Ie (A) 2
	Pollution degree:	3	

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

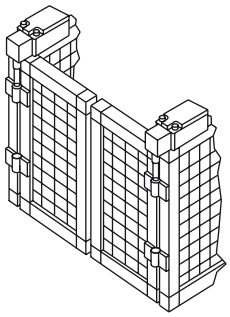
IP67

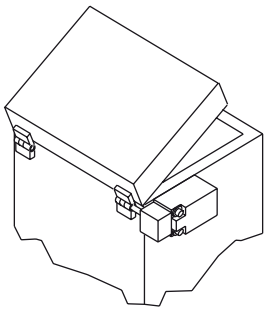
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529.
They can therefore be used in all environments where the maximum protection of the housing is required.

Laser engraving

All devices are indelibly marked with a dedicated laser system that allows the marking to be also suitable for extreme environments. This system that does not use labels, prevents the loss of plate data and the marking is more resistant over time.

Application examples





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.

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 7, 9, 18, 20, 21, 22, 33, 34

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

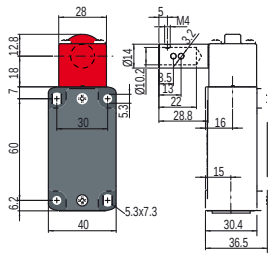
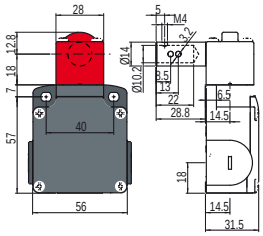
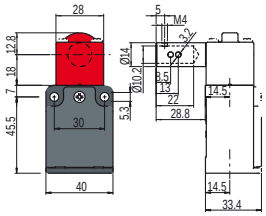
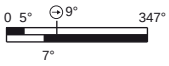
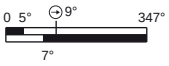
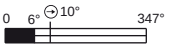
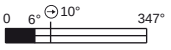
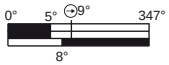
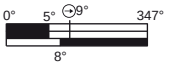
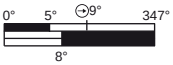
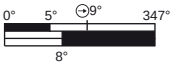
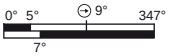
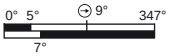
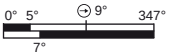
Please contact our technical service for the list of approved products.

Dimensional drawings

All measures in the drawings are in mm

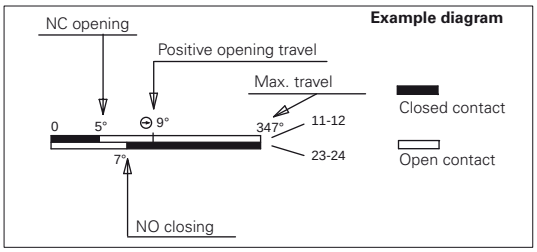
Contact type:

L = slow action
LO = slow action overlapped

Contact blocks		Metal housing Stainless steel actuator	Metal housing Stainless steel actuator	Metal housing Stainless steel actuator
				
18	L	FD 1895-M2 → 1NO+1NC	FL 1895-M2 → 1NO+1NC	
				
7	LO	FD 795-M2 → 1NO+1NC	FL 795-M2 → 1NO+1NC	
				
9	L	FD 995-M2 → 2NC	FL 995-M2 → 2NC	
				
20	L	FD 2095-M2 → 1NO+2NC	FL 2095-M2 → 1NO+2NC	
				
21	L	FD 2195-M2 → 3NC	FL 2195-M2 → 3NC	
				
22	L	FD 2295-M2 → 2NO+1NC	FL 2295-M2 → 2NO+1NC	
				
33	L	FD 3395-M2 → 1NO+1NC	FL 3395-M2 → 1NO+1NC	FC 3395-M2 → 1NO+1NC
				
34	L	FD 3495-M2 → 2NC	FL 3495-M2 → 2NC	FC 3495-M2 → 2NC
				
Min. force		0.15 Nm (0.4 Nm →)	0.15 Nm (0.4 Nm →)	0.15 Nm (0.4 Nm →)

How to read travel diagrams

All measures in the diagrams are in degrees

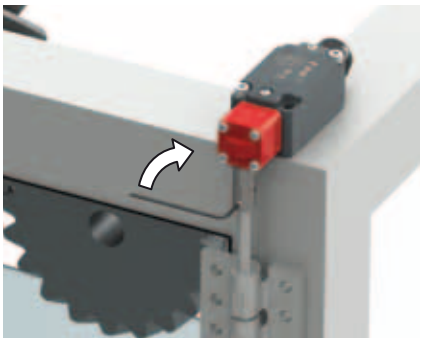


IMPORTANT:
In **safety applications**, actuate the switch **at least up to the positive opening travel** shown in the travel diagrams with symbol ⊖. Operate the switch **at least with the positive opening force**, indicated between brackets below each article, aside the minimum force value.

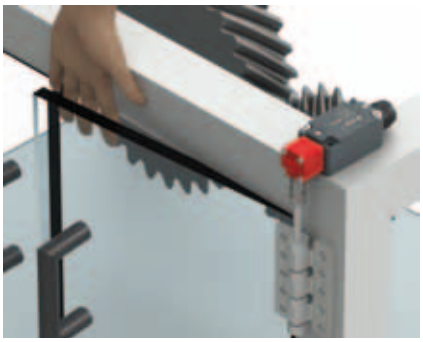
Accessories See page 287

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

Adjustment of the operating point



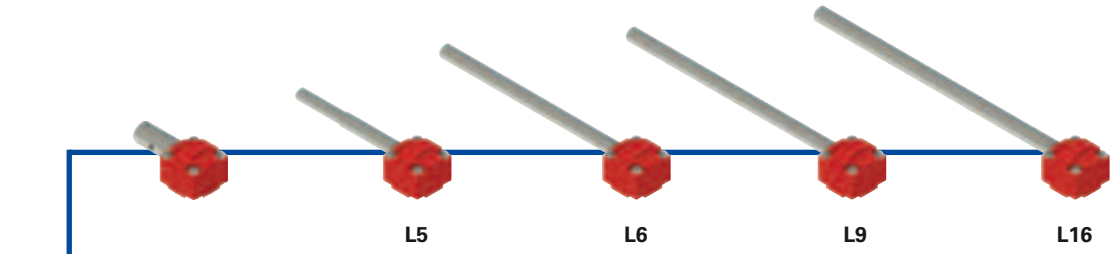
Temporary shaft locking
(dowel provided).



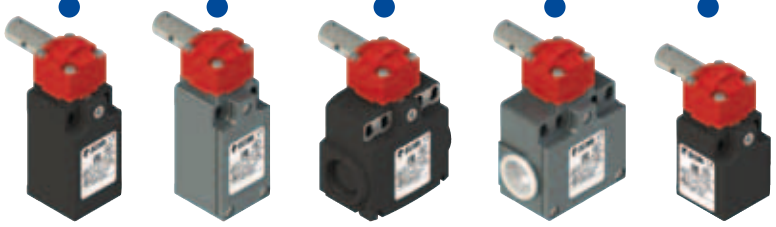
Verify the operating point according to
EN ISO 13857, adjust the
operating point again if necessary.

Switch locking (pin provided).

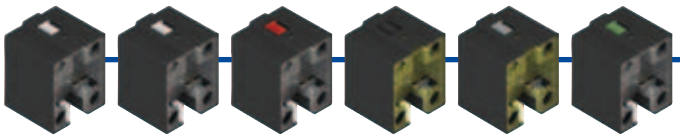
Selection diagram



ACTUATORS



CONTACT BLOCKS



5 1NO+1NC, snap action

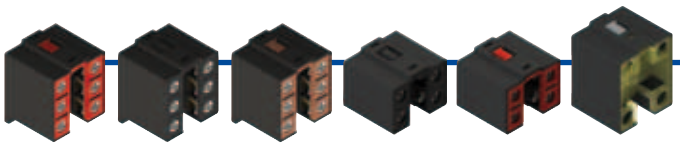
6 1NO+1NC, slow action

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.

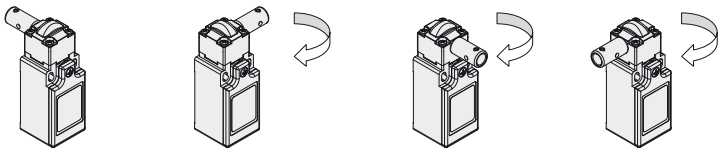
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.**

	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

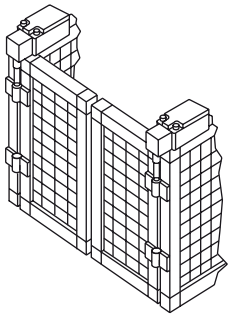
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529.
They can therefore be used in all environments where the maximum protection of the housing is required.

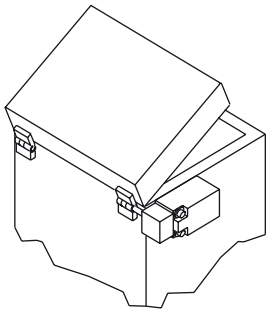
Extended temperature range

-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

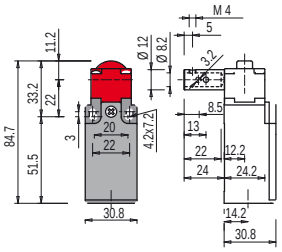
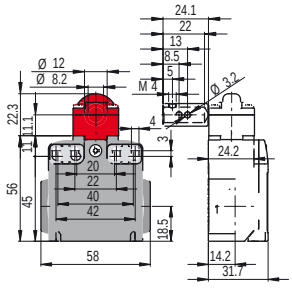
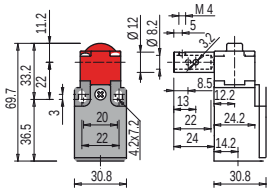
Please contact our technical service for the list of approved products.

Dimensional drawings

All measures in the drawings are in mm

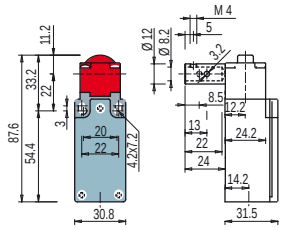
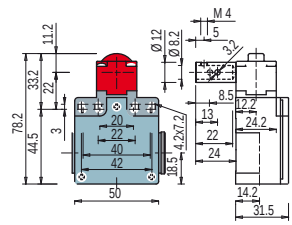
Contact type:

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

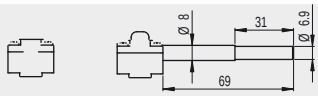
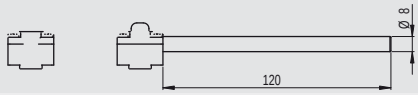
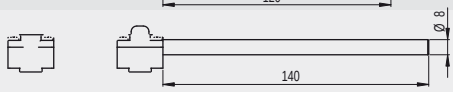
Items with code on **green** background are stock items

Accessories See page 287

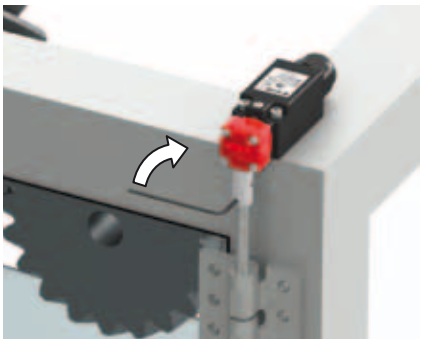
→ The 2D and 3D files are available at **www.pizzato.com**

Dimensional drawings for actuators

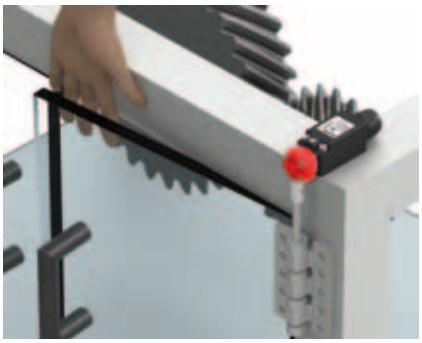
All measures in the drawings are in mm

Option	Drawing
L5	
L6	
L9	
L19	

Adjustment of the operating point



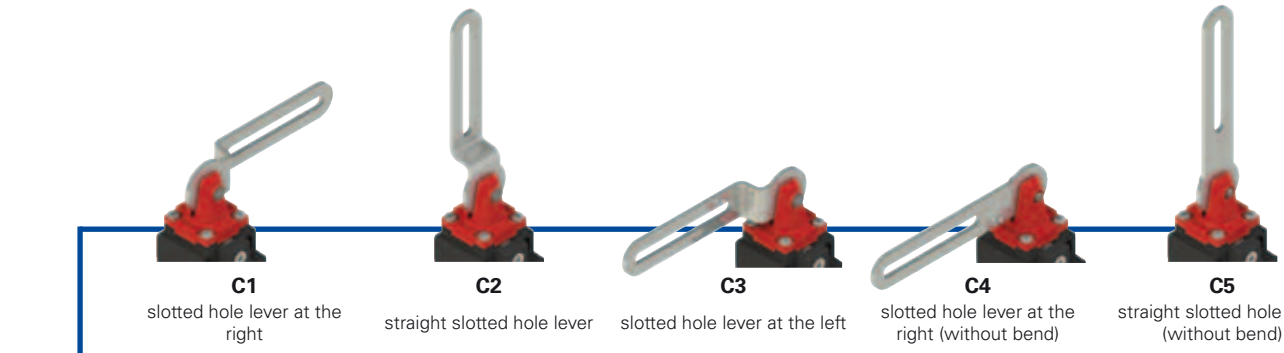
Temporary shaft locking (dowel provided).



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

Switch locking (pin provided).

Selection diagram



C1
slotted hole lever at the right

C2
straight slotted hole lever

C3
slotted hole lever at the left

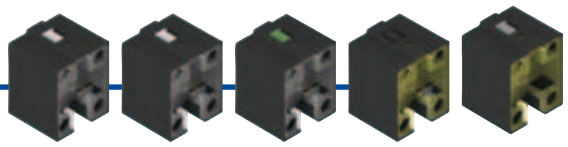
C4
slotted hole lever at the right (without bend)

C5
straight slotted hole lever (without bend)

ACTUATORS

FR **FM** **FX** **FZ** **FK**

CONTACT BLOCKS



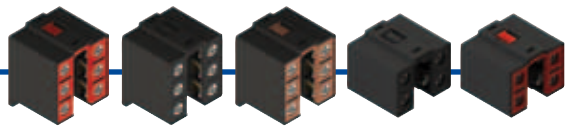
5
1NO+1NC, snap action

6
1NO+1NC, slow action

18
1NO+1NC, slow action

9
2NC slow action

66
1NC 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

CONDUIT ENTRIES

Threaded conduit entries (standard)

With cable gland

With M12 plastic connector

With M12 metal connector

product options

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 | options | options

FR 18C1-GM2K70T6

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

Contact blocks	
18	1NO+1NC, slow action
5	1NO+1NC, snap action
6	1NO+1NC, slow action
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
66	1NC, slow action

Actuators	
C1	slotted hole lever at the right
C2	straight slotted hole lever
C3	slotted hole lever at the left
C4	slotted hole lever at the right (without bend)
C5	straight slotted hole lever (without bend)

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

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

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.

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

article | options | options

FK 33C1-GM1K24T6

Housing	
FK	technopolymer, one conduit entry

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

Actuators	
C1	slotted hole lever at the right
C2	straight slotted hole lever
C3	slotted hole lever at the left
C4	slotted hole lever at the right (without bend)
C5	straight slotted hole lever (without bend)

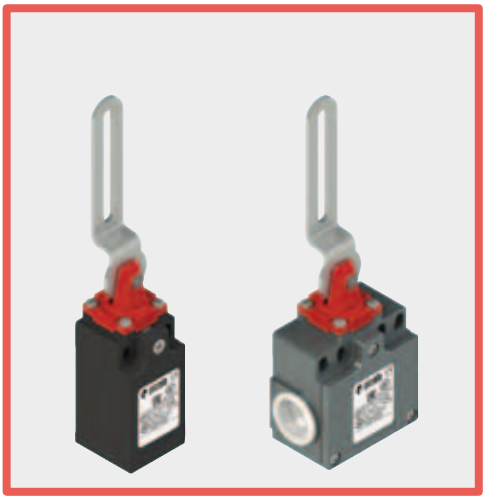
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

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

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

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

Safety switches **with slotted hole lever**



Main features

- Metal housing or technopolymer housing, from one to two conduit entries
- Protection degree IP67
- 10 contact blocks available
- Versions with M12 connector
- Versions with gold-plated silver contacts

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}:	2,000,000 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, 7, 9, 18:	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.

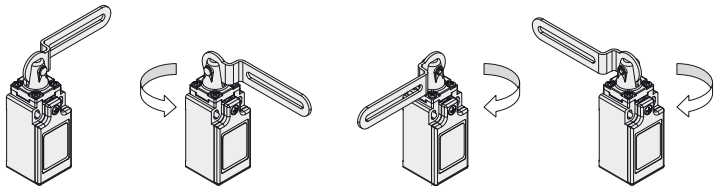
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.**

	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

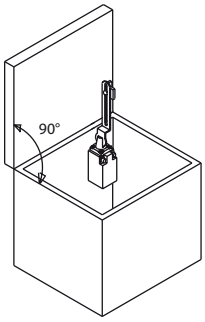
These safety switches are used to control gates or doors with hinge protecting hazardous parts of machines without inertia. Easy to install, they do not need the interaction with the hinge of the guard. They are very sensitive and positively open the contacts after few degrees of rotation, sending an immediate stop signal.

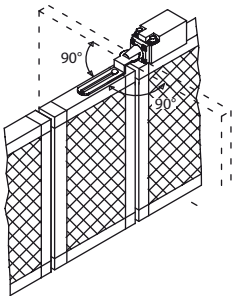
Orientable heads



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.

Application examples





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.

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, 7, 9, 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

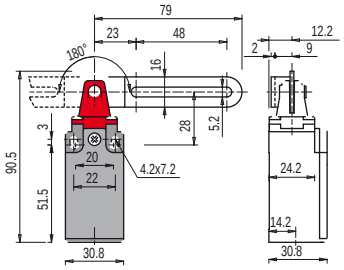
Please contact our technical service for the list of approved products.

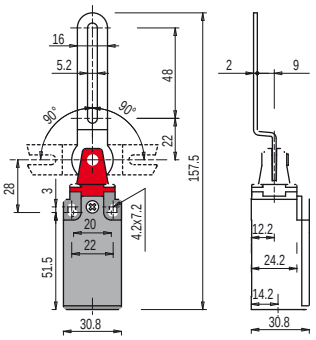
Dimensional drawings

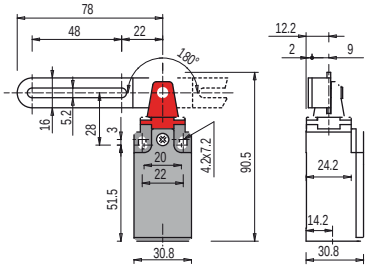
All measures in the drawings are in mm

Contact type:

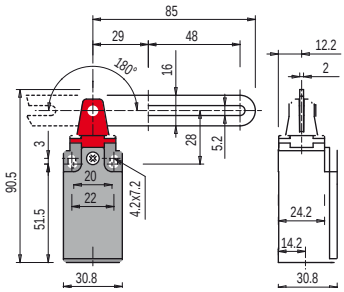
R = snap action
L = slow action
LA = slow action closer

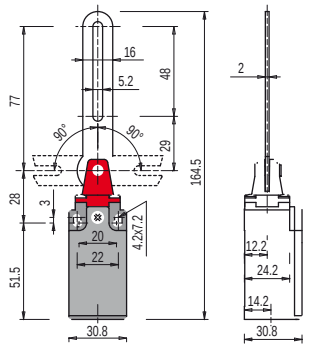






Contact blocks				
5	R	FR 5C1-M2 → 1NO+1NC	FR 5C2-M2 → 1NO+1NC	FR 5C3-M2 → 1NO+1NC
6	L	FR 6C1-M2 → 1NO+1NC	FR 6C2-M2 → 1NO+1NC	FR 6C3-M2 → 1NO+1NC
9	L	FR 9C1-M2 → 2NC	FR 9C2-M2 → 2NC	FR 9C3-M2 → 2NC
18	LA	FR 18C1-M2 → 1NO+1NC	FR 18C2-M2 → 1NO+1NC	FR 18C3-M2 → 1NO+1NC
20	L	FR 20C1-M2 → 1NO+2NC	FR 20C2-M2 → 1NO+2NC	FR 20C3-M2 → 1NO+2NC
21	L	FR 21C1-M2 → 3NC	FR 21C2-M2 → 3NC	FR 21C3-M2 → 3NC
22	L	FR 22C1-M2 → 2NO+1NC	FR 22C2-M2 → 2NO+1NC	FR 22C3-M2 → 2NO+1NC
33	L	FR 33C1-M2 → 1NO+1NC	FR 33C2-M2 → 1NO+1NC	FR 33C3-M2 → 1NO+1NC
34	L	FR 34C1-M2 → 2NC	FR 34C2-M2 → 2NC	FR 34C3-M2 → 2NC
66	L	FR 66C1-M2 → 1NC	FR 66C2-M2 → 1NC	FR 66C3-M2 → 1NC
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)
Travel diagrams		page 304 - group 10	page 304 - group 11	page 304 - group 10





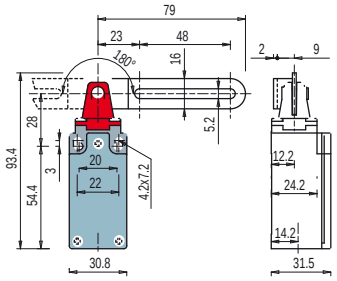
Contact blocks				
5	R	FR 5C4-M2 → 1NO+1NC	FR 5C5-M2 → 1NO+1NC	
6	L	FR 6C4-M2 → 1NO+1NC	FR 6C5-M2 → 1NO+1NC	
9	L	FR 9C4-M2 → 2NC	FR 9C5-M2 → 2NC	
18	LA	FR 18C4-M2 → 1NO+1NC	FR 18C5-M2 → 1NO+1NC	
20	L	FR 20C4-M2 → 1NO+2NC	FR 20C5-M2 → 1NO+2NC	
21	L	FR 21C4-M2 → 3NC	FR 21C5-M2 → 3NC	
22	L	FR 22C4-M2 → 2NO+1NC	FR 22C5-M2 → 2NO+1NC	
33	L	FR 33C4-M2 → 1NO+1NC	FR 33C5-M2 → 1NO+1NC	
34	L	FR 34C4-M2 → 2NC	FR 34C5-M2 → 2NC	
66	L	FR 66C4-M2 → 1NC	FR 66C5-M2 → 1NC	
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	
Travel diagrams		page 304 - group 10	page 304 - group 11	

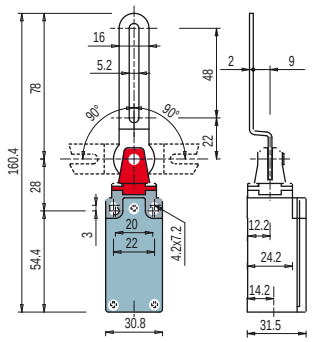
Accessories See page 287

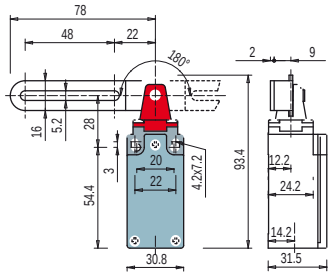
→ The 2D and 3D files are available at **www.pizzato.com**

Contact type:

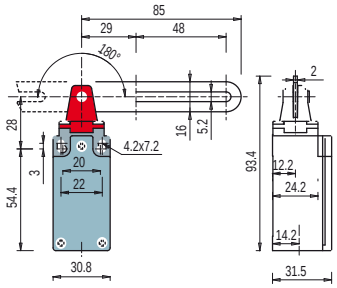
R = snap action
L = slow action
LA = slow action closer

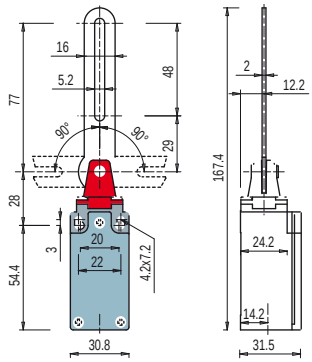






Contact blocks				
5	R	FM 5C1-M2 → 1NO+1NC	FM 5C2-M2 → 1NO+1NC	FM 5C3-M2 → 1NO+1NC
6	L	FM 6C1-M2 → 1NO+1NC	FM 6C2-M2 → 1NO+1NC	FM 6C3-M2 → 1NO+1NC
9	L	FM 9C1-M2 → 2NC	FM 9C2-M2 → 2NC	FM 9C3-M2 → 2NC
18	LA	FM 18C1-M2 → 1NO+1NC	FM 18C2-M2 → 1NO+1NC	FM 18C3-M2 → 1NO+1NC
20	L	FM 20C1-M2 → 1NO+2NC	FM 20C2-M2 → 1NO+2NC	FM 20C3-M2 → 1NO+2NC
21	L	FM 21C1-M2 → 3NC	FM 21C2-M2 → 3NC	FM 21C3-M2 → 3NC
22	L	FM 22C1-M2 → 2NO+1NC	FM 22C2-M2 → 2NO+1NC	FM 22C3-M2 → 2NO+1NC
33	L	FM 33C1-M2 → 1NO+1NC	FM 33C2-M2 → 1NO+1NC	FM 33C3-M2 → 1NO+1NC
34	L	FM 34C1-M2 → 2NC	FM 34C2-M2 → 2NC	FM 34C3-M2 → 2NC
66	L	FM 66C1-M2 → 1NC	FM 66C2-M2 → 1NC	FM 66C3-M2 → 1NC
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)
Travel diagrams		page 304 - group 10	page 304 - group 11	page 304 - group 10





Contact blocks				
5	R	FM 5C4-M2 → 1NO+1NC	FM 5C5-M2 → 1NO+1NC	
6	L	FM 6C4-M2 → 1NO+1NC	FM 6C5-M2 → 1NO+1NC	
9	L	FM 9C4-M2 → 2NC	FM 9C5-M2 → 2NC	
18	LA	FM 18C4-M2 → 1NO+1NC	FM 18C5-M2 → 1NO+1NC	
20	L	FM 20C4-M2 → 1NO+2NC	FM 20C5-M2 → 1NO+2NC	
21	L	FM 21C4-M2 → 3NC	FM 21C5-M2 → 3NC	
22	L	FM 22C4-M2 → 2NO+1NC	FM 22C5-M2 → 2NO+1NC	
33	L	FM 33C4-M2 → 1NO+1NC	FM 33C5-M2 → 1NO+1NC	
34	L	FM 34C4-M2 → 2NC	FM 34C5-M2 → 2NC	
66	L	FM 66C4-M2 → 1NC	FM 66C5-M2 → 1NC	
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	
Travel diagrams		page 304 - group 10	page 304 - group 11	

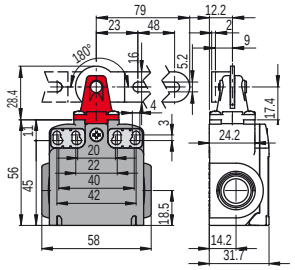
Accessories See page 287

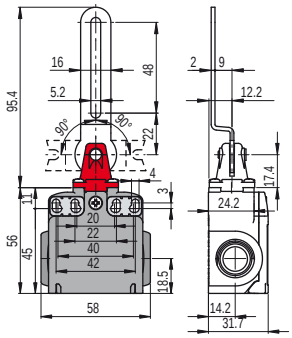
→ The 2D and 3D files are available at **www.pizzato.com**

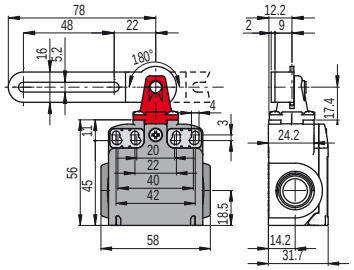
Safety switches **with slotted hole lever**

Contact type:

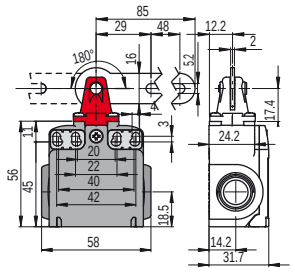
R = snap action
L = slow action
LA = slow action closer

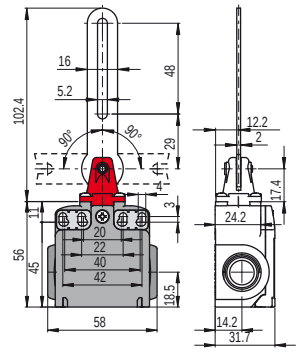






Contact blocks				
5	R	FX 5C1-M2 → 1NO+1NC	FX 5C2-M2 → 1NO+1NC	FX 5C3-M2 → 1NO+1NC
6	L	FX 6C1-M2 → 1NO+1NC	FX 6C2-M2 → 1NO+1NC	FX 6C3-M2 → 1NO+1NC
9	L	FX 9C1-M2 → 2NC	FX 9C2-M2 → 2NC	FX 9C3-M2 → 2NC
18	LA	FX 18C1-M2 → 1NO+1NC	FX 18C2-M2 → 1NO+1NC	FX 18C3-M2 → 1NO+1NC
20	L	FX 20C1-M2 → 1NO+2NC	FX 20C2-M2 → 1NO+2NC	FX 20C3-M2 → 1NO+2NC
21	L	FX 21C1-M2 → 3NC	FX 21C2-M2 → 3NC	FX 21C3-M2 → 3NC
22	L	FX 22C1-M2 → 2NO+1NC	FX 22C2-M2 → 2NO+1NC	FX 22C3-M2 → 2NO+1NC
33	L	FX 33C1-M2 → 1NO+1NC	FX 33C2-M2 → 1NO+1NC	FX 33C3-M2 → 1NO+1NC
34	L	FX 34C1-M2 → 2NC	FX 34C2-M2 → 2NC	FX 34C3-M2 → 2NC
66	L	FX 66C1-M2 → 1NC	FX 66C2-M2 → 1NC	FX 66C3-M2 → 1NC
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)
Travel diagrams		page 304 - group 10	page 304 - group 11	page 304 - group 10





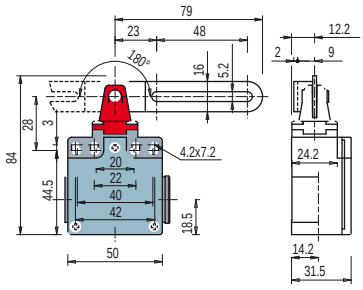
Contact blocks				
5	R	FX 5C4-M2 → 1NO+1NC	FX 5C5-M2 → 1NO+1NC	
6	L	FX 6C4-M2 → 1NO+1NC	FX 6C5-M2 → 1NO+1NC	
9	L	FX 9C4-M2 → 2NC	FX 9C5-M2 → 2NC	
18	LA	FX 18C4-M2 → 1NO+1NC	FX 18C5-M2 → 1NO+1NC	
20	L	FX 20C4-M2 → 1NO+2NC	FX 20C5-M2 → 1NO+2NC	
21	L	FX 21C4-M2 → 3NC	FX 21C5-M2 → 3NC	
22	L	FX 22C4-M2 → 2NO+1NC	FX 22C5-M2 → 2NO+1NC	
33	L	FX 33C4-M2 → 1NO+1NC	FX 33C5-M2 → 1NO+1NC	
34	L	FX 34C4-M2 → 2NC	FX 34C5-M2 → 2NC	
66	L	FX 66C4-M2 → 1NC	FX 66C5-M2 → 1NC	
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	
Travel diagrams		page 304 - group 10	page 304 - group 11	

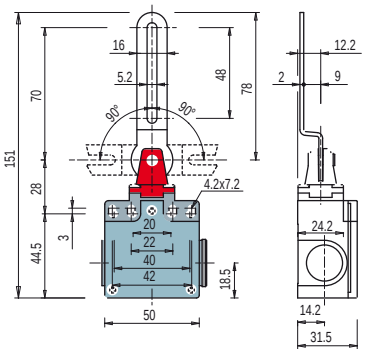
Accessories See page 287

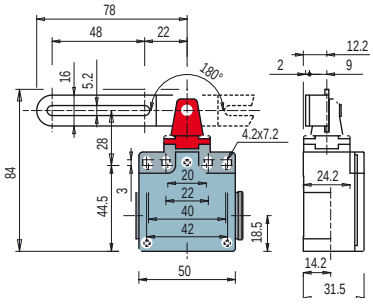
→ The 2D and 3D files are available at **www.pizzato.com**

Contact type:

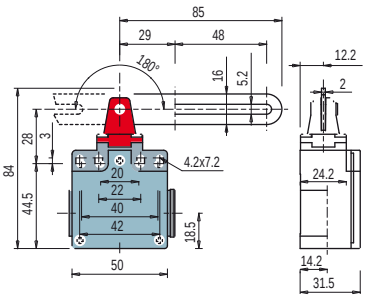
R = snap action
L = slow action
LA = slow action closer

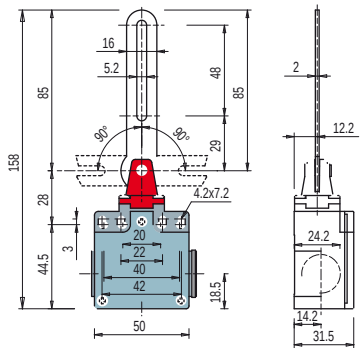






Contact blocks				
5	R	FZ 5C1-M2 → 1NO+1NC	FZ 5C2-M2 → 1NO+1NC	FZ 5C3-M2 → 1NO+1NC
6	L	FZ 6C1-M2 → 1NO+1NC	FZ 6C2-M2 → 1NO+1NC	FZ 6C3-M2 → 1NO+1NC
9	L	FZ 9C1-M2 → 2NC	FZ 9C2-M2 → 2NC	FZ 9C3-M2 → 2NC
18	LA	FZ 18C1-M2 → 1NO+1NC	FZ 18C2-M2 → 1NO+1NC	FZ 18C3-M2 → 1NO+1NC
20	L	FZ 20C1-M2 → 1NO+2NC	FZ 20C2-M2 → 1NO+2NC	FZ 20C3-M2 → 1NO+2NC
21	L	FZ 21C1-M2 → 3NC	FZ 21C2-M2 → 3NC	FZ 21C3-M2 → 3NC
22	L	FZ 22C1-M2 → 2NO+1NC	FZ 22C2-M2 → 2NO+1NC	FZ 22C3-M2 → 2NO+1NC
33	L	FZ 33C1-M2 → 1NO+1NC	FZ 33C2-M2 → 1NO+1NC	FZ 33C3-M2 → 1NO+1NC
34	L	FZ 34C1-M2 → 2NC	FZ 34C2-M2 → 2NC	FZ 34C3-M2 → 2NC
66	L	FZ 66C1-M2 → 1NC	FZ 66C2-M2 → 1NC	FZ 66C3-M2 → 1NC
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)
Travel diagrams		page 304 - group 10	page 304 - group 11	page 304 - group 10





Contact blocks				
5	R	FZ 5C4-M2 → 1NO+1NC	FZ 5C5-M2 → 1NO+1NC	
6	L	FZ 6C4-M2 → 1NO+1NC	FZ 6C5-M2 → 1NO+1NC	
9	L	FZ 9C4-M2 → 2NC	FZ 9C5-M2 → 2NC	
18	LA	FZ 18C4-M2 → 1NO+1NC	FZ 18C5-M2 → 1NO+1NC	
20	L	FZ 20C4-M2 → 1NO+2NC	FZ 20C5-M2 → 1NO+2NC	
21	L	FZ 21C4-M2 → 3NC	FZ 21C5-M2 → 3NC	
22	L	FZ 22C4-M2 → 2NO+1NC	FZ 22C5-M2 → 2NO+1NC	
33	L	FZ 33C4-M2 → 1NO+1NC	FZ 33C5-M2 → 1NO+1NC	
34	L	FZ 34C4-M2 → 2NC	FZ 34C5-M2 → 2NC	
66	L	FZ 66C4-M2 → 1NC	FZ 66C5-M2 → 1NC	
Min. force		0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	
Travel diagrams		page 304 - group 10	page 304 - group 11	

Accessories See page 287

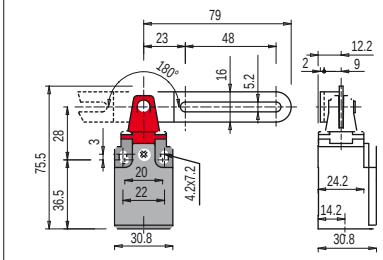
→ The 2D and 3D files are available at **www.pizzato.com**

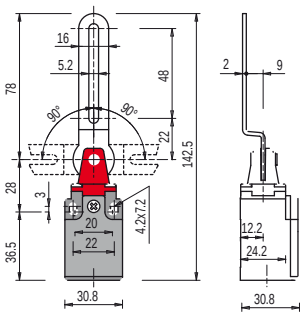
Safety switches **with slotted hole lever**

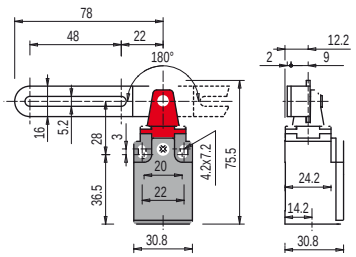
Contact type:

L = slow action

Contact blocks

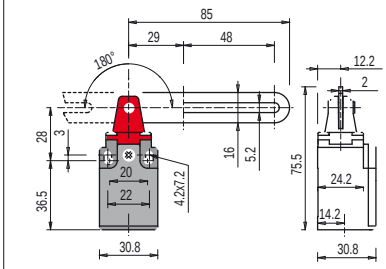


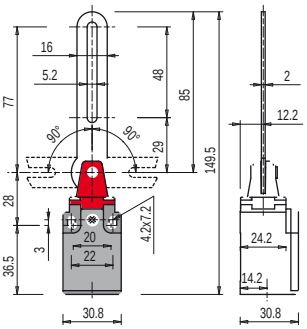




Contact blocks				
33 L	FK 33C1-M1 → 1NO+1NC	FK 33C2-M1 → 1NO+1NC	FK 33C3-M1 → 1NO+1NC
34 L	FK 34C1-M1 → 2NC	FK 34C2-M1 → 2NC	FK 34C3-M1 → 2NC
Min. force	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)
Travel diagrams	page 304 - group 10	page 304 - group 11	page 304 - group 10

Contact blocks





Contact blocks				
33 L	FK 33C4-M1 → 1NO+1NC	FK 33C5-M1 → 1NO+1NC	
34 L	FK 34C4-M1 → 2NC	FK 34C5-M1 → 2NC	
Min. force	0.11 Nm (0.15 Nm →)	0.11 Nm (0.15 Nm →)	
Travel diagrams	page 304 - group 10	page 304 - group 11	

Accessories See page 287

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