



ATEX





Technical definitions

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FD series position switches

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Category	Zone	EPL	Approvals	Product code extension	ATEX/EPL category				
					M2/Mb	2G/Gb	2D/Db	3G/Gc	3D/Dc
3D	22	Dc	Ex II 3D Ex tc IIIC T80°C Dc	-EX4	-	-	-	-	■
2G M2	1 M2	Gb Mb	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb	-EX7	■	■	-	■	-
2D	21	Db	Ex II 2D Ex tb IIIC T80°C Db	-EX8	-	-	■	-	■

FL series position switches

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Category	Zone	EPL	Approvals	Product code extension	ATEX/EPL category				
					M2/Mb	2G/Gb	2D/Db	3G/Gc	3D/Dc
3D	22	Dc	Ex II 3D Ex tc IIIC T80°C Dc	-EX4	-	-	-	-	■
2G M2	1 M2	Gb Mb	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb	-EX7	■	■	-	■	-
2D	21	Db	Ex II 2D Ex tb IIIC T80°C Db	-EX8	-	-	■	-	■

FM series position switches

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Category	Zone	EPL	Approvals	Product code extension	ATEX/EPL category				
					M2/Mb	2G/Gb	2D/Db	3G/Gc	3D/Dc
2G M2	1 M2	Gb Mb	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb	-EX7	■	■	-	■	-

FA series pre-wired position switches

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Category	Zone	EPL	Approvals	Product code extension	ATEX/EPL category				
					M2/Mb	2G/Gb	2D/Db	3G/Gc	3D/Dc
3D 3G	22 2	Dc Gc	Ex II 3D Ex tc IIIC T80°C Dc Ex II 3G Ex nC IIC T6 Gc	-EX5	-	-	-	■	■

Accessories

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ATEX Directive

The acronym ATEX (**A**tmospheres **E**xplosives) refers to two European directives concerning the risk of deflagration in potentially explosive atmospheres:

- ATEX 2014/34/EU: concerns the requirements for electrical and non-electrical equipment for use in potentially explosive environments. According to this directive, the manufacturer has to comply with the provided requirements and mark its articles according to specific categories.
- ATEX 99/92/EC: lays down minimum requirements for the safety and health protection of workers potentially at risk from explosive atmospheres.

These directives define the requirements for the protection of safety and health of persons, domestic animals and property, as well as the conformity assessment procedures to prove that the devices comply with the directives' requirements.

Classification of potentially explosive atmospheres

A potentially explosive atmosphere is an atmosphere which could become explosive due to local and/or operational conditions. These environments present a mixture with air under atmospheric conditions of flammable substances in the form of in the form of gases, vapours, mists or dusts.

The ATEX 99/92/EC Directive classifies two types of potentially explosive atmospheres, depending on presence of combustible gases or dusts in the zone. These two types of explosive atmospheres are in turn classified in three zones each, according to the frequency and duration of the explosive atmosphere. Areas in atmospheres with explosive gases are classified in zones 0, 1 and 2; whereas in atmospheres with explosive dusts in zones 20, 21 and 22:

- Zone 0/20: A place in which the presence of flammable gas or dust is continuously present. Constant danger. It requires at least Category 1 equipment.
- Zone 1/21: A place in which the presence of flammable gas or dust is likely to occur in normal operation occasionally. Potential danger. It requires at least Category 2 equipment.
- Zone 2/22: A place in which the presence of flammable gas or dust is not likely to occur in normal operation or, if it does occur, will persist for a short period only. Or it occurs due to a failure. Lower danger. It requires at least Category 3 equipment.

The end user has the responsibility to identify and classify the different zones and to install appropriate equipment.

Equipment categories acc. to ATEX directive and IEC standards

According to the ATEX Directive 2014/34/EU equipment is classified into two main groups:

- Group I: equipment and systems for mining
- Group II: equipment and systems for all other applications

Equipment of the group I is divided in two further categories according to the required protection level:

- Category M1: Equipment designed to ensure a very high level of protection
- Category M2: Equipment designed to ensure a high level of protection

Equipment of the group II is further subdivided into three categories according to the required protection level:

- Category 1: Equipment designed to ensure a very high level of protection (for use in zone 0 and 20, 1 and 21, 2 and 22)
- Category 2: Equipment designed to ensure a high level of protection (for use in zone 1 and 21, 2 and 22)
- Category 3: Equipment designed to ensure a normal level of protection (for use in zone 2 and 22)

A comparison between the EPL (Equipment Protection Levels) defined by the IEC 60079-0 standard and the categories and applications of the ATEX Directive are shown in table 1.

Environment features				Equipment features				
Field of application	Flammable substance	Potentially explosive atmosphere	Classification of potentially explosive atmospheres: ZONE	acc. to ATEX 2014/34/EU		acc. to IEC 60079-0		Required protection level
				Required marking of the device: CATEGORY	Required marking of the device: GROUP	Group	EPL	
Mining				M1	I	I	Ma	very high
				M2			Mb	high
Surface	Gases	It is present continuously, or for long periods or frequently	0	1G	II	II	Ga	very high
		It is likely to occur	1	2G			Gb	high
		It is not likely to occur but, if it does occur, will persist for a short period only	2	3G			Gc	normal
	Dusts	It is present continuously, or for long periods or frequently	20	1D		III	Da	very high
		It is likely to occur	21	2D			Db	high
		It is not likely to occur but, if it does occur, will persist for a short period only	22	3D			Dc	normal

Table 1 – Classification of environment and equipment according to ATEX directive and IEC 60079-0 standard

Protective measures

To avoid the risk of explosions caused by an electrical trigger in a potentially explosive atmosphere, different protective measures can be taken:

- use of enclosures to encapsulate dangerous part in order to limit explosions to the inside of the housing itself;
- avoid contact between hot spots and the potentially explosive atmosphere by interposing solid, liquid or gaseous bodies;
- take measures to limit the generation of dangerous hot spots, eliminating the possibility of failures or limiting the system power so that it is insufficient to cause the ignition.

Various protective modes have been developed and standardised for each of these modes as listed in table 2.

Protective measure	Symbol	Engraving	Zone GAS	Zone DUSTS	IEC / EN standard
General requirements	/	/	0, 1, 2	20, 21, 22	IEC 60079-0 EN 60079-0
Oil immersion		Ex ob Ex oc	1 2	/	IEC 60079-6 EN 60079-6
Pressurized enclosure		Ex pv Ex pxb Ex pyb Ex pzc	1, 2 1 1 2	/ 21 21 22	IEC 60079-2 EN 60079-2
Powder filling		Ex q	1	/	IEC 60079-5 EN 60079-5
Flameproof enclosure		Ex da Ex db Ex dc	0 1 2	/	IEC 60079-1 EN 60079-1
Increased safety		Ex eb Ex ec	1 2	/	IEC 60079-7 EN 60079-7
Intrinsic safety		Ex ia Ex ib Ex ic	0 1 2	20 21 22	IEC 60079-11 EN 60079-11
Encapsulation		Ex ma Ex mb Ex mc	0 1 2	20 21 22	IEC 60079-18 EN 60079-18
Non sparking		Ex nA Ex nC Ex nR	2 2 2	/	IEC 60079-15 EN 60079-15
Protective housing		Ex ta Ex tb Ex tc	/	20 21 22	IEC 60079-31 EN 60079-31
Optical radiation		Ex op is Ex op pr Ex op sh	0, 1, 2 1, 2 0, 1, 2	20, 21, 22 21, 22 20, 21, 22	IEC 60079-28 EN 60079-28

Table 2 - Protective measures and applicable standards

Marking examples

Devices for places with presence of gas

Ex II 2G Ex ia IIC T6 Gb

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① EU marking
- ② Equipment group (see table 1)
- ③ Protection category (see table 1)
- ④ Prefix for safety devices according to the IEC / EN standards
- ⑤ Type of protection (see table 2)
- ⑥ Classification of gases (see table 4)
- ⑦ Temperature class (see table 3)
- ⑧ EPL acc. to IEC 60079-0 (see table 1)

Devices for places with presence of dusts

Ex II 3D Ex tc IIIC T80°C Dc

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① EU marking
- ② Equipment group (see table 1)
- ③ Protection category (see table 1)
- ④ Prefix for safety devices according to the IEC / EN standards
- ⑤ Type of protection (see table 2)
- ⑥ Classification of dusts (see table 5)
- ⑦ Maximum surface temperature of the equipment
- ⑧ EPL acc. to IEC 60079-0 (see table 1)

Class	T1	T2	T3	T4	T5	T6
Maximum surface temperature of the equipment	450 °C	300 °C	200 °C	135 °C	100 °C	85 °C

Table 3 - Temperature classes

	I	IIA	IIB	IIC
T1	methane	propane, industrial methane, ethane, benzene, ammoniac, acetic acid, carbon monoxide, methanol, toluene	acrylonitrile	hydrogen
T2		ethanol, amyl acetate, butane	ethylene	acetylene
T3		nafta, benzene, esano	hydrogen sulfide	
T4		acetaldehyde	ethyl ether	
T5				
T6				carbon disulfide

Table 4 - Classification of gases (excerpt from standard IEC / CENELEC/NEC 505)

IIIA	IIIB	IIC
combustible particles	non-conductive powder	conductive powder

Table 5 - Classification of dusts



Main features

- ATEX approval
- Metal housing, one conduit entry
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings:

Product code extension	Quality mark	Certificate type and notified body
-EX4		EU declaration of conformity Pizzato Elettrica S.r.l.
-EX7		EU type examination certificate TUV Italia
-EX8		EU type examination certificate TUV Italia

Installation for safety applications:

Use only switches marked with the  symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications and **EN ISO 13849-2 tables D3** (well-tried components) and **D.8** (fault exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 230. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given in the registration certificate, in the operating manual and on pages 227 to 242.

⚠ For the correct use of the switch, please use appropriate cable glands suitable for the zone in compliance with the ATEX directive, see Accessories on page 183.

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5
Protection degree acc. to EN 60529:	IP66 with cable gland of equal or higher protection degree

General data

Ambient temperature (-EX7):	-20°C ... +60°C
Ambient temperature (-EX4/-EX8):	-20°C ... +70°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	
FD ••••-EX•	10 million operating cycles
FD ••93-EX•, FD ••78-EX•, FD ••8•-EX•, FD ••95-EX•	500,000 operating cycles
FD ••99-EX•, FD ••R2-EX•	250,000 operating cycles
Mounting position:	any
Safety parameters B _{10D} (NC contacts):	
FD ••••-EX•	20,000,000
FD ••93-EX•, FD ••78-EX•, FD ••8•-EX•	1,000,000
FD ••99-EX•, FD ••R2-EX•	500,000
FD ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 229
Wire cross-sections and wire stripping lengths:	see page 249

Contact blocks available:

2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 28, 29, 30, 33, 34, 37, 66, 67

Note: contact blocks 2 and 3 are not available for articles FD ••••-EX7, FD ••••-EX8.

In compliance with standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, EN 50041, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA C22.2 No. 14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11, EN IEC 63000.

Compliance with the requirements of:

ATEX Directive 2014/34/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

Positive contact opening in conformity with standards:

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

Product code extension	Category	Zone	EPL	Approvals	Electrical data	Utilization category
-EX4	3D	22	Dc	 II 3D Ex tc IIIC T80°C Dc	Thermal current (I _{th}): 10 A Rated insulation voltage (U _i): 500 Vac 600 Vdc 400 Vac for contact blocks 20, 28 Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type aM fuse 10 A 500 V Pollution degree: 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 250 400 500 Ie (A) 6 4 1 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 3 0.55 0.3
-EX7	2G M2	1 M2	Gb Mb	 II 2G Ex ia IIC T6 Gb  I M2 Ex ia I Mb	⚠ This switch type must be used only in intrinsic safety circuits in compliance with standard IEC 60079-11, EN 60079-11 Maximum current (Ii): 2.5 A Maximum voltage (Ui): 30 Vdc Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type gG fuse 4 A 250 V Pollution degree: 3	
-EX8	2D	21	Db	 II 2D Ex tb IIIC T80°C Db	Thermal current (I _{th}): 6 A Rated insulation voltage (U _i): 250 Vac/Vdc Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type aM fuse 6 A 500 V Pollution degree: 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 250 Ie (A) 6 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 3 0.55 0.3

Quality marks of the product



UL approval: E131787
EAC approval: RU C-IT.YT03.B.00035/19

Features approved by UL

Electrical Ratings: Q300 pilot duty (69 VA, 125-250 V dc)
A600 pilot duty (720 VA, 120-600 V ac)

Environmental Ratings: Types 1, 4X, 12, 13

For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).

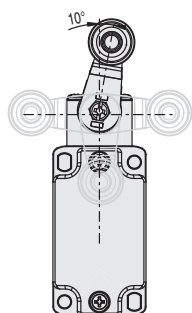
For contact blocks 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 14 AWG. Tightening torque for terminal screws of 12 lb in (1.4 Nm).

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

Adjustable levers

For these switches the lever can be adjusted in 10° steps over the entire 360° range. The positive movement transmission

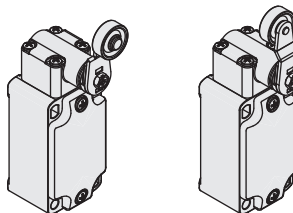
is always guaranteed thanks to the particular geometrical coupling between the lever and the revolving shaft as prescribed for safety applications by the German standard BG-GS-ET-15.



Reversible levers

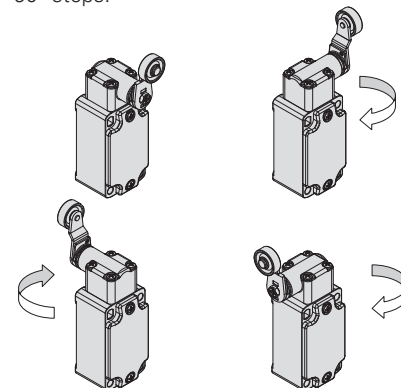
With these switches, the lever can be secured in either the normal or reverse position, whereby positive coupling is retained.

In this way two different working planes of the lever are possible.



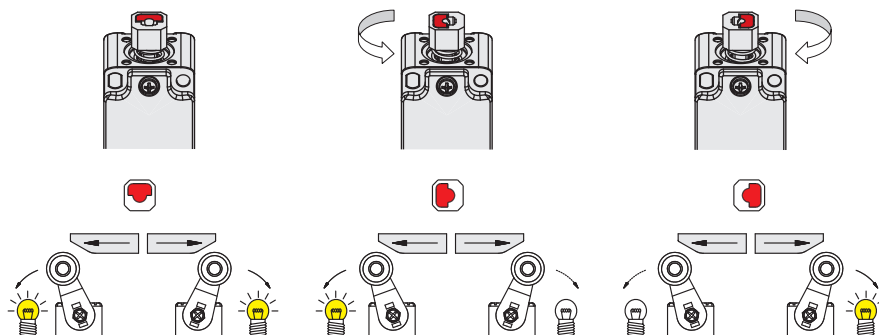
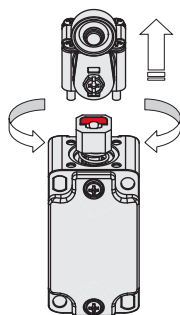
Head with variable orientation

For all switches the head can be rotated in 90° steps.



Unidirectional heads

For switches with swivelling lever, the unidirectional operation can be set by removing the four head screws and rotating the internal plunger.



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 product code extension
FD 502-GM2-EX7

Housing

FD metal, one conduit entry

Contact block

5 1NO+1NC, snap action
6 1NO+1NC, slow action
7 1NO+1NC, slow action, make before break
... ..

Actuators

01 short plunger
02 roller lever
... ..

ATEX approval

-EX4 II 3D Ex tc IIIC T80°C Dc
-EX7 II 2G Ex ia IIC T6 Gb
II M2 Ex ia I Mb
-EX8 II 2D Ex tb IIIC T80°C Db

Contact type

G silver contacts (standard)
G silver contacts, 1 µm gold coating
G1 silver contacts, 2.5 µm gold coating (not for contact block 2, 20, 21, 22, 28, 29, 30)

Contact type:
R = snap action
L = slow action

Category		Contact block	With steel roller with self-lubrication or 316L stainless steel on request		With steel roller with self-lubrication or 316L stainless steel on request		With steel roller with self-lubrication or 316L stainless steel on request			
3D	2	R	FD 201-M2-EX4	2x(1NO-1NC)	FD 202-M2-EX4	2x(1NO-1NC)	FD 205-M2-EX4	2x(1NO-1NC)	FD 211-M2-EX4	2x(1NO-1NC)
	5	R	FD 501-M2-EX4	➔ 1NO+1NC	FD 502-M2-EX4	➔ 1NO+1NC	FD 505-M2-EX4	➔ 1NO+1NC	FD 511-M2-EX4	➔ 1NO+1NC
	6	L	FD 601-M2-EX4	➔ 1NO+1NC	FD 602-M2-EX4	➔ 1NO+1NC	FD 605-M2-EX4	➔ 1NO+1NC	FD 611-M2-EX4	➔ 1NO+1NC
	20	L	FD 2001-M2-EX4	➔ 1NO+2NC	FD 2002-M2-EX4	➔ 1NO+2NC	FD 2005-M2-EX4	➔ 1NO+2NC	FD 2011-M2-EX4	➔ 1NO+2NC
2G M2	5	R	FD 501-M2-EX7	➔ 1NO+1NC	FD 502-M2-EX7	➔ 1NO+1NC	FD 505-M2-EX7	➔ 1NO+1NC	FD 511-M2-EX7	➔ 1NO+1NC
	20	L	FD 2001-M2-EX7	➔ 1NO+2NC	FD 2002-M2-EX7	➔ 1NO+2NC	FD 2005-M2-EX7	➔ 1NO+2NC	FD 2011-M2-EX7	➔ 1NO+2NC
2D	5	R	FD 501-M2-EX8	➔ 1NO+1NC	FD 502-M2-EX8	➔ 1NO+1NC	FD 505-M2-EX8	➔ 1NO+1NC	FD 511-M2-EX8	➔ 1NO+1NC
	20	L	FD 2001-M2-EX8	➔ 1NO+2NC	FD 2002-M2-EX8	➔ 1NO+2NC	FD 2005-M2-EX8	➔ 1NO+2NC	FD 2011-M2-EX8	➔ 1NO+2NC
Max. speed		0.5 m/s		0.5 m/s with cam at 30°		0.5 m/s with cam at 30°		0.5 m/s		
Actuating force		8 N (25 N ➔)		6 N (25 N ➔)		6 N (25 N ➔)		8 N (25 N ➔)		
Travel diagrams		page 230 - group 1		page 230 - group 2		page 230 - group 2		page 230 - group 1		

Contact type:
R = snap action
L = slow action

		External gasket		Ball, Ø 12.7 mm, stainless steel		External gasket			
Contact type: R = snap action L = slow action									
Category	Contact block								
3D	2 R	FD 215-M2-EX4	2x(1NO-1NC)	FD 216-M2-EX4	2x(1NO-1NC)	FD 219-M2-EX4	2x(1NO-1NC)	FD 220-M2-EX4	2x(1NO-1NC)
	5 R	FD 515-M2-EX4	➔ 1NO+1NC	FD 516-M2-EX4	➔ 1NO+1NC	FD 519-M2-EX4	➔ 1NO+1NC	FD 520-M2-EX4	1NO+1NC
	6 L	FD 615-M2-EX4	➔ 1NO+1NC	FD 616-M2-EX4	➔ 1NO+1NC	FD 619-M2-EX4	➔ 1NO+1NC	/	/
	20 L	FD 2015-M2-EX4	➔ 1NO+2NC	FD 2016-M2-EX4	➔ 1NO+2NC	FD 2019-M2-EX4	➔ 1NO+2NC	FD 2020-M2-EX4	1NO+2NC
2G M2	5 R	FD 515-M2-EX7	➔ 1NO+1NC	FD 516-M2-EX7	➔ 1NO+1NC	FD 519-M2-EX7	➔ 1NO+1NC	FD 520-M2-EX7	1NO+1NC
	20 L	FD 2015-M2-EX7	➔ 1NO+2NC	FD 2016-M2-EX7	➔ 1NO+2NC	FD 2019-M2-EX7	➔ 1NO+2NC	FD 2020-M2-EX7	1NO+2NC
2D	5 R	/	/	FD 516-M2-EX8	➔ 1NO+1NC	FD 519-M2-EX8	➔ 1NO+1NC	/	/
	20 L	/	/	FD 2016-M2-EX8	➔ 1NO+2NC	FD 2019-M2-EX8	➔ 1NO+2NC	/	/
Max. speed		0.5 m/s with cam at 30°		0.5 m/s with cam at 30°		0.5 m/s		1 m/s	
Actuating force		11 N (25 N ➔)		8 N (25 N ➔)		8 N (25 N ➔)		0.09 Nm	
Travel diagrams		page 230 - group 1		page 230 - group 1		page 230 - group 1		page 230 - group 3	

Contact type:
R = snap action
L = slow action

		External gasket		External gasket		Bistable		Rope switch for signalling	
Category	Contact block								
3D	2 R	FD 221-M2-EX4	2x(1NO-1NC)	FD 225-M2-EX4	2x(1NO-1NC)	/		FD 276-M2-EX4	2x(1NO-1NC)
	5 R	FD 521-M2-EX4	1NO+1NC	FD 525-M2-EX4	1NO+1NC	FD 541-M2-EX4	➔ 1NO+1NC	FD 576-M2-EX4	1NO+1NC
	6 L	/		/		/		FD 676-M2-EX4	1NO+1NC
	20 L	FD 2021-M2-EX4	1NO+2NC	FD 2025-M2-EX4	1NO+2NC	/		FD 2076-M2-EX4	2NO+1NC
2G M2	5 R	FD 521-M2-EX7	1NO+1NC	FD 525-M2-EX7	1NO+1NC	FD 541-M2-EX7	➔ 1NO+1NC	FD 576-M2-EX7	1NO+1NC
	20 L	FD 2021-M2-EX7	1NO+2NC	FD 2025-M2-EX7	1NO+2NC	/		FD 2076-M2-EX7	2NO+1NC
2D	5 R	/		/		FD 541-M2-EX8	➔ 1NO+1NC	FD 576-M2-EX8	1NO+1NC
	20 L	/		/		/		FD 2076-M2-EX8	2NO+1NC
Max. speed		1 m/s		1 m/s		0.5 m/s with cam at 30°		0.5 m/s	
Actuating force		0.08 Nm		0.14 Nm		0.21 Nm (0.36 Nm ➔)		initial 20 N - final 40 N	
Travel diagrams		page 230 - group 3		page 230 - group 3		page 230 - group 4		page 230 - group 6	

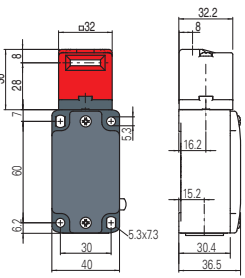
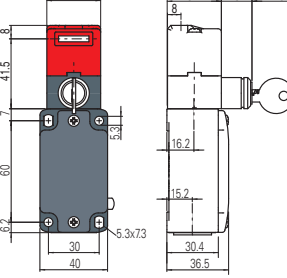
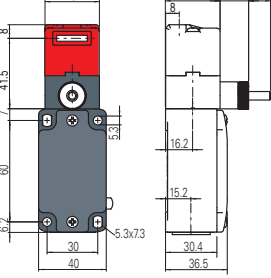
All values in the drawings are in mm

Accessories See page 207

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

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Safety switches with separate actuator

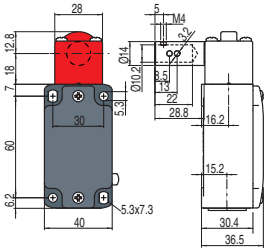
		Switches with separate actuator	Switches with separate actuator and key release	Switches with manual mechanical delay
		Switch without actuator	Switch without actuator	Switch without actuator
Contact type:  = slow action				
Category	Contact block			
3D	6 	FD 693-M2-EX4  1NO+1NC	/	FD 6R2-M2-EX4  1NO+1NC
	18 	/	FD 1899-M2-EX4  1NO+1NC	/
	20 	FD 2093-M2-EX4  1NO+2NC	FD 2099-M2-EX4  1NO+2NC	FD 20R2-M2-EX4  1NO+2NC
	28 	/	FD 2899-M2-EX4  1NO+2NC	/
2G M2	20 	FD 2093-M2-EX7  1NO+2NC	FD 2099-M2-EX7  1NO+2NC	FD 20R2-M2-EX7  1NO+2NC
	28 	/	FD 2899-M2-EX7  1NO+2NC	/
2D	20 	FD 2093-M2-EX8  1NO+2NC	FD 2099-M2-EX8  1NO+2NC	FD 20R2-M2-EX8  1NO+2NC
	28 	/	FD 2899-M2-EX8  1NO+2NC	/
Actuating force		10 N (18 N )	30 N (40 N )	10 N (18 N )
Travel diagrams		see General Catalogue Safety 2023-2024	see General Catalogue Safety 2023-2024	see General Catalogue Safety 2023-2024

Actuators

VF KEYF	VF KEYF1	VF KEYF2	VF KEYF3	VF KEYF7	VF KEYF8
Straight actuator	Angled actuator	Swivelling actuator	Actuator adjustable in two directions	Actuator adjustable in one direction	Universal actuator

IMPORTANT: These actuators can be used only with items of the FD series (e.g. FD 2093-M2-EX7).
Actuators with low level of coding acc. to EN ISO 14119.

Safety switches for hinges

Contact type:  = slow action				
Category	Contact block			
3D	18 	FD 1895-M2-EX4  1NO+1NC		
	20 	FD 2095-M2-EX4  1NO+2NC		
2G M2	20 	FD 2095-M2-EX7  1NO+2NC		
2D	20 	FD 2095-M2-EX8  1NO+2NC		
Actuating force		0,15 Nm (0,4 Nm )		
Travel diagrams		see General Catalogue Safety 2023-2024		

Safety rope switches with reset for emergency stops

Contact type:

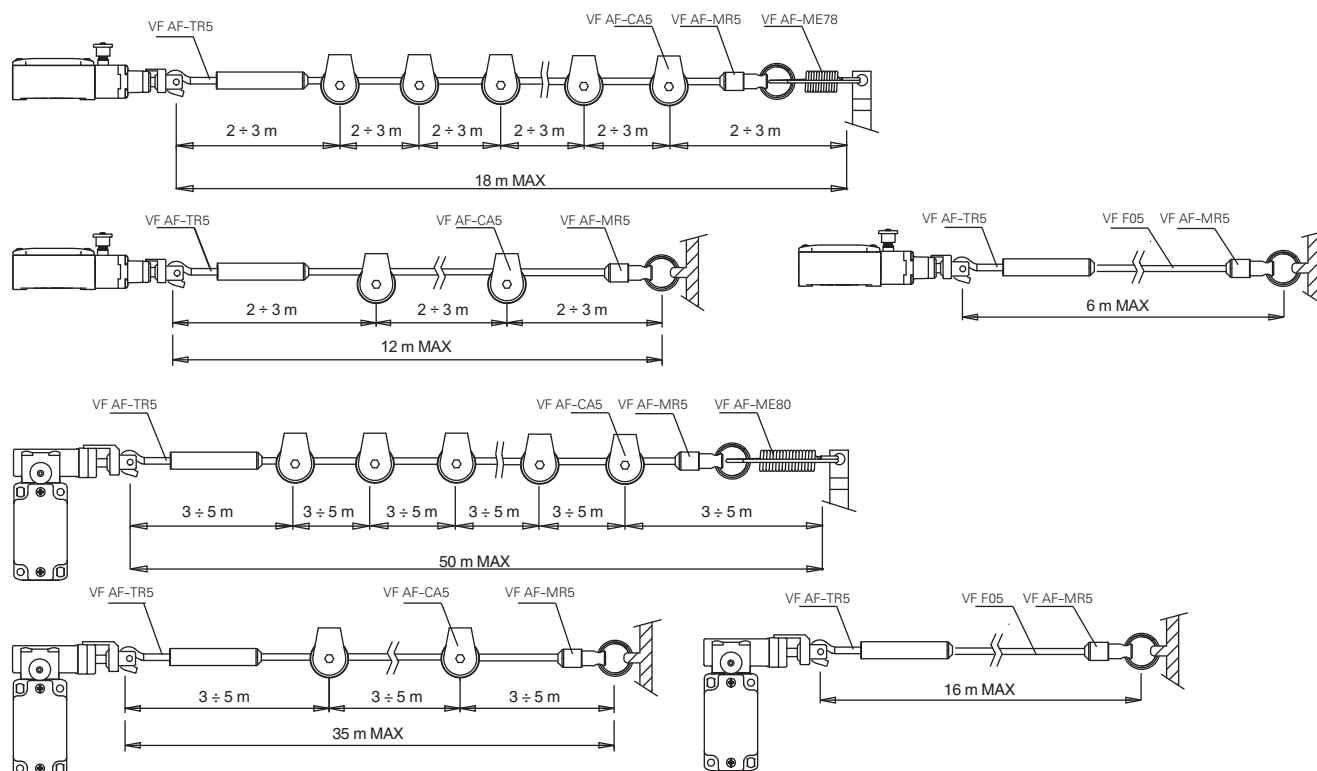
L = slow action

Category	Contact block				
3D	18 L	FD 1878-M2-EX4	→ 1NO+1NC	FD 1883-M2-EX4	→ 1NO+1NC
	20 L	FD 2078-M2-EX4	→ 1NO+2NC	FD 2083-M2-EX4	→ 1NO+2NC
2G M2	20 L	FD 2078-M2-EX7	→ 1NO+2NC	FD 2083-M2-EX7	→ 1NO+2NC
				FD 2084-M2-EX7	→ 1NO+2NC
2D	18 L	FD 1878-M2-EX8	→ 1NO+1NC	FD 1883-M2-EX8	→ 1NO+1NC
	20 L	FD 2078-M2-EX8	→ 1NO+2NC	FD 2083-M2-EX8	→ 1NO+2NC
Actuating force		initial 63 N ... final 83 N (90 N →)		initial 147 N ... final 235 N (250 N →)	
Travel diagrams		see General Catalogue Safety 2023-2024		see General Catalogue Safety 2023-2024	

Accessories for rope installation

VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR11	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal heads	Safety spring for transversal heads	Rope coil Ø 5 mm length 100 m	Rope function indicator	Stainless steel pulley	Angular pulley, stainless steel

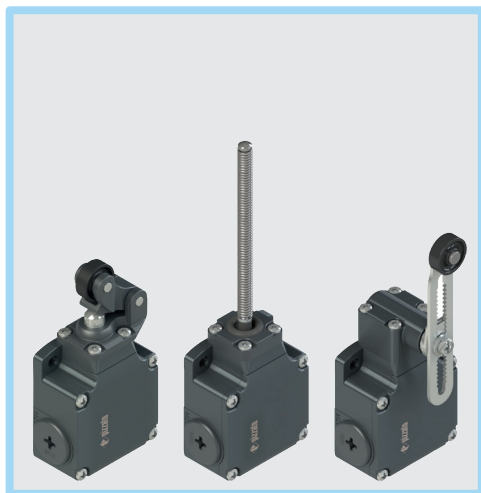
Application examples and max. rope length



All values in the drawings are in mm

Accessories See page 207

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



Main features

- ATEX approval
- Metal housing, three conduit entries
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings:

Product code extension	Quality mark	Certificate type and notified body
-EX4		EU declaration of conformity Pizzato Elettrica S.r.l.
-EX7		EU type examination certificate TUV Italia
-EX8		EU type examination certificate: TUV Italia

Installation for safety applications:

Use only switches marked with the  symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications and **EN ISO 13849-2 tables D3** (well-trying components) and **D.8** (fault exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 230. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given in the registration certificate, in the operating manual and on pages 227 to 242.

⚠ For the correct use of the switch, please use appropriate cable glands suitable for the zone in compliance with the ATEX directive, see Accessories on page 183.

Technical data

Housing

Metal housing, powder-coated	
Three threaded conduit entries:	M20x1.5
Protection degree acc. to EN 60529:	IP66 with cable gland of equal or higher protection degree

General data

Ambient temperature (-EX7):	-20°C ... +60°C
Ambient temperature (-EX4/-EX8):	-20°C ... +70°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	
FL ••••-EX•	10 million operating cycles
FL ••93-EX•, FL ••78-EX•, FL ••8•-EX•, FL ••95-EX•	500,000 operating cycles
Mounting position:	any
Safety parameters B _{10D} (NC contacts):	
FL ••••-EX•	20,000,000
FL ••93-EX•, FL ••78-EX•, FL ••8•-EX•	1,000,000
FL ••95-EX•	2,500,000
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 229
Wire cross-sections and wire stripping lengths:	see page 249

Contact blocks available:

2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 28, 29, 30, 33, 34, 37, 66, 67

Note: contact blocks 2 and 3 are not available for articles FL ••••-EX7, FL ••••-EX8.

In compliance with standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, EN 50041, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA C22.2 No. 14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11, EN IEC 63000.

Compliance with the requirements of:

ATEX Directive 2014/34/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

Positive contact opening in conformity with standards:

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

Product code extension	Category	Zone	EPL	Approvals	Electrical data	Utilization category
-EX4	3D	22	Dc	 II 3D Ex tc IIIC T80°C Dc	Thermal current (I _n): 10 A Rated insulation voltage (U _i): 500 Vac 600 Vdc 400 Vac for contact blocks 20, 28 Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type aM fuse 10 A 500 V Pollution degree: 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 250 400 500 Ie (A) 6 4 1 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 3 0.55 0.3
-EX7	2G M2	1 M2	Gb Mb	 II 2G Ex ia IIC T6 Gb  I M2 Ex ia I Mb	Maximum current (Ii): 2.5 A Maximum voltage (Ui): 30 Vdc Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type gG fuse 4 A 250 V Pollution degree: 3	⚠ This switch type must be used only in intrinsic safety circuits in compliance with standard IEC 60079-11, EN 60079-11
-EX8	2D	21	Db	 II 2D Ex tb IIIC T80°C Db	Thermal current (I _n): 6 A Rated insulation voltage (U _i): 250 Vac/Vdc Conditional short circuit current: 1000 A acc. to EN 60947-5-1 Protection against short circuits: type aM fuse 6 A 500 V Pollution degree: 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 250 Ie (A) 6 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 3 0.55 0.3

Quality marks of the product



UL approval: E131787
EAC approval: RU C-IT.YT03.B.00035/19

Features approved by UL

Electrical Ratings: Q300 pilot duty (69 VA, 125-250 V dc)
A600 pilot duty (720 VA, 120-600 V ac)

Environmental Ratings: Types 1, 4X, 12, 13

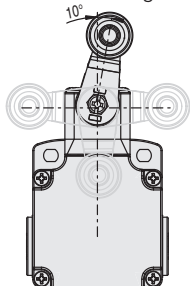
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).

For contact blocks 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 14 AWG. Tightening torque for terminal screws of 12 lb in (1.4 Nm).

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

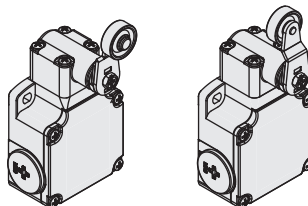
Adjustable levers

For switches with swivelling lever, the lever can be adjusted in 10° steps over the entire 360° range. The positive movement transmission is always guaranteed thanks to the particular geometrical coupling between the lever and the revolving shaft as prescribed for safety applications by the German standard BG-GS-ET-15.



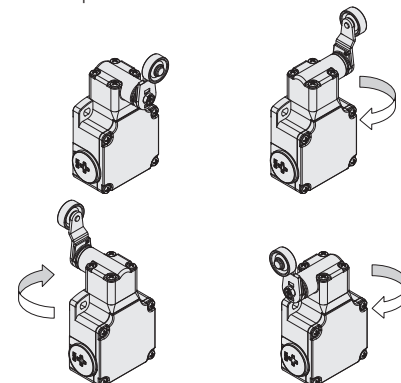
Reversible levers

For switches with swivelling lever, the lever can be fastened on straight or reverse side maintaining the positive coupling. In this way two different working planes of the lever are possible.



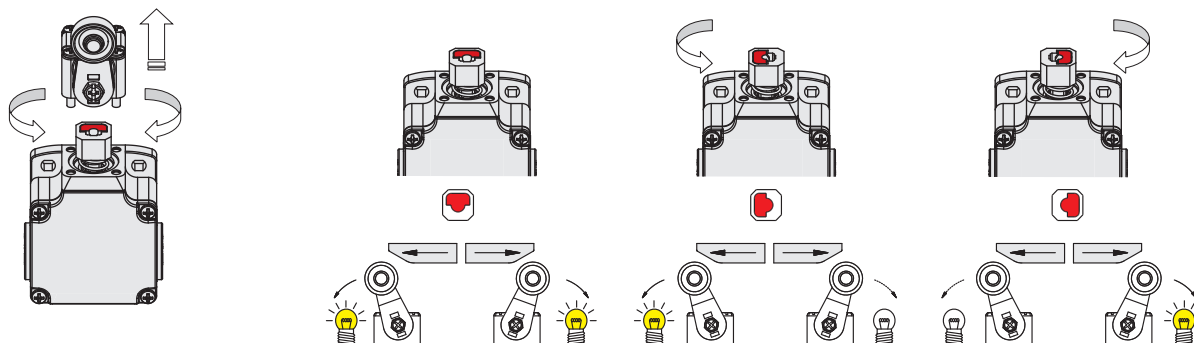
Head with variable orientation

For all switches the head can be rotated in 90° steps.



Unidirectional heads

For switches with swivelling lever, the unidirectional operation can be set by removing the four head screws and rotating the internal plunger (except contact block 16).



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 product code extension
FL 502-GM2-EX7

Housing

FL metal, three conduit entries

Contact block

5 1NO+1NC, snap action
6 1NO+1NC, slow action
7 1NO+1NC, slow action, make before break
... ..

Actuators

01 short plunger
02 roller lever
... ..

ATEX approval

-EX4 Ex II 3D Ex tc IIIC T80°C Dc
-EX7 Ex II 2G Ex ia IIC T6 Gb
Ex I M2 Ex ia I Mb
-EX8 Ex II 2D Ex tb IIIC T80°C Db

Contact type

G silver contacts, 1 µm gold coating
G1 silver contacts, 2.5 µm gold coating (not for contact block 2, 20, 21, 22, 28, 29, 30)

Contact type:
R = snap action
L = slow action

Contact type: R = snap action L = slow action				With steel roller with self-lubrication or 316L stainless steel on request		With steel roller with self-lubrication or 316L stainless steel on request				
Category	Contact block									
3D	2	R	FL 201-M2-EX4	2x(1NO-1NC)	FL 202-M2-EX4	2x(1NO-1NC)	FL 205-M2-EX4	2x(1NO-1NC)	FL 211-M2-EX4	2x(1NO-1NC)
	5	R	FL 501-M2-EX4	➔ 1NO+1NC	FL 502-M2-EX4	➔ 1NO+1NC	FL 505-M2-EX4	➔ 1NO+1NC	FL 511-M2-EX4	➔ 1NO+1NC
	6	L	FL 601-M2-EX4	➔ 1NO+1NC	FL 602-M2-EX4	➔ 1NO+1NC	FL 605-M2-EX4	➔ 1NO+1NC	FL 611-M2-EX4	➔ 1NO+1NC
	20	L	FL 2001-M2-EX4	➔ 1NO+2NC	FL 2002-M2-EX4	➔ 1NO+2NC	FL 2005-M2-EX4	➔ 1NO+2NC	FL 2011-M2-EX4	➔ 1NO+2NC
2G M2	5	R	FL 501-M2-EX7	➔ 1NO+1NC	FL 502-M2-EX7	➔ 1NO+1NC	FL 505-M2-EX7	➔ 1NO+1NC	FL 511-M2-EX7	➔ 1NO+1NC
	20	L	FL 2001-M2-EX7	➔ 1NO+2NC	FL 2002-M2-EX7	➔ 1NO+2NC	FL 2005-M2-EX7	➔ 1NO+2NC	FL 2011-M2-EX7	➔ 1NO+2NC
2D	5	R	FL 501-M2-EX8	➔ 1NO+1NC	FL 502-M2-EX8	➔ 1NO+1NC	FL 505-M2-EX8	➔ 1NO+1NC	FL 511-M2-EX8	➔ 1NO+1NC
	20	L	FL 2001-M2-EX8	➔ 1NO+2NC	FL 2002-M2-EX8	➔ 1NO+2NC	FL 2005-M2-EX8	➔ 1NO+2NC	FL 2011-M2-EX8	➔ 1NO+2NC
Max. speed		0.5 m/s		0.5 m/s with cam at 30°		0.5 m/s with cam at 30°		0.5 m/s		
Actuating force		8 N (25 N ➔)		6 N (25 N ➔)		6 N (25 N ➔)		8 N (25 N ➔)		
Travel diagrams		page 230 - group 1		page 230 - group 2		page 230 - group 2		page 230 - group 1		

Contact type:
R = snap action
L = slow action

Category		Contact block	External gasket		Ball, Ø 12.7 mm, stainless steel		External gasket			
3D	2	R	FL 215-M2-EX4	2x(1NO-1NC)	FL 216-M2-EX4	2x(1NO-1NC)	FL 219-M2-EX4	2x(1NO-1NC)	FL 220-M2-EX4	2x(1NO-1NC)
	5	R	FL 515-M2-EX4	➔ 1NO+1NC	FL 516-M2-EX4	➔ 1NO+1NC	FL 519-M2-EX4	➔ 1NO+1NC	FL 520-M2-EX4	1NO+1NC
	6	L	FL 615-M2-EX4	➔ 1NO+1NC	FL 616-M2-EX4	➔ 1NO+1NC	FL 619-M2-EX4	➔ 1NO+1NC	/	/
	20	L	FL 2015-M2-EX4	➔ 1NO+2NC	FL 2016-M2-EX4	➔ 1NO+2NC	FL 2019-M2-EX4	➔ 1NO+2NC	FL 2020-M2-EX4	1NO+2NC
2G M2	5	R	FL 515-M2-EX7	➔ 1NO+1NC	FL 516-M2-EX7	➔ 1NO+1NC	FL 519-M2-EX7	➔ 1NO+1NC	FL 520-M2-EX7	1NO+1NC
	20	L	FL 2015-M2-EX7	➔ 1NO+2NC	FL 2016-M2-EX7	➔ 1NO+2NC	FL 2019-M2-EX7	➔ 1NO+2NC	FL 2020-M2-EX7	1NO+2NC
2D	5	R	/	/	FL 516-M2-EX8	➔ 1NO+1NC	FL 519-M2-EX8	➔ 1NO+1NC	/	/
	20	L	/	/	FL 2016-M2-EX8	➔ 1NO+2NC	FL 2019-M2-EX8	➔ 1NO+2NC	/	/
Max. speed			0.5 m/s with cam at 30°		0.5 m/s with cam at 30°		0.5 m/s		1 m/s	
Actuating force			11 N (25 N ➔)		8 N (25 N ➔)		8 N (25 N ➔)		0.09 Nm	
Travel diagrams			page 230 - group 1		page 230 - group 1		page 230 - group 1		page 230 - group 3	

Contact type:
R = snap action
L = slow action

		Contact type:		External gasket		Bistable		Rope switch for signalling	
		R = snap action L = slow action							
Category	Contact block								
3D	2	R	FL 221-M2-EX4	2x(1NO-1NC)	FL 225-M2-EX4	2x(1NO-1NC)	/	FL 276-M2-EX4	2x(1NO-1NC)
	5	R	FL 521-M2-EX4	1NO+1NC	FL 525-M2-EX4	1NO+1NC	FL 541-M2-EX4	FL 576-M2-EX4	1NO+1NC
	6	L	/	/	/	/	/	FL 676-M2-EX4	1NO+1NC
	20	L	FL 2021-M2-EX4	1NO+2NC	FL 2025-M2-EX4	1NO+2NC	/	FL 2076-M2-EX4	2NO+1NC
2G M2	5	R	FL 521-M2-EX7	1NO+1NC	FL 525-M2-EX7	1NO+1NC	FL 541-M2-EX7	FL 576-M2-EX7	1NO+1NC
	20	L	FL 2021-M2-EX7	1NO+2NC	FL 2025-M2-EX7	1NO+2NC	/	FL 2076-M2-EX7	2NO+1NC
2D	5	R	/	/	/	/	FL 541-M2-EX8	FL 576-M2-EX8	1NO+1NC
	20	L	/	/	/	/	/	FL 2076-M2-EX8	2NO+1NC
Max. speed		1 m/s		1 m/s		0.5 m/s with cam at 30°		0.5 m/s	
Actuating force		0.08 Nm		0.14 Nm		0.21 Nm (0.36 Nm)		initial 20 N - final 40 N	
Travel diagrams		page 230 - group 3		page 230 - group 3		page 230 - group 4		page 230 - group 6	

All values in the drawings are in mm

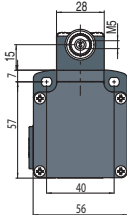
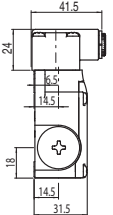
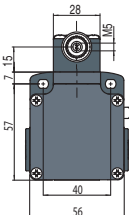
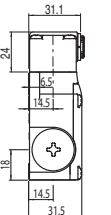
Accessories See page 207

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

Position switches with swivelling lever without actuator

Contact type:

R = snap action
L = slow action

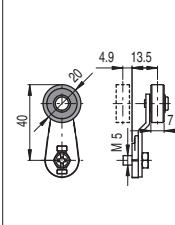
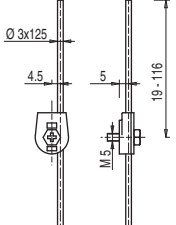
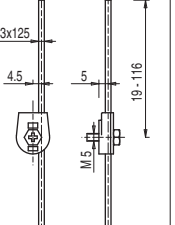
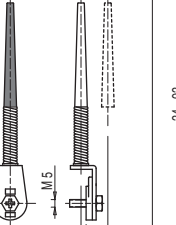
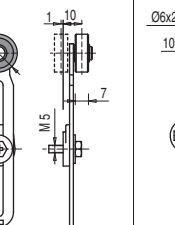
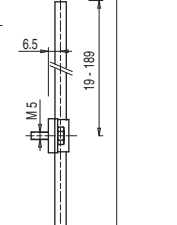
Category	Contact block	Regular head		Compact head	
					
3D	2 R	FL 238-M2-EX4	2x(1NO-1NC)	FL 258-M2-EX4	2x(1NO-1NC)
	5 R	FL 538-M2-EX4	1NO+1NC	FL 558-M2-EX4	1NO+1NC
	6 L	FL 638-M2-EX4	1NO+1NC	FL 658-M2-EX4	1NO+1NC
	20 L	FL 2038-M2-EX4	1NO+2NC	FL 2058-M2-EX4	1NO+2NC
2G M2	5 R	FL 538-M2-EX7	1NO+1NC	FL 558-M2-EX7	1NO+1NC
	20 L	FL 2038-M2-EX7	1NO+2NC	FL 2058-M2-EX7	1NO+2NC
2D	5 R	FL 538-M2-EX8	1NO+1NC	FL 558-M2-EX8	1NO+1NC
	20 L	FL 2038-M2-EX8	1NO+2NC	FL 2058-M2-EX8	1NO+2NC
Actuating force		0.1 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 230 - group 4		page 230 - group 4	

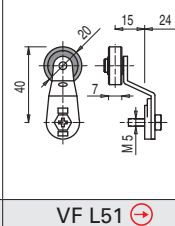
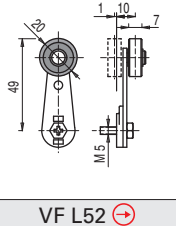
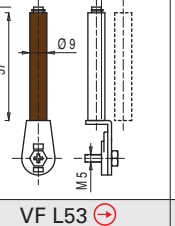
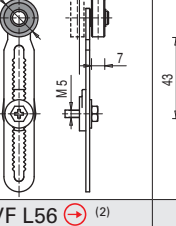
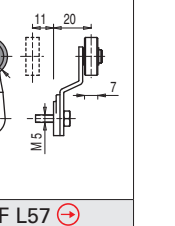
IMPORTANT

For safety applications: join only switches and actuators marked with symbol  next to the product code. For more information about safety applications see details on page 225.

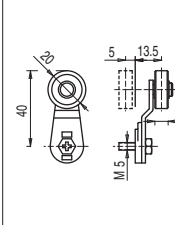
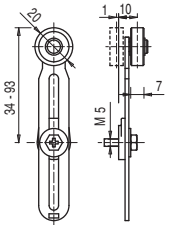
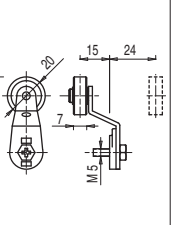
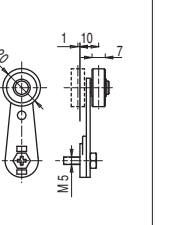
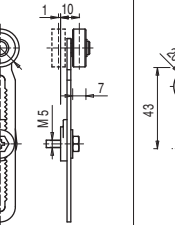
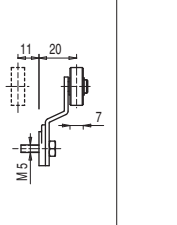
Separate actuators

IMPORTANT: These separate actuators can be used only with items of the FL series.

	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Spring rod with plastic tip	Adjustable actuator with techno- polymer roller	Adjustable glass fibre rod
						
Article	VF L31	VF L32 (2)	VF L33 (2)	VF L34	VF L35 (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s	1.5 m/s	1 m/s	1.5 m/s (cam at 30°)	1.5 m/s

	Technopolymer roller Ø 20 mm	Technopolymer roller Ø 20 mm	Porcelain roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller Ø 20 mm
					
Article	VF L51	VF L52	VF L53	VF L56 (2)	VF L57
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	0.5 m/s	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)

Steel rollers, Ø 20 mm, with self-lubrication

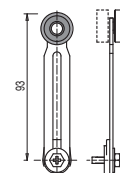
						
Article	VF L31-R24	VF L35-R24 (1) (2)	VF L51-R24	VF L52-R24	VF L56-R24 (2)	VF L57-R24
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)

Note: To order with 316L stainless steel roller: replace R24 with R41 in the order numbers.

- (1) Lever VF L35 can only be used in safety applications if adjusted to its max. length, as shown in the figure to the right.

If an adjustable lever is required for safety applications, use the VF L56 adjustable safety lever.

- (2) If installed with switch FL •58-M2-EX (e.g. FL 558-M2-EX•, FL 658-M2-EX•...) the actuator may hit the housing of the switch upon actuation. This possible interference depends on the fixing position of actuator and switch head.



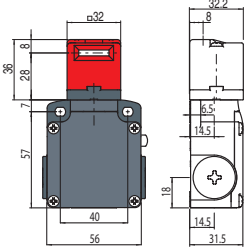
All values in the drawings are in mm

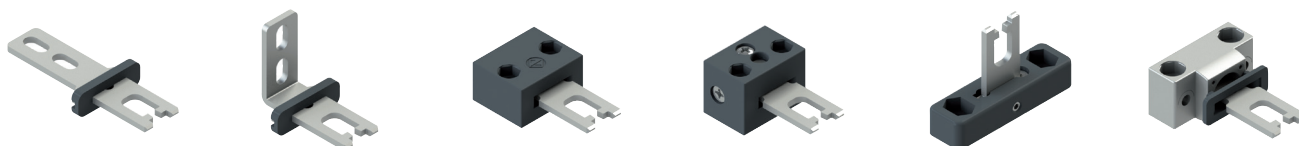
Accessories See page 207

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

Safety switches with separate actuator

Contact type:
 = slow action

Category	Contact block	Switches with separate actuator	
		Switch without actuator	
			
3D	6 	FL 693-M2-EX4	1NO+1NC
	20 	FL 2093-M2-EX4	1NO+2NC
2G M2	20 	FL 2093-M2-EX7	1NO+2NC
2D	20 	FL 2093-M2-EX8	1NO+2NC
Actuating force		10 N (18 N )	
Travel diagrams		see General Catalogue Safety 2023-2024	

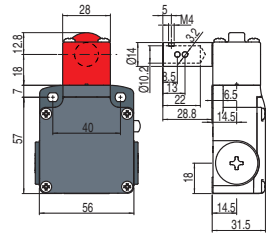
Actuators

VF KEYF	VF KEYF1	VF KEYF2	VF KEYF3	VF KEYF7	VF KEYF8
Straight actuator	Angled actuator	Swivelling actuator	Actuator adjustable in two directions	Actuator adjustable in one direction	Universal actuator

IMPORTANT: These actuators can be used only with items of the FL series (e.g. FL 2093-M2-EX7).
 Actuators with low level of coding acc. to EN ISO 14119.

Safety switches for hinges

Contact type:
 = slow action

Category	Contact block	Switches with separate actuator	
		Switch without actuator	
			
3D	18 	FL 1895-M2-EX4	1NO+1NC
	20 	FL 2095-M2-EX4	1NO+2NC
2G M2	20 	FL 2095-M2-EX7	1NO+2NC
2D	20 	FL 2095-M2-EX8	1NO+2NC
Actuating force		0,15 Nm (0,4 Nm )	
Travel diagrams		see General Catalogue Safety 2023-2024	

Safety rope switches with reset for emergency stops

Contact type:

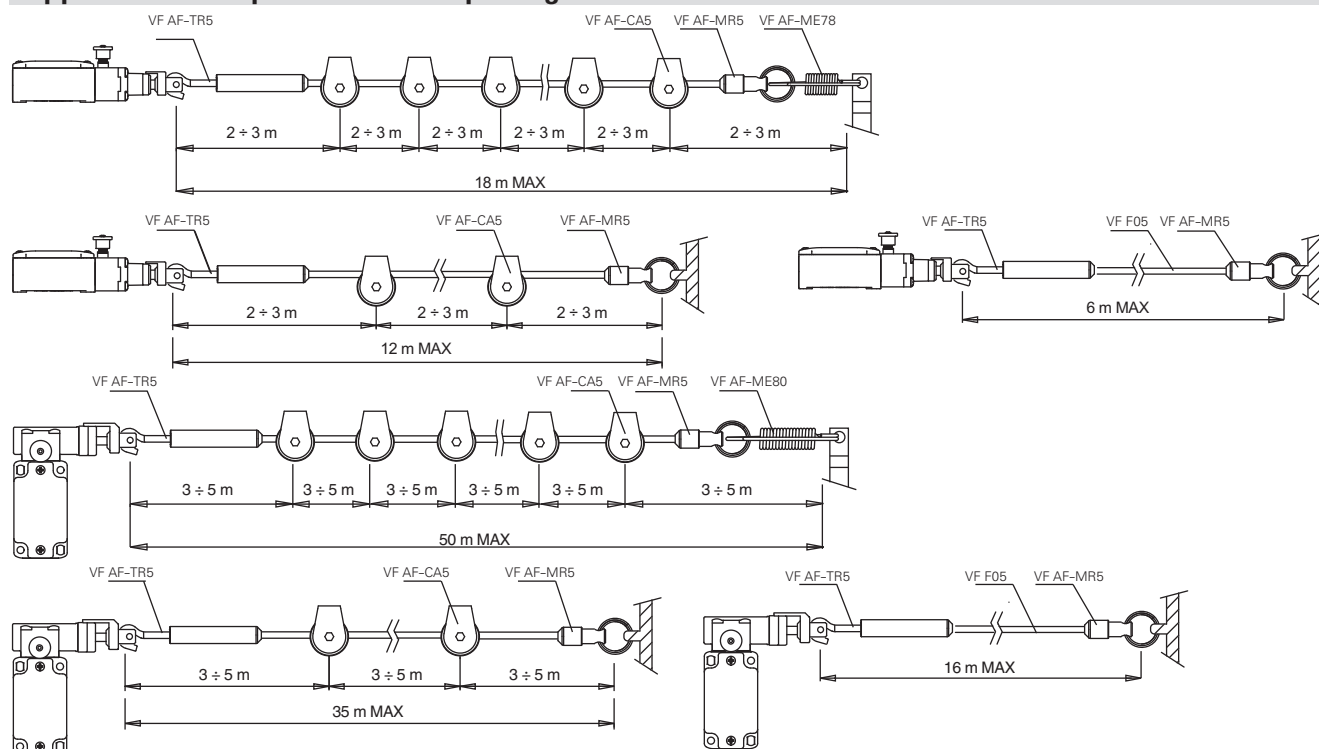
L = slow action

Category	Contact block				
3D	18 L	FL 1878-M2-EX4	1NO+1NC	FL 1883-M2-EX4	1NO+1NC
	20 L	FL 2078-M2-EX4	1NO+2NC	FL 2083-M2-EX4	1NO+2NC
2G M2	20 L	FL 2078-M2-EX7	1NO+2NC	FL 2083-M2-EX7	1NO+2NC
				FL 2084-M2-EX7	1NO+2NC
2D	18 L	FL 1878-M2-EX8	1NO+1NC	FL 1883-M2-EX8	1NO+1NC
	20 L	FL 2078-M2-EX8	1NO+2NC	FL 2083-M2-EX8	1NO+2NC
Actuating force		initial 63 N ... final 83 N (90 N $\rightarrow$)		initial 147 N ... final 235 N (250 N $\rightarrow$)	
Travel diagrams		see General Catalogue Safety 2023-2024		see General Catalogue Safety 2023-2024	

Accessories for rope installation

VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR11	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal heads	Safety spring for transversal heads	Rope coil Ø 5 mm length 100 m	Rope function indicator.	Stainless steel pulley	Angular pulley, stainless steel

Application examples and max. rope length



All values in the drawings are in mm

Accessories See page 207

$\rightarrow$ The 2D and 3D files are available at www.pizzato.com



Main features

- ATEX approval
- Metal housing, one conduit entry
- Protection degree IP67
- Versions with gold-plated silver contacts

ATEX markings:

Product code extension

Quality mark

Certificate type and notified body

-EX7EU type examination certificate
TUV Italia

Technical data

Housing

Metal housing, powder-coated

One threaded conduit entry:

M20x1.5

Protection degree:

IP67 acc. to EN 60529 (with cable gland of equal or higher protection degree)

General data

Ambient temperature:

-20°C ... +60°C

Max. actuation frequency:

3600 operating cycles/hour

Mechanical endurance:

FM ••••-EX•

10 million operating cycles

FM ••C•-EX•, FM ••96-EX•

500,000 operating cycles

Mounting position:

any

Safety parameters B_{10D} (NC contacts):

FM ••••-EX•

20,000,000

FM ••C•-EX•

1,000,000

FM ••96-EX•

2,500,000

Mechanical interlock, not coded:

type 1 acc. to EN ISO 14119

Tightening torques for installation:

see page 231

Wire cross-sections and

wire stripping lengths:

see page 249

Contact blocks available:

5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 28, 29, 30, 33, 34, 37, 66, 67

In compliance with standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, EN 50047, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA C22.2 No. 14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11, EN IEC 63000.

Compliance with the requirements of:

ATEX Directive 2014/34/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

Positive contact opening in conformity with standards:

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

Installation for safety applications:

Use only switches marked with the  symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications and **EN ISO 13849-2 tables D3** (well-tried components) and **D.8** (fault exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 232. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

 **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given in the registration certificate, in the operating manual and on pages 227 to 242.**

 **For the correct use of the switch, please use appropriate cable glands suitable for the zone in compliance with the ATEX directive, see Accessories on page 183.**

Product code extension	Category	Zone	EPL	Approvals	 This switch type must be used only in intrinsic safety circuits in compliance with standard IEC 60079-11, EN 60079-11
	2G M2	1 M2	Gb Mb	II 2G Ex ia IIC T6 Gb I M2 Ex ia I Mb	
-EX7	Electrical data Maximum current (Ii): Maximum voltage (Ui): Conditional short circuit current: Protection against short circuits: Pollution degree:				2.5 A 30 Vdc 1000 A acc. to EN 60947-5-1 type gG fuse 4 A 250 V 3

Quality marks of the product



UL approval: E131787
EAC approval: RU C-IT.YT03.B.00035/19

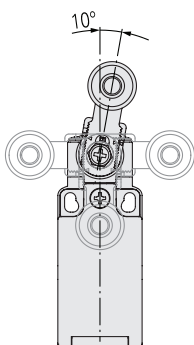
Features approved by UL

Electrical Ratings: Q300 pilot duty (69 VA, 125-250 V dc)
A600 pilot duty (720 VA, 120-600 V ac)
Environmental Ratings: Types 1, 4X, 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 14 AWG. Tightening torque for terminal screws of 12 lb in (1.4 Nm).

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

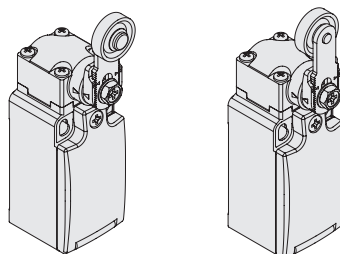
Adjustable levers

For these switches the lever can be adjusted in 10° steps over the entire 360° range. The positive movement transmission is always guaranteed thanks to the particular geometrical coupling between the lever and the revolving shaft as prescribed for safety applications by the German standard BG-GS-ET-15.



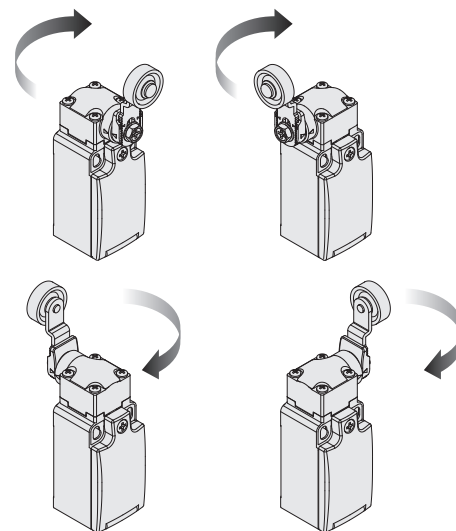
Reversible levers

With these switches, the lever can be secured in either the normal or reverse position, whereby positive coupling is retained. In this way two different working planes of the lever are possible.



Head with variable orientation

For all switches the head can be rotated in 90° steps.



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 product code extension
FM 502-GM2-EX7

Housing

FM metal, one conduit entry

Contact block

5 1NO+1NC, snap action
11 2NC, snap action
12 2NO, snap action
20 1NO+2NC, slow action
21 3NC, slow action
22 2NO+1NC, slow action

Actuators

01 short plunger
02 roller lever
... ..

ATEX approval

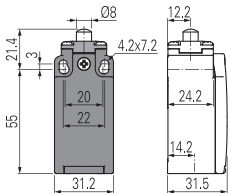
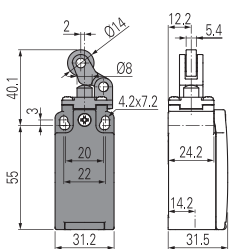
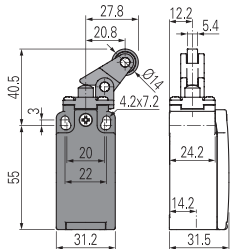
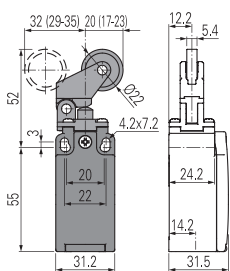
-EX7 II 2G Ex ia IIC T6 Gb
 I M2 Ex ia I Mb

Contact type

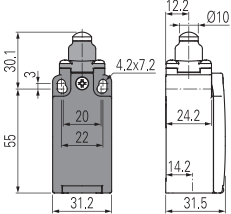
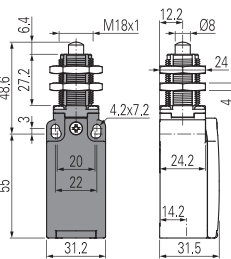
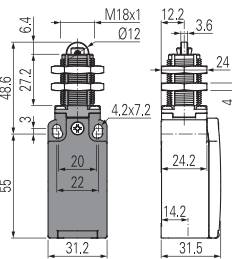
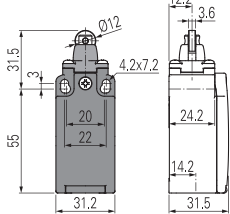
silver contacts (standard)
G silver contacts, 1 µm gold coating
G1 silver contacts, 2.5 µm gold coating (not for contact block 20, 21, 22, 28, 29, 30, 33, 34)

Contact type:

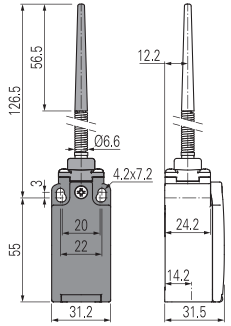
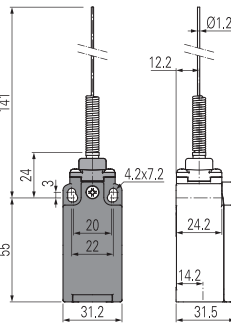
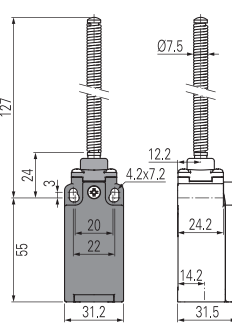
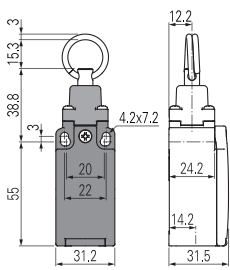
R = snap action
L = slow action

Category	Contact block				
					
2G	5	R FM 501-M2-EX7 → 1NO+1NC	FM 502-M2-EX7 → 1NO+1NC	FM 505-M2-EX7 → 1NO+1NC	FM 507-M2-EX7 → 1NO+1NC
M2	20	L FM 2001-M2-EX7 → 1NO+2NC	FM 2002-M2-EX7 → 1NO+2NC	FM 2005-M2-EX7 → 1NO+2NC	FM 2007-M2-EX7 → 1NO+2NC
Max. speed		0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	4 N (25 N →)
Travel diagrams		page 232 - group 1	page 232 - group 2	page 232 - group 2	page 232 - group 3

Contact type:
R = snap action
L = slow action

Category	Contact block				
					
2G	5	R FM 508-M2-EX7 → 1NO+1NC	FM 512-M2-EX7 → 1NO+1NC	FM 513-M2-EX7 → 1NO+1NC	FM 515-M2R28-EX7 → 1NO+1NC
M2	20	L FM 2008-M2-EX7 → 1NO+2NC	FM 2012-M2-EX7 → 1NO+2NC	FM 2013-M2-EX7 → 1NO+2NC	FM 2015-M2R28-EX7 → 1NO+2NC
Max. speed		0.5 m/s	0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°
Actuating force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	8 N (25 N →)
Travel diagrams		page 232 - group 1	page 232 - group 1	page 232 - group 1	page 232 - group 1

Contact type:
R = snap action
L = slow action

Category	Contact block				
					
2G	5	R FM 520-M2-EX7 → 1NO+1NC	FM 521-M2-EX7 → 1NO+1NC	FM 525-M2-EX7 → 1NO+1NC	FM 576-M2-EX7 → 1NO+1NC
M2	20	L FM 2020-M2-EX7 → 1NO+2NC	FM 2021-M2-EX7 → 1NO+2NC	FM 2025-M2-EX7 → 1NO+2NC	FM 2076-M2-EX7 → 2NO+1NC
Max. speed		1 m/s	1 m/s	1 m/s	0.5 m/s
Actuating force		0.06 Nm	0.04 Nm	0.11 Nm	initial 20 N - final 40 N
Travel diagrams		page 232 - group 4	page 232 - group 4	page 232 - group 4	page 232 - group 7

All values in the drawings are in mm

Accessories See page 207

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

Position switches with swivelling lever without actuator

Contact type:

R = snap action
L = slow action

Category	Contact block	
2G M2	5 20	
Actuating force		0.06 Nm (0.25 Nm)
Travel diagrams		page 232 - group 5

IMPORTANT

For safety applications: join only switches and actuators marked with symbol next to the product code.

For more information about safety applications see details on page 225.

Separate actuators

IMPORTANT: These separate actuators can be used only with items of the FM series.

	Technopolymer roller Ø 18 mm	Technopolymer roller Ø 18 mm	Adjustable square rod, 3x3x125 mm	Adjustable round rod Ø 3x125 mm	Spring rod with plastic tip	Technopolymer roller Ø 20 mm
Article	VN A00KA	VN A00KB	VN A00LB	VN A00LE	VN A00LL	VN A00KE
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s (cam at 30°)

	Technopolymer roller Ø 20 mm	Porcelain roller	Technopolymer roller Ø 20 mm	Adjustable safety actuator with technopolymer roller	Technopolymer roller Ø 20 mm	Adjustable glass fibre rod
Article	VN A00KF	VN A00LP (2)	VN A00KG	VN A00KP	VN A00KH	VN A00LH
Max. speed	1.5 m/s (cam at 30°)	0,5 ms	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s

Steel rollers, Ø 20 mm, with self-lubrication

VN A00KB-R24	VN A00KE-R24	VN A00KF-R24	VN A00KG-R24	VN A00KH-R24	VN A00KP-R24

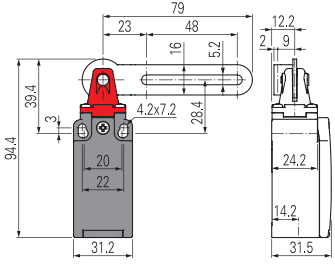
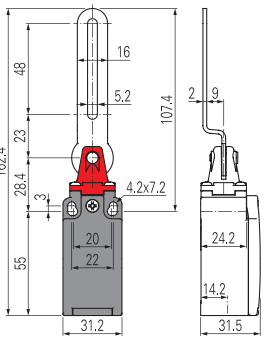
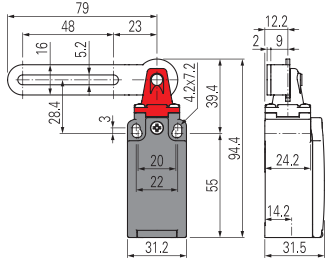
Note: To order with 316L stainless steel roller: replace R24 with R41 in the order numbers.

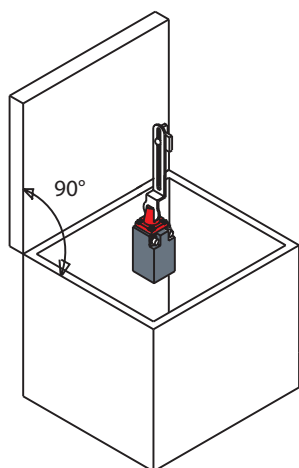
Note: To check the correspondence with previous lever codes, please consult the table "Changed article codes" on page 289. Example: VF LE30 -> VN A00KA.

Safety switches with slotted hole lever

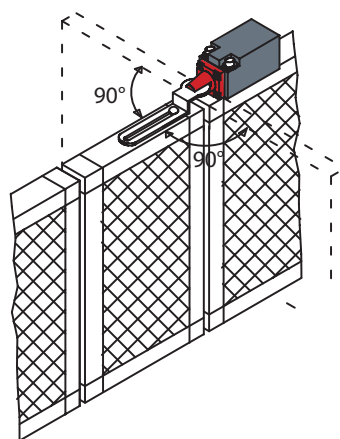
Contact type:

 = slow action

Category	Contact block		
2G M2	20		
		FM 20C1-M2-EX7  1NO+2NC	FM 20C2-M2-EX7  1NO+2NC
Actuating force		11 N (15 N )	11 N (15 N )
Travel diagrams		page 234 - group 10	page 234 - group 11
			
		FM 20C3-M2-EX7  1NO+2NC	
		11 N (15 N )	
		page 234 - group 10	

Application examples

Safety switch with slot-
ted hole lever, mounting
inside the safety guard

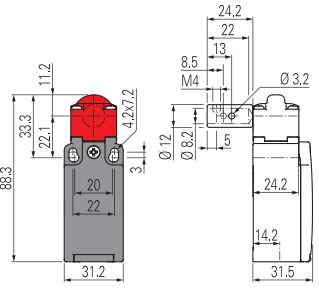


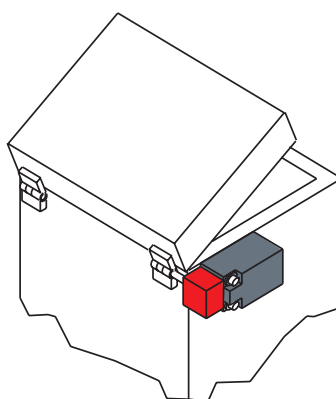
Safety switch with slot-
ted hole lever, mounting
on doors with a pivoting
range of 180°

Safety switches for hinges

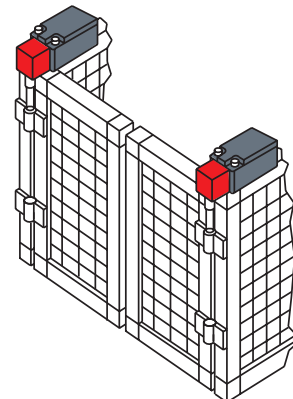
Contact type:

 = slow action

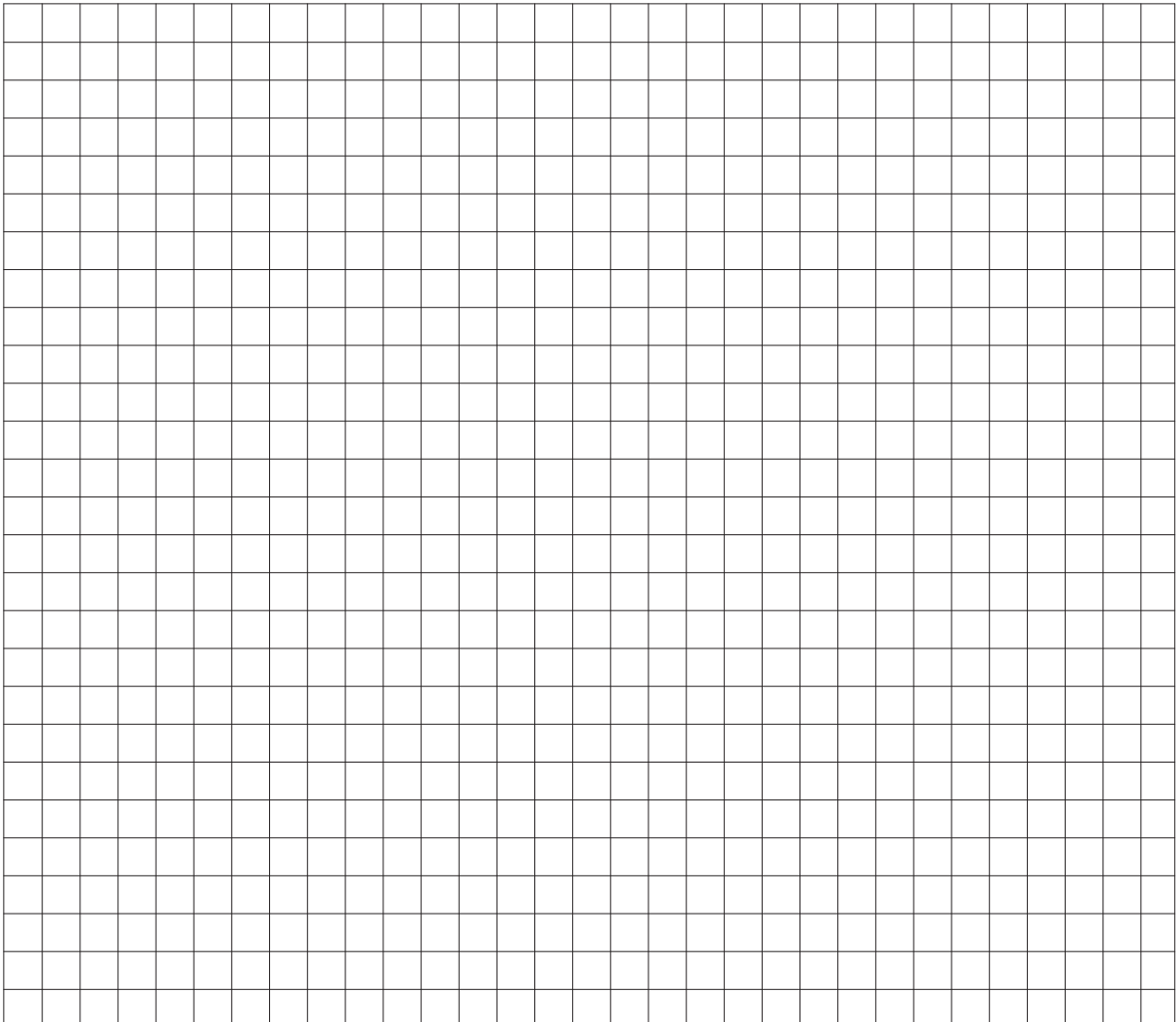
Category	Contact block	
2G M2	20	
		FM 2096-M2-EX7  1NO+2NC
Actuating force		0,15 Nm (0,4 Nm )
Travel diagrams		page 234 - group 9

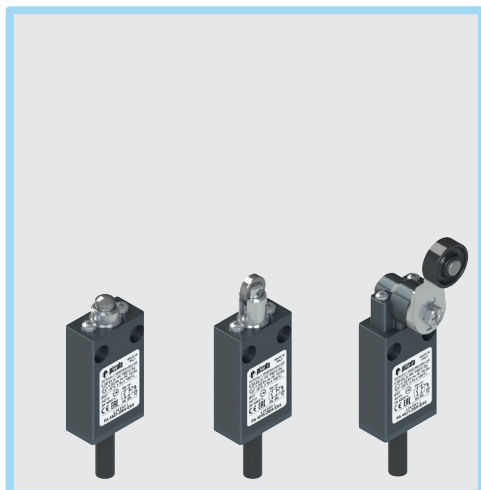
Application examples

Safety switch for hinges, mounting
outside the safety guard



Safety switches for hinges, mount-
ing on double door

[illegible]



Technical data

Housing

Metal housing, powder-coated
With cable in halogen-free polyurethane, 2 m, other lengths on request
Protection degree acc. to EN 60529: IP67

General data

Ambient temperature: -20°C ... +60°C
Max. actuation frequency: 3600 operating cycles/hour
Mechanical endurance: 10 million operating cycles
Mounting position: any
Safety parameters B_{10D} (NC contacts): 20,000,000
Mechanical interlock, not coded: type 1 acc. to EN ISO 14119
Tightening torques for installation: see page 237

Main features

- ATEX approval
- Metal housing
- Protection degree IP67
- Cable, halogen-free polyurethane

In compliance 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 C22.2 No. 14, IEC 60079-0, EN 60079-0, IEC 60079-31, EN 60079-31, IEC 60079-15, EN 60079-15, EN IEC 63000.

ATEX markings:

Product code extension
Quality mark

Certificate type and notified body

-EX5



EU declaration of conformity
Pizzato Elettrica S.r.l.

Compliance with the requirements of:

ATEX Directive 2014/34/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.

Positive contact opening in conformity with standards:

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

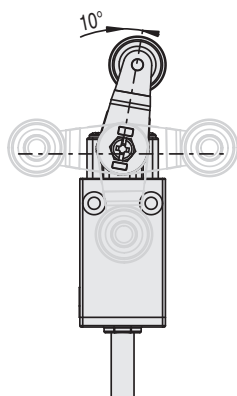
Installation for safety applications:

Use only switches marked with the  symbol beside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "Internal wiring") as required by **EN ISO 14119, paragraph 5.4** for specific interlock applications and **EN ISO 13849-2 tables D3** (well-trying components) and **D.8** (fault exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

 **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given in the operating manual and on pages 227 to 242.**

Product code extension	Category	Zone	EPL	Approvals	
	3D	22	Dc		II 3D Ex tc IIIC T80°C Dc
	3G	2	Gc		II 3G Ex nC IICT6 Gc
-EX5	Electrical data				
	Thermal current (I _m):			10 A	
	Rated insulation voltage (U _i):			400 Vac/dc	
	Conditional short circuit current:			1000 A acc. to EN 60947-5-1	
	Protection against short circuits:			type aM fuse 10 A 500 V	
	Pollution degree:			3	
	Utilization category				
	Alternating current: AC15 (50÷60 Hz)				
	U _e (V)		120	250	400
	I _e (A)		6	4	3
	Direct current: DC13				
	U _e (V)		24	125	250
	I _e (A)		2.5	0.55	0.27

Adjustable levers

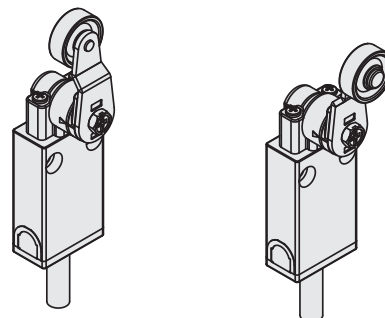


For these switches the lever can be adjusted in 10° steps over the entire 360° range. The positive movement transmission is always guaranteed thanks to the particular geometrical coupling between the lever and the revolving shaft as prescribed for safety applications by the German standard BG-GS-ET-15.

Reversible levers

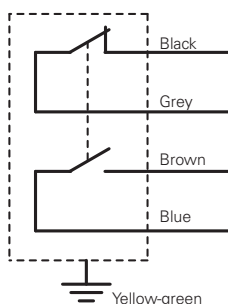
With these switches, the lever can be secured in either the normal or reverse position, whereby positive coupling is retained.

In this way two different working planes of the lever are possible.



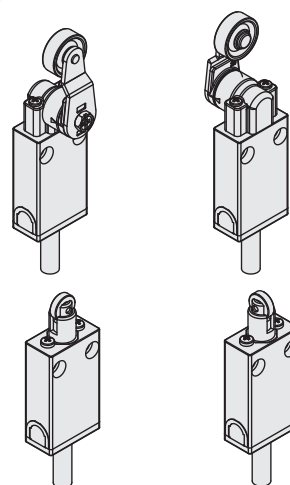
Internal wiring

1NO+1NC



Head with variable orientation

Depending on the model, it is possible to rotate the head in 90° or 180° steps.

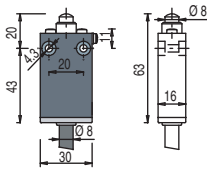
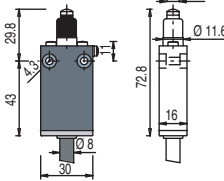
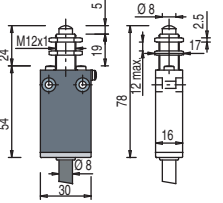


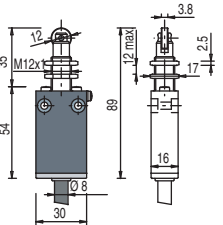
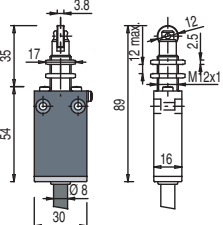
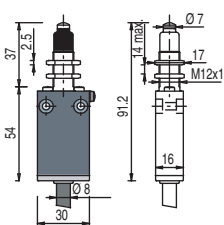
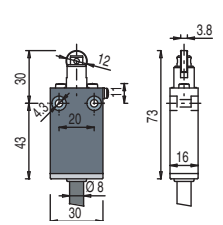
Code structure

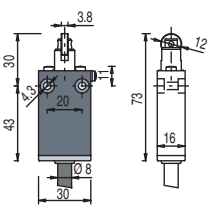
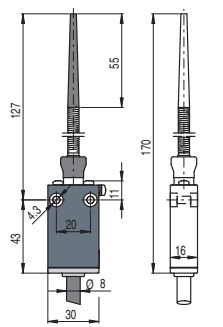
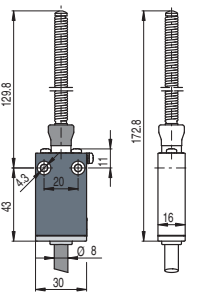
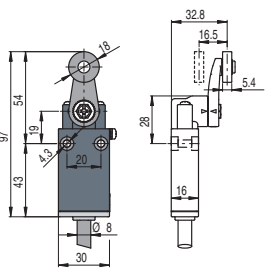
Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article		options	product code extension
FA 4501-2SHG-EX5			
Housing			ATEX approval
FA	metal		-EX5 II 3D Ex tc IIIC T80°C Dc
Contact block			II 3G Ex nC IICT6 Gc
45	1NO+1NC, snap action		Contact type
46	1NO+1NC, slow action		silver contacts (standard)
Actuators			G silver contacts, 1 µm gold coating
01	short plunger		Cable type
02	unidirectional lever		H PUR cable, halogen free
08	plunger		Output direction
...	...		S bottom output
Connection type			
1	cable, length: 1 m		
2	cable length: 2 m		
...	...		
0	cable, length: 10 m		

Other lengths on request.

		Unidirectional operation		External gasket	Secured only by means of threaded head
Contact type: R = snap action L = slow action					
Category	Contact block				
3D	45 R	FA 4501-2SH-EX5  1NO+1NC		FA 4508-2SH-EX5  1NO+1NC	FA 4510-2SH-EX5  1NO+1NC
3G	46 L	FA 4601-2SH-EX5  1NO+1NC		FA 4608-2SH-EX5  1NO+1NC	FA 4610-2SH-EX5  1NO+1NC
Max. speed		0.5 m/s		0.5 m/s	0.5 m/s
Actuating force		10 N (25 N )		10 N (25 N )	10 N (25 N )
Travel diagrams		page 238 - group 1		page 238 - group 1	page 238 - group 1

		Secured only by means of threaded head	Secured only by means of threaded head	External gasket	Steel roller, Ø 12 mm, with self-lubrication
Contact type: R = snap action L = slow action					
Category	Contact block				
3D	45 R	FA 4511-2SH-EX5  1NO+1NC	FA 4512-2SH-EX5  1NO+1NC	FA 4513-2SH-EX5  1NO+1NC	FA 4515-2SH-EX5  1NO+1NC
3G	46 L	FA 4611-2SH-EX5  1NO+1NC	FA 4612-2SH-EX5  1NO+1NC	FA 4613-2SH-EX5  1NO+1NC	FA 4615-2SH-EX5  1NO+1NC
Max. speed		0.1 m/s with cam at 30°	0.1 m/s with cam at 30°	0.5 m/s	0.1 m/s with cam at 30°
Actuating force		10 N (25 N )	10 N (25 N )	10 N (25 N )	10 N (25 N )
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 1

		Steel roller, Ø 12 mm, with self-lubrication	External gasket	External gasket	With Ø 20 mm steel roller with self-lubrication on request
Contact type: R = snap action L = slow action					
Category	Contact block				
3D	45 R	FA 4517-2SH-EX5  1NO+1NC	FA 4520-2SH-EX5 1NO+1NC	FA 4525-2SH-EX5 1NO+1NC	FA 4530-2SH-EX5  1NO+1NC
3G	46 L	FA 4617-2SH-EX5  1NO+1NC	/	/	FA 4630-2SH-EX5  1NO+1NC
Max. speed		0.1 m/s with cam at 30°	1 m/s	1 m/s	1.5 m/s with cam at 30°
Actuating force		10 N (25 N )	0.03 Nm	0.06 Nm	0.03 Nm (25 N )
Travel diagrams		page 238 - group 1	page 238 - group 3	page 238 - group 3	page 238 - group 4

Contact type:		with steel roller with self-lubrication on request		Square rod, 3x3 mm		with steel roller with self-lubrication on request	
R L = snap action = slow action							
Category	Contact block						
3D	45	R	FA 4531-2SH-EX5	1NO+1NC	FA 4533-2SH-EX5	1NO+1NC	FA 4534-2SH-EX5
3G	46	L	FA 4631-2SH-EX5	1NO+1NC	FA 4633-2SH-EX5	1NO+1NC	FA 4634-2SH-EX5
Max. speed		1.5 m/s with cam at 30°		1.5 m/s		1.5 m/s	
Actuating force		0.03 Nm (0.25 Nm →)		0.03 Nm		0.03 Nm	
Travel diagrams		page 238 - group 4		page 238 - group 4		page 238 - group 4	

Category		Contact block	Stainless steel round rod, Ø 3 mm, with self-lubrication		With steel roller with self-lubrication on request		With steel roller with self-lubrication on request		With steel roller with self-lubrication on request	
3D 3G	45	R	FA 4550-2SH-EX5	1NO+1NC	FA 4551-2SH-EX5	➡ 1NO+1NC	FA 4552-2SH-EX5	➡ 1NO+1NC	FA 4554-2SH-EX5	➡ 1NO+1NC
	46	L	FA 4650-2SH-EX5	1NO+1NC	FA 4651-2SH-EX5	➡ 1NO+1NC	FA 4652-2SH-EX5	➡ 1NO+1NC	FA 4654-2SH-EX5	➡ 1NO+1NC
Max. speed		1.5 m/s		1.5 m/s with cam at 30°		1.5 m/s with cam at 30°		1.5 m/s with cam at 30°		
Actuating force		0.03 Nm		0.03 Nm (0.25 Nm ➡)		0.03 Nm (0.25 Nm ➡)		0.03 Nm (0.25 Nm ➡)		
Travel diagrams		page 238 - group 4		page 238 - group 4		page 238 - group 4		page 238 - group 4		

Category		Contact block	With steel roller with self-lubrication on request		With steel roller with self-lubrication on request		With steel roller with self-lubrication on request		Glass fibre rod	
3D 3G	45	R	FA 4555-2SH-EX5	1NO+1NC	FA 4556-2SH-EX5	1NO+1NC	FA 4557-2SH-EX5	1NO+1NC	FA 4569-2SH-EX5	1NO+1NC
	46	L	FA 4655-2SH-EX5	1NO+1NC	FA 4656-2SH-EX5	1NO+1NC	FA 4657-2SH-EX5	1NO+1NC	FA 4669-2SH-EX5	1NO+1NC
Max. speed			1.5 m/s with cam at 30°		1.5 m/s with cam at 30°		1.5 m/s with cam at 30°		1.5 m/s	
Actuating force			0.03 Nm (0.25 Nm →)		0.03 Nm (0.25 Nm →)		0.03 Nm (0.25 Nm →)		0.03 Nm	
Travel diagrams			page 238 - group 4		page 238 - group 4		page 238 - group 4		page 238 - group 4	

(1) Positive opening only with actuator set to max.

Accessories**ATEX cable gland, technopolymer****Technical data:**

ATEX marking:

 II 2G Ex eb IIC Gb II 1D Ex ta IIIC Da

Body and ring material:

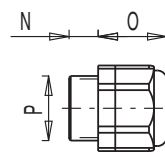
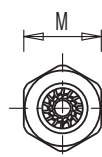
Plastic PA V0 acc. to UL 94

Ambient temperature:

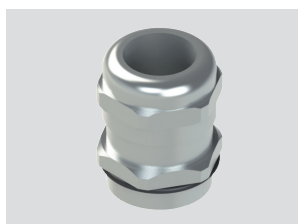
-20°C ... +85°C

Protection degree:

IP68 (≤ 10 bar)



Article	Description	ATEX certificate number	 M	N	O	P
VF PBM20C6P-2GD	M20x1.5 technopolymer cable gland for multipolar cables Ø 6.5 ... 12 mm	IECEX BVS 14.0020X BVS 14 ATEX E 025 X	24	9	24	M20x1.5

ATEX cable gland, metal**Technical data:**

ATEX marking:

 II 2G Ex e II II 1D Ex tD A20 IP68

Body and ring material:

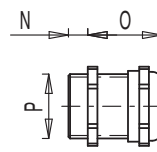
Nickel-plated brass

Ambient temperature:

-20°C ... +95°C

Protection degree:

IP68 (≤ 10 bar)



Article	Description	ATEX certificate number	 M	N	O	P
VF PBM20C6M-2GD	M20x1.5 brass cable gland for multipolar cables Ø 6 ... 12 mm	KEMA 99ATEX6971 X	24	9	24	M20x1.5

[illegible]This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin black lines. There are 20 columns and 20 rows of squares, creating a total area of 400 small squares. The grid covers the entire page, leaving no margins or other markings.